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Aggregate Productivity Measures

System of National Accounts
1990-1991

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Statistics Canada
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standing cooperation involving Statistics Canada, the citizens of
Canada, its businesses and governments. Accurate and timely
statistical information could not be produced without their
continued cooperation and goodwill.*

Symbols

The following standard symbols are used in Statistics Canada publications:

..   figures not available.

...   figures not appropriate or not applicable.

-     nil or zero.

--   amount too small to be expressed.

p   preliminary figures.

r   revised figures.

x   confidential to meet secrecy requirements of the Statistics Act.

Contributors

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The System of National Accounts

In Canada, the National Accounts have been developed since the close of the Second World War in a series of publications relating to their constituent parts. These have now reached a stage of evolution where they can be termed a "System of National Accounts". For purposes of identification, all publications (containing tables of statistics, descriptions of conceptual frameworks and descriptions of sources and methods) which make up this System carry the term "System of National Accounts" as a general title.

The System of National Accounts in Canada consists of several parts. The annual and quarterly Income and Expenditure Accounts (included with Catalogue Nos. carrying the prefix 13) were, historically speaking, the first set of statistics to be referred to with the title "National Accounts" (National Accounts, Income and Expenditure). The Balance of International Payments data (Catalogue Nos. with prefix 67), are also part of the System of National Accounts and they, in fact, pre-date the Income and Expenditure Accounts.

Greatly expanded structural detail on industries and on goods and services is portrayed in the Input-Output Tables of the System (Catalogue Nos. with prefix 15). The Catalogue Nos. carrying the prefix 15 also provide measures of the contribution of each industry to total Gross Domestic Product at factor cost as well as Productivity Measures.

Both the Input-Output tables and estimates of Gross Domestic Product by industry use the establishment as the primary unit of industrial production. Measures of financial transactions are provided by the Financial Flow Accounts (Catalogue Nos. with prefix 13). Types of lenders and financial instruments are the primary detail in these statistics and the legal entity is the main unit of classification of transactors. Balance sheets of outstanding assets and liabilities are published annually.

The System of National Accounts provides an overall conceptually integrated framework in which the various parts can be considered as interrelated sub-systems. At present, direct comparisons amongst those parts which use the establishment as the basic unit and those which use the legal entity can be carried out only at highly aggregated levels of data. However, Statistics Canada is continuing research on enterprise-company-establishment relationships; it may eventually be feasible to reclassify the data which are on one basis (say the establishment basis) to correspond to the units employed on another (the company or the enterprise basis).

In its broad outline, the Canadian System of National Accounts bears a close relationship to the international standard as described in the United Nations publication: A System of National Accounts (Studies in Methods, Series F, No. 2 Rev. 3, Statistical Office, Department of Economic and Social Affairs, United Nations, New York, 1968).

Notes to Users

Productivity data reported here incorporate revisions affecting some of the underlying data. These revisions are as follows:

1. Input output tables for 1987 were revised and data from the preliminary 1988 input-output tables were used for the first time. This resulted in revisions to compensation data and real GDP (excluding government royalties on natural resources and rents of owner-occupied dwellings) data for the years 1987 to 1991.

2. Re-basing of the Labour Force Survey to the 1986 population census resulted in changes to employment data.

3. Change of employment sources in the urban transit system industry, interurban and rural transit system and postal service industry which affects the employment data of the transportation and storage industry, communications industry and construction industry from 1961.

4. Reconciliation of the provincial and the national capital stock estimates resulted in revisions to the capital stock of most industries with minor changes at the aggregate level.

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Introduction

This issue of *Aggregate productivity measures* is introducing a new format of presentation of the productivity and related statistics. It is, as last year, divided into two parts. Part 1 presents the labour productivity, labour compensation and unit labour cost estimates. Part 2 presents the multifactor productivity estimates. However, the highlights follow immediately this introduction and are based on an analysis of both labour and multifactor productivity estimates. Many graphics have been added to the data tables in order to help the readers assess the evolution through time. These graphs contain complete time series from 1961 on. It is hoped that these editing changes will improve the presentation of the productivity and related statistics.

In addition, this issue includes preliminary estimates for both 1990 and 1991 while last year issue, released in July, included 1989 preliminary estimates. Multifactor productivity estimates were released in CANSIM last year at the same time as the publication was released. This year, preliminary multifactor productivity estimates for 1990 were released in CANSIM in February in order to improve timeliness. These estimates were since then revised and updated in CANSIM along with some other revisions to 1989 figures.

The labour productivity estimates have limitations which have been emphasized in each issue of this publication and which have lead to the development of experimental multifactor productivity estimates. The major limitation is that labour productivity measures output per unit of labour input instead of output per unit of all inputs combined. Consequently the growth in labour productivity reflects the growth in output that results from two sources: 1) the growth of other productive factors relative to the growth in labour; and 2) the improved efficiency of all inputs, including labour. Multifactor productivity estimates take into account the contribution of all inputs so that they can be interpreted, in principle, as measures of increased efficiency only.

The relationship between labour productivity and multifactor productivity is depicted on the figure next page where both measures are shown for the Canadian business sector. Production is measured by real value added and factor inputs are comprised of capital and labour. Labour productivity grew faster than multifactor productivity over the last decades as it resulted both from the increased contribution of capital to output growth and the increased efficiency of combined capital and labour. Indeed, the capital intensity of production increased over that period as indicated by the positive growth, in most years, of the capital labour ratio, which is depicted on the same figure. This means that, even though there would have been no increase in efficiency, labour productivity would have grown as a result of the larger quantities of equipment used per worker. It is normal to expect an increase in production when workers are better equipped, that is, to expect an increase in their productivity. But this does not mean necessarily an increase in efficiency as more equipments have been used. Efficiency increases only when production increases without increase in inputs. The efficiency component of labour productivity, which is also the efficiency component of the capital productivity, is precisely multifactor productivity. The latter indicates how quickly production could grow each year without increased use of capital and labour.

Part 2 presents experimental multifactor productivity indices for the business sector of the Canadian economy. This is the third consecutive years that multifactor productivity estimates are released. Readers who are not familiar with multifactor productivity measures would benefit from reading the accompanying technical appendices as they explain the basic concepts with which they must be familiar to interpret

correctly the statistical tables. Appendix 1, in particular, describes several multifactor productivity measures. All these multifactor productivity measures use the same mathematical formula but they differ with respect to the outputs and the inputs to which they are applied. Distinct productivity measures are defined for industries, group of industries and for the aggregate business sector. Also of interest, the two feature articles of the 1989 issue of this publication which provide extensions to the basic concepts and deeper insight into multifactor productivity measures.

Figure 1

Indices of business sector labour productivity, multifactor productivity and capital-labour ratio, 1961-1991
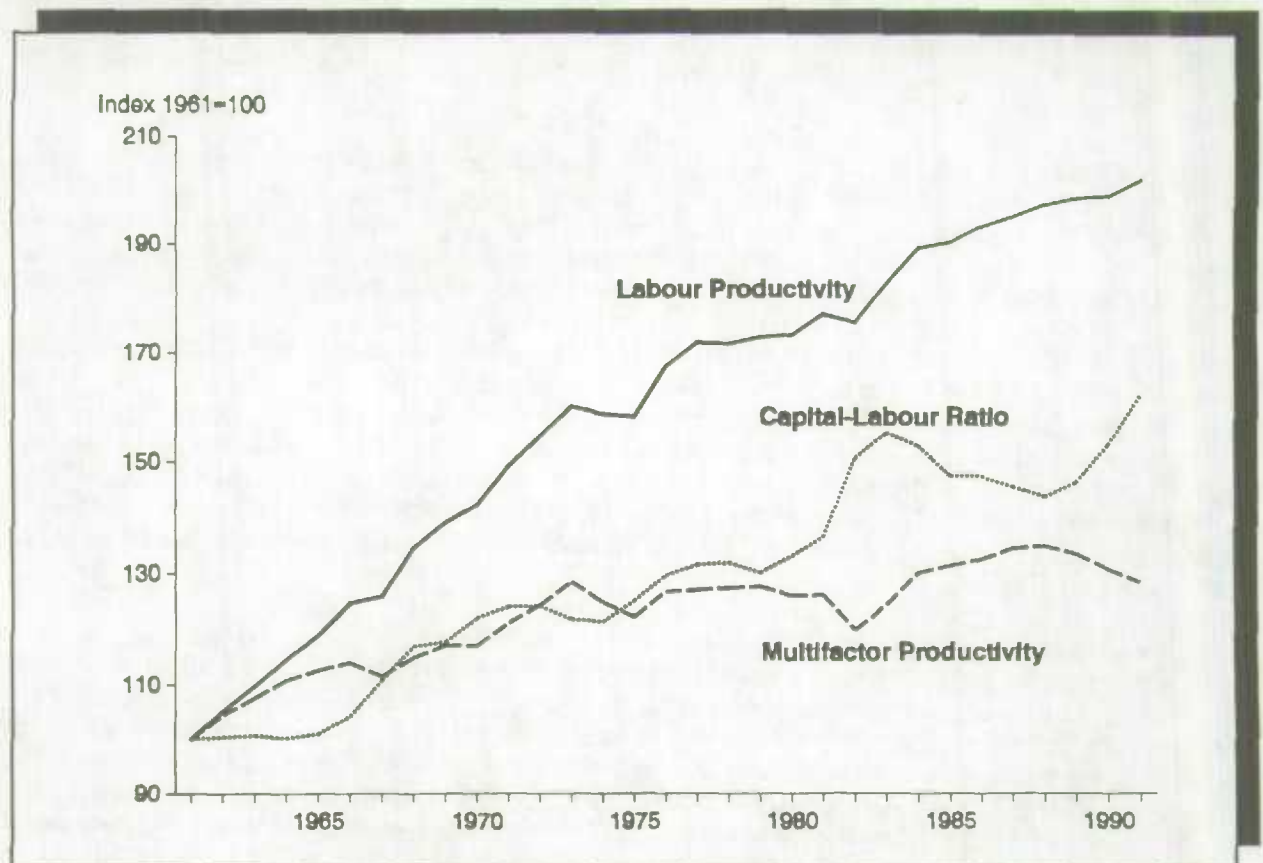
The experimental character of these estimates mainly originate from the multiplicity of the indices produced so far. Alternative indices by *industry* have been produced on the basis of gross output, of gross output net of intra-industry sales and, this year, on the basis of value-added as well as *interindustry* indices which bear on products groups rather than industries. At the aggregate level, alternative measures have been produced on the basis of the value-added of the business sector and on the basis of its deliveries to the final demand. All these indices do not have the same utility although they show reality on different angles which are of interest. A choice will eventually be done for the regular release of the indices. Yet still other indices are considered and will eventually be developed as explained in the second feature article of the last year issue of this publication which presented an overall framework under the unifying concept of integration. Alternative measures of capital stock, capital services and depreciation formula are being

analysed. Research is also under way on the comparability of Canadian productivity estimates with estimates produced in United-States and other countries.

Multifactor productivity estimates, if they come closer to estimates of efficiency gains, are not exempt of problems of their own. Productivity index estimates, in principle, measure increases in efficiency associated with technical progress and scale economies but, in practice, they also measure the impact of underutilization of productive resources over the slack periods of the business cycle as well as many potential biases due to errors in the data. For instance, some inputs are not accounted for. This is the case presently of natural resources whose quantity and quality, which are not yet available, are potentially crucial for primary industries' productivity estimates. This explains why productivity estimates for important industries such as forestry and mining are not made available at the present time. As research on the measurement of these resources proceeds, more primary industry estimates will become available. Research is also under way on the measurement of the labour input. In particular, it is hoped that disaggregated estimates of hours worked by industry will be produced next year so that multifactor productivity estimates based on hours worked rather than employment as is now the case will be produced.

Similarly, the deflation of output in many service industries appears to be inadequate, at least for productivity studies, and their estimates are withheld until progress is made on that front. Over-deflation of output in service industries on the basis of input prices, as is often the case, leads to an underestimation of their productivity growth. To the extent that service industries supply goods producing industries, the service inputs of the latter are underestimated. This tends to bias upwards the productivity gains of the goods producing industries. At the aggregate level, these biases compensate as aggregate productivity is related only to final demand deliveries which are net of intermediate inputs (provided that final sales of services are not biased).

Estimates for other industries have biases which have changed over the historical record as the methods used to estimates their outputs and inputs have changed. For the non-residential construction industries, output has been deflated with an average of input prices before 1971, whipping out productivity gains from the productivity estimates. After 1971, a larger number of construction activities have been deflated with improved deflators, contributing to an improvement of their productivity estimates. Still, much progress have to be made in the measurement of the output deflators of the construction industries.

Table I

FOR FURTHER READING_____

Selected publications from Statistics Canada

The labour and multifactor productivity indexes presented in this publication are obtained mainly from a set of integrated industry and commodity statistics within the System of National Accounts (SNA). The integration ensures consistency of definition over time and across industry and commodity classifications and the information may therefore differ from other Statistics Canada data. Publications with a catalogue number prefix 15 contain SNA integrated data and are available under the following titles:

■ Gross Domestic Product by Industry, cat. 15-001.
■ The Input-Output Structure of the Canadian Economy, cat. 15-201.
■ The Input-Output Structure of the Canadian Economy in Constant Prices, cat. 15-202.
■ The Input-Output Structure of the Canadian Economy, 1961-81, cat. 15-510, occasional.
■ The Input-Output Structure of the Canadian Economy in Constant Prices, 1961-81, cat. 15-511, occasional.

HIGHLIGHTS

Recent Productivity Developments in Canada: Are They Indicating a Persistent Slowdown?

Recent trends have raised some concerns about Canada's ability to compete in world markets, especially with its largest trading partner, the United States. Among these, the productivity performance of domestic industries and their unit labour costs are the major ones. These highlights address the productivity side of the competitiveness issue by analyzing the short and long term productivity performance of Canadian industries with special reference to manufacturing. It also focuses on factors underlying productivity growth so as to provide some insights into its future prospects.

Past issues of this publication contained Canada-US productivity comparisons which unfortunately are not meaningful at the present time pending major historical revisions of U.S. data. We expect to resume such comparisons in future issues.

The Canadian Business Sector

Multifactor productivity of Canadian business enterprises fell by 2.1% in 1990 and 1.7% in 1991 as the economy reached the end of a long expansionary cycle that began in 1982 and evolved into a recession. Such a fall in productivity is characteristic of business cycle downturns, reflecting in part additional productive capacity built during the expansion but made temporarily unnecessary by unexpected reductions in the growth of demand.

Labour productivity in the business sector as measured by real GDP per person-hour worked increased by 1.5% in 1991 and a meagre 0.1% in 1990. The positive labour productivity growth in 1991 contrasts with the marked decline in multifactor productivity, as a result of an increased contribution of capital to output growth. Labour productivity grew at an average annual rate of 1.6% for the business cycle 1982-1991, which is marginally higher than the annual average rate of 1.5% for the previous 1975-1982 cycle, and much lower than the 3.3% average annual productivity gains of the 1961-1975 period. Thus, there has been a deceleration in the labour productivity performance of the Canadian business sector in the second half of the 1961-1991 period (see Figure 1). This result was somewhat unexpected, given the relatively favourable economic conditions which prevailed from 1982 to 1988. Will labour productivity continue on its downward trend? Is this a sign that rapid improvement in technical progress is gone forever? Not necessarily, as labour productivity reflects both changes in the capital-labour ratio and changes in productive efficiency.

Growth in business sector multifactor productivity over the last business cycle, a more comprehensive measure of productive efficiency, does not support the notion of a long-term decline in efficiency growth. Rather, it indicates that overall productive efficiency growth has in fact improved over the 1982-91 period when compared to the 1975-1982 period, contrary to the indications given by the labour productivity measure (see Figure 1). Between 1982 and 1991, multifactor productivity grew at an average annual rate

Figure 1

Indices of business sector labour productivity, multifactor productivity and capital-labour ratio, 1961-1991

Aggregate Productivity Measures
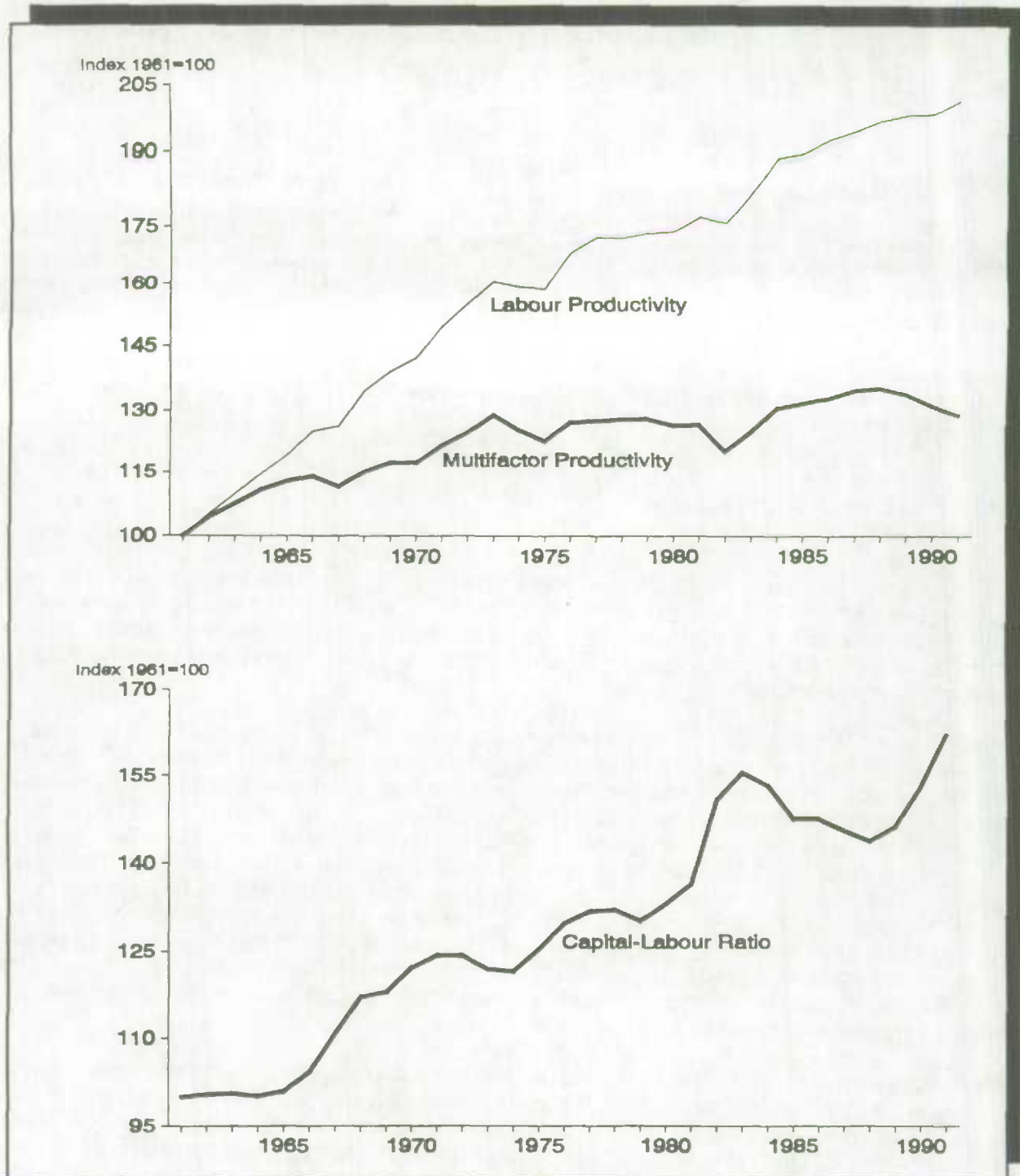
of 0.8%, which is better than the performance attained over the previous 1975-1982 business cycle, when it declined on average by 0.3% per year. Nevertheless, it is still short of the achievement of the 1961-1975 period when it reached a high of 1.5% growth per year on average. The recovery in the 1980s placed the 1982-1991 productivity growth on par with the historical 1961-1991 average.

The different trends between labour and multifactor productivity over these last two business cycles may be explained by a change in the contribution of capital to output growth. Over the current business cycle, there has been a deceleration in the rate of growth of productive capital stock from an average growth of 4.3% per year in 1975-82 to 2.6% in 1982-91, while annual employment growth decreased slightly from 1.9% in 1975-82 to 1.8% in 1982-91. As a result, the growth rate of the capital-labour ratio decelerated from an average of 2.3% in 1975-82 to 0.8% in 1982-91 inducing a convergence of the two productivity growth rates in this period. However, for most of the past 30 years, the capital-labour ratio has increased, causing labour productivity to grow faster than multifactor productivity.

Despite the productivity record, there is a widely held belief that the Canadian business sector became less competitive over recent years, both at home and abroad. In part, this stems from the path followed by Canadian net exports of goods and services over the last few years. Figures 2 to 4 show a strong deterioration of both the goods and services trade balance between 1988 and 1991, although the goods trade balance recovered somewhat in 1990 and 1991. A substantial proportion of the overall decline in the net trade of goods is due to an increase in the machinery and equipment deficit, while the deterioration

Figure 2

Net exports of goods and services in constant 1986 prices - billion of dollars, 1961-1991
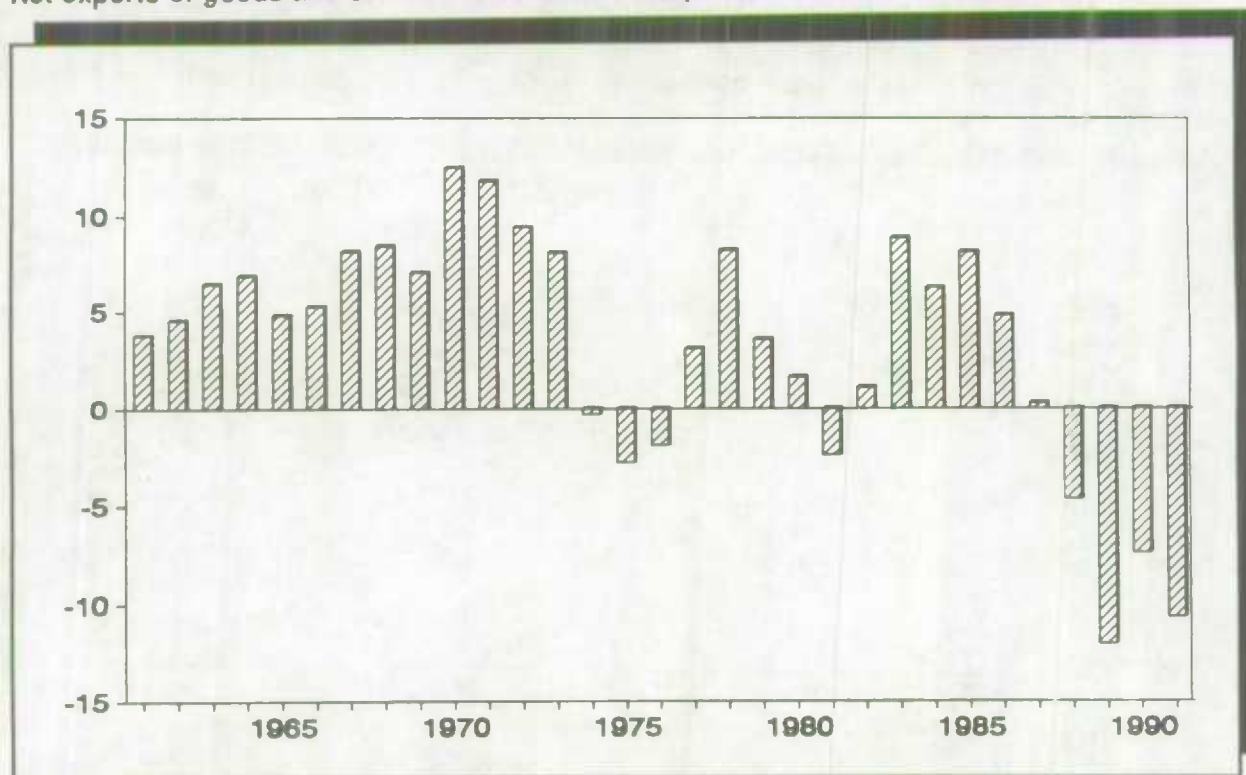
Figure 3

Merchandise trade balance and selected components in constant 1986 prices - billion of dollars, 1961-1991
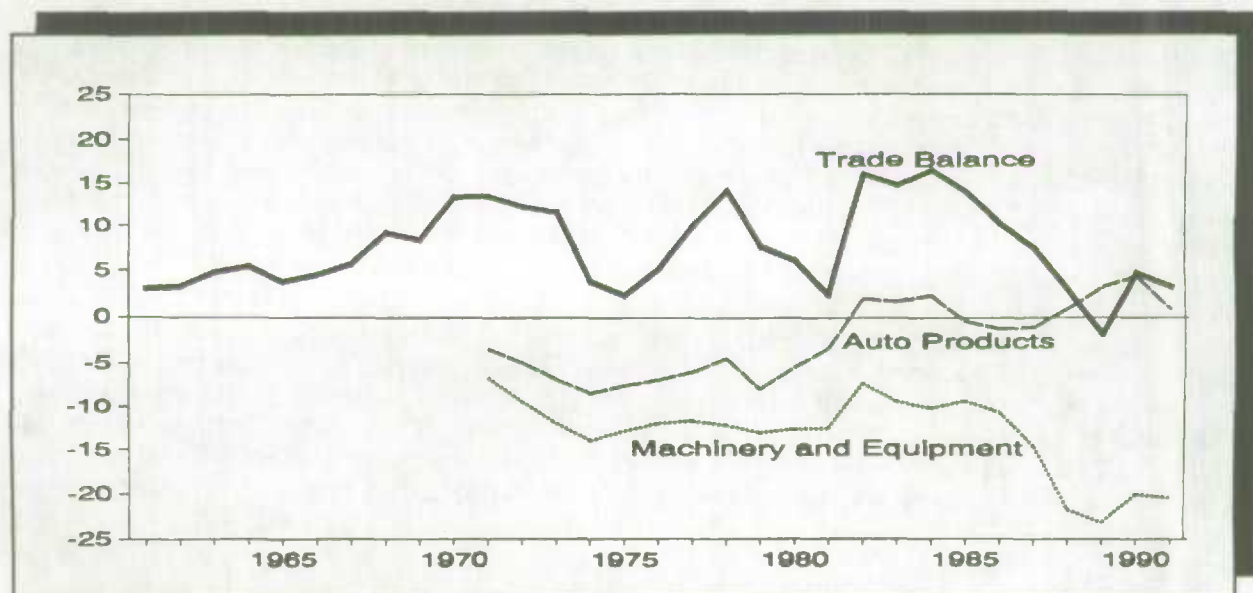
Figure 4

Net exports of services and selected components in constant 1986 prices - billion of dollars, 1961-1991

　　　　Aggregate Productivity Measures
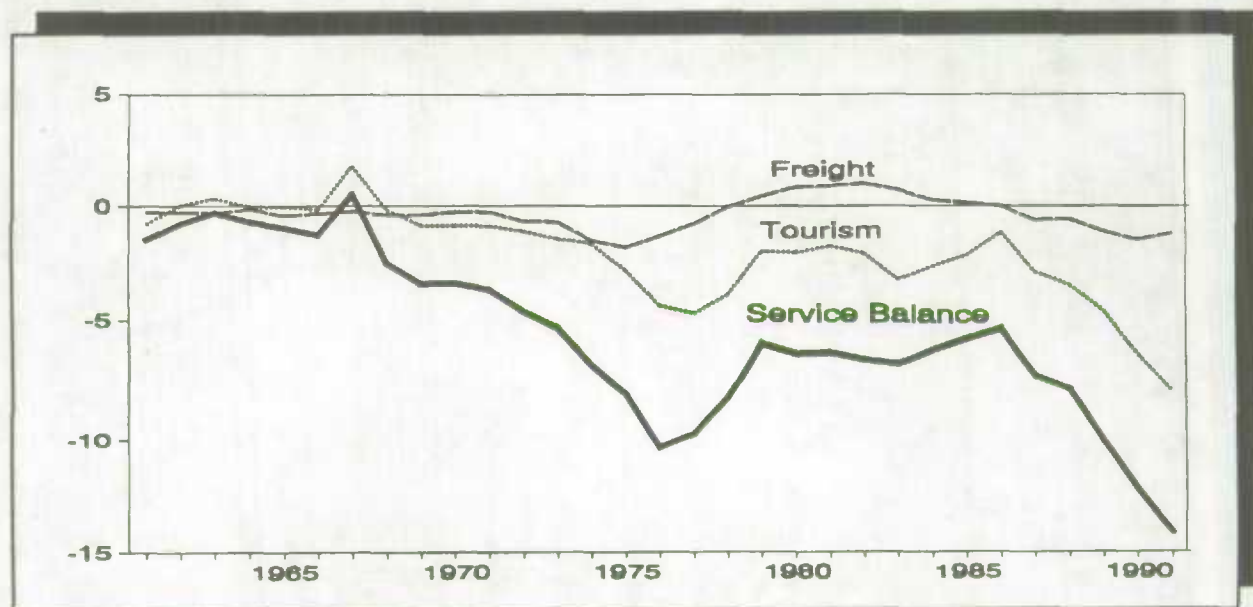
of the services account also contributed significantly to the overall decline, primarily as a result of an increase in the tourism deficit.

Figure 5

Ranking of selected industries according to gross output multifactor productivity, average annual growth rates, 1961-1988
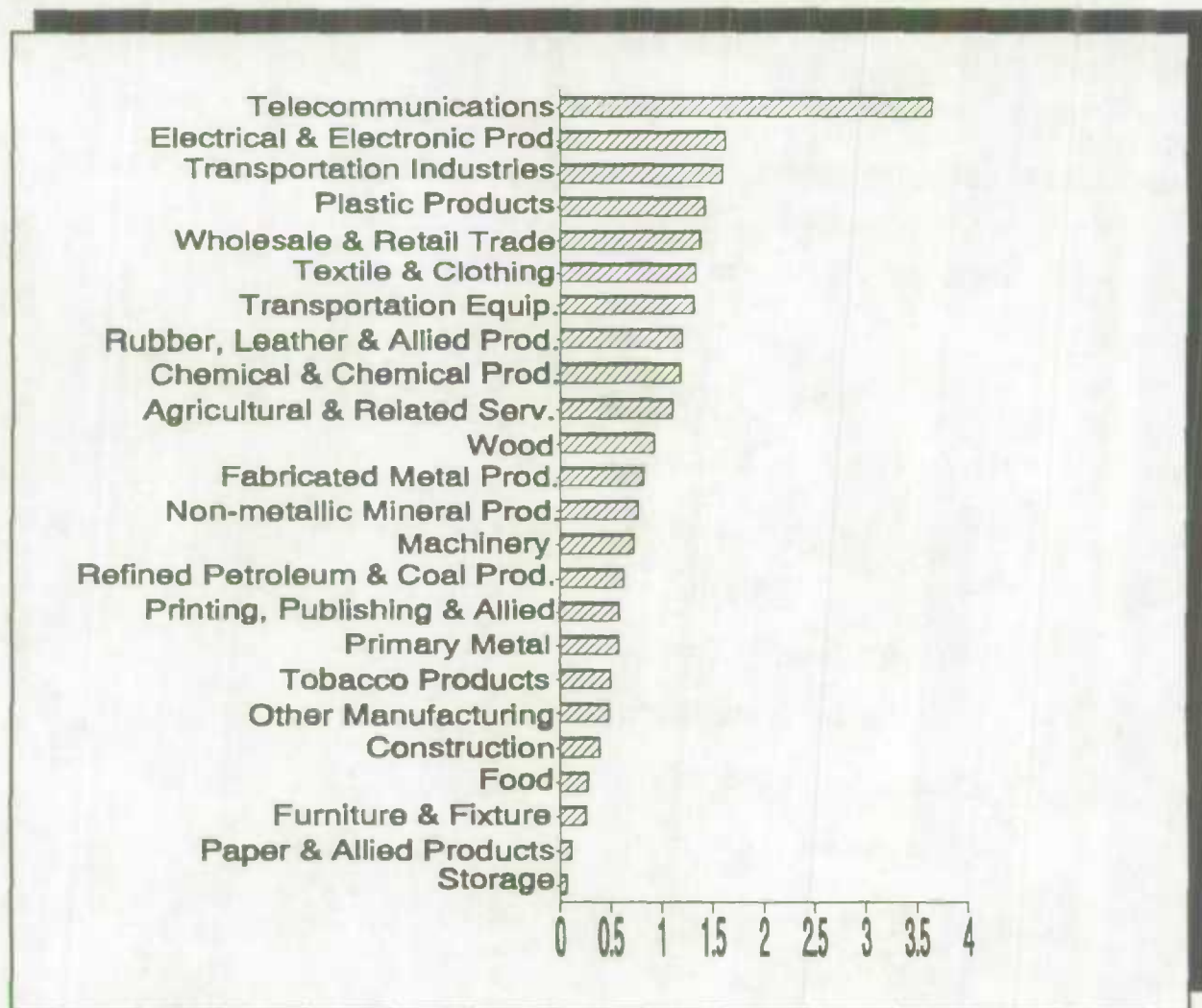
There are potentially many reasons behind the deterioration of Canadian competitiveness over the last few years. Among these, the appreciation of 21.3% between 1986 to 1991 of the value of the domestic currency is certainly one. In addition, competitiveness was strained by an increase in the interest rate differential between Canada and the United States. The central bank's rate differential climbed from 0.6 percentage points in 1981 to 4.2 percentage points in 1991. This, combined with the world-wide slowdown in economic activity and a recession in the U.S.A., made it difficult for producers to sustain the growth of output and, therefore, the productivity growth of the earlier stages of the expansion.

More fundamentally, one may ask the question: is there an emerging downward trend in productivity growth that may impair competitiveness of the Canadian economy over the long run or is the recent performance of productivity only cyclical in nature? Although it is difficult to answer such a question, the next sections focus on recent developments that put productivity growth into perspective by looking at the manufacturing industries which are the largest contributors to aggregate productivity growth in Canada and by presenting other associated indicators of performance for Canadian manufacturing industries which may be indicative of future developments.

Figure 6

Average annual contribution of industries to business sector multifactor productivity growth, 1961-1973
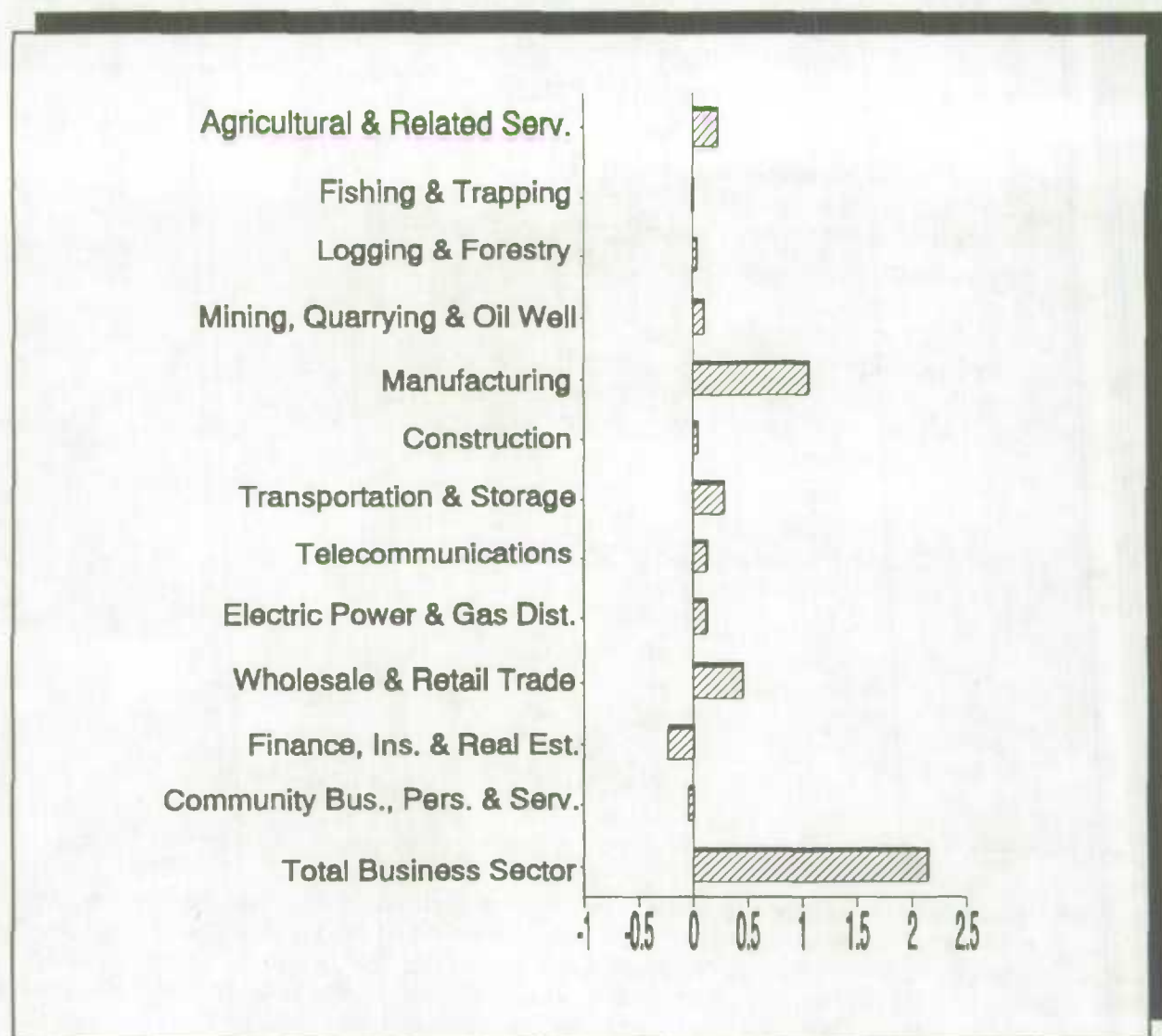
The Importance of Manufacturing in the Canadian Business Sector

Productivity growth at the business sector level is hardly meaningful without looking at the performance of industries at a more disaggregated level and the contribution of these industries to the aggregate. Figure 5 illustrates this by showing average annual productivity growth rates for individual manufacturing industries and large non-manufacturing industries. These growth rates, which are computed from industry multifactor productivity indices defined in terms of gross output, show large differences in productivity performance across business sector industries. For example, productivity grew at a much faster rate in the telecommunications industries than in any other industry. Wholesale and retail trade and the transportation and storage industries have enjoyed a better productivity performance than most manufacturing industries except plastic products.

