

THE ECONOMICS
OF THE SERVICE SECTOR
IN CANADA

Service Industry Growth

*Causes and
Effects*

*Herbert G. Grubel and
Michael A. Walker*



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Series Editors:
Herbert G. Grubel
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PART I

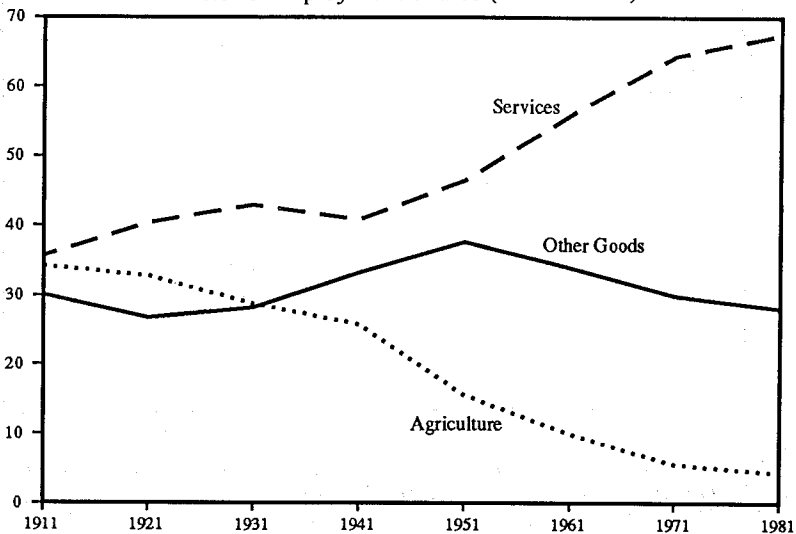
WHY STUDY SERVICES AND WHAT ARE THEY?

CHAPTER 1

WHY THE CONCERN OVER CANADA'S SERVICE INDUSTRIES?

This study of Canadian service industries has been motivated by widespread concern over the large size and seemingly continuous growth of the service sector. These facts are shown dramatically in two graphs. Drawing on data from decennial censuses, figure 1 shows that in 1911 the service, agricultural products, and other goods producing industries employed roughly equal proportions of the Canadian labour force.¹ Since then, the share of Canadians employed in agriculture has been declining continuously and levelled off in 1971 at about 5 percent.

Figure 1
Historic Employment Shares (Census Years)



Source: *Historical Statistics of Canada*, 2nd ed., Ottawa, Series 08-55, 1983.

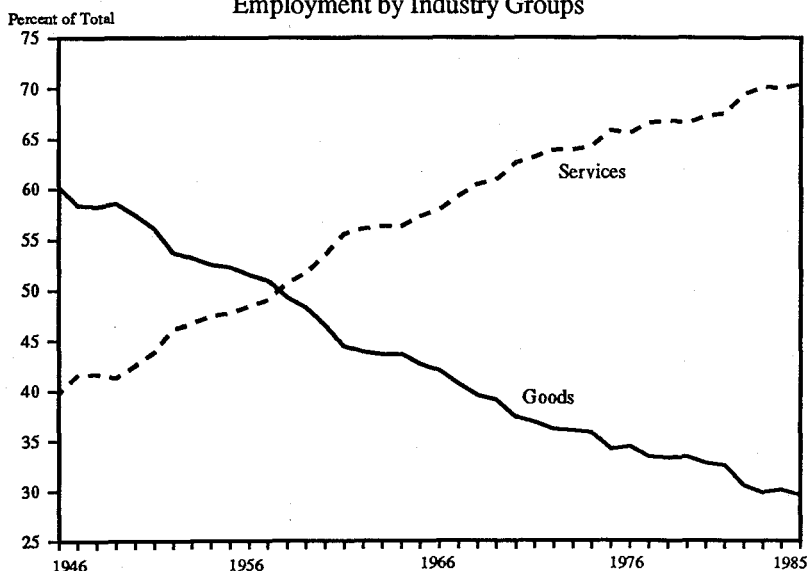
The share of employment in other goods producing industries, mainly manufacturing and mining, has risen since 1921. It reached a peak near 40 percent in 1951 and has been on a steady downward trend since. The share of Canadians employed in service producing industries, on the other hand, has been rising virtually without interruption during the 70 years under consideration. In 1981, fully 70 percent of Canadians produced services.

TRENDS IN THE SERVICE INDUSTRIES

Trends Since 1946

Figure 2 draws on annual data collected by Statistics Canada in the *Labour Force Survey* since the end of the second World War. It shows the trend towards service employment that has motivated this study even more dramatically. In 1946, the share of Canadian workers in service and goods producing industries was 40 and 60 percent, respectively. Since then, the share in the former has been rising and in the latter has been falling at nearly constant rates. By 1985, only 30 percent of all Canadian workers were employed in goods manufacturing and the rest in service production.²

Figure 2
Employment by Industry Groups



Source: Statistics Canada, *National Income and Expenditure Accounts, Volume 1, The Annual Estimates 1926-74*, catalogue 531, Occasional, 1976 for years up to 1971; *GDP by Industry*, catalogue 61-213, 1981 and 1986 for years after 1971.

Some Implications of These Trends

It is interesting to speculate about the future by assuming that these trends in employment will continue. A linear extrapolation of events in the last 40 years implies that by the year 2025 all Canadians will work in services. This outcome is regarded by some as economic armageddon.

The results of such a linear extrapolation are unlikely to be realized for a number of reasons. First, and at the most general level of reasoning, economic trends that produce otherwise costly and unacceptable consequences tend to set in motion forces that change the determinants of these trends. Often, these changes can be foreseen only dimly by observers, but history is full of extrapolative predictions of doom that failed to materialize as a result of unexpected developments. There have been periodic predictions of national or global overpopulation by authors from Malthus in the 17th century to John Ehrlich in the 1970s and many other authors in recent years. The demise of capitalism was predicted by Marx in the 19th century and by long lists of analysts since. The view that market economies have chronic tendencies to overproduction, underconsumption, and stagnation has periodically been replaced by equally strongly held views about the system's tendency for chronic inflation and material scarcities.

Second, and most important, the nature of services is much different from that underlying the analysis of the predictors of doom. One of the central findings of this study is that nearly all the real growth in the post-war years has been in producer or intermediate services which are embodied in increasing quantities in goods and services for final consumption or international trade. The growing use of intermediate service inputs is an integral part of the process of economic growth which is driven by increased capital deepening and specialization in the production process; especially as the growing stock of human and knowledge capital is introduced into the goods production process by individuals and firms considered to be part of the service sector.

Despite our belief that the growth of the service sector is unlikely to have dire consequences for the well-being of Canadians in the future, this chapter reviews a number of reasons that have been advanced for thinking these trends are undesirable and require the intervention of governments. However, before we do so, we note that in recent years the growth in employment by and large has been matched by the growth of output in the service producing industries in Canada. We will return to this topic in chapter 4 and show that in the post-war years there have been some differential rates of productivity growth in goods and service producing industries, which in turn have resulted in some divergence of growth rates in the output and employment in the two sectors. But these differences are small enough to be set aside in this introductory chapter in return for a significant

6 *Why Concern Over Canada's Service Industries*

simplification of the exposition and analysis. For this reason, the following discussion and data concern only trends in employment.

Usefulness of the Analysis

Our study contains information that can be useful to individuals, companies, and governments. Individual Canadians and the business sector will find an analysis of trends and developments that they should consider in planning their personal careers and the management of their economic affairs. Governments can use the information to design policies that facilitate, or at least do not impede, private sector adjustment to potentially costly developments.

More specifically and in a sense centrally, the study has some implications for traditional economic policies aimed at development and the equalization of incomes in Canada. These policies have historically attempted to encourage goods producing industries, mainly the construction of factories and the development of mines and other natural resource exploitation industries. Yet, as the statistics show, in recent years about 70 percent of Canadians joining the labour force have found employment in the service not the goods producing sector. Moreover, half of the service sector output and employment consists of producer services, the production and use of which has important implications for the productivity and international competitiveness of Canadian goods producing industries.

In hindsight, then, it appears as though government policies aimed at the encouragement of the goods producing sector may have been inefficient. There has been a relative encouragement of the goods sector and discouragement of the service producing sector. Subsidies paid to the goods sector either directly or in the form of tax preferences have, at least in part, been financed by a correspondingly higher tax burden on services. In addition, depreciation allowances are permitted for tax purposes on physical capital assets of corporations but not on the human and knowledge capital used proportionately more by most of the service industries.

These issues will be discussed at greater length in the concluding section of this study after development of the relevant conceptual models and empirical evidence. However, it is clear from the above that there are many important policy issues which may be perceived differently in light of a better understanding of the nature of the service sector industries.

Relevance to Some Other Concerns

A study of the service industries promises to be relevant to a number of other concerns of Canadians, largely because of trends that have been contemporaneous with the growth in the service sector. One of these is that un-

employment rates have fluctuated widely since the beginning of the century. But since the 1960s, after employment in services exceeded that in goods production, there has been a pronounced upward trend in average unemployment rates over each successive peak and trough in the business cycle.

Another concern is that since the 1970s the Canadian economy has gone through a noticeable decrease in the rate of growth of productivity and real output which is alleged to have coincided with some acceleration in the growth of the service industry sector. Additional concerns have been expressed about the social and economic implications of service sector growth for income distribution, regional disparities in development, international trade, education, and the welfare of women and others.

Plan of Analysis

In the remainder of this chapter we elaborate on these and other concerns. In the process we reflect the conventional wisdom found in popular writings and public beliefs shaped by them. In subsequent chapters we will return to these concerns. In doing so, we conclude that most of them are both more complex and less serious than is widely believed. We feel that, nevertheless, it is useful to articulate and document as carefully as possible the views of analysts who have been alarmed by the growth of service sector employment and output. Through this process we expect to set the stage for a more thorough appreciation of the different approaches and conclusions advanced in the core of this study.

ARE SERVICES UNPRODUCTIVE?

Informal discussions readily reveal that a large proportion of Canadians would rather work in goods producing industries than in service industries. Many Canadians also view as somehow superior the output of goods over that of services. For these reasons, there is a widespread general attitude which views growth of the Canadian service sector as undesirable.

The origins of this attitude are found in the early history of industrialization. At that time, when most people in the world lived at the edge of subsistence, only a few rich people could afford to hire personal servants. These servants produced the only type of services known, such as household, valet, and other personal services that made life easier for the well-to-do. The identification of service activities generally with these limited types of service production is still widespread today.

Producers of such personal services have traditionally ranked low in the occupational hierarchy since the work requires low skills, involves repetitive tasks, and can be demeaning. Monetary compensation has tended to be

low. It is therefore easy to see why an identification of service production generally with personal services leads to the view that it is not desirable.

Service Income is Unproductive and Derived

Philosophers and economists have strengthened this view by noting some important implications of such personal service employment. Workers in these occupations are not available for the production of food and other material necessities of life. They also do not manufacture goods that are traded internationally. Given the pre-occupation of classical economists with the processes that increased material well-being and moved people from the edge of subsistence, it is understandable that they considered service workers to be unproductive. The consumption of these workers was viewed as being derived from the output of goods producing workers. Service production was thus seen to cause a lowering of the standard of living of the community as a whole.

These views about the lack of economic and social productivity of service workers were expressed by Adam Smith and other classical economists. They permeate the attitudes of many people to this day. Karl Marx, writing in the tradition of these classical economists, also took this position on the value of services. His ideas have had great practical influence. They have resulted in the development of the national income accounting procedures known as the Material Product System. It is in use in the Soviet Union and other communist states. As the name implies, it attaches value only to material output.

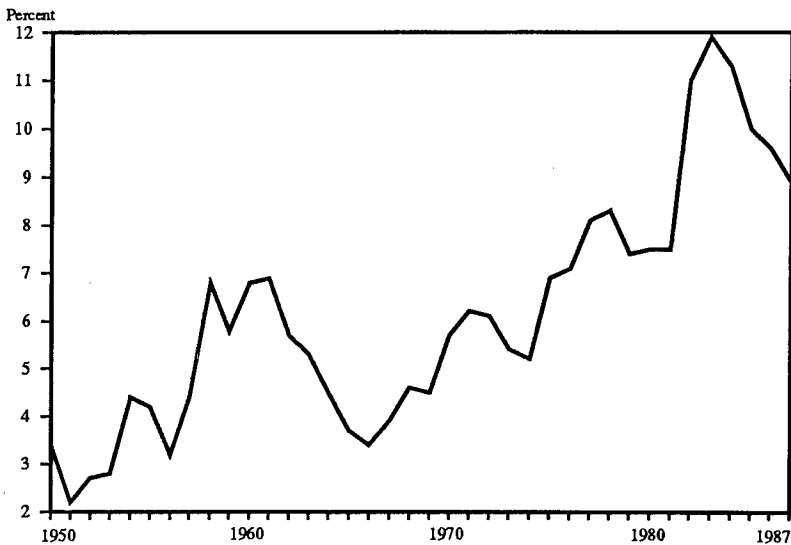
National income accounts in Western nations are kept according to the System of National Accounts, which was developed and is modified by an office of the United Nations. Under this system, the market value of service production is added to that of goods production to derive estimates of national income and production.³ Modern economic theory provides the rationale for this treatment of services on the grounds that the action of consumers who spend money on services rather than goods reveals that they value these services marginally higher than the goods. Spending on goods or services are equivalent providers of satisfaction and therefore of national income and production.

It is clear from the preceding that it is worthwhile to analyse in some depth these issues about the value of services. The greater the understanding of modern principles of accounting and valuation, the easier it will be for governments to enact policies that maximize economic growth and development.

DOES SERVICE SECTOR GROWTH CAUSE UNEMPLOYMENT AND LOW PRODUCTIVITY GROWTH?

Unemployment in Canada has always been cyclical, rising during recessions and falling during recoveries. This pattern also characterized the period 1961 to 1985, as can readily be seen from the unemployment rate data in figure 3. The data also show that superimposed on these cycles has been a strong upward trend in the unemployment rate. After a nadir of 3.4 percent in 1966, the peaks and troughs of each cycle have been higher than those before.

Figure 3
Unemployment Rates in Canada



Source: Economic Review, April 1984.

There are several explanations in the economics literature for this upward trend.⁴ The one most relevant for our analysis concerns the growth of the service sector. A comparison of figures 2 and 3 shows a striking similarity in the upward trend of both service sector employment and unemployment rates, at least since the 1960s.

Deindustrialization

The coincidence of these trends has been explained theoretically and documented empirically in several books and many professional articles which

have helped to popularize the concepts "deindustrialization" and "post-industrial society."⁵ This literature has also lent much support to arguments about the need for "industrial policies" to deal with the problems caused by deindustrialization.

Since these industrial policies can be implemented only with the help of a great deal of government planning and direction, all the ideas and empirical evidence found in this literature have potentially great implications for the future organization of Canadian and other Western economies. If the suggested industrial policies were adopted, it would mean that market processes and personal freedoms would have to be curtailed sharply, a reversal of more recent trends in policy attitudes.

The analysis linking the growth of unemployment and the service industries may be summarized as follows. There is a strong parallel between the growth and decline of agriculture, manufacturing, and services. Thus, from at least the 19th century, the accumulation of capital and technology raised the productivity of inputs into agriculture. This in turn led to higher output and lower prices for food and other agricultural products.

However, demand did not keep pace with increased productivity, primarily because the demand for food is income and price inelastic. The low income and price elasticities of demand simply reflect the fact that the biological needs of people for nutrition are limited and, once they are met, even large increases in income and reductions in relative prices do not induce large increases in consumption. As a result of these developments and characteristics of the demand for agricultural products, fewer and fewer people were needed in the agricultural sector.

The production and consumption of other goods, especially manufactured, has gone through an analogous cycle. Capital accumulation raised productivity and lowered prices of consumer goods. Until recently, demand for these goods was high enough to assure growing employment, but in recent years demand saturation has set in. As a result, income and price elasticities of demand for these products have dropped. Sales gains have been less than productivity increases and fewer people have been needed in the other goods producing sector.

Service Industry Developments

According to the models explaining the correlation between unemployment and service sector growth, similar patterns of development are taking place with the service industries as have been observed in the case of agriculture and other goods producing industries. Diminishing returns and saturation are setting in with respect to the consumption of services. Time is the ultimate constraint on our ability to consume services such as restaurant meals, amusement, and sports. This is so in spite of technical developments

like tape recordings and special play-back devices that permit the simultaneous consumption of musical entertainment and eating, driving and jogging.

In addition, productivity in the delivery of some services, like banking, fast food restaurants, telecommunications, air transport, and medicine, has been increasing rapidly, often through the application of new electronic technology. Though the relative prices of such services have fallen, quantities demanded have not risen fast enough to prevent the levelling off or even decreases of employment in these industries.

Another important source of demand for services which has been responsible for the rapid growth of service sector employment has been growth in government programmes. Thus, since the introduction of universal medical care in Canada in the middle 1960s there has been a rapid and large expansion of medical service industry output and employment. However, this expansion has slowed very much as the demand for and costs of medical care have escalated. In recent years, several provincial governments have been forced to introduce spending restraints. Similarly the expansion of employment in the publicly-financed lower education sectors has ceased or even turned negative as the baby boom generation was replaced by a much smaller new generation of students. This stagnation has not yet reached higher education but may be expected to do so as the smaller age-cohorts move through the education system. It is therefore highly unlikely that in the future the two most important service industries financed by governments will provide large employment opportunities for Canadians.

The current and pending slowdown in the growth of demand for services in Canada therefore appears to be very similar to the pattern of development experienced by the agricultural and other goods producing sectors in the past. Consumer saturation or unwillingness to finance purchases by public spending have resulted in slow growth of demand. Productivity increases permit the output demanded to be produced by ever smaller numbers of workers.

Where Do the Workers Go?

The new element in the current situation is that workers who cannot find jobs in the agricultural and other goods and service producing industries have no other place to go. In the first cycle, workers made redundant in agriculture could find work in other goods producing sectors and the service sector. In the second cycle, workers from the goods producing industries could find employment in the service industries. But this pattern cannot be repeated. There are no new industries that can employ these workers. There appear to be no production activities capable of meeting as

yet unsatisfied needs of consumers and therefore providing the work needed for full employment. We have in this model, therefore, an explanation for the upward trend in Canadian unemployment rates shown in figure 3.

The model for the explanation of the correlation between the growth of unemployment and the service sector is appealing since it builds on the intuitively sound foundation of the ubiquitous law of diminishing returns which explains the phenomenon of saturation. The cycles of growth and decline of agriculture and other goods producing industries are well-documented.

If this model is correct, we can expect ever-increasing levels of unemployment, much as we have seen during the last two decades. This is not a pleasant prospect, to say the least, and it warrants the following study of the nature of service industry growth and its possible effects on unemployment.

PRODUCTIVITY SLOWDOWN AND INFLATION

The standard of living of Canadians is determined by labour productivity levels and growth rates. These not only determine the quantity of goods and services available for consumption and investment, they also heavily influence the size of the tax base and the ability of the government to raise revenue for the provision of public services, social security, and income redistribution.

One widely-used index of labour productivity is the value of output per man-hour in the economy's commercial sector. Time series of this index are more revealing than measures of per capita income since the measure automatically adjusts for changes in the age composition of the population, in labour force participation rates, and the number of hours worked per time period. In addition, the measure excludes the government sector, for which the measurement of output and productivity is subject to special problems to be discussed below.

Real output per man-hour rose at annual rates of 4.0 and 4.3 percent in the 1950s and 1960s, respectively. During the 1970s, productivity growth slowed to an annual average of only 1.7 percent. During the years 1978 to 1981, the figure was only 0.1 percent per year (Statistics Canada 14-201).

Several economic studies have attempted to explain this slowdown in productivity growth in Canada (Sharpe 1986, Daly and McCharles 1986). While it has been possible to identify some causes of this slowdown, particularly the increase in energy prices and the distortions caused by accelerating and unstable inflation during the 1970s, the phenomenon remains an unexplained economic puzzle. On the other hand, it is easy and

straightforward to argue that the service sector had a role to play in this slowdown.

Between 1951 and 1971, output per man-hour in the goods producing sector rose at an annual rate of 5.5 percent while that in the service sector rose only 2.3 percent. During the 1970s, the corresponding figures were 2.1 percent and 1.2 percent. Simple arithmetic implies that with this sectoral distribution of productivity growth, overall productivity increases have to be a decreasing function of the size of the service sector. The growing level of the service sector noted above implies some of the slowdown in the growth rate of overall productivity is attributable solely to the growing arithmetic weight of the service sector in the calculation of the average. These developments in productivity will continue in the future as long as there is growth in the share of the service sector in total output.⁶

Implications for Inflation

In one of the most widely-cited and influential studies of the service sector, Baumol (1967) considered the macro-economic implications of the different rates of productivity growth in the service and goods producing sectors. Using the following arguments, he concluded that these developments generated a bias for inflation.

Consider an economy consisting of the service sector, where labour has zero, and of the goods producing sector, where labour has 3 percent annual increases in productivity. Following Keynes, assume that nominal wage rates cannot move down. Also adopt the neo-classical assumption that labour is paid its marginal product. For an understanding of the ultimate process of adjustment it is useful to consider initially that nominal wages in the goods producing sector rise 3 percent per year while wages in the service sector remain stable. Under these assumptions, the price indices for goods and services remain constant since the wage increases do not generate upward pressures on output prices in either sector.

However, it is clear that such differential wage developments in the two sectors necessarily create disequilibria in labour and product markets, given consumers' tastes and output prices. The wage differences attract additional labour to the goods sector at the expense of a shrinking service sector. As a result, fewer services are supplied and their prices rise relative to goods prices. This has several important effects which ultimately restore equilibrium through time.

The increases in the prices of services permit employers in that sector to pay higher wages and reduce the loss of labour to the goods producing sector. In equilibrium and under the preceding assumptions, if service output prices rise at 3 percent per year, wages in that sector can increase at the same rate and all incentives for the reallocation of labour between the two

sectors are eliminated. However, this dynamic equilibrium has two major consequences.

First, the price index of the service sector rises at the rate of 3 percent per year. Given zero inflation rates for the goods sector, the economy's overall inflation rate is a weighted average of rates of price increases in the two sectors. If each makes up one-half of the economy, the inflation rate is 1.5 percent per year.⁷ This inflationary bias is the macro-economic consequence of unbalanced growth which is at the centre of Baumol's conclusions. It is known in the economics literature as the Baumol effect.⁸

Secondly, the cost of services relative to goods rises continuously through time. In private markets for services, this generates incentives for the use of alternatives to these services. The increased use of household durables can be explained through this mechanism. However, very important for ideological reasons and as an explanation of the growth of government spending in the post-war years is the influence of the Baumol effect on public spending. A constant real share of national income devoted to publicly supplied services like education and health care can be maintained only if the government allocates an ever-increasing share of nominal national income to finance their production. This implies ever higher levels of taxation and government spending. The same argument can be used to explain why costs for the performing and most other arts are increasing.

It is easy to see how the preceding model can be changed to account for the fact that in the real world the service sector also has productivity increases. However, Baumol made much of the fact that the basic nature of most services rules out productivity increases. In a widely-cited example he notes that it takes the same time and number of musicians to play a Beethoven quartet in 1980 as it did in the 18th century. In a recent article Baumol (1987) qualified these conclusions by pointing to the diversity of the service sector which includes some industries like communications, where productivity increases have been very high in recent years.

THE DISTRIBUTION OF INCOME

Some recent studies have presented evidence which implies that the recent growth in the service sector is pointing toward the development of a new pattern of income distribution in the United States (Bluestone 1982, and Stanbeck 1981). According to these studies, there has been a more rapid growth of people with high and low incomes than those with average incomes. Since many trends in the U.S. economy tend to characterize the Canadian economy concurrently or with some lag, the income redistribution effects of service sector growth are of interest to Canadians as well.

According to U.S. research, the relative decline of middle-income earners is attributed to service sector growth because it has resulted in the

rapid expansion of work requiring low skills but also paying low wages. Positions with these characteristics are prevalent in such prominent and rapidly growing industries as retailing, restaurants, computer data entry, home services, and menial office work. At the same time, the service sector has also provided many positions requiring high skills and bringing high pay, as in computer operations, medical facilities, accounting, and engineering. Growth in the traditional jobs with average skill requirements and pay scales is alleged not to have kept pace with these developments.

The phenomenon of the unbalanced growth in the high- and low-paying jobs has been referred to as "bimodalism." This descriptive term originated with the idea that these trends would eventually replace the traditional bell-shaped curve of income distribution with one which has humps at both ends and a dip in the middle.

A bimodal income distribution in Canada is believed to be undesirable for a number of reasons. It would result, as never before, in an upper and a lower class of people. In a sense, those with lower incomes would be like servants to those with higher incomes. The income inequality would produce a corresponding inequality in political power. The disappearance of the middle class would increase social strains since it has traditionally been a buffer for tensions and rivalries between the high- and low-income groups. Economic and social stability, historically rooted in the middle class, would suffer. A bimodal income distribution would certainly change the character of Canadian society and most likely it would worsen it.

The Place of Women

In recent years, strong public interest has developed in the incomes and career opportunities for women relative to those of men (Block and Walker 1982). The growth of the service sector has some implications for this debate since a large proportion of the service industry positions have traditionally been held by women, as in the retail, personal care, and food service industries. Jobs in these industries typically receive low compensation and provide only part-time employment.

Because of these characteristics of service industries, their growth tends to influence the ratio of female to male incomes and wages. The relatively rapid growth of the service industries in the recent past and future is likely to aggravate the average income disadvantage suffered by women.

It seems obvious from the above that study of the service industries will shed light on the merit of existing concerns over the development of a bimodal income distribution pattern and the role of women in it.

EFFECTS ON UNIONIZATION LEVELS AND POWER

There has been some speculation that the growth of the service industries in Canada and other countries may be due to what is known as "vertical disintegration" or "contracting out" of services by large firms (McKenzie 1987, Kutscher 1987). Such contracting out appears to have been particularly prevalent in activities such as accounting, legal, marketing, computer, cleaning, and similar services. Small firms or branches of large, specialized professional firms appear to have taken over the work that was traditionally provided by employees of large companies.

Contracting out has been explained as the response of managers to opportunities for increased operating efficiency. One of the most fundamental explanations of contracting out is rooted in the modern theories of the firm advanced by Coase (1937) and Williamson (1979). According to these theories, departments in large companies have all the characteristics of government bureaus which are protected from the forces of market competition. These forces normally spur firms and workers to operate at peak efficiency and effort. Without these market incentives, internally provided services often cost more than services bought outside the firm. Under these conditions, managers find it advantageous to cease internal production of such services.

Contracting out may also be caused by cost conditions resulting from unionization and social legislation that produce greater costs for large firms than for small firms. For example, high wages, work rules, and lay-off and retirement provisions negotiated by unions typically raise the effective costs of the services provided by the departments of large firms covered by such union contracts. Specialized suppliers of these services in the market are often small and not unionized because their size makes them an unprofitable target for unionization. Such firms typically are not unionized because their work-forces consist predominantly of employees with professional degrees who have historically resisted unionization efforts. To the extent that they are not unionized, such firms tend to have lower operating costs and the lower prices they offer generate incentives for contracting out.

One of the interesting implications of contracting out to be discussed at length below concerns the proposition that it results in a biased statistical estimate of the growth of service occupations and production in the economy. Thus, when a manufacturing firm contracts out accounting services, statistics will show an increase in service employment and a decrease in goods production employment and value added. Yet, it is clear that there has been no net change in the actual levels of employment or output of services or goods in the economy. This peculiar result is because accountants working for a manufacturing firm are considered, for statistical reporting purposes, to be employed in the goods producing sector.

Implications

It is clear from the preceding explanations of the motives for contracting out that it may result in a reduction in the overall level of unionization in Canada. As work done by unionized workers in large firms is ended and carried on by small, non-unionized enterprises, union membership is reduced. This is one of the main reasons unions in many industries and jurisdictions in Canada in recent years have tried to resist the trend toward contracting out, demanding and taking industrial action in order to obtain clauses in settlements that prohibit it.¹⁰

Lower unionization levels in Canada are considered to be undesirable by many people who see unions as instruments for the creation of a just society. Unions are believed to have brought higher incomes for the working class at the expense of the owners of capital and to have provided protection for workers against the ravages of technical change and the arbitrariness of employers. The union movement has supported liberal progressive parties and candidates that have pushed for the development of all kinds of social legislation in Canada.

It is clear that contracting out has the potential of reducing the size and therefore the ability of unions to generate benefits for workers and general social conditions. Seen from this perspective, the growth of service industries, driven by the practice of contracting out, is an undesirable development. It is therefore important to study the validity of the analysis and evidence which gives rise to this conclusion.

TRADE AND REGIONAL DISPARITIES

During the 1980s, the United States developed a merchandise trade deficit of unprecedented magnitude. In 1985 the deficit was equal to more than 4.5 percent of GNP. During the 1980s, the U.S. production of goods as a percent of total national output declined, much like it has in Canada and as was shown in figures 1 and 2. Some analysts have interpreted these developments as an indication of the U.S. loss of comparative advantage in goods production. This fact is relevant for Canada since, if explanations of its causes are correct, the Canadian economy may well run into the same problem in the future.

The loss of comparative advantage in goods production of any country raises questions about its ability to pay for the imported goods it needs to meet the demands of consumers. Service industries' exports have been suggested as the main means for restoring and keeping balance in the foreign trade of such a country.

It has been argued that, unfortunately, prospects for the growth in U.S. service exports are not good. The main reason for this is alleged to be the

existence of domestic regulations in many countries which discriminate against foreigners.

Regulation of service industries typically has been imposed because the output of these industries has been subject to strongly decreasing marginal costs which give rise to so-called natural monopolies. The best known of these industries are the producers of electricity, gas, telecommunications, and transportation services. The regulation of other industries has been justified on the grounds that their output generates negative or positive effects on welfare that are not captured adequately by the price system. Examples of industries in this class are banking and insurance which can be the source of negative externalities and therefore need to be regulated and curbed. Positive externalities are associated with education and medical care where collective benefits are greater than the sum of individual benefits.

A final group of industries subject to regulation and protection against foreign competition are those that are alleged to generate positive social benefits which its producers are unable to capture. Examples of industries in this class are in the field of entertainment and are believed to have great influence on the shape of national cultures.

There is widespread belief that U.S. producers would be able to compete successfully with these service industries in the absence of the existing, often discriminatory, regulations governing their output. Therefore, removal of the discriminatory features of the regulation are necessary for the U.S. economy to pay its way in the future. Such a policy would also permit the world to continue the process of increasing international trade and specialization. This process is considered to have contributed greatly to the era of global prosperity and rising incomes in the post-war years when, however, it has been stimulated significantly by the liberalization of trade in goods.

There is much opposition in the world to U.S. government efforts to achieve a similar liberalization of service trade, yet some progress has been made. The Canada-U.S. free trade agreement contains strong and innovative provisions for freer trade in services, as will be discussed in a later chapter. The Uruguay Round of GATT negotiations scheduled for the 1990s will have talks on service trade liberalization running separately but concurrently. This separation is the compromise result of U.S. demands for the talks and the reluctance of developing countries to link goods and services in the same set of concessions. It remains to be seen how successful these talks will be.

The Canadian economy has historically developed in parallel with the U.S. economy. As a result, the preceding analysis raises the spectre that before too long the Canadian balance of goods trade may also turn negative and become dependent upon the ability to generate adequate service ex-

ports. Questions about the likelihood and severity of this potential problem and issues on how to approach the GATT talks on services provide yet another justification for this study.

Regional Disparities

Regional disparities in income and economic growth, be they between rural and urban areas or between the East and West, have been a major concern for Canadian governments in recent decades. There are some important questions about the influence of service industry growth on these regional disparities.

On the one hand, much of the recent growth in service industries has involved increasing specialization of human skills, as in computers, engineering, and medicine. Such specialization is possible only in large urban areas where the number and density of the population provide adequate markets. As a result, the recent and most likely future developments in these types of service industries encourage further urbanization at the expense of employment opportunities in rural areas and small population centres.

To some extent the division of the market for the specialists of today and tomorrow encompasses not just historic cities. It extends to large areas of concentrated population, some of which span international borders. Toronto and Montreal are part of the Eastern continental belt of concentrated population that lies on both sides of the border. Vancouver, in turn, is integrated into the U.S. population agglomeration along the Pacific coast. These facts favour the growth of Ontario, Quebec, and parts of British Columbia at the expense of the rest of Canada and threaten further aggravation of existing regional disparities.

Factors Favouring Dispersion

On the other hand, the micro-electronic revolution has made it possible for many kinds of service work to take place in rural and remote areas. Word processors have made authors independent of secretarial support, the telephone substitutes for personal visits, and cables link users to electronic libraries. The very fact that more and more employment is in services means that workers in that sector can be away from the raw material base, transportation facilities, and ready markets that in the past determined the location of factories and employment opportunities.

The need for greater markets for the ever-increasing specialization in services and the opportunity for work in decentralized locations are offsetting each other to some extent. However, it seems likely that on balance the growth of the service sector will lead to further urban and regional concentration of the Canadian population. Greater understanding of this

process should result from this study. Through such understanding will come insights into the best methods for dealing with the costs of these trends.

DOING EACH OTHER'S WASH?

One of the strong trends in the Canadian economy in recent decades has been the growth of labour-force participation by women. There appears to have been a fundamental change in the role women perceive themselves to play in society. The traditional housewife and mother in her 20s has been replaced by the typical working woman who contributes to the family's acquisition of the major household possessions such as cars and appliances and who helps to accumulate funds for the down payment on a home. Many women have chosen the pursuit of ambitious professional careers over the traditional role of mother and housewife.

Two income earner families without children have been the source of a growing demand for a wide range of services. They eat in restaurants, take holidays, have their laundry done, use hair and body care facilities, ride on public transportation, go to night school, and so on, much more than families with children and wives in more traditional roles. Career women who have children often retain their work commitment and create demand for a wide range of home and child care services.

From a fundamental economic perspective, many of these developments imply that work that previously had been done by women in households is now done in the commercial service sector. This fact is important because while work performed in the household is not counted in national income, work done in the commercial sector is. As a result, in recent years a certain proportion of the growth in national income coming from the service sector is a statistical illusion. It does not reflect a genuine rise in living standards. As someone has put it, we are taking in each other's wash. We earn money in doing our work, but whatever we earn from doing our neighbour's laundry, we pay out to another neighbour to do ours.

It is well-known that national income is an imperfect measure of welfare and that the monetization of previously unmeasured activities is just one source of divergence between the growth in national income and welfare. However, since monetization of the service industry is measurable to some degree, as we will see below, study of the service sector will permit us to understand better and to quantify at least some of the factors which create a divergence between the growth in measured national income and welfare.

THE LINK BETWEEN SERVICES AND GOODS PRODUCTION

A final reason for studying the service sector of the Canadian economy is that it is closely linked to the goods producing sector so that useful insights about the nature and future of the economy can be gained by a better understanding of the interdependence of the two sectors. The strength of this interdependence can best be appreciated by the realization that about half of service sector output is used in the further production of goods and services bought by final users.

One view of this linkage sees the demand for these producer services entirely driven by the demand for goods. There are transportation, communication, accounting, engineering, computing, advertising, financial, wholesale and retail, and many other services needed in the process of manufacturing goods, managing the affairs of firms, and bringing the goods to consumers. There are the education, health care, restaurant, hotel, and transportation services bought by goods producers for their workers and managers. Repair and maintenance services are needed to assure the functioning of many goods owned by consumers and producers.

Many government services, like justice, the provision of health and safety, the maintenance of roads and ports, education, and statistics, are used as inputs by the producers of goods. There is also a link running from demand for services to demand for goods. Airplanes and buses are needed to supply transportation services. Computers are needed for the production of computer consulting and output services.

It is easy to see that an autonomous increase in the demand for goods would tend to increase automatically the demand for these privately and publicly supplied producer services. By analogy, increases in the demand for some final and intermediate services results in automatic increases in the demand for goods. This view of service and goods demand as being derived from some autonomous and exogenously determined force provides an important but limited understanding of the link between the two sectors. Another view considers the role of service inputs as a dynamic force driving the production of goods.

According to this view service industries are the vehicle by which new technology is introduced into the goods production process. This new technology can lead to the lowering of production costs, the development of improved and new products, and new and more efficient methods for the distribution of goods. Some of the best known service inputs used in the introduction of new technology are research and development science, engineering, computer, business consulting, advertising, marketing, and education services.

The process of product, good and service innovation is part of what Schumpeter called the "process of creative destruction" which gives market

economies their dynamism and economic growth and explains their superior performance over socialist and planned economies. The innovations result in net increases in demand for some categories of goods, as when colour replaced black and white television technology. It can also lead to increased sales abroad as manufacturers enjoy lower costs or hold a competitive edge with an innovative product. But most important, gains in the efficiency of production result in higher incomes to labour and other factors of production and thus increases in welfare. We return below to a more detailed analysis of the way in which producer service inputs should be viewed as both responding to greater demand for goods and contributing to and changing the mix of demand for goods.

SUMMARY AND CONCLUSIONS

The growth of the service sector in Canada in recent decades has been strong and persistent. It has brought and is certain to bring in the future some important and fundamental changes to the Canadian economy and the lives of people.

It has been argued that the correlations between service sector growth and rising unemployment rates on the one hand and the slowdown in productivity growth on the other in recent years is no coincidence but can be explained by some basic laws of economics and arithmetic. Some special characteristics of service employment suggest that Canada will face increasing pressures for greater income equality between occupations and different regions. Membership of unions may decrease and problems may arise with foreign trade. Increases in measured national income may be a statistical illusion and contribute to a sense of dissatisfaction with the overall performance of the free enterprise system.

In this chapter we have presented these arguments with logical rigour but rather uncritically and without concern about the accuracy of the deductive reasoning and facts alleged to be true. In essence, these views can be found in some semi-popular books and journalistic treatises. We have found in many informal discussions that a large proportion of Canadians have been exposed to these ideas. This exposure has created serious concerns about the implications of the growth of the service sector for the well-being of current and future generations of Canadians.

In the final section of this chapter we noted another more optimistic reason for studying the service sector. The ideas outlined in this section represent the central message of our study and will be presented in much more detail and backed by empirical evidence. If it is correct and the service sector is a primary source of and vehicle for delivery of new technology and goods, then its growth has an overall positive effect on economic

well-being of Canadians and should be welcomed rather than deplored or the subject of concern and government intervention.

No one study can provide definitive assessments of the arguments presented in this chapter or magic formulas for dealing with any consequences of a growing service sector which are considered harmful to public welfare. Instead, the aims and results of our study will be much more modest. We attempt to show that many of the public concerns are unwarranted because of a misinterpretation of fragmentary or excessively aggregated information on the service sector. In the case of some concerns, we will find that market and social responses to undesirable developments are already taking place or may be expected to do so eventually. Some other concerns will be seen to involve inevitable trade-offs and choices that have to be made by individuals and society.

People usually fear the unknown more than the undesirable developments themselves. At the very least, our study will reduce the size of the unknown. We hope that for many people the information will mean a better personal preparation for dealing with changes in the future. We also hope that politicians and bureaucrats will be encouraged to leave the market economy alone or use better policies than they would have without the understanding of the service sector which this book provides.

NOTES

1. Movement of workers from the goods sector into the service producing sector in Canada has been going on probably since settlement of the country began. Unfortunately, however, reliable data on this trend are available only since the first census of 1881 and, until the 1911 census, only on the distribution of employment in agriculture and the rest of the economy. According to these early data, the share of agricultural employment fell from 48.1 percent in 1881 to 34.3 percent in 1911 (Statistics Canada 1983, D 1-7).

Precise definitions of the service and other industries are provided in the next chapter. Following the practice of Statistics Canada, the composition of the industrial aggregates is:

AGRICULTURE

- Standard Industrial Class (SIC) 1;

OTHER GOODS PRODUCING SECTOR

- forestry SIC 2
- fishing SIC 3
- mining, oil and gas wells SIC 4
- manufacturing SIC 5
- construction SIC 6
- utilities SIC 572-579

SERVICES

- transportation and storage, communications SIC 501-548
- wholesale and retail trade SIC 8
- finance, insurance and real estate SIC 9
- community, business and personal service industries SIC 10
- public administration and defense SIC 11.

In figure 1 agriculture and other goods producing industries have been combined and are shown as goods producing industries. In figure 2 the preceding definitions are employed without change.

2. In anticipation of some of the more detailed analysis below, it should be noted here that the decline in employment *shares* does not mean that there has necessarily been a decline in *absolute* employment. In fact, during the period 1951 to 1981, other goods producing sector employ-

ment rose from 1.9 million to 3.1 million. Total employment in agriculture has held steady at about 470,000 since 1972.

3. It is interesting to note that as a result of these differences in accounting systems it is necessary for scholars to re-estimate Material Product System data according to System of National Accounts principles to compare output and growth in communist and non-communist countries.
4. These explanations are discussed in Grubel and Bonnici (1986). One set is based on the Keynesian tradition and points to unnecessarily stringent monetary and fiscal policies as well as an excessive concern over the effects of inflation. Another explanation emphasizes the role of wage rates in the adoption of labour saving technology and the importance of union threats and social insurance programmes in preventing the adoption of full employment wage rates in the non-unionized sector. Other approaches are discussed in Chand and Hubley (1986).
5. Two of the most quoted studies in this tradition are Shelp (1981) and Bluestone and Harrison (1982). British conditions are discussed in Blackaby (1978). Canadian conditions are addressed in Magun (1982), Chand (1983 a,b), Coffey and Polese (1987), McRae and Dubois (1988), Radwanski (1986), and Stern (1985). Gershuny and Miles (1983) attempt an international and theoretical integration of existing knowledge. Riddle (1986) offers a survey of a large part of the existing literature.
6. It is obvious that the low productivity growth of the service industries implies that the increases in unemployment discussed in the preceding section are less likely and smaller. In this sense, concerns about the implications of service sector growth for unemployment and productivity gains are somewhat inconsistent.
7. We abstract here from the monetarist argument that this inflation rate can be sustained only if the money supply is increased at 3 percent per year, one-half of the increase going to financing the 1.5 percent higher level of real transactions and 1.5 percent toward financing the higher price level. According to this model, if the money supply is permitted to increase only at the rate of 1.5 percent per year, price stability would ensue with price increases of equal magnitude in the service sector being offset by corresponding decreases in the goods sector. Real wages on average in the two sectors increase at 1.5 percent per year whether there is price stability or inflation.
8. We do not want to enter here into the history of thought on this subject, but it should be noted that a similar model and conclusions are found in Fuchs (1968). Baumol and Fuchs worked on these problems at roughly the same time, and it will never be known how they influenced each other's ideas. Baumol's formulation of the model is more elegant than Fuchs' and its publication in the *American Economic Review* assured that it was distributed and read widely.

9. The subject of bimodalism, its relationship to the growth of service industries, and its impact on social and economic conditions in the United States, has recently been discussed in an article by Barbara Ehrenreich aptly titled, "Is the Middle Class Doomed?" (*New York Times Magazine*, September 7, 1986). The article is based on a book concerned with "class and politics," which the author is writing while a Fellow at the Washington-based Institute for Policy Studies. A study in *Public Interest* by Kusters and Ross (1988) shows that existing estimates of bimodalism are very sensitive to the database and statistical methods used. Some reasonable methods result in the disappearance of the phenomenon. The article also contains the basic scholarly references to the literature on which this controversy is based.
10. The bitter and long strike in the B.C. forest industry in 1986 centred on issues of contracting out.

CHAPTER 2

WHAT ARE SERVICES?

In the first chapter we used the word “services” without any prior discussion of its meaning. Such a treatment of the word is indeed appropriate at most levels of discussion and analysis. Most people seem to know without hesitation in what contexts to use the words services and goods. However, for the analysis in later chapters we need a rigorous definition and taxonomy because development of theoretical models and study of historic trends and relationships require clear conceptual distinctions and precise operational definitions.

Before we embark on our analysis we need to admit that, unfortunately, there exists no simple definition of the concept “services” and we will not produce one here. All attempts to define services rigorously and simply appear to suffer from the same fate. If they are rigorous, they become unmanageably complex because they need to consider too many exceptions to general principles. If they are simple and general, they are either too broad and thus include goods, or too narrow, and thus exclude some activities which in common usage or statistical treatments are accepted clearly to be services.

In spite of these well-known problems associated with the definition of services, we hope that the analysis of this chapter is useful in clearing up some ambiguities and establishing some taxonomies for discussion and the presentation of data. At the very least, readers of this chapter will become aware of the complexity of the concept of services.

A HISTORY OF ECONOMIC DOCTRINE

A brief consideration of the history of economic thought on services provides some useful insight about their nature. As we noted in chapter 1, classical economists such as Adam Smith considered services to be so distinctly different from goods that their production was considered to involve the unproductive use of labour.

The historic view of services as an activity without merit has its origin in the intellectual problem of understanding what determines value. The physiocrats and mercantilists, along with many of later classical economists, drew heavily on the labour theory of value and the concept of value in exchange. Adam Smith thus explained that the market price of two rabbits for one deer was determined by the fact that it took twice as many hours to capture a deer as a rabbit.

This basic model could not be used to explain the exchange value of services since nothing exchangeable was produced through the work of a servant. Services once produced cannot be exchanged for food, clothing, and shelter. Therefore they failed the ultimate test of valuable goods in the world view of physiocrats and mercantilists.

All this becomes vivid in Smith's words (Book II of the *Wealth of Nations*). Labour used in the production of services does not "fix or realize itself in any particular subject...which endures after that labour is past and for which an equal quantity of labour could afterward be purchased." He included in the category of unproductive labour "churchmen, lawyers, physicians, men of letters of all kinds; players, buffoons, musicians, opera singers, opera dancers, etc." "Like the declamation of the actor, the harangue of the orator, or the tune of the musician, the work of all of them perishes in the very instant of production." On the other hand, "Productive labour adds to the value of the subject on which it is bestowed."

Services as Tertiary Activity

During the 1930s Australian economists Fisher (1939) and Clark (1940) developed models of the stages of economic growth. In doing so they described the production of raw materials "primary," of goods "secondary," and of services "tertiary."

The production of raw materials is primary in the sense that without raw materials there cannot be any goods manufacture. Secondary manufacture thus depends on primary production. It appears that by calling service production tertiary, these authors have implied, probably inadvertently, that services were of a lower order of importance and somehow dependent on primary and secondary output. In making the concept of services operational, these authors used the residual approach. Anything that was not considered to be the output of the agricultural or industrial sector was the output of the service sector. It is clear that this approach does not come to grips with the essential characteristics that distinguish goods from services.

Current Approaches

Current dictionary definitions of services relate it directly to the word servant and the associated personal relationships involved. These definitions indicate a strong association of the concept to the ideas of classical economists that persist even today in general linguistics.

This is especially noteworthy since modern economic analysis has abandoned totally the classical notion that services are in any sense unproductive.¹ To the contrary, modern economic analysis stresses that goods and services are equivalent in two fundamental ways. First, in consumer theory the consumption of both final goods and services is seen as providing utility and raising welfare. This same theory also provides the rationale for adding up the value of goods and services bought and sold in competitive markets to arrive at the total value of national income and production.

For later purposes of analysis, it should be noted that both goods and services may be consumable directly or serve as inputs in further production. In the latter use, they are also indistinguishable in the sense that they increase the value of the final output by amounts which, under perfect competition, are equal to the market price of these inputs.

Secondly, in production theory there is no essential difference between goods and services. Both require the inputs of capital, labour, technology, and goods and services at an intermediate stage of production. In a fully-employed economy, an increase in the output of goods requires a decrease in the output of services and vice versa.

Because of the equivalence of goods and services in consumer and production theory, modern textbooks in economics typically disregard all problems of definition and refer to "goods and services" or simply "goods" that implicitly include services as the providers of utility.

Melvin (1988) finds it useful to analyse the functions performed by services and through it gain an understanding of their nature and how they differ from goods. His taxonomy distinguishes three classes of services. First, there are the contact services like haircuts and appendectomies which require producers and consumers to be at the same place and same time to transact the service. Secondly, there are substitution services like TV and radio entertainment which permit the consumption of a service that was performed at a different time and location. Third, there are intermediation services like transportation and retailing which provide a means for getting together producers and consumers.

He believes that economic analysis has difficulties in fitting services into the standard theoretical framework because it abstracts from what is common to all three types of services. The need for special treatment of services arises "because of the constraints of distance and uncertainty

associated with the time and space dimensions of economic analysis. The failure of most theoretical analysis to formally incorporate these dimensionality constraints may to some extent account for the difficulty economists have encountered in dealing with services" (Melvin 1978, p.5).

Lancaster (1966) proposed that all goods and services be considered as bundles of different characteristics, each of which provides some utility to consumers. In turn, consumers typically combine goods and services with different bundles of characteristics to satisfy their needs. Entrepreneurial and marketing activities are aimed to a substantial degree at the task of designing and selling new products and services that have or can be used together to provide previously unavailable bundles of characteristics. This model suggests that it may be useful to consider consumption activities according to the intensity with which they use goods and services, rather than attempting taxonomies of pure goods and pure service consumption.

Factor Services

Modern economic theory uses the convention of referring to the services of the factors of production—capital, labour, land, and technology. The use of services in this context is a historic accident and unfortunately complicates the problem of delimiting the meaning of the word for the analytical and empirical purposes of this study.

We will have very little to say about factor services. This is a convenient procedure. It is justifiable mainly on the grounds that factor services are not considered to have given rise to any new and pressing policy concerns as is apparent from the fact that they did not appear in the discussion of policy issues in chapter 1. In general economic theory, the analysis of the determinants of factor endowments is distinctly different from that dealing with the optimum use of given factor inputs.²

Intermediate Input Services

As a final point in our review of the history of thought on services, we note that services are and always have been much more varied than is implied by the example of the servant noted above. The servant symbolizes personal services. As we shall see later, these represent only a relatively small and stable fraction of total service employment and output.

A large proportion of all services is produced by bankers, accountants, engineers, and scientists whose output is used by firms producing goods. In addition, there are the transportation and distribution services without which there could only be complete individual self-sufficiency in production and consumption. Finally, it is possible to interpret the production of education and medical services as inputs into the creation and maintenance

of society's stock of human capital and health. Without this expenditure, productivity and the welfare of any country's population would fall quickly.

All of the services just discussed have been produced for many centuries and are obviously productive, even if one considers personal services not to be. Therefore, it is somewhat of a puzzle that a distinction between personal and other services did not evolve earlier and undermine the idea that the production of services is less valuable than that of goods.

SOME DEFINITIONS

If there is no distinction found in basic economic theory between goods and services whose main characteristics are their use as consumables, intermediate inputs, and producables, the distinction must be found in other characteristics.³ To discover them it is useful to turn to a specialized dictionary. The widely-used *Penguin Dictionary of Economics* (1972, p. 372) offers the following definition: "Services are consumer or producer goods which are mainly intangible and often consumed at the same time as they are produced." The emphasis here is on the lack of tangibility of services.

The classic study of services in the post-war years is Fuchs' (1968), who lists a number of characteristics which distinguish services from goods. One of these is the lack of tangibility. Others are that they "perish in the very instant of production," that they are produced with the consumer present and participating, and that they cannot be transported, accumulated, or stored.

This descriptive analytical approach to services has dominated the thinking of economists throughout the 1970s, though it has been found wanting in several respects. Most importantly, it is possible to find services which don't have these descriptive characteristics, or one can in turn define the characteristics such that they do not hold for all services. For example, is the service of a barber really intangible? Certainly, the result of the application of the service, the cropped hair, is tangible (Hill 1977).

Riddle (1986) criticizes a long list of existing definitions of services in five pages of her book. Reading these pages is a useful, if frustrating, experience since it leads quickly to the conclusion that a simple definition does not exist. Yet, a comprehensive definition has its own shortcomings, as can be seen from the one provided by Riddle:

Services are economic activities that provide time, place and form utility while bringing about a change in or for the recipient of the service. Services are produced by the producer acting for the recipient; the recipient providing part of the labor; and/or the recipient and the producer creating the service in interaction.

Hill's Definition

In 1977, Hill published a paper in which he provided a general definition of services and which establishes one unifying characteristic. This definition is now accepted widely by economists. The following uses Hill's words but draws on a more recent paper:

A service producing activity is one in which the activity of the producer brings about an improvement in the condition of some other economic unit. The improvement may take the form of a physical transformation of some good or goods owned by the consumer unit. Alternatively, the improvement may relate to the physical or mental condition of some individual person, or group of persons. In either case, the distinguishing feature of service production is that the producer adds value, not to his own goods or person, but to the goods or person of some other economic unit" (Hill 1987).

It is best to use the author's own words in elaboration of this definition:

It should be noted that it is inherent in the idea of a service that it should be provided to some economic unit...This is in marked contrast to goods production where the producer may have no idea who will acquire the goods on which he is working. A farmer may grow crops in complete isolation from his eventual customers, but a teacher cannot teach without pupils. In the case of services, the actual process of production must directly impinge on some consuming economic unit in order for a service to be provided (1987).

Whatever the nature of services provided, a common element running through all kinds of service production is that services have to be delivered as they are produced. This constitutes the fundamental difference from goods production where there is no such constraint on production (1987).

The fact that services must be acquired by consumers as they are produced means that they cannot be put into stock by producers (1977, p. 337).

Embodied Services

In later discussion we will use the idea of embodied services, which we consider to be one of our fundamental contributions to the analysis of the service sector.⁴ Services are considered to be embodied after service producing agents have changed the state of persons or of goods owned by others. Following Hill's definition, this transformation is valuable to the

person or to the owner of the good. Students carry the embodied services of teachers; treated patients those of doctors. The services of mechanics are embodied in repaired automobiles; the services of musicians are embodied in recordings; of computer programmers in electronic storage disks. Shoes in a store have embodied in them the services of transportation needed to ship the raw materials and final products; of the advertising and accounting personnel of the shoe and leather manufacturers; and of the retail store; when the shoes leave the store they embody the services of the sales clerk.

The concept of embodied services is analytically important because it focuses attention on the role played by services in the production of goods and how many useful properties of goods are attributable directly to service inputs. As we will discuss in more detail in a later chapter, to the extent that service inputs are provided by highly-skilled persons and represent the application of scientific, engineering, and management skills, the growth of embodied services in goods production reflects a process of capital deepening.

Trade in Embodied Services

The concept of embodied services has been applied to the analysis and measurement of international trade in services Grubel (1987b, 1988). It permits great simplification in the explanation of this trade in services by the implication that direct international trade in services is not possible. It requires that either people or goods move across borders to deliver services or to be transformed through the application of some services. Alternatively, service trade takes place through the cross-border shipment of goods which have in them embodied services.

More precisely, service exports take place when tourists, students, and medical patients go to the exporting country temporarily in order to absorb travel, accommodation, food, educational, and medical services. Service exports also are generated when goods are brought into a country temporarily for the administration of repair services or other minor transformations like packaging, cleaning, and sorting.

By analogy, service imports are recorded when teachers, consultants, doctors, executives, and unskilled workers take up temporary residence in the importing country in order to deliver their services. Industrial equipment leased for temporary use similarly provides services that represent an import to the country where it is operated.

This trade in services requiring the movement of people or goods coexists with trade in services that are embodied in goods and electronic signals. Books, newspapers, films, magazines, technical reports, blueprints, computer discs, and tapes embody primarily educational, cultural, and informational services. Most of these same services can also be transmitted

via telecommunications systems. The electronic signals involved in this trade may be difficult to monitor with present technology, but in a sense relevant for the current analysis they represent a physical embodiment of services just like the more traditional printed material. Moreover, if we can believe unofficial reports about the activities of national security agencies, the monitoring of mail and electronic communications systems has reached a high level of technical sophistication.

The preceding discussion centred on educational, cultural, and information services because their value overwhelms the value of the goods or electronic messages in which they are embodied. However, all traded goods embody services to some degree. The scientific, engineering, design, financial, management, legal, and similar business services embodied in such goods as automobiles is large and growing. It is through services embodied in goods that countries exploit comparative advantage in their respective service industries.

Finally, in the context of this preliminary discussion of the nature of services and international trade in them, it should be noted that there is also international trade in factor services. This category of trade encompasses income from, and payments for, financial capital through interest payments, direct investment through dividends, royalties and fees for intellectual property, patents, and copyright. The flow of these services also involves the physical presence of documents or goods in the foreign country. However, as in the case of factor services noted above in the domestic context, the empirical, conceptual, and analytical problems associated with international factor movements and payments are much different from those associated with the trade in services embodied in people or goods. They will thus not be treated in the present study.

A TAXONOMY OF SERVICES

In common English we find the noun service used frequently as an adjective. In the preceding discussion we have referred to "service industries" as units of production that are different from goods industries. We have also referred to "service occupations" like teachers, personal servants, and the providers of medical services. The word service is, in addition, used in conjunction with other nouns to describe the more technical economic concepts of service consumers, service functions and products, service delivery vehicles, and service delivery institutions. We believe that these many modifying uses of the word service are responsible, at least in part, for the difficulties that are encountered in defining the word alone.

We now turn to a somewhat more detailed explanation of the main contexts in which services is used in English, government statistics, and economic analysis.

Service Producing Industries

Economic treatises make widespread use of the taxonomy shown in table 1. It was originally suggested by Browning and Singleman (1975). In the table, individual industries are identified by names and the numbered Standard Industrial Classification code (SIC), the nature of which is discussed below.

Table 1
A Goods and Service Industry Taxonomy

I. GOODS PRODUCING SECTOR

agriculture; manufacturing; construction; mining, oil and gas wells;
utilities; forestry; fishing and trapping
(SIC 1970, 001 to 421; 572 to 579)

II. SERVICE PRODUCING SECTOR

1. *Distributive Services*

transportation and storage; communications, wholesale and retail trade
(SIC 501 to 548; 602 to 699)

2. *Consumer Services*

accommodation and food services; personal services; amusement and
recreational services; miscellaneous services
(SIC 841 to 849; 871 to 899)

3. *Producer Services*

services to business management; finance; insurance and real estate
(SIC 701 to 737; 851 to 869)

Source: Picot, 1986.

The taxonomy in table 1 places the construction industry and utilities with the goods producing industries. In some other taxonomies found in the literature they are treated as a part of the service producing sector. We prefer to treat these two industries in the manner implicit in the table on the grounds that they produce a tangible output. Inclusion in the service sector can be justified by reference to the common usage of the terms construction services and utility services. We find common usage in this case a poor guide, given that the taxonomy is to provide data for economic analysis where the goods producing characteristic is most important.⁵

Service Industry Occupations

As we noted above, much concern over the growth of service industries is related to the occupations working in them. For this reason information is

needed on service occupations as distinct from service industries. The food service industry, for example, employs managers and accountants as well as the occupations that prepare and serve the food, clean the dishes and premises, and maintain the equipment. We can gain an informed opinion about the implications of the growth of the food service industry on income distribution only if we have data on the number of people in these occupations and the incomes they earn.

Statistics Canada uses the Standard Occupational Classification (SOC) system to record the number of people and their incomes in each category. This system, like the SIC, is used by many countries and revised periodically. It is large, complex, and detailed.

The rich detail of information assembled under the SOC system can be appreciated most easily by the following brief set of examples, using the 1980 revision (Statistics Canada 1981). Starting with the second highest level of aggregation (the two-digit category) we single out group 91, transport equipment operating occupations. This group contains 3-digit sub-categories like 911, air transport operating occupations, and 915, water transport operating occupations. Each of these categories in turn is made up of 4-digit entries. Under water transport operating occupations are subclasses 9151, deck officers, and 9153, engineering officers, ship. The 1980 SOC contains several hundred individual occupations.

Data for the SOC are collected through the census. Like almost all statistics on occupations, they suffer from the problem that respondents classify themselves. Studies have shown that the results are not the same as would be produced by surveys and classifications undertaken by persons fully familiar with the SOC system and concepts. Nevertheless, since there are unlikely to be systematic changes in the self-classification biases, the data give reliable information about the evolution of employment in individual occupations.

For most purposes of analysis the disaggregated SOC data set is too large and cumbersome. The most widely-used data on occupations therefore are highly aggregated. In recent years, an occupational classification system has appeared monthly as table 24 in *The Labour Force* (Statistics Canada 71-001). It is based on the Labour Force Survey and contains the following occupational categories based on the 1980 SOC.⁶

- managerial, administrative
- natural sciences
- social sciences
- religion
- teaching
- medicine and health
- artistic and recreational

- clerical
- sales
- service
- agriculture
- fishing, hunting, trapping
- forestry and logging
- mining and quarrying
- processing
- machining
- product fabricating, assembling and repairing
- construction trades
- transport equipment operation
- materials handling
- other crafts and equipment operation

In a later chapter we present data on the number of people in different occupations and their incomes. In this context we discuss other available classification schemes and data sources, like those provided by Revenue Canada. We also introduce information from a special study by Statistics Canada which examines the earnings of different occupations listed separately by industries.

Service Delivery Institutions

A final aspect of services is captured in a taxonomy that focuses attention on the institutions through which they are delivered.

I. Households

1. Care for and education of children
2. Food preparation, laundry, et cetera
3. Maintenance of property
 - a. shelter
 - b. automobiles
 - c. other durables

II. Markets

Products and industries noted above

III. Voluntary Organizations

1. Religious organizations
2. Fraternal organizations

3. Community welfare organizations
 4. Unions
- IV. Government
1. Medical care
 2. Pensions and other social insurance services
 3. Education
 4. Internal security
 5. External security
 6. General services

In recent decades quantitatively important shifts have taken place in the choice of service delivery vehicles by the public. A large fraction of the services once provided by households has been commercialized and is provided by markets. The government has taken over many of the services that historically have been produced by voluntary organizations, the market, and the family.

From a study of the motives for and effects of these and other trends in the delivery of services it is possible to gain useful insights into history and possible future developments.