Figure 7

Average annual contribution of Industries to business sector multifactor productivity growth, 1973-1988
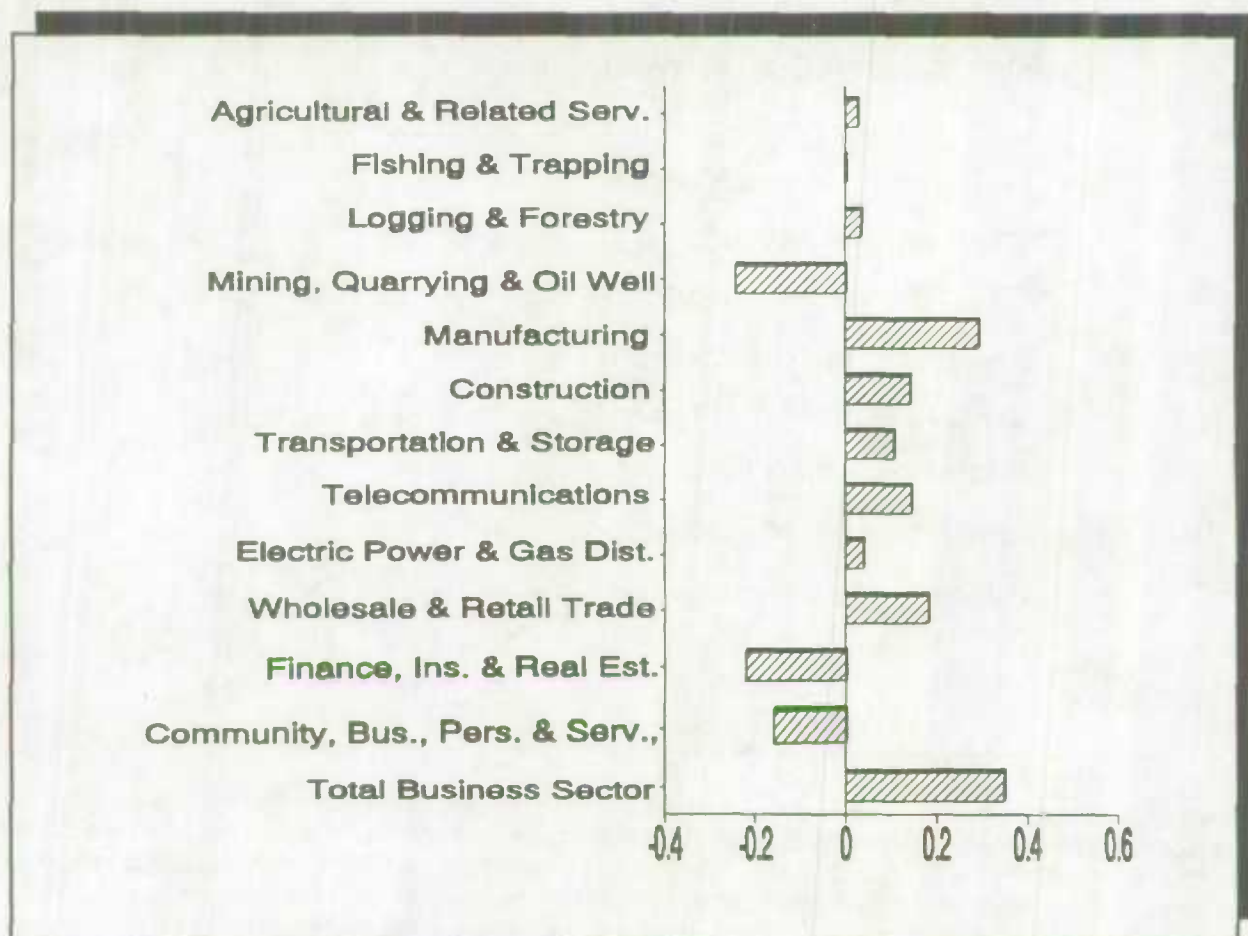
However, the above productivity gains do not take into account the relative importance of each industry in the total business sector. This importance can be measured by the ratio of each industry's output to aggregate output which is far more important for manufacturing industries than for other industries. The weighted productivity performance of industries, or what amounts to the same, their contribution to business sector productivity growth, therefore, appears quite different as shown by the set of the following figures for three different time periods, 1961-1973, 1973-1988 and 1961-1988 (see Figures 6, 7 and 8).

Figure 8

Average annual contribution of industries to business sector multifactor productivity growth, 1961-1988
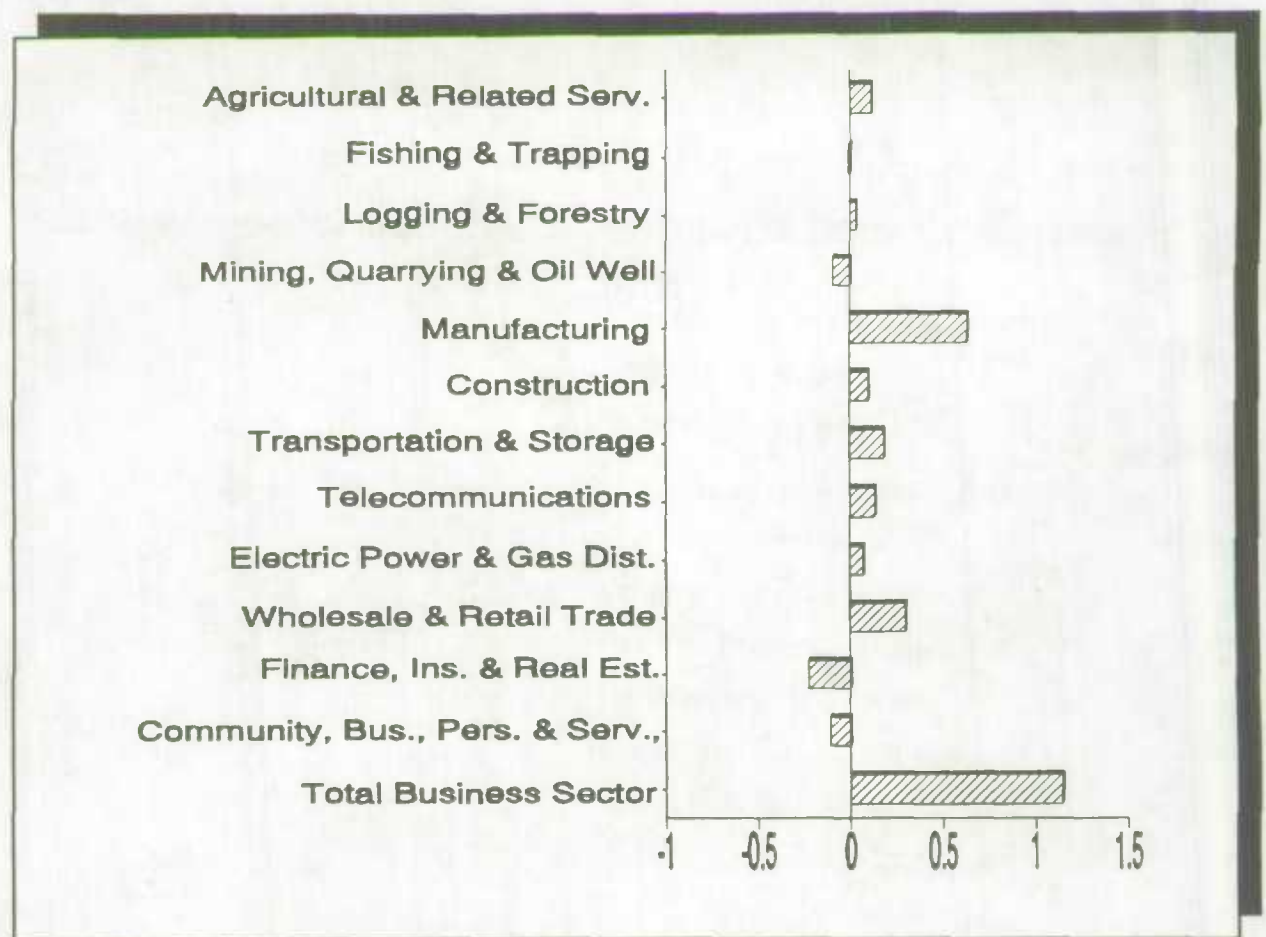
While in Figure 5, telecommunications industries were by far the dominant industry group, it is now manufacturing which plays the dominant role. This is the case for the entire 1961-88 period as well as for the 1961-73 and 1973-88 sub periods. Overall, between 1961 to 1988, manufacturing industries contributed 55% of aggregate productivity gains. While the contribution of manufacturing was stable in the two periods, the contribution of other industries changed significantly. By comparing the two periods, one can observe the increasingly depressing role played by the Mining industries on aggregate productivity. Mining, Finance, Insurance and Real Estate as well as Community, Business and Personal Services slowed down the growth rate of aggregate productivity after 1973. The rise of telecommunications in the post 1973

period was not sufficient to offset the increased number of industries with negative contribution to Business Sector productivity growth. The relative contribution of non-manufacturing industries increased compared to manufacturing during that latter period partly because overall productivity gains as well as manufacturing productivity gains were both substantially lower.

Again, the contribution of individual manufacturing industries varies widely. Outstanding are the transportation equipment industries and the electrical and electronic products groups (see Figure 9). Among the weakest components, one finds tobacco and furniture and fixtures products industries.

Figure 9

Average annual contribution of industries to business sector multifactor productivity growth, 1961-1988
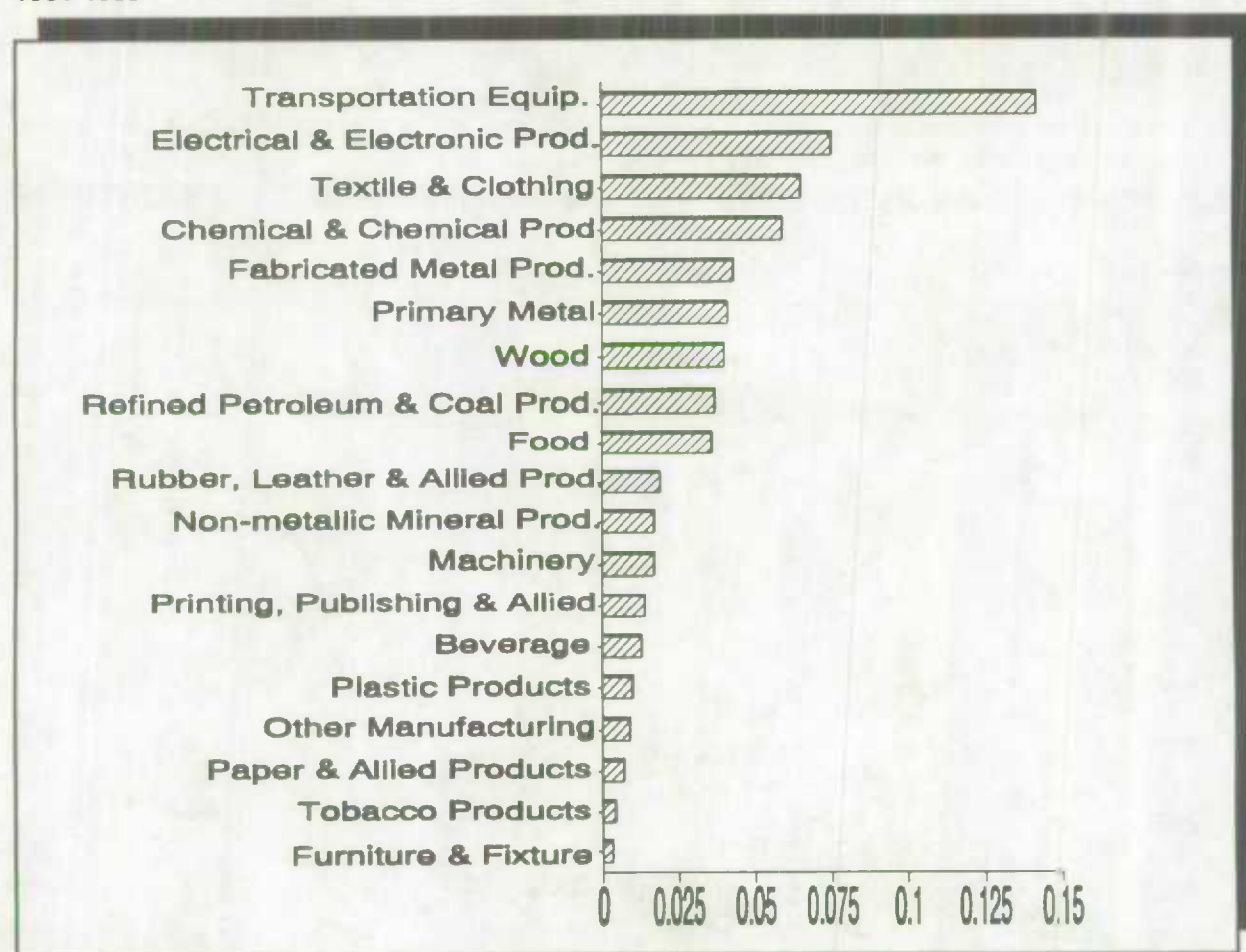
The conclusion to be drawn from this is that aggregate productivity has been consistently dependent on the behaviour of manufacturing productivity in the past. Manufacturing productivity is also important in that it is a sector of the economy which is subject to fierce international competition and we now turn to a more detailed look at this sector.

Factors Behind the Recent Manufacturing Productivity Slowdown

Canadian manufacturing multifactor productivity declined for three consecutive years in 1989, 1990 and 1991 (-2.9%, -4.9% and -3.7% respectively). The decline resulted, in part, from the rapid slowdown in economic activity in 1989 (manufacturing real GDP decelerated from a 5.2% increase in 1988 to a 0.3% increase in 1989) and the reduction in economic activity in 1990 and 1991 (manufacturing real GDP declined by 5.3% and 6.5% respectively). By the end of 1991, the productivity losses in the preceding three years eliminated most of the gains that took place since 1983. Over the course of the 1982-1991 business cycle, multifactor productivity improved slightly, with an average annual growth rate of 1.0%, which is higher than 0.6% registered during the preceding business cycle but much lower than the 2.5% recorded during the 1961-1975 period. The recovery in the 1982-1991 business cycle was not sufficient to bring multifactor productivity gains at a level of the 1961-1991 average of 1.6%.

Figure 10

Real business investment in machinery and equipment, real gross domestic product (GDP) and capacity utilization rate in manufacturing, 1961-1991
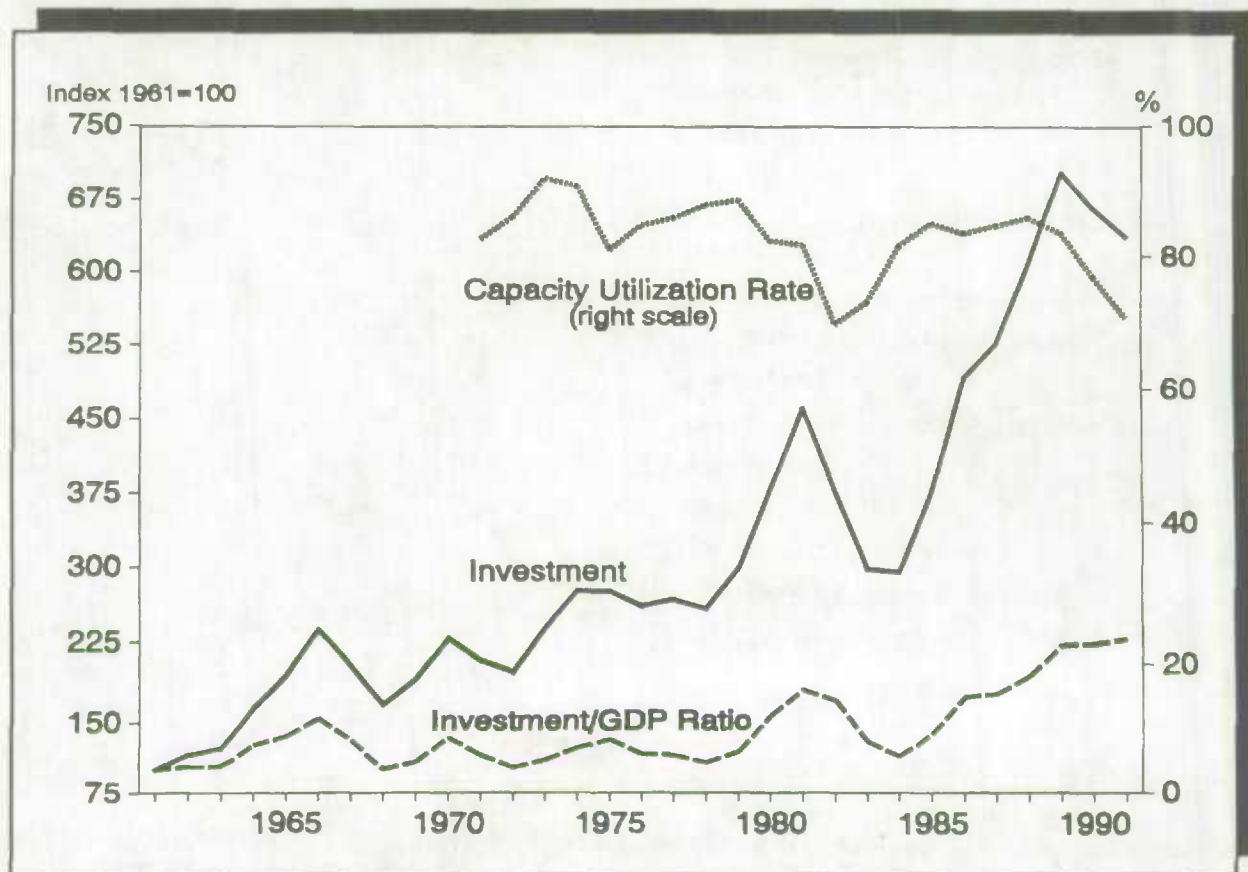
Multifactor productivity is sensitive over the short run to capacity utilization rates. For manufacturing industries, the capacity utilization index reached peaks in 1974 and 1979 with respective values of 90.8% and 88.7% (see Figure 10). The index fell to as low as 69.8% in the trough of the 1982 recession and it moved up during the following expansionary phase to 85.9% in 1988. However, it fell sharply in the last three years to 83.5%, 76.9% and 70.8% respectively. Machinery industries were the most affected by this decline. The sharp drop in the utilization index in Canadian manufacturing industries is probably a major explanatory factor underlying their poor productivity performance over the last years. This tends to explain the recent productivity decline as a cyclical phenomenon rather than as a long run development.

Investment in machinery and equipment is another key indicator of technical change in that new technologies are, to a large extent, embedded in new capital equipment. Since 1984, real investment in machinery and equipment in the manufacturing industries has proceeded, on average, at a rapid rate, indicating that technical progress could have followed a healthy long term path. As shown in figure 10, growth in machinery and equipment investment over that period indicates an improvement over the rest of the historical period. In the last three years, real investment per unit of value-added increased even though absolute investment declined slightly. This may be another indication that the relatively poorer productivity performance of Canadian manufacturing industries over the last few years may be cyclical in nature. Indeed, looking at both the capacity utilization rate and real investment growth in machinery and equipment, it is clear that the fall in productivity in manufacturing industries was accompanied by a fall in their output at a time they were increasing capital stock. With a resumption of output growth in Canada, productivity advance could proceed at a rapid pace. This would turn the recent Canadian losses of competitiveness into longer term gains. Nevertheless, high exchange rates and higher interest costs as mentioned above, and relatively higher growth in wages could hinder an expansion in output.

A strong correlation may not be established between short run movements in research and development (R&D) expenditure and productivity growth particularly for the Canadian economy in which many foreign subsidiaries benefit from R&D expenditures made abroad. However, it is interesting to notice that the recovery of manufacturing multifactor productivity growth in the 1980s may have been aided by large increases in R&D expenditures. In relative terms, current R&D expenditures increased from a low of 0.8% of revenue in 1975 to an all time high of 1.4% in 1989, the last year for which this ratio can be computed (see Figure 11). In absolute terms, manufacturing R&D expenditures in current prices in 1991 were almost twice that of 1981, and seven times that of 1973. The path of R&D expenditures among manufacturing industries has varied. Industries with high R&D to revenue ratio such as telecommunications equipment and other electronic equipment manufacturers increased their ratio between 1982 and 1989, although most of the increase took place in the first two years of this period. In contrast, aircraft & parts manufacturers, pharmaceutical and medicine products, which are also industries carrying intensive research activities, had an almost constant R&D to revenue ratio over the period. The 15% total manufacturing increase in the ratio of R&D to revenue between 1982 to 1989 reflect some marginal increases by industries not highly involved in research activities, notably in the other manufacturing industries. Similar to increased investment spending, increased expenditures in research and development hold the promise of future gains in manufacturing productivity.

Figure 11

Expenditure on research and development (R&D) and multifactor productivity growth in manufacturing industries, 1973-1991
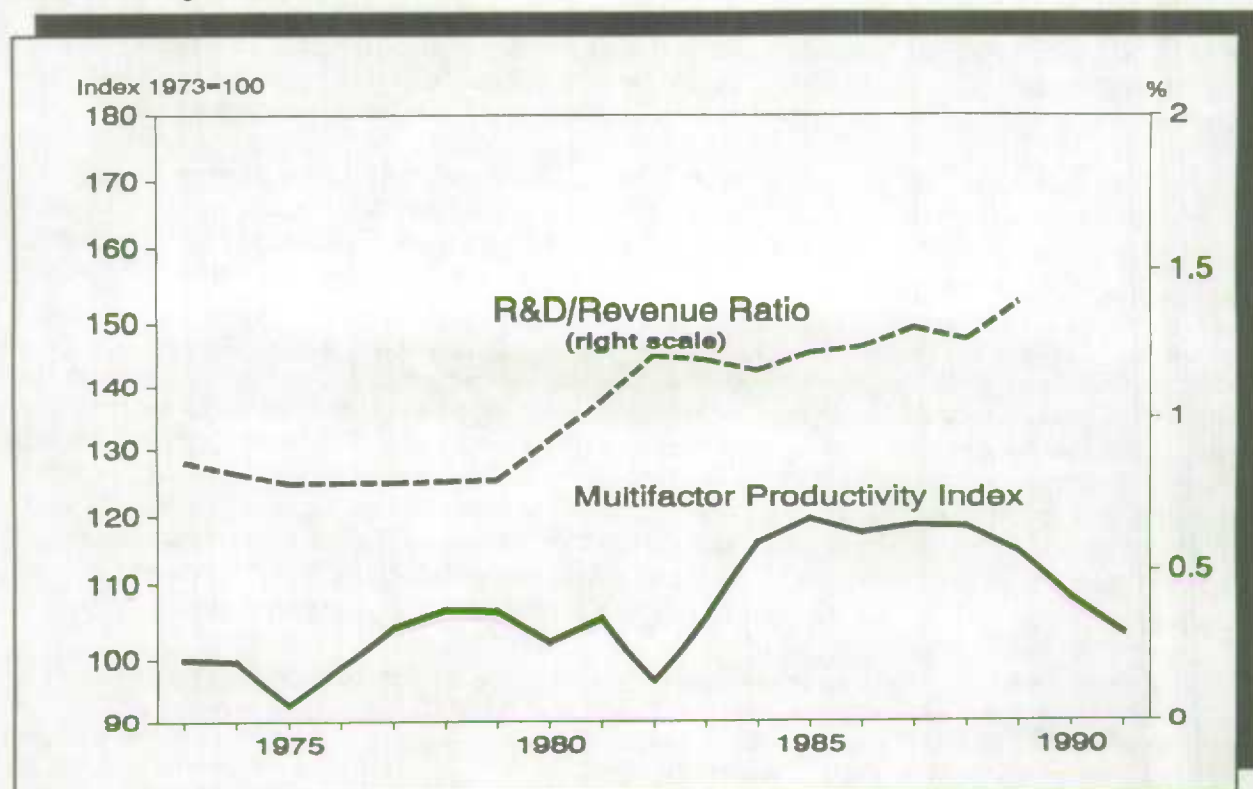
Efficiency by Product Groups

Another way of looking at performance is to look at the overall efficiency of the Canadian economy for selected groups of products and services, taking into account all industries contributing directly or indirectly to their production, that is to look at productivity by product across industries rather than on a strictly industry basis. Such an efficiency measure is provided by the interindustry multifactor productivity index which is a weighted average of the industry productivity indices discussed above[1]. The weights are provided by the value-added of the contributing industries over the specific commodity groups[2]. The commodity groups are the same commodity output of industries as above except that the measure now focuses on the joint efficiency of the immediate suppliers and all of their own upstream suppliers. Figure 12 shows the ranking of productivity performance on the output of industries measured by their interindustry productivity. It can be observed that the ranking of industries change in relation to those of Figure 5, in some cases significantly. In particular, the output commodities of the wood and non-metallic mineral products industries increased their ranking as the result of productivity gains of all direct and indirect

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[1]   *See appendix 1 , part 2 for an explanation of the interindustry index of productivity.*

[2]   *The larger is the value which is added directly or indirectly by an industry to the value of a product group, the larger is its weight.*

suppliers. The opposite case can be observed in the case of the outputs of transportation and wholesale & retail trade. The direct and indirect productivity of these services decreased in relation to the productivity of the transportation and trade industries due to lower productivity gains in upstream industries.

Figure 12

Ranking of selected industries according to inter-industry productivity, average annual growth rates, 1961-1988
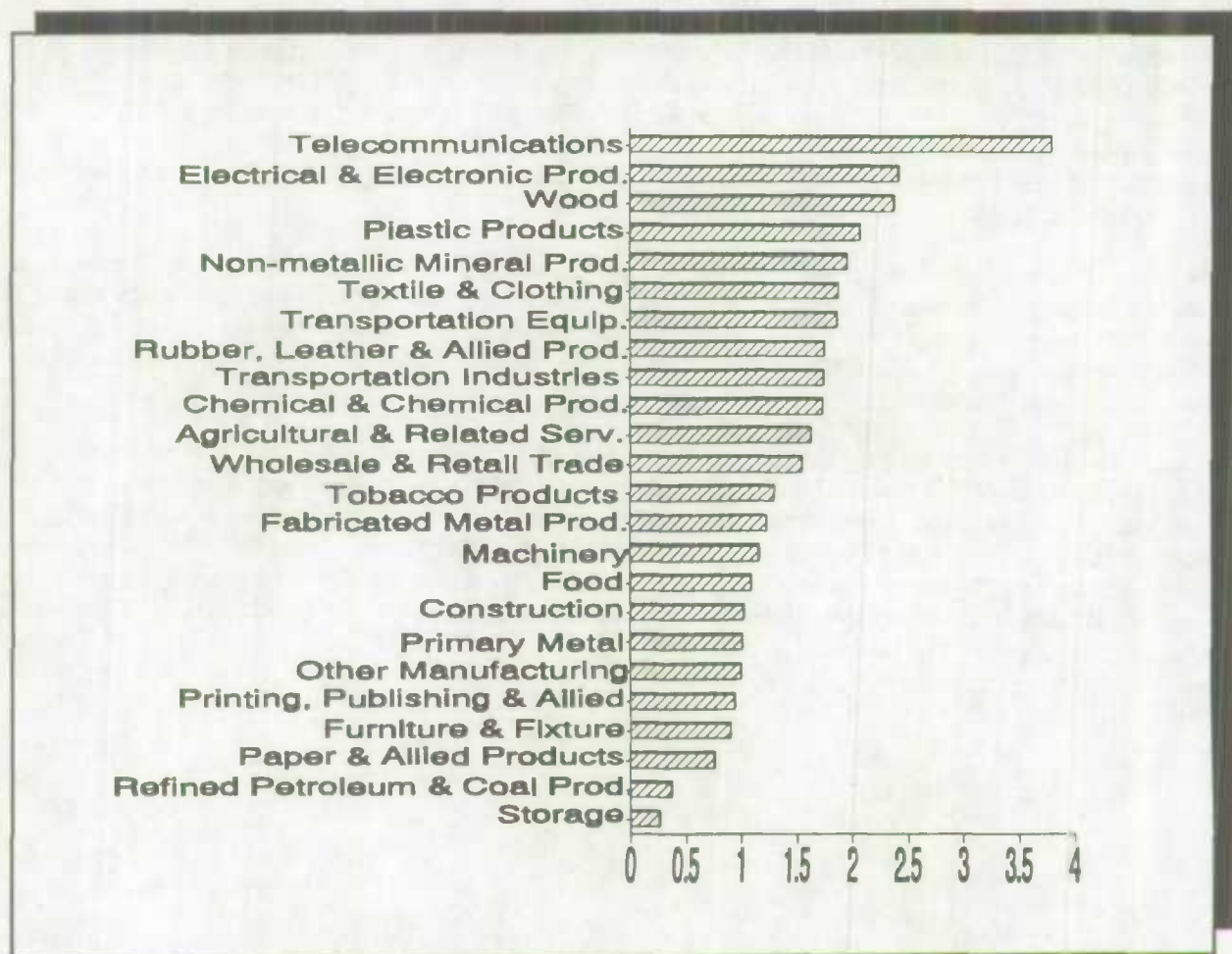
Comparing the industry and the interindustry performance ranking reveals how important the interindustry linkages are in determining the overall performance of the economy. Low productivity growth industries which have high interindustry productivity growth are indirectly supporting aggregate productivity growth by providing a market to their more efficient suppliers. The latter can be seen as channelling their productivity gains to the final demand through their industrial customers. This is the case for the wood products industry whose own productivity was 34% higher in 1988 in relation to 1961 and whose interindustry productivity in 1988 was 88% higher than in 1961. The higher interindustry productivity reflects in part the productivity gains of the logging and forestry industry. On the other hand, the converse situation occurs in the refined petroleum and coal industry caused in part by lower productivity in the oil and gas industry. It shows that the latter are not well supported by their suppliers to face international competition.

Indeed, suppliers that have experienced low productivity gains supply, ceteris paribus, more expensive intermediate inputs over the long run as increases in primary input prices (wages and capital costs) are not compensated by productivity gains. Moreover, higher intermediate input prices induce higher final demand commodity prices for tradeable commodities and ultimately impair the ability to compete.

Conclusion

Canadian competitiveness seems to have deteriorated in recent years as indicated by the external balance figures and the rise in the costs of capital and labour, the exchange rate and the interest rate differential with the United States. These factors, the fierce competition from abroad and the onset of the 1990-1991 recession with the accompanying fall in capacity utilization contributed to the Canadian negative multifactor productivity growth in that period. This indicates that the recent poor productivity performance is potentially strongly related to unfavourable cyclical phenomena.

The manufacturing sector, which plays a predominant role in the economy-wide productivity performance, suffered declines in multifactor productivity during these recession years. However, unlike other difficult times, the business reaction was swift and positive. Employment and labour costs were finally contained within bounds. As a result, inflation in unit labour costs declined and output per person-hour actually increased in both 1990 and 1991.

The underlying potential for long-term performance may have been more favourable than that suggested by the performance of the last few years as investment in machinery and equipment and in R&D indicate. Even though the historically high productivity gains of the 1960s were not repeated in the 1980s, business sector productivity recovered from the low levels suffered in the 1970s to a level close to the long-term average of the last 30 years. There is some evidence that a recovery in *potential* productivity growth has been taking place in Canada since 1982. This means that *actual* productivity could rebound in Canada if output expands in the next recovery.

PART 1

Labour productivity

Labour compensation

Unit labour cost

Table 1 - Indexes of labour productivity and unit labour cost, business sector industries, 1961-1991, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity Real GDP per person	Labour productivity Real GDP per person-hour	Compensation per person	Compensation per person hour	Unit labour cost
1961	33.4	55.7	64.6	8.7	60.0	51.7	15.5	13.4	25.9
1962	36.0	56.9	66.0	9.2	63.2	54.5	16.1	13.9	25.5
1963	38.1	58.2	67.0	9.8	65.4	56.8	16.8	14.6	25.6
1964	40.9	60.2	69.0	10.6	67.9	59.3	17.7	15.4	26.0
1965	44.2	63.0	71.6	11.9	70.1	61.6	18.8	16.6	26.9
1966	47.3	65.1	73.2	13.3	72.6	64.6	20.4	18.2	28.1
1967	48.3	66.2	74.1	14.5	72.9	65.2	21.9	19.6	30.0
1968	51.0	66.2	73.2	15.5	77.0	69.6	23.4	21.1	30.3
1969	53.8	68.1	74.6	17.1	78.9	72.0	25.1	22.9	31.8
1970	54.3	68.0	73.7	18.3	79.8	73.6	26.8	24.8	33.6
1971	57.7	69.4	74.6	20.0	83.1	77.3	28.8	26.8	34.7
1972	61.2	71.6	76.5	22.2	85.5	80.0	31.1	29.1	36.3
1973	66.7	75.3	80.5	25.9	88.6	82.8	34.4	32.2	38.9
1974	69.0	79.0	83.9	30.8	87.3	82.2	38.9	36.7	44.6
1975	69.3	80.2	84.6	35.4	86.4	81.9	44.1	41.8	51.0
1976	74.0	81.5	85.3	40.7	90.8	86.7	50.0	47.7	55.0
1977	76.4	83.3	85.9	45.1	91.7	88.9	54.2	52.5	59.1
1978	78.9	85.9	88.9	49.2	92.0	88.8	57.3	55.4	62.3
1979	82.4	89.5	92.1	55.5	92.1	89.5	62.1	60.3	67.4
1980	83.8	91.4	93.5	62.8	91.7	89.7	68.7	67.2	74.9
1981	87.5	94.2	95.4	72.4	92.8	91.7	76.8	75.9	82.8
1982	82.6	91.3	90.9	75.8	90.4	90.9	83.0	83.5	91.8
1983	85.5	91.3	90.4	79.1	93.7	94.6	86.6	87.5	92.5
1984	91.5	93.7	93.4	85.9	97.7	98.0	91.7	92.0	93.9
1985	96.6	98.1	98.1	93.6	98.5	98.5	95.5	95.4	96.9
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.0	103.2	104.0	109.9	101.7	101.0	106.5	105.7	104.7
1988	110.4	107.2	108.2	121.6	103.0	102.1	113.4	112.4	110.2
1989	113.1	110.1	110.1	131.7	102.7	102.7	119.6	119.6	116.4
1990	112.5	109.8	109.3	137.5	102.4	102.9	125.2	125.8	122.3
1991	110.0	107.1	105.4	139.3	102.7	104.4	130.0	132.1	126.6

Annual % Change

Table 2 - Indexes of labour productivity and unit labour cost, business sector-excluding agricultural and related services industries, 1961-1991, (1986=100)

| Year | Real gross domestic product | Persons at work | Person-hours | Labour compen-sation | Labour productivity | | Compen-sation per person | Compen-sation per person-hour | Unit labour cost |
					Real GDP per person	Real GDP per person-hour			
1961	32.7	50.8	57.2	8.4	64.2	57.1	16.5	14.6	25.6
1962	34.9	52.4	59.2	8.9	66.5	58.9	17.0	15.1	25.6
1963	36.8	53.9	60.6	9.5	68.2	60.6	17.6	15.7	25.8
1964	39.9	56.3	63.3	10.4	70.9	63.1	18.4	16.4	26.0
1965	43.1	59.6	66.8	11.6	72.3	64.6	19.5	17.4	27.0
1966	46.0	62.5	69.3	13.1	73.7	66.5	21.0	18.9	28.4
1967	47.6	63.5	70.0	14.3	75.0	68.0	22.5	20.4	30.0
1968	50.2	63.7	69.5	15.3	78.9	72.2	24.0	22.0	30.4
1969	52.9	65.8	71.2	16.9	80.4	74.4	25.7	23.7	31.9
1970	53.8	66.0	70.6	18.1	81.5	76.1	27.5	25.7	33.7
1971	56.8	67.4	71.6	19.9	84.3	79.3	29.5	27.7	35.0
1972	60.9	70.1	74.3	22.2	86.8	82.0	31.6	29.8	36.4
1973	66.3	74.2	78.6	25.8	89.3	84.4	34.7	32.8	38.8
1974	68.9	78.1	82.1	30.6	88.3	83.9	39.2	37.3	44.5
1975	68.9	79.0	82.3	35.2	87.3	83.7	44.6	42.8	51.2
1976	73.6	80.5	83.4	40.7	91.4	88.2	50.5	48.8	55.3
1977	76.1	82.5	84.5	45.1	92.2	90.0	54.7	53.4	59.3
1978	78.8	85.0	87.6	49.1	92.6	90.0	57.7	56.0	62.3
1979	82.6	88.8	90.9	55.5	93.0	90.9	62.5	61.1	67.2
1980	83.9	90.9	92.7	62.8	92.3	90.5	69.1	67.8	74.9
1981	87.4	93.8	94.7	72.3	93.2	92.3	77.1	76.4	82.8
1982	82.0	90.9	90.1	75.7	90.2	91.1	83.3	84.1	92.3
1983	85.2	90.6	89.6	79.0	94.0	95.1	87.1	88.2	92.7
1984	91.6	93.2	92.8	85.9	98.3	98.7	92.1	92.5	93.7
1985	97.1	97.9	97.8	93.5	99.3	99.4	95.6	95.7	96.3
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.5	103.5	104.4	110.2	101.9	101.0	106.4	105.5	104.5
1988	111.3	107.9	109.3	121.9	103.1	101.8	112.9	111.5	109.6
1989	113.8	111.2	111.6	132.1	102.4	102.0	118.8	118.4	116.1
1990	112.8	110.9	110.7	138.0	101.7	101.9	124.4	124.7	122.3
1991	110.3	107.8	106.2	139.5	102.3	103.9	129.4	131.4	126.5

Annual % Change

Table 3 - Indexes of labour productivity and unit labour cost, business sector-services, 1961-1991, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	28.3	38.8	45.6	6.8	72.8	62.0	17.6	15.0	24.2
1962	29.5	40.2	47.0	7.3	73.3	62.7	18.2	15.5	24.7
1963	31.2	41.7	48.4	7.8	74.9	64.6	18.8	16.2	25.1
1964	33.7	43.6	50.2	8.6	77.3	67.1	19.8	17.2	25.6
1965	36.1	46.2	52.8	9.7	78.2	68.3	20.9	18.3	26.8
1966	39.0	48.5	54.6	10.8	80.4	71.5	22.3	19.8	27.7
1967	40.8	50.2	56.5	12.1	81.3	72.3	24.0	21.4	29.6
1968	42.7	50.9	56.4	13.0	83.9	75.7	25.5	23.0	30.4
1969	45.2	53.6	58.7	14.6	84.3	76.9	27.3	24.9	32.4
1970	47.5	54.8	59.3	15.9	86.7	80.2	29.1	26.9	33.6
1971	50.5	56.4	60.7	17.5	89.5	83.2	31.0	28.8	34.6
1972	54.2	59.6	63.6	19.8	91.0	85.2	33.2	31.1	36.5
1973	58.3	63.4	67.7	22.9	92.1	86.2	36.1	33.8	39.2
1974	61.8	67.7	71.8	27.4	91.2	86.0	40.4	38.2	44.3
1975	64.4	70.1	73.8	32.0	91.9	87.3	45.7	43.4	49.7
1976	68.0	71.6	74.8	37.0	94.9	90.8	51.6	49.4	54.4
1977	70.0	74.9	77.0	41.2	93.5	91.0	55.0	53.6	58.9
1978	73.7	78.1	80.8	45.2	94.4	91.2	57.9	56.0	61.4
1979	77.9	81.7	83.8	51.5	95.3	92.9	63.0	61.4	66.1
1980	81.3	84.9	86.8	59.1	95.7	93.7	69.6	68.0	72.6
1981	84.8	88.9	90.0	67.6	95.4	94.2	76.1	75.1	79.7
1982	81.0	88.5	88.2	73.3	91.6	91.9	82.9	83.2	90.5
1983	83.3	89.1	88.0	77.2	93.4	94.7	86.6	87.7	92.6
1984	89.2	92.3	91.7	84.9	96.6	97.2	92.0	92.6	95.2
1985	94.6	97.6	97.2	93.0	97.0	97.3	95.3	95.7	98.3
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.8	103.6	104.2	110.9	102.1	101.5	107.0	106.5	104.8
1988	111.7	107.7	108.5	122.7	103.7	102.9	113.9	113.1	109.8
1989	115.7	111.3	111.3	133.9	104.0	104.0	120.3	120.3	115.7
1990	117.1	112.8	112.7	142.7	103.8	103.9	126.5	126.6	121.8
1991	116.2	111.8	110.1	148.0	104.0	105.5	132.4	134.4	127.3