Many statistics that have been assembled for other purposes can be used to gain insights into these service delivery institutions.

SUMMARY AND CONCLUSIONS

There appears to be no definition of services that is all-encompassing and usefully simple at the same time. To gain a good understanding of the nature of services it helps to study the history of economic thought about services.

Classical economists' views of services were strongly influenced by their analysis of the determinants of value. Since services could not be exchanged and their production resulted in reduced output of exchangeable material goods, they were considered to involve an unproductive use of resources. Modern economic theory emphasizes that services are substitutes in production and consumption. Therefore, there is no need for separate theories about goods and services.

Hill's analysis points to some basic distinguishing and important characteristics of goods and services. A service is a change in the condition of an economic unit which results from the activity of another economic unit. Services are consumed as they are produced. Therefore, the unit trans-

formed must be in close contact with the unit producing the transformation, except in the case where the service is conveyed in printed or electronic form. We introduced the concept of embodied services to focus analytical and empirical attention on the importance of service activities that change the condition of persons or increase the value of goods through some transformation.

These characteristics of services underlie most informal and official statistical distinctions between goods and services. They are useful in understanding the nature of international trade in services and point to the conceptual and empirical importance of services that are consumed and traded indirectly through previous embodiment in goods.

One important cause of confusion about the concept of services arises when people refer simply to services when in fact they are discussing some aspects of service industries, service occupations, or service delivery institutions. A good understanding of the role of services in the economy is impossible without the maintenance of clear distinctions produced by the attachment of modifying nouns to the word services. It is also important to know the nature, sources, and limitations of statistics on services provided by the Government of Canada since most of our empirical knowledge about the service sector rests on these data.

NOTES

1. The influence of the idea that services are without value is alive in the West and has had significant influence on economic policies in recent years. John McEnery (1986) documents that many British politicians still accept the classical notion that service industries are unproductive. He also shows that these politicians have been responsible for British government policies in post-war years that have been pre-occupied with the creation of jobs in manufacturing through subsidies. These policies have directly or indirectly resulted in burdens on the service sector.
2. Services in balance of payments accounts are defined to include factor services like those from capital, labour, royalties and patents, as well as genuine services like those from tourism and banking. However, in international economics the basic theory of comparative advantage and gains from trade assumes given factors of production and considers trade in such services as banking and tourism to be manifestations of specialization in production and gains from trade. An entirely different body of theory is applied to the study of the determinants and welfare effects of international factor movements. This distinction also pervades international organizations. GATT is responsible for dealing with restrictions on the free movement of goods and services and has no jurisdiction over restrictions on factor movements.
3. In *The New Palgrave*, Pascal Petit under the entry Services notes that some differences between goods and services are very important for one of the central propositions of economic theory, the efficiency of resource allocation in the model of the Walrasian auctioneer.

The Walrasian model of exchange presupposes a clear distinction between prices and quantities of merchandise. Here transactions can be located and potentially reversed since they are subject to property rights. Excess supply is supposed to lead to an accumulation of stocks. Characteristics of products and agents are clearly identifiable and are not affected by transactions. All these propositions are difficult to extend to the case of services...A service represents a transformation of the user (in the case of services to persons) or the user's goods (in the case of services involving goods)... Service utilization therefore does not involve any transferable acquisition but a modification to the characteristics of the agents or their goods (page 314).

This conclusion leaves open the question of whether the Walrasian model can be modified to account for these differences while the main implications for efficient resource allocation remain.

4. Similar concepts have been used in recent publications concerned with international trade in services. See Bagwhati (1984) and Samson and Snape (1985).
5. Some readers may find it useful to consider briefly the nature and history of the Standard Industrial Classification (SIC) system used in table 1. The system is used by Statistics Canada and most other countries under an international agreement. The comparability of statistics across nations which it has produced has been a great boon to economic scholars and historians. It has contributed significantly to our understanding of economic trends and their determinants, internationally as well as within Canada.

The SIC system guides the assembly and publication of data on employment, sales, and value added of individual industries. In Canada employment data primarily come from the monthly *Labour Force Survey* and the *Census*. Output data are gathered from a variety of surveys of Canadian firms.

The SIC system was first introduced in 1948 and has undergone several revisions since. It has been suggested that the system was designed with a bias toward the collection of data from goods producing industries at the expense of the service sector. This bias may well stem from the historic view that service production is less valuable than goods production, as we discussed above. However, as figure 1 shows, in the 1940s goods sector employment exceeded service sector employment so that when the SIC system was designed, the emphasis on goods production may well have been appropriate.

Whatever the motives of the past and biases in existing classification schemes, the growth of the service sector has led to efforts for an expansion and revision of its coverage in the SIC system. In the late 1980s, several international conferences, convened under the leadership of Statistics Canada, have started co-operative work aimed at such a revision. Given the budget constraints under which many statistical offices have found themselves since the 1970s, the completion of these studies is not expected soon and implementation of recommended reforms is even further away.

The SIC system contains data at several levels of aggregation. The headings in table 1 represent so-called divisions which contain major groups. For example, division 10, community, business and personal service industries, contains major group 5, services to business management. Within this group is the 3-digit industry, computer services. It, in turn, is the aggregation of 4-digit industries like computer programming and other software services, and data processing services. Some of these aggregation principles may be observed in the presentation of some of the data below.

6. Occupational statistics are available in *Historical Statistics of Canada* (Statistics Canada 1983) only since 1948. The source has two tables covering two subperiods since 1948, each using a different set of occupational classes which in turn do not coincide with those shown in the text.

PART II

AVAILABLE INFORMATION ON THE CANADIAN SERVICE SECTOR

In this part of the book we provide basic statistical information from published sources about the Canadian service sector. We do so with a minimum of critical comment, and we make no effort to prove or disprove formally any hypotheses or models. However, the presentation of facts without any guidance by fundamental ideas about causes, effects, and policy issues tends to introduce horizontal neurosis in all but the most dedicated reader. For this reason, we will spice up our presentation with suggestive references to our central ideas about the causes and effects of modern service sector growth, in particular the role of producer services and the phenomenon of embodied services.

In the next part we develop more systematically our analytical models to study causes and effects of the growth of the service sector and its components. In the concluding chapters, the insights from this section will be used to speculate about the past and future effects of service sector growth on economic development and welfare in Canada and to derive policy implications.

We consider it important to provide the basic information contained in this section for a number of reasons. First, the material represents the only assembly of specialized data on the Canadian service sector in the literature. It pulls together data which are found in a wide array of original sources. Scholars and general readers should find useful this set of statistics.

Secondly, the data permit readers to gain an overview of developments that is relatively uncontaminated by our own analytical, ideological, or political preconceptions. Of course, contamination of this sort is inevitable. The publications of Statistics Canada are as free as possible of bias in this sense, though scholars in the tradition of Marxist and radical economics think this bias is still quite large. We certainly cannot and do not want to

make this book a collection of all Statistics Canada data on the service sector.

Therefore, the very choice of material for presentation involves some of our biases and preconceptions. In addition, the discussion of phenomena in the light of simple theories for the purpose of generating readers' interest and preparing them for the more theoretical part involves analytical and ideological points of view. Nevertheless, our efforts in the presentation of basic facts constitute an honest attempt to present unbiased information. Our aim is to present enough basic raw material to permit readers to develop some of their own analytical insights and derive independent policy conclusions.

Third, the information represents the base on which we will rest our analytical models, projections, and policy implications. It is efficient to draw on this base in later chapters without having to elaborate there on the nature and informational content of the basic data.

Chapter 3 presents data on the level of employment in service industries at different levels of aggregation, concentrating on the post-war years. In chapter 4 we analyse available data on the value added (GDP) of service industries, again at different levels of aggregation and in terms of time series. Chapter 5 is devoted to the study of two sets of data. From the household expenditure surveys we obtain statistics on service expenditures by consumers. We give special attention to the relationship of this spending to income levels and through time. The other set of data draws on the Census to bring out the educational and occupational characteristics of workers in the service industries. Chapter 6 contains a theoretical analysis of the nature of productivity and the problems encountered in measuring it in the service sector. Simple measures of labour productivity in different service industries and through time complete the analysis of this chapter.

CHAPTER 3

EMPLOYMENT IN CANADIAN SERVICE INDUSTRIES

Data on employment levels by industry in Canada are collected through two different processes, the *Census* and the *Labour Force Survey*. The first census was in 1871. Complete census surveys are taken every ten years and certain special surveys take place at shorter intervals. The *Labour Force Survey* started in 1946 and is taken every month. As is the case with all statistical databases, definitions for time series have changed through time and new series have been added. These facts determine the time span covered in the tables and figures in this study.

The information collected through the *Census* and *Labour Force Survey* are published in a large number of official pamphlets and statistical series. The most important of these are given below in the notes to the tables and figures. However, it is worth noting here that the best source for historical statistics is the book *Historical Statistics of Canada*, published in a second edition in 1983 by Statistics Canada.

EMPLOYMENT IN GOODS AND SERVICE INDUSTRIES

Figures 1 and 2, presented earlier, contain information on the growth of service sector employment in a longer run historic perspective. The first figure shows a roughly equal proportion of Canadians working in agriculture, manufacturing, and the service sector in 1911. Since then, the service industries have absorbed a steadily growing percentage of workers, reaching nearly 68 percent in 1981. This growth of service sector employment occurred almost entirely at the expense of agriculture which had reached a level of nearly 5 percent in 1981. In the same year, manufacturing employed 28 percent of the labour force, which was slightly less than its share in 1911, though this percentage has not been constant throughout the period. In 1951, manufacturing employment was at a historic peak of near-

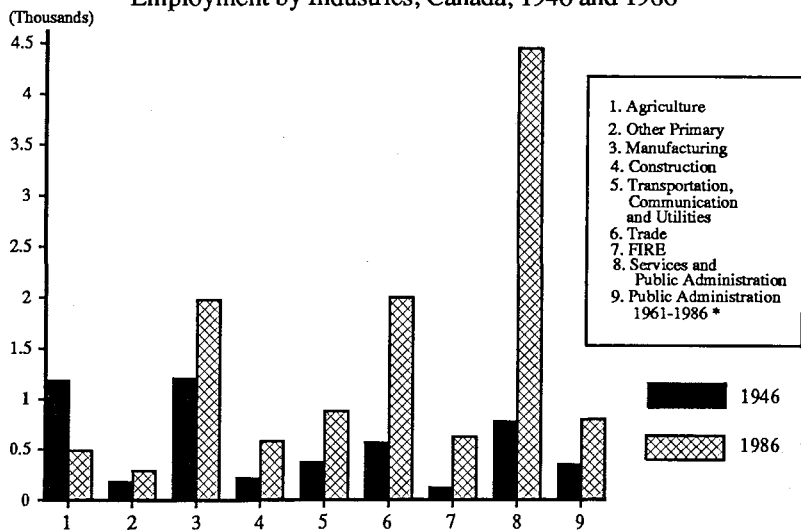
ly 40 percent. The following data from four census surveys show a steady decline.

Figure 2 is based on labour force statistics and shows dramatically the reversal of employment in service and goods producing industries in Canada since 1946. During the 40 years since then, employment in the service industries rose from 40 to 70 percent, all at the expense of the goods producing sector.

Traditional Industry Categories

Figures 4 to 6 present employment data by industries. The industry classes shown were developed during the 1930s and introduced into the statistical system of most industrial countries during the post-war years. It can be seen from the tables that the list of industries is biased against showing details of the service sector.

Figure 4
Employment by Industries, Canada, 1946 and 1986



Source: The Labour Force, Statistics Canada, Nov. 1983, p.79 and May 1986, p.47

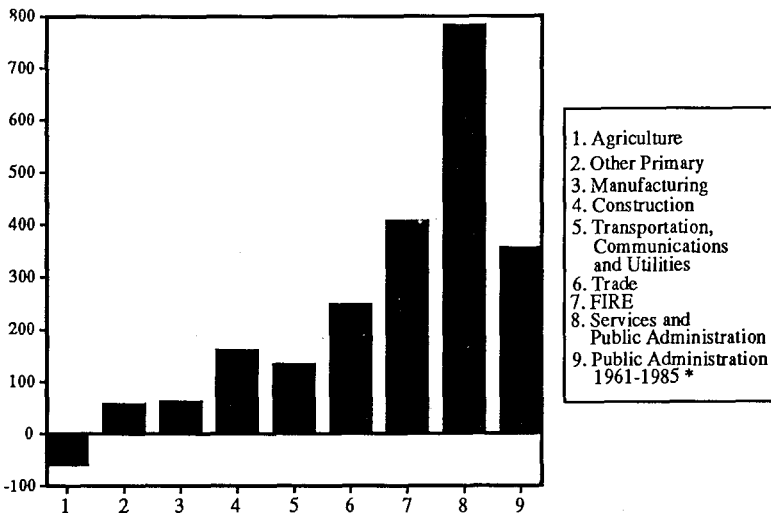
Note: * Public Administration included in Services prior to 1961.

Comparison in this category is between 1961 and 1986 figures.

In 1986, the trade and services industries had the greatest absolute number of employees, 2.1 million and 4.0 million respectively, each greater than the 2.0 million category of manufacturing. It seems desirable to have sub-categories of these two industries to obtain greater understanding of the

sources of the employment. In the next section we examine some data which shed light on the composition of the service industry category. In the future, statistical recording categories may well be revised to produce greater detail and hence reduce the size of the residual service category.¹

Figure 5
Percentage Gains in Employment, by Industry, 1946 to 1985



Source: The Labour Force, Statistics Canada, Nov. 1985, p.79 and May 1986 p.47.

Note: Public Administration included in Services prior to 1961.

Comparison in this category is between 1961 and 1985 figures.

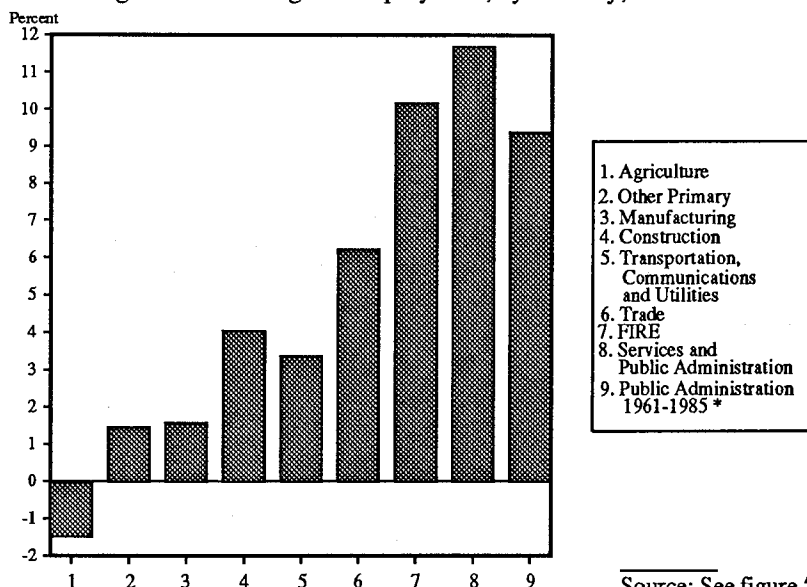
The percentage gains in employment during the period 1946 to 1986 in figure 5 show that the finance, insurance and real estate industry had the greatest rate of increase, over 400 percent. The second highest growth rate was recorded by the services industry at almost 400 percent. Trade and construction showed the third and fourth highest growth rates, both substantially below those of the first two service industries. Employment in the other primary and manufacturing industries showed the smallest rates of growth at less than 100 percent.

Some readers may also find it interesting to note that the public administration sector has shown a gain in employment of only about 110 percent between 1961 and 1986, the only years for which the relevant data are available. These years are widely regarded as the period when the extension of government was proceeding at a very great rate. Employment statistics suggest that this expansion may have been more in the field of expenditure, regulation, social insurance, and other dimensions than in the absorption of labour.

Time Profile

Figure 5 highlights the interesting fact that the dramatic relative growth of the service sector at the expense of the goods producing sector noted above was not associated with an absolute decrease of employment in any industry other than agriculture. In other words, adjustment problems of any of the broad industry categories surveyed in these statistics have not been due to the absolute decline of employment but to a failure of employment growth to keep pace with the average.

Figure 6
Average Annual Change in Employment, by Industry, 1946 to 1986



Source: See figure 5.

Some readers may find interesting the presentation of the same information contained in figure 5 by expressing the total employment gains over the 40 years in figure 6 as average annual rates of growth. According to this measure, employment in finance, real estate and insurance has grown at an average annual rate of 4 percent, just slightly more than the rate found for services. Average annual growth rates for other primary and manufacturing were about 1 percent or a quarter of the levels attained by the two leading service industries. Employment in agriculture has fallen at an average annual rate of about 2 percent, which is large if one considers the absolute number of people involved and the general growth of population and national output.

Growth by Decades

However, average growth rates over 40 years hide some interesting cycles and recent developments. To bring these out, we provide the time series statistics in table 2. In order to show longer run trends rather than short-run cycles, we show the average decennial employment growth rates of each industry for each of four subperiods.

Table 2
Employment Growth by Selected Industries
Percentage Growth Rates per Decade

Decade	1946-55	1956-65	1966-75	1976-86
Agriculture	-30.9	-23.6	-8.7	7.63
Other Primary	30.89	18.24	-0.9	24.26
Manufacturing	13.1	14.01	7.47	4.27
Construction	64.73	12.38	21.08	0.63
Transportation,	23.34	23.4	31.18	11.77
Communications, and Other Utilities				
Trade	47.29	29.82	39.2	27.31
Finance, Insurance and	43.55	44.33	56.44	30.65
Real Estate				
Services*	36.86	67.29	56.74	41.28
			(56.23)	(47.10)
Public Administration			58.71	19.17

Source: "40th Anniversary of the Labour Force Survey," *The Labour Force, Statistics Canada, November 1985, catalogue 71-001, monthly.*

Note: Prior to 1961, employment in Public Administration was included in the Service industry category. The 1966 to 1986 growth rates for Services have been calculated in two ways. First, Public Administration is included as part of Services. This maintains consistency with the 1946-55 and 1956-65 periods and these data are shown unbracketed. The second method calculates Service growth rates excluding Public Administration and these rates are shown in brackets.

These data show that agriculture experienced its greatest rates of decline in the immediate post-war decade. The rates of decline became smaller thereafter in every decade except the last. Perhaps surprisingly, in the last decade, employment growth in agriculture was actually positive.

The other primary industry went through a unique pattern of very rapid employment growth in the first and last decade and negative growth in the middle two decades. In contrast, manufacturing employment growth rates

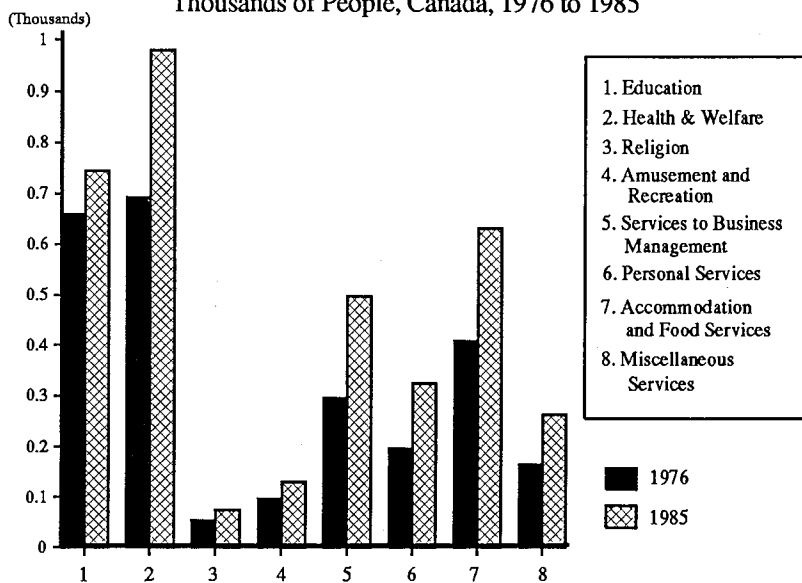
were stable in the first two decades and then fell progressively in the next two. Growth rates in the trade, finance, insurance and real estate and services industries were consistently high in each of the decades, though there were also some fluctuations in the decennial rates.

Services had the highest employment growth rate of any industry during all of the decennial periods with 67.2 percent in 1956 to 1965. The employment growth rate of the public sector in the decade 1966 to 1975 was the second highest of any sector on record with 58.7 percent. In the last decade, this sector's rate fell to 19.2 percent. Finance, insurance and real estate grew at the third highest decennial rate of 56.4 percent in 1966 to 1975.

SERVICE SUBSECTOR GROWTH

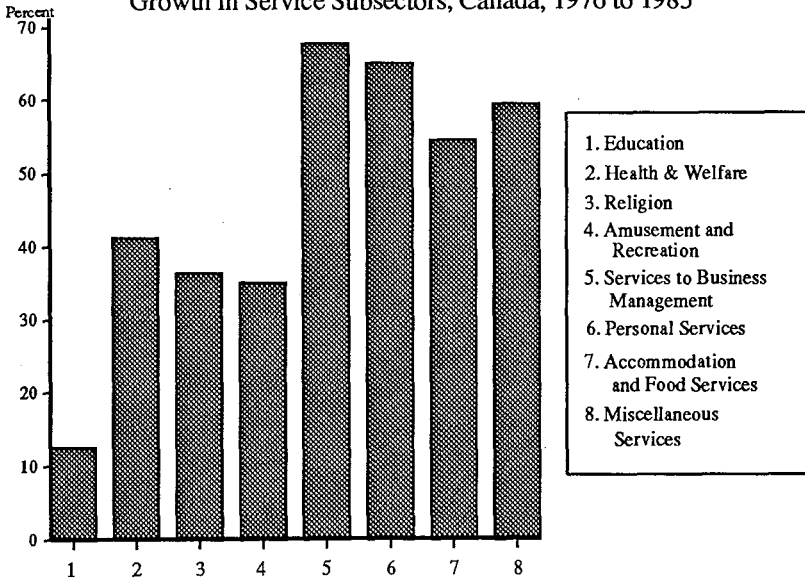
In 1985, Statistics Canada celebrated the 40th anniversary of the *Labour Force Survey* by compiling some special statistics on the growth of the service sector. The coverage of these data starts in 1976 and figures 7 and 8 show updates to 1985. The industries covered do not exhaust the service sector but have been selected on the basis of economic significance and data availability. We may assume that they cover the service industries of greatest economic and policy interest.

Figure 7
Employment in Selected Service Subsectors
Thousands of People, Canada, 1976 to 1985



Source: Same as table 2.

Figure 8
Growth in Service Subsectors, Canada, 1976 to 1985



Source: Same as table 2.

The absolute employment data in the first of the two figures reveal the overwhelming importance of employment in the education and health and welfare sectors in both 1975 and 1985. In 1985, health and welfare alone employed about 1 million people while education provided work for nearly 800,000 Canadians.

For later analytical purposes and in the doctrinal perspectives developed in chapter 1, it is worth noting that services bought by consumers, in comparison, were relatively small sources of employment. Leading in absolute number is the accommodation and food industry with about 620,000 in 1985. Personal services and amusement and recreation, which are almost symbolic of the service industries, together employed only about 420,000. In this context, we also find remarkable that the fourth-highest employment level is found in the services to business management industry.

Rates of Growth

The employment levels for individual industries in 1976 and 1985 shown in figure 7 were converted to growth rates and graphed in figure 8. These statistics point to the growing importance of the services to business management sector. It enjoyed the greatest growth rates of all sectors under

study at about 70 percent. It is followed by personal services, miscellaneous services, and accommodation and food services at around 60 percent.

Growing at much smaller rates have been the remaining service sectors. Most notable are the low growth rates of employment in education, around 17 percent, and the growth rates near 40 percent and much below average in employment in health and welfare, religious services, and amusement and recreation. These figures are only partly compatible with the view that service sector growth stems predominantly from spending on what is widely perceived to be almost symbolic of wasteful and decadent spending of our modern society, governments providing social services and consumer spending on personal services, amusement, and recreation. Only the robust growth in personal services seems to lend credibility to this view.

SPECIAL SUBSECTOR AND REGIONAL DATA

In 1987, the Department of Regional Industrial Expansion (DRIE) published *Employment Dynamics: Focus on Canada's Service Sector 1978-1984*. It contains data which were compiled specifically for this publication by Statistics Canada from Revenue Canada tax returns and some other relevant databases. The tables show, by industries, provinces, and for Canada, the number of firms in 1984, employment levels in 1978 and 1984, and total payrolls. The basic data have been subjected to some manipulation, and there are growth rates and shares of industries in employment totals by provinces. However, there is no interpretation of the data or testing of hypotheses. The tax return data do not provide exactly the same impression about the service sector as do the data presented in the preceding section, though the general information about trends is much the same. The reasons for differences are partly the different time period covered and partly the different database, that is the *Labour Force Survey* and income tax data, respectively. A reconciliation of the two sets of information will not be attempted here.

From the vast amount of basic information available in the DRIE publication, we have chosen to reproduce here tables 3 and 4. These data add to the information on the growth of the service sector presented in previous sections by showing industries at lower levels of aggregation than was available previously. It also permits some insights into the different developments which have characterized the provinces.

The tables show growth rates during a period which was characterized by the inflationary boom years 1978 to 1980, the recession of 1981-82, and the steady growth with price stability thereafter. The coverage of these different phases of the business cycle implies that the data reflect some cyclical forces at work but by and large show the effects of trends and structural change.

TABLE 3
Percentage Growth in Employment by Major Sector, Canada and Provinces, 1978 - 1984

SECTOR	NFLD	P.E.I	N.S.	N.B.	QUE.	ONT.	MAN.	SASK	ALTA	B.C.	CANADA
Goods Producing	-6.7	5.5	-0.2	-6.4	-11.0	0.9	-5.6	13.0	11.4	-8.1	-2.8
Primary	-7.2	54.7	9.6	3.6	-3.8	4.8	-7.2	49.5	44.0	4.1	13.6
Manufacturing	-6.6	-6.6	-2.4	-8.4	-11.5	0.6	-5.3	-2.4	-6.2	-11.2	-4.8
Service Industries	9.5	7.0	13.9	7.1	10.1	16.5	8.0	17.4	11.3	11.3	12.9
Construction	-17.7	-21.5	5.7	-23.3	-2.5	-0.8	-9.3	1.1	-28.7	-10.3	-8.1
Wholesale	7.5	3.8	2.6	3.0	1.4	15.1	5.9	13.5	-1.8	-3.4	6.3
Retail Trade	10.5	14.4	30.4	19.2	20.6	17.0	10.9	34.6	26.4	22.5	20.0
Transportation	-18.4	35.0	-2.6	3.8	-9.0	3.0	-8.8	3.8	9.2	7.0	-0.2
Communications and Utilities	-5.4	-7.6	3.2	1.7	-0.8	7.2	-3.8	15.8	15.7	-2.2	4.1
Finance Insurance and Real Estate	1.1	0.9	11.7	1.8	0.5	14.1	-1.4	11.5	5.3	12.6	8.5
Business Services	46.0	9.5	29.8	-6.1	22.1	32.0	14.0	45.5	27.5	28.8	27.6
Other Selected Services	19.1	36.5	23.3	12.1	4.0	24.4	15.5	28.2	16.9	14.3	16.6
Community Services	20.7	22.5	21.5	31.8	21.5	21.5	21.5	21.5	21.5	21.5	21.5
Public Administration	15.2	11.7	3.8	-2.0	10.3	15.4	9.5	3.1	14.1	2.2	10.3
All Industries	6.3	6.8	11.1	4.1	4.0	11.8	5.3	16.7	11.4	7.0	8.8

Source: Statistics Canada, Business Micro Data Information and Analysis, unpublished data.

TABLE 4

Total Percentage Growth in Employment by Industry Subsector, Canada and Provinces, 1978-1984

INDUSTRY	NFLD	P.E.I	N.S.	N.B.	QUE.	ONT.	MAN.	SASK	ALTA	B.C.	CANADA
Transportation											
Air Transport	1.2	34.7	11.1	0.8	-7.3	12.5	-1.9	-11.2	-4.2	7.7	2.2
Rail Transport	-49.8	0.0	-22.3	-14.5	-14.7	-15.5	-8.0	-12.8	1.9	-6.4	-13.1
Water Transport	80.6	54.8	-8.9	60.1	-28.3	-17.0	-39.1	-67.9	-10.9	-2.5	-7.7
Trucking	-7.5	22.0	2.1	40.1	-15.3	-1.8	1.6	23.3	14.1	-1.0	0.8
Other Transportation	-3.7	28.9	24.0	15.4	7.1	22.5	-28.4	15.8	17.5	50.2	17.6
Storage and Warehousing	76.9	0.0	-14.6	-27.4	-26.7	2.5	-33.2	1.2	-16.8	55.5	-1.1
Finance, Insurance and Real Estate											
Banks and other Deposit	-12.8	-9.1	-6.6	-9.6	-7.3	10.4	-5.9	9.0	15.3	2.4	3.0
Other Credit Agencies	-16.0	39.3	-14.3	-1.9	4.7	25.8	0.6	6.2	-1.1	9.4	10.5
Security Brokers, Dealers	84.2	180.0	94.2	42.4	48.7	91.1	83.3	135.0	54.6	250.2	95.5
Investment, Holding Companies	95.7	-47.4	116.2	28.7	25.8	26.1	31.6	8.8	-1.7	-35.5	7.0
Insurance Carriers	-2.2	13.8	11.7	-0.2	-1.2	4.3	-2.9	17.2	15.9	6.6	3.6
Insurance, Real Estate Agencies	13.3	46.0	61.2	33.8	14.1	17.1	26.4	1.3	7.6	27.6	17.9
Real Estate Developers	32.0	-28.3	32.4	10.0	5.9	11.8	-13.5	15.5	-13.7	14.9	7.0

Table 4 (continued)

INDUSTRY	NFLD	P.E.I.	N.S.	N.B.	QUE.	ONT.	MAN.	SASK	ALTA	B.C.	CANADA
Business Services											
Employment Agencies	160.2	0.0	26.8	-12.3	34.3	16.4	16.6	30.8	18.4	8.3	20.0
Computer Services	811.8	-45.5	266.3	872.7	181.5	125.6	204.4	96.3	147.0	208.8	150.9
Security, Investigation	29.6	0.0	30.1	-1.3	0.9	16.3	-5.2	38.3	20.4	26.5	11.3
Accountants	20.7	24.7	27.0	0.6	31.6	22.7	12.8	17.6	53.3	25.6	28.0
Advertising	235.3	300.0	-50.4	144.9	52.5	51.3	111.7	189.3	82.8	-2.3	46.6
Architects	7.3	-45.7	-16.2	69.1	30.1	17.6	-51.2	18.1	-30.9	6.9	3.0
Engineering, Scientific	50.4	2.2	81.7	26.5	-26.4	12.3	9.4	31.6	5.5	21.2	4.8
Lawyers, Notaries	36.6	33.6	51.9	9.3	43.6	36.8	16.7	61.4	88.0	87.4	49.8
Management Consultants	120.6	22.7	17.9	78.6	117.4	52.2	31.5	74.1	47.6	56.9	63.2
Miscellaneous Business Services	-10.0	-5.7	-7.7	-46.2	22.3	40.5	0.1	55.4	21.6	4.2	23.6
Other Selected Services											
Accommodation	1.5	22.8	20.5	3.6	-20.8	-5.0	7.7	7.4	10.9	-13.0	-5.3
Restaurants	27.0	46.1	21.6	17.8	12.7	25.5	21.2	43.2	22.1	32.0	22.9
Machinery Rental	7.7	-19.4	28.5	-25.4	-3.0	159.1	-16.2	34.5	0.5	11.7	63.9
Repair Shops	55.9	50.0	130.1	39.6	38.8	24.7	28.0	41.1	20.3	20.9	31.3

Source: Statistics Canada, Business Micro Data Integration and Analysis, unpublished data.