Annual % Change
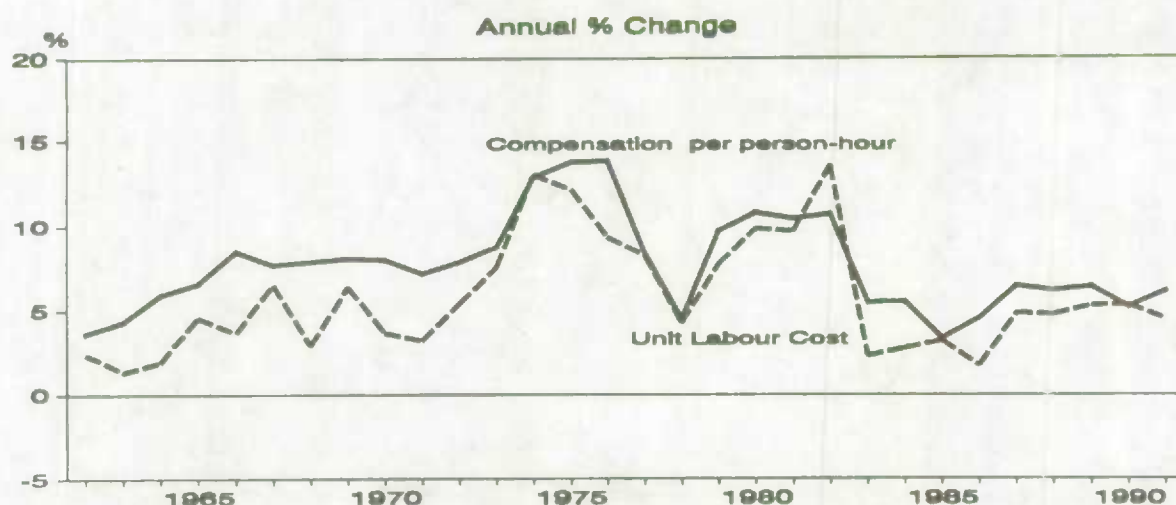
Table 4 - Indexes of labour productivity and unit labour cost, business sector-goods, 1961-1991, (1986=100)

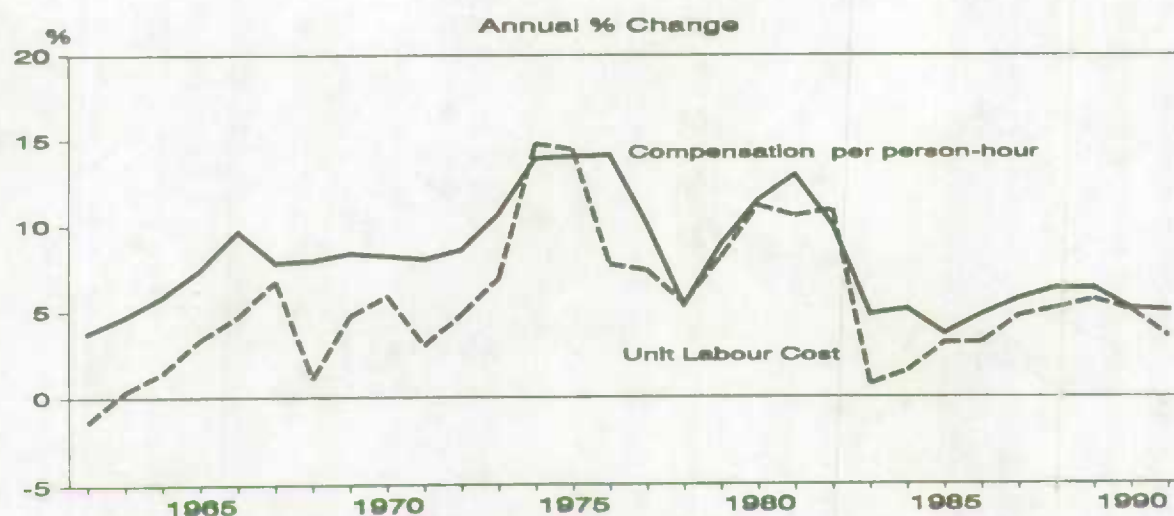| Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	39.2	82.4	91.7	11.0	47.6	42.8	13.4	12.0	28.0
1962	43.2	83.4	93.1	11.6	51.8	46.4	13.9	12.5	26.8
1963	45.8	84.4	93.7	12.2	54.3	48.9	14.5	13.1	26.7
1964	49.0	86.7	95.8	13.2	56.6	51.2	15.3	13.8	27.0
1965	53.2	89.7	98.5	14.7	59.3	54.0	16.4	14.9	27.6
1966	56.5	91.3	99.7	16.4	61.9	56.7	18.0	16.5	29.1
1967	56.7	91.5	99.1	17.6	61.9	57.2	19.2	17.8	31.1
1968	60.3	90.5	97.2	18.6	66.6	62.0	20.6	19.2	30.9
1969	63.4	91.2	97.3	20.3	69.5	65.2	22.2	20.8	31.9
1970	61.9	88.9	94.2	21.2	69.6	65.7	23.9	22.5	34.3
1971	65.7	89.8	94.6	23.2	73.2	69.5	25.8	24.5	35.3
1972	69.1	90.7	94.9	25.4	76.2	72.8	28.0	26.8	36.8
1973	76.2	94.3	98.9	29.8	80.8	77.0	31.6	30.2	39.1
1974	77.0	96.9	101.2	35.1	79.4	76.1	36.2	34.7	45.6
1975	74.6	96.3	100.0	39.7	77.5	74.6	41.2	39.7	53.2
1976	80.6	97.1	100.3	45.5	83.0	80.4	46.9	45.4	56.4
1977	83.5	96.7	98.8	50.2	86.3	84.5	51.9	50.8	60.1
1978	84.6	98.1	100.3	54.3	86.2	84.3	55.3	54.1	64.1
1979	87.3	101.9	104.0	60.7	85.7	83.9	59.6	58.4	69.6
1980	86.2	101.8	102.9	67.5	84.7	83.8	66.4	65.6	78.3
1981	90.0	102.7	103.2	78.5	87.6	87.2	76.5	76.1	87.3
1982	84.0	95.9	94.7	79.0	87.7	88.8	82.4	83.4	94.0
1983	87.5	94.6	93.8	81.5	92.5	93.3	86.1	86.9	93.1
1984	93.7	95.8	95.8	87.3	97.8	97.8	91.0	91.1	93.1
1985	98.5	98.8	99.4	94.5	99.7	99.0	95.6	95.0	95.9
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	104.1	102.6	103.6	108.6	101.5	100.4	105.9	104.8	104.4
1988	109.0	106.5	107.6	120.2	102.4	101.3	112.9	111.7	110.3
1989	110.3	108.1	108.4	128.8	102.0	101.7	119.1	118.8	116.8
1990	107.5	105.2	104.5	130.9	102.2	102.9	124.5	125.3	121.8
1991	103.4	99.8	98.7	128.2	103.6	104.8	128.4	129.8	123.9

Annual % Change

Table 5 - Indexes of labour productivity and unit labour cost, agricultural and related services industries, 1961-1991, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	57.8	134.8	161.6	20.1	42.9	35.8	14.9	12.4	34.7
1962	71.0	130.7	155.6	19.7	54.4	45.7	15.1	12.7	27.8
1963	79.9	128.2	150.8	20.2	62.3	53.0	15.8	13.4	25.3
1964	73.1	124.4	144.2	20.7	58.8	50.7	16.6	14.3	28.3
1965	76.7	117.9	134.8	20.6	65.1	56.9	17.5	15.3	26.8
1966	86.4	107.6	125.1	21.0	80.3	69.1	19.5	16.8	24.3
1967	70.1	110.5	126.7	22.7	63.4	55.3	20.5	17.9	32.3
1968	75.2	107.9	121.1	23.3	69.7	62.1	21.6	19.2	30.9
1969	80.9	105.8	119.6	24.2	76.4	67.6	22.9	20.3	30.0
1970	71.6	101.5	113.7	23.4	70.5	62.9	23.0	20.6	32.7
1971	84.8	101.6	114.1	24.5	83.5	74.4	24.1	21.5	28.9
1972	72.2	95.6	105.7	25.0	75.5	68.3	26.1	23.6	34.6
1973	79.3	92.9	105.7	32.4	85.4	75.0	34.9	30.6	40.8
1974	69.6	94.1	107.5	35.3	74.0	64.8	37.6	32.9	50.8
1975	81.3	100.3	114.5	40.1	81.0	71.0	40.0	35.0	49.3
1976	88.5	97.9	110.3	41.8	90.4	80.2	42.7	37.9	47.3
1977	87.5	96.8	105.0	46.1	90.4	83.3	47.6	43.9	52.6
1978	83.8	99.1	105.8	53.5	84.6	79.2	54.0	50.6	63.9
1979	77.0	100.8	108.7	56.9	76.3	70.8	56.4	52.4	73.9
1980	81.5	100.3	103.9	60.3	81.3	78.5	60.2	58.0	74.0
1981	88.9	101.9	105.2	75.3	87.2	84.5	73.9	71.6	84.8
1982	94.5	97.5	101.0	80.0	96.9	93.5	82.1	79.2	84.7
1983	91.7	101.7	101.1	82.9	90.2	90.7	81.5	82.0	90.4
1984	88.8	101.5	100.9	88.6	87.4	88.0	87.3	87.8	99.8
1985	85.1	101.4	103.2	98.7	83.9	82.5	97.3	95.7	116.1
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	90.1	98.1	97.9	99.1	91.9	92.1	100.9	101.2	109.9
1988	85.4	95.4	92.7	109.9	89.5	92.1	115.2	118.5	128.7
1989	92.5	92.5	91.0	114.9	100.0	101.6	124.3	126.4	124.3
1990	103.7	92.0	92.0	120.6	112.7	112.7	131.0	131.0	116.3
1991	103.8	96.3	95.6	131.9	107.7	108.5	136.9	137.9	127.1

Annual % Change

Table 6 - Indexes of labour productivity and unit labour cost, manufacturing industries, 1961-1991, (1986=100)

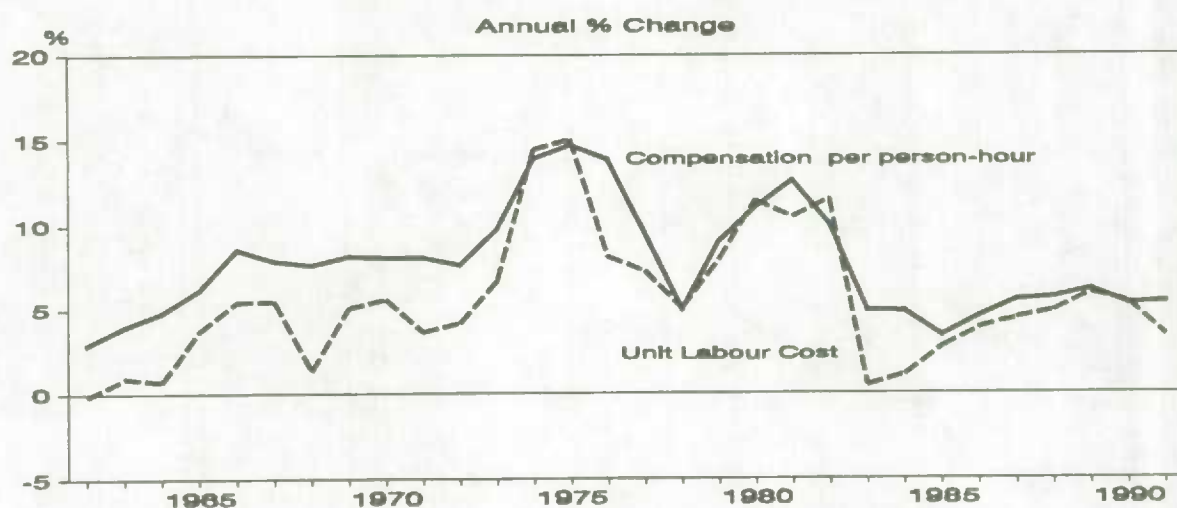| Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	35.9	74.8	77.7	10.8	47.9	46.1	14.4	13.9	30.1
1962	40.0	77.1	81.0	11.6	51.8	49.4	15.1	14.3	29.1
1963	42.6	79.0	83.3	12.4	54.0	51.2	15.7	14.9	29.2
1964	46.9	82.6	87.5	13.6	56.7	53.6	16.5	15.5	29.0
1965	51.6	86.9	92.0	15.1	59.4	56.1	17.4	16.4	29.2
1966	54.9	91.1	95.8	17.0	60.3	57.4	18.6	17.7	30.9
1967	56.2	91.8	96.0	18.1	61.2	58.5	19.7	18.8	32.2
1968	59.9	91.1	95.5	19.4	65.7	62.7	21.2	20.3	32.3
1969	64.1	93.0	97.0	21.2	69.0	66.1	22.8	21.9	33.1
1970	61.4	90.8	94.1	22.2	67.6	65.2	24.5	23.6	36.2
1971	65.3	90.7	93.4	23.8	72.0	69.9	26.2	25.4	36.4
1972	70.6	93.5	96.3	26.3	75.5	73.3	28.2	27.3	37.3
1973	78.2	97.8	100.3	29.7	79.9	77.9	30.4	29.6	38.0
1974	80.5	99.8	101.7	34.6	80.7	79.2	34.7	34.1	43.0
1975	75.1	97.5	98.3	38.3	77.1	76.5	39.3	38.9	50.9
1976	80.6	97.9	98.6	43.9	82.3	81.8	44.8	44.6	54.5
1977	83.6	95.9	96.8	47.7	87.1	86.3	49.8	49.3	57.1
1978	87.4	98.9	100.1	53.2	88.3	87.3	53.7	53.1	60.8
1979	90.6	102.5	102.9	60.2	88.4	88.1	58.7	58.5	66.4
1980	86.6	102.2	102.2	66.2	84.7	84.7	64.8	64.8	76.4
1981	89.8	102.2	101.0	75.3	87.8	88.9	73.7	74.5	83.9
1982	78.2	94.3	92.2	75.9	82.9	84.8	80.6	82.4	97.1
1983	83.2	92.4	91.5	79.9	90.1	91.0	86.6	87.4	96.1
1984	94.0	95.2	95.2	87.2	98.7	98.7	91.6	91.5	92.8
1985	99.3	97.6	97.7	94.1	101.7	101.6	96.4	96.3	94.8
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	104.8	103.0	103.9	107.0	101.7	100.9	103.8	103.0	102.0
1988	110.3	107.6	108.7	116.8	102.5	101.5	108.6	107.5	106.0
1989	110.6	108.9	108.8	123.7	101.5	101.6	113.6	113.7	111.9
1990	104.7	103.0	101.6	122.6	101.6	103.0	119.0	120.6	117.1
1991	97.9	95.7	94.3	119.9	102.3	103.8	125.3	127.1	122.5

Annual % Change

Table 7 - Indexes of labour productivity and unit labour cost, construction industries, 1961-1991, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	49.2	70.1	75.5	10.6	70.1	65.1	15.1	14.1	21.6
1962	51.3	70.4	77.7	10.8	72.8	66.0	15.4	13.9	21.1
1963	51.4	71.8	79.1	11.3	71.6	65.0	15.7	14.3	21.9
1964	54.2	75.8	83.8	12.3	71.5	64.6	16.2	14.6	22.6
1965	59.2	83.4	92.0	14.3	71.1	64.4	17.1	15.5	24.1
1966	60.5	86.5	95.6	16.3	69.9	63.2	18.8	17.1	27.0
1967	60.9	83.9	91.5	17.6	72.6	66.5	21.0	19.2	28.9
1968	63.2	83.4	89.8	18.2	75.7	70.3	21.8	20.3	28.8
1969	60.6	83.8	88.7	19.5	72.3	68.3	23.2	22.0	32.2
1970	59.4	80.9	85.3	20.5	73.4	69.7	25.4	24.1	34.6
1971	61.7	83.9	87.1	24.0	73.5	70.8	28.7	27.6	39.0
1972	61.7	85.8	89.4	26.2	71.9	69.0	30.5	29.3	42.5
1973	63.5	91.4	95.6	32.7	69.5	66.5	35.8	34.2	51.5
1974	65.5	96.4	100.8	39.6	68.0	65.0	41.1	39.3	60.5
1975	72.7	94.8	98.5	47.1	76.7	73.8	49.7	47.8	64.8
1976	81.9	99.9	102.8	54.6	82.0	79.6	54.7	53.1	66.7
1977	86.1	101.4	101.7	60.5	84.9	84.6	59.7	59.5	70.3
1978	81.8	98.5	100.0	59.7	83.0	81.8	60.6	59.7	73.0
1979	82.6	103.2	105.4	63.7	80.1	78.4	61.7	60.4	77.0
1980	86.8	101.5	104.3	72.7	85.5	83.3	71.7	69.8	83.8
1981	96.7	103.2	105.0	88.4	93.7	92.1	85.6	84.2	91.4
1982	96.8	96.7	93.0	84.9	100.1	104.0	87.9	91.3	87.8
1983	95.1	93.3	91.0	83.4	101.9	104.4	89.4	91.7	87.8
1984	89.1	91.4	90.6	84.6	97.5	98.3	92.6	93.4	95.0
1985	96.0	98.4	99.3	92.0	97.6	96.7	93.5	92.7	95.8
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.7	105.8	109.5	117.6	99.9	96.5	111.1	107.4	111.2
1988	111.7	113.5	118.7	134.9	98.4	94.1	118.8	113.6	120.8
1989	116.8	119.5	124.2	150.8	97.7	94.0	126.2	121.4	129.2
1990	117.5	121.9	123.1	157.5	96.3	95.4	129.2	127.9	134.1
1991	113.3	111.6	110.6	146.5	101.5	102.4	131.3	132.4	129.4

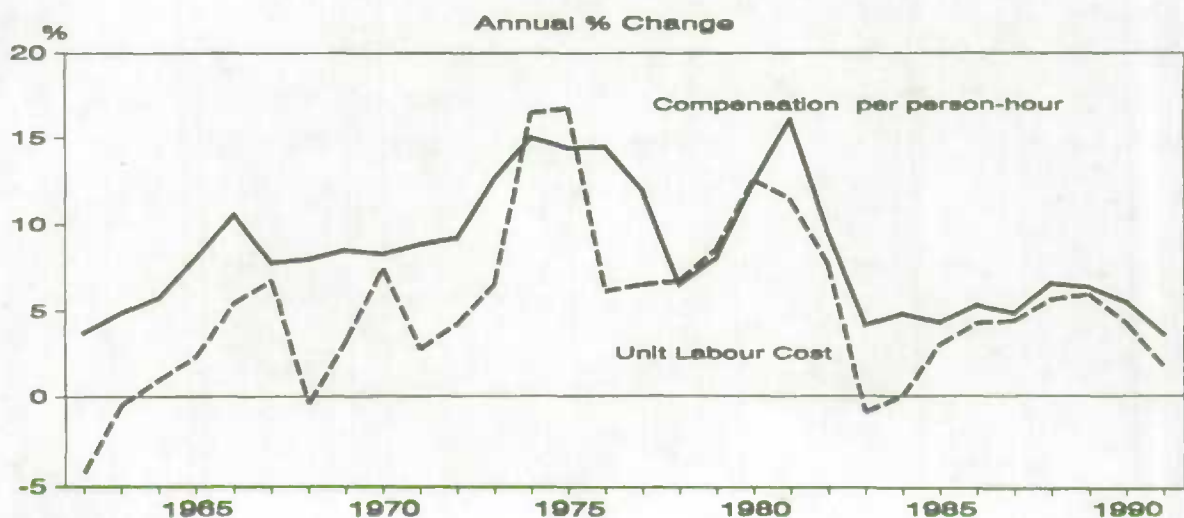Annual % Change

Compensation per person-hour

Unit Labour Cost

Table 8 - Indexes of labour productivity and unit labour cost, transportation and storage industries, 1961-1991, (1986=100)

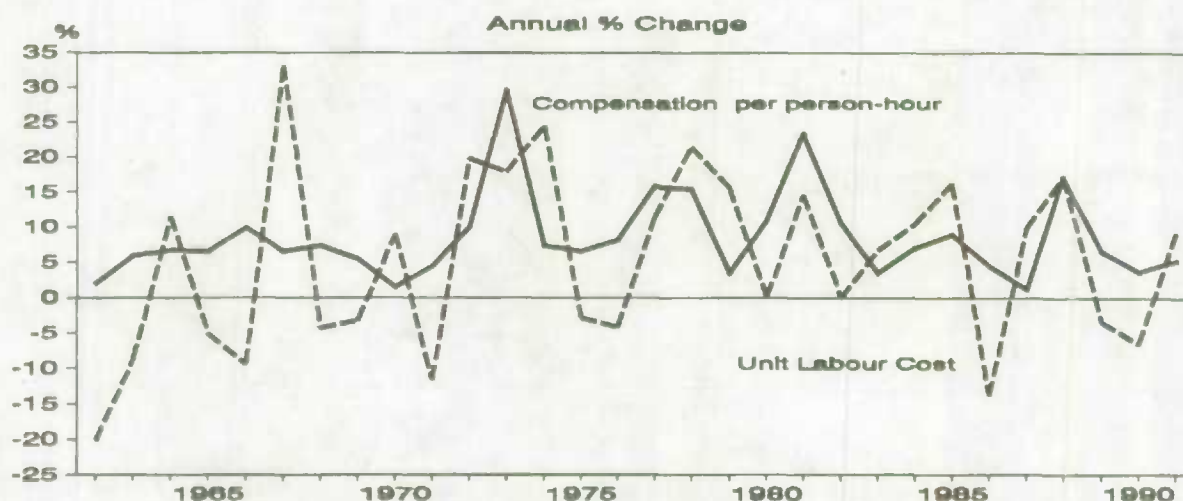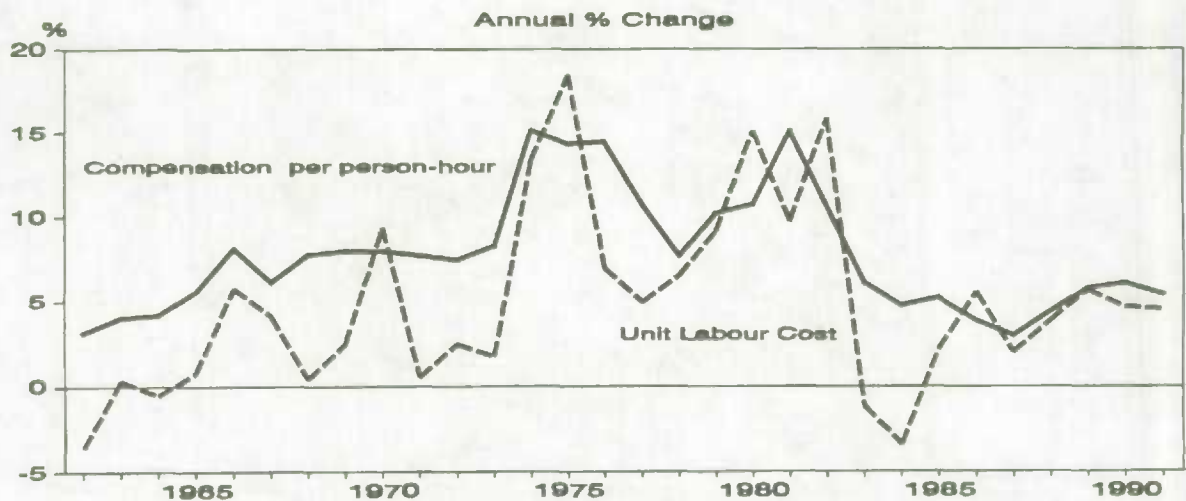| Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity Real GDP per person	Labour productivity Real GDP per person-hour	Compen-sation per person	Compen-sation per person-hour	Unit labour cost
1961	34.2	70.8	78.4	10.1	48.3	43.6	14.3	12.9	29.7
1962	34.1	69.4	76.4	10.5	49.2	44.7	15.1	13.7	30.6
1963	37.8	71.0	78.3	11.1	53.2	48.3	15.7	14.2	29.5
1964	41.6	71.5	79.0	12.0	58.2	52.7	16.8	15.2	28.8
1965	44.1	75.6	83.2	13.3	58.3	53.0	17.6	16.0	30.1
1966	47.4	77.7	82.8	14.5	61.0	57.3	18.7	17.5	30.6
1967	48.4	79.4	85.2	15.9	60.9	56.8	20.1	18.7	32.9
1968	50.3	77.5	81.9	17.1	64.9	61.4	22.0	20.8	34.0
1969	54.9	78.4	82.4	18.8	70.1	66.7	24.0	22.8	34.2
1970	59.8	77.8	80.9	19.8	76.9	73.9	25.4	24.4	33.1
1971	62.3	79.9	82.6	21.4	77.9	75.4	26.8	25.9	34.3
1972	66.2	81.7	83.7	24.1	81.0	79.1	29.5	28.8	36.4
1973	70.6	84.5	86.8	27.1	83.6	81.3	32.1	31.2	38.4
1974	73.7	89.6	91.8	32.4	82.3	80.3	36.2	35.3	44.0
1975	72.6	88.6	89.4	37.7	81.9	81.2	42.5	42.1	51.9
1976	72.1	87.8	88.6	42.1	82.1	81.4	48.0	47.5	58.4
1977	75.2	93.2	93.0	47.9	80.7	80.9	51.4	51.5	63.7
1978	79.0	95.2	96.1	53.0	83.0	82.2	55.7	55.2	67.1
1979	88.4	98.2	98.4	59.3	90.0	89.8	60.4	60.2	67.1
1980	85.3	102.7	103.7	66.9	83.0	82.3	65.1	64.5	78.4
1981	84.3	104.2	103.0	75.8	80.9	81.8	72.8	73.6	89.9
1982	79.6	98.7	96.8	79.8	80.6	82.2	80.8	82.4	100.2
1983	85.5	94.1	90.7	81.9	90.8	94.2	87.0	90.3	95.8
1984	95.6	96.4	95.3	89.3	99.1	100.3	92.7	93.8	93.5
1985	97.6	97.0	96.5	95.3	100.6	101.1	98.2	98.7	97.6
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	106.9	102.5	105.9	104.9	104.3	101.0	102.3	99.1	98.1
1988	111.9	102.5	106.4	111.6	109.1	105.2	108.8	104.9	99.7
1989	111.4	105.3	108.6	119.3	105.7	102.5	113.2	109.8	107.1
1990	111.2	106.5	109.0	125.6	104.4	102.0	118.0	115.2	113.0
1991	107.4	105.4	106.6	129.5	101.9	100.8	122.8	121.4	120.5

Annual % Change
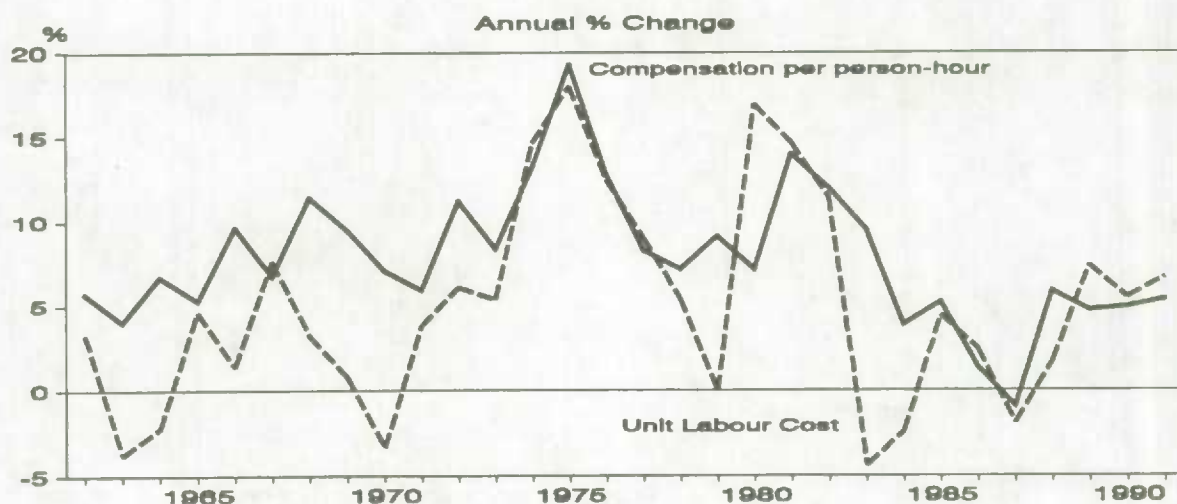
Table 9 - Indexes of labour productivity and unit labour cost, communication industries, 1961-1990, (1986=100)

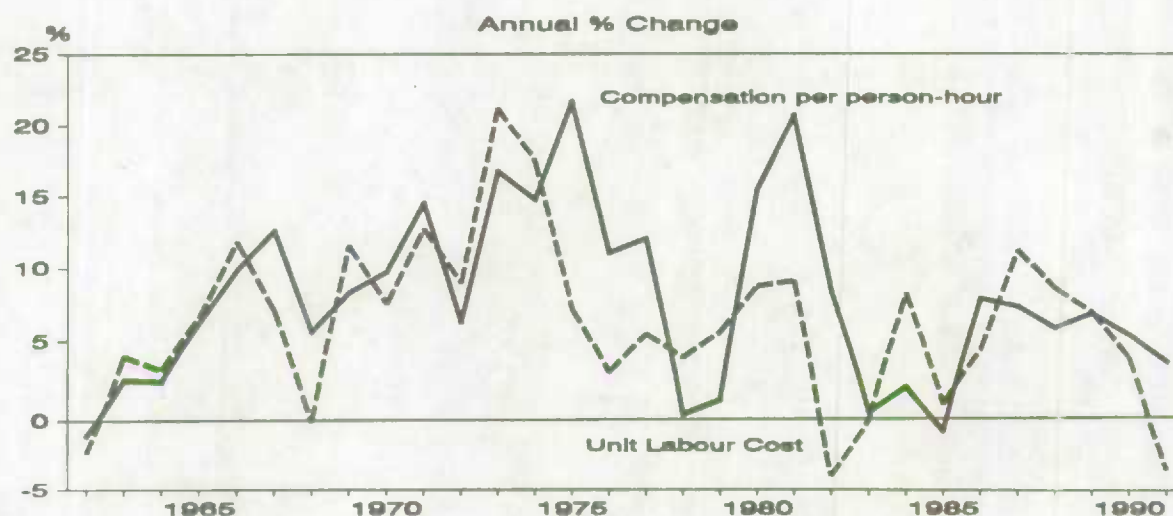| Year | Real gross domestic product | Persons at work | Person-hours | Labour compen-sation | Labour productivity | | Compen-sation per person | Compen-sation per person-hour | Unit labour cost |
					Real GDP per person	Real GDP per person-hour			
1961	14.4	52.0	57.4	6.8	27.8	25.1	13.1	11.9	47.3
1962	15.5	53.9	59.2	7.2	28.8	26.3	13.4	12.2	46.3
1963	16.7	56.2	61.8	7.8	29.7	27.0	13.9	12.6	46.7
1964	18.3	59.1	65.1	8.3	31.0	28.2	14.0	12.7	45.0
1965	19.9	58.7	64.5	9.0	33.9	30.9	15.3	14.0	45.3
1966	21.7	64.1	67.9	10.3	33.8	31.9	16.1	15.2	47.6
1967	23.9	65.4	69.9	11.7	36.6	34.2	17.8	16.7	48.7
1968	25.9	63.9	67.3	12.7	40.5	38.4	19.9	18.9	49.2
1969	27.8	67.2	70.5	14.0	41.3	39.4	20.8	19.8	50.3
1970	30.4	68.9	71.5	15.1	44.1	42.5	21.9	21.1	49.5
1971	32.8	73.0	75.2	17.0	44.9	43.6	23.2	22.6	51.7
1972	35.8	75.4	76.8	19.1	47.5	46.6	25.3	24.9	53.3
1973	39.8	80.5	82.2	22.5	49.4	48.4	28.0	27.4	56.6
1974	44.9	86.4	88.0	26.8	51.9	51.0	31.0	30.5	59.8
1975	50.6	86.6	86.7	31.5	58.4	58.4	36.4	36.4	62.3
1976	55.7	93.2	93.1	38.2	59.8	59.8	41.0	41.0	68.6
1977	59.1	96.3	95.3	44.6	61.4	62.0	46.4	46.8	75.5
1978	64.8	95.0	95.5	49.1	68.3	67.9	51.7	51.4	75.7
1979	71.2	96.7	96.6	55.5	73.6	73.7	57.4	57.5	78.0
1980	77.9	99.3	99.8	62.4	78.4	78.1	62.9	62.6	80.2
1981	84.0	102.0	101.0	73.4	82.3	83.2	72.0	72.7	87.4
1982	83.9	103.8	101.7	81.5	80.9	82.5	78.5	80.1	97.1
1983	86.1	102.3	99.0	86.3	84.1	86.9	84.3	87.2	100.3
1984	90.2	101.4	100.2	93.6	88.9	90.0	92.2	93.3	103.7
1985	95.4	101.3	100.7	98.4	94.1	94.8	97.1	97.8	103.2
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	106.7	102.7	102.1	106.2	103.9	104.5	103.4	104.0	99.5
1988	114.3	101.2	100.7	111.8	112.9	113.5	110.4	110.9	97.8
1989	128.0	106.1	105.3	120.5	120.6	121.5	113.6	114.4	94.2
1990	139.2	107.3	106.8	130.0	129.7	130.3	121.1	121.7	93.4
1991	145.3	106.9	106.5	136.3	135.9	136.5	127.5	128.1	93.9

Annual % Change

Table 10 - Indexes of labour productivity and unit labour cost, wholesale and retail trade industries, 1961-1991, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	32.5	46.6	54.5	8.3	69.7	59.6	17.8	15.3	25.6
1962	34.8	47.5	55.4	8.8	73.2	62.8	18.6	15.9	25.4
1963	36.4	49.1	56.7	9.4	74.1	64.2	19.2	16.6	25.8
1964	39.3	51.1	58.7	10.4	77.0	67.0	20.3	17.7	26.4
1965	42.2	53.5	61.2	11.4	78.8	68.9	21.3	18.6	27.0
1966	45.6	55.9	63.3	12.7	81.6	72.1	22.7	20.1	27.9
1967	47.9	57.1	64.5	13.9	84.0	74.3	24.4	21.6	29.0
1968	49.5	58.3	64.8	14.9	84.9	76.4	25.6	23.0	30.2
1969	52.5	61.5	67.4	17.0	85.4	77.8	27.6	25.2	32.4
1970	54.7	62.7	68.0	18.6	87.3	80.5	29.7	27.4	34.0
1971	57.3	64.2	69.0	20.2	89.2	83.1	31.5	29.3	35.3
1972	61.5	67.6	72.3	22.7	91.0	85.1	33.6	31.4	36.9
1973	65.1	71.4	76.3	25.7	91.2	85.3	36.0	33.6	39.5
1974	67.0	75.5	79.9	30.7	88.7	83.9	40.6	38.4	45.8
1975	69.8	77.8	81.6	36.7	89.7	85.6	47.2	45.1	52.6
1976	74.0	78.7	81.6	41.7	94.0	90.7	53.0	51.2	56.4
1977	73.5	80.2	82.2	45.6	91.6	89.4	56.8	55.5	62.0
1978	74.9	84.1	86.0	49.0	89.1	87.1	58.2	56.9	65.3
1979	77.0	86.8	88.3	55.6	88.8	87.2	64.0	62.9	72.1
1980	78.8	88.5	89.7	62.2	89.0	87.9	70.3	69.4	79.0
1981	81.4	93.0	93.7	70.4	87.5	86.8	75.7	75.1	86.5
1982	76.8	90.0	89.0	74.2	85.3	86.3	82.5	83.4	96.7
1983	82.1	89.1	87.1	77.4	92.1	94.2	86.8	88.8	94.3
1984	87.6	94.1	92.9	85.7	93.1	94.3	91.0	92.2	97.8
1985	95.0	98.1	97.3	93.2	96.9	97.7	95.0	95.8	98.1
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	106.7	102.3	102.1	109.6	104.3	104.5	107.1	107.4	102.7
1988	112.7	106.2	105.8	120.5	106.1	106.5	113.5	113.9	106.9
1989	112.7	108.8	107.7	130.3	103.6	104.6	119.8	121.1	115.7
1990	110.4	108.2	107.5	136.5	102.0	102.6	126.2	127.0	123.7
1991	108.1	104.8	102.4	137.5	103.1	105.6	131.2	134.3	127.2

Annual % Change
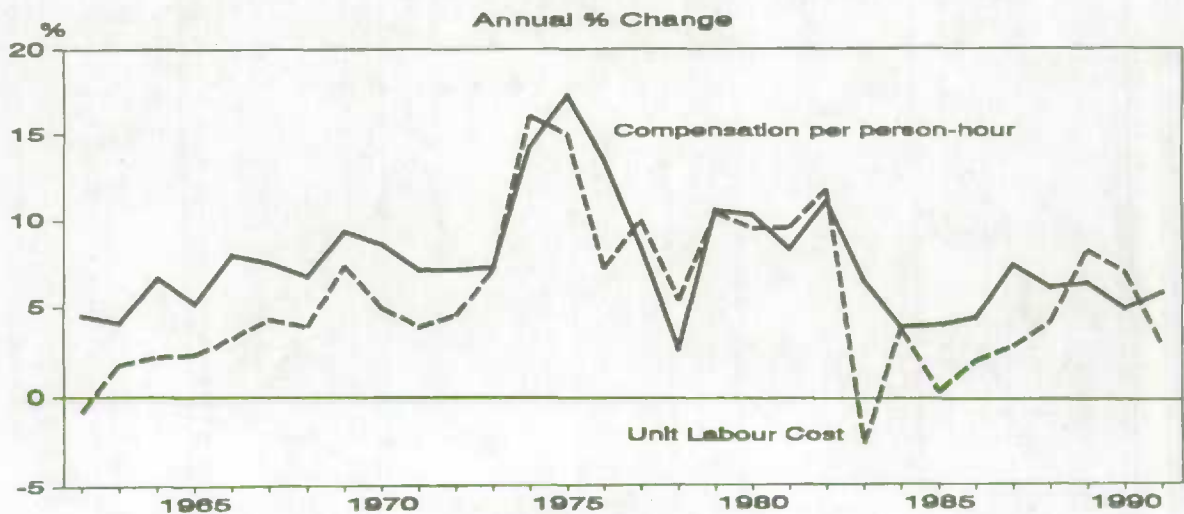
Table 11 - Indexes of labour productivity and unit labour cost, community, business and personal services industries, 1961-1991, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	24.5	23.6	29.2	5.0	104.0	84.1	21.3	17.2	20.5
1962	25.8	25.8	31.7	5.5	100.0	81.3	21.5	17.5	21.5
1963	27.3	26.9	32.7	6.0	101.3	83.6	22.3	18.4	22.1
1964	29.2	28.9	34.6	6.7	100.8	84.2	23.3	19.4	23.1
1965	31.8	31.9	37.6	7.8	99.7	84.7	24.6	20.9	24.6
1966	34.6	34.3	39.6	8.9	100.8	87.3	26.1	22.6	25.9
1967	36.4	36.4	41.8	10.4	99.9	87.0	28.5	24.8	28.5
1968	36.1	36.6	41.3	11.0	98.8	87.6	30.0	26.6	30.4
1969	38.5	39.1	43.5	12.3	98.6	88.5	31.5	28.3	32.0
1970	39.2	40.8	44.7	13.8	95.9	87.5	33.7	30.8	35.2
1971	43.9	42.3	46.2	15.4	103.8	94.9	36.5	33.4	35.1
1972	47.4	45.3	49.0	17.4	104.7	96.6	38.4	35.5	36.7
1973	52.7	49.0	53.3	20.4	107.7	98.9	41.7	38.3	38.8
1974	57.2	53.0	57.1	24.4	108.0	100.2	46.0	42.7	42.6
1975	59.9	56.1	60.5	27.6	106.8	99.0	49.1	45.5	46.0
1976	64.6	58.6	62.8	33.0	110.1	102.8	56.3	52.6	51.1
1977	66.3	62.4	65.0	36.3	106.2	102.0	58.1	55.8	54.7
1978	70.9	65.9	69.7	40.4	107.6	101.7	61.3	57.9	56.9
1979	73.6	70.7	73.9	45.6	104.0	99.5	64.5	61.7	62.0
1980	81.0	75.4	78.0	54.2	107.3	103.8	71.8	69.5	66.9
1981	87.6	80.2	82.5	62.8	109.2	106.2	78.2	76.1	71.7
1982	86.3	82.9	83.5	70.1	104.1	103.4	84.5	83.9	81.1
1983	85.1	86.6	86.4	74.3	98.3	98.5	85.7	85.9	87.2
1984	90.1	88.6	88.7	82.1	101.7	101.6	92.7	92.6	91.1
1985	93.6	97.0	97.4	91.7	96.5	96.1	94.5	94.2	98.0
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.7	105.2	106.3	113.0	100.5	99.4	107.4	106.3	106.9
1988	113.6	110.4	112.5	127.5	102.9	101.0	115.5	113.4	112.2
1989	119.9	116.2	117.0	141.2	103.2	102.4	121.6	120.7	117.8
1990	124.5	119.7	120.8	154.5	104.0	103.1	129.0	127.9	124.1
1991	119.5	120.5	119.7	162.8	99.1	99.8	135.1	136.0	136.3

Annual % Change

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	53.9	94.0	100.0	13.2	57.3	53.9	14.0	13.2	24.5
1962	58.0	94.1	100.6	13.9	61.7	57.7	14.8	13.8	23.9
1963	58.2	93.8	99.9	14.4	62.1	58.3	15.4	14.4	24.8
1964	62.1	95.7	102.6	15.4	64.8	60.5	16.1	15.0	24.8
1965	66.2	98.1	105.2	16.5	67.5	63.0	16.9	15.7	25.0
1966	66.4	101.0	107.5	18.2	65.8	61.8	18.0	16.9	27.4
1967	71.6	101.3	108.2	19.5	70.7	66.2	19.2	18.0	27.2
1968	73.3	99.9	107.9	20.6	73.4	68.0	20.6	19.1	28.1
1969	73.0	98.7	105.0	22.0	73.9	69.5	22.3	20.9	30.1
1970	72.3	97.8	103.7	23.5	73.9	69.7	24.0	22.6	32.5
1971	78.0	96.1	101.3	24.9	81.1	77.0	25.9	24.6	31.9
1972	79.3	97.6	101.5	27.1	81.2	78.1	27.8	26.7	34.2
1973	83.0	98.4	101.8	29.5	84.3	81.5	30.0	29.0	35.6
1974	82.2	96.9	100.2	33.8	84.8	82.0	34.8	33.7	41.1
1975	76.3	96.6	100.2	39.4	79.0	76.2	40.8	39.4	51.6
1976	84.6	96.4	99.9	44.9	87.8	84.7	46.6	45.0	53.1
1977	89.3	98.0	100.6	49.6	91.2	88.8	50.7	49.3	55.6
1978	90.6	100.1	102.6	54.4	90.5	88.3	54.3	53.0	60.0
1979	93.7	101.1	103.4	60.5	92.7	90.7	59.8	58.5	64.5
1980	91.3	102.4	103.5	67.2	89.1	88.1	65.6	64.9	73.6
1981	92.0	101.1	101.1	75.9	90.9	91.0	75.0	75.1	82.5
1982	91.9	98.2	97.5	80.7	93.6	94.3	82.2	82.8	87.8
1983	90.3	95.9	97.4	84.9	94.2	92.7	88.5	87.2	94.0
1984	94.4	96.0	97.9	88.4	98.3	96.4	92.1	90.4	93.7
1985	100.6	98.6	99.0	93.8	102.1	101.6	95.2	94.7	93.2
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	100.7	101.1	102.2	106.1	99.6	98.6	104.9	103.9	105.3
1988	101.2	102.8	104.8	113.0	98.4	96.5	109.9	107.9	111.8

Annual % Change

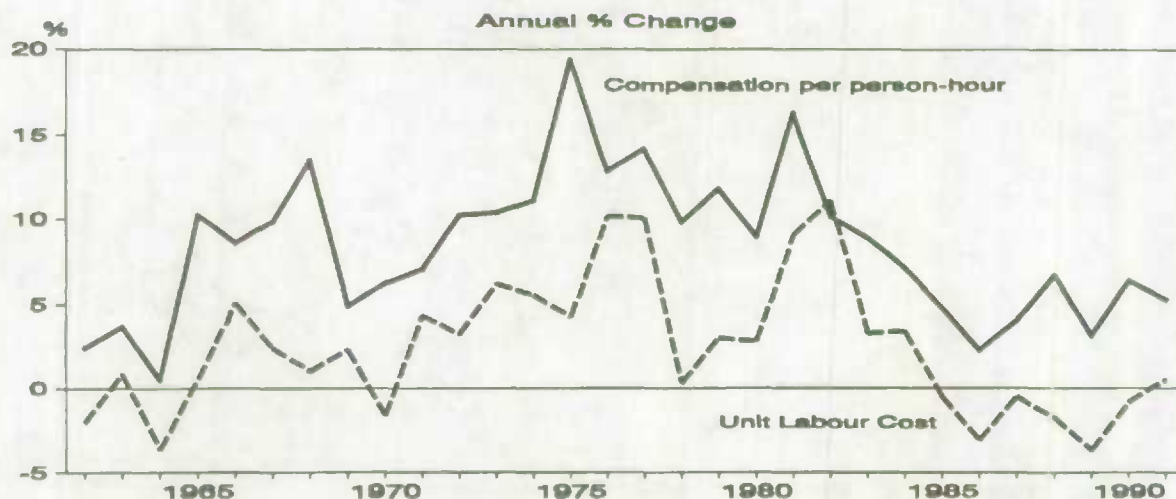## Table 13 - Indexes of labour productivity and unit labour cost, beverage industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	55.5	88.4	94.4	11.4	62.8	58.8	12.9	12.1	20.5
1962	58.4	88.2	94.6	11.7	66.2	61.7	13.3	12.4	20.1
1963	64.2	87.8	93.8	12.3	73.2	68.5	14.0	13.1	19.1
1964	66.5	88.8	95.5	13.0	74.9	69.7	14.7	13.6	19.6
1965	71.7	91.0	97.9	14.2	78.8	73.2	15.6	14.5	19.8
1966	83.1	94.6	101.0	16.0	87.9	82.3	16.9	15.8	19.2
1967	88.3	98.0	105.0	17.3	90.1	84.1	17.7	16.5	19.6
1968	84.1	98.5	106.7	18.7	85.3	78.8	19.0	17.5	22.2
1969	93.0	98.5	105.1	20.3	94.4	88.4	20.6	19.3	21.9
1970	98.4	96.1	102.2	21.6	102.4	96.3	22.5	21.2	22.0
1971	106.0	97.4	103.0	23.5	108.8	103.0	24.1	22.8	22.2
1972	109.5	97.1	101.3	25.3	112.8	108.2	26.1	25.0	23.1
1973	119.6	99.1	102.8	28.1	120.7	116.4	28.4	27.4	23.5
1974	121.0	102.7	106.5	33.1	117.9	113.7	32.2	31.0	27.3
1975	116.3	103.0	107.2	38.4	112.9	108.5	37.3	35.9	33.1
1976	112.7	103.3	107.3	44.2	109.1	105.0	42.8	41.2	39.3
1977	118.3	104.4	107.5	48.9	113.3	110.1	46.9	45.5	41.4
1978	115.7	103.2	106.0	52.0	112.2	109.2	50.4	49.1	45.0
1979	118.3	105.0	107.6	58.4	112.7	109.9	55.6	54.2	49.3
1980	114.0	102.0	103.4	64.0	111.7	110.2	62.8	61.9	56.2
1981	113.4	103.1	103.3	72.0	110.0	109.8	69.8	69.7	63.5
1982	103.3	100.6	100.1	78.5	102.7	103.2	78.0	78.4	76.0
1983	99.3	98.7	98.9	84.2	100.6	100.4	85.3	85.1	84.8
1984	103.8	99.9	97.5	89.7	103.9	106.5	89.8	92.0	86.4
1985	105.4	100.6	100.9	94.8	104.9	104.5	94.2	93.9	89.9
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	101.7	98.8	100.1	103.7	102.9	101.5	104.9	103.6	102.0
1988	107.1	99.2	102.1	106.5	108.0	104.9	107.3	104.2	99.4

Annual % Change

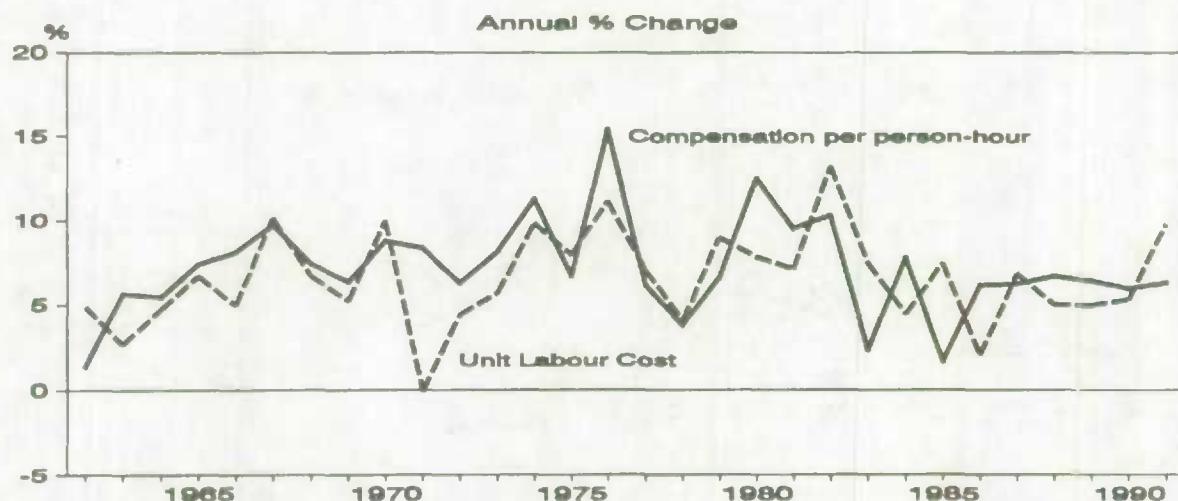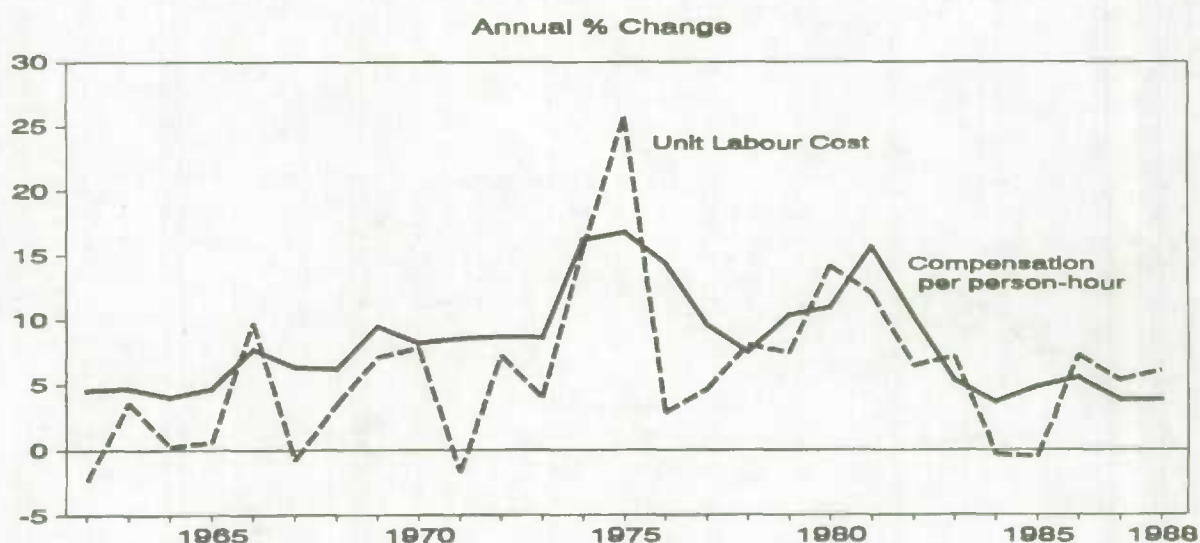| Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	92.9	147.2	181.1	15.8	63.1	51.3	10.7	8.7	17.0
1962	92.7	159.2	191.5	17.3	58.2	48.4	10.9	9.1	18.7
1963	100.0	157.3	184.6	17.6	63.5	54.2	11.2	9.5	17.6
1964	105.8	155.1	178.8	18.2	68.2	59.2	11.7	10.2	17.2
1965	111.5	146.5	174.7	18.7	76.1	63.8	12.8	10.7	16.8
1966	103.1	145.4	176.1	19.9	70.9	58.6	13.7	11.3	19.3
1967	100.0	150.0	179.8	22.0	66.6	55.6	14.7	12.3	22.1
1968	96.9	144.5	169.0	23.6	67.1	57.4	16.3	13.9	24.3
1969	111.8	142.1	162.4	24.6	78.6	68.8	17.3	15.1	22.0
1970	116.9	141.6	162.9	27.2	82.6	71.8	19.2	16.7	23.3
1971	131.1	137.1	154.5	28.5	95.6	84.8	20.7	18.4	21.7
1972	138.8	135.5	151.3	30.4	102.5	91.7	22.5	20.1	21.9
1973	142.1	133.7	146.7	32.6	106.3	96.9	24.4	22.2	22.9
1974	152.9	136.5	147.6	36.4	112.0	103.6	26.7	24.7	23.8
1975	154.4	138.2	151.0	43.9	111.7	102.2	31.8	29.1	28.5
1976	146.8	129.7	142.1	47.2	113.2	103.3	36.4	33.2	32.1
1977	168.4	127.4	136.0	52.2	132.2	123.9	41.0	38.4	31.0
1978	142.6	124.8	133.7	53.8	114.3	106.7	43.2	40.3	37.8
1979	147.5	123.7	133.0	58.3	119.2	110.9	47.2	43.9	39.6
1980	149.6	120.8	127.2	63.9	123.8	117.6	52.9	50.3	42.7
1981	153.4	124.2	132.5	77.4	123.5	115.7	62.3	58.4	50.4
1982	149.6	123.7	128.7	84.0	121.0	116.2	67.9	65.3	56.1
1983	135.2	115.0	120.0	89.2	117.6	112.6	77.6	74.3	66.0
1984	128.3	109.1	113.3	91.9	117.6	113.2	84.2	81.1	71.6
1985	105.9	101.5	107.6	96.2	104.3	98.4	94.7	89.4	90.8
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	106.5	85.1	87.5	94.8	125.1	121.6	111.4	108.3	89.1
1988	103.3	78.7	81.3	89.3	131.2	127.0	113.5	109.9	86.5

Annual % Change

Table 15 - Indexes of labour productivity and unit labour cost, rubber products industries, 1961-1988, (1986=100)

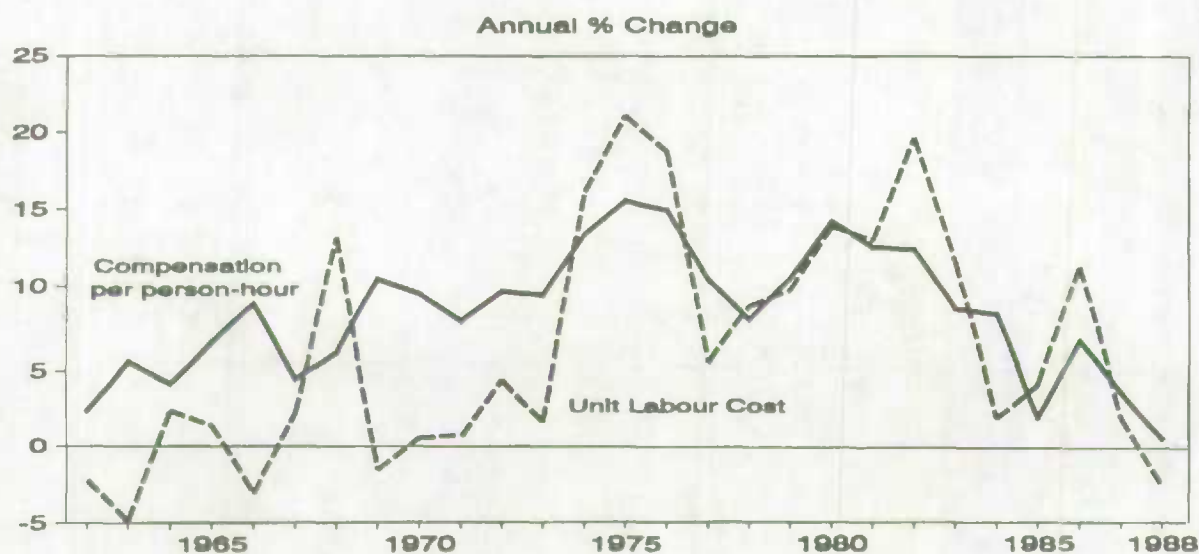| Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	30.4	66.1	67.9	9.7	46.0	44.8	14.6	14.2	31.7
1962	38.7	67.2	71.1	10.6	57.6	54.5	15.8	14.9	27.4
1963	41.3	72.5	76.1	11.5	57.0	54.2	15.8	15.1	27.8
1964	44.5	76.1	82.0	12.7	58.4	54.2	16.7	15.5	28.7
1965	46.9	80.6	85.2	14.2	58.3	55.1	17.6	16.7	30.3
1966	53.7	86.7	92.4	16.0	61.9	58.1	18.5	17.3	29.8
1967	58.0	88.2	94.6	17.1	65.7	61.3	19.4	18.1	29.5
1968	55.9	82.6	88.3	17.3	67.7	63.3	20.9	19.6	30.9
1969	58.3	84.4	89.6	19.2	69.1	65.1	22.8	21.5	33.0
1970	54.4	80.5	84.5	19.8	67.5	64.3	24.5	23.4	36.3
1971	58.3	80.2	83.5	21.0	72.7	69.8	26.2	25.2	36.0
1972	64.2	87.6	91.1	25.0	73.4	70.6	28.6	27.5	38.9
1973	74.5	97.0	100.0	29.2	76.8	74.5	30.1	29.2	39.2
1974	66.9	95.2	96.1	31.2	70.3	69.6	32.8	32.4	46.6
1975	64.0	96.4	97.0	35.9	66.4	66.0	37.3	37.1	56.2
1976	79.3	100.8	102.1	41.9	78.6	77.6	41.6	41.0	52.8
1977	90.9	101.1	102.0	45.9	89.8	89.1	45.4	45.0	50.5
1978	94.6	102.9	104.0	49.9	92.0	91.0	48.6	48.0	52.8
1979	107.6	105.7	109.6	60.1	101.8	98.2	56.9	54.9	55.9
1980	92.7	102.2	103.1	63.4	90.7	90.0	62.0	61.5	68.3
1981	88.0	103.3	105.1	73.5	85.2	83.7	71.2	70.0	83.6
1982	76.7	97.3	98.5	76.4	78.8	77.9	78.5	77.6	99.6
1983	89.6	97.6	99.0	81.4	91.8	90.5	83.4	82.3	90.9
1984	112.9	99.3	100.5	90.6	113.7	112.3	91.2	90.1	80.3
1985	114.5	98.4	99.9	93.4	116.3	114.6	94.8	93.4	81.5
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	104.7	94.1	94.6	97.0	111.3	110.8	103.1	102.6	92.6
1988	110.4	101.6	103.4	108.7	108.7	106.8	107.0	105 1	98.4

Annual % Change

Table 16 - Indexes of labour productivity and unit labour cost, plastic products industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	7.6	23.9	24.3	3.7	31.7	31.3	15.5	15.3	48.9
1962	9.5	25.5	26.6	4.1	37.2	35.7	16.2	15.6	43.6
1963	11.2	27.7	28.7	4.7	40.3	38.9	16.9	16.3	41.9
1964	14.0	30.8	32.7	5.5	45.4	42.6	17.8	16.7	39.2
1965	15.8	32.9	34.4	6.2	48.0	45.9	18.8	18.0	39.2
1966	18.9	38.1	40.1	7.7	49.6	47.1	20.1	19.1	40.5
1967	20.1	39.8	42.1	8.5	50.5	47.7	21.4	20.2	42.4
1968	28.6	44.4	46.9	10.1	64.4	60.9	22.7	21.5	35.3
1969	32.1	45.5	47.7	11.0	70.6	67.3	24.3	23.2	34.4
1970	32.5	47.4	49.1	12.2	68.6	66.2	25.7	24.8	37.4
1971	36.9	50.4	51.9	13.9	73.3	71.2	27.6	26.9	37.7
1972	46.9	57.5	59.1	17.1	81.4	79.3	29.7	28.9	36.5
1973	54.4	63.9	65.1	20.3	85.1	83.5	31.7	31.2	37.3
1974	52.7	66.7	66.6	24.3	79.0	79.1	36.4	36.5	46.1
1975	47.9	65.5	65.1	26.7	73.1	73.6	40.8	41.0	55.7
1976	53.5	68.7	68.8	32.1	77.9	77.8	46.7	46.6	59.9
1977	56.2	69.6	69.3	35.7	80.7	81.0	51.3	51.5	63.6
1978	63.7	76.1	76.0	42.0	83.7	83.8	55.2	55.2	65.9
1979	73.7	80.0	82.0	48.1	92.1	90.0	60.2	58.7	65.3
1980	73.5	82.4	82.1	54.6	89.2	89.5	66.2	66.5	74.3
1981	75.5	81.6	82.0	61.6	92.5	92.0	75.5	75.1	81.6
1982	68.8	76.4	76.4	62.6	90.1	90.1	82.0	82.0	91.0
1983	78.7	76.3	77.2	67.4	103.1	101.9	88.3	87.3	85.6
1984	90.1	85.4	85.6	77.9	105.5	105.3	91.2	91.1	86.5
1985	99.6	92.3	93.4	89.1	107.9	106.7	96.5	95.4	89.4
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	112.3	108.0	108.8	111.8	104.0	103.2	103.5	102.7	99.5
1988	113.9	122.2	123.5	132.8	93.2	92.2	108.8	107.5	116.7

Annual % Change

Table 17 - Indexes of labour productivity and unit labour cost, leather and allied products industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	83.1	153.9	162.7	25.8	54.0	51.1	16.8	15.9	31.0
1962	90.6	155.4	167.0	27.0	58.3	54.2	17.4	16.2	29.8
1963	91.1	154.6	165.4	27.7	58.9	55.1	17.9	16.7	30.3
1964	97.0	154.2	164.5	29.0	62.9	59.0	18.8	17.7	29.9
1965	95.6	154.5	163.1	30.1	61.9	58.6	19.5	18.4	31.5
1966	94.2	154.5	162.4	32.5	61.0	58.0	21.1	20.0	34.5
1967	90.4	147.0	154.2	33.0	61.5	58.6	22.5	21.4	36.5
1968	91.3	145.2	154.9	34.9	62.9	58.9	24.0	22.5	38.2
1969	90.8	142.5	150.2	36.4	63.7	60.4	25.6	24.2	40.1
1970	84.8	129.7	136.5	34.8	65.3	62.1	26.8	25.5	41.0
1971	85.4	127.5	134.7	36.7	67.0	63.4	28.8	27.2	42.9
1972	82.5	124.7	131.8	38.2	66.1	62.6	30.6	29.0	46.3
1973	83.8	124.0	129.2	41.0	67.6	64.8	33.1	31.7	48.9
1974	86.8	121.0	128.2	46.6	71.7	67.7	38.5	36.4	53.7
1975	87.2	121.7	125.2	52.6	71.7	69.7	43.2	42.0	60.3
1976	95.9	120.4	124.9	59.7	79.6	76.8	49.6	47.8	62.3
1977	88.9	107.7	112.0	58.6	82.5	79.3	54.4	52.3	65.9
1978	101.7	110.9	114.5	66.0	91.7	88.8	59.5	57.6	64.9
1979	103.1	115.8	120.4	75.6	89.0	85.6	65.3	62.8	73.4
1980	98.5	113.2	115.9	78.6	87.0	84.9	69.4	67.8	79.8
1981	103.5	117.3	120.1	91.5	88.2	86.2	78.0	76.2	88.4
1982	90.2	101.2	104.6	85.2	89.1	86.2	84.2	81.5	94.5
1983	95.2	101.9	102.5	89.3	93.5	92.9	87.7	87.2	93.8
1984	104.3	104.1	105.6	96.7	100.2	98.7	92.9	91.5	92.7
1985	100.1	98.6	99.9	97.0	101.6	100.2	98.5	97.1	97.0
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	92.6	92.9	91.1	96.1	99.7	101.6	103.4	105.5	103.8
1988	86.6	86.3	85.5	91.7	100.3	101.3	106.3	107.3	105.9

Annual % Change

Table 18 - Indexes of labour productivity and unit labour cost, primary textile and textile products industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	28.3	110.8	118.1	16.2	25.5	24.0	14.6	13.7	57.3
1962	33.9	116.2	123.8	17.7	29.2	27.4	15.2	14.3	52.1
1963	37.8	119.4	129.8	19.0	31.6	29.1	15.9	14.7	50.4
1964	41.1	126.5	138.7	21.2	32.5	29.6	16.8	15.3	51.6
1965	42.2	129.3	140.9	22.9	32.6	29.9	17.7	16.2	54.2
1966	42.1	127.4	137.7	24.5	33.0	30.5	19.2	17.8	58.2
1967	43.6	129.6	139.1	26.3	33.6	31.3	20.3	18.9	60.3
1968	48.4	122.1	130.8	26.5	39.7	37.1	21.7	20.3	54.7
1969	53.9	123.9	132.0	28.7	43.5	40.8	23.2	21.8	53.3
1970	51.3	118.2	124.4	29.3	43.4	41.2	24.8	23.5	57.1
1971	56.6	116.0	121.7	30.9	48.8	46.5	26.6	25.4	54.5
1972	67.0	123.8	129.4	34.9	54.1	51.8	28.2	27.0	52.1
1973	71.4	128.8	133.7	38.7	55.5	53.4	30.1	29.0	54.2
1974	72.1	128.7	132.4	43.9	56.0	54.4	34.1	33.1	60.9
1975	70.8	121.0	123.9	46.3	58.5	57.2	38.2	37.3	65.3
1976	72.0	113.3	115.3	50.4	63.5	62.4	44.5	43.7	70.0
1977	75.8	106.2	107.2	52.6	71.4	70.8	49.5	49.0	69.3
1978	83.4	108.1	109.3	58.3	77.2	76.3	53.9	53.3	69.9
1979	90.6	112.1	113.2	67.0	80.8	80.0	59.8	59.2	74.0
1980	88.1	111.3	111.1	73.5	79.1	79.3	66.0	66.1	83.4
1981	91.8	109.6	110.3	80.9	83.8	83.2	73.8	73.3	88.1
1982	71.2	96.4	97.7	75.7	73.9	72.9	78.5	77.5	106.3
1983	91.6	102.7	103.1	86.8	89.2	88.9	84.5	84.2	94.7
1984	91.1	101.5	101.1	90.3	89.7	90.1	89.0	89.3	99.2
1985	90.4	97.8	96.2	93.9	92.5	94.0	96.1	97.7	103.9
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	102.9	102.6	103.0	108.2	100.3	99.9	105.5	105.0	105.2
1988	102.2	104.5	105.4	113.3	97.8	96.9	108.4	107.5	110.9

Annual % Change

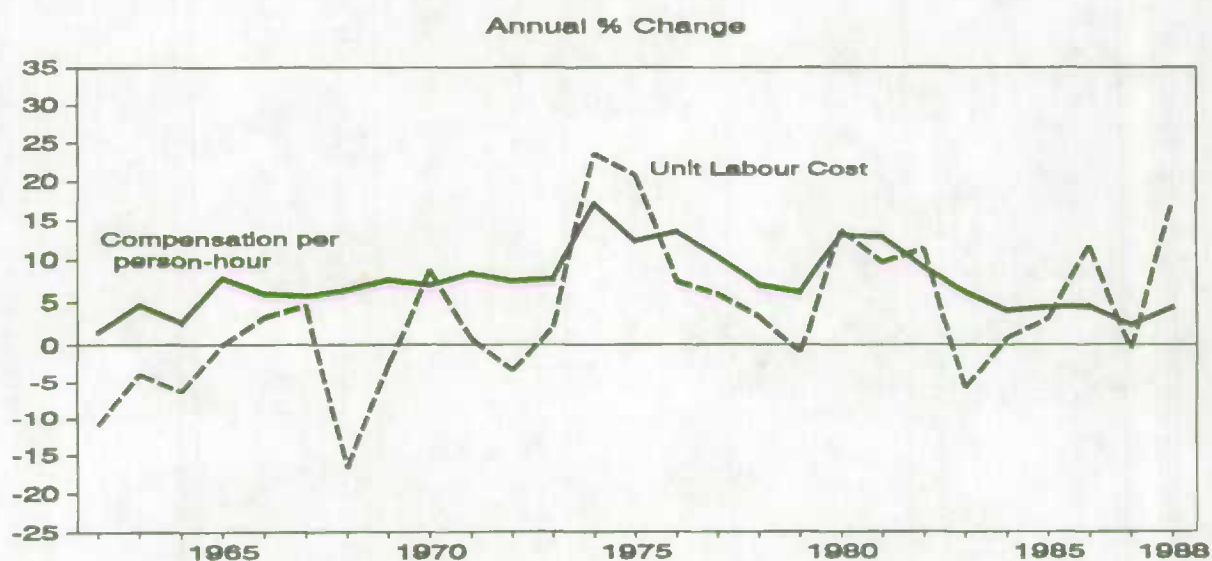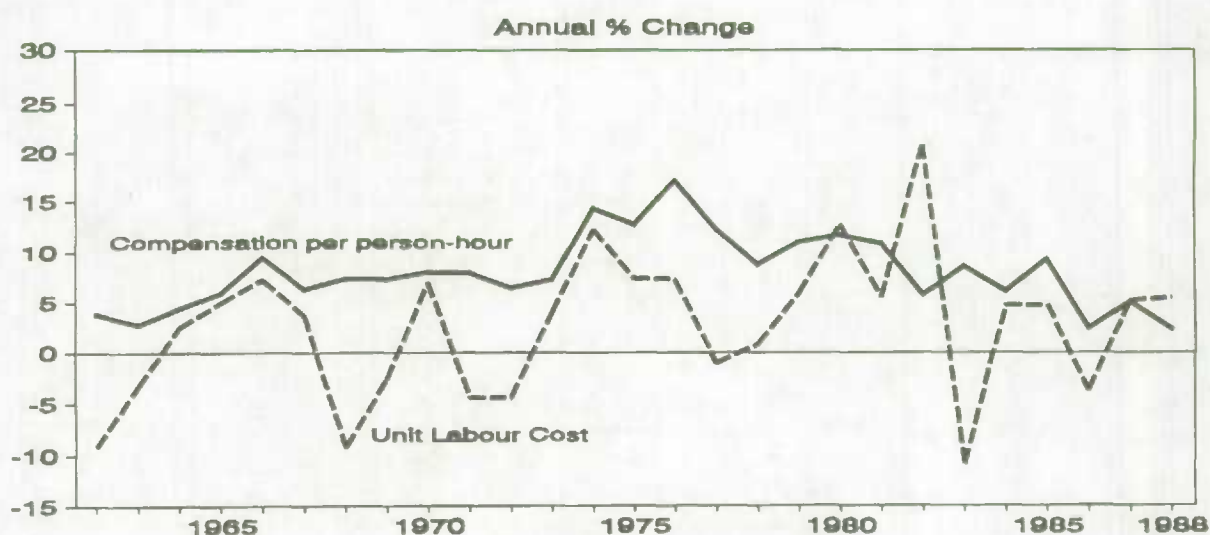Table 19 - Indexes of labour productivity and unit labour cost, clothing industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	56.6	100.4	102.3	17.0	56.3	55.3	16.9	16.6	30.0
1962	60.3	98.9	103.4	17.6	60.9	58.3	17.8	17.0	29.2
1963	62.8	99.1	104.3	18.4	63.4	60.2	18.6	17.7	29.3
1964	65.1	103.0	108.2	20.0	63.2	60.2	19.4	18.5	30.7
1965	68.1	105.6	110.0	21.6	64.5	61.9	20.4	19.6	31.7
1966	68.9	106.2	109.7	23.1	64.9	62.8	21.7	21.0	33.5
1967	66.7	104.1	108.8	23.8	64.0	61.2	22.9	21.9	35.8
1968	68.4	104.5	109.5	25.6	65.5	62.5	24.5	23.4	37.4
1969	68.7	106.5	111.4	28.0	64.5	61.7	26.3	25.1	40.7
1970	67.3	104.2	109.1	28.8	64.6	61.7	27.6	26.4	42.8
1971	68.3	105.7	108.1	31.3	64.7	63.2	29.6	28.9	45.7
1972	73.0	109.4	111.6	34.7	66.8	65.5	31.7	31.1	47.5
1973	78.3	111.7	112.0	38.1	70.1	69.8	34.1	34.0	48.6
1974	78.9	109.0	109.9	42.9	72.4	71.8	39.4	39.0	54.3
1975	81.8	107.9	109.1	49.4	75.8	74.9	45.7	45.2	60.4
1976	87.2	109.4	110.2	56.7	79.7	79.1	51.9	51.5	65.1
1977	85.7	101.9	102.0	58.4	84.2	84.1	57.3	57.2	68.1
1978	92.9	102.6	102.5	64.1	90.6	90.6	62.5	62.5	68.9
1979	99.7	103.8	103.9	71.7	96.1	96.0	69.1	69.0	71.9
1980	94.1	99.9	98.3	75.7	94.1	95.7	75.8	77.1	80.5
1981	96.9	99.7	96.9	82.2	97.3	100.0	82.5	84.8	84.8
1982	86.1	94.0	89.9	80.3	91.6	95.7	85.5	89.3	93.3
1983	86.2	96.6	95.8	85.3	89.2	90.0	88.3	89.1	99.0
1984	92.8	97.3	97.3	90.1	95.4	95.4	92.6	92.6	97.1
1985	95.8	97.5	96.9	93.3	98.2	98.9	95.7	96.3	97.4
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	103.6	98.5	102.2	105.9	105.2	101.4	107.5	103.6	102.2
1988	102.4	101.6	103.2	112.4	100.8	99.2	110.7	108.9	109.8

Annual % Change

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	33.0	75.9	78.5	9.8	43.4	42.0	12.9	12.5	29.8
1962	37.1	78.4	83.3	10.6	47.4	44.6	13.5	12.7	28.5
1963	41.8	81.1	86.8	11.5	51.5	48.2	14.2	13.3	27.6
1964	44.8	83.3	89.6	12.5	53.8	50.0	14.9	13.9	27.8
1965	46.7	84.9	91.5	13.5	55.0	51.0	15.9	14.8	29.0
1966	47.2	85.2	90.6	14.7	55.4	52.0	17.3	16.3	31.2
1967	48.5	82.6	89.7	15.3	58.7	54.1	18.5	17.0	31.5
1968	52.5	82.5	88.0	16.5	63.7	59.7	20.0	18.8	31.5
1969	53.6	84.4	89.2	18.2	63.5	60.2	21.6	20.4	34.0
1970	53.7	79.8	83.4	18.6	67.3	64.3	23.3	22.2	34.6
1971	55.0	83.6	87.8	21.4	65.8	62.6	25.6	24.4	39.0
1972	55.6	93.5	96.8	25.9	59.5	57.5	27.7	26.8	46.6
1973	61.3	101.5	105.0	31.3	60.3	58.4	30.8	29.8	51.1
1974	63.5	97.2	99.4	35.0	65.3	63.9	36.0	35.3	55.1
1975	56.4	89.3	90.9	36.6	63.2	62.1	41.0	40.3	64.9
1976	68.4	97.6	100.1	46.8	70.1	68.4	47.9	46.7	68.3
1977	75.9	100.0	101.8	54.1	75.9	74.6	54.1	53.1	71.2
1978	76.2	107.3	108.5	62.3	71.0	70.2	58.1	57.4	81.7
1979	76.4	110.2	111.5	70.9	69.4	68.5	64.4	63.6	92.8
1980	81.5	106.0	106.4	75.7	76.8	76.6	71.4	71.1	92.9
1981	78.3	101.7	97.0	79.4	77.0	80.7	78.1	81.9	101.4
1982	63.3	87.8	80.2	72.4	72.1	79.0	82.5	90.3	114.4
1983	78.3	92.0	89.0	83.6	85.0	88.0	90.9	94.0	106.9
1984	87.8	92.9	91.8	88.0	94.5	95.6	94.7	95.8	100.2
1985	99.7	97.0	96.8	95.3	102.8	103.0	98.3	98.5	95.6
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	115.5	109.4	110.0	116.3	105.6	105.0	106.4	105.8	100.8
1988	116.2	111.5	114.2	122.9	104.2	101.8	110.2	107.7	105.8

Annual % Change

Table 21 - Indexes of labour productivity and unit labour cost, furniture and fixture industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	40.5	57.7	61.0	9.6	70.1	66.4	16.7	15.8	23.8
1962	43.6	59.6	63.9	10.4	73.1	68.2	17.4	16.3	23.8
1963	47.9	62.0	66.2	11.2	77.2	72.4	18.0	16.9	23.3
1964	50.8	65.7	70.3	12.4	77.4	72.3	18.8	17.6	24.4
1965	58.6	69.9	74.3	13.7	83.8	78.9	19.7	18.5	23.5
1966	65.4	75.3	80.1	16.0	86.8	81.6	21.3	20.0	24.5
1967	68.0	75.9	79.8	17.0	89.6	85.3	22.3	21.3	24.9
1968	69.6	74.6	78.0	17.8	93.2	89.2	23.8	22.8	25.5
1969	75.8	76.4	79.5	19.6	99.2	95.4	25.6	24.6	25.8
1970	68.1	72.7	75.3	19.7	93.7	90.3	27.1	26.2	29.0
1971	72.3	74.3	77.1	21.3	97.4	93.8	28.7	27.6	29.4
1972	88.2	81.1	84.3	25.2	108.7	104.6	31.0	29.8	28.5
1973	97.3	84.3	87.4	28.3	115.4	111.3	33.6	32.4	29.1
1974	85.2	88.6	92.2	33.8	96.1	92.4	38.2	36.7	39.7
1975	80.6	86.5	89.4	37.1	93.2	90.2	42.9	41.4	46.0
1976	88.2	83.7	87.2	41.7	105.4	101.2	49.8	47.9	47.3
1977	81.9	76.5	79.3	41.6	107.1	103.3	54.4	52.4	50.7
1978	89.7	78.7	81.1	45.8	114.0	110.6	58.2	56.5	51.1
1979	88.5	85.9	89.5	53.0	103.0	98.9	61.7	59.2	59.9
1980	82.3	85.6	87.7	58.4	96.2	93.9	68.2	66.6	70.9
1981	91.7	88.5	90.2	69.8	103.6	101.6	78.8	77.3	76.1
1982	69.9	79.8	80.8	64.9	87.6	86.5	81.4	80.4	92.9
1983	79.0	78.8	77.7	69.4	100.3	101.6	88.2	89.3	87.9
1984	85.0	81.6	81.4	76.0	104.2	104.5	93.1	93.4	89.4
1985	94.7	89.9	89.5	87.1	105.4	105.9	97.0	97.4	92.0
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	99.8	110.9	111.4	111.8	90.0	89.5	100.9	100.4	112.1
1988	98.7	112.1	112.6	121.5	88.0	87.7	108.3	107.9	123.1