Growth Rates for Canada

The last column of table 3 shows that for Canada during the years 1978 to 1984 employment in all industries rose by 8.8 percent. It dropped 4.8 percent in manufacturing and 2.8 percent in the total goods producing sector. Employment in all service industries rose 12.9 percent. Negative growth rates in employment were found only in the major service subsectors construction (-8.2) and transportation (-0.2). The highest growth rates were registered by business services (27.6), community services (which includes education and health care) (21.5), and retail trade (20.0).

Table 4 shows breakdowns by some selected major sectors listed in the preceding table. In the transportation industry, the most notable facts are the decline in employment registered by rail and water transport and the relative stagnation of the remaining industries with the exception of the category, other industries. This sector employed 122,000 workers in 1984, in contrast with the 114,000 in trucking, and includes bus and urban transportation, taxi cabs, pipelines, highway and bridge maintenance, parking lots and garages, travel agencies, and miscellaneous transport covered by SIC 508-517. The dynamics of part of this industrial group is subjected to closer scrutiny by Palmer (1988).

Employment in finance, insurance and real estate grew at 8.5 percent, which was about a third less than the growth in total employment. This slow overall average was undoubtedly due to the low growth of only 3 percent of the banks and other deposit-taking institutions which had 243,000 employees in 1984 representing 40 percent of the sector's total employment. According to Chant (1988), during this period banks enjoyed the benefits of applying labour-saving electronics to many of their operations. Very rapid growth was enjoyed by security brokers and dealers (96 percent) which benefited from the national and global integration of capital markets as well as a drop in transactions costs brought about by the electronics revolution. Insurance and real estate agencies also grew at a rate above average (17.9 percent). According to Jenkins (1988), this growth has been due to changes in industrial organization which in turn received a substantial boost through the availability of electronic marketing and accounting systems.

The breakdown of business services in table 4 shows that this sector's high growth rate was driven by extraordinarily high growth rates in computer (151 percent), management consulting (63 percent), lawyers and notaries (50 percent), and advertising services (47 percent). Only architects and engineering and scientific services grew at low rates of 3.0 and 4.8 percent, respectively. Readers interested in a complete examination of these subcomponents of business services should see Gill (1988) on the legal profession, Palda (1988) on advertising, Lerner (forthcoming) on account-

ing and management consulting, and Hammes (1988) on consulting engineers.

However, the growth rates in the business sector and its components should be seen in the perspective of the relative levels of employment. In 1984, total employment in Canada was 9.6 million when all business services employees numbered only 459,000 or 4.8 percent. Computer services that year employed only 23,000, and management consultants 44,000. Finally, table 4 shows that employment in the category other selected services, machinery rental, grew at the very high rate of 64 percent while the industry accommodation shrank by 5 percent. According to Scarfe and Krantz (1988), the decline of accommodation industry employment is likely to have been due partly to reduced tourism but mainly to decreased business travel caused by the recession and slump of the early 1980s.

Even though the main objective of the preceding presentation is the introduction of general information about the service sector and not theorizing or hypothesis testing, it may be useful to present here just a few speculative remarks about the causes of the observed differences in growth rates of the individual sectors. Continuing on a theme already introduced and to be expanded upon, we note that the growth in the business services sector is likely to reflect the process by which market economies introduce into production increased supplies of human and knowledge capital. These increased supplies in turn are the product of regular gains in education levels of the population, which have been documented for Canada by Easton (1988) and West (1988) in their studies of the lower and higher education systems, respectively. The service industries output is also driven by the growth in the world's stock of knowledge.

Studies of individual industries in the Fraser Institute series on the service sector analyse at some length the driving forces behind the rapid growth in some and the slow growth of some other of the industries in tables 3 and 4. Readers with special interests in certain industries may wish to study these publications. While diverse and not easily summarized, it is possible to interpret these forces as reflections of the general human and knowledge capital deepening process that is central to our theory of service sector growth.

Some Data by Provinces

Tables 3 and 4 contain information on the growth of industries and service subsectors by individual provinces. It is possible to note only a few generalizations and highlights from these tables. In table 3 we note the following.

First, high employment gains in the goods producing sector took place during the years 1978 to 1984 only in Prince Edward Island, Saskatchewan,

and Alberta. In each case, this growth was attributable to very large gains in primary production (55, 50, and 40 percent in the three provinces, respectively). Manufacturing output fell in all provinces except Ontario, where it rose 0.6 percent. The drop was especially great in Quebec (12 percent) and British Columbia (11 percent).

Secondly, employment growth in the service sector was positive in all provinces and the interprovincial variance was smaller than in the case of goods sector employment. The employment boom enjoyed by Ontario and Saskatchewan (17 percent in both) during this period is reflected in service sector growth much above the national average of 13 percent.

Third, the variance in employment growth in the service industries generally is large and there appears to be some correlation between the performance of the goods sector and service industries producing inputs used by the goods sector. However, there are some notable anomalies. Despite Ontario's sterling overall employment growth, the retail sector grew only 17 percent, which is less than the average 20 percent in other provinces. On the other hand, even though overall growth was poor, the retail sector in British Columbia generated employment growth at 23 percent, which is above the national average. These differences probably reflect the widespread introduction of Sunday retailing in British Columbia and continued prohibitions against it in Ontario. Deregulation is also likely to have had much influence on the differences in the employment growth rates of communications and utilities, finance, insurance and real estate, and business services, in all of which British Columbia performed better than would have been expected.

Fourth, the variance in employment growth in public administration is very great, with Ontario leading the pack on the high end (15 percent) and New Brunswick at the low end (-2 percent). British Columbia, with a government known for its restraint programme, had a growth rate at 2.2 percent, the second lowest in Canada. However, in terms of government spending recorded in community services and consisting to a considerable degree of programmes funded and directed by Ottawa, such as medical care and higher education, the variance in employment growth rates across provinces was near zero.²

Industry Subsectors

The data in table 4 again reveals large variances in employment growth rates by provinces for individual industry subsectors. It is not possible to comment on such differences without guidance by some policy interest or theoretical proposition. However, a quick scanning of the table shows that the greatest growth rates and variances across provinces are found in security brokers and dealers. British Columbia's industry gained 250 per-

cent employment while the national average was only 96 percent. This development undoubtedly reflects the growth of the Vancouver stock market as a centre for raising and trading speculative capital for ventures in natural resources and high technology. It is remarkable that this expansion has survived the depression in this market during the early 1980s.

Very large percentage gains and variances in employment are also found in computer services. Gains in smaller provinces like Newfoundland (812 percent) and New Brunswick (873 percent) should probably be interpreted cautiously since even relatively small absolute changes on a small base generate large percentage gains. However, it is remarkable that in Ontario, where the rest of the economy boomed and public administration employment grew more rapidly than the national average, computer service employment growth lagged behind the national average (126 as against 151 percent). By contrast, British Columbia with its depressed goods market and very low growth in public administration enjoyed gains in computer services employment of 209 percent, significantly above the national average.

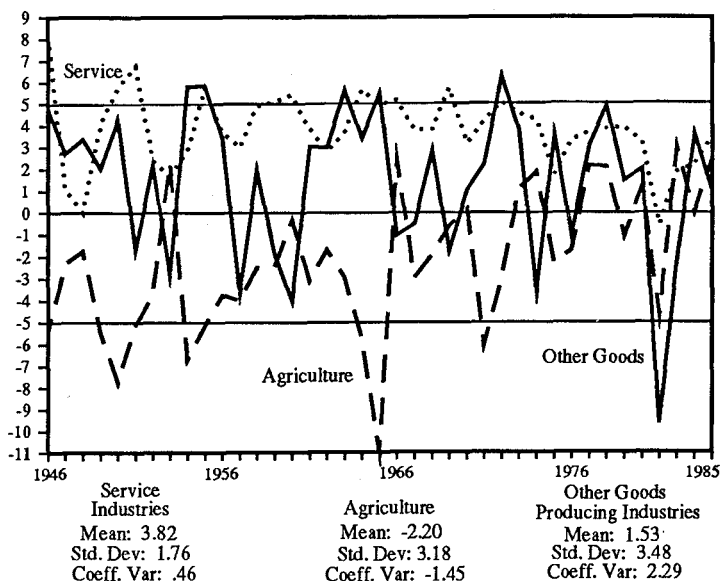
One interesting but highly speculative interpretation of this difference between these two large provinces is that lack of employment opportunities in the goods and government sector in British Columbia pushed some workers into seeking self-employment in the computer service sector whereas this incentive was absent in Ontario. This interpretation has important implications for understanding the nature of the service sector. On the one hand, the production of goods and government services drives the demand for producer services, but the slow growth of computer services in Ontario, relative to the growth in the rest of the economy, suggests that it can have a less than proportional effect. On the other hand, the growth can also be supply driven. According to our theory of embodied services sketched above, this supply generates its own demand. It does so to the extent that the computer and similar service industries succeed in the creation of innovative and efficient output for user industries. These service inputs are demanded by user industries because they generate gains in productivity greater than their costs. Under competition they also improve the competitiveness of the goods producing sector and help overcome the kinds of difficulties which, for example, beset the British Columbia industries in the wake of the collapse of the global boom in natural resources in 1980 to 1983.

EMPLOYMENT STABILITY OF GOODS AND SERVICE INDUSTRIES

In this section we consider the employment stability of the service industries and compare it with that of the agricultural and other goods

producing sectors of the Canadian economy. The analysis uses the *Labour Force Survey* data from 1946 to 1984-85, which also underlay the discussion of post-war trends above.

Figure 9
Annual Growth Rates in Employment, 1946 to 1985



In figure 9 we have plotted the year-to-year percentage changes in employment for the three sectors. We have chosen not to show deviations from the mean or trend in the time series since our main interest is in showing the simple variance in the annual fluctuations in employment growth. Because of our approach, the lines shown fluctuate around the average annual employment growth rate of each sector. As is clear from the analysis above, employment in the service industries grew at an average annual rate of 3.82 percent while the growth rates for agriculture and the other goods producing industries were -2.2 and 1.53 percent, respectively.

The graph also reveals quite clearly that all three industries have experienced substantial fluctuations in annual rates of employment growth. There does not appear to be a strong correlation in the series except in 1974 and 1981, when all three series exhibit large downturns, and during the years in between when all series turned up. In both years of large declines in all three series there were large global recessions, the first one due to the energy price increases forced by OPEC actions and the second due to very

restrictive monetary policies in most industrial countries designed to reduce inflation. It is worth noting that in 1981-82 employment growth in the service industries was negative for the first and only time during the post-war years.

The variance of employment growth rates is smallest in the service industries, somewhat smaller in agriculture, and largest in the other goods producing industries. This visual message is confirmed by the two statistical measures of the magnitude of the fluctuations shown in the graph, the standard deviation and the coefficient of variation. The coefficients of variation (standard deviations divided by the means) for agriculture and other goods producing industries are about three and four times as large, respectively, as the coefficient for services.

Some Secondary Trends

Figure 9 also reveals trends in sectoral employment growth that are not readily discernible from the other statistics discussed above. Most remarkable is that a trend line fitted through the data concerning the annual rates of change in agricultural employment would have a clear upward slope, even though it would be in the negative range during most years. The average during the first ten years after the war was about -5 percent and the average during the last ten years was about zero percent. Thus, the post-war crisis in the form of declining employment in agriculture appears to have become less important.

Employment growth rates in the service industries, on the other hand, show no trend around a mean of about 4 percent between 1946 and 1974. Thereafter, all annual values were below this trend, but it is not clear whether the last ten years show just a lower level or a downward trend. Seen from these same perspectives, the other goods producing industries' employment growth rate has been remarkably stable throughout the period.

It is worth noting that trends in the employment growth rates of agriculture and services are to a certain extent the outcome of the fact that the levels of employment in the two industries are approaching zero and 100 percent, respectively. It is a logical necessity that once employment in agriculture approaches zero the annual average rates of decline must become smaller and approach zero asymptotically. An analogous process affects a sector approaching 100 percent.

A Note on Causes of Differences

In a Ph.D. dissertation written at the Department of Economics at Simon Fraser University, Mohammed Ansari (1988) documented that during the post-war years the goods and private service producing sectors in Canada

exhibited distinctly different patterns of wage behaviour. Real wages in the goods producing sector rose rapidly during periods of global resource booms and remained stable during recessions. On the other hand, while real wages in the service sector moved up during these global resource booms as their effects spilled over and affected the service industries, service sector wages were much more responsive to decreases in demand than were goods sector wages and actually fell during some recessionary periods.

Important causes of these differences in real wage behaviour of the two sectors are the higher levels of unionization and the larger firm sizes in the goods producing sector. Union contracts and militancy mitigate against decreases in real wages during slumps. The willingness of owners as well as employers of small firms to accept lower incomes when business is poor generates the same effects as risk and profit-sharing schemes (see Grubel, 1987c, for a study of these schemes). It results in greater effective real wage flexibility and, most important for a wide range of public policy issues, the correspondingly greater employment stability of the total service sector noted in figure 9 and of the private service sector discussed in Ansari (1988).

Conclusions

The data on employment growth in Canada show that the service industries have been a source of relative stability, though they have also experienced substantial fluctuations in employment growth rates. Since the annual growth rates of the Canadian labour force have been quite stable and the fluctuations in employment growth in the three sectors were not perfectly negatively correlated, the service industries have contributed some to the fluctuations in the Canadian unemployment rate during the post-war years.

The different sizes of the base from which annual employment growth rates are calculated have some important implications for the absolute fluctuations in the rates of employment creation by the three sectors. For example, since the service industries represent 70 percent of all employment, a decline in the rate of job creation from 5 to zero percent annually means that 3.5 percent of the total labour force did not find jobs. By analogy, another industry which makes up 30 percent of the total and goes from a 5 to a zero percent annual growth rate produces a loss of only 1.5 percent of total jobs. Thus, even the relatively minor percentage fluctuations in the service industries' employment growth rates have substantial repercussions for the absolute numbers of jobs created.

A study and data by Ansari (1988) not presented here suggest that the differences in the stability of employment of the goods and private service producing sectors is due to a considerable degree to the greater real wage flexibility of the service sector. This difference in real wage flexibility in

turn is associated with lower levels of unionization and relatively larger average size of firms in the goods producing sector.

SOME LIMITATIONS OF THE DATA

Like all statistical data, those on employment by industries have important limitations of which users should be aware. The first of these is conceptual and central to the analysis of the role of services in the economy. It stems from the fact that the classification of an industry is determined by the characteristics of its final output and reflects only imperfectly the occupational activities of its employees.

A goods producing firm employs traditional factory workers who handle, assemble, transform, and otherwise change tangible materials into goods for sale. But this same firm also employs accountants, lawyers, computer experts, and other service producing individuals. Under existing statistical procedures, these service producing employees are counted as employees of the goods producing sector.

By analogy, service producing firms often have in their employ individuals who produce goods. Science labs have glassblowers and some computer service firms have electricians and mechanics.

These characteristics of the employment data mean there is no necessary correspondence between the number of people who consider themselves to be in service occupations and work and those who are reported as employees of service industries.

These characteristics also give rise to the important problem of "disintegration" or "contracting out" of services, which is defined as the act by goods producing firms of buying in the market certain services which they had produced within the organization previously. This phenomenon is important in principle since its occurrence leads to statistically reported growth of service output which is essentially illusory. It is matched by a corresponding decrease in service output in another sector, though it shows up as a decline in goods production.

The problem of contracting out has been discussed by McFetridge (1988) and McCharles (forthcoming) in the Fraser Institute series of service sector studies. We review these publications and other literature in a later chapter below. While there was evidence of some contracting out during the post-war years, the bulk of the growth of service sector employment reflects genuine net growth.

Problems of Coverage

Another important limitation of the data on employment in the service and goods producing sectors stems from the survey procedures used by Statistics Canada. Some of the basic data on employment are gathered through the survey of establishments and companies. The main problem with these surveys is that new firms and small firms are difficult to find and include.

Unfortunately, these problems of coverage are more significant for the service than the goods producing sector. A relatively small number of very large employers provide the overwhelming bulk of employment in the goods producing sector. As a result, employment growth rates are considered to be quite reliable since there appears to have been little shift of production to the small firm sector.

The service sector, on the other hand, is characterized by small firms with numbers of employees that exclude them from the statistical surveys. This is an especially serious problem since independent evidence from the United States suggests that in recent years large numbers of these small firms have been founded and have provided the bulk of new employment in the service sector.

Tables 3 and 4, which are based on income tax data, do not suffer from the same shortcomings as the tables which are based on establishment surveys. For this reason, the evidence on the growth of the service sector found in these two tables is the more reliable.

NOTES

1. In defense of the existing classification scheme we may consider the 1946 employment data in table 2. They show that agriculture and manufacturing each employed more people than any other of the industries shown, including services. At that time it must have seemed reasonable to design the large number of goods production categories and treat service producing activities at a more aggregate level.
2. With the national average at 21.5 percent and the maximum deviation of other provinces at 1 percentage point, the 31.8 percent for New Brunswick seems so extraordinary that it is tempting to question the validity of this provincial figure.

CHAPTER 4

GROSS DOMESTIC PRODUCT OF SERVICE SECTOR INDUSTRIES

In this chapter we present data on the value of the economic activity generated by service industries in Canada. This economic activity is known technically as value added or Gross Domestic Product (GDP) at factor cost.¹ It measures the expenditure of firms in the service sector on the so-called original factors of production—labour, capital, and land. In practice, GDP is estimated by subtracting from an industry's gross output the value of all intermediate inputs which leaves as a residual the spending on the original factors.

It may be useful to briefly illustrate the concept of GDP at factor prices by numbers from two traditional industries characterized by very different relative sizes of gross output and GDP. On one extreme are trading activities. In 1983, total retail sales were \$123 billion. Since intermediate inputs (primarily the wholesale value of the goods retailed) were \$102 billion, the GDP of the retailing industry in 1983 was \$21 billion. The ratio of GDP to gross output was 0.17. At the opposite size of GDP relative to gross output is the community, business and personal services industry. In 1983, it had gross sales of \$102 billion but intermediate inputs of only \$29 billion and therefore a GDP of \$73 billion. Its GDP to gross output ratio was 0.72.

Employment and GDP are the most widely-used measures of the relative economic importance of individual industries. It is quite clear from the definition and the method for calculating GDP that there is a high degree of correlation between GDP size and employment. Nevertheless, there can be divergences of the two measures since the amounts of capital per worker and land used are different in each industry.

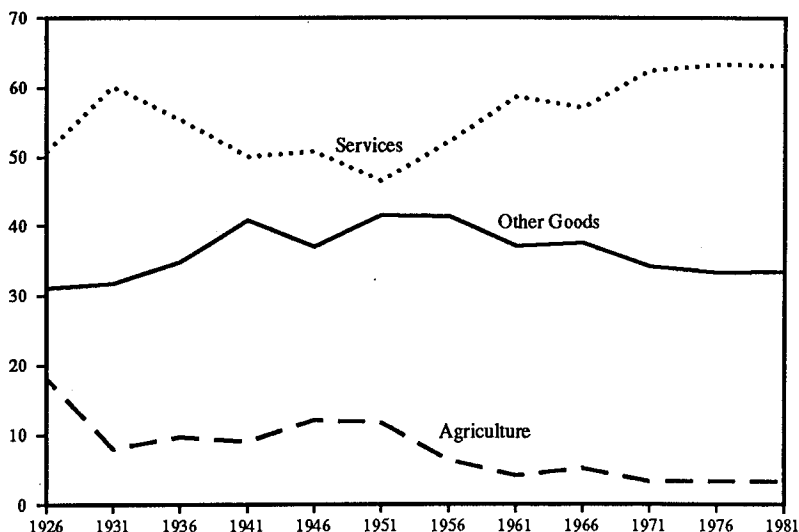
Differences in the growth rate of real GDP and employment reflect changes in the productivity of the factor inputs. For this reason, chapter 4

presents the available evidence on the relative size of service industry GDP and the growth rates of GDP of individual industries.²

AGGREGATE HISTORIC TIME SERIES 1926 to 1981

We first consider the longest time trend possible given existing historic statistics. In this compilation we attempt comparability of GDP data with the employment statistics that were presented in figure 1. Thus, figure 10 shows what percentages of total GDP were produced by agriculture, other goods producing, and service producing industries during the period 1926 to 1981.³

Figure 10
Historic GDP Shares at Current Prices



Source: Statistics Canada, Historical Statistics of Canada, 2nd ed. 1983, section F, series F225-240.

Figure 10 shows that changes in the output shares of the agricultural, other goods, and service producing sectors have not been entirely smooth. The distinct trends which play a central role in many of the models and policy recommendations presented in chapter 1 have persisted only since the 1950s and even then they have not been completely stable.

The GDP share of agriculture was on a secular decline between 1926 and 1971, though there have been short and small interruptions of the downward trend caused by the second World War. Interruptions of the trend also occurred when favourable conditions in world markets and prices

for agricultural products combined with good harvests in Canada. From 1972 to the present, the share of agriculture in GDP has been remarkably constant at around 3 percent.

From 1926 onward, the GDP of other goods producing industries rose. As a result of the war and the following period of increased demand for goods that were scarce during the war, the share continued to rise before it reached a peak in the first half of the 1950s. Since then, it has been falling and in recent years has been at a level about 4 percentage points below its previous low in 1926.

The service producing industries reached a peak of 60 percent of GDP in 1931, then fell for the next 20 years to a low of about 47 percent in 1951. During the following 30 years, the service industry GDP share rose to about 68 percent.

GDP Compared with Employment

It is instructive to compare the GDP data in figure 10 with the employment data in figure 1. As can be seen from the graphs, the percentage of people working in agriculture has dropped much more sharply than the percentage of total GDP attributable to the industry. The reverse relationship holds for the service sector where the employment share has been on a much steeper upward trend than has the GDP share. In the other goods producing industries, by contrast, shares have been relatively constant by both measures.

These results are explained by the relative labour productivity and capital intensities of production used in these three sectors. During the period under observation, the agricultural industry used increasing amounts of capital per worker, and there have been large increases in the market value of the land used in production. Capital has replaced workers and raised the productivity of the remaining workers. Since GDP measures the value of land and capital inputs as well as labour, the rapid growth in the former has made agricultural GDP fall more slowly than employment.

The opposite effect has dominated in the service producing industries. The capital (and relatively minor land) inputs rose more slowly than the labour input compared with the relevant input trends in the rest of the economy. By contrast, the growth of labour and other factor inputs in the other goods producing industries has been roughly the same as in the economy as a whole.

Conclusions

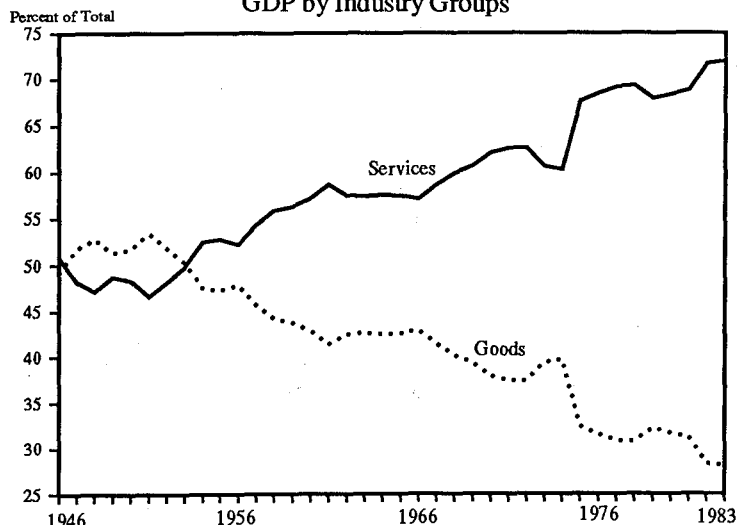
The long historic time series on GDP at factor cost by large industrial aggregates basically reconfirms the findings of the preceding chapter based

on employment statistics. The service producing industries in Canada contribute the largest share to the output of the economy. In recent years this share has risen to over two-thirds of the total. The share of service GDP in total GDP has grown somewhat more slowly than the share of service employment. This is because the amount of capital per worker and productivity in the service sector have grown more slowly than in the rest of the economy.

INDUSTRIAL AGGREGATES SINCE 1946

In this section we present a more detailed analysis of the post-war years, concentrating on high levels of aggregation and a comparison with the employment data presented in figure 2. Figure 11 shows the time series of GDP at factor cost and in current prices covering goods and services annually for the years 1946 to 1983.

Figure 11
GDP by Industry Groups



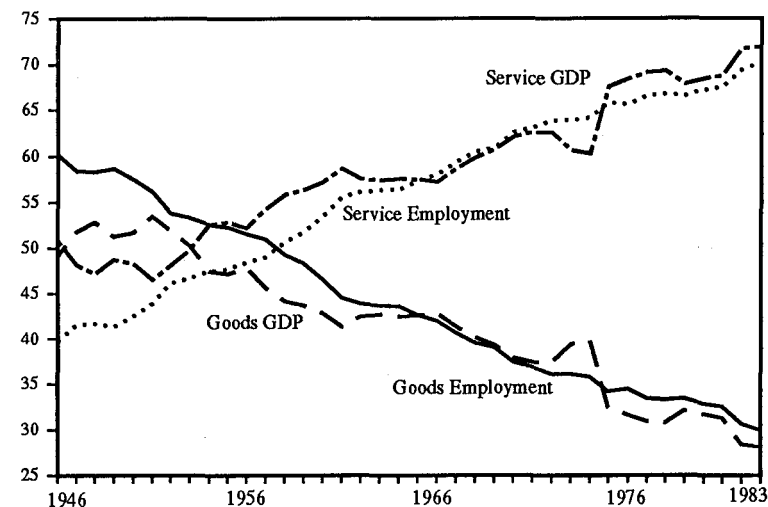
Source: Statistics Canada, National Income and Expenditure Account
Volume 1, The Annual Estimates 1926-74, catalogue 13-531, Occasional, 1976 for years up to 1971.
GDP by Industry, catalogue 61-213, 1981, 1984, for years after 1971

At the beginning of the period, GDP of the two sectors was practically the same at about 50 percent. During the following six years, the goods producing sector of GDP was marginally above that of the service producing sector. Since 1953, service sector GDP has grown much more rapidly than goods producing GDP. By 1983, these different growth rates had

resulted in service GDP representing about 73 percent of the total while that of the goods producing sector reached a low of 27 percent.

The changes in the shares of GDP of the two sectors has not been smooth. There were upturns in the relative size of the goods sector in the early 1960s, early 1970s, and in 1978-79. These years were characterized by a global boom in natural resource prices and demand, which had obvious implications for the output and productivity of the goods producing industries in Canada. The large jump in the time series in 1974-75 appeared after a revision of the data by Statistics Canada, presumably in response to the unusually large changes brought about by the energy price increases that followed the actions of OPEC in 1974.

Figure 12
Employment and GDP Shares by Industry Groups



Source: Statistics Canada, National Income and Expenditure Account
Volume 1, The Annual Estimates 1926-74, catalogue 13-531, Occasional, 1976 for years up to 1971.
GDP by Industry, catalogue 61-213, 1981, 1984, for years after 1971

GDP Compared with Employment

Figure 12 combines the time series of employment and GDP shares for the service and other industries in Canada during the post-war years. Three facts are worth noting. First, until the late 1950s, the series on employment

and GDP diverge by substantial margins for both goods and services. Second, the shares of goods and service GDP were equal in 1946 and 1953 while those of employment were equal only in 1958.

Third, after 1961 and until 1973 and 1974, the employment and GDP shares track very closely for both goods and services. In 1973 and 1974, the shares diverged quite sharply, and while the employment shares remained on an almost unchanged trend line, the GDP share of goods reversed the trend and actually rose. Correspondingly, during these two years the share of service GDP actually fell. We believe these developments were due to the energy price changes and natural resources boom. Between 1974 and 1975 these abnormal changes in GDP shares were offset by extraordinarily large changes in the opposite direction. Thereafter, the time series again track each other to a remarkably close degree.

Conclusions

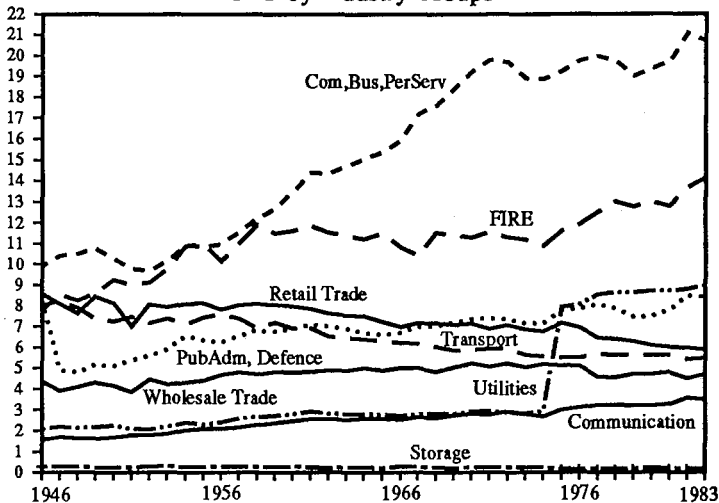
The annual data on the size of GDP originating in service industries during the post-war years in Canada show that the sector has been growing continuously in importance. Starting at a level of 50 percent in 1946, the share of service GDP reached 68 percent in 1983. These results were almost the same as those discovered for employment in the service industries, though during the post-war years there were some interesting subperiods during which trends in the development of GDP shares were reversed temporarily. According to these data, it is not unreasonable to suggest that relative shares of GDP and employment in the two sectors followed the same trends, most notably so since the early 1960s until the latest years.

SERVICE INDUSTRY GROUPS 1946 to 1983

Figure 13 presents time series on the share of total GDP contributed by the basic industries making up the service sector in Canada. Figure 14 shows the percentage growth rates in GDP of these industries during the period 1946 to 1983. Several facts stand out from this representation.

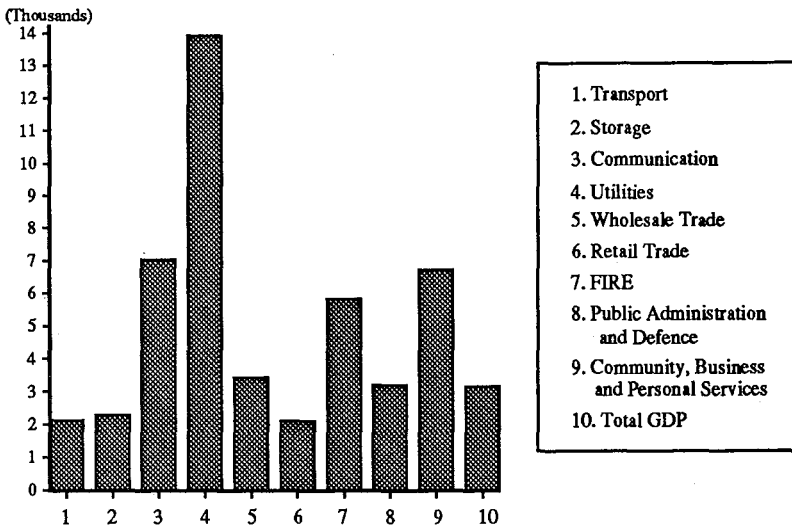
First, the community, business and personal services industry, which includes education and medical care, has been the largest throughout the entire post-war period. Moreover, its relative importance has increased from only 10 percent in 1946 to 22 percent in 1983. Yet, the growth of this sector has not been steady. After near zero growth between 1947 and 1957, it rose rapidly during the next 15 years when a boom in school-age children and the introduction of universal medical care generated large increases in spending on education and health care services. Since 1972, the share of this sector has remained nearly constant. A look at the growth rates in figure 14 shows that this growth converted to only the third highest rate of

Figure 13
GDP by Industry Groups



Source: Statistics Canada, National Income and Expenditure Account
Volume 1, The Annual Estimates 1926-74, catalogue 13-531, Occasional, 1976 for years up to 1971.
GDP by Industry, catalogue 61-213, 1981, 1984, for years after 1971

Figure 14
Growth Rates of Industry Groups, 1946 to 1983
in Current Dollars



Source: Statistics Canada, National Income and Expenditure Account
Volume 1, The Annual Estimates 1926-74, catalogue 13-531, Occasional, 1976 for years up to 1971.
GDP by Industry, catalogue 61-213, 1981, 1984, for years after 1971

all the service industries during the period. It has been exceeded by a large margin by the growth rate of utilities and only slightly by that of communications.

Second, the finance, insurance and real estate industry (FIRE) has the second largest GDP share of the service sector. It has also had the fourth highest growth rate.

Third, the public administration and defence industry has experienced steady growth after the sharp drop following the second World War in 1947. It has been the fourth largest industry in recent years, and while its growth rate between 1946 and 1983 is equal to that of total GDP, the rate from 1947 to the last year has been much above the total economy.

Fourth, the highest growth rate of any industry during the years was achieved by the electric power, gas and water utilities industry. Figure 13 reveals that the GDP of this industry experienced a dramatic jump between 1974 and 1975. This was due to the sharp increases in energy prices throughout the world that resulted from the actions of OPEC in 1974. However, it is interesting to note that the equally large increases in oil prices in 1979 did not produce a similar jump. The National Energy Program enacted during this period prevented the full economy-wide impact of these price increases.

Fifth, the basic support service industries, transport, storage, wholesale and retail trade, have contributed roughly constant shares to GDP. The communications industry has grown so rapidly that it is placed second after utilities. This development is due to the technological revolution in electronics and the accompanying fall in the relative price of the industry's output. However, figure 13 shows that in spite of this strong growth, the industry's GDP is only about 3.5 percent of the total.

Conclusions

In general, the data reconfirm the findings of preceding chapters. Quantitatively, the most important industries are community, business and personal services, and finance, insurance and real estate, which provide substantial inputs into further production. The communications industry has also shown very high growth rates. These facts represent the foundation of the general theory of service sector growth which we develop below.

We have not made detailed comparisons of GDP and employment growth in individual industries. Not much insight would be derived from such a tedious exercise. The close correlation in the growth rates of the two measures at high levels of aggregation noted in the preceding sections carries over to the individual industries in general. Deviations are explained by

changes in the industries' relative use of labour and capital as was discussed in the context of figure 10 for agriculture and services.

NOMINAL AND REAL GDP AND EMPLOYMENT GROWTH

In the preceding section we presented data on the current dollar value of GDP of individual sectors. For many purposes of analysis, however, it is more relevant to study real magnitudes. Unfortunately, the derivation of real from nominal dollar values is difficult practically and, because of changes in the basic nature of goods and services through time, is difficult to do even conceptually.

This problem can be appreciated readily by considering whether the real cost of television sets has risen or fallen when consumers stopped buying 15-inch black and white receivers costing \$100 and started buying 15-inch colour receivers costing \$150. The problems are even greater in the case of services, for example in medicine and government, where measures of output are ambiguous. How does one measure improvement in health delivered by a doctor or the relief of suffering generated by the efforts of a social worker? In the absence of a clear unit of output measure, it is impossible to establish a cost per unit of output and therefore a price index. Moreover, there are no unambiguous measures of the quality of these kinds of services. We return to the thorny issue of quality changes in our chapter on productivity.

In spite of practical and conceptual difficulties, Statistics Canada prepares estimates of real and nominal GDP growth and levels for a large number of industries. It does so by estimating each year the prices relative to some base year of each industry's gross output and of the intermediate inputs it uses. These price indices are used to deflate gross values and obtain estimates of real values for both gross outputs and intermediate inputs. The difference between the two is the real dollar value of GDP.

Figure 15 presents data by large service industry groupings for the period 1971 to 1983, with 1971 prices as a base year. It can be seen that inflation was significant during this period. The GDP of all service industries measured in current prices rose about 350 percent while GDP in 1971 prices rose only about 50 percent.

It is also evident from the graph that there are differences in the real GDP growth rates by the industry groupings shown. Most important, the ranking of the groupings changes according to the measure used. While finance, insurance and real estate shows the greatest nominal and real growth rates, public administration and defence moves from second place in nominal to last in real terms. Transportation, communications and utilities, on the other hand, ranks fourth in nominal and second in real terms.

Figure 15

Nominal GDP, Real GDP, and Employment Growth, 1971 to 1983

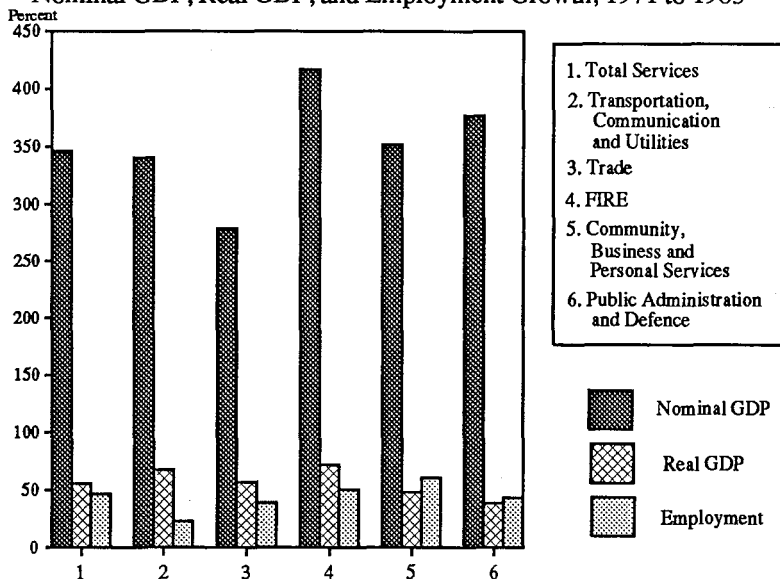
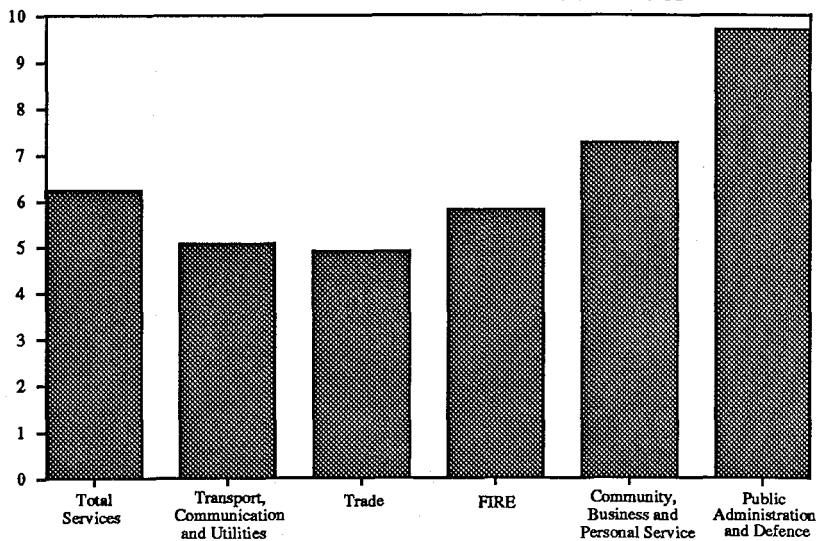


Figure 16

Service Industries GDP

Nominal over Real Growth Rates for 1971 to 1983



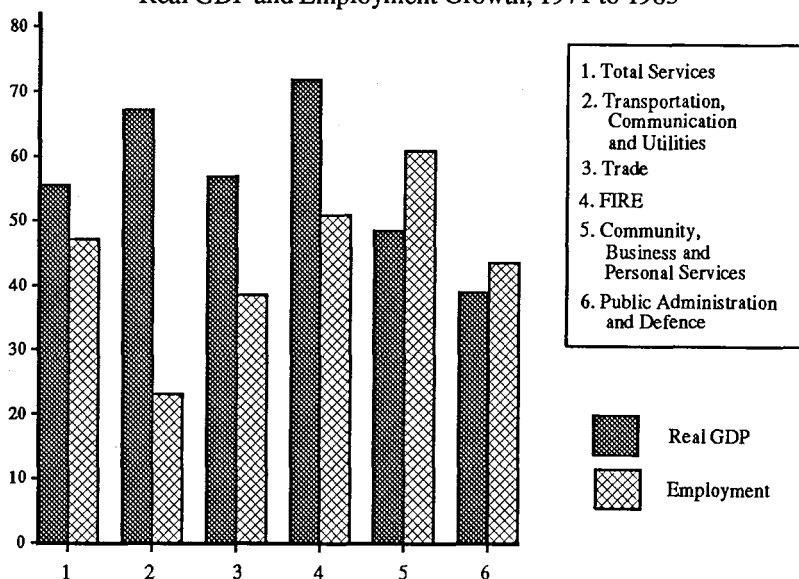
Source: Statistics Canada, GDP by Industry, cat. 61-213, 1981, 1984

Another and perhaps clearer representation of the relationship between nominal and real GDP growth rates by service industry subsectors is shown in figure 16. It shows the ratio of the 1971 to 1983 percentage growth rate in nominal terms over that in real terms. Public administration and defence has by far the largest ratio while that for wholesale and retail trade is the smallest.

Employment

In figure 15 the third bar for each industry grouping shows the growth of employment in the period 1971 to 1983. The relationship between the growth in real GDP and employment is important since it reflects increases in the productivity of labour. In order to show this relationship more clearly and to permit easier ranking of the industry groupings by real GDP, figure 17 presents the real GDP and employment growth rates at the appropriate scale.

Figure 17
Real GDP and Employment Growth, 1971 to 1983



For the total of service industries, the employment growth rate of about 47 percent was 9 percent smaller than the growth rate of real GDP of 56 percent. This implies that during the period 1971 to 1983 labour produc-

tivity in services overall rose by 9 percentage points. However, there were wide differences in productivity growth between the industry groupings.

The greatest productivity growth rate was in transportation, communications and utilities, the second highest in finance, insurance and real estate. At the other extreme are community, business and personal services which experienced a considerably larger growth in employment than in GDP. Similar, but smaller negative productivity growth rates were experienced by public administration and defence. In a later chapter we discuss in some detail the real and statistical causes of such negative productivity growth.

Conclusions

The data presented in this section show that the performance record of service industries differs according to the measure used, nominal and real GDP, and employment. The real growth rate of the industry grouping transportation, communications and utilities is much greater than the growth rate of its nominal GDP and employment. This reflects both the growth in real energy prices and the productivity-increasing effects of the electronics revolution during the period under observation. At the other extreme, the second place in the nominal GDP ranking held by public administration and defence is replaced by rankings at or near the bottom by real GDP and employment growth for that industry grouping. This, in turn, reflects the nature of the services provided by the sector, which makes difficult the application of labour-saving technology and impedes productivity growth.

SUMMARY AND CONCLUSIONS

The main objectives of this chapter have been to provide some insights about the service industry sector in Canada based on statistics about GDP and the value added by the service industries, and to discuss relationships between nominal and real GDP and employment.

The data show that, for the service industries as a whole, most of the generalizations made in the earlier chapter on employment with regard to growth and relative size of the goods producing sector carry over to the GDP measure. However, there are some significant differences in the rankings of industry groupings on the basis of growth rates in nominal and real GDP and employment. These differences are due to differential rates of price changes and productivity growth experienced by these industries. These findings suggest that business and government planning decisions should be based on consideration of all three measures of performance of service industries.

NOTES

1. The adjective "domestic" indicates that income earned abroad by factors of production in the industry is excluded from the estimates. By contrast, foreign factor incomes are included in Gross National Product. The adjective "gross" indicates that depreciation has not been subtracted from the payments received by capital. The difference between GDP and GDP at factor cost is that the latter values are purged of all indirect taxes which inflate the prices of inputs and outputs.
2. The data used in this chapter are prepared and published regularly by the same division of Statistics Canada which deals with all of the national income and product accounts. Historic time series going back to 1926 were taken from *Historical Statistics of Canada*, second edition. Data coverage in this volume ends with the year 1976. To continue the series and to obtain more details by industry subgroups in the post-war years, we used a special publication of national income accounts cited in the notes to the relevant tables. For data from 1971, we consulted the publication *GDP by Industry* (61-213) which unfortunately ceased publication in 1984.
3. In the compilation of these series we have included in the service industries the following industrial categories:
 - transportation;
 - storage;
 - communications;
 - utilities;
 - wholesale trade;
 - retail trade;
 - finance, insurance and real estate (FIRE);
 - public administration and defence; and
 - community, business and personal services.

It is clear that we have thus treated construction as a goods producing industry.

CHAPTER 5

SERVICE CONSUMPTION EXPENDITURES

In the introductory chapters we discussed the history of thought of the service industries and noted the dominant preoccupation of classical economists with consumer services. To this day, one of the most widely-accepted propositions about consumer services is that demand for them rises more rapidly than income and that the implicit income elasticity of demand characterizes them as a luxury. Much of economists' thinking about services has been dominated by the Baumol-Fuchs model of differentially lower productivity growth in the consumer and government service sectors which results in a permanent and creeping bias toward inflation. In our analysis of current policy concerns over the growing dominance of the service sector, we found a similar preoccupation with the impact of public and private service consumption on productivity, inflation, and the cost of government.

To provide a background for a theoretically and empirically testable model of the demand for consumer and government services to be presented below, we devote this chapter to the analysis of some readily available data on service expenditures by Canadian households. Many readers may find the data of some interest since they lend themselves to comparison with personal experiences and invite speculation about future trends in demand and business opportunities. Many other readers will be surprised to find there is very little evidence supporting the conventional wisdom about the high income elasticity of demand for consumer services, even at the relatively descriptive level of analysis carried out in this chapter.

AGGREGATE SERVICE CONSUMPTION EXPENDITURES

Every few years Statistics Canada surveys a large number of households to obtain a record of how they spend their incomes. The raw data collected go

into great detail about the categories of expenditures. For example, they ask about spending on restaurant food in two broad categories, "Locally and on Day Trips" and "While on Trips Overnight or Longer." The former category, in turn, is broken down into restaurant meals taken at work, at school, other meals out, and between meal foods.

The expenditure surveys also contain detailed demographic information about families such as size, marital status, location and characteristics of residences, and income. The raw data from these surveys serve as inputs into the construction of a number of fundamental statistics, such as the consumer price indices. For this chapter we have used a special compilation of data published in *Family Expenditure in Canada*.¹ The tables in this publication focus on family expenditures which are aggregated into relatively broad categories and cross-classified according to income, family size, and similar characteristics.

As in all statistical series, the family expenditure series has its shortcomings and needs to be interpreted with caution. The main problem with this series is the low response rate of participants in the survey. This is understandable, given the detailed recordkeeping required of households that take seriously the request for information about their spending. In addition, the surveys cover only selected urban areas rather than the entire country. One expert familiar with the construction of the family expenditure survey noted in correspondence with us that the data are "indicative" not "conclusive."

Selected Aggregates 1974 and 1984

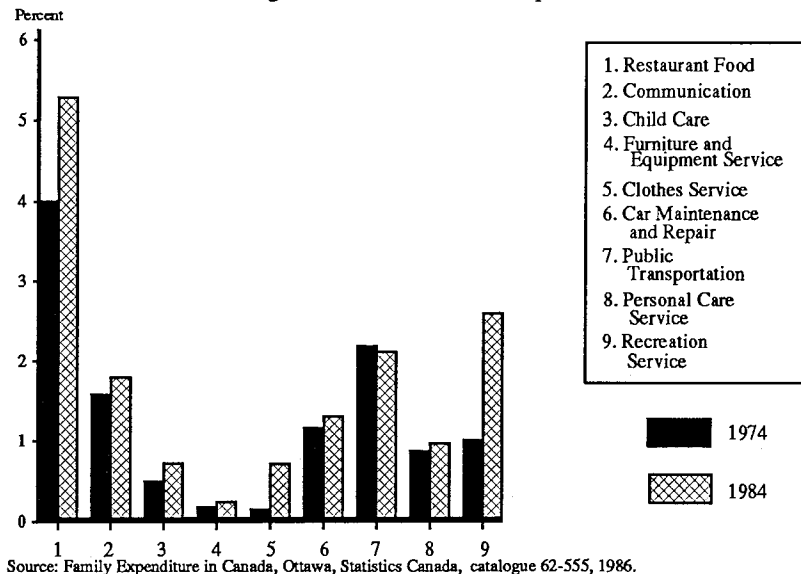
To keep the analysis from getting swamped by detail, we have chosen to examine nine broad categories of family consumer expenditures. These categories were selected because they appeared as convenient aggregations in the 1984 tables and because they represent categories to which most Canadians can relate easily. As can be seen from figure 18, we have also compared spending on each category for the years 1974 and 1984. These two years are spaced sufficiently to reveal some interesting trends which we believe have been, more or less, general during the post-war years.

Spending on restaurant meals in 1974 was 4 percent of total consumer spending.² By 1984, this percentage had risen to 5.3 percent, a gain in the share of over 30 percent. The most dramatic increase over the decade took place in spending on recreational services, which includes such items as attendance at performances, use of recreational facilities, and package travel tours.³ In 1984, spending on recreational services represented the second highest category.

Ranking third in this selected group of categories is expenditures on public transportation. Over the decade the share consumers devoted to this

category remained almost constant. The fourth highest expenditure group is communications, which rose slightly between the two years under observation. This is quite interesting because the relative cost of telephone services fell substantially during this period. The facts suggest that the greater quantity of the service consumed resulted in greater total spending in spite of the lower prices.

Figure 18
Selected Service Sector Expenditures
Percentage of Total Consumer Expenditures



Spending on the maintenance and repair of automobiles and trucks, not covered by insurance, remained almost a constant fraction of total spending at about 1.3 percent. This is noteworthy in light of the fact that average automobile ownership and the relative cost of repairs rose during the decade. Presumably, the constancy of the percentage reflects the increased quality of the automobiles and the generally reduced need for servicing as well as a constancy in the share of automobiles insured.

Finally, note that spending on personal care services, such as barbers, servants, valets, guards, and chauffeurs, constituted 1 percent of the total and was at the same level in 1974 and 1984. It is recalled from our discussion of historic views of the nature of services that the personal care provided by servants in the 18th and 19th centuries represents one of the

key types of service that shape public views on the subject to this day. The Soviet Union still excludes such services from its accounting of national income and production.

The data show how unimportant spending on this type of service has become in the 20th century. The high relative cost of servants has forced people to do with a small amount of such services. They have tended to substitute the purchase of dry-cleaning, laundromat, and restaurant services for some of the work provided historically by servants. They also have increased household production through the use of equipment like washing machines, vacuum cleaners, and refrigerators to obtain the equivalent services which in the past were provided by washer-women, sweepers, and servants doing daily shopping. Partially prepared foods and modern stoves have reduced the requirements for cooking personnel in households.

SERVICES AS A FUNCTION OF INCOME

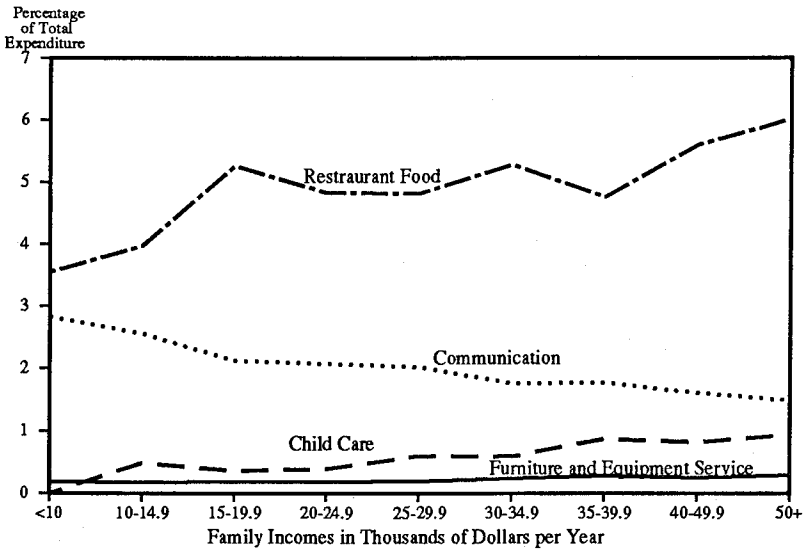
We have noted the conventional wisdom regarding the high income elasticity of demand for services in several contexts. In principle, this may be inferred from two different sets of data. First, there is the basic phenomenon of rising service sector production and spending found in time series like figure 1. It is also found in figure 18, where in nearly all categories the spending percentage was higher in 1984 than it was in 1974.

In a sense, it is almost axiomatic that when the share of total spending on a specific good increases through time, the income elasticity of demand for that good is greater than one. However, we will see later that this analysis is overly simplistic since it neglects all kinds of other determinants of demand like relative prices, new technology, and changes in taste.

Secondly, the income elasticity of demand for services can be estimated by considering the share of spending on a particular service by families with different incomes during the same time period. If this share is an increasing function of family income, it is said that the demand for this product has an income elasticity greater than one. The classical economists who observed that the keeping of servants was the privilege of high income families and that the truly rich aristocrats and merchants had large numbers of servants probably based their views about the high income elasticity of demand for services of these kinds on cross-sectional data.

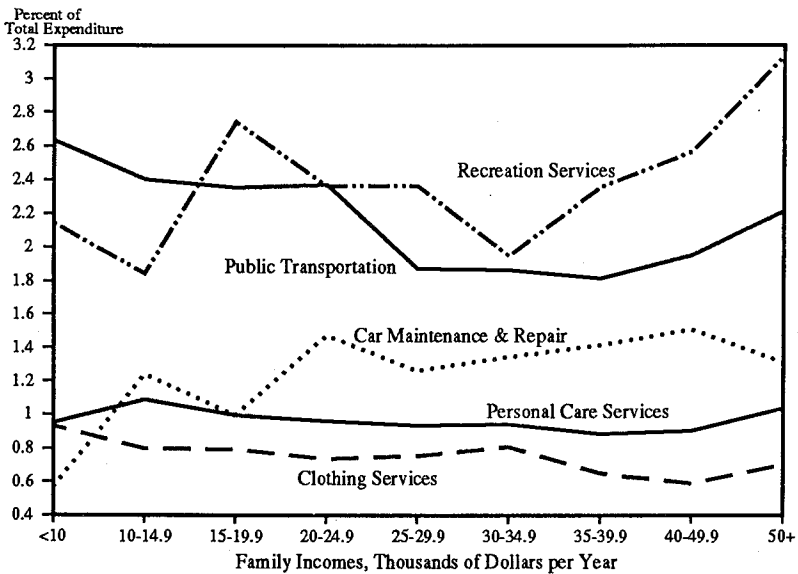
Figures 19 and 20 examine evidence on the income elasticity of demand that can be found in the 1984 Canadian expenditure survey using the second of the two methods for estimation. Along the horizontal axis of the two graphs we show annual family income going from below \$10,000 to over \$50,000 in increments given in the original statistics. The vertical axis measures the percent of total current consumption expenditures which is devoted to each of the specific categories of services. There is no analytical

Figure 19
Selected Service Consumption Expenditures by Income Classes, 1984



Source: Family Expenditure in Canada, Ottawa, Statistics Canada, catalogue 62-555, 1986 and 1976.

Figure 20
Selected Service Consumption Expenditures by Income Classes, 1984



difference between the two graphs. Two, instead of one, have been used in order to facilitate interpretation of the individual categories of spending.⁴

It can be seen that only four of the nine types of service expenditures are generally upward sloping and therefore have an income elasticity greater than one over the entire range. Of these, the greatest elasticity is shown by restaurant food expenditures, which also takes up the largest fraction of all service spending, as we noted above. The second steepest upward slope is found for expenditure on automobile maintenance and repair. Child care service expenses appear also to rise proportionately more than income. Recreational service spending exhibits an unusual pattern in that it is highest at the lower and highest income classes on the one hand, and lowest in one of the middle income classes, on the other.

Communications, over the entire range of income, and public transportation, generally, but not smoothly over all income classes, both exhibit elasticities of demand smaller than one. This fact manifests itself in the general downward slope of the graph.

All of the remaining service expenditure classes exhibit income elasticities at or very near one, which is to say that families at all levels of income are spending about equal proportions of their incomes on each of these types of services. It is interesting that personal care services, which historically had been believed to have a high income elasticity of demand, in Canada during the year 1984 required 1 percent of total current consumption expenditures at all levels of income.

It may be worth noting here that relative prices of the services in figures 19 and 20 do not enter into our discussion of the income elasticities of demand. This is so since the income expenditure relationships represent a snapshot in time when all of the income classes had to pay the same prices. In a later chapter we discuss the demand for consumer services through time. In such a study, it is necessary to introduce relative prices as well as incomes to gain a full understanding of the determinants of the quantity of services demanded.

Conclusions

Selected statistics on consumer spending on services suggest that income elasticities of demand across income classes vary considerably. Personal care services have an elasticity of about one and constitute only about 1 percent of total current consumption spending. Restaurant food services have the highest income elasticity, absorbed the greatest proportion of total spending in 1974 and 1984, and showed the greatest gain in share over the time period.

The analysis in this section was not scientifically rigorous in that the coverage of service categories was selective, we used only visual interpretations of income elasticities and in the comparison of the 2 years we omitted consideration of relative price changes and other influences on demand. Nevertheless, the evidence is sufficiently strong to suggest that the income elasticity of demand for services in general is not high and on average is about one. If this generalization is correct and holds in the future, consumer spending on services may be expected not to provide much stimulus for demand and output even if Canadian incomes on average continue to rise.

NOTES

1. The subtitle is "Selected Cities, 1984," Statistics Canada, catalogue 62-555, published in 1986.
2. It should be noted that the base for the calculation of spending percentages in each category is "Total Current Consumption." This differs from "Total Expenditure" by the exclusion of spending which changes the balance sheets of households, such as the purchase of houses (but not the purchase of consumer durables and automobiles).
3. The statistical classes used in the 1974 and 1984 publications are not identical, and we had to use our judgement on building up the 1974 data from a disaggregated set. As a result, the 1974-84 growth rate in this category should be considered with some caution. However, the 1984 spending on recreational services is that found in the publication and is strictly comparable to the other 1984 expenditure categories.
4. An unfortunate problem of presentation has arisen in the construction of the graphs. Statistics Canada does not provide income classes of consistent width. First, there are the open-ended categories at the bottom and at the top. Since the bottom class has a logical floor of zero and the highest class contains some very high incomes, the percentage spent on each category of good by these groups especially should be interpreted with some caution. Certainly, one should avoid strong generalizations based on deviations in these classes from broad patterns found in the others.
Secondly, all the income classes cover \$5,000 except the last one which covers \$10,000. The width of income classes appears to have been determined by the desire to have in each class roughly equal numbers of Canadian families. The nine income classes each consisted of the following numbers of families and unattached individuals, going from the lowest to the highest class (in thousands): 517, 400, 355, 367, 417, 358, 521, and 813. The proportional spacing in the graphs does not reflect this fact properly, though the visual distortion is small and warranted in order to keep the exposition reasonably simple.

CHAPTER 6

OCCUPATIONS IN THE SERVICE INDUSTRIES

In the introductory chapter we noted some reasons for the growing interest in the service industries relevant for this chapter. One reason is that service occupations tend to require low skills and are rewarded with low pay. Another is that the sector offers employment disproportionately to females. If these facts are correct, then the growth of the service sector results in a widening of the skill and income gaps between males and females. This would be a highly undesirable development, especially since these gaps have become matters of public concern and some government policies have been designed to overcome them. In this chapter we present some basic statistics about the mix of occupations in the goods and service producing sectors in Canada which can serve as a background for further discussion of the issues of occupational and income gaps between males and females.

Information about the occupations of Canadians and their employment in different industries is published by two sources, the decennial *Census* and *The Labour Force*. We use both in the analysis of this section. Precise references to the publications used are found in the notes to the graphs.

The census data are extremely voluminous and subject to many problems, the most important of which stems from the fact that census respondents declare their own occupations. As a result, there are problems of knowing the level of training and responsibility which characterizes the occupations. For example, people tend to describe themselves as cooks whether they prepare french fries at a fast food restaurant or are head chefs at fine restaurants serving gourmet food. Or the president of a large Canadian bank with a Ph.D. in economics, responsible for thousands of employees and billions of dollars worth of assets, is a manager just like the person in charge of two employees at the donut shop in the shopping mall. It is clear that for some economic analysis it is important to have separate counts of cooks and managers with these different levels of training and responsibility.

Another problem is that many people provide descriptions which do not fit into existing classification schemes, even though these schemes distinguish several hundred occupations. Statisticians therefore have to allocate such people proportionately to the existing classes, which introduces errors of unknown size. It is for this reason that the census statisticians warn users of the data that the comparison of occupations between censuses should be avoided. In this study we use the detailed census data for only the year 1981, and we draw on the Labour Force Survey data for some comparisons through time.

The Labour Force Survey uses personal interviews to gather data. As a result, probing questions by survey administrators can eliminate some of the difficulties associated with the self-classification schemes of the census. It can also deal with some of the ambiguities in the definitions of occupations, as in the case of cooks and managers noted above. An additional advantage of this data set over the census is its frequent collection and publication. We draw on a special compilation published in 1986 to obtain consistent data on some service occupations for a ten-year period.