Annual % Change

Table 22 - Indexes of labour productivity and unit labour cost, paper and allied products industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	62.6	82.0	88.4	11.1	76.4	70.8	13.5	12.5	17.6
1962	63.4	83.8	90.9	11.7	75.7	69.7	13.9	12.8	18.4
1963	65.9	84.6	91.3	12.2	77.8	72.1	14.4	13.3	18.5
1964	72.0	88.4	96.4	13.3	81.4	74.7	15.0	13.8	18.4
1965	74.3	91.5	98.9	14.4	81.1	75.1	15.7	14.5	19.3
1966	79.5	97.2	104.5	16.7	81.8	76.1	17.2	16.0	21.0
1967	77.1	99.3	105.7	18.2	77.6	72.9	18.3	17.2	23.6
1968	80.1	98.7	104.6	19.4	81.1	76.6	19.7	18.6	24.3
1969	87.7	102.0	108.7	21.6	86.0	80.7	21.2	19.8	24.6
1970	86.5	102.1	107.4	22.9	84.6	80.5	22.5	21.4	26.5
1971	85.3	100.3	104.2	24.2	85.0	81.9	24.1	23.2	28.4
1972	92.8	101.1	105.6	26.4	91.7	87.8	26.1	25.0	28.5
1973	100.3	103.1	106.7	28.8	97.2	94.0	27.9	27.0	28.7
1974	108.6	109.9	113.1	35.6	98.8	96.0	32.4	31.5	32.8
1975	77.3	106.5	99.6	36.6	72.5	77.6	34.3	36.7	47.4
1976	95.3	109.1	107.6	45.9	87.4	88.6	42.1	42.7	48.2
1977	94.2	104.0	106.0	49.3	90.6	88.8	47.5	46.5	52.4
1978	104.1	105.5	113.2	54.3	98.7	91.9	51.4	47.9	52.1
1979	102.8	106.9	108.1	59.3	96.2	95.1	55.4	54.8	57.6
1980	100.7	107.8	115.0	66.1	93.4	87.6	61.3	57.4	65.6
1981	96.7	107.6	108.1	75.4	89.9	89.5	70.1	69.8	78.0
1982	82.9	100.5	100.2	78.0	82.5	82.7	77.7	77.9	94.2
1983	92.8	97.6	97.7	82.1	95.0	94.9	84.1	84.0	88.5
1984	96.1	98.9	99.2	86.6	97.2	96.9	87.6	87.3	90.1
1985	94.9	97.5	97.9	92.8	97.3	96.9	95.1	94.8	97.7
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	106.0	102.0	101.7	105.4	104.0	104.3	103.4	103.7	99.4
1988	108.4	103.1	103.8	111.7	105.1	104.5	108.3	107.6	103.0

Annual % Change

Table 23 - Indexes of labour productivity and unit labour cost, printing, publishing and allied industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity — Real GDP per person	Labour productivity — Real GDP per person-hour	Compensation per person	Compensation per person-hour	Unit labour cost
1961	44.7	63.2	67.2	10.1	70.7	66.5	15.9	15.0	22.6
1962	46.3	63.1	67.5	10.5	73.4	68.6	16.7	15.6	22.7
1963	47.2	63.7	68.3	11.0	74.1	69.2	17.3	16.1	23.3
1964	47.5	64.1	68.3	11.5	74.1	69.5	17.9	16.8	24.2
1965	49.7	67.1	71.5	12.6	74.0	69.5	18.8	17.7	25.4
1966	52.4	70.0	74.3	14.0	74.9	70.6	20.0	18.9	26.7
1967	53.7	71.4	75.8	14.9	75.3	70.9	20.9	19.7	27.8
1968	54.6	71.7	76.3	16.1	76.2	71.5	22.4	21.1	29.4
1969	55.8	72.3	77.5	17.4	77.2	71.9	24.0	22.4	31.1
1970	54.2	71.6	76.7	18.3	75.6	70.6	25.5	23.8	33.7
1971	54.6	71.9	76.2	19.6	75.9	71.7	27.2	25.7	35.8
1972	58.8	73.3	77.5	21.5	80.2	75.9	29.3	27.7	36.5
1973	65.0	77.4	80.9	24.2	84.0	80.4	31.3	30.0	37.3
1974	65.5	78.4	81.3	27.9	83.5	80.5	35.6	34.3	42.6
1975	66.4	78.7	81.2	31.6	84.3	81.7	40.1	38.9	47.6
1976	72.9	79.3	81.1	35.9	92.0	89.9	45.3	44.2	49.2
1977	76.5	78.1	79.3	38.7	97.9	96.4	49.5	48.7	50.6
1978	82.3	81.7	83.7	43.2	100.7	98.4	52.8	51.6	52.5
1979	84.1	85.4	86.6	48.7	98.4	97.1	57.0	56.2	57.9
1980	88.8	89.3	91.6	56.2	99.4	96.9	62.9	61.4	63.3
1981	91.0	89.7	90.2	64.2	101.3	100.8	71.6	71.2	70.6
1982	83.4	89.4	90.1	69.2	93.2	92.5	77.4	76.8	83.0
1983	86.3	89.3	89.1	75.5	96.6	96.8	84.5	84.7	87.5
1984	93.2	92.1	92.5	82.1	101.2	100.7	89.2	88.8	88.2
1985	97.6	95.0	95.0	90.3	102.7	102.8	95.0	95.1	92.5
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	99.8	103.4	103.7	107.2	96.5	96.2	103.6	103.3	107.4
1988	104.4	108.2	109.5	120.8	96.4	95.3	111.6	110.4	115.8

Annual % Change

Table 24 - Indexes of labour productivity and unit labour cost, primary metal industries, 1961-1988, (1986=100)

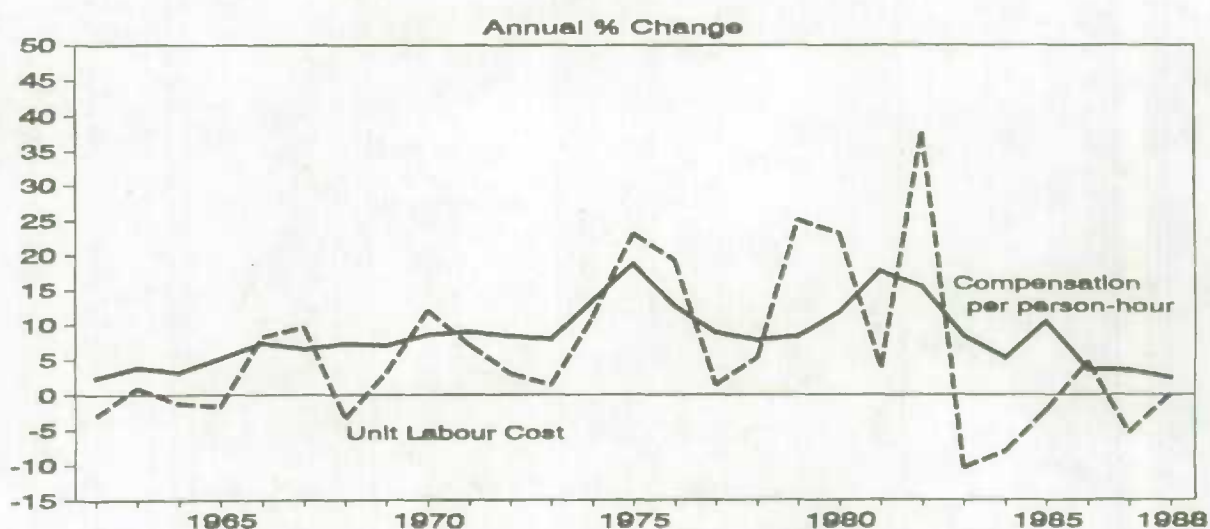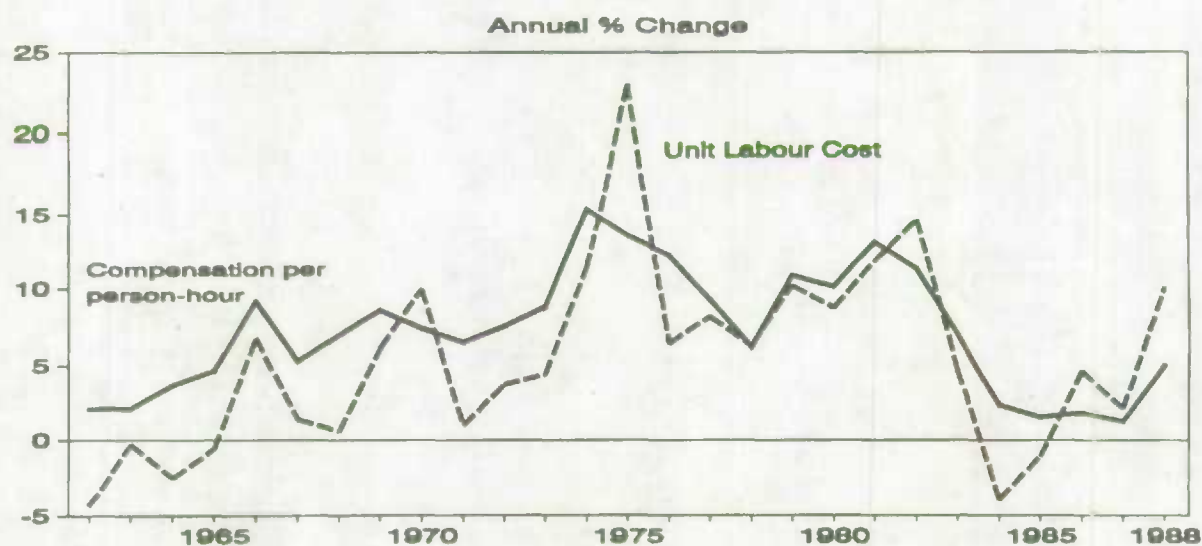| Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	52.2	86.5	92.0	11.4	60.3	56.7	13.2	12.4	21.9
1962	56.6	88.4	94.6	12.0	64.0	59.8	13.6	12.7	21.2
1963	60.1	90.9	97.6	12.9	66.1	61.6	14.1	13.2	21.4
1964	67.4	97.1	104.8	14.2	69.4	64.3	14.7	13.6	21.1
1965	77.2	104.1	112.0	16.0	74.1	68.9	15.4	14.3	20.8
1966	79.4	109.6	116.3	17.9	72.5	68.3	16.3	15.4	22.5
1967	76.7	109.4	115.6	18.9	70.1	66.4	17.3	16.4	24.7
1968	84.6	109.3	114.9	20.2	77.4	73.6	18.5	17.6	23.9
1969	85.9	107.5	112.5	21.2	80.0	76.4	19.7	18.8	24.6
1970	87.3	112.6	117.9	24.1	77.5	74.0	21.4	20.4	27.6
1971	86.5	110.5	114.9	25.6	78.3	75.3	23.1	22.3	29.6
1972	91.4	110.0	115.4	27.8	83.1	79.2	25.3	24.1	30.4
1973	100.3	112.9	118.9	31.0	88.8	84.3	27.4	26.0	30.9
1974	107.6	118.4	124.9	36.9	90.9	86.1	31.1	29.5	34.3
1975	98.0	116.6	118.1	41.4	84.1	83.0	35.5	35.0	42.2
1976	90.2	113.7	115.0	45.4	79.3	78.4	39.9	39.5	50.3
1977	98.9	115.5	117.4	50.5	85.6	84.2	43.7	43.0	51.0
1978	104.1	118.3	120.6	55.9	88.0	86.3	47.3	46.4	53.7
1979	94.8	122.9	126.8	63.7	77.2	74.8	51.8	50.2	67.2
1980	87.3	124.5	128.4	72.2	70.1	67.9	58.0	56.2	82.7
1981	94.5	120.9	122.7	81.2	78.2	77.0	67.2	66.2	85.9
1982	71.0	109.8	110.0	84.1	64.7	64.5	76.6	76.4	118.4
1983	80.1	102.5	102.5	85.0	78.2	78.2	82.9	82.9	106.1
1984	98.0	105.3	109.4	95.6	93.1	89.5	90.8	87.3	97.5
1985	103.7	103.2	102.6	98.9	100.5	101.1	95.9	96.5	95.4
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	110.5	100.7	101.0	104.6	109.8	109.4	103.8	103.6	94.6
1988	120.3	105.1	107.4	113.9	114.5	112.1	108.4	106.1	94.7

Annual % Change

Table 25 - Indexes of labour productivity and unit labour cost, fabricated metal products industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	40.4	68.9	70.8	11.7	58.6	57.1	17.0	16.6	29.1
1962	47.2	74.8	77.5	13.1	63.1	60.9	17.5	16.9	27.8
1963	50.8	77.3	81.4	14.1	65.7	62.4	18.2	17.3	27.7
1964	57.9	82.6	87.1	15.6	70.1	66.4	18.9	17.9	27.0
1965	67.2	91.4	96.1	18.0	73.5	69.9	19.7	18.8	26.8
1966	73.2	97.7	102.3	21.0	74.9	71.5	21.5	20.5	28.7
1967	73.6	94.7	99.1	21.4	77.7	74.3	22.6	21.6	29.1
1968	77.4	93.5	98.0	22.6	82.8	79.0	24.2	23.1	29.2
1969	81.0	96.0	100.2	25.1	84.3	80.8	26.2	25.1	31.0
1970	77.7	94.7	98.5	26.5	82.0	78.9	28.0	26.9	34.1
1971	81.1	93.9	97.4	27.9	86.3	83.2	29.7	28.7	34.4
1972	85.1	95.2	98.7	30.4	89.5	86.3	32.0	30.8	35.7
1973	92.5	99.9	102.9	34.5	92.6	89.9	34.6	33.5	37.3
1974	100.4	106.1	107.8	41.7	94.6	93.1	39.3	38.7	41.5
1975	91.4	104.7	106.2	46.7	87.3	86.1	44.6	44.0	51.1
1976	97.6	106.1	107.5	53.1	92.0	90.8	50.0	49.4	54.4
1977	95.9	103.1	104.5	56.4	93.0	91.7	54.7	53.9	58.8
1978	99.0	105.8	108.0	61.9	93.6	91.7	58.5	57.3	62.5
1979	102.3	110.4	110.9	70.4	92.6	92.2	63.8	63.5	68.9
1980	102.4	109.0	109.6	76.7	93.9	93.5	70.3	70.0	74.9
1981	100.6	106.1	106.4	84.3	94.8	94.6	79.4	79.2	83.8
1982	85.5	94.2	93.1	82.2	90.8	91.8	87.2	88.2	96.1
1983	80.7	87.6	86.0	81.2	92.1	93.8	92.7	94.4	100.6
1984	86.9	87.4	86.8	83.9	99.4	100.0	96.0	96.7	96.6
1985	97.6	94.5	95.1	93.3	103.3	102.7	98.8	98.2	95.6
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.9	106.5	106.8	108.2	99.5	99.1	101.6	101.3	102.1
1988	108.7	114.0	115.0	122.3	95.3	94.5	107.3	106.3	112.5

Annual % Change

Table 26 - Indexes of labour productivity and unit labour cost, machinery industries, 1961-1988 (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	35.3	54.2	55.1	8.9	65.1	64.0	16.5	16.2	25.3
1962	40.6	58.6	60.7	10.0	69.3	66.9	17.1	16.5	24.7
1963	45.1	63.4	66.3	11.3	71.1	68.0	17.9	17.1	25.1
1964	54.4	69.7	73.5	13.0	78.1	74.0	18.6	17.6	23.8
1965	62.4	77.4	82.4	15.2	80.6	75.8	19.6	18.4	24.3
1966	68.8	83.1	87.9	17.5	82.7	78.2	21.0	19.9	25.4
1967	69.0	85.7	89.5	18.9	80.5	77.1	22.1	21.1	27.4
1968	66.3	81.2	84.6	19.1	81.7	78.4	23.5	22.6	28.8
1969	73.6	86.7	89.4	22.1	84.9	82.3	25.5	24.7	30.0
1970	68.6	83.0	85.0	22.6	82.7	80.7	27.3	26.6	33.0
1971	71.4	80.5	82.6	23.6	88.8	86.5	29.3	28.6	33.0
1972	77.5	87.2	89.4	27.2	88.9	86.8	31.2	30.4	35.1
1973	85.0	91.8	93.5	30.6	92.6	90.9	33.3	32.7	36.0
1974	96.7	100.9	101.6	38.1	95.8	95.1	37.8	37.5	39.4
1975	96.2	107.7	108.0	45.3	89.4	89.0	42.1	41.9	47.1
1976	97.2	104.0	104.4	49.1	93.4	93.1	47.2	47.0	50.5
1977	99.5	103.5	102.3	53.7	96.2	97.3	51.9	52.5	54.0
1978	105.0	105.7	105.9	59.8	99.3	99.1	56.6	56.5	57.0
1979	120.6	114.7	114.4	71.2	105.1	105.4	62.1	62.2	59.0
1980	122.4	121.4	120.5	83.2	100.8	101.6	68.5	69.0	68.0
1981	118.4	118.7	116.9	93.5	99.7	101.3	78.7	80.0	78.9
1982	88.2	100.4	98.1	86.2	87.9	89.9	85.9	87.9	97.8
1983	78.0	89.1	87.4	78.7	87.6	89.3	88.4	90.1	100.9
1984	94.5	93.1	92.7	86.3	101.5	102.0	92.8	93.2	91.4
1985	96.5	95.5	95.2	92.3	101.0	101.3	96.6	96.9	95.7
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	98.0	105.5	106.7	106.5	92.9	91.9	101.0	99.9	108.7
1988	109.4	116.7	116.8	122.5	93.8	93.7	105.0	104.9	111.9

Annual % Change

Table 27 - Indexes of labour productivity and unit labour cost, transportation equipment industries, 1961-1988 (1986=100)

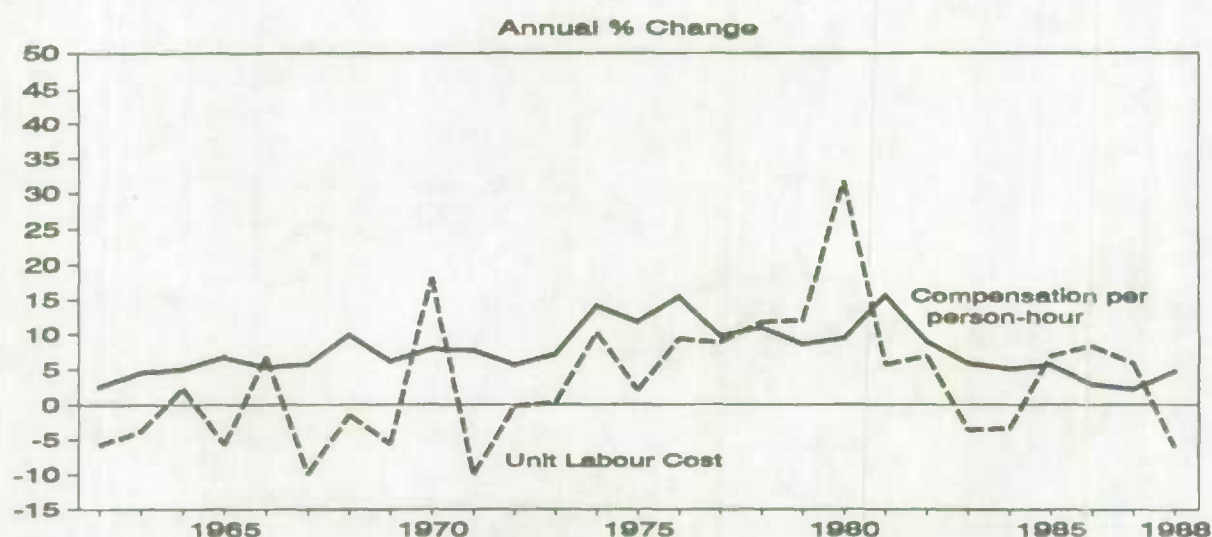| Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity Real GDP per person	Labour productivity Real GDP per person-hour	Compen-sation per person	Compen-sation per person-hour	Unit labour cost
1961	15.1	46.6	45.2	6.7	32.4	33.4	14.4	14.8	44.4
1962	18.0	49.4	49.4	7.5	36.3	36.4	15.2	15.2	41.8
1963	21.2	52.7	53.4	8.5	40.1	39.6	16.1	15.9	40.2
1964	23.8	58.4	58.4	9.8	40.7	40.6	16.7	16.7	41.1
1965	29.9	64.4	64.9	11.6	46.4	46.0	18.0	17.9	38.8
1966	31.7	70.2	69.8	13.1	45.1	45.4	18.7	18.8	41.4
1967	37.3	72.2	70.1	13.9	51.7	53.3	19.3	19.9	37.3
1968	43.1	72.9	72.5	15.9	59.1	59.4	21.7	21.9	36.8
1969	51.2	77.6	76.6	17.8	66.0	66.9	22.9	23.2	34.7
1970	42.6	72.1	69.7	17.5	59.1	61.1	24.2	25.1	41.0
1971	52.6	74.1	71.9	19.4	71.0	73.2	26.2	27.0	36.9
1972	59.9	78.3	77.4	22.1	76.5	77.5	28.2	28.6	36.9
1973	70.5	86.2	85.2	26.1	81.8	82.8	30.3	30.6	37.0
1974	70.7	85.0	82.6	28.8	83.2	85.7	33.9	34.9	40.8
1975	72.4	79.1	77.1	30.1	91.6	94.0	38.1	39.1	41.6
1976	78.4	82.0	79.0	35.7	95.6	99.1	43.5	45.1	45.5
1977	81.5	83.0	81.5	40.4	98.3	100.0	48.7	49.6	49.5
1978	84.2	88.6	84.8	46.7	95.0	99.3	52.7	55.0	55.4
1979	84.3	93.7	87.6	52.3	90.0	96.3	55.9	59.8	62.1
1980	65.3	87.9	81.6	53.4	74.2	80.0	60.8	65.4	81.8
1981	72.0	87.9	82.3	62.3	81.9	87.5	70.9	75.7	86.5
1982	66.0	80.2	73.9	61.0	82.3	89.3	76.1	82.6	92.5
1983	75.7	80.9	77.2	67.5	93.6	98.1	83.5	87.5	89.2
1984	95.9	91.3	89.9	82.7	105.0	106.7	90.6	92.0	86.2
1985	102.6	98.4	97.4	94.6	104.2	105.3	96.1	97.2	92.2
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	99.6	101.9	103.2	105.5	97.7	96.4	103.6	102.2	106.0
1988	117.2	108.6	108.9	116.6	108.0	107.6	107.4	107.1	99.5

Annual % Change

Table 28 - Indexes of labour productivity and unit labour cost, electrical and electronic products industries, 1961-1988 (1986=100)

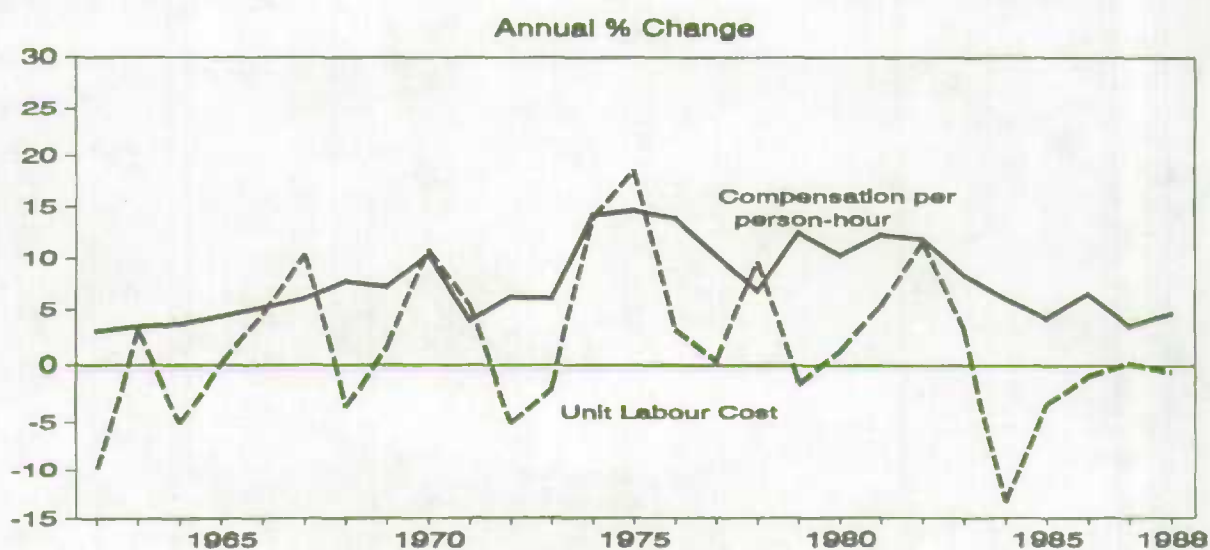| Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	19.1	72.1	75.9	11.4	26.5	25.1	15.9	15.1	60.0
1962	23.4	77.5	81.6	12.7	30.2	28.7	16.3	15.5	54.1
1963	24.6	81.5	85.7	13.7	30.2	28.8	16.9	16.0	55.8
1964	28.1	84.3	89.5	14.9	33.3	31.4	17.6	16.6	53.0
1965	31.3	90.8	95.8	16.6	34.5	32.7	18.3	17.3	53.0
1966	34.9	99.4	106.1	19.4	35.1	32.9	19.5	18.2	55.4
1967	34.3	104.4	108.7	21.0	32.9	31.6	20.1	19.3	61.2
1968	37.4	102.4	106.1	22.1	36.6	35.3	21.6	20.8	59.1
1969	40.6	105.3	108.9	24.3	38.5	37.3	23.1	22.3	60.0
1970	38.5	101.0	103.8	25.6	38.1	37.1	25.3	24.6	66.4
1971	36.9	98.9	101.0	25.9	37.3	36.6	26.1	25.6	70.0
1972	41.5	98.8	101.3	27.5	42.0	40.9	27.9	27.2	66.4
1973	47.5	104.6	107.5	31.0	45.4	44.2	29.6	28.8	65.2
1974	49.4	109.1	111.5	36.7	45.3	44.3	33.6	32.9	74.3
1975	44.6	102.4	104.1	39.3	43.5	42.8	38.4	37.7	88.1
1976	47.4	99.4	100.2	43.1	47.7	47.3	43.3	43.0	90.8
1977	47.5	90.8	91.3	43.3	52.3	52.0	47.6	47.4	91.1
1978	47.7	92.9	94.1	47.6	51.3	50.6	51.3	50.6	99.9
1979	57.4	98.6	99.3	56.5	58.3	57.9	57.3	56.9	98.4
1980	64.2	101.9	101.9	63.9	63.0	63.0	62.7	62.7	99.6
1981	72.2	107.7	107.6	75.7	67.1	67.1	70.3	70.4	104.8
1982	66.6	99.3	99.0	77.9	67.1	67.3	78.5	78.7	116.9
1983	66.9	94.6	94.8	80.7	70.8	70.6	85.4	85.2	120.6
1984	86.3	100.5	99.7	90.0	85.8	86.5	89.5	90.3	104.3
1985	95.7	101.4	102.7	96.5	94.4	93.2	95.2	94.0	100.8
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	110.7	106.4	107.4	111.0	104.1	103.1	104.3	103.4	100.2
1988	120.5	111.3	111.2	120.2	108.3	108.4	108.0	108.1	99.7

Annual % Change

Table 29 - Indexes of labour productivity and unit labour cost, non-metallic mineral products industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity		Compensation per person	Compensation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	46.7	81.0	87.2	11.7	57.7	53.6	14.4	13.4	25.0
1962	55.3	85.3	92.5	12.9	64.8	59.8	15.1	13.9	23.3
1963	56.8	86.2	92.6	13.4	65.9	61.3	15.6	14.5	23.6
1964	63.3	90.8	98.9	14.8	69.7	64.0	16.3	15.0	23.4
1965	69.4	95.2	105.0	16.5	72.9	66.1	17.4	15.7	23.8
1966	74.0	98.8	107.0	18.4	74.9	69.1	18.6	17.2	24.8
1967	68.3	96.3	104.0	18.9	70.9	65.7	19.6	18.2	27.7
1968	74.5	97.0	103.9	20.5	76.9	71.7	21.1	19.7	27.4
1969	76.5	97.2	104.3	22.4	78.7	73.3	23.1	21.5	29.3
1970	72.6	94.0	99.0	22.9	77.2	73.3	24.4	23.2	31.6
1971	86.3	97.4	102.7	25.7	88.5	84.0	26.4	25.0	29.8
1972	98.3	101.0	106.1	29.1	97.4	92.7	28.8	27.4	29.6
1973	107.1	106.6	110.8	32.9	100.5	96.7	30.9	29.7	30.7
1974	109.4	110.2	113.5	38.8	99.3	96.4	35.2	34.1	35.4
1975	101.9	107.5	110.7	43.5	94.8	92.1	40.5	39.3	42.7
1976	104.8	106.4	108.4	49.1	98.4	96.6	46.1	45.3	46.8
1977	100.8	102.0	104.0	52.5	98.8	96.9	51.4	50.4	52.1
1978	108.1	104.6	106.4	57.9	103.4	101.6	55.3	54.4	53.5
1979	111.8	106.6	108.0	64.8	104.9	103.5	60.8	60.0	58.0
1980	98.2	105.0	104.0	69.2	93.5	94.4	65.9	66.6	70.5
1981	94.5	104.5	102.9	77.9	90.4	91.8	74.6	75.7	82.5
1982	72.4	90.7	88.2	73.8	79.8	82.1	81.4	83.7	102.0
1983	80.2	88.9	88.0	77.1	90.2	91.1	86.7	87.6	96.1
1984	87.8	91.4	91.2	82.6	96.0	96.3	90.4	90.6	94.1
1985	95.8	94.6	94.2	90.9	101.2	101.7	96.1	96.6	94.9
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	109.6	106.2	107.8	109.7	103.2	101.7	103.3	101.7	100.1
1988	112.4	108.1	110.5	116.2	104.0	101.7	107.5	105.1	103.4

Annual % Change

Table 30 - Indexes of labour productivity and unit labour cost, refined petroleum and coal products industries, 1961-1988, (1986=100)

| Year	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Labour productivity Real GDP per person	Labour productivity Real GDP per person-hour	Compensation per person	Compensation per person-hour	Unit labour cost
1961	40.2	88.0	88.7	10.6	45.7	45.4	12.0	11.9	26.3
1962	50.5	87.8	89.3	11.0	57.5	56.5	12.5	12.3	21.8
1963	52.8	84.7	86.7	11.0	62.3	60.9	13.0	12.7	20.8
1964	57.6	84.2	86.4	11.5	68.4	66.6	13.6	13.3	19.9
1965	60.8	78.8	80.2	11.4	77.2	75.8	14.4	14.2	18.7
1966	66.6	81.7	85.6	13.0	81.5	77.8	15.9	15.2	19.5
1967	60.3	100.9	105.6	17.3	59.7	57.1	17.2	16.4	28.8
1968	68.0	98.4	103.3	18.2	69.1	65.8	18.5	17.6	26.8
1969	64.5	101.7	103.2	20.7	63.4	62.5	20.4	20.1	32.1
1970	66.4	102.3	102.8	22.0	65.0	64.6	21.5	21.4	33.2
1971	72.7	101.3	102.5	23.6	71.8	70.9	23.3	23.0	32.5
1972	70.3	99.5	99.7	25.2	70.7	70.5	25.3	25.3	35.8
1973	103.2	104.3	103.1	28.4	98.9	100.1	27.2	27.5	27.5
1974	105.0	115.0	113.2	35.4	91.3	92.8	30.8	31.3	33.7
1975	113.4	113.0	108.4	41.6	100.4	104.7	36.8	38.4	36.7
1976	106.0	112.4	107.0	46.5	94.3	99.1	41.3	43.5	43.9
1977	132.2	119.9	113.7	54.6	110.3	116.3	45.5	48.0	41.3
1978	118.9	137.2	131.1	64.6	86.6	90.6	47.0	49.2	54.3
1979	97.9	126.5	122.2	65.6	77.3	80.1	51.8	53.7	67.0
1980	96.1	131.8	125.9	75.4	72.9	76.3	57.2	59.9	78.5
1981	111.3	153.1	146.9	100.7	72.7	75.8	65.8	68.5	90.5
1982	103.2	146.4	137.5	116.1	70.5	75.0	79.3	84.5	112.6
1983	102.7	125.7	126.5	111.6	81.6	81.2	88.8	88.3	108.8
1984	103.5	114.5	116.1	107.7	90.4	89.2	94.1	92.8	104.0
1985	100.8	111.9	114.9	107.5	90.1	87.8	96.0	93.6	106.6
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	105.3	98.4	100.5	104.8	107.1	104.8	106.6	104.3	99.5
1988	106.8	101.8	100.4	107.3	104.9	106.4	105.4	106.9	100.5

Annual % Change

Table 31 - Indexes of labour productivity and unit labour cost, chemical and chemical products industries, 1961-1988, (1986=100)

| Year | Real gross domestic product | Persons at work | Person-hours | Labour compen-sation | Labour productivity | | Compen-sation per person | Compen-sation per person-hour | Unit labour cost |
					Real GDP per person	Real GDP per person-hour			
1961	28.1	73.1	74.7	10.5	38.5	37.7	14.4	14.1	37.5
1962	30.8	74.2	75.6	11.1	41.5	40.8	15.0	14.7	36.1
1963	33.3	76.1	77.9	11.9	43.8	42.8	15.6	15.3	35.7
1964	37.1	78.2	80.3	12.7	47.5	46.3	16.2	15.8	34.1
1965	40.7	81.3	85.7	13.7	50.0	47.5	16.9	16.0	33.8
1966	44.7	85.1	86.9	15.5	52.5	51.4	18.2	17.8	34.6
1967	45.8	86.7	87.8	16.5	52.8	52.1	19.1	18.8	36.1
1968	48.3	88.7	90.6	18.2	54.5	53.3	20.5	20.1	37.7
1969	52.5	90.5	93.4	20.1	58.0	56.2	22.2	21.5	38.3
1970	51.7	91.4	93.6	21.6	56.6	55.3	23.7	23.1	41.8
1971	54.8	89.9	91.2	22.8	60.9	60.0	25.4	25.0	41.6
1972	56.6	87.0	88.0	23.8	65.1	64.3	27.3	27.0	42.0
1973	64.3	90.2	91.2	26.3	71.3	70.5	29.2	28.9	41.0
1974	65.3	93.1	93.5	30.7	70.1	69.8	33.0	32.9	47.1
1975	58.5	93.6	94.3	34.9	62.5	62.0	37.3	37.0	59.6
1976	64.7	92.8	89.0	38.7	69.7	72.7	41.6	43.5	59.8
1977	70.5	95.3	96.0	44.1	74.0	73.5	46.3	46.0	62.5
1978	78.7	96.7	97.6	48.4	81.3	80.6	50.1	49.6	61.6
1979	84.4	99.9	99.2	54.7	84.4	85.0	54.8	55.2	64.9
1980	79.4	99.5	98.5	61.4	79.8	80.6	61.7	62.4	77.4
1981	85.9	102.6	101.1	72.5	83.8	85.0	70.6	71.7	84.3
1982	76.4	101.3	98.7	78.5	75.4	77.4	77.5	79.5	102.8
1983	89.9	100.1	100.0	82.9	89.8	89.9	82.8	82.9	92.2
1984	98.4	100.2	100.4	89.1	98.2	98.0	88.9	88.7	90.5
1985	99.5	99.8	99.5	93.7	99.8	100.0	93.9	94.1	94.1
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	107.1	101.7	101.1	106.4	105.2	105.9	104.6	105.3	99.4
1988	108.4	107.3	108.1	115.1	101.0	100.3	107.2	106.5	106.2

Annual % Change

Table 32 · Indexes of labour productivity and unit labour cost, other manufacturing industries, 1961-1988, (1986=100)

Year	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation	Labour productivity		Compen-sation per person	Compen-sation per person-hour	Unit labour cost
					Real GDP per person	Real GDP per person-hour			
1961	45.2	68.9	72.4	11.5	65.6	62.5	16.7	15.9	25.4
1962	48.5	70.4	75.2	12.2	68.8	64.4	17.3	16.2	25.1
1963	49.0	71.9	76.9	13.1	68.2	63.8	18.2	17.0	26.6
1964	55.1	74.5	80.6	14.2	74.0	68.4	19.1	17.7	25.8
1965	57.3	76.9	82.9	15.4	74.4	69.1	20.0	18.5	26.8
1966	63.6	81.2	87.0	17.2	78.3	73.1	21.2	19.8	27.0
1967	62.8	81.0	86.1	18.2	77.5	73.0	22.5	21.2	29.0
1968	68.8	81.4	85.5	19.5	84.5	80.5	24.0	22.8	28.4
1969	74.9	85.0	89.8	21.9	88.1	83.3	25.7	24.3	29.2
1970	73.9	83.7	88.4	22.9	88.2	83.5	27.3	25.9	31.0
1971	76.0	82.9	87.2	24.4	91.7	87.1	29.5	28.0	32.1
1972	84.6	86.8	90.7	26.6	97.5	93.3	30.7	29.4	31.5
1973	88.7	90.2	93.4	29.3	98.3	94.9	32.5	31.4	33.1
1974	92.5	94.0	97.8	34.5	98.4	94.6	36.7	35.3	37.3
1975	88.3	94.2	97.3	38.2	93.7	90.7	40.6	39.3	43.3
1976	98.7	95.9	97.7	42.9	102.9	101.1	44.8	44.0	43.5
1977	96.2	89.9	91.2	45.3	107.0	105.4	50.4	49.6	47.1
1978	99.3	92.0	93.2	50.3	108.0	106.6	54.6	54.0	50.6
1979	105.1	94.3	95.8	56.8	111.5	109.7	60.3	59.3	54.1
1980	93.0	94.3	95.2	63.6	98.6	97.8	67.4	66.8	68.3
1981	100.9	97.8	98.6	74.8	103.2	102.3	76.6	75.9	74.2
1982	93.9	91.2	90.8	76.1	102.9	103.4	83.4	83.8	81.1
1983	91.0	90.4	90.7	81.6	100.7	100.3	90.3	90.0	89.7
1984	103.7	93.2	94.4	87.5	111.3	109.9	93.9	92.6	84.3
1985	109.4	95.9	98.1	93.1	114.1	111.5	97.2	94.9	85.2
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	104.6	99.4	98.0	101.3	105.2	106.6	101.9	103.3	96.9
1988	110.1	106.9	105.3	115.0	103.1	104.6	107.6	109.1	104.4

Annual % Change
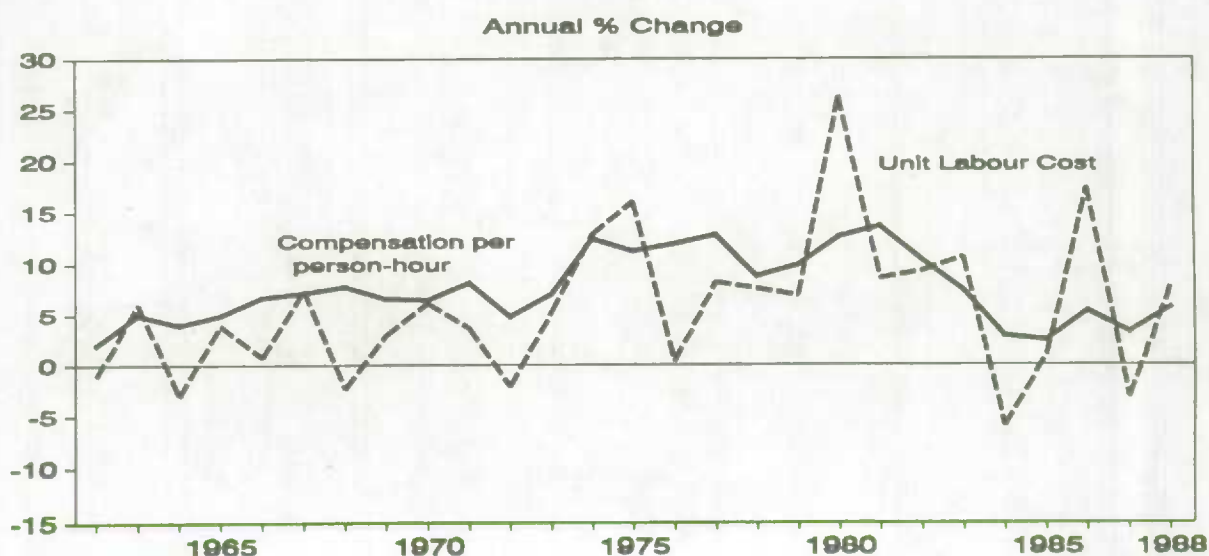
APPENDIX 1

About the measures

1 - Labour Productivity

Ideally, a productivity index would take into account all resources that are used as inputs to the production process. A comprehensive measure, such as this, is called a *total factor*, or, alternatively, a *multifactor* productivity index. This is the focus of Part 2 of this publication. The only resource, that is measured in producing a *labour productivity* index is labour input. Although labour input is an important determinant in the level of output it is not the only one. Therefore, labour productivity is considered to be a *partial productivity measure*.