In the following analysis we consider the service occupations from several different perspectives, the most important of which are as follows. First, we consider cross-classifications highlighting differences between goods and service producing industries. Secondly, we trace individual occupations and professions through time. In this section we do not distinguish between males and females. The final approach focuses on the role of women in several occupations and professions.

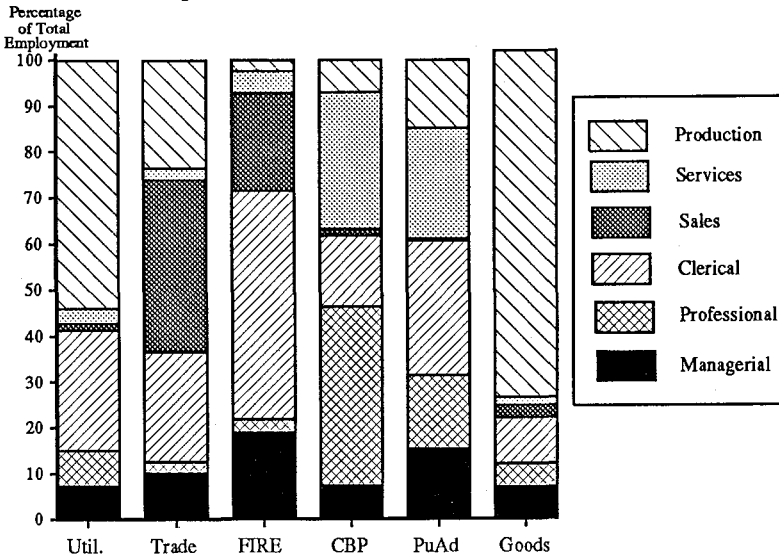
GOODS AND SERVICES

Figure 21 shows the proportions of total employment provided by Canadians in different occupations, broken down by the major service industries discussed in preceding chapters and contrasted to the goods industries in total. So-called production workers constitute nearly 70 percent of all the occupations in the goods industries, about 55 percent in the utilities industries and, perhaps somewhat surprising, 22 percent in trade, which consists of wholesale and retail trade combined. Production workers represent a very small share of the occupations in the classic service industries finance, insurance and real estate (FIRE), community, business and personal services (CPB), and Public Administration (PuAd).

The occupation with the classic title "services" consists of persons who do the work of janitors, provide social care, and all the rest that cannot be classified under the obvious sales, clerical, managerial, and professional. It comes as no surprise that services occupations make up the largest proportion of all in the community, business and personal services and public administration industries. Similarly, the preponderance of sales occupations in

trade and finance, insurance and real estate industries conforms to expectations, though many readers may find surprising the small share of workers in sales in the remaining industries.

Figure 21
Occupations in Service Industries, Male and Female



Source: 1981 Census of Canada, Population, Labour Force, Industry by Occupation, catalogue 92-923, vol. 1, table 1.

Clerical workers make up a large proportion of all employees in all industries. They are most dominant in finance, insurance and real estate and least dominant in the goods producing industries.

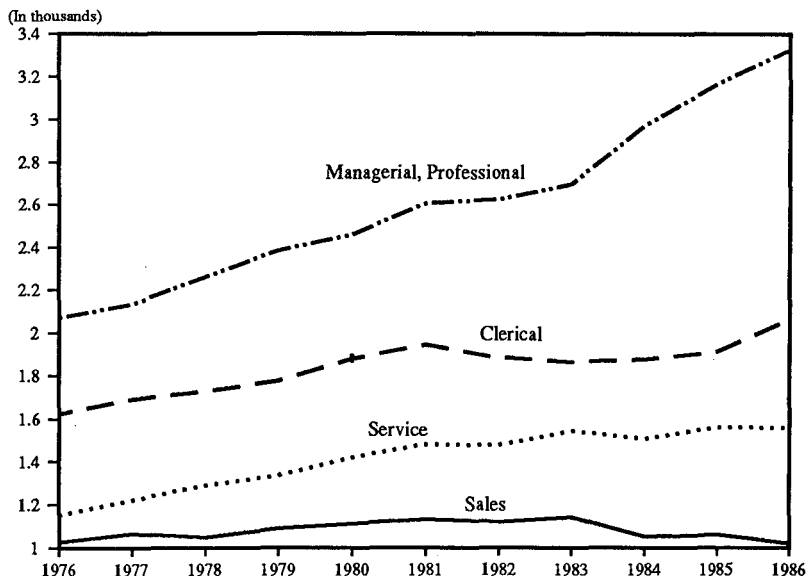
Some of the most highly paid and coveted employment opportunities are in the professions and the managerial occupations. We discuss the composition of the professions in more detail below. However, as can be seen from figure 21, they make up by far the largest share of the community, business and personal care industry and are quite dominant in public administration. This reflects the strong representation of teachers and the health care professions in this occupation.

The managerial occupations constitute an average of about 10 percent in all industries except finance, insurance and real estate and public administration, where they make up 20 and 15 percent, respectively.

Absolute Numbers and Time Series 1976 to 1986

Figure 22 presents some data on the absolute numbers of the main professions as they are published in *The Labour Force*. They cover all industries, including those producing goods. Information provided in the preceding chapters reveals that about one-third of all Canadians only work in the goods producing industries. Figure 21 shows that only about one-third of these are in the service occupations. For these reasons we may consider that about 90 percent of the developments in the service occupations shown in figure 22 reflect those in the service industries.

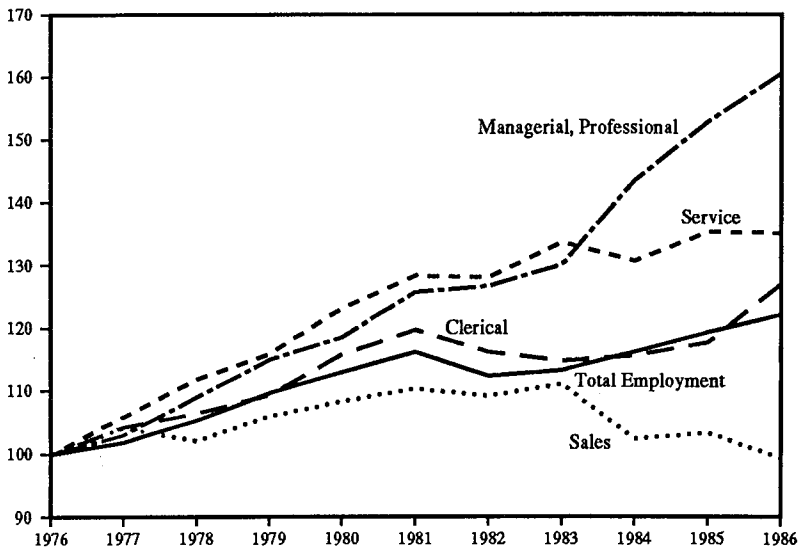
Figure 22
Employment by Occupation, Both Sexes



It can be seen in the graph that the class which combines managerial and professional occupations is by far the largest. In 1986 it consisted of about 3.5 million people. The next highest classes are clerical, service and sales occupations, respectively.

In figure 23 we show the same data as in figure 22 in the form of an index set equal to 100 in 1976 so that it is easier to ascertain the relative rates of growth in employment in these occupations. For reference, the index for total employment in Canada is also given.

Figure 23
Employment Indices by Occupations
1976 = 100



The largest rate of growth of about 60 percent during the ten years was enjoyed by managers and professionals with a particularly strong growth spurt since 1983. The smallest rate of expansion was in the sales occupations between 1976 and 1983. Thereafter, the number of people in that occupation actually fell to slightly below the 1976 level. The number of Canadians in the service and clerical occupations rose gradually through time and somewhat more quickly than total employment.

The Professions

Figures 24 and 25 show the absolute numbers of the occupations which make up the professions during the years 1976 to 1985. We have chosen to use two graphs to facilitate interpretation of what otherwise would have been a time series concentrated in the range of 300,000 to 400,000. The professions with these levels of membership are teaching; medical and health; and natural scientists, engineers and mathematicians. Professionals active in the social sciences; and artistic, literature and recreational fields contain about 100,000 each. By far the largest group of professionals with about 600,000 in 1976 are the managers and administrators.

Figure 24
Employment in Professions, Both Sexes

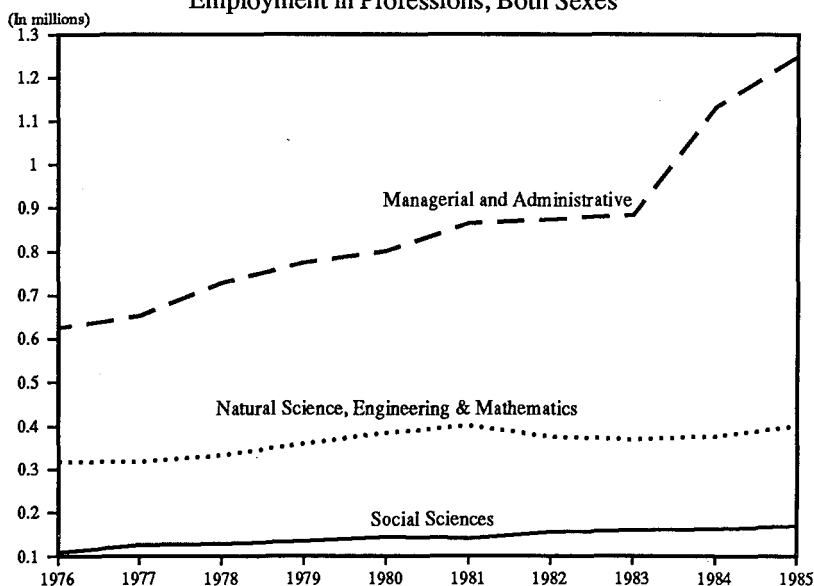
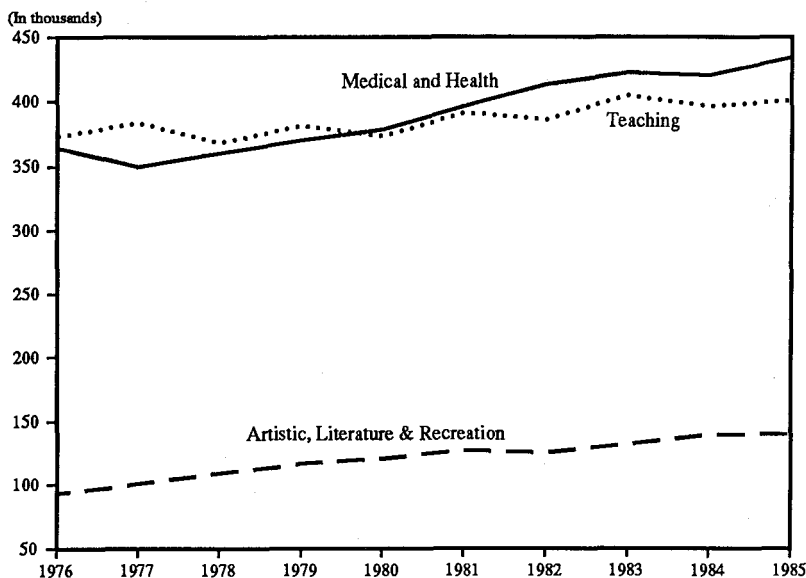
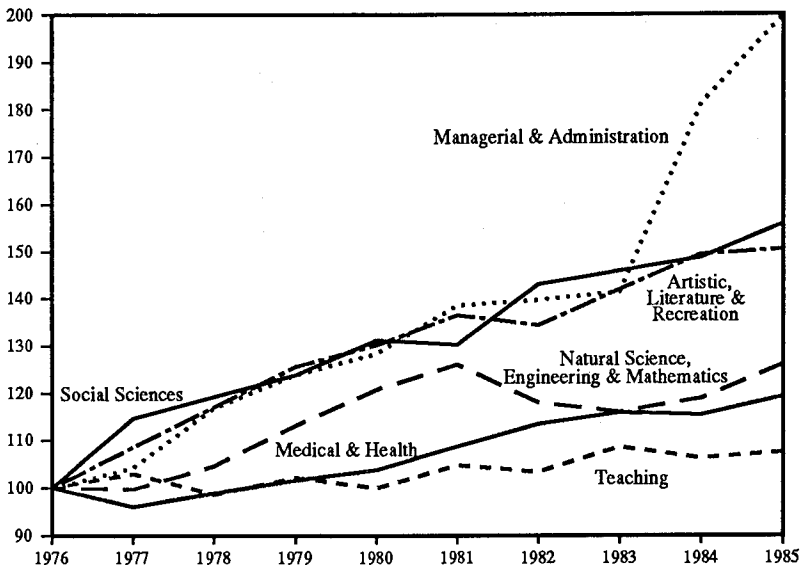


Figure 25
Employment in Professions, Both Sexes



While the absolute numbers in figures 24 and 25 indicate that membership in all the professions has risen during the decade, figure 26 shows the growth rates explicitly through an index which sets the 1976 level at 100. As can be seen from this graph, the number of managers and administrators doubled during the decade while the slowest growth rate of only about 10 percent was achieved by teachers. The social sciences and artistic, literary and recreation professions increased their employment by about 50 percent, even though at both the beginning and the end of the period they were the smallest of the six groups.

Figure 26
Employment in Professions, Both Sexes
1976 = 100



It may come as a surprise to many to find that the medical and health professions increased only about 15 percent during the entire period, only slightly less than the 23 percent of those employed as natural scientists, engineers and mathematicians. It is interesting to note that the latter occupation, found mostly in the private sector, grew rapidly during the economic boom years up to 1981, shrank absolutely in the following two years, and in 1985 reached the previous high attained in 1981.

Conclusions

The data on the occupations held by Canadians show the expected. The service occupations dominate in the service industries. The figures also reveal some interesting differences in the extent to which individual industries employ members of the managerial, professional, clerical, sales and service occupations. Most noteworthy for some purposes of analysis is the preponderance of managers and professionals in finance, insurance and real estate; community, business and personal services, and public administration.

The time series statistics show that managers and professionals are the largest professional group and that their numbers have grown most rapidly. Membership in the sales profession, on the other hand, is the smallest and experienced the lowest growth rate. A breakdown of the professions showed the dominance in absolute levels and growth rates of managers and administrators. It also revealed that the slowest growth rate was experienced by the professions of teachers and medical and health.

FEMALES IN THE OCCUPATIONS

Table 5 is rich in informational detail. It repeats the same breakdown of occupations as a percent of total employment in individual service industries and the goods producing sector as did figure 21. The detail added is the percentage which females in each occupation represent in their total employment in each industry. A few facts stand out.

The proportion of females is much smaller than that of males in the occupation production in all industries; in services in public administration; and in managers in all industries except utilities. On the other hand, females dominate proportionately by wide margins in all industries in the clerical occupation.

The time series of the percentage of females in each occupation in figure 27 covers the years 1976 to 1986. It shows that females constitute about 80 and 50 percent of the total membership of the clerical and service occupations, respectively. They are about 40 percent in sales and the managerial and professional occupations, as well as the total labour force. They represent about 15 percent in the goods producing sector.

Of some interest is the growth rate of the percentage of females in the individual occupations and in the total work force. Figure 28 provides this information through an index which treats the 1976 percentage as 100. It shows that the percentage of women rose steadily over the entire period in all occupations and the total labour force until 1985. Thereafter, the index for services dropped and that for managers and professionals rose sharply.¹ The highest growth rate in the percentage of women is found in the sales

Figure 27
Employment by Occupations
Percentage of Women in Occupation

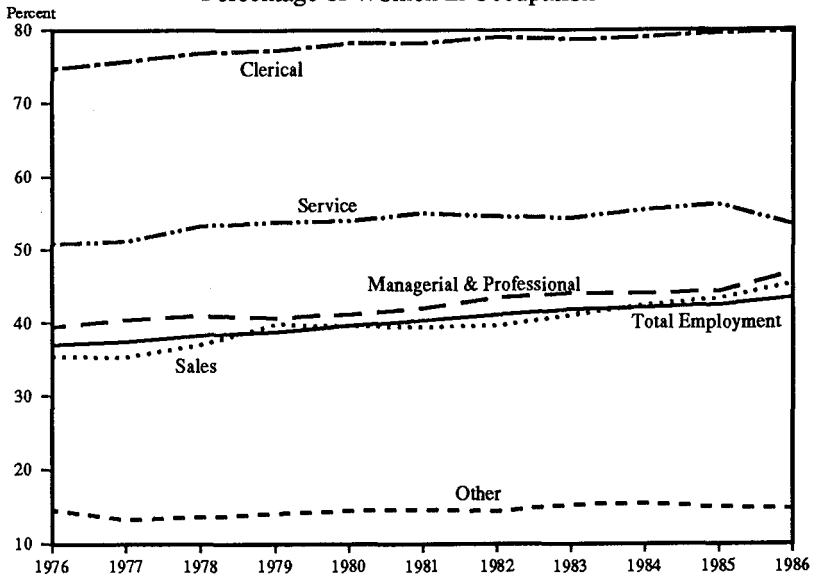


Figure 28
Women's Share in Occupations

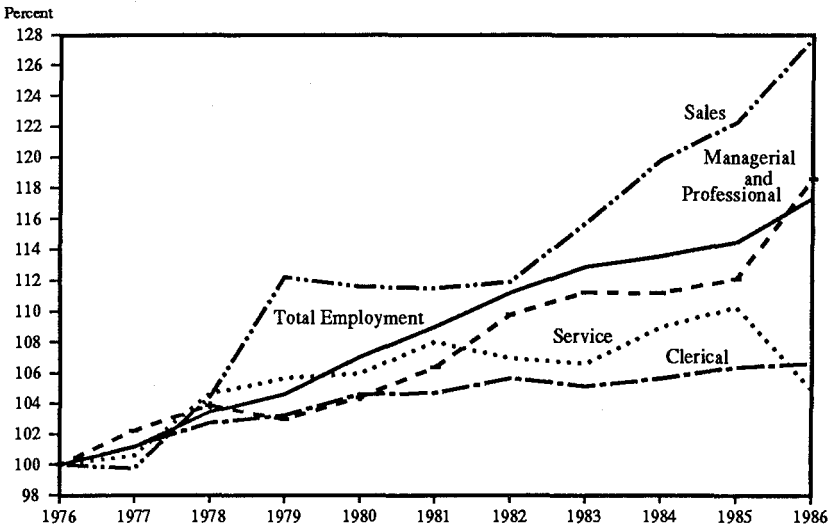


Table 5
Occupations in Service Industries, Male and Female

Occupations	Industries					
	Utilities	Trade	FIRE	CBP	Public Admin.	Goods Production
Managerial						
Male	7.4	13.6	31.4	12.3	18.1	7.8
Female	6.6	5.6	11.0	3.9	10.4	4.1
Ratio M/F	1.1	2.4	2.8	3.0	1.7	1.9
Professional						
Male	8.2	2.2	4.4	38.7	16.4	5.3
Female	5.7	2.5	1.8	39.1	15.5	3.6
Ratio M/F	1.4	0.9	2.4	0.9	1.0	1.4
Clerical						
Male	13.1	10.4	13.4	4.6	10.2	4.2
Female	69.3	41.7	72.4	22.4	61.7	29.9
Ratio M/F	0.1	0.2	0.1	0.2	0.1	0.1
Sales						
Male	1.3	34.7	38.3	1.9	0.3	2.8
Female	1.7	40.6	10.8	1.1	0.2	2.6
Ratio M/F	0.7	0.8	3.5	1.6	1.1	1.0
Services						
Male	2.7	2.1	6.9	27.9	32.8	1.4
Female	4.8	3.2	3.3	31.0	9.5	2.0
Ratio M/F	0.5	0.6	2.0	0.8	3.4	0.6
Production						
Male	66.9	36.7	5.3	14.3	21.9	78.2
Female	11.5	6.1	0.5	2.1	2.3	57.5
Ratio M/F	5.7	5.9	10.2	6.7	9.2	1.3

occupation, followed by managerial and professional. In the field clerical, the share rose about 5 percent and, as is apparent from the preceding graph, reached the very high level of 80 percent.

Finally, we turn to the proportion of females in the professions. Figure 29 shows the percentage of females in each of the professions during the years 1976 to 1985. As can be seen, the highest proportion of females is found in medical and health, followed closely by that in the social sciences, both

Figure 29
Percentage of Women Employed in Professions

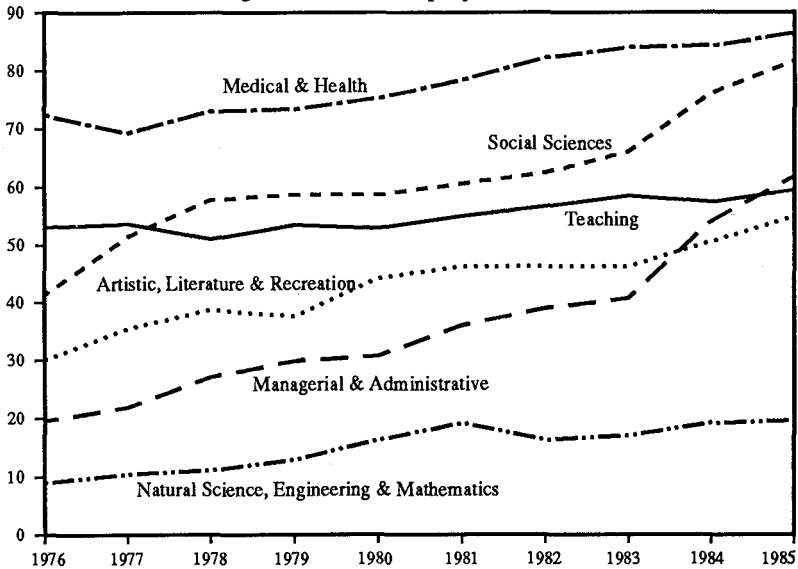
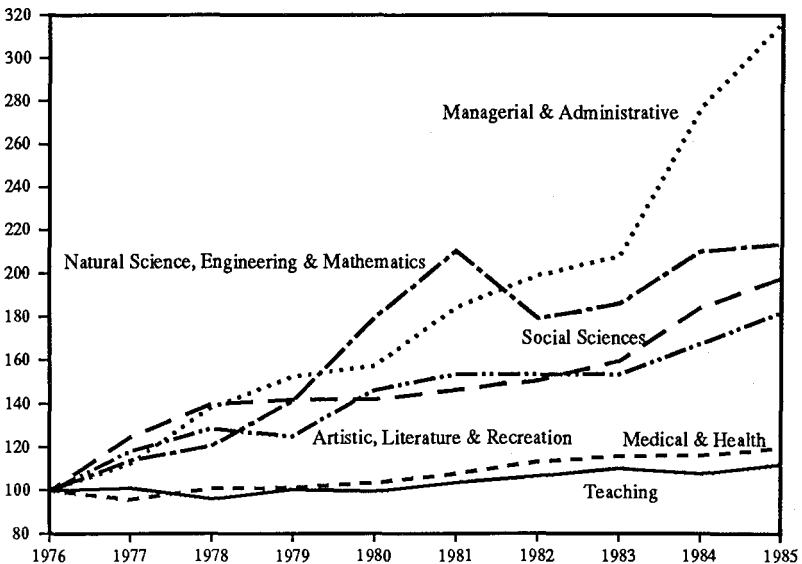


Figure 30
Index of Percentage of Women Employed in Professions
1976 = 100



around 75 percent in 1985. Females in the teaching profession are about half of the total. They represent the smallest proportion among the natural scientists, engineers and mathematicians at about 15 percent in 1985.

The share of women is increasing in all the professions. This can be seen most clearly from figure 30, which again shows the index of the share equal to 100 in 1976. The growth of the percentage of women in teaching and medical and health professions has been extremely small during the ten years under study. On the other hand, it has grown about 3.3 times in management and administration. In the remaining professions, the share of women has nearly doubled. All these developments have to be seen in the light of the basic growth of the females' share in total employment of about 15 percent, that is from 37.1 percent to 42.5 percent.

Conclusions

Females have increased as a proportion of all workers in all industries and professions during the period 1976 to 1985 due to the overall increase in the female labour force participation rate. Our data show that in the fields in which females traditionally have had the largest share of positions, such as clerical, teaching, and medical and health care, their percentage gains have been moderate. The largest gains in terms of shares of total membership in professions has taken place in managerial and administrative occupations and in natural sciences, engineering and mathematics, where the share has been lowest in the past.

EDUCATIONAL ATTAINMENTS

The educational attainment of workers in Canadian service industries is of interest to people concerned about the income distribution effects of the growth of the service sector. As we noted in chapter 1, it is widely believed that service industries provide employment for people with low and high education levels. The former are considered to be workers in the personal service industries such as restaurants, recreational, and similar low-tech industries. The latter, in turn, are believed to be found in the computer, business service, and other high-tech industries. This growth pattern is believed to result in a so-called bimodal income distribution since the relative growth of the extremes occurs at the expense of the traditional middle class of skilled workers in the goods producing industries.

The educational requirements of the service industries are also of interest to policy-makers concerned with planning the mix of schooling most likely to be required by the Canadian economy in the future and to parents and students planning their education.

The Statistics

Data on the educational attainments of workers in the service industries can be found in the census publications. These sources draw on the 1-in-20 sample of population surveys which contain a rich body of detailed information on individuals and families.

In this section we take a brief look at the data from the 1981 census available in a volume entitled *Population: Labour Force—Industry by Demographic and Educational Characteristics, Canada, Provinces, Urban, Rural Non-Farm and Rural Farm* (catalogue 92-921). To the best of our knowledge, there has been no previous analysis of these data aimed at the assessment of the educational characteristics of Canadians in the service and goods producing industries.

Service and Goods Aggregation

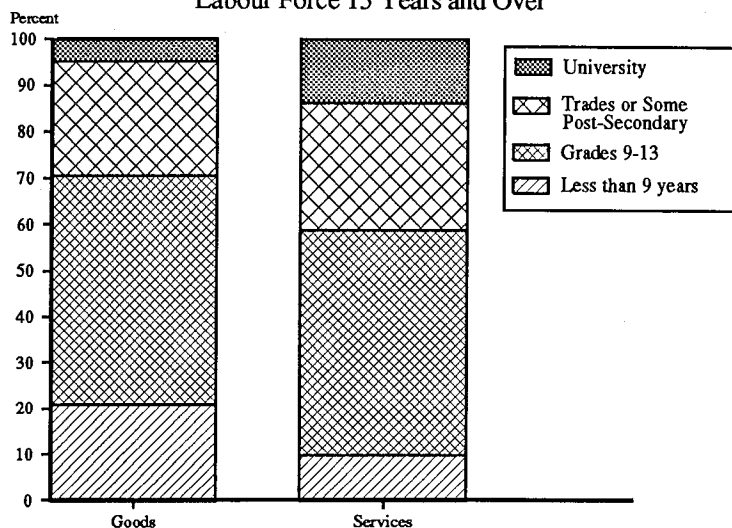
Figure 31 contains a simple bar graph which reflects the educational attainment of the labour force 15 years and over in the goods and services producing industries. These aggregates contain the same industries as were specified in preceding sections. The educational attainment levels were aggregated from those found in the original publications to assure ease of interpretation.²

The most outstanding fact evident from figure 31 is that the service industries employ proportionately fewer people with the lowest and proportionately more with the highest education levels. This fact is strikingly obvious from the bar charts. The relationship is made more precise in figure 32, which also introduces information on educational attainment by age groups. The bar charts show the proportion of Canadians in each age group employed in the service industries at each educational attainment level, using their proportion in the goods industries as the norm equal to 100.

The information in figure 32 is easy to interpret. Consider, for example, the age group 15-24. The second bar represents the educational attainment level of grades 9-13 and shows a level of about 100. This means that Canadians with this amount of education constituted the same percent of the total work-force age 15-24 in the goods and the service producing industries. By analogy, the tallest bar in the 15-24 age group shows that persons with a university degree have twice the percentage of the total in the service as compared with the goods producing industries.

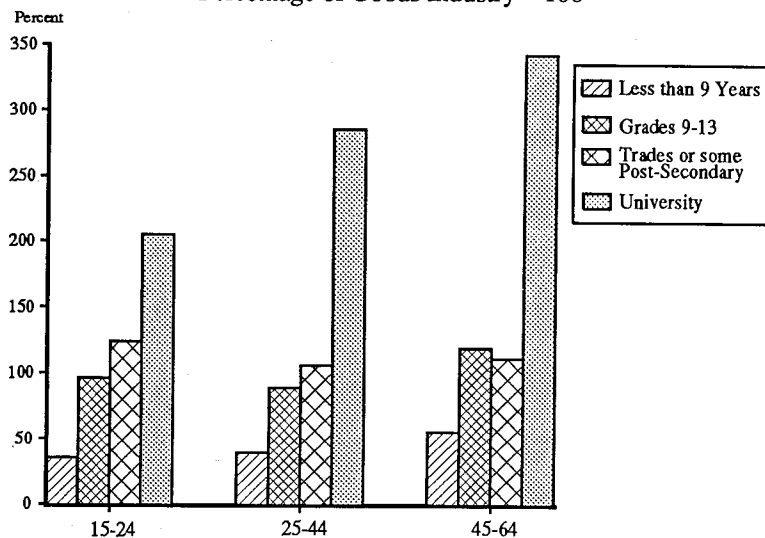
The three age groups shown in figure 32 reveal almost identical patterns. The relatively uneducated make up about half the proportion in the services as they do in the goods producing industries. Canadians in the service industry with a university degree represent about three times the proportion that they do in the goods producing industries.³

Figure 31
Educational Attainment, All Ages
Labour Force 15 Years and Over



Source: Census of Canada, Population, catalogue 92-921.

Figure 32
Educational Attainment of Service Workers by Age
Percentage of Goods Industry = 100



Source: Census of Canada, Population, catalogue 92-921.

Bimodalism

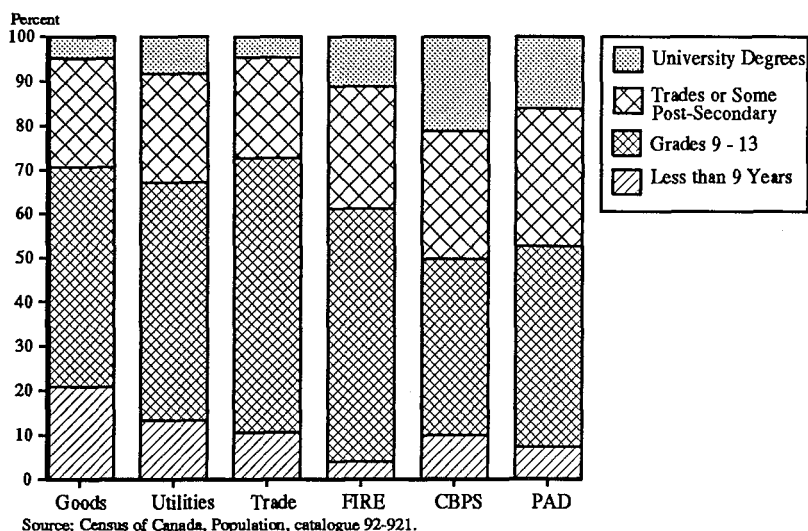
The data in figure 31 have an interesting and straightforward implication for the issue of bimodalism, the likely effects of the relative growth of service sector employment on income distribution. Let us assume that the supply of people with different education levels is determined by demand for them and that the expansion of the service sector is not accompanied by changes in the mix of educational attainment of workers demanded. Under these assumptions, future growth in service sector employment will result in a proportionately greater increase in the demand for workers with the highest university levels of educational attainment and a decrease in the demand for those with the lowest levels of schooling, which is less than 9 years. It will leave relatively unchanged the dominant middle with high school and trade certifications. Since there is a high correlation between education and income, we can expect a relative decrease in low- and increase in high-income earners as the service sector expands. The net result of these developments will be an increase in average incomes and a skewing of the distribution away from the number in the lowest income classes and towards those with the highest incomes, not an expansion of the highest and lowest as is suggested by the bimodalism model.

Educational Attainment by Industry

In the remaining analysis of this section we use data on educational attainment by the goods producing industries in the aggregate and the main service industries discussed in preceding parts of this chapter. We drop information on educational attainment by age and use instead only data on the entire work-force aged 15 to 64.

The first bar in figure 33 repeats the first column in figure 31 in order to provide a norm for comparisons of the data for the five service industries. As can be seen, the service industries themselves show fairly wide differences in the proportion of their workers with education less than 9 years and with a university degree. All of the service industries have proportions of workers with the lowest education levels smaller than the goods industries. The relatively fewest workers with low education are found in the industry finance, insurance and real estate (FIRE). The share of university degree holders is smallest in retail and wholesale trade (Trade) and yet, remarkably, almost identical to that in the goods producing sector. All other service industries have proportions of workers with university degrees that are much greater than those in the goods industries. The largest proportion is found in community, business and personal services (CBPS).

Figure 33
Educational Attainment by Industry, All Ages, 15 - 64



Goods Producing Industries Equal to 100

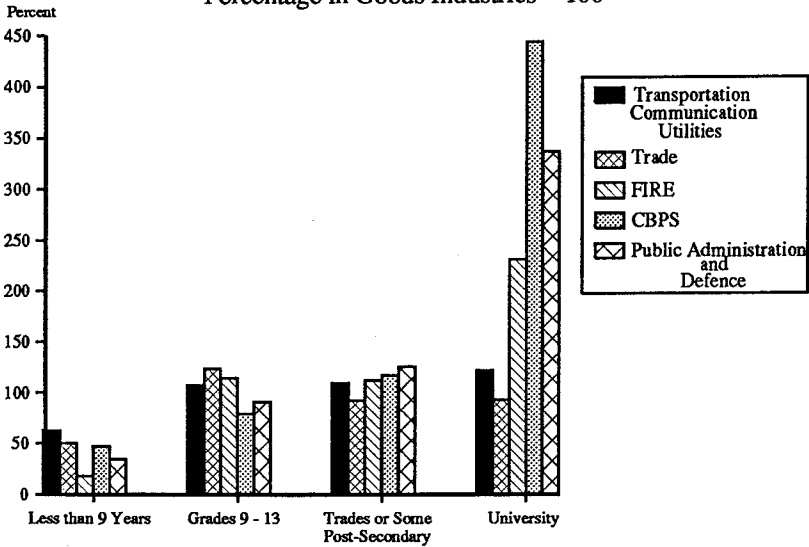
The information contained in figure 33 has been processed by defining as 100 the proportion of all workers in each group of educational attainment in the goods sector and expressing that of each service industry in relation to this norm. Figure 34 shows these service industry indices grouped by education levels. Thus, it can be seen that in the category of education less than 9 years the index is about 60 for transportation, communication and other utilities, about 50 each for trade and CBPS, 40 for public administration and defence (PAD), and only about 20 for FIRE.

The middle categories of educational achievement are represented to a remarkably similar relative degree in all service industries. The index at an average of about 100 also shows that for these levels of education, representation is about equal in the goods and the service producing industries.

Large differences between service relative to the goods industries show up in the proportions of employees holding university degrees. Utilities and trade are equal to and slightly below the goods industries norm. The industry CBPS, on the other hand, has proportionately 4.5 times the univer-

sity graduates than do the goods industries. This index is at 2.3 and 3.2 for the FIRE and PAD service industries, respectively.

Figure 34
Educational Attainment, All Ages
Percentage in Goods Industries = 100



Source: Census of Canada, Population, catalogue 92-921.

The implications of these patterns of educational achievement by service industries reinforce those noted in the preceding comparison of the larger goods and service industry aggregates. The service industries FIRE, CBPS, and PAD are not only those with the greatest propensity to hire university graduates, they are also the most rapidly growing industries within the service sector. Therefore, extrapolation of past trends into the future suggest a relatively more rapid expansion of employment by persons with the highest level of educational attainment. This fact in turn implies more rapid growth in the proportion of all Canadians earning high incomes.

The data on the relative scarcity of jobs with low education levels in the service industries imply, for analogous reasons, a relative decrease in employment and the size of the low income distribution sector.

Conclusions

The data on the educational achievement of workers show that employment of persons with university degrees is relatively much greater and with education less than 9 years was relatively much smaller in the service than in the goods producing industries in Canada in 1981. This pattern is most pronounced in the service industries FIRE, CBPS, and PAD.

Taking into account the fact that the service sector and especially that the last mentioned three service industries have had above-average growth rates, a continuation of these trends has interesting implications for the future demand for people with different levels of education. It means that those with university degrees can expect above-average and those with less than 9 years education can expect below-average rates of growth in employment opportunities. This trend may be expected to be accompanied by a correspondingly more rapid and slower growth in the relative number of Canadians in the high and low sectors of the income distribution respectively.

Of course, the data used in this analysis represent a stock of manpower, the composition of which has been determined by past education decisions, relative wages of people with different levels of educational attainment, social policies with respect to minimum wages and the relative pay of women, and developments in technology determining the demand for labour with different skills.⁴ Changes in any of these past determinants of the stock will influence supplies, compensation levels, demand, and even technology in the future. For this reason, the preceding projections of employment, like all such exercises, must be treated cautiously.

NOTES

1. The 1976-85 data are from a special Statistics Canada study, "Occupational Trends Among Women in Canada: 1976-85," Appendix 1 of *The Labour Force*, October 1986. The relevant table is headed, "Employment by Occupational Category and Sex" (page 107). The 1986 data are from the December 1986 issue of the same periodical and stem from a table entitled, "Labour Force by Industry, Class of Worker and Sex and by Occupation" (page 99). The difference in coverage is "Employment" and "Labour Force." This may account for the discontinuity in the two series 1985-86 noted in the text, though such problems do not appear to exist in the other occupations.
2. The descriptions in our graphs have the following headings in the Statistics Canada publication given in quotes:

Less than 9 years—"No Certificate or Diploma—Less than Grade 9;"
Grades 9-13—"No Certificate or Diploma, Grades 9-13" plus "High School Certificate and Diploma;"
Trades or Some Post-Secondary—"Trade Certificate or Diploma" plus "University or other Non-University Certificate or Diploma;"
University—"University Degree."

Our categories are the same as those used in "An Educational Profile of Selected Occupations, Canada 1981," *Canadian Statistical Review*, November 1983.

3. Since we know that 70 percent of all Canadians work in the service sector, these data suggest that people with university degrees are seven times as likely to work in the service than in the goods industries. This follows from the fact that 70 divided by 30 is 2.3, which is the likelihood of people generally working in the service rather than goods industries. This figure is multiplied by 3, the ratio of the proportion of university degree holders in the service over the goods producing sector shown.
4. If, for example, decisions made by Canadians result in a relative increase in the supply of persons with less than 9 years of schooling, then the wages of these individuals should fall relative to those of other workers and to the cost of capital. This would induce the employment of more such workers relative to others with higher education and relative to capital. It would also encourage the development of technology suitable to this wage rate relative to the cost of capital. In all industries, including the service industries, the relative share of persons with low education levels would rise more than the 1981 stock data suggest.

However, the trend in educational achievements just assumed may not result in lower relative wages of such persons if the government

sets minimum wages or adopts equal pay for equal work policies above those the market would have produced. Under these conditions, the analysis in the text has to be extended further. The obvious main conclusions are that under these conditions there would be a disproportionate increase in the unemployment rate among the less educated. Analogous conclusions follow from policies which maintain high levels of pay for university graduates when their relative supply is increased, except that these individuals are likely to enter lower paying occupations and industries rather than become unemployed.

CHAPTER 7

PRODUCTIVITY IN THE SERVICE SECTOR

Productivity is defined as an index of the efficiency with which output is produced by factors of production, such as labour, capital, land, and by intermediate inputs. As such, the index reflects the capacity of the means of production to generate output, the level of which in turn determines consumption and overall welfare. Productivity is therefore an economic variable of great importance for assessing how well an economic system is serving its population.

The productivity of labour is measured by the ratio of net output over labour input of a production unit during a period of time. Labour productivity at high levels of aggregation is reported routinely by national income accountants in Canada and other countries. In this chapter we review empirical evidence available on labour productivity of Canadian service industries. As will be seen, the measurement of productivity in the service industries is subject to many special difficulties. It has been suggested that because of these difficulties information on the performance of the industry as well as the economy as a whole is seriously misleading. We present these issues here, but their resolution is likely to be in the distant future, if it ever can be found.

While labour productivity is the most measured, there are also indices of productivity for all inputs into a production process. These are undertaken primarily by scholars and involve many conceptual and practical problems of measurement. The most recent theoretical work in this field with a special emphasis on services is found in Diewert (1988).

FIRST PRINCIPLES OF PRODUCTIVITY MEASUREMENT

The principles underlying the construction of labour productivity indices may be understood most easily by considering a simple numerical example

involving the production of a good called a widget. Assume that in period one 100 workers use only their hands to produce 500 widgets worth \$1,000 in a process requiring \$400 of intermediate inputs. Labour productivity and the value added by labour in the industry during that first period is \$600, or \$6 per worker. In national income accounting terms, this value added is known as gross domestic product at factor cost (GDP).

Now assume that in the next period of equal length the same 100 workers produce 600 widgets worth \$1,200, unchanged in quality and design. The production process still involves only the use of hands and the same \$400 of intermediate inputs. Under these assumptions, GDP per worker is \$8 and labour productivity has increased by one-third.¹

An element of realism might be added to this example by assuming that labour in both periods uses capital and land (measured by their depreciation) to produce the output. Under these assumptions, it is normal to estimate labour productivity in the same manner as just discussed. The value added is divided by the amount of labour. It is clear that the resultant index still reports correctly the value of output associated with a unit of labour. But it is no longer possible to attribute changes in productivity unambiguously to labour since they could be due to increased use of capital or land. However, because of the simplicity of calculation, labour productivity measures calculated in this manner are used almost universally.

In the presence of capital and land depreciation, the productivity of labour can be estimated unambiguously only through the use of what is known as total factor productivity measurement. This technique makes it possible to attribute the origin of the productivity gains to labour and other individual inputs. The technique involves the specification of production functions and the use of regression techniques to trace the relative growth of each input through time. Coefficients attached to the input variables are interpreted as reflections of the contributions made to total output. They are therefore equivalent to a measure of productivity.²

These production function estimates normally result in an unexplained residual of growth not attributable to increases in any of the measured inputs. In early total productivity studies this residual, attributed to the so-called X factor input, has been large. The inclusion of ever more refined productive inputs such as education and research and development expenditures has succeeded in reducing the size of the unexplained residual, though in general and at aggregate levels of measurement it has remained uncomfortably large (see Denison 1969).

Price Changes

The simple model of labour productivity in the widget industry used in the preceding paragraphs can be amended to consider changes in the prices of

inputs and the output during the period over which productivity is measured. The procedure for doing so requires deflation of the nominal values of inputs and output by appropriate price indices. Statistics on the prices of labour, intermediate inputs, and outputs are collected and published regularly by the Canadian government.

In principle, such deflation results in an estimation of the physical units of the inputs and output. In terms of the above equation, the quantity indices would be substituted for the dollar values. No special problems arise in the estimation of labour productivity if price indices used for deflation are accurate measures of price increases alone.

Appropriate Units of Labour

It is well-known that there has been a long historic downward trend in the number of hours worked by the average worker in a day, week, month, and year in Canada and the rest of the world. For this reason, labour productivity measures should be based on hours worked as the basic unit. Unfortunately, reliable statistics on hours worked are not available at levels of industry aggregation at which productivity is to be measured.

In the empirical evidence to be presented below, we show the extent of the measurement bias which is introduced by the use of average annual man-years instead of hours worked in the calculation of productivity. We do so for two aggregate series for which the needed statistics are readily available. The evidence available permits assessment of likely biases introduced in productivity measurements for other industry aggregates.

ISSUES IN THE MEASUREMENT OF QUALITY CHANGES

One of the most difficult problems in the estimation of labour productivity arises from the fact that changes in the prices of intermediate inputs and of outputs reflect both changes in prices and in quality. A textbook example of this process involves tires and may be explained in this way. Assume that in 1960 all tires sold in Canada had biased plies and cost an average of \$50. In 1980, all tires sold were radial and cost an average of \$100. Assume that there has been no change in the mix of sizes and other characteristics and that the general consumer price index doubled during this period.

Under these assumptions and disregarding any quality changes, the current dollar value added of the tire industry would be divided by two in order to estimate the constant value (or units) of output which in turn is divided by the labour input to estimate the productivity of labour in the latter year. For illustrative purposes, assume that the number of tires produced per worker was the same in 1960 and 1980. This assumption makes the

index of labour productivity 100 in both years and implies a zero gain of labour productivity over 20 years.

However, it is well-known that radial tires have a much longer tread-life than bias ply tires. Let us assume that the average 1980 tire could be driven 50 percent more miles than the average 1960 tire. This means the output of workers in the tire industry, measured in terms of an index of road use, rose 50 percent. A true index of labour productivity in the tire industry thus implies a gain of 50 percent instead of the zero gain that was estimated in the absence of an adjustment for the quality of the industry's output.

It is difficult, in general, to adjust output indices for quality changes because typically they are not as simple to estimate as the example just discussed. Even in this example, there are some obvious problems of quality that were omitted. For example, radial tires are more resistant to puncture and skidding than bias ply tires. On the other hand, many users find that radial tires provide a bumpy ride when they are cold. In principle, these quality changes should also be considered in the estimation of labour productivity by appropriate adjustments in the output indices. However, the quantification of such quality changes has proven to be expensive and elusive.

The U.S. government has a system for estimating quality adjusted price indices for automobiles. For this purpose they use so-called hedonic price indices. The construction of these indices involves the annual estimation of equations with prices of cars as the dependent variable and a host of measurable characteristics as independent variables. Year-to-year comparisons of the coefficients on the independent variables can be interpreted as implicit price changes. According to the hedonic price index measure, automobile prices have risen less than can be inferred from nominal and consumer price index adjusted changes. According to some recent estimates, the bias has been somewhat less than 1 percent annually.

It has not been feasible to construct hedonic price indices for other products.³ However, the U.S. Department of Labor Statistics and Statistics Canada require that the staff which collects information on prices used in the regular construction of price indices be aware of significant changes in the quality of goods.⁴ Upon reporting such changes, specially trained investigators decide on needed adjustments to the indices. Unfortunately, however, these adjustments typically are not made to reflect changes in the cost of goods and services to consumers. In terms of the above example, they do not result in an implicit reduction in the cost of using automobile tires brought about by the substitution of radial for bias ply tires. Instead, the new type of tire is linked into the calculation of the consumer price index by entry as a new product at the level 100 with a weight determined by its relative importance in the basket of total consumption expenditures.

This procedure biases upward the estimated consumer price index in cases where the quality of goods and services has improved. However, this bias is corrected somewhat by the same treatment of goods and services subject to the deterioration of quality. The net effect of these influences is believed to be a small upward bias in the assessment of inflation. Professor Don Daly, one of Canada's experts in the measurement of productivity, assessed the evidence on this matter and suggested to us that genuine inflationary bias due to the measurement problem is less than 1 percent per year.

PROBLEMS OF MEASURING SERVICE PRODUCTIVITY

The principles and problems of measuring productivity in the service industries are the same as in the goods industries, as long as the services are sold and therefore have a market price per unit. Such market prices are available for all of the services bought by consumers and producers with some exceptions noted below. The simple example of how to calculate labour productivity in the case of widgets can readily be applied to services. Doing so requires only that we substitute service outputs like haircuts, restaurant meals, cheque clearing transactions, and telephone calls for the good widgets.

The estimation of quality appears to be more difficult for some types of services than for goods, but this is merely a matter of degree. Restaurant meals come in many different qualities which are determined by such elements as the environment and ambience of the facilities and the attentiveness and skill of the personnel serving the food. These characteristics often dominate what should be the most fundamental property of a meal, the nutritional value of the food served. It is clear that this problem is very similar to that noted above in relation to automobile tires. Different types of tires are distinguished by the most fundamental characteristic of mileage, but they also have other differentiating properties like safety, comfort, and versatility.

Units of Output

In some marketed service industries there are special difficulties in establishing a price per unit of output because units are defined in a particular way. For example, a lawyer or automobile repair service may be priced on the basis of time spent to achieve certain objectives. Any conventional units of output applied to this type of work, such as judicial trials completed or cars restored to running condition, are only very imperfect indices of the output produced.

Nevertheless, statistics on output are collected in most marketed service industries. These statistics use measures that are readily available rather

than conceptually perfect. In the case of financial intermediaries, output statistics cover such activities as the number of cheques cleared, cash transactions, and loans and mortgages issued. Medical service industries quantify the number of treatments administered for different illnesses and the number of bed-days occupied by patients.

Presumably, one reason why physical measures of output of these service industries tend to leave one uncomfortable is that quality levels and changes often seem to be very important. Lawyers' services clearly are not of homogeneous quality. A day in a hospital bed was a completely different product before and after the use of electronic monitoring equipment for critically ill patients. The availability of antibiotics has changed the nature of treatment for many illnesses. Bank teller machines have significantly changed the convenience, accessibility, and speed of cash withdrawals.

The preceding analysis suggests that in the case of marketed services, the statistics on output and productivity should be used with caution. They certainly are much less reliable than those for goods. At the same time, we should note that in many industries simple productivity measures are used widely and perform useful functions. For example, in the assessment of the performance of individual stores or firms in the retail industry, the dollar value of sales per square foot is used widely. For some other purposes, the dollar value of sales per person provides useful information for managers and entrepreneurs.

Non-market Services

Services provided by government and charitable organizations differ from marketed services and goods in a most fundamental way relevant to the estimation of productivity. They do not have a market price. Defence, education, the administration of the social security net, police protection, judicial, recreational, transportation (highways), and many other government services are provided free or at user costs that cover only a small fraction of their true cost.⁵

Services provided by charities and non-profit organizations like the church and think tanks are provided free or at subsidized user costs to consumers. As such, they are very similar to government services in the way they complicate the measurement of output.

Private firms producing services for the market can readily supply information about outputs, such as the number of hours spent with customers of a law firm, of teller transactions, and loans made by banks, since these basic data are essential to the accounting and control mechanisms of the business. Government bureaus are under no obligation to collect corresponding statistics. This makes it more difficult to substitute such quan-

titative indices for real output measures in the case of government than in the case of law firms and banks.

During the 1970s, internationally concerted efforts were made to gather specific information on the output of government agencies similar to that used in some service firms in the private sector. For example, in both Canada and the United States, governments kept track of the number of cheques issued by the agencies responsible for the administration of social security. The numbers of telephone calls, misdirected cheques, address changes, and similar measures of output and quality were also counted. These efforts are alleged to have resulted in increased internal controls of the agencies in which they were applied. It is symbolic of this control use that the measures continue to be published regularly by Treasury Board in Canada and the Bureau of Management and Budgets in the United States. However, because of costs and incomplete coverage, these data were never used to calculate comprehensive quantitative output and productivity data for government services.

In this context, it should be noted that counting simple government outputs like cheques issued was criticized by analysts who saw the purpose of government activities much more broadly. In the case of the social security administration, for example, the appropriate ultimate measure would be the extent to which it assured financial security for retired and other needy persons. In the case of defence, the ultimate measure would be the degree of protection from foreign invasion. According to this view, the use of social security cheque issues or the manoeuvres of troops as proxies for these ultimate social goals may be misleading. However, the very statement of the problem in these terms suggests the conceptual and overwhelming practical difficulties involved in government output measures of this sort. Conceptually, the need for broader measurement of government output is clear, but implementation of the concepts has had to be delayed and may never take place.

Finally, the problem of measuring quality changes is important also for non-market services. Managerial and technical efficiencies caused by the use of computers and electronic control devices are likely to have reduced the number of errors and speeded up services provided by numerous government agencies in their dealings with the public. For the same reasons, the quality of the services provided by the armed services are likely to have improved in terms of surveillance of potential enemies and the effectiveness and reliability of weapons and delivery systems. No systematic record of quality changes of non-market services exists. At any rate, without appropriate information on output and price, estimates of quality would not be of much use in the construction of productivity series in this sector.

MEASURING GOVERNMENT SERVICES

Special approaches are required in the construction of statistics on real output and productivity for government activities because of the absence of distinct units of output and the lack of price and quality information. The fundamental technique used is to assume that all changes in the value of labour and other inputs result in changes in the value of output by equal amounts.

For example, Statistics Canada estimates of the gross output of provincial administrations rose from \$1.8 to \$2.6 billion between 1973 and 1983 in constant dollars.⁶ Gross domestic product, which is the same as the value added, of this industry rose by exactly the same nominal value. This implies that no estimate was made of intermediate inputs used by provincial administrations.⁷

This procedure for the estimation of real output is used for all activities of Canadian governments. It has important implications for the central concern of this chapter. Changes in the productivity of labour must always be zero.⁸ In other words, calculation procedures assure that percentage changes in real output are equal to the percentage changes in real labour inputs.

In the case of some government activities, such as universities and colleges (SIC 806), the publication noted above shows gross output and intermediate inputs used to estimate value added by the sector. Different price indices are used to deflate these three gross values. However, the result shows that all three time series have grown at identical rates. This result implies that the construction of the series did not use actual data on intermediate inputs. Instead, it assumed that intermediate inputs were a constant real fraction of the real value added which consists of real labour costs and depreciation. The use of this methodology assures that changes in labour productivity also must always be zero in sectors where intermediate inputs are subtracted from gross output.

The methodology used in the estimation of the value of output in the public sector has an important implication for the assessment of the growth of productivity in the economy as a whole. If it is true that labour in the public sector has become more productive through time, then the economy-wide estimates of productivity growth in Canada are biased downward. Some may challenge the validity of the assumption about increasing productivity of labour in this sector. However, it is hard to believe that the use of computers, modern communications systems, training, and managerial control systems has had no positive effect on labour productivity through time.⁹

Because of the difficulties associated with the measurement of productivity in the government sector, Statistics Canada produces aggregate data on productivity only for "Commercial Goods Producing Industries" and

“Commercial Service Producing Industries.”¹⁰ Labour productivity data on less aggregated industry groupings presented below were calculated for this study from published statistics on real GDP and employment.

SOURCES OF NEGATIVE PRODUCTIVITY GROWTH

Some of the service industries studied exhibited negative rates of growth in productivity. How is this possible? First, information on production and employment in the sectors came from different statistical surveys. A bias can therefore result from data which show a greater growth in employment than actually took place. This explanation seems most appropriate for the small negative growth in productivity in public administration and defence, since for reasons noted above, real output growth should be exactly equal to the growth in employment, except for depreciation.

The second reason is that productivity has increased but failure to adjust for quality improvements makes it appear to have fallen. This explanation may be most relevant to personal services, for which the statistics show reductions in productivity of 5 percent annually during the period 1976 to 1984. This type of result might be produced under the following conditions.

Consider a barber shop which produced an average of 100 haircuts per worker in the first time period and an average of only 80 in the second time period. Such an outcome could result from more careful styling required due to a change in fashion to longer hair and the increased provision of tied-in services, such as washing and drying. Price increases in the cost of a haircut presumably reflect this increased service, but if the deflation of the statistics considered these price increases to be a result of general inflation rather than quality improvement, the real quantity of output is underestimated and can result in the appearance of negative productivity growth.

As a further example of such causes of negative productivity growth, consider teaching. The student/teacher ratio may be lowered deliberately to increase contact time and raise the quality of teaching. Under these conditions there is a decrease in the standard measures of labour productivity in terms of students educated per teacher.¹¹

Third, productivity in service industries may decline as a result of business cycle fluctuations which force operation of firms at less than optimal scale. In the preceding example of the barber shop, the decline in output per worker may have been caused simply by the lack of customers during the second period. This phenomenon is responsible for the widely-observed increases in overall productivity during economic recoveries and corresponding slowdowns during recessions.

Fourth, negative productivity growth in services and other industries can be due to the use of less productive workers. These may be used for a

variety of reasons, but one of these is especially relevant for the present study of services. During a recession, workers laid off by large firms often enter the service sector in fields where barriers are low, providing cleaning, gardening, and a host of personal and business services. Such new suppliers of services may be less productive than those in the business for a long time.

Fifth, productivity can decline as a result of strife between employers and employees. In evidence presented below, it can be seen that the growth of labour productivity of Canada Post workers has been negative since the middle 1960s. This date coincides with the official acceptance of union bargaining rights in the post office and granting of the right to strike. It also coincides with efforts to mechanize the industry. Read (1983), the producer of these data on Canada Post, pointedly titled the study, "Canada Post, A Case Study in the Correlation of Collective Will and Productivity." This evidence suggests that organizational change and especially the effects of unionization and the introduction of labour saving technology can result in negative productivity growth if the technology is not applied in the designed fashion. We should note, though, that this kind of outcome is not possible for any length of time in the case of private firms. Competition would force bankruptcy and quickly punish non-cooperative behaviour between employers and employees.

Sixth, negative productivity growth may be the result of cheating on taxes through under-reporting of income and services provided. Studies of the underground economy by Mirus and Smith (1981) for Canada and Feige (1979) for the United States¹² have assembled powerful empirical evidence in support of the hypothesis that the underground economy has grown strongly in post-war years. The models used by these analysts suggest that opportunities for such underground activities are particularly great in small firms providing personal and business services as well as restaurants, retailing, and repair shops. Increases in this kind of cheating have coincided with increases in effective marginal tax rates and the availability and generosity of social insurance programmes which provide a subsistence base from which underground economy activities yield high marginal benefits. As a result, the growth of the underground economy is at least consistent with observed persistent declines in some service industries. At the same time, we should note that other explanations and estimates of the size of the underground economy have been claimed to be excessive by national income accountants and some specialists in productivity studies, like Edward Denison (1985).

Seventh, and perhaps most important, negative productivity growth in a service industry is a reflection of technical change that provides benefits to the users of the output. Consider a town which initially is served by one shopping centre located at the outskirts. Now, assume that competition

among retailers results in the establishment of a second shopping centre at the other end of this town and that it draws one-half of an unchanged number of shoppers to its facilities.

Under these conditions, it is likely that the retailing business in this town has lost some scale economies. Average mark-up rises and value added per worker drops. Yet, it is clear that consumers have gained. Average travel time to shopping facilities is lowered, and there may be other amenities. The revealed preference of consumers creates a presumption that they have experienced at least a marginal gain in welfare. Customers who originally had to travel the greatest distance to shop now have the shortest journey. They gain more than marginally. If there were a proper accounting of the household production function, the innovation in retailing and the recorded decrease in labour productivity in this industry could be shown to increase labour productivity in the household sector. Yet, the data do not show such a development or attribution of cause.

The principle of the preceding example is operative also in the case of services used as inputs by producers. Consider a computer service firm which has produced a new software package sold in a competitive market and using inputs such that it earns a normal profit. Furthermore, assume that an estimate of labour productivity shows a reduction from the preceding period because the number of computer instructions embodied in programmes per man-hour has dropped. Under competition, such a programme will be purchased only if it raises the user's net income. Consider that it also raises labour productivity by reducing the number of operators needed for a production machine. Again, such a process of innovation originating with a service industry shows a reduction in its labour productivity but can be identified directly as the source of productivity gain in another industry.

Machine tool producers and other manufacturers of intermediate inputs and capital goods often encounter similar conditions. Productivity growth in their industries is low or even negative while the users of these machines enjoy large gains in productivity. The phenomenon has received considerable interest in studies of productivity in the goods producing sector. To the best of our knowledge, however, it has been neglected both analytically and empirically in the case of service industries. In the next section of our study, we shed some light on the origin of this state of affairs when we discuss the importance of distinguishing between consumer, government, and producer services.

SOME SPECIAL PROBLEMS WITH SERVICE PRODUCTIVITY

No discussion of productivity in the service sector would be complete without mention of a phenomenon analysed and popularized by William

Baumol (1967). This phenomenon involves the historic rise in the prices of certain personal and public services relative to the prices of goods. The most outstanding examples of such relative price increases are found in teaching, public transportation, and the arts.

There are two implications of this analysis stressed by Baumol that are of particular relevance to this chapter. First, the process results in an upward bias in the consumer price index, even if price increases are nil in the sectors enjoying productivity increases. Furthermore, the share of nominal dollars out of total expenditures spent on services by governments and consumers rises through time, even if there is no increase in the proportion of real services in the budgets.¹³

In a recent publication, Baumol (1987) corrects what he perceives to be the widely held view that all productivity increases in the service industries are low. He showed that productivity gains have been very high in communications services and greater than the average for goods in transportation and some other services to business management. Below we present related evidence for Canada.

Services and Overall Productivity

A central theme of the analysis to be presented in the next section concerns the role of producer (or intermediate) service inputs as a source of overall productivity gains in the economy. We view the growth of the service sector as the outcome of the process of accumulation of knowledge and human capital and the accompanying increased roundaboutness of production, as the Austrian school has called the process of capital accumulation and specialization.

In this view, the producer service industries contribute to overall productivity growth that is not reflected in their own productivity increases. Competition in these service industries assures that economic rents to innovation are temporary and that gains from the use of innovations are passed on to the buyers of these services. For example, returns to producers of computers used in the control of machine tools are normal because of the ready availability of computers and the relative ease of producing software. In the preceding section, we presented a brief example of the general process with the emphasis on the possible case where productivity growth in the industry producing the computer services has been negative. To capture the phenomenon of how these computer services raise the productivity of machine tool users requires studies of total factor productivity with a special twist. Intermediate inputs provided by service industries have to be treated as a separate input.