Although the partial productivity indexes described above are appropriate for many analytical uses, they do not describe the sources of economic growth. This is the case because measured changes in output per unit of labour input are not necessarily attributable to the contribution of labour alone, but also to the contribution of other productive resources and the effectiveness with which all are combined and organized for production. In other words, changes in technology, capital investment, returns to scale, capacity utilization, work flow, managerial skills and labour management relations each has a bearing on movements in what is termed the "labour productivity" series. In contrast, the *multifactor productivity index* would be quite suitable for analysis concerned with the various sources of economic growth.

Due to the fact that there are two alternative measures of labour input, there are, correspondingly, two measures of labour productivity. When labour input is measured in terms of persons at work, the labour productivity measure is *real GDP per person at work*; when it is measured in terms of hours worked the labour productivity measure is *real GDP per person-hour*. Both of these partial productivity indicators are based on a ratio of output to labour input, and are produced and presented in index number form. The interpretation of real GDP per person at work is straightforward. Real GDP per person-hour, however, may be a more appropriate measure for most applications since it incorporates changes in the average number of hours worked per week, which has a tendency to decline.

2 - Output

The concept of output used in labour productivity measurement is constant price Gross Domestic Product at factor cost by industry (excluding Government royalties on natural resources and rents of Owner occupied dwellings). The output measures are calculated with a 1961 price base for the period 1961 to 1971, a 1971 price base for the years 1971 to 1981 and a 1981 price base for the years 1981 to 1986. The price base that applies to subsequent years is 1986. These series were then rescaled to correspond to a 1986 reference year (i.e. 1986=100) for convenience, as 1986 is the base year currently in effect. The rates of growth in the original series were protected in the process. A more complete description of the output measures is found in *The Input-Output Structure of the Canadian Economy 1961-1981* (Catalogue

15-510) and in *The Input-Output Structure of the Canadian Economy in Constant Prices, 1961-1981* (Catalogue 15-511).

The productivity measures pertain to business sector industries only[3]. The output of non-business sector industries, because it is not normally marketed, presents some difficulties in measurement. The conventional measure of output for non-business sector industries is labour input or labour input plus depreciation. Such an approach does not yield a meaningful measurement of productivity.

3 - Labour Input

In principle, labour input should cover all labour services expended to bring about a given output. This report presents two measures of labour services: persons at work, and person-hours worked. Neither of these measures, however, takes into account the changing quality of labour input.

Persons at work denote all *paid* and *other-than-paid* persons engaged in the production of output. The other-than-paid workers include self-employed workers and unpaid family workers.

Person-hours worked are the sum of person-hours spent at the place of employment by persons at work, and therefore differ from a measure of "person-hours paid" by excluding time used on vacation, holiday, illness, accident, etc.

4 - Labour Compensation

Labour compensation is a measure of the value of labour services engaged in the production process. It includes all payments in cash or in kind by domestic producers to persons at work as remuneration for work, including wages, salaries and supplementary labour income of paid workers, plus an imputed labour income for self-employed workers. Statistics of labour compensation in this report represent the most comprehensive labour cost data available for all industries at the present time since they include both cash payments and supplements, and cover all persons at work for gain.

The value of labour services of self-employed persons is an imputed value. The basis of the imputation is the assumption that the value of labour of an hour of a self-employed person's working time is the same as the value of an hour of an average paid worker in the same industry division. This recognizes that labour services are essentially contracted for on a time basis, and a measure of labour compensation should not reflect returns on investment or to risk taking. An adjustment is made in the case of self-employed persons such as doctors, dentists, lawyers, accountants and engineers. These occupations are largely self-employed, but the average earnings of paid workers in the same industry division underrepresent the earnings of these occupations. In this case direct evidence on average labour income is introduced.

Unpaid family workers, while not directly recompensed for their services, are not a free resource, and their contribution is subsumed in the net income of the firm where they are employed. However no labour

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[3]   *Further detail on the industry coverage of the productivity measures in this publication can be found in Appendix 3 of Part 1.*

income is imputed to unpaid family workers. There is no valid basis for measuring the value of their services, and it is judged that less error is generated by their exclusion from measures of labour compensation than by imputing labour income to them at the same rate as paid workers. The number of unpaid family workers is insignificant in most industries.

5 - Unit Labour Cost

Unit labour cost is the ratio of labour compensation to real GDP. It is a measure of the cost of labour per unit of real output. Unit labour cost can also be viewed as the ratio of average compensation to labour productivity; thus, unit labour cost will increase when average compensation grows more rapidly than labour productivity.

6 - Absolute Values

All time series in this report are presented in index number form. This form emphasizes relative change as the objective in constructing the productivity and related measures. The indexes are constructed from absolute values of persons at work, person-hours, real gross domestic product and labour compensation, and there is some interest in the absolute values underlying these indexes.

There are some caveats to be observed in the use of absolute values, and these account in part for the choice of an index number presentation. The measurement of employment, output, etc., is subject to some, usually indeterminate, margin of error. While such statistical error will have some effect on measures of relative change, it can be expected that, both for individual sectors and their aggregations, the effect of such error will be more serious when intersectoral comparisons of absolute levels are attempted. It is also worth noting that the relative values of output, because they are adjusted for price change, can change depending on the choice of the base year. Prices do not always change by the same amount, or even necessarily in the same direction, and the choice of a different base year would yield different relative prices for output.

Text table 1 gives the absolute values underlying the indexes for the year 1986. To calculate the absolute values corresponding to the published indexes the following procedure can be followed:

$$\frac{\text{Index}}{100} \times 1986 \text{ value from Text table 1.}$$

Text table 1

Absolute values of labour productivity and unit labour cost, 1986

Industry Title	Real gross domestic product	Persons at work	Person-hours	Labour compen-sation
	$'000,000	'000	000,000	$'000,000
Business sector industries	335,673	8,553	15,298	225,727
Business sector - excluding agricultural and related services industries	324,616	8,059	14,216	220,196
Business sector - services	173,374	5,244	8,993	126,868
Business sector - goods	162,299	3,309	6,305	98,859
Agricultural and related services industries	11,057	493	1,082	5,531
Manufacturing industries	86,789	1,804	3,341	56,919
Construction industries	28,082	673	1,242	23,449
Transportation and storage industries	20,254	459	856	14,857
Communication industries	13,248	200	372	7,628
Wholesale and retail trade industries	51,581	1,991	3,409	41,443
Community, business and personal services industries	52,119	1,990	3,286	41,921

APPENDIX 2

Sources of data

1 - Output

The output data used to calculate the indexes of labour productivity and unit labour cost are the estimates of constant price Gross Domestic Product at factor cost by industry. The following sources are utilized: *Indexes of Real Domestic Product by Industry, 1961 Base*, (Catalogue 61-506), for the years 1946-1961. For these years, only index values of output are available. For the years 1961 to 1981, *The Input-Output Structure of the Canadian Economy in Constant Prices 1961-1981* (Catalogue 15-511) is used. For the years 1982 to 1988, *The Input-Output Structure of the Canadian Economy in constant prices* (Catalogue 15-202) is used. For the years 1989, 1990 and 1991 *Gross Domestic Product by Industry* (Catalogue 15-001) is used. The data on real GDP in the finance, insurance and real estate industries excludes real GDP of Govt. royalties on natural resources and rents of Owner occupied dwellings.

2 - Labour Input

This appendix presents two measures of labour input: the annual average number of persons at work and the number of person-hours worked by these persons at work. The data sources for both of these measures are given below.

An explanation of the data sources for the labour input measures for the years 1946 to 1961 can be found in: *Indexes of Output Per Person Employed and Per Man-hour in Canada, Commercial Non-agricultural Industries, 1947-1963* (Catalogue 14-501).

Persons at work. Persons at work are made up of two groups: *paid workers* and *other-than-paid workers*. The other-than-paid workers include self-employed and unpaid family workers.

Paid workers. The number of paid workers in agriculture, fishing and trapping industries for all years is taken from the Labour Force Survey (Catalogue 71-001). Multiple job holders are added from 1975.

Estimates of Employees by Province and Industry, 1961-1976 (Catalogue 72-516), and monthly Catalogue 72-008 are the sources for the years up to 1982 for the following industries:

> Logging and forestry industries;
> Construction industries;
> Transportation and storage industries;
> Communication industries;
> Other utility industries;
> Wholesale and retail trade industries;

Finance, insurance and real estate industries;
Community, business and personal services.

For the period after 1982 up to 1987, the publication *Employment Earnings and Hours* (Catalogue 72-002) was the data source used for the above industries. In addition, other sources of information are used as follows:

In transportation and storage industries the following publications were used to derive the number of paid workers[4]: *Air Carrier Operations in Canada* (Catalogue 51-002), *Rail Transport* (Catalogue 52-212; 52-215 and 52-216), *Gas Utilities: transportation and distribution systems* (Catalogue 57-205) and *Oil Pipeline Transport* (Catalogue 55-201), *Passenger Bus and Urban Transit Statistics* (Catalogue 53-215).

In communication industries paid workers data were obtained from: *Radio and Television Broadcasting* (Catalogue 56-204); *Cable Television* (Catalogue 56-205), *Canada Post Corporation Annual*.

For 1988 the data source for logging and forestry industries, other utility industries and finance, insurance and real estate industries remained *Employment, Earnings and Hours* (Catalogue 72-002) while year-to-year change from Labour Force Survey was applied to 1987 absolute values for construction industries, wholesale and retail trade industries and community, business and personal services (excluding educational service industries and hospitals). The data sources for transportation and storage industries, communication industries remained unchanged.

For the years 1989, 1990 and 1991 the year-to-year change from Labour Force Survey (LFS) and Survey of Employment Payroll and Hours (SEPH) was applied to the 1988 absolutes values.

Out of the above list of industries, the construction industries need a special mention. In Input-Output concept all paid workers in construction activity taking place in other sector or industry is rerouted to the construction industries of the Business Sector. Thus, the number of paid workers engaged in construction activity in these other industries is calculated as the ratio between own-account construction and the average wage of the industry in which the activity took place.

The mining, quarrying and oil well industries are broken down into four major groups according to the 1980 SIC:

1. Mining industries;
2. Crude petroleum and natural gas industries;
3. Quarry and sand pit industries;
4. Service industries incidental to mineral extraction.

The primary data source used for the first three groups for 1961-1989 is the *General Review of the Mineral Industries*, (Catalogue 26-201). The only exception to this is the oil sands industry, which falls into the second major group, crude petroleum and natural gas industries. This industry is not covered in the *General Review of the Mineral Industries*, and therefore the data used for this industry are taken from the *Survey of Employment Payroll and Hours*. The last major group, service industries incidental to mineral extraction, includes three industries according to the 1970 SIC: Contract Drilling for Petroleum, Other Contract Drilling and Miscellaneous Services Incidental to Mining. For the years up to 1976 the number

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[4] *For further details the reader is referred to 'Sources and Methods of Estimating Employment by Input-Output Industries 1961-1988' by K.S. Gill and Monique Larose.*

of paid workers in the first two industries is obtained from *Contract Drilling for Petroleum and Other Contract Drilling* (Catalogue 26-207). Beginning in 1977 the number of paid workers in other contract drilling is published in Catalogue 26-201 and the number of paid workers in contract drilling for petroleum is estimated from other information pertaining to the industry up to the year 1982. After that, Catalogue 72-002 has been used. The remaining part of the mining, quarrying and oil wells industries is measured using decennial census and the Catalogue 72-002 from 1983-1989. For the years 1990 and 1991 the year-to-year change from SEPH was applied to 1989 absolute values.

The source of the number of paid workers in manufacturing for 1961-1989 is *Manufacturing Industries of Canada: National and Provincial Areas* (Catalogue 31-203) a publication from the annual survey of manufactures. These data are adjusted for improved coverage in the 1970's. For 1990 and 1991 the year-to-year change from Labour Force Survey was applied to 1989 absolutes values.

Other-than-paid workers. For manufacturing industries the number of other-than-paid workers is derived from the series on working owners and partners in *Manufacturing Industries of Canada: National and Provincial Areas* (Catalogue 31-203). The numbers reported for the 1970's were adjusted to effect consistency with output data. For all other industries *Labour Force Survey* (Catalogue 71-001) is used. The number of self-employed doctors and dentist (Homes for personal and nursing care and other health and social services, part of community business and personal services) are obtained from *Taxation Statistics*, Revenue Canada Taxation (Catalogue no. RV 44-1990) back to 1961.

Person-hours worked. With the exception of manufacturing industries the number of person-hours worked in each industry is obtained as the product of the number of persons at work and the average number of hours worked in each year.

In manufacturing, the basic source is the *Annual Survey of Manufactures*, supplemented by other survey results as noted. Distinct calculations are made for production workers and for salaried employees, total person-hours worked being obtained as the sum of the two elements. The adjustments effected to the published levels of persons at work in the 1970's also operate on person-hours worked. For production workers, the number of person-hours worked is obtained from tabulations of returns to the *Annual Survey of Manufactures*. For salaried employees, the methodology for estimating hours worked is slightly different in the early part of the period, up to 1969. The discontinuance of the survey *Earnings and Hours of Work in Manufacturing* at that time necessitated a different technique in the later period. This survey yielded a value of average hourly earnings applicable to the earnings of salaried employees. With hourly earnings, payroll values are converted into estimated hours paid. The survey of *Labour Costs in Canada* covers the manufacturing industry in selected years, and this provides a basis for converting hours *paid* to hours *worked.* For the years after 1969, the occasional surveys of *Labour Costs in Canada* provide the basis for estimating hours worked by salaried employees. From 1983 onwards the *Annual Survey of Manufactures* provides tabulations from which it is possible to estimate average hours worked per week for salaried employees.

Due to the fact that the 1987 entries on person-hours worked in the *Annual Survey of Manufactures* were captured but were not edited, in-house estimates of person-hours were made in order to maintain the continuity of the labour productivity time series. These estimations cover the major group level (M level). The estimates of person-hours by industry were derived either from the *Survey of Labour Force* (LFS) or the *Survey of Employment, Payroll and Hours* (SEPH) for each of the 21 manufacturing major groups. The resulting hours estimates for the total of manufacturing were reconciled with average hours worked from the LFS for total manufacturing since, historically, the level of hours of the *Annual Survey of Manufactures* is very close to the level of hours given by LFS at this level of aggregation. Hours worked by working owners and partners were estimated for 1987 at the M level on the assumption that its growth rate with

respect to 1986 equals that for paid workers. For 1988 person-hours worked for the paid workers were derived mostly from the Survey of Manufacturers (15 major groups) from SEPH (4 major groups) and (2 major groups) from L.F.S. For all years up to 1986 and the year 1988 average hours worked by working owners and partners in manufacturing are based on the hours worked of salaried employees.

For recent years, when the *Annual Survey of Manufactures* is not yet available, the average hours worked for the paid workers and working owners and partners in manufacturing is based on the growth rate of average hours worked from LFS, calculated as explained below.

Average hours worked for industries other than manufacturing are calculated from tabulations of the *Labour Force Survey.* Estimates are made independently for paid workers and other-than-paid workers; from 1975 the latter class is further divided into self-employed workers and unpaid family workers. Multiple job holders are included from 1975.

Monthly data from the *Labour Force Survey* refer only to the survey week. The survey week can be taken as representative of other weeks in the month except for holidays and strikes. The procedure is to first adjust the survey weeks for the effect of strikes and holidays falling in that week. This yields a nominal value of the hours worked in that week if there were no strikes or holidays. The survey generates the data required to make these corrections. Corresponding nominal values for non-survey weeks are estimated by interpolation. These nominal values for each week of the year are then adjusted by the known impact of strikes and/or holidays on that week. The necessary data on strikes are tabulated by Labour Canada. Only the paid worker series is adjusted for strikes. The holiday adjustment is based on statutory holidays and studies of employment practices in industries. Average annual hours worked per week are calculated as the average of the weekly values adjusted for strikes and holidays. The number of hours worked per year is simply the weekly average multiplied by the number of weeks in the year. The number of weeks in the year is not taken as constant, but reflects the vagaries of the calendar. A calendar year encompasses 52 complete weeks plus one, or in leap years, two extra days. If these extra day(s) fall on a normal day of rest the year is considered to have 52 weeks even. If not, the number of weeks is greater. There can be a slight variation in the year-to-year change in hours worked on this account.

3 - Labour Compensation

There are two components to labour compensation: labour income of paid workers and an imputed labour income of self-employed workers. The labour income of paid workers is taken from the following sources: *The Input-Output Structure of the Canadian Economy 1961-1981* (Catalogue 15-510), the same publication for 1982 and following years (Catalogue 15-201) except for the two most recent years where it is taken from the *National Income and Expenditure Accounts* (Catalogue 13-201) (Table 28). Adjustments are made to exclude non-business industries and reroute own-account construction industries.

Labour income of other-than-paid workers. In addition to the labour income of paid workers, labour compensation includes an imputed labour income for all other-than-paid workers except unpaid family workers. The imputation is based on the assumption that the hourly income for the labour of self-employed persons is the same as that of paid worker in the same year and the same industry.

For the years to 1975 the hours worked of self-employed workers were estimated as the ratio of self-employed persons to other-than-paid workers times the hours worked by other-than-paid workers. From 1975, as noted above, the hours worked by self-employed persons are estimated directly.

An adjustment is made in the case of some professional persons, such as doctors, dentists, lawyers, accountants and engineers. These occupations are largely self-employed, but the average earnings of paid workers in the same industry division underrepresent the earnings of these occupations. In these cases data on the number of self-employed professional persons and their average labour income back to 1961 are obtained from *Taxation Statistics*, Revenue Canada Taxation, (Catalogue No. RV 44-1990), for the year 1988 and similar publications for other years.

APPENDIX 3

Aggregation parameters for labour productivity

The statistics in this publication refer to business sector industries, as defined in the Canadian System of National Accounts (SNA). Corresponding statistics for the non-business sector industries are not published due to difficulties in the measurement of output. There is indeed, no clear basis for valuing production given that the goods and services they produce are generally not marketed. As measures of the inputs of labour or labour and capital services are taken as estimates of the output of these industries, their productivity ratios have little meaning.

The most detailed account of the business sector is in terms of individual industries classified as per the *Standard Industrial Classification* (SIC). Aggregation of SIC industries generates 154 link (L) level industries (excluding the fictive industries), 47 medium (M) level industries and 13 small (S) level industries.

There are a total of 32 statistical tables on labour productivity appearing in Part 1 of this publication. Tables 1-4 are produced for special aggregates of business sector industries. Tables 5-11 correspond to selected S level business sector industries (except for Table 10 for which two S level industries have been combined). The remaining tables, 12-32, are associated with the M level industries that belong to manufacturing. The industry content for each of the tables in this publication is outlined below.

The following tables show the concordance between the classification of industries of the Canadian System of National Accounts and the Canadian Standard Industrial Classification.

Text table 2

Concordance between "S" level industry codes, standard industrial classification codes (SIC's) and link codes

S Level Industries					
S Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
1	Agricultural & related services ind.	011-017, 021-023	001-021	001-021	1
2	Fishing & trapping industries	031-033	041-047	041-047	2
3	Logging & forestry industries	0411, 0412, 0511	031, 039	031, 039	3
4	Mining, quarrying & oil well industries	0611-0617, 0619, 0621-0625, 0629, 063, 071 081, 082, 091, 092	051-052 057-059, 061, 064, 071-073, 079, 083 087, 096, 098, 099	051-059 061, 063-066, 071, 073, 077, 079, 083 087, 092-099	4-13
5	Manufacturing industries	(See M level below)			14-108
6	Construction industries	401-449	404-421	404-421	109-117
7	Transportation & storage industries	451-459 461, 471 479, 996 9991	501-509 512, 515- 517, 519 524, 527	501, 502 504-509 512, 519 515-517 524-527	118-128
8	Telecommunication industries	481-483 4841	543-545 548	543-545 548	129-131
9	Electric & gas utilities industries	491, 492 499	572, 574 579	572, 574 579	132-134
10,11	Wholesale and retail trade industries	501-599 601-692	10722,2611 602-629 631-699	1292, 2611 602-629 631-699	135-136
12	Finance, insurance & real estate	701-705 709, 711- 729, 731- 733, 741- 743, 7499 7511, 7512 759, 761	7011-7016 7019, 703, 705, 707 715, 7211, 7212, 735, 7371	702, 704 7311, 7312 735, 7371	137-139
13	Community, business, personal services	771-777, 779, 851- 859, 861 8621, 863 865, 866 8671, 8679 868, 8691- 8693, 8699 911-914, 921 922, 961- 966, 969 971, 972 973, 979 982, 983 991-995 9999,4842	801-809 821-827 841-845 849, 851- 855, 861- 864, 866 867, 869 871, 872 874, 876 877, 879 881-886 891, 8931 894-899	801-809 821,823- 827, 851 853-859 861, 862 864, 866 869, 871 872, 874- 879, 891 8931, 894- 899	142-154

Text table 3

Concordance between "M" level industry codes, standard industrial classification codes (SIC's) and link codes

M Level Industries - Manufacturing

M Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
8	Food industries	1011, 1012 102-104 1051-1053 106, 1071 1072, 1081- 1083, 109	101-108	101, 103 105, 107 111, 112 123-125 128, 1291 131, 133 135, 139	14-24
9	Beverage industries	111-114	109, 145, 147	141, 143	25-28
10	Tobacco products industries	121, 122	151, 153	151, 153	29
11	Rubber products industries	151-159	1623, 1629	163, 169	30
12	Plastic products industries	161-169	1651, 27332	27332, 3851	31
13	Leather & allied products industries	1711, 1712 1713, 1719	1624, 172 174, 179	161, 172 174, 179	32,33, 34
14	Primary textile & textile products industries	181-183 191-193 199	181-187, 189, 2391	183, 193, 197, 201 211-216 218, 221 223, 2292, 2299,2391	35-40
15	Clothing industries	243-245, 249	175, 231 2392, 243- 249	175, 231 2392, 242- 249	41, 42
16	Wood industries	251, 252 254, 256 258, 259	251, 252 254, 256 258, 259	251, 252 254, 256 258, 259	43-47
17	Furniture & fixture industries	261, 264 269	2619, 264 266	2619, 264 266	48-50
18	Paper & allied products industries	271-273 279	271, 272 2731, 2732 27331, 274	271, 272 2731, 2732 27331, 274	51-54
19	Printing, publishing & allied industries	281-284 8932	286-289, 8932	286-289,	55, 56
20	Primary metal industries	291, 292 294-297 299	291, 292 294-298	291, 292 294-298	57-63
21	Fabricated metal products industries	301-309	301-309	301-309	64-71
22	Machinery industries	311, 312 319	311, 315 316	311, 315 316	72-74
23	Transportation equipment industries	321, 323- 329	1652, 188 321, 323- 329	2291, 321 323-329 3852	75-81
24	Electrical & electronic products	331-339	268, 318 3399 331-336, 338, 3391	268, 318 331, 332 334-339	82-89

Text table 3

Concordance between "M" level industry codes, standard industrial classification codes (SIC's) and link codes (concluded)

M Level Industries - Manufacturing

M Codes Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
25 Non-metallic mineral products industries	351, 352 354-359	351, 352 353-359	341, 343 345, 347 348, 351- 357, 359	90-95
26 Refined petroleum & coal products	361, 369	365, 369	365, 369	96
27 Chemical & chemical products industries	371-377 379	372-379	371-379	97-103
28 Other manufacturing industries	391-393 397, 399	391-393 397, 399	219, 381- 384, 393, 395, 397- 399	104-108

Special Aggregations

Industry Title	S code
Business sector industries	1-13
Business sector - goods	1-6, 9
Business sector - services	7-8, 10-13
Business sector - excluding agricultural and related services	2-13

APPENDIX 4

Quality assurance and rating of the estimates for labour productivity

Like other components of the System of National Accounts (SNA), the labour productivity and unit labour cost measures presented in this publication are derived from a variety of sources and subjected to various adjustments. Assessing the quality of the data thus raises difficulties similar to those pointed out in other SNA publications. The labour productivity and related data presented in this publication are derived from:

(1) input-output tables, income and expenditure accounts, and the real domestic product accounts of the SNA, and,

(2) various surveys and censuses containing information on employment and hours worked.

Quality ratings presented in text tables 4 and 5 are provided for the latest benchmark year as noted on the table. Data sources are different for past periods than for more recent periods and data for the period following the benchmark year are deemed to be of lesser quality although no quality rating is provided.

In rating various data our main interest lies more in year-to-year changes than in the levels of various constructs. No attempt will be made to establish a cardinal rating of various constructs used in productivity. However, based on an informed opinion, an ordinal rating will be attempted. Also, as stated above, only benchmark data is rated. The rank of 1 means most reliable, the rank of 2 means reliable and the rank of 3 means acceptable. Any series which do not support a rank of 3 is not published. Ratings are provided for the following series:

(i)   Real GDP at factor cost;
(ii) Persons at work;
(iii) Person-hours worked;
(iv) Labour compensation;
(v)   Real GDP per person at work;
(vi) Real GDP per person-hour;
(vii) Unit labour cost.

Real GDP. The quality ratings of real GDP have been taken from Appendix A of the publication: *The Input-Output Structure of the Canadian Economy, 1988* (Catalogue 15-201).

Persons at work. For these data the rankings have been determined as follows: In general, a rank of 1 has been assigned to the most reliable estimates that are based completely on censuses[5], surveys or

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[5]   *See Appendix 2 of Part 1 for a full description of data sources.*

administrative records with minimum adjustments for coverage, valuation and classification. A rank of 2 has been assigned to less reliable census and survey data with adjustments for coverage. A rank of 3 has been assigned to all other sources, for example, household surveys (Labour Force Survey), and decennial censuses, unless experience indicates otherwise. The main reason that household surveys or decennial censuses have been assigned this ranking is because of lack of precision in the industrial classification of the responses in household surveys or population censuses as compared to establishment based censuses or surveys. However, the quality rating of series taken from sample surveys, like the Labour Force Survey, also depends on the size of the sample. Aggregate series may, therefore, have higher ratings than disaggregated series. Likewise, at a given level of aggregation, large industries may have a better quality rating than small industries.

By these criteria, the employment data from the Annual Survey of Manufactures at the S level of aggregation in 1988 have the ranking of 2. The reason it has been assigned a ranking of 2 and not 1 as in the previous year is because in 1988, 19.2% of the paid workers data are taken from tax returns and the small forms. Out of that percentage 13.3% are estimated from tax files where employment is not reported: data on wages and salaries are used to estimate the number of paid workers in this portion of the universe. For 1988, the following criteria has been used for ranking the employment data for various industries at M level of aggregation in Manufacturing. A ranking of 1 has been assigned where less than 10.0% of the employment data are taken from the tax returns. A ranking of 2 has been assigned to data where more than 10.0% but less than 20.0% of the data is from the tax returns. A ranking of 3 has been assigned where more than 20.0% data are from the tax returns.

The employment data for the agriculture industry are taken from Labour Force Survey, which is a household survey. For this industry it is the only source of employment. Also, in the agriculture industry 61.9% of the workers are "other-than-paid" where the quality of data is expected to be slightly lower than the "paid workers". The employment data for agriculture industry, therefore, has been assigned a ranking of 3. For the remaining industries making up business sector of the economy, the employment data for paid workers originates from either establishment-based surveys (*Estimates of employees* up to 1982 and SEPH from 1983 onwards) or from a variety of other surveys. The employment data for the other-than-paid workers is obtained from the LFS. Therefore, for all remaining industries for which productivity and unit labour cost data are published at the S level of aggregation, the quality rating of the employment data is determined as follows: A ranking of 1 has been assigned to the industry where up to 10.0% of the persons at work are other-than-paid. For industries where this ratio is between 10.0% and 20.0%, the ranking is 2. For industries where this ratio is greater than 20.0% the ranking of 3 has been assigned to the employment data. However, at the aggregate business sector level, errors are compensating and it is felt that a quality rating of 1 could be attributed to the data.

Person-hours worked. The number of person-hours worked in each industry except Manufacturing is obtained as the product of the number of person at work and the average number of hours worked in each year. Average hours data from the *Labour Force Survey* are good quality data and where comparisons are possible e.g. in manufacturing, average hours from both sources show very similar year-to-year changes. As a separate construct, the average hours worked data have a quality rating of 2. Since person-hours worked data are a product of the number of persons at work and the average number of hours worked, the quality rating of person-hours is the rounded average of the two variables. In Manufacturing the person-hours worked data come from the Annual Survey of Manufactures where distinct calculations are made for production workers and for salaried employees, total person-hours worked being obtained as the sum of two elements. However, even for production workers the person-hours worked are mostly estimated from person-hours paid. For salaried employees it is derived using average standard work week and vacation weeks paid. Since the hours worked data at the S level of aggregation in manufacturing is simply a sum of the hours worked data at the M level of aggregation (there being no

compensating errors) the quality rating of person-hours worked data at both S and M level of aggregation has bee put at 2. Aggregate business sector hours have been attributed a rating of 1 because of compensating errors.

Labour compensation. Labour compensation is the sum of labour income of paid workers and the imputed labour income of self-employed workers. Since the estimates of labour income in the benchmark year come from tax data and have been subjected to various Input-Output adjustments (for example, own-account construction), these have a rating of one. However, in some industries (for example Agriculture, Construction, Retail Trade) there is a large number of self-employed workers for whom there is no direct measure of labour income and an imputation is made on the assumption that the hourly compensation of self-employed workers equals that of paid workers. Therefore, at aggregation level S the following rating criteria has been used. For industries, where the ratio of self-employed workers to persons at work is less than 10.0% the rating of labour compensation data is 1, where this ratio is more than 10.0% but less than 20.0% the rating is 2. For a ratio greater than 20.0% a rating of 3 has been assigned. By these criteria compensation data for all manufacturing industries at M level of aggregation have been assigned a quality rating of 1.

Labour productivity and *other ratios.* The quality ratings of ratios like real GDP per person at work, real GDP per person-hour and unit labour cost have been set at the weakest rounded average rating of the two variables. For example, if the rating for real GDP is 1, and employment is 2, then the rating for real GDP per person at work is 2.

Text table 4

Quality ratings of labour productivity and related data at aggregation level S and business sector, 1988

Industry title	Real gross domestic product	Persons at work	Person-hours	Labour Compensation	Real gross domestic product per person	Real gross domestic product per person-hour	Unit Labour Cost
Agricultural & related services ind.	2	3	3	3	3	3	3
Manufacturing industries	1	2	2	1	2	2	1
Construction industries	3	2	2	2	3	3	3
Transportation and storage industries	2	2	2	2	2	2	2
Communication industries	2	1	2	1	2	2	2
Wholesale and retail trade industries	2	2	2	1	2	2	2
Community, business and personal services industries	2	2	2	2	2	2	2
Business sector	1	1	1	1	1	1	1

Text table 5

Quality ratings of labour productivity and related data for manufacturing industries at aggregation level M, 1988

Industry title	Real gross domestic product	Persons at work	Person-hours	Labour compensation	Real gross domestic product per person	Real gross domestic product per person-hour	Unit labour cost
Food	2	1	2	1	2	2	2
Beverage	2	1	2	1	2	2	2
Tobacco	1	1	2	1	1	2	1
Rubber	1	1	2	1	1	2	1
Plastic	1	3	2	1	3	2	1
Leather & allied	1	2	2	1	2	2	1
Primary textile & text. prod.	1	2	2	1	2	2	1
Clothing	1	1	2	1	1	2	1
Wood	2	2	2	1	2	2	2
Furniture & fixture	1	3	2	1	3	2	1
Paper & allied	1	1	2	1	1	2	1
Printing, publishing & allied	2	3	2	1	3	2	2
Primary metal	2	1	2	1	2	2	2
Fabricated metal	1	3	2	1	3	2	1
Machinery	1	3	2	1	3	2	1
Transp. equip.	2	1	2	1	2	2	2
Electrical & electronic	2	1	2	1	2	2	2
Non-metallic mineral	1	2	2	1	2	2	1
Refined petroleum & coal	2	1	2	1	2	2	2
Chemical & chemical prod.	2	1	2	1	2	2	2
Other manufacturing	2	3	2	1	3	2	2

APPENDIX 5

Algebraic Presentation of Indexes

1 - Productivity index

The basic formula of labour productivity used throughout this report may be expressed as follows:

$$Index\ of\ productivity = \frac{Real\ GDP\ Index}{Labour\ Input\ Index}\ X\ 100$$

or, in algebraic form:

$$P_t = \left[\frac{Q_t/Q_o}{L_t/L_o}\right]\ X\ 100$$

Where P is the index of labour productivity, and Q and L are constant price output (Real Domestic Product) and the volume of labour input respectively, at the appropriate level of aggregation, and the subscripts o and t refer to the base year and any other year.

2 - Unit labour cost index

Similarly, the index of unit labour cost may be expressed as follows:

$$Unit\ labour\ cost\ Index = \frac{Labour\ compensation\ Index}{Real\ GDP\ Index}\ X\ 100$$

or, in algebraic form:

$$U_t = \left[\frac{C_t/C_o}{Q_t/Q_o}\right]\ X\ 100$$

By dividing both the numerator and the denominator of the unit labour cost expression by the labour input index, the unit labour cost index can also be expressed as a ratio of the average labour compensation index to the labour productivity index. That is:

$$U_t = \frac{\textit{Average labour compensation index}}{\textit{Productivity index}} \times 100$$

Where U is the unit labour cost index, C is labour compensation; Q and L and the subscripts were defined above.

3 - Labour productivity, unit labour cost and average labour compensation

The definitions of P, Q, L, U and C were given above, but expressed here as absolutes. If W is denoted as average labour compensation, then by definition:

$P = Q/L$

$W = C/L$

$U = C/Q$ or

$U = W/P$

The growth in these variables can be presented as

$P_t = P_o (1 + p)^n$

$W_t = W_o (1 + w)^n$

$U_t = U_o (1 + u)^n$

Where the lower case letters refer to the rates of growth and the subscripts o and t and superscript n refer to time. P_o, W_o and U_o represent the values in the initial year o and P_t, W_t and U_t represent the values of P, W and U in the year t with n being the time interval in years between the year t and the year o. In the year t:

$U_t = W_t / P_t$

Substituting the preceding three relationships into the above equation yields

$$U_o \, (1 \, + \, u)^n = \frac{W_o \, (1 \, + \, w)^n}{P_o \, (1 \, + \, p)^n}$$

which simplifies to

$$U_o \, (1 \, + \, u)^n = U_0 \left[\frac{1 \, + \, w}{1 \, + \, p} \right]^n$$

$$1 \, + \, u = \frac{1 + w}{1 + p}$$

or, solving for u

$$u = \frac{w \, - \, p}{1 \, + \, p}$$

Thus the growth rate in unit labour cost is inversely related to the labour productivity growth rate. The last equation can be expressed as

$$p = \frac{w \, - \, u}{1 \, + \, u}$$

If unit labour cost grows more quickly than average labour compensation, the labour productivity growth rate is negative.

APPENDIX 6

Labour Productivity, unit labour cost and related data in CANSIM

PART 2

Multifactor Productivity

Experimental Data

Table 1 - Indexes of *Industry gross output* multifactor productivity for selected industries, (1986=100)

Year	Business sector	Agricultural & related services industries	Manufacturing industries	Construction industries	Transportation & storage industries	Telecom- munication industries	Wholesale & retail trade industries
1961	75.0	72.9	81.3	90.2	67.9	40.6	71.8
1962	78.3	84.5	84.0	91.7	67.9	41.4	74.6
1963	80.7	91.7	85.3	91.6	72.1	42.1	75.9
1964	83.0	86.6	87.0	92.1	76.0	43.3	78.5
1965	84.5	88.9	88.2	91.8	76.9	45.7	80.3
1966	85.5	95.6	88.2	90.8	79.1	46.0	82.8
1967	83.6	84.1	87.3	91.7	79.0	47.8	84.4
1968	86.1	87.3	88.9	93.4	80.8	50.4	84.8
1969	87.9	91.1	90.3	92.2	84.5	53.0	85.7
1970	87.9	86.2	89.4	92.8	87.6	55.7	87.3
1971	90.9	95.1	90.8	93.6	88.1	56.7	88.8
1972	93.4	89.3	92.7	92.9	90.2	59.3	91.0
1973	96.6	92.9	94.8	92.0	91.6	62.0	91.7
1974	93.9	83.4	94.7	91.1	90.5	65.2	90.3
1975	91.9	88.9	92.5	94.9	89.6	69.8	90.8
1976	95.3	93.9	94.5	97.7	89.6	71.7	93.7
1977	95.5	91.3	96.2	98.5	90.2	72.8	92.3
1978	95.7	89.5	96.9	97.1	92.3	76.8	91.2
1979	95.9	85.4	96.9	95.7	96.6	81.4	91.8
1980	94.8	87.0	95.7	98.0	93.2	87.3	92.1
1981	94.9	92.1	96.6	101.3	92.4	89.6	91.9
1982	90.0	94.8	94.0	103.5	90.8	86.5	89.6
1983	93.6	93.8	96.7	103.6	95.2	88.3	95.0
1984	97.9	94.1	99.6	101.3	99.0	92.9	96.1
1985	99.0	92.3	100.6	99.3	99.3	96.2	98.4
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	101.4	98.1	100.3	100.4	103.1	103.9	102.8
1988	101.9	97.9	100.3	99.9	105.9	106.7	103.9
1989	100.7	..	..	..	..	..	..
1990	98.6	..	..	..	..	..	..
1991	96.9	..	..	..	..	..	..

Average Annual % Change

1961-1991   **1961-1988**

- 0.8
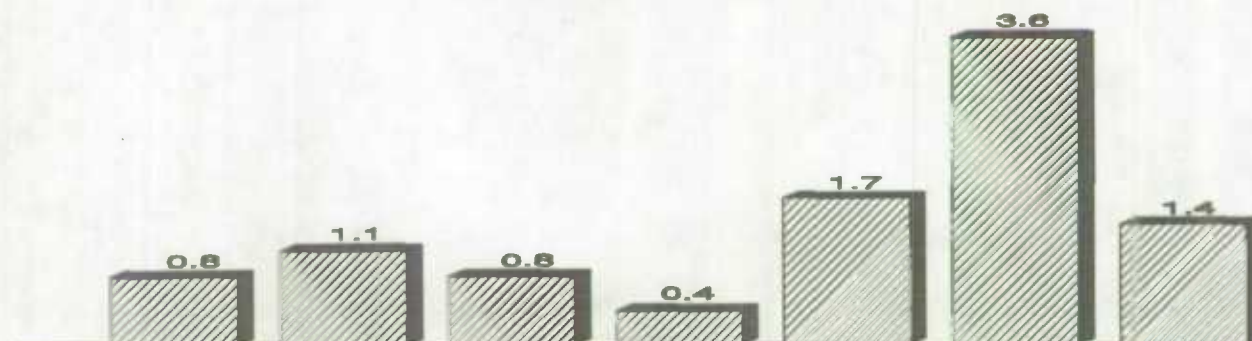- 1.1
- 0.8
- 0.4
- 1.7
- 3.6
- 1.4

Table 2 - Indexes of *Industry net-gross output* multifactor productivity for selected industries, (1986=100)

Year	Business sector	Agricultural & related services industries	Manufacturing industries	Construction industries	Transportation & storage industries	Telecommunication industries	Wholesale & retail trade industries
1961	78.7	70.9	76.0	90.1	65.2	39.5	71.4
1962	81.7	82.6	79.3	91.7	65.3	40.4	74.1
1963	83.8	89.8	81.0	91.6	69.6	41.1	75.5
1964	85.9	84.7	83.2	92.1	73.8	42.3	78.1
1965	87.2	87.0	84.7	91.8	74.7	44.7	80.0
1966	88.0	93.8	84.7	90.8	77.0	45.0	82.5
1967	86.4	82.2	83.6	91.7	76.9	46.8	84.2
1968	88.6	85.4	85.6	93.4	78.9	49.4	84.6
1969	90.1	89.2	87.5	92.2	82.8	52.1	85.5
1970	90.1	84.3	86.2	92.8	86.2	54.8	87.1
1971	92.7	93.4	88.0	93.6	86.7	55.8	88.6
1972	94.8	87.4	90.5	92.9	89.1	58.4	90.9
1973	97.4	91.1	93.3	92.0	90.5	61.1	91.6
1974	95.2	81.4	93.2	91.0	89.4	64.4	90.2
1975	93.5	87.0	90.3	94.9	88.4	69.0	90.6
1976	96.4	92.1	92.9	97.7	88.4	71.0	93.6
1977	96.5	89.5	95.1	98.4	89.0	72.1	92.1
1978	96.7	87.7	96.0	97.1	91.4	76.2	91.0
1979	96.9	83.4	96.0	95.7	96.3	80.9	91.7
1980	95.9	85.0	94.5	98.0	92.3	87.0	92.0
1981	96.0	90.3	95.6	101.3	91.4	89.3	91.7
1982	92.0	93.6	92.3	103.5	89.6	86.2	89.4
1983	95.0	92.3	95.7	103.6	94.5	87.9	94.9
1984	98.5	92.7	99.5	101.3	98.9	92.7	96.0
1985	99.2	90.5	100.7	99.3	99.2	96.0	98.3
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	101.1	97.6	100.4	100.4	103.5	104.1	102.8
1988	101.5	97.4	100.4	99.9	106.7	106.9	104.0
1989	100.6	..	..	..	..	..	..
1990	98.9	..	..	..	..	..	..
1991	97.5	..	..	..	..	..	..

Average Annual % Change

1961-1991   **1961-1988**

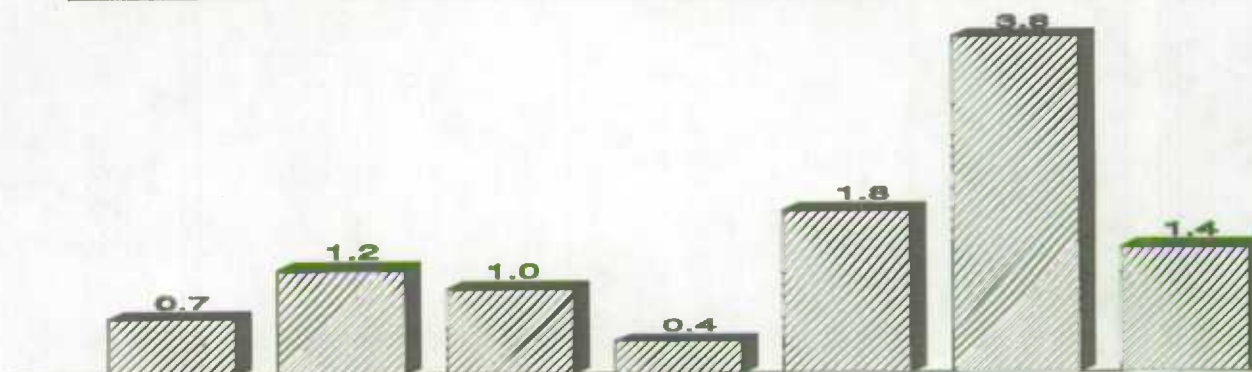0.7   1.2   1.0   0.4   1.8   3.8   1.4

Table 3 - Indexes of *Industry value added* multifactor productivity for selected industries, (1986=100)

Year	Business Sector	Manufacturing
1961	75.0	56.0
1962	78.3	61.1
1963	80.7	63.7
1964	83.0	67.1
1965	84.5	69.6
1966	85.5	69.6
1967	83.6	67.8
1968	86.1	71.1
1969	87.9	74.3
1970	87.9	72.1
1971	90.9	75.3
1972	93.4	79.7
1973	96.6	84.9
1974	93.9	84.7
1975	91.9	78.8
1976	95.3	84.0
1977	95.5	88.6
1978	95.7	90.6
1979	95.9	90.5
1980	94.8	87.1
1981	94.9	89.7
1982	90.0	82.2
1983	93.6	89.8
1984	97.9	98.7
1985	99.0	101.8
1986	100.0	100.0
1987	101.4	101.0
1988	101.9	100.8
1989	100.7	97.9
1990	98.6	93.1
1991	96.9	89.6

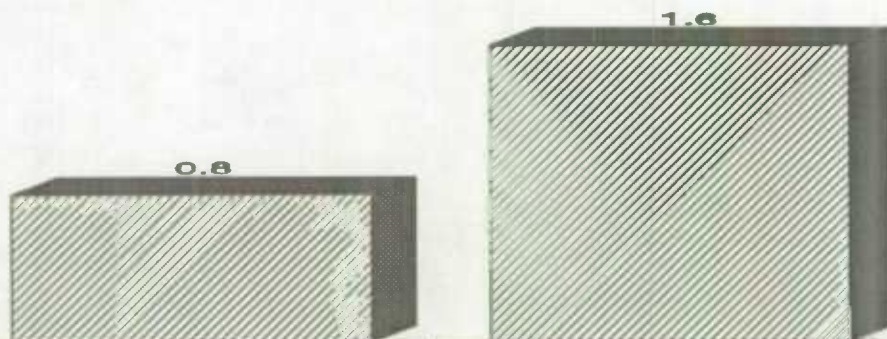### Average Annual % Change, 1961-1991

0.8

1.6

Table 4 - Indexes of *interindustry* multifactor productivity for selected Industries, (1986=100)

Year	Business sector	Agricultural & related services industries	Manufacturing industries	Construction industries	Transportation & storage industries	Telecommunication industries	Wholesale & retail trade industries
1961	78.7	63.8	71.2	77.2	65.6	39.0	68.6
1962	81.7	75.0	75.5	80.7	66.2	40.0	71.7
1963	83.8	82.3	78.2	82.0	70.6	40.7	73.5
1964	85.9	78.6	80.4	84.7	75.4	42.0	76.4
1965	87.2	81.3	82.2	85.6	76.4	44.7	78.5
1966	88.0	88.3	82.8	85.0	78.9	45.0	81.4
1967	86.4	76.8	81.1	84.5	78.2	46.5	82.2
1968	88.6	80.8	83.6	87.7	80.8	49.3	83.2
1969	90.1	84.8	86.4	87.4	84.8	52.0	84.4
1970	90.1	80.1	85.1	87.8	88.3	54.7	86.1
1971	92.7	89.6	87.8	89.9	89.2	55.9	88.1
1972	94.8	84.7	90.7	90.8	92.4	58.7	90.8
1973	97.4	88.2	95.0	91.1	94.8	61.7	92.1
1974	95.2	79.4	93.3	89.1	93.0	64.9	90.3
1975	93.5	84.7	89.7	91.0	91.0	69.4	90.1
1976	96.4	90.1	93.3	94.8	91.2	71.6	93.5
1977	96.5	87.3	95.0	95.8	91.8	72.6	92.0
1978	96.7	85.3	95.7	95.1	93.8	76.8	91.1
1979	96.9	81.2	95.8	94.1	98.5	81.5	91.9
1980	95.9	82.3	93.4	95.6	94.1	87.6	91.9
1981	96.0	87.4	93.6	98.5	92.8	89.9	91.5
1982	92.0	89.1	89.5	97.3	89.7	86.0	87.9
1983	95.0	89.8	93.5	99.7	95.3	87.8	93.7
1984	98.5	91.7	98.7	100.2	99.3	93.0	95.7
1985	99.2	90.1	100.2	99.5	99.7	96.0	98.1
1986	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	101.1	98.5	101.1	101.3	103.7	104.1	103.0
1988	101.5	98.6	101.6	101.2	106.9	106.7	104.1
1989	100.6	..	..	..	..	..	..
1990	98.9	..	..	..	..	..	..
1991	97.5	..	..	..	..	..	..

Average Annual % Change

1961-1991   1961-1988
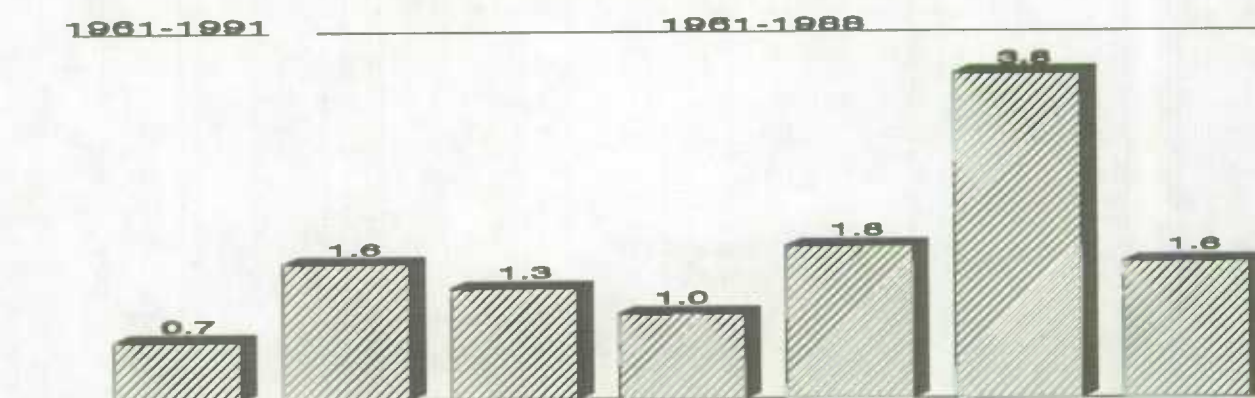

0.7 1.6 1.3 1.0 1.8 3.8 1.6

Table 5 - Indexes of *industry gross output* multifactor productivity for manufacturing industries, (1986=100)

Year	Food industries	Beverage industries	Tobacco products industries	Plastic products industries	Rubber, leather & allied products ind.
1961	91.2	86.7	94.2	65.6	74.9
1962	92.5	88.5	93.0	66.4	80.2
1963	92.3	92.4	95.5	69.0	80.9
1964	93.1	93.8	97.2	72.0	82.8
1965	94.0	95.8	99.4	73.2	82.7
1966	93.4	101.8	96.3	74.5	84.0
1967	94.4	103.9	94.3	73.9	83.5
1968	94.6	100.7	93.3	84.2	84.1
1969	94.5	103.3	96.8	87.7	84.8
1970	94.8	104.5	98.5	85.3	83.7
1971	97.1	105.2	102.5	87.9	84.7
1972	97.2	105.7	104.9	92.9	84.1
1973	98.1	110.2	106.3	94.7	86.5
1974	97.9	108.5	109.1	89.9	84.3
1975	96.4	106.1	107.7	86.0	82.4
1976	99.1	105.9	106.7	87.0	88.3
1977	100.0	108.6	114.3	88.8	93.3
1978	99.9	107.8	109.0	92.4	96.2
1979	100.0	108.3	109.9	96.3	98.3
1980	98.8	107.8	110.7	93.9	95.4
1981	98.4	107.2	110.2	97.9	94.8
1982	98.7	104.2	109.8	96.6	92.3
1983	98.4	103.6	106.8	101.1	96.1
1984	99.3	103.8	105.4	103.3	103.1
1985	100.5	102.2	100.6	103.8	104.1
1986	100.0	100.0	100.0	100.0	100.0
1987	99.8	101.6	105.6	99.2	102.5
1988	98.1	104.3	107.6	95.9	103.1

Average Annual % Change, 1961-1988

Table 5 - Indexes of *industry gross output* multifactor productivity for manufacturing industries, (1986=100)

Year	Textile, textile prod. & clothing industries	Wood industries	Furniture & fixture industries	Paper and allied products ind.	Printing, publishing and allied ind.
1961	69.6	75.2	87.6	97.4	83.5
1962	72.8	77.9	89.8	97.7	85.1
1963	74.8	80.8	92.1	98.7	85.3
1964	75.3	82.0	91.9	101.0	84.8
1965	74.8	82.4	94.5	99.5	84.4
1966	74.5	82.3	95.8	98.9	85.0
1967	74.0	83.8	95.2	95.0	85.1
1968	76.7	86.2	96.5	95.5	85.8
1969	77.9	86.2	98.9	98.1	86.6
1970	77.4	86.2	96.2	97.6	85.6
1971	79.5	85.2	97.5	97.0	86.0
1972	82.1	82.6	103.8	99.9	88.6
1973	83.2	83.1	107.0	102.4	91.5
1974	83.2	83.0	97.9	104.2	90.9
1975	84.2	81.4	96.3	91.1	91.8
1976	86.3	84.7	101.5	98.3	96.5
1977	88.5	87.1	102.4	99.0	99.6
1978	92.0	85.9	106.4	102.3	101.9
1979	94.3	85.9	104.2	101.6	101.0
1980	93.9	88.7	102.3	101.6	101.3
1981	95.3	89.0	103.4	99.9	101.3
1982	91.4	86.9	93.5	94.2	96.7
1983	95.0	92.1	98.5	98.5	98.8
1984	96.6	96.5	101.0	99.7	101.6
1985	97.6	100.0	101.8	99.8	101.2
1986	100.0	100.0	100.0	100.0	100.0
1987	100.9	102.5	95.5	101.3	97.8
1988	99.2	100.8	93.7	100.2	97.5

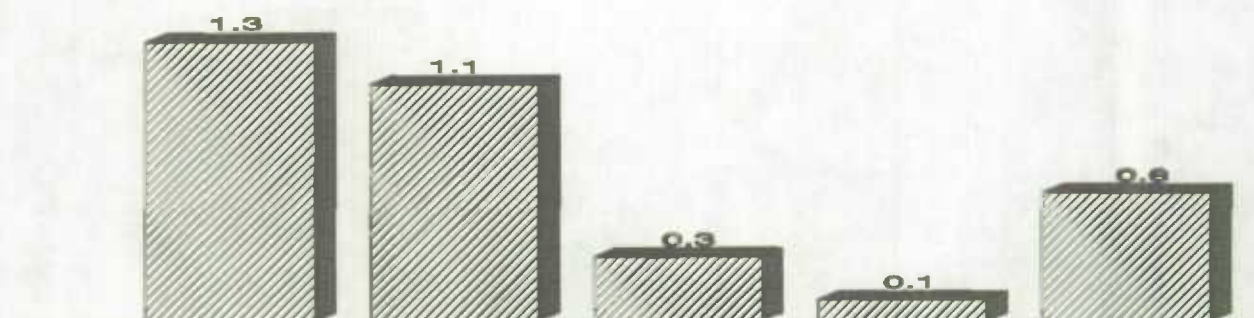## Average Annual % Change, 1961-1988

Table 5 - Indexes of *industry gross output* multifactor productivity for manufacturing industries, (1986=100)

Year	Primary metal industries	Fabricated metal products ind.	Machinery industries	Transportation equipment ind.	Electrical & electronic products ind.
1961	89.0	79.6	82.2	70.7	66.7
1962	91.0	83.5	86.4	73.9	71.6
1963	91.9	85.3	88.9	76.8	72.1
1964	93.6	88.5	92.9	77.3	74.9
1965	95.4	91.1	93.7	80.2	76.6
1966	94.8	91.2	95.0	78.7	77.4
1967	92.4	90.0	93.6	81.3	73.7
1968	95.3	91.8	92.7	83.4	75.7
1969	95.9	92.3	95.2	87.2	77.9
1970	95.3	90.7	94.2	83.7	77.1
1971	94.9	92.8	96.1	88.1	73.6
1972	96.6	94.6	97.1	91.1	77.4
1973	98.6	96.9	98.9	94.7	80.9
1974	99.3	98.0	100.0	95.1	80.6
1975	96.2	94.4	96.5	97.0	79.0
1976	93.7	96.2	97.0	98.0	82.0
1977	96.9	96.8	98.5	99.1	84.8
1978	98.3	97.3	100.7	98.8	84.1
1979	94.8	94.4	104.1	98.2	89.9
1980	92.7	95.5	102.5	92.5	93.3
1981	95.3	97.2	99.8	94.0	94.3
1982	89.8	94.8	92.0	92.7	90.9
1983	94.6	96.0	90.8	95.9	91.2
1984	98.7	99.6	98.2	99.9	97.1
1985	100.8	101.4	99.6	101.0	99.1
1986	100.0	100.0	100.0	100.0	100.0
1987	102.4	99.5	97.9	98.6	101.2
1988	103.8	99.0	99.8	100.4	103.0

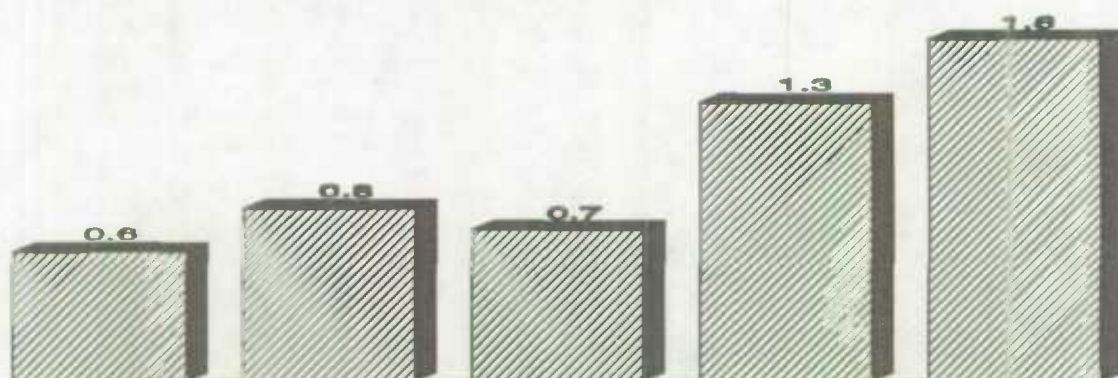## Average Annual % Change, 1961-1988

Table 5 - Indexes of *industry gross output* multifactor productivity for manufacturing industries, (1986=100)

| Year	Non-metallic mineral products industries	Refined petroleum and coal products	Chemical & chemical products ind.	Other manufacturing industries
1961	83.4	85.2	73.6	87.3
1962	88.9	89.7	75.7	89.4
1963	89.7	90.6	77.9	88.4
1964	93.0	92.6	80.7	91.8
1965	94.7	94.4	82.5	91.7
1966	94.9	96.1	82.6	93.6
1967	89.5	92.2	81.0	91.4
1968	92.9	94.1	81.7	94.3
1969	94.6	92.4	83.2	96.1
1970	92.9	92.7	82.6	94.1
1971	99.0	93.1	85.5	95.5
1972	105.7	92.9	87.5	99.3
1973	100.2	96.4	91.3	101.1
1974	96.3	95.9	91.2	100.5
1975	93.6	96.4	86.3	98.7
1976	94.6	95.8	88.8	103.5
1977	93.7	98.8	89.3	104.2
1978	95.2	96.6	91.7	104.9
1979	95.7	95.3	93.5	103.5
1980	90.0	95.7	91.0	101.2
1981	89.6	97.8	93.7	102.6
1982	84.0	100.0	88.5	102.1
1983	89.7	101.7	95.5	101.6
1984	94.4	102.3	98.6	105.4
1985	98.3	101.2	99.5	106.1
1986	100.0	100.0	100.0	100.0
1987	102.2	100.8	101.5	101.0
1988	102.4	100.7	100.9	99.2

Average Annual % Change, 1961-1988
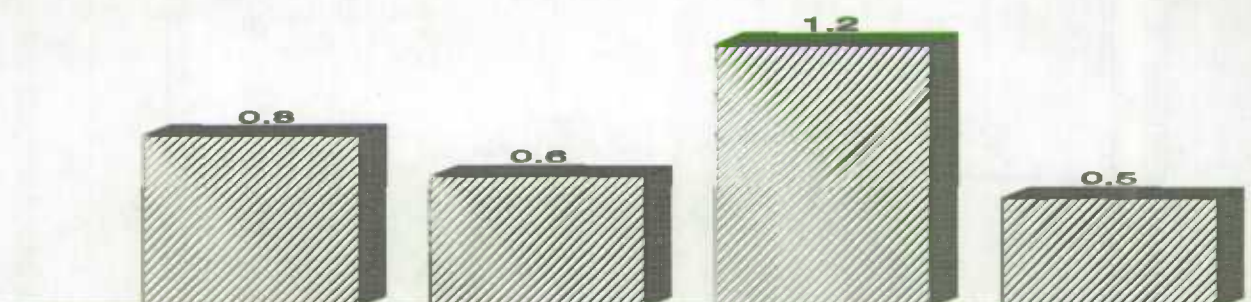
Table 6 - Indexes of *Industry net-gross output* multifactor productivity for manufacturing industries, (1986=100)

Year	Food industries	Beverage industries	Tobacco products industries	Plastic products industries	Rubber, leather & allied products ind.
1961	89.9	86.3	92.5	64.7	73.2
1962	91.3	88.2	90.9	65.5	78.9
1963	91.1	92.2	94.1	68.2	79.7
1964	92.0	93.7	96.1	71.3	81.8
1965	93.1	95.7	98.7	72.5	81.7
1966	92.4	102.0	95.0	73.8	83.1
1967	93.4	104.2	92.5	73.2	82.5
1968	93.7	100.9	91.3	83.7	83.2
1969	93.6	103.5	95.6	87.3	83.9
1970	94.0	104.8	97.6	84.9	82.7
1971	96.6	105.5	102.5	87.6	83.7
1972	96.7	106.1	105.4	92.6	83.2
1973	97.8	110.9	107.1	94.5	85.7
1974	97.6	109.0	110.6	89.6	83.4
1975	95.7	106.5	108.9	85.5	81.3
1976	98.9	106.2	107.7	86.6	87.6
1977	100.0	109.1	117.0	88.4	92.8
1978	99.9	108.3	110.6	92.1	96.0
1979	100.0	108.8	111.7	96.1	98.2
1980	98.5	108.2	112.6	93.7	95.1
1981	98.1	107.6	112.0	97.8	94.5
1982	98.4	104.4	111.5	96.5	91.8
1983	98.1	103.8	107.9	101.1	95.8
1984	99.1	104.1	106.3	103.5	103.3
1985	100.6	102.4	100.7	103.9	104.3
1986	100.0	100.0	100.0	100.0	100.0
1987	99.8	101.8	106.4	99.2	102.6
1988	97.8	104.6	108.7	95.7	103.3

Average Annual % Change, 1961-1988

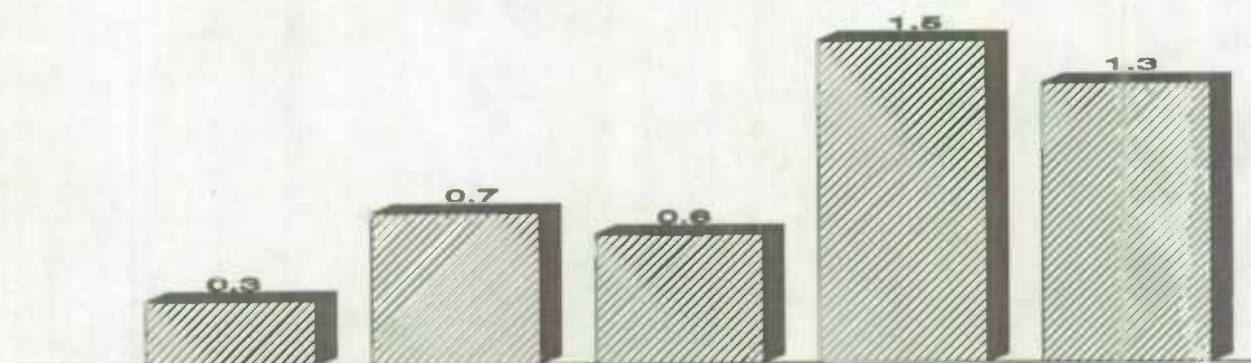
0.3   0.7   0.6   1.5   1.3

Table 6 - Indexes of *industry net-gross output* multifactor productivity for manufacturing Industries, (1986=100)

Year	Textile, textile prod. & clothing industries	Wood industries	Furniture & fixture industries	Paper and allied products ind.	Printing, publishing and allied ind.
1961	62.0	72.9	87.3	97.2	82.4
1962	65.9	75.9	89.6	97.4	84.1
1963	68.4	79.0	91.9	98.6	84.4
1964	68.9	80.3	91.7	101.2	83.8
1965	68.4	80.8	94.4	99.6	83.4
1966	68.0	80.7	95.7	98.8	84.1
1967	67.4	82.3	95.1	94.4	84.2
1968	70.7	85.1	96.4	95.0	84.9
1969	72.3	85.0	98.9	97.9	85.8
1970	71.5	85.0	96.1	97.3	84.7
1971	74.2	83.9	97.5	96.7	85.1
1972	77.5	81.0	104.0	100.0	87.9
1973	78.9	81.5	107.3	102.9	90.9
1974	78.9	81.5	97.8	105.0	90.3
1975	80.1	79.7	96.2	90.0	91.3
1976	82.7	83.3	101.6	98.1	96.3
1977	85.5	86.0	102.5	98.9	99.6
1978	89.9	84.7	106.6	102.6	102.0
1979	92.7	84.7	104.4	101.8	101.1
1980	92.3	87.8	102.4	101.8	101.5
1981	94.0	88.0	103.6	99.8	101.4
1982	89.1	85.8	93.3	93.4	96.5
1983	93.7	91.4	98.5	98.3	98.7
1984	95.7	96.2	101.0	99.6	101.8
1985	96.9	100.0	101.9	99.8	101.3
1986	100.0	100.0	100.0	100.0	100.0
1987	101.1	102.8	95.3	101.4	97.6
1988	98.9	100.9	93.5	100.2	97.2

Average Annual % Change, 1961-1988
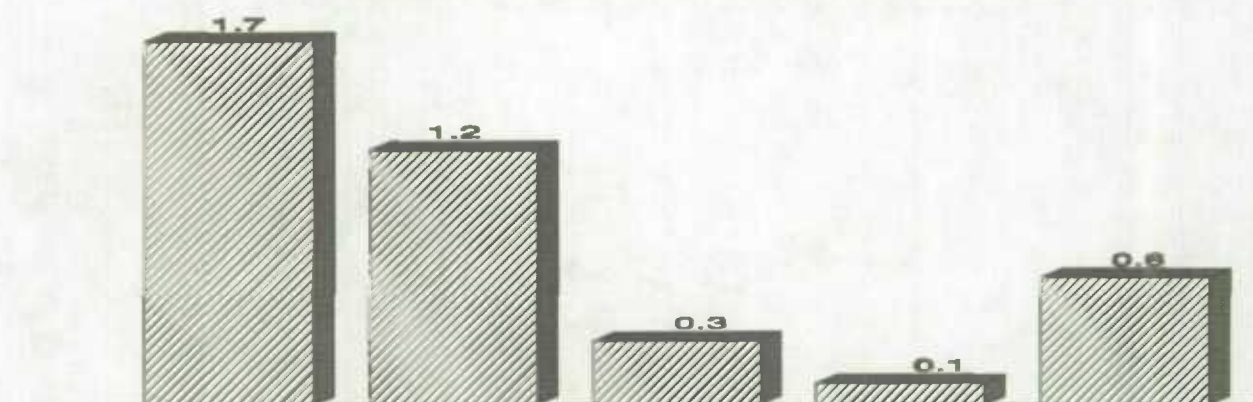

1.7 | 1.2 | 0.3 | 0.1 | 0.6

Table 6 - Indexes of *industry net-gross output* multifactor productivity for manufacturing industries, (1986=100)

Year	Primary metal industries	Fabricated metal products ind.	Machinery industries	Transportation equipment ind.	Electrical & electronic products ind.
1961	87.2	77.9	81.5	67.5	64.1
1962	89.5	82.1	85.9	71.2	69.3
1963	90.5	84.1	88.4	74.5	69.9
1964	92.5	87.6	92.6	75.0	72.9
1965	94.5	90.4	93.4	78.4	74.8
1966	93.8	90.6	94.8	76.7	75.7
1967	91.1	89.2	93.3	79.7	71.6
1968	94.4	91.2	92.4	82.0	73.9
1969	95.1	91.7	95.0	86.2	76.2
1970	94.5	90.0	93.9	82.4	75.3
1971	93.9	92.3	96.0	87.1	71.6
1972	95.9	94.2	97.0	90.3	75.6
1973	98.1	96.8	98.9	94.2	79.4
1974	99.0	97.9	100.0	94.6	79.1
1975	95.5	94.0	96.3	96.6	77.3
1976	92.7	96.0	96.8	97.8	80.6
1977	96.2	96.6	98.4	98.9	83.6
1978	97.8	97.2	100.8	98.6	82.8
1979	93.8	94.0	104.4	98.0	89.2
1980	91.5	95.2	102.7	91.9	92.8
1981	94.4	97.0	99.8	93.5	93.9
1982	88.1	94.4	91.5	92.1	90.2
1983	93.6	95.8	90.2	95.6	90.6
1984	98.4	99.6	98.1	99.8	96.9
1985	100.9	101.5	99.6	101.1	99.0
1986	100.0	100.0	100.0	100.0	100.0
1987	102.8	99.5	97.7	98.5	101.2
1988	104.5	98.9	99.7	100.5	103.2

Average Annual % Change, 1961-1988
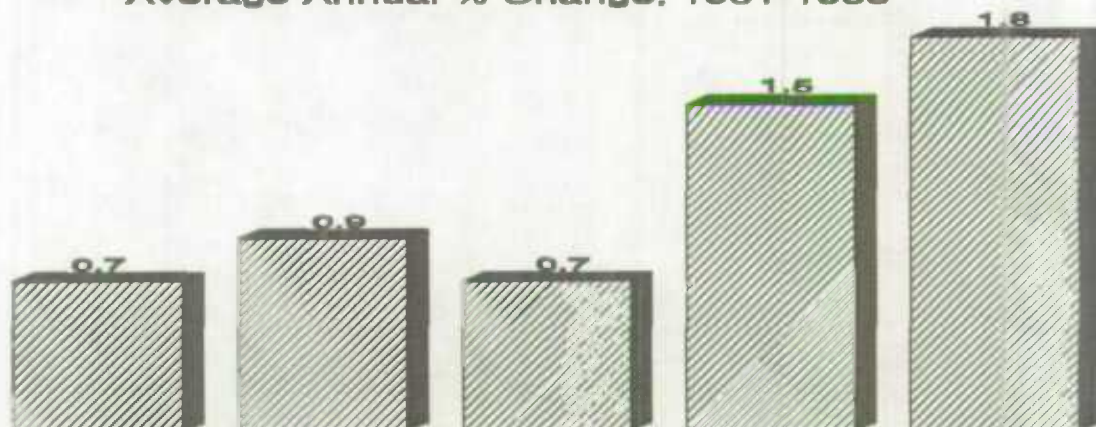
0.7   0.9   0.7   1.5   1.8

Table 6 - Indexes of *industry net-gross output* multifactor productivity for manufacturing industries, (1986=100)

Year	Non-metallic mineral products industries	Refined petroleum and coal products	Chemical & chemical products ind.	Other manufacturing industries
1961	81.8	85.0	70.0	86.9
1962	87.8	89.5	72.4	89.0
1963	88.7	90.4	74.7	88.0
1964	92.3	92.4	77.9	91.5
1965	94.2	94.3	80.0	91.4
1966	94.4	96.0	80.0	93.4
1967	88.4	92.1	78.3	91.1
1968	92.2	94.0	79.0	94.1
1969	94.1	92.3	80.6	95.9
1970	92.2	92.5	80.1	93.9
1971	99.0	93.0	83.2	95.3
1972	106.7	92.8	85.4	99.3
1973	100.5	96.3	89.6	101.2
1974	96.1	95.8	89.5	100.5
1975	93.1	96.3	83.9	98.6
1976	94.1	95.7	86.8	103.7
1977	93.2	98.7	87.3	104.4
1978	94.9	96.5	90.1	105.2
1979	95.4	95.2	92.3	103.7
1980	89.0	95.6	89.3	101.3
1981	88.5	97.7	92.6	102.7
1982	82.3	100.0	86.2	102.1
1983	88.7	101.8	94.5	101.7
1984	93.8	102.4	98.3	105.7
1985	98.1	101.2	99.4	106.4
1986	100.0	100.0	100.0	100.0
1987	102.4	100.8	101.9	101.1
1988	102.6	100.7	101.1	99.2

Average Annual % Change, 1961-1988

Table 7 - Indexes of *interindustry* multifactor productivity for manufacturing industries, (1986=100)

Year	Food industries	Beverage industries	Tobacco products industries	Plastic products industries	Rubber, leather & allied products ind.
1961	72.8	78.1	76.6	56.1	65.2
1962	79.1	80.9	80.1	58.5	71.5
1963	82.1	85.2	85.7	61.8	73.0
1964	81.9	87.5	87.3	66.5	76.1
1965	84.3	90.0	90.7	67.7	76.4
1966	86.3	96.5	89.9	69.2	77.8
1967	82.5	97.4	82.9	68.2	76.9
1968	84.7	95.3	83.9	78.8	78.5
1969	86.6	98.7	89.9	83.1	79.9
1970	85.7	99.9	90.3	80.7	78.8
1971	92.0	101.7	98.6	84.1	80.7
1972	91.1	103.8	100.8	90.6	81.4
1973	94.9	110.3	104.4	94.6	84.8
1974	89.5	107.1	104.2	89.0	82.1
1975	88.5	103.0	103.3	82.2	78.7
1976	94.6	105.0	104.8	84.3	85.6
1977	95.1	107.9	113.3	85.6	90.7
1978	94.5	107.9	107.1	90.2	94.4
1979	92.5	108.1	107.2	96.2	97.7
1980	90.8	106.6	108.1	91.8	93.3
1981	92.4	106.4	109.0	96.1	93.2
1982	92.5	101.1	107.0	91.2	88.1
1983	93.5	102.2	105.3	98.5	93.6
1984	96.1	104.4	105.2	103.3	102.6
1985	97.3	102.9	99.4	103.5	104.0
1986	100.0	100.0	100.0	100.0	100.0
1987	99.5	102.1	106.4	100.5	103.2
1988	97.4	105.1	108.7	97.5	104.1

Average Annual % Change, 1961-1988
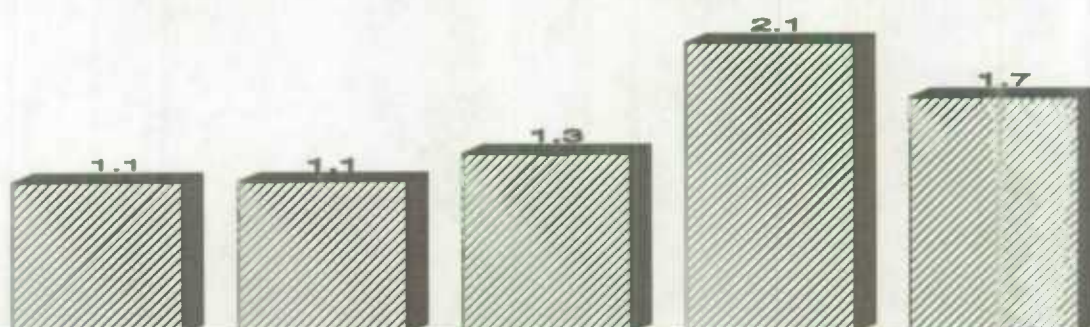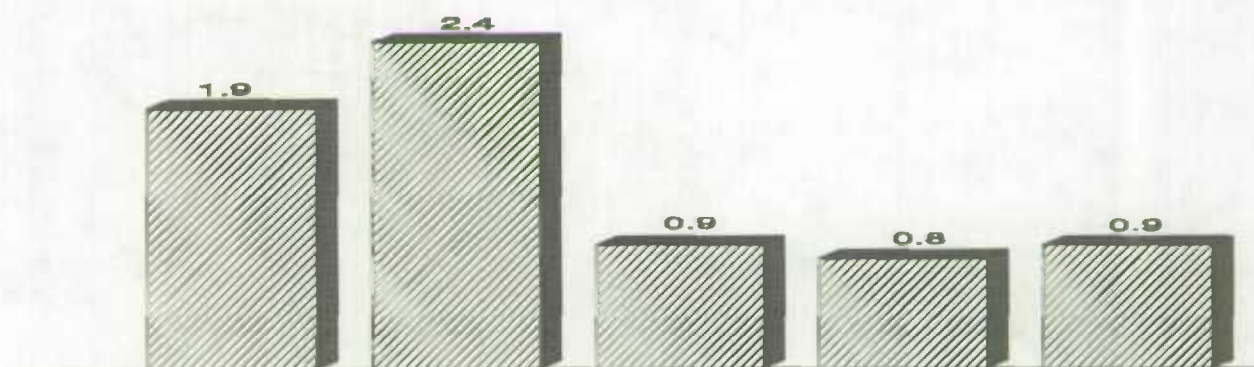

1.1 1.1 1.3 2.1 1.7

Table 7 - Indexes of *interindustry* multifactor productivity for manufacturing industries, (1986=100)

| Year	Textile, textile prod. & clothing industries	Wood industries	Furniture & fixture industries	Paper and allied products ind.	Printing, publishing and allied ind.
1961	60.1	55.3	74.2	83.6	76.1
1962	64.0	58.7	77.8	84.1	77.8
1963	66.7	62.5	81.1	86.5	78.7
1964	67.6	64.8	82.5	90.2	79.1
1965	67.3	65.0	85.1	88.3	78.7
1966	67.4	65.0	86.4	88.0	79.4
1967	66.5	65.5	85.5	82.8	78.5
1968	69.9	69.8	88.3	84.9	80.0
1969	71.4	71.0	91.6	88.9	81.6
1970	71.1	71.9	89.1	88.7	80.8
1971	74.0	71.2	91.2	88.6	81.5
1972	77.2	70.4	98.6	93.4	85.3
1973	79.0	71.1	103.0	97.3	89.2
1974	78.9	71.0	93.6	98.6	88.6
1975	79.7	67.0	89.8	81.3	86.4
1976	82.8	72.0	96.4	91.0	93.1
1977	85.3	74.7	97.8	92.0	96.4
1978	90.0	74.2	102.5	96.1	99.9
1979	93.0	74.3	101.0	95.7	99.2
1980	92.2	77.9	98.6	95.3	99.3
1981	93.6	77.7	99.7	92.9	98.8
1982	87.6	75.2	87.2	84.9	91.8
1983	92.3	84.1	95.0	92.6	96.3
1984	95.5	93.2	99.8	97.3	100.9
1985	96.9	97.9	101.7	98.6	100.9
1986	100.0	100.0	100.0	100.0	100.0
1987	101.6	105.7	96.2	103.5	98.4
1988	99.3	104.3	94.4	102.7	98.1

Average Annual % Change, 1961-1988

Table 7 - Indexes of *Interindustry* multifactor productivity for manufacturing industries, (1986=100)