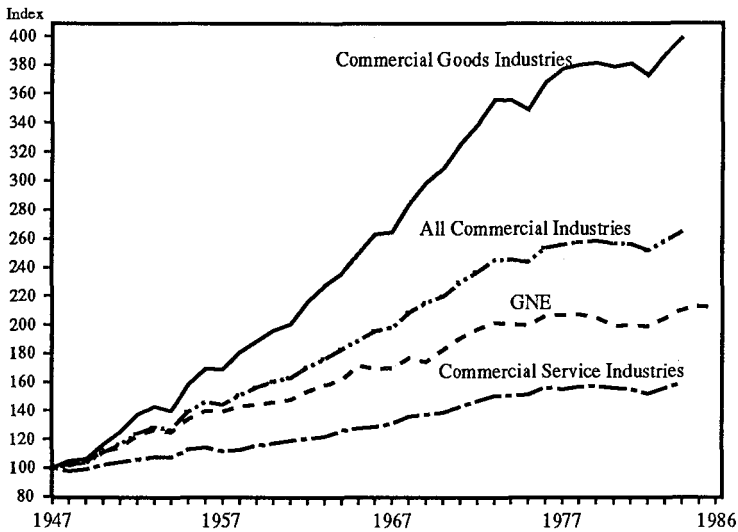
We have not been able to document the indirect relationship between producer services and productivity of industries using them and, to the best

of our knowledge, such studies do not exist. Therefore, the important indirect role of the service industries in the generation of productivity gains must remain a hypothesis for the time being. We return to the general subject below, but its importance in the assessment of productivity in service industries warrants this brief introductory discussion.

EVIDENCE ON AGGREGATE PRODUCTIVITY TRENDS

The overall productivity of labour is an important determinant of living standards in Canada since, historically, about 70 to 75 percent of national income has accrued to labour. For this reason, we present in figures 35 and 36 the broadest available measure of labour productivity, gross national expenditure (GNE) per employed person, together with some other basic output series.

Figure 35
Domestic Product, 1971 Prices, per Employed Person

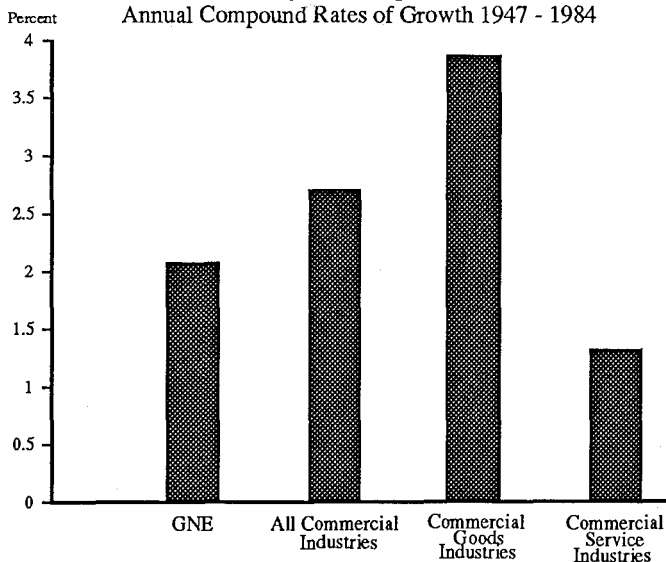


Source: Statistics Canada, Aggregate Productivity Measures, catalogue 14201

In the third line from the top, the first graph shows the time profile of real GNE per employed person, using 1947 as a base of 100. As can be seen, over a 39-year period the index has roughly doubled. According to figure 36, this translates into an annual compound rate of growth of 1.78 percent. Growth over the period has not been even. It was generally more

rapid in the immediate post-war years and the 1960s than later. There have also been interruptions in the growth that marked major recessions. The 1974 recession followed the first oil price shock and that in 1981 occurred as part of a global recession which was induced by U.S. government efforts to combat the endemic inflation of the 1970s and its move into the double digit range in 1979.

Figure 36
Productivity Growth per Person
Annual Compound Rates of Growth 1947 - 1984



Source: Statistics Canada, Aggregate Productivity Measures, catalogue 14201

The second highest line in figure 35 represents an aggregate which Statistics Canada calls "all commercial industries." It thus represents productivity growth in the economy excluding government and other non-profit organizations. In the discussion of fundamental concepts above, we noted that the last two sectors show zero or very low productivity growth rates, partly because of measurement biases. The low productivity growth of these sectors explains why the aggregate all commercial industries has a higher growth rate than GNE. The difference is about 0.75 percentage points annually on average during the period.

All commercial industries consists of the weighted average of the commercial goods and commercial service industries. As can be seen, the goods sector has had by far the highest rate of productivity growth of any sector at nearly 4 percent per year on average. The service sector has had by far the

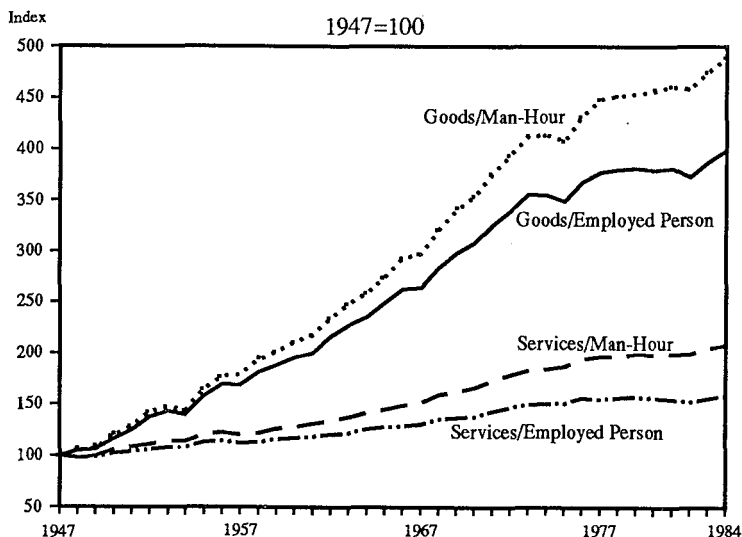
lowest rate at a 1.2 percent annual growth rate. It may be noted from the time series chart that year-to-year instabilities are greatest in the goods and lowest in the service producing sectors.

These data illustrate some of the basic principles discussed in preceding sections of this study. The non-commercial sector has the lowest productivity growth of any sector. It is followed by the commercial service sector, and both are dominated by the productivity gains of the commercial goods sector.

Measuring Labour Input

Before we turn to an analysis of labour productivity in more disaggregated service industries, we discuss briefly some statistical problems associated with measuring the quantity of labour which is used in the estimation of the output per worker in different time periods. In the preceding calculation, we have used the average number of workers employed in the industries during the period when the relevant real GDP was produced. The main problem with this statistic is that during the post-war years the average hours worked by workers has decreased.

Figure 37
Domestic Product, 1971 Prices, per Employed Person



Source: Statistics Canada, Aggregate Productivity Measures, catalogue 14201

Statistics Canada publishes information on the real GDP per man-hour for some industrial aggregates. Figure 37 shows the time profile of the productivity indices for the commercial goods and service producing sectors using both the number of employed persons and man-hours as the denominator of the ratio. The data indicate that estimated productivity growth is much larger if expressed on the basis of man-hours rather than employed persons. In the case of commercial services, the increase between 1947 and 1984 on the hourly base is nearly twice that of the employed person base. In commercial goods production, the absolute percentage gap is larger at nearly 100, but in relation to the productivity of employed persons the excess is only about 25 percent (from 400 to 500) in the last year, 1984.

Figure 37 suggests that the rates of productivity change shown below are biased downward by perhaps as much as 50 percent. However, it is likely that the relative ranking of service industry subsectors is unaffected by the bias due to the use of employed person statistics since there was probably a rather similar rate of decrease in hours worked in all these sectors.

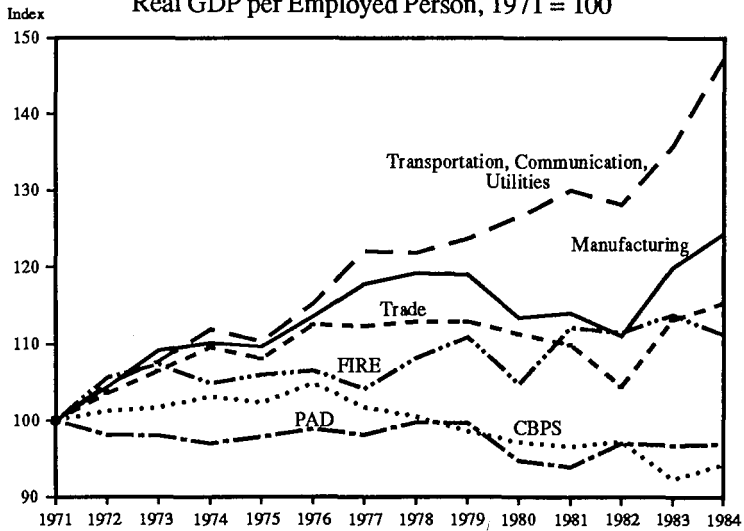
SERVICES COMPARED WITH MANUFACTURING

Figures 38 and 39 show productivity developments in the broad categories of service industries for which the national income accounting division of Statistics Canada has published a consistent series on GDP at factor cost, or value added, over the lengthy period 1971 to 1984.

These output data were matched to employment data for the same industrial aggregates derived from the *Labour Force Survey*. As a result of having to use data collected by different methods and by different statistical bureaus, there are some inconsistencies in classification. Given these limitations of the database, we can see that the highest annual average productivity growth rate of 2.8 percent was achieved by the service industry trade, communications and utilities and the lowest was in community, business and personal services at a negative 0.4 percent. Productivity gains in retail and wholesale trade were around 1 percent, and in finance, insurance and real estate about 0.8 percent. Public administration and defence experienced slight annual declines in productivity which, as we discussed above, are probably due to imperfections in the basic data since national income accounting methods are designed to always produce zero productivity gains.

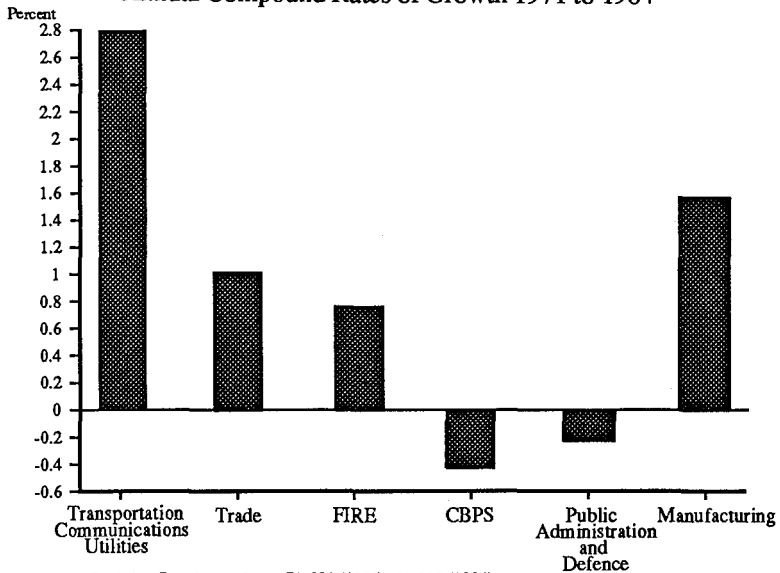
The last bar in figure 38 shows that the annual average productivity gain in Canadian manufacturing industries during the period 1971 to 1984 was 1.5 percent. It is interesting to note that this norm was exceeded by productivity gains of 2.8 percent in the industry transportation, communication and utilities. This statistic clearly indicates the error of assuming that all service industries lag in productivity growth behind those of manufactur-

Figure 38
Labour Productivity Service Industries
Real GDP per Employed Person, 1971 = 100



Source: Statistics Canada, catalogue 71-001 (1985), 61-213 (1984)

Figure 39
Productivity Growth per Person Employed
Annual Compound Rates of Growth 1971 to 1984



Source: Statistics Canada, catalogue 71-001 (1985), 61-213 (1984).

ing. The data show that this can be said only of a limited set of service industries, community, business and personal services, and public administration and defence. Trade and finance, insurance and real estate had gains nearly two-thirds those of manufacturing.

Levels of Productivity

The preceding statistics concerned rates of productivity growth. These figures are of greatest interest in assessing the changes in living standards that follow from past and expected future industrial growth patterns. However, they tell only half the story since the absolute levels of productivity in these sectors are also of some relevance to this assessment.

The importance of the level and growth rates in productivity may be seen by the following simple example. Consider a simple economy consisting of a manufacturing sector which has a labour productivity of \$50 and 100 workers who therefore produce an output of \$5,000. It also has a service sector with labour productivity of \$100, 100 workers and an output of \$10,000. Total output is \$15,000, and average labour productivity is $\$15,000/200 = \75 . Now assume that productivity grows at 10 percent in manufacturing and zero percent in services. During the same period, employment grows at zero percent in the former and 100 percent in the latter sector.

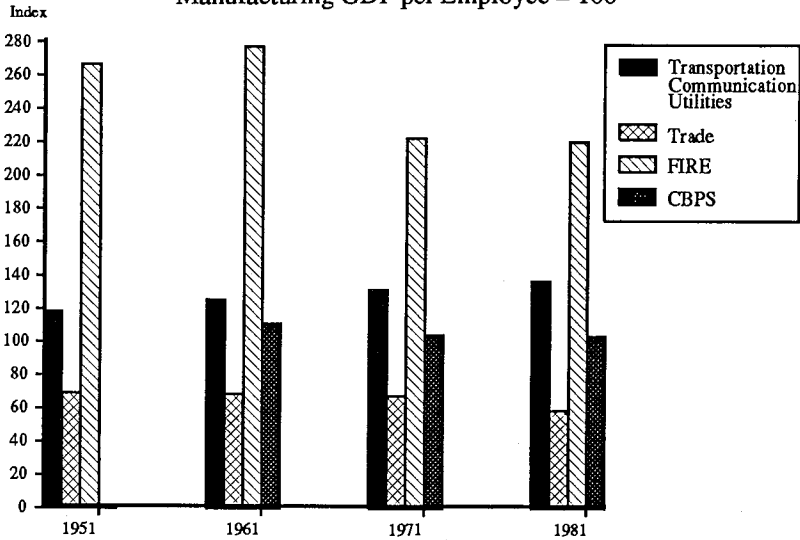
Using these assumptions, national output increases \$500 in manufacturing and \$10,000 in services. Total output is now \$25,500, and the labour force is 300. During the period under consideration, average labour productivity has increased to \$85, for a 13.3 percent overall gain over the initial \$75. This is clearly a greater gain than the average of 5 percent which is calculated by taking the mean of 10 and zero percent in the two sectors.

Figure 40 shows the importance of these ideas for Canada in the post-war years. We have calculated, for the four census years 1951, 1961, 1971, and 1981, the current dollar GDP per employee in manufacturing and considered it to be equal to 100 in each year. We then derived equivalent figures for each of the service sectors shown and expressed it relative to the base of 100 for manufacturing. The results may come as a surprise to many people.

Output per employee in finance, insurance and real estate has been more than twice that of manufacturing during all these years.¹⁴ The same comparison for transportation, communication and utilities, and trade show these industries to have been above manufacturing consistently but by only a relatively small margin. Only community, business and personal services have outputs per person (about 75 percent) that were lower than those in manufacturing. There are some small trends in these relationships over the

30 years shown in the graph, but they are not significant enough to warrant discussing at length.

Figure 40
GDP Factor Cost per Employee of Service Industries
Manufacturing GDP per Employee = 100



Source: Statistics Canada, catalogue 13-531, 61-213, 71-001

These data suggest that, even though productivity *gains* in some service industries have been below those in manufacturing, the relatively greater growth rate of employment in some service industries has pulled up average output growth in the commercial sector of Canada. In other words, the relatively rapid growth in some commercial service sectors has had a positive influence on the growth rate of national income in Canada even though productivity growth in the commercial service industries lags behind that of manufacturing.

Some researchers have systematically explored the effects of sectoral shifts in output between the service and goods producing sectors in Canada with the explicit aim of assessing the contribution which this shift made to the overall productivity slowdown. Chand (1983) covered the period 1950 to 1979 and only the aggregate sectors goods and services. He found that the sectoral shifts reduced overall productivity growth by only 0.1 percentage points. He emphasized the role played by different absolute productivity levels in reaching this conclusion. Henson and McCracken (1986) used data on 63 industries and found that during the period 1971 to 1975

changes in employment share (which favoured goods production) actually added 0.42 percentage points to overall productivity growth. On the other hand, during the period 1976 to 1981, the changes in shares decreased productivity growth by 0.13 percentage points.

In a study which concentrated on the effects of the 1981-82 recession and its aftermath, Sharpe (1986) concluded:

employment share shifts have indeed significantly reduced aggregate productivity growth in Canada....The growth in output per person in the private domestic economy was reduced in absolute terms by around 0.4 percentage points per year in the 1981-85 period....Canada experienced large declines in employment shares in above-average productivity level industries, particularly in mining and manufacturing since 1981...Rapid growth in employment share in low productivity level retail trade and business, personal and community services, explains the negative impact of employment share shifts on aggregate productivity growth (page 43).¹⁵

To the extent, therefore, that growth in the service sector is responsible for the slowdown in overall productivity growth as measured by GNE per person, the blame must fall on the non-commercial service sector, primarily public administration and defence and the service subsector community, business and personal services, which is both large and has low and falling productivity levels.

Before we close this section we should note the obvious sources of the observed differences in the levels of productivity in the service and goods producing sectors. They are due to differences in the quantity of two types of capital used in the industry. In all the service industries, but particularly finance, insurance and real estate, educational attainment levels and therefore human capital per employee are above those in manufacturing, as we have seen in the preceding chapter. Transportation, communication and utilities is almost the textbook example of an industry using large amounts of real capital per employee. From this fact follows that the observed differences in productivity have nothing to do systematically with the characteristics of workers or output other than the extent to which human and physical capital can be used in production.

SOME SERVICE SUBSECTORS

Sharpe (1986) obtained some special compilations of data from Statistics Canada which are of particular interest and relevance to the analysis of productivity trends in Canadian service industries. These data permitted Sharpe to calculate output per man-hour for the years 1975, 1981, and 1985 in real dollars and by some fundamentally different service subsectors. Moreover, by calculating growth rates for boom and recessionary periods,

he was able to discover some interesting differences in productivity developments during the two parts of the business cycle. Table 6 contains excerpts from one of the tables presented by Sharpe.

Table 6
Output Per Hour in 1971 Dollars by Selected Canadian Industries

	Average Annual Rates of Change		GDP Share 1985
	1975-81	1981-85	
Private Economy	1.00	1.06	100.00
Manufacturing	0.90	2.62	23.94
Transportation, Communication and Utilities	3.10	3.02	16.22
Transportation	2.37	3.94	7.26
Storage	4.64	-0.69	0.20
Communications	3.97	-0.94	4.73
Electric Power, Gas & Water	2.51	5.62	4.02
Wholesale Trade	1.50	2.99	6.62
Retail Trade	0.50	1.23	8.49
Finance, Insurance, Real Estate (Excluding Rents and Royalties)	2.05	0.59	10.15
Finance	1.89	-0.99	3.11
Insurance Carriers	4.61	0.14	1.39
Insurance Agencies and Real Estate	1.46	0.98	5.64
Community, Business and Personal Services	-0.22	-0.87	22.26
Education and Related Services	-1.16	-0.41	5.42
Health and Welfare Services	0.49	-0.24	6.03
Amusement and Recreation	-3.40	3.71	0.96
Services to Business Management	1.09	-2.46	4.69
Personal Services	-2.50	-2.96	0.91
Accommodation and Food	-2.80	-1.63	2.78
Other Services	1.68	-1.34	1.47

Source: Sharpe (1986) who calculated figures on GDP by Industry, CANSIM mini-base matrix 1.130 and 1.131, based on *Gross Domestic Product by Industry*, catalogue 61-005, Statistics Canada. The data on Total Actual Hours Worked were supplied by the Labour Force subdivision of Statistics Canada.

Notes: Other Services includes religious organizations and miscellaneous services (labour organizations and trade associations, photographic services, nes, automobile and truck rentals and other miscellaneous services).

One of the surprising facts found in table 6 is that during the boom period 1975 to 1981 manufacturing had annual productivity gains that were smaller than those in the private economy as a whole and much smaller than those in all the service industries at high levels of aggregation, with the exception of retail trade and community, business and personal services. The highest rates of productivity growth during that period were enjoyed by storage and insurance carriers, neither of which carried much weight in the total economy as reflected in the last column of the table which records the share that each industry contributes to total GDP. Also of some note are the only negative productivity growth rates in the period. They are all found in the community, business and personal services sector. In this service sector, only health and welfare services, other services (see their composition in the notes to the table), and services to business management had positive productivity growth rates. The rates in the last two exceeded those in manufacturing by substantial margins.

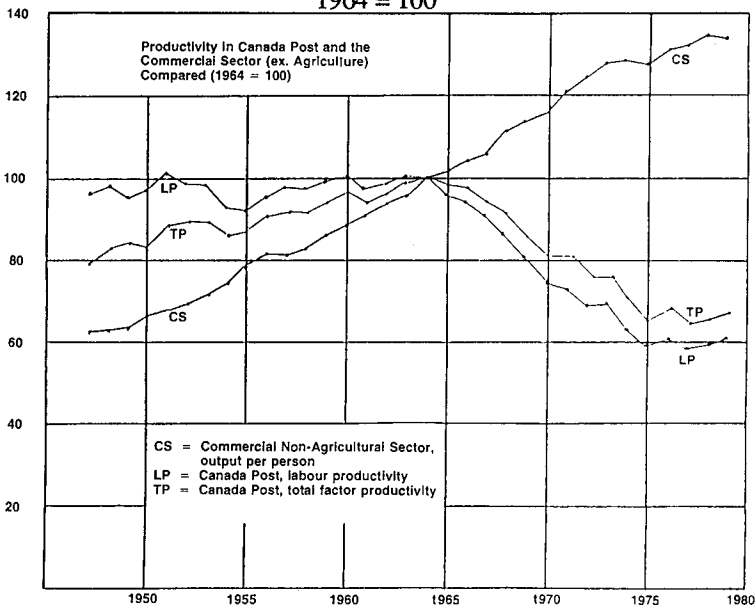
The period 1981 to 1985 includes not just the recession years 1981 and 1982 but also some years of rapid recovery, especially for manufacturing in Ontario and Quebec. During this period, annual productivity gains in manufacturing were three times as high as in the preceding period under study. Productivity gains in trade and in transportation and utilities also were higher in the latter than the former period. However, the rest of the service economy had lower gains and several more negative growth rates. Community, business and personal services, which contributed 22.26 percent to the GDP of the private economy (as compared with the 23.94 percent contributed by manufacturing), had an overall annual rate of productivity loss of 0.87 percent. In this subsector, only amusement and recreation had a positive rate of productivity gains.

The GDP weights in the last column provide the weight which each industry carries in the calculation of the productivity gains for the total private economy. Remembering that the service industries GDP share rose during the latter period, it can readily be seen why the negative growth rate of the community, business and personal services sector as well as the low growth rate in most of the other service sectors generated the basic result noted above. The shift in output share towards services reduced the total private sector growth rate by 0.4 percentage points during the period 1981 to 1985. The positive influence of the higher productivity levels in finance, insurance and real estate was obviously insufficiently large to offset the influence of the growth in community, business and personal services, which has both a low level and declining productivity.

PRODUCTIVITY IN CANADA POST

The last subject treated in this chapter is productivity in Canada Post. It was documented in a study prepared by Read (1983) for a conference on productivity research in Canada and was published in Daly (1983). The study is an example of how purely statistical measures of productivity can be used to shed light on problems of human relations and unionization or, more neutrally, as the author suggests in the title of the paper, "The Correlation of Collective Will and Productivity."

Figure 41
Productivity in Canada Post and the Commercial Sector Compared
1964 = 100



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Figure 41 shows as a reference labour productivity levels for Canada's commercial sector, excluding agriculture, with 1964 equal to 100. This is the same statistical series plotted earlier in figure 21 and was derived in the same way. This broad measure of productivity shows a rather constant upward trend interspersed with some brief fluctuations around the trend.

The centre of interest in this graph is on the two lines reflecting total and labour productivity in Canada Post. The level in 1964 was again chosen to be 100. Labour productivity is simply the total value added by the agency divided by the number of employees. Since the value added contains

depreciation of capital and the amount of capital per worker was increased during the period, it is useful to take account of this fact. This is done by the index of total factor productivity.

Labour productivity in Canada Post remained constant until the middle 1960s and then fell steadily and strongly until 1975 when it levelled off. By that year, it had reached a level of 60 percent of the peak attained in 1964. Total productivity moved in parallel with labour productivity, though the former rose somewhat more before 1964 and fell more slowly thereafter than the latter.

By almost any standard, the decline in labour productivity of Canada Post is astounding. It is even more so if we consider that it occurred during a period when the electronics revolution permitted the creation of sorting and other equipment which has the technical potential for greatly increasing productivity.

Furthermore, the results should be seen in the light of much informal evidence that the quality of postal service has deteriorated. By this we mean that the length of time required to get mail delivered and the variance of this time appear to have increased. There are fewer deliveries per week to private households, and the pickup of mail from post boxes has been reduced. A number of strikes during which mail services stopped completely has seriously reduced the reliability of the postal system for the delivery of services to some commercial activities. These activities, such as mail order business and the receipt of payment through the mails, cannot be interrupted without threatening the existence of some types of businesses. If these forms of deterioration of services were properly reflected in the productivity measure, the decrease would have been even greater.

Read develops some hypotheses about the causes of this productivity decline after 1964 and summarized his findings as follows:

The reasons for what happened at Canada Post are very complex as one might expect. However, two facts stand out as particularly important: a) an enhancement in worker alienation beginning in the 1960s; and b) a transition in labour organization from postal employees' associations to full-fledged unions with the unions seeking to establish this new identity inclined to use the underlying alienation to increase their own bargaining power (page 131).¹⁶

SUMMARY AND CONCLUSIONS

Productivity in the service industries is an important but also complicated problem. Conceptual and statistical problems in measuring productivity are even more severe in services than in goods industries because of the existence of large quantities of services provided by the government for which

no useful units of output exist. As a result, there are no indices of prices and the actual recording of productivity relies on a methodology that assures that these services always appear with a zero productivity change. Furthermore, the measurement of quality changes in services appears to be even more elusive than in goods.

Nevertheless, in the case of private services for sale, unit prices are available directly or can be calculated conveniently. Therefore, official statistics for these industries permit examination of the growth rates and levels of labour productivity in Canada. These data reveal that the private service sector has on average a much slower growth rate of productivity than do the goods producing and manufacturing sectors.

We found some exceptions to the basic view that all service industries have lower levels and growth rates of productivity than the goods producing industries. Nevertheless, in recent years and according to the latest statistics available, the shift in output towards the service sector, especially community, business and personal services, has reduced the productivity of the total economy below what it would have been without this shift.

However, this conclusion presents a misleading conclusion about the role of the service sector in overall productivity levels and growth in Canada. Producer services, which represent a large part of the total service sector, are used as inputs for the further production of goods and services in the private and public sector. In the next section we will elaborate on the way in which these producer services introduce into the overall production system scientific, organizational, and engineering innovations which raise the productivity of these industries. In this manner, some important service industries contribute to overall productivity growth even though they show small or no gains of their own.

NOTES

1. Using the above numerical example we can calculate an index of labour productivity (ILP). In period one, productivity (LP₁) is \$6 per worker and is defined to have the index value of 100 (ILP₁). In the next period, with labour productivity (LP₂) at \$8, the index is:

$$ILP_2 = (LP_2 / LP_1) * 100 = (8/6) * 100 = 133.33$$

This result implies that over the one period under observation the productivity of labour has increased by one-third, as noted in the text.

2. One of the most important recent developments in the estimation of total factor productivity measurement has been duality theory. It permits the use of information on the prices of inputs to estimate production functions on the grounds that there is a strict duality between quantities and prices. Since information on prices is available more readily than that on quantities, the scope for the estimation of total factor productivity has been widened considerably.
3. Scholars occasionally produce special studies of individual industries. Gordon (1987) used hedonic price index techniques to estimate the cost of electronic computers and found that the method used by U.S. government statisticians vastly underestimated the reduction in the real cost of effective computing capabilities of machines sold in the market.
4. See Mark (1983) for information on U.S. government practices.
5. Students of public finance remember that in the language of Musgrave's theory, these government services are "merit" or "public" goods and the attainment of Pareto optimal efficiency in the allocation of resources requires that in fact they are provided without charge.
6. These numbers are from Statistics Canada *GDP by Industry*, 61-213, Annual, 1984.
7. This implies that the heading Gross Output is false and that it should be Gross Domestic Product. Under current treatment, intermediate inputs used by the government are measured in a special account, Government Expenditures on Goods and Services. This treatment accorded intermediate inputs presumably is necessitated by the absence of reliable information on their use by individual government agencies and departments. This practice is somewhat disturbing in the case of defence, since this department has large expenditures on real goods and services relative to the pay for soldiers and administrators.
8. This is so only if the deflation of the gross GDP values assures that proportional changes in real GDP are equal to the proportional changes

in the number of employees and that real depreciation is either negligibly small or a constant fraction of real GDP.

9. In a section below we present evidence on the drop in labour productivity at Canada Post. This evidence may or may not be characteristic of the rest of government operations.

We should also note that the discussion here concerns growth in productivity and not comparisons of levels and growth rates of productivity in the private and public sector. Estimates of economy productivity growth rates are biased downward as long as there is a positive growth rate in the public sector when it is assumed to be zero. This positive growth rate may be smaller than that in the private sector, and the gap in absolute levels in the two sectors may be widening. The statement is still true.

10. Statistics Canada, *Aggregate Productivity Measures*, catalogue 14-201.
11. Easton (1987) reviewed the evidence on the correlation between value added by education processes and the student/teacher ratio. He concludes that there is no conclusive evidence on this matter. Nevertheless, the lowering of student/teacher ratios is a declared policy objective of most teachers' unions, which insist that it raises the educational attainment of students.
12. Taxation and regulatory regimes appear to be particularly encouraging the underground economy in Europe.
13. Of course, the relative price effect induces the purchase of substitute goods and services. In a later chapter we present a theoretical model and empirical study of the determinants of personal service consumption expenditures. It will be seen that the relative price and income effects would have resulted in a decrease in the proportion of real expenditures on services. The ratio remained constant as a result of the increased female labour force participation rate in Canada and the United States, which reduced the household production of, and increased market demand for, such services.
14. The GDP for FIRE includes the value added due to rents and royalties. This method of estimating the GDP for FIRE may be responsible for the high level and rate of growth in productivity in this service industry. We have not been able to quantify the influence of these components of the GDP of FIRE on the total.
15. Sharpe also noted that a significant part of the negative effect of the shift in employment shares on overall productivity has been due to the unusually large shift in employment which accompanied the sharp recession and drop in goods production in 1981-82. If the recovery restores the longer run trend in the share of employment created by goods, then his results will change accordingly. It is likely that they will return to the longer run trend found by Chand and others.

16. Read (page 131) also notes that in 1968 Postmaster General Eric Kierans launched a programme of mechanization and modern managerial control in Canada Post. In response, the Canadian Union of Postal Workers intensified its adversarial stance and adopted as national policy a statement concluding:

We therefore declare that unless the above reasonable and just conditions are met by our Employer, we shall ensure that the enormously expensive and complex mechanization programme in the Post Office WILL NOT SUCCEED (emphasis in the original).

The data suggest that CUPW has kept its promise.