Year	Primary metal industries	Fabricated metal products ind.	Machinery industries	Transportation equipment ind.	Electrical & electronic products ind.
1961	83.4	71.6	73.9	61.3	54.7
1962	84.3	77.2	79.0	65.7	60.4
1963	85.1	79.8	83.1	69.5	61.0
1964	90.2	84.5	88.4	70.8	64.2
1965	92.2	87.7	89.6	74.6	66.4
1966	90.1	87.8	91.0	73.2	67.7
1967	88.6	85.9	88.6	75.9	63.6
1968	90.7	88.9	88.9	78.8	65.8
1969	91.0	90.3	91.9	83.4	68.6
1970	89.5	88.8	91.1	79.6	67.4
1971	85.9	90.6	93.4	84.5	65.1
1972	88.4	93.1	95.4	88.6	70.7
1973	95.8	97.8	99.1	93.5	75.1
1974	91.0	98.2	100.1	93.6	75.2
1975	86.2	91.9	94.5	94.4	72.7
1976	85.6	94.0	95.7	96.0	76.5
1977	88.5	95.0	97.5	97.3	79.2
1978	91.9	96.0	99.9	97.3	78.6
1979	87.5	92.9	103.6	96.8	86.0
1980	86.2	92.3	100.9	90.4	90.3
1981	85.7	93.9	98.4	92.0	91.4
1982	81.2	88.1	88.1	89.1	87.2
1983	87.3	92.5	88.3	93.9	88.5
1984	97.0	99.8	97.5	99.5	96.9
1985	100.9	102.5	99.5	101.1	98.9
1986	100.0	100.0	100.0	100.0	100.0
1987	107.1	100.2	98.4	98.9	101.9
1988	109.6	99.5	100.8	101.2	104.3

Average Annual % Change, 1961-1988
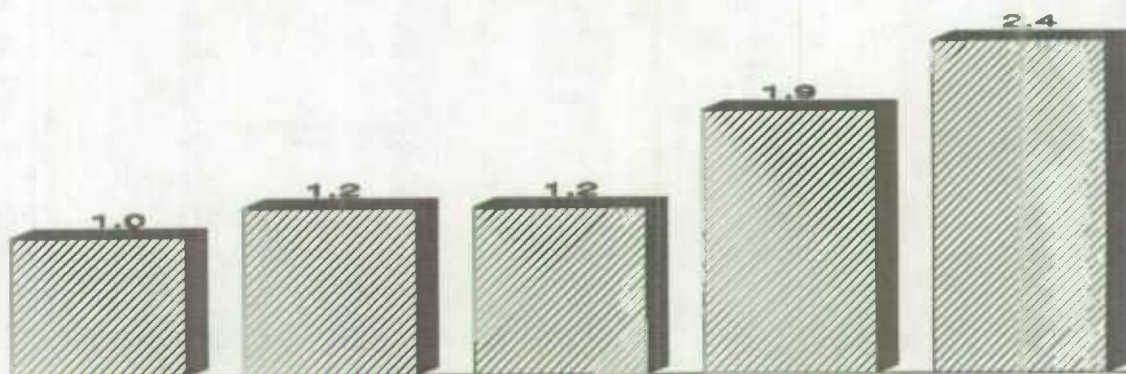
Table 7 - Indexes of *interindustry* multifactor productivity for manufacturing industries, (1986=100)

Year	Non-metallic mineral products industries	Refined petroleum and coal products	Chemical & chemical products ind.	Other manufacturing industries
1961	63.2	99.3	63.9	77.8
1962	68.4	105.6	66.6	80.2
1963	69.7	108.3	69.9	80.2
1964	74.5	113.0	73.3	84.5
1965	77.8	116.1	76.0	84.7
1966	77.7	120.1	77.2	86.8
1967	75.4	116.2	75.1	83.6
1968	78.7	121.3	77.0	87.7
1969	81.3	120.8	79.7	90.3
1970	79.0	124.6	80.3	88.4
1971	84.0	126.2	84.8	90.6
1972	91.5	131.4	87.2	96.2
1973	95.2	139.9	92.3	99.5
1974	93.8	135.6	92.2	97.7
1975	90.8	128.6	86.2	94.1
1976	93.4	123.3	89.5	100.3
1977	91.8	124.1	91.0	100.5
1978	94.8	115.3	93.3	101.9
1979	95.8	115.8	95.6	101.0
1980	87.8	107.3	91.3	98.7
1981	86.0	103.3	94.6	100.1
1982	78.4	101.9	87.0	97.6
1983	87.0	104.1	93.8	98.8
1984	94.2	105.7	98.4	105.0
1985	97.5	105.0	100.2	105.9
1986	100.0	100.0	100.0	100.0
1987	105.1	104.7	102.6	101.9
1988	106.7	109.6	101.8	101.3

Average Annual % Change, 1961-1988

Bar chart showing: 2.0, 0.4, 1.7, 1.0
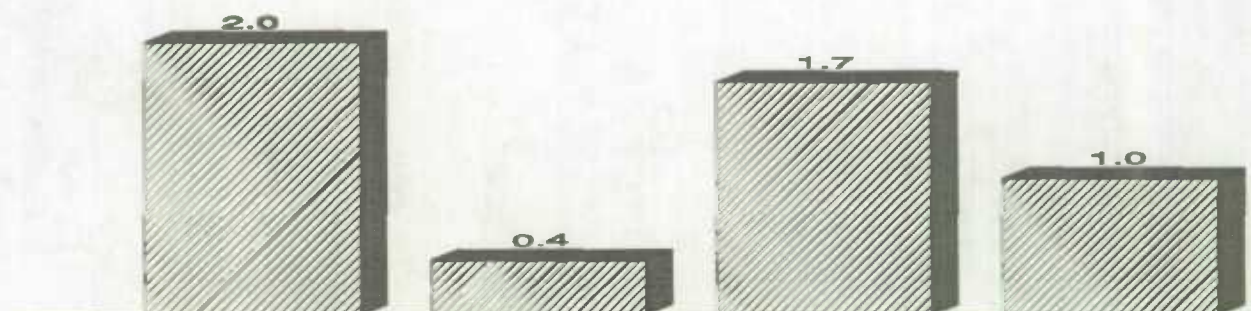
APPENDIX 1

Basic concepts and methods

1 - Multifactor productivity in a nutshell

The basic idea standing behind the development of the multifactor productivity accounts is to define and apply to the Canadian economy a measure of performance in production activities. It is assumed that resources are optimally allocated between the various production activities so that the object of the performance indicators is solely to reveal the technical *efficiency* with which the available resources are used in each of these production activities or groups of these activities.

These indicators, in contrast to the labour productivity indices regularly published in this publication, take into account the contribution of all productive factors (inputs) to the growth of outputs. For this reason, they are called *multifactor* or *total* factor productivity indices. The labour productivity measures presented in this publication take into account only the contribution of labour input to the growth of output and, for this reason, constitute *partial* measures of productivity.

In general, productivity gains are defined in a residual fashion as the growth in output not accounted for by the growth in production factors explicitly listed in the chosen formula. Multifactor productivity measures output per unit of all factors of production combined (such as labour, capital, materials and services used as inputs in the production of goods and services). Hence, the growth in multifactor productivity reflects the growth in output not accounted for by the growth of all productive factors. Consequently, multifactor productivity does not reveal the contribution of the production factors but the joint effects of economies of scale, technical progress and other influences not explicitly taken into account.

At the industry level, two alternative but complementary indices of multifactor productivity are proposed. One takes into account only the direct productivity gains made by an industry without considering the indirect productivity gains made by its suppliers. The other looks at the productivity gains made in the production of the goods and services of an industry by taking into account the productivity gains made by all industries which contributed directly and indirectly to that production.

The first index, based on the most usual concept of multifactor productivity, measures the productivity gains taking place within a business industry, from the point of view of that industry *taken in isolation* from the rest of the business sector of the economy. The index measures the growth in the gross output of an industry unaccounted for by the growth in all of its factors of production; that is, both the ones called primary, which are the labour and capital inputs, and the intermediates, which are the material and service inputs purchased from other industries. This index does not take account of the productivity gains which take place in the industries which produce these intermediate inputs[6]. We will refer to this index as the *industry* index.

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6 *Except possibly for intermediate inputs originating from the industry itself as will be explained below.*

The alternative productivity index presented here does. It is based on the *interindustry* concept[7] of multifactor productivity which is relatively new. This index takes into account the productivity gains realized within an industry as well as within all industries directly or indirectly supplying that industry. The index measures the growth in the output of an industry unaccounted for by the growth in all its primary inputs as well as by the growth in the primary inputs used in the production of its intermediate inputs by its direct and indirect industry suppliers. In that sense, the interindustry productivity index takes into account all the primary inputs which have been used in *the business sector of the economy as a whole* to produce the goods and services of a given industry. In other words, each industry is viewed as an integrated component of the production sector of the economy rather than as an isolated entity.

At the aggregate business sector level, i.e., when considering the productivity of all business sector industries combined, both indices refer to the same outputs and inputs. They consequently give the same results for the total business sector gross domestic product.

Measuring the performance of an *economy* at producing the output coming out of a given industry using the interindustry concept, is quite different from measuring the performance of that same *industry* in producing that output, in the traditional way. Both measures are useful. For instance, in an effort to increase the performance of an economy it could be inappropriate to support declining industries with low productivity gains without considering the performance of the industries supplying them with goods and services. The latter industries, which may benefit from important productivity gains, may also be strongly dependent on the low performance industries for the sale of their output.

2 - The concept and measurement of productivity

The *level* of productivity is a ratio between the level of production of some economic units and the quantity of inputs they use. Although there may be alternative ways to compute the productivity ratio, all of these consist in combining all the goods and services produced into a single *aggregate output index* and, likewise, all of the production factors used into a single *aggregate input index*. The aggregation of the goods and services produced or used in the production process requires that these goods and services be measured in some common units. These units in economics, similarly to the weight and size units of physics, are naturally taken to be the relative values of the goods and services on the market at some specific point(s) in time. Each quantity of a commodity is therefore attributed a weight according to its contribution to the value of the aggregate of which it is a part of. Thus, the larger the quantity produced (used) of a commodity and/or the higher its price relatively to other commodities, the larger will be its importance in the value of all goods and services produced (used) and the larger will be its importance in the aggregate output (input) index[8]. The multifactor productivity index *level* is computed as the ratio of the aggregate output index level to the aggregate input index level. Productivity *growth* is positive if the aggregate output index grows faster than the aggregate input index. Productivity decreases in the opposite case.

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7 *The concept with empirical estimates was first introduced by T.K. Rymes in a previous study done for Statistics Canada. See T.K. Rymes and A. Cas, "On the Feasibility of Measuring Multifactor Productivity in Canada", Statistics Canada, Input-Output Division, 1985. However, contrary to Rymes and Cas, we include the capital stock in the primary inputs rather than in intermediate inputs.*

8 *This can be established more formally as the Divisia aggregation formula for a twice differentiable linearly homogeneous production function under competitive market conditions and profit maximisation.*

For empirical applications, some choices have to be made on how to actually measure inputs and outputs. One criterion which we have used is inclusiveness of all production activity occurring in the business sector of the economy. This implies that the indices, at the industry level, had to be defined on a *gross output* measure of their activities. The gross output of an industry is the aggregate volume of all goods and services produced and work done by the industry. Gross output can be defined as either including or excluding intraindustry sales as will be discussed further below. Other investigators have used different definitions of output such as, gross output net of depreciation of the capital stock. The labour productivity indices presented in this publication use a real value added measure of output.

Correspondingly, on the input side, the measure of the index had to be inclusive of all purchased (and measurable) inputs which can basically be classified into two broad categories: (1) *intermediate* inputs which are comprised of the many goods (raw materials) and services purchased by the industries, and (2) *primary* inputs including labour inputs, capital inputs and natural resources. More formally, we consider as intermediate inputs those inputs which are produced and are consumed during the same period (usually a year) by the business sector of the economy. The primary inputs[9] are supplied from other sectors of the economy such as the household sector. As discussed further below, in an open economy context, imports and a few other variables can as well be included in the set of primary inputs.

In the actual implementation of the multifactor productivity indices, a more detailed breakdown of both the inputs and outputs by commodity were used as described in Appendix 3. The more disaggregated (and consequently more homogeneous) set of commodities used improves the quality of the measured productivity indices and presents a definite advantage over the more aggregated (and more heterogeneous) set of commodities usually used by some other investigators.

The multifactor productivity indices have an important advantage over the partial labour productivity indices. This advantage stems from the inclusiveness of all the major factors contributing to the growth of output in the economy. Output growth is accounted for by increases in productive capacity, the use of increased amount of various services and goods purchased by industries (including energy) and by labour. Output growth which is not accounted for by the growth of inputs is what we call productivity. Therefore, the more detailed and inclusive[10] is the list of production factors entering into the estimates, the more growth in output can be "explained".

The explanation is cast, it is true, only in descriptive terms in that it shows the apportionment of output growth between the major contributing factors. But it may be pursued much further. One may attempt, for instance, to relate the increasing efficiency of labour to various factors such as basic education, on the job training, improvements in working conditions, changes in managerial style, etc. Such an attempt has not been undertaken here as our main purpose is to focus on the development of the database and on measurement issues, in order to provide to the user community the basic elements necessary to carry the analysis further.

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9 *Capital goods are commodities produced by the business sector like intermediate inputs. However, they are accumulated only if savings occur. In addition, they are excluded from the intermediate input set on the ground that they are, by definition, not totally consumed during the period in which they have been produced. Extending the interindustry measure over many periods to cover capital goods leads to the dynamic index number formula suggested in R. Durand and M. Salem, "On a Dynamic Productivity Index Number Formula", Input-Output Division, Statistics Canada, November 1987 (revised February 1990).*

10 *All input costs are taken into account but the quantities of these inputs are not broken down into perfectly homogenous categories through time. Some inputs are simply omitted and their costs reported under the capital costs which are computed residually. Externalities are also neglected.*

The inclusion of all production factors in the computation of productivity indices does not preclude the computation of meaningful indices of partial productivity. However, in order to analyze and attempt to explain the partial productivity of any contributing production factor, one must first express its productivity in relation to the contribution of the other production factors. For instance, the index of partial labour productivity may have increased because the quantity of equipment, raw materials and energy used per unit of labour have all increased. Only when the contribution of these other factors have been netted out can the partial labour productivity be meaningfully related to factors such as education and experience. Multifactor productivity presents a net advantage on this count compared to the labour productivity, in that it precisely allows the decomposition of increased labour productivity between the portion which comes from the contribution of the other production factors, and the portion which comes from other factors explaining the increased efficiency of labour such as education. The labour productivity indices regularly published in this publication do not allow such a decomposition.

3 - Which production activities?

In the application of the concept of productivity, inputs and outputs must be clearly identified. They may refer to the entire Canadian economy and/or to various components of the economy. These components, in the System of National Accounts, are either *sectors* or *industries*. The productivity indices refer only to the productivity of the resources used by the *business sector* of the economy. In the System of National Accounts, the business sector "encompasses that group of transactors who produce goods and services for sale at a price which is calculated to cover costs and yield a profit..."[11]. An industry is defined, in the System of National Accounts, "as a group of operating units [establishments] engaged in the same or similar kind(s) of economic activity, e.g., coal mines, clothing factories, department stores, laundries"[12]. Industries include both business and non business establishments but can be sectored to include only business establishments. The productivity indices presented in this publication refer only, either explicitly or implicitly, to business establishments.

The productivity of the government sector is not covered as it cannot be computed at the present time within the framework of the System of National Accounts. The latter adopts indeed as a convention (for lack of a better alternative) to measure the output of the government sector as being equal to its primary input use. As a consequence, the growth in outputs cannot diverge from the growth in inputs as required for a meaningful productivity measure.

The productivity indices, therefore, provide an accounting record of the effectiveness with which business establishments make use of the economy's resources through time. To make the interpretation of these indices more precise, we still need to clarify further how they are actually derived. Basically, we need to define more precisely the sets of inputs and outputs used in their compilation both conceptually[13] and empirically (see Appendix 2).

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11 *Robert B. Crozier, National Income and Expenditure Accounts, Volume 3, A Guide to the National Income and Expenditure Accounts, Definitions-Concepts-Sources-Methods (catalogue 13-549, 1975, p. 101).*

12 *The Input-Output Structure of the Canadian Economy, 1961-1981 (catalogue 15-510, p. 18).*

13 *A more precise though more technical description of the conceptual aspects may be found in R. Durand and M. Salem, op. cit.*

4 - Which resources and how they are measured

Unemployed resources are excluded from the computation of productivity. Thus, for example, the labour input is measured by employment (and will eventually be measured by hours worked) rather than by the available labour force. The productivity indices, consequently, do not measure the performance of the economy as a whole which is often reduced by the waste of available resources. Rather, the productivity indices presented here intend to track the evolution of the technical performance of the production processes which would obviously not be well captured if unemployed resources were taken into account.

Secondly, employed resources may not be fully utilized as is often the case in the downturn phase of the business cycle. Labour hoarding is a classical example. The productivity indices presented here do not correct for the short run under-utilization of employed resources and, consequently, do not track perfectly the evolution of the technological possibilities (potential efficiency). Over the short run, the indices will reveal, in addition to improvement in technical possibilities, a loss of efficiency, if any, related to the under-utilization of the employed resources. This sensitivity of the productivity indices to business cycle fluctuations is not without its own advantages. Many would argue that what counts is the measure of the *actual* efficiency with which business firms use production factors at a given time rather than the *potential* (maximum) efficiency of the production factors, were they fully utilized. Only over the long run, that is from peak to peak use of employed resources, will the indices reveal the increased productivity associated with the existing technological possibilities in either the form of change in that technology (technical progress) or a better use of all of the available technologies (scale economies).

5 - Alternative measures of multifactor productivity

5.1 Two concepts of Industry. Basically, two distinct notions of an industry are considered which include different groups of production activities. The first notion corresponds to the traditional view and is based on the definition of an industry as the set of establishments producing similar goods and services. Such an industry transforms purchased goods and services (intermediate inputs) by using its own capital and labour services (primary inputs).

Starting with the industry, as traditionally defined, the latter rarely carries all of the transformations from basic minerals to final products. The automobile industry, for instance, uses steel as an intermediate input, which has been produced by the steel industry. Rarely are automobile producers involved in steel manufacturing. The production of steel is part of the total transformation processes involved in the production of automobiles but it is not part of the transformation processes of the automobile industry itself. If one is interested in the productivity of all the production processes involved in the production of the output of the automobile industry, one would *integrate*[14] the productivities of activities of all industries having participated in such production. This would embrace the industry directly involved in the manufacture of automobiles (the automobile industry) as well as those industries indirectly involved in supplying the automobile industry with all the necessary parts, materials and services (all the "upstream" industries, such as the steel industry). The *interindustry* productivity estimates presented here are based on this notion of

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[14] For a full discussion of the concept of integration in relation to productivity measurement, see Durand R., "Aggregation, Integration and Productivity Analysis: An Overall Framework", Aggregate Productivity Measure, 1989, Statistics Canada, (catalogue 15-204), pp. 107-118.

industries and, therefore, refer to the productivity of groups of industries linked to each other by the flow of intermediate goods and services.

The *vertically* integrated industry produces the same output bundle as the traditional industry (say automobiles) but, as it comprises an enlarged group of activities, it uses a different set of inputs. Its inputs also comprise own capital and purchased labour services. However, it looks behind the purchase of goods and services from other industries at the inputs used by these upstream industries to produce the goods and services purchased.

In the example of the automobile industry, the inputs are the capital and labour inputs of this industry and the intermediate inputs it purchases, say steel. The inputs of the steel industry are its own capital and labour inputs and the intermediate inputs it purchases, say steel ingots. In turn, the steel ingot industry has as inputs its own capital and labour and iron ore from a mine it owns. In considering the interindustry set of inputs, we know that it takes capital and labour in the ingot industry to extract the ore and to produce ingots, and that it takes the capital and labour of the steel industry to transform the ingots into steel. Downstream, it takes the capital and labour of the automobile industry to transform the steel into automobiles. Thus, the set of inputs in the interindustry measure of productivity now includes the capital and labour services used directly and indirectly in the production of automobiles. In this sense, the interindustry concept integrates the contribution of upstream industries to the production of its output bundle.

As just mentioned, if one adopts the restricted point of view of an industry's participants, the sources of the industry's inputs, whether intermediate or primary, do not matter. From that point of view, inputs are considered as given to the industry although for the economy as a whole these resources had to be either (1) produced by other industries, (2) imported or (3) supplied by households in the form of capital and labour. From that point of view, the industry, *as an isolated entity*, is the universe over which productivity is computed. This is the essence of the *traditional view* on productivity.

The new interindustry perspective on productivity is equivalent to the perspective of an observer whose concerns lie in the efficiency with which the scarce resources of the *economy as a whole* are being used. One may, in particular, be interested in the efficiency with which an industry, *as a component of the business sector rather than as an isolated entity*, uses the scarce primary resources available to the business sector of the economy, whether directly or indirectly, by purchasing goods and services from other industries. The latter industries use both primary and intermediate inputs but the intermediate inputs they use also originate from upstream industries so that, going through all interindustry transactions, all intermediate inputs can ultimately be accounted for by uses of primary inputs. In an open economy context, primary inputs can as well include imports and non-business supplies. Intermediate inputs, at the industry level as well as at the aggregate business sector level, do not count in the appraisal of productivity gains. Intermediate inputs are only important in that they provide a bridge-measure of the indirect usage of primary inputs by industries. The usage of the latter can only be computed from the intermediate input usage through the interindustry links. The interindustry productivity indices thus refer to a group of industries which are *computationally* vertically integrated.

The real degree of vertical integration of industries is constantly changing through the years. It is also quite different from one country to another. Therefore, the comparisons of productivity growth through time or across countries based on the conventional industry indices are always limited by the changing degree of integration through time or the varying degree of integration across countries. At a very disaggregated level, this statistical instability of the traditional productivity measures may become important. Indeed, the industries' establishments may not only integrate more or less vertically but also migrate from one industry to another as their output mix changes through time. By artificially fully integrating all industries vertically,

the interindustry productivity indices become insensitive to such "statistical" influences. Indeed, they measure the productivity of the same production processes.

From the point of view of the economist interested in the global performance of the business sector as a whole *in the production of some group of commodities*, in particular for international trade studies, the interindustry measure may prove to be more interesting than the traditional industry measure. Indeed, it takes into account not only the efficiency with which various inputs are combined within some industry to produce a given group of outputs but also the efficiency of the industries supplying the intermediate inputs. Thus, to take the example of the motor vehicle industry, this measure takes into account not only the efficiency of the assembly plants, but also the efficiency of the plants producing the auto parts and other raw materials, including up to the production of basic minerals and other industries' output located far upstream in the chain of production. The national economy may possess very efficient assembly plants as compared to foreign plants but still remain handicapped on the international automobile market because of the relative inefficiency of the industries which "feed" its motor vehicle industry.

It is, in fact, advantageous to use both measures of productivity as they provide complementary information. The industry measure isolates the efficiency of the motor vehicle industry segment in the production of automobiles. The joint use of both measures allows the analysis of the overall efficiency of production processes (vertically integrated industries) as well as the efficiency of each of its (isolated industry) segments.

5.2 Two concepts of gross output. As mentioned above, in addition to the standard gross output measure derived from the input-output tables, one may adopt another production concept for the purpose of estimating multifactor productivity: the gross output net of all intraindustry flows. According to Gullickson and Harper[15],"...removing intraindustry transactions assures that vertical integration or disintegration through time in the Census data do not bias the estimates." This advantage refers only to intraindustry integration while the interindustry measure introduced above possesses the same advantage over both intra- and interindustry sales.

The concept of net gross output[16] has the further advantage of smoothing the aggregation process. With the traditional view, the concept of gross output is maintained at all levels of aggregation except at the total business sector level. This means that productivity of broad aggregates such as goods industries and services industries are defined on gross output while productivity of the business sector is defined on value added. Therefore, a switch is made abruptly from gross output on broad aggregates to value added at the business sector level. With the alternative measure of net gross output, the output measure converges gradually toward value added as, when moving to broader aggregates, intermediate inputs are progressively reclassified from interindustry sales to intraindustry sales and subtracted from gross output.

If the economic structure were simple, one industry producing one good or service, it would be easy to remove intraindustry transactions from inputs and outputs; however, in rectangular input-output tables, industries are producing many commodities and each commodity may be produced by many industries. In addition, imports and other non-business sources of supply must first be removed from commodity uses. For a given industry, it is therefore not trivial to identify the amount of an intermediate input being produced by that same industry. The only way to derive net gross output is to bring in an assumption about who

15 W. Gullickson and M.J. Harper, "Multifactor Productivity Measurement for Two-Digit Manufacturing Industries", paper presented at the 1986 meeting of the Western Economic Association in San Francisco, July 1-5, 1986.

16 For a full discussion of the net-gross output concept of productivity, see Diaz, A. "Alternative Concepts of Output and Productivity", Aggregate Productivity Measures 1989, Statistics Canada, catalogue 15-204, pp. 97-106.

produces the inputs of a given industry net of imports and other leakages. For this, we assume that the commodities used in an industry originate from all producing industries according to their production shares[17].

As an example, let's assume that the fabricated metal products industry makes 80% of total fabricated structural metal products and that 20% of it is being produced by the primary metal industries. Therefore, only 80% of the former industry's input, net of leakages, in fabricated metal products will be subtracted from inputs and total output in order to balance the input-output productivity database according to this concept of net gross output.

There is still an advantage in deriving productivity growth estimates based on gross output instead of net gross output. By doing so, it is possible to compare individual industries' productivity growth to the productivity growth of some aggregate they are part of since the latter is a weighted average of the former with weights summing to one. This is, however, not possible when using the net gross output concept since the productivity gain of the aggregate is a weighted average of the individual industries' productivity gains with weights summing to more than one.

6 - Aggregate business productivity

When considering the business sector as a whole, only primary inputs are given, as mentioned above. Intermediate inputs must be produced and, consequently, can be looked at equally as outputs of the production process. From that point of view, what counts is the amount of primary resources used by the business sector and, as a counterpart, the amount of goods and services delivered by the business sector for final consumption. Therefore, at the aggregate business sector level, output must be netted out of intermediate goods and services used as inputs. This also corresponds and is equal to the gross output net of intraindustry sales. But aggregate output may also be defined as gross output minus intermediate and primary *commodity* inputs, that is as real value added.

Correspondingly, on the input side, only primary inputs must be taken into account. These include principally capital, labour, natural resources and, in an open economy, imported inputs. To that list, all other inputs not produced by the domestic business sector may be added, that is government supply of goods and services, inventory depletion and other leakages, including the commodities produced by industries which have been reclassified as non business for the purpose of productivity analysis (see Appendix 3 of Part 2). The universe over which productivity indices are computed is then the *entire business sector*. From that point of view, *intermediate inputs* are just *intermediate outputs*, that is, an intermediate step in the production process rather than a final end as it was the case from the point of view of the isolated industry.

It is easy to see, from what precedes, that *net final demand* for commodities is equivalent to business value added, that is, to the value of total business output (gross output) minus the consumption of all commodity inputs. Similarly, final demand net of imports of final goods and other final uses of non-business supplies is equivalent to final demand deliveries of the business sector to which correspond all business primary inputs, including imports of raw materials. Hence, the alternative aggregate productivity indices can be

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17 *For technical details, see René Durand, "Productivity Analysis and the Measurement of Gross Output Net of Intraindustry Sales", Statistics Canada, Input-Output Division, January 1991.*

seen as the index of productivity on net final demand[18] or the index of productivity on final demand originating from the business sector.

Relating the disaggregated productivity indices to their common aggregate counterpart for the whole business sector leads to the establishment of aggregation weights. The aggregation weights for the industry and the interindustry indices differ. Given that the interindustry indices integrate the productivity of all the industries associated directly and indirectly with the production of final demand deliveries, it follows that the aggregation weights are simply equal to the ratios of industries' final demand sales to the total business sector's final demand sales. These weights sum to one.

Similarly, for the industry productivity indices, both the productivity gains of the industries selling directly and those of the upstream industries selling indirectly to final demand have to be considered and weighted. But the productivity gains of the industries associated with final demand deliveries correspond, in this case to the productivity gains associated with the gross deliveries of all industries. It follows that the aggregation weights are given by the ratios of the value of industries' gross outputs (gross output net of intraindustry sales) to the business sector's value added (value of final demand deliveries). These weights sum to more than one.

To conclude, the productivity indices refer to a gross output (or net gross output) measure at the industry level and to value added (final demand deliveries) at the aggregate business sector level. Value added here is the sum of value added at factor cost (as defined in the System of National Accounts) and *Other Indirect Taxes*. The latter, which include mostly property taxes, are considered as part of gross capital income. Taxes paid on other primary inputs are also included such as import duties on imported imports. This is the case for both the traditional (isolated) industry and the alternative interindustry measures. Productivity in the government sector is not covered as it cannot presently be meaningfully computed.

7 - Usefulness of productivity indices in economic analysis

As indicated earlier, a principal role of multifactor productivity measures is to separate the observed growth in industrial production into increases in the economic resources employed by industries and increases in overall efficiency. This step permits a more complete accounting of the sources of economic growth than the existing partial measures within the framework of the System of National Accounts. Time series of multifactor productivity by industry also allow analysts to measure trends and detect shifts in competitive advantages among various Canadian industries vis-a-vis similar industries in the rest of the global economy. By showing how industries' evolution has been influenced by their technical performance, multifactor productivity assessments help analysts and policy makers address such issues as domestic industrial policy and international industrial strategy. Similarly, businesses and other private organizations observe productivity movements to evaluate the long-term viability of various industries and formulate more informed investment decisions.

In addition, proper growth accounting opens the way to a better understanding of the sources of productivity growth. The latter can be conceptually decomposed into three components: economies of scales, technical progress and measurement errors due to omitted factors. Growth accounting paves the way to further analysis of the sources of scale economies and technical progress. Taking technical progress as an example, it could be defined as the general advance in knowledge. If we accept this definition, then, over

18 *Final demand productivity indices by commodity could be computed but they are not presented here.*

the long run, technical progress is the only source of *permanent and sustained* improvement in productivity. Indeed, at any point in time, the level of education of workers may be raised only to a certain limit through investments in education. Similarly, the diffusion of the best known technologies through investments in physical equipment has a limit as well as the best use of existing technical possibilities through scale economies. Only investments in fundamental research in both human and natural sciences and investments in applied research and development can lead to a better and more educated labour force and better equipment over the very long run. Measuring the contribution of technical progress to the growth in output helps in understanding the importance of society's investment in such research.

APPENDIX 2

Multifactor productivity database description

1 - Introduction

In order to derive multifactor productivity indices, prices and volumes of outputs and inputs are estimated from various sources. For outputs and intermediate inputs by industry, the data are obtained from the current and constant prices Canadian input-output tables[19]. Some transformations of these data are required to obtain better conceptual measures for the purpose of estimating multifactor productivity. They are summarized in this appendix. Some of these transformations were suggested by Rymes and Cas in an earlier study[20]. Primary input costs are also taken from input-output tables while their volumes are estimated from other sources. Labour input data are taken from the labour productivity program and their sources are described in Appendix 2 of Part 1 of this publication. Capital input data are described in a technical note which is summarized below[21]. The industry coverage of the "business sector" used for multifactor productivity estimates differs slightly from the usual definition of the national accounts in both Canada and United-States as explained in further detail in Appendix 3.

2 - Input-output commodity data

The input-output tables are estimated at both *producers'* and *purchasers'* prices. Producers' prices are the prices received by the sellers at the boundary of their establishment. Purchasers' prices correspond to the market prices at the point of delivery and include various margins which are not included in the producers' prices. Some of these margins are paid to business sector enterprises in exchange of real services such as retail and wholesale services and transportation services. Commodity indirect tax margins, on the other hand, represent a pure transfer without any real counterpart.

As the proposed productivity measures are derived under the assumption of competitive market behaviour, it can be argued that outputs of industries should be valued at producers' prices while their inputs should be valued at purchasers' prices. The *Divisia* index of productivity growth, which is used here, rests, on the assumption of profit maximization behaviour of firms in competitive markets. This implies that the marginal product of each input be equated to its real price defined as the purchasing cost of the input including all margins divided by the net selling price of the output, excluding all margins. But as real margins represent

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[19] *For informations on data sources and concepts, refer to The Input-Output Structures of the Canadian Economy, 1961-1981 (Revised Data), Statistics Canada, Catalogue 15-510, Input-Output Division, 1987, pp. 1-127.*

[20] *Rymes T.K. and A. Cas, "On the Feasibility of Measuring Multifactor Productivity in Canada", Input-Output Division, Statistics Canada, 1985.*

[21] *For a detailed documentation on capital input, see Documentation of Capital Input and Capital Cost Time Series for Multifactor Productivity Measures, by M. Salem, R. Fortin and Y. Sabourin, Statistics Canada, Input-Output Division, December 1990.*

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real inputs which can be substituted for other inputs over the long run, they were considered as distinct inputs rather than included in the physical volumes of the other inputs. Tax margins were excluded from the input set. All commodity input and output volumes were therefore taken from the producers' prices input-output tables. In current prices, commodity taxes paid were added to the value of commodities purchased.

Conceptually, operating subsidies can be considered as negative indirect taxes. Therefore, they were distributed over the input and output commodities to which they apply. Some subsidies, however, could not be attributed to specific commodities and were treated as non commodity indirect taxes (see below).

Royalties were considered as taxes levied on industries' outputs in the productivity accounts. They were subtracted from the producers' prices of outputs to estimate the net prices received by producers. Royalties are considered as a rental income on natural resources received by the business sector industry *Government Royalties on Natural Resources* in the regular input-output tables. However, this is an improperly defined industry for productivity analysis as it has no inputs except the *Other operating surplus* which is equated to the royalties perceived. The industry was also excluded on the grounds that it appeared doubtful that governments act as a real monopoly in natural resources industries.

Since government goods and services cannot be substituted by other business industry supplies, they are added to primary inputs. As well, unallocated imports and exports of commodities are considered as part of the primary inputs. In general, all commodities which are not produced by the business sector as defined for productivity analysis (see section 5 below) are considered as primary commodities. This is the case, for instance, of postal services. For neoclassical productivity estimates, this classification of inputs is immaterial. It does have an incidence, however, on the interindustry estimates.

Dummy industries have been removed from the input-output tables. Corresponding dummy commodity inputs have been transformed into real inputs on the basis of the input structure of dummy industries.

3 - Labour Input at Current and Constant Prices

The measure of labour input volumes includes employment of paid employees and employment of other-than-paid employees (self-employed and unpaid family workers). These series have the same sources as the ones used for the labour productivity measure described in this publication. Although hours-worked by type of employment would constitute a better conceptual measure of labour input, they are not currently available for all industries[22]. In order to allow for comparison of productivity estimates between industries, we are thus confined to use employment count as labour input volume estimates. Labour costs are the current dollar values of wages and salaries, supplementary labour income and labour income of the self-employed.

The labour income of self-employed is an imputation based on the assumption that, in most industries, self-employed workers earn the same hourly rate as the paid workers. However, in the case of industries where professional self-employed workers are numerous (doctors, dentists, lawyers, accountants, engineers), since the average earnings of paid workers in the same industry division underrepresent the earnings of these occupations, direct evidence on average labour income was introduced. Consequently,

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[22] *In United-States, person-hours are used.*

labour income of self-employed is afterward deducted from net income of unincorporated business of industries to keep the system accounting balance.

4 - Capital Input at Current and Constant Prices

The input of capital services for a given year is assumed to be proportional to net capital stock in constant prices at the end of the previous year. The choices of a net rather than a gross capital stock measure or of a convex rather than a concave depreciation curve are still open issues which will require further research[23]. The capital stock excludes investment done during the current year as the latter are not yet, in general, productive.

Two particular problems occur when using the net capital stock figures from the Investment and Capital Stock Division: first, these data are based on the 1970 SIC while the input-output tables are on the 1980 SIC; secondly, these data are estimated for industries including business and non business establishments, not only for the business industries like in the case of input-output tables. Capital assets for industry segments have been estimated, removed from some industry groups and reclassified to others so as to maximize the number of concordant industry classes. Non-business industry capital stocks were estimated and removed from the industries where significant sectoring differences were known to exist: namely, non-metal mines, chemical and chemical products industries, miscellaneous manufacturing industries, railway transport and related service industries, and other utility industries.

The principal difficulty in estimating the price of capital input is that, unlike intermediate commodities, it cannot be observed from market transactions except in the case of leases. The price is therefore imputed on the basis of what the industry would charge itself for using its own capital assets, which is the income generated from capital services: the sum of other operating surplus and net income of unincorporated business net of labour income of self-employed. Non-commodity indirect taxes (subsidies) are also added (subtracted) to the capital cost as they are associated with the industry's ownership and use of capital assets. Prices are obtained by dividing the generated income by net capital stock of the previous year in constant dollars of the productivity database.

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[23] In Canada U.S. comparisons, one must note that, in the Canadian measure of the capital stock, a more accelerated depreciation pattern is being used. For a more technical description of the new capital asset series, see Fixed Capital Flows and Stocks, Methodology, Investment and Capital Stock Division, Statistics Canada, May 1990.

APPENDIX 3

Aggregation parameters for multifactor productivity measures

For the purpose of deriving multifactor productivity growth rates, the inputs in goods and services were taken from the input-output tables in their most disaggregated level[24] (about 600 commodities). However, it was not possible to use the industries' outputs or inputs at their most disaggregated level (154 industries for the business sector at the link level of the input-output tables) mainly because capital stock series were not available for some industries. Input-output tables have been aggregated to a special level of aggregation -- identified as PL -- required for the multifactor productivity measures which consists of 109 business sector industries (excluding Postal Services for which no capital data are yet available). For analytical purposes, two other aggregation levels were built: 30 industries (level PM) and 12 industries (level PS). These levels were determined to be as close as possible to the M and S levels of industry classification of input-output tables. It is hoped that further developments of the capital database will eventually allow a full reconciliation of the PM and PS aggregation levels with the corresponding M and S levels and that these developments will extend the PL level closer to the L level.

The industrial coverage of the business sector in both Canada and United-States departs slightly from the current definition of the System of National Accounts as some components were excluded. In Canada, these are Owner Occupied Dwellings (industry L 141), Postal Service (industry number L 131), Other Utility Industries nec (L 134) and Government Royalties on Natural Resources (industry number L 140). Owner Occupied Dwellings and Government Royalties on Natural Resources were considered as improperly defined industries for productivity analysis while capital stock data were not available for the Postal Service Industry and Other Utility Industries. In United States, capital stock data are also responsible for the exclusion of all government enterprises as well as owners occupied dwellings from the aggregate measure of multifactor productivity. The business sector excluding these components is called the *private business sector* in the U.S. accounts.

Text tables 1 through 3 establish the concordance between the input-output L level and the multifactor productivity database PL, PM and PS levels of aggregation. In a few cases, and again because of capital stock data limitations, multifactor productivity estimates refer to a somewhat different group of industries from those regularly published in the labour productivity section: as showed in Text table 2, at the PS level, Wholesale and Retail Trade Industries were grouped together; as shown in Text table 3, at the PM level for Manufacturing Industries, Leather & Allied Products Industries were grouped with Rubber Products Industries, Clothing Industries were grouped with Primary Textile & Textile Products Industries.

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[24] *Empirically, it was impossible, at this stage, to include a measure of natural resources such as land used as inputs. Natural resources are important mostly for primary industries but play only a minor role in other industries.*

Text table 1

Concordance between the PL aggregation level and the link level of aggregation of industries of input-output tables

PL Level Industries					
PL Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
1	Agricultural & related services ind.	011-017 021-023	001-021	001-021	1
2	Fishing and trapping industries	031-033	041-047	041-047	2
3	Logging & forestry industries	0411,0412 0511	031,039	031,039	3
4	Metal mines	0611-0617 0619	051-052 057-059	051-059	4-6
5	Non-metal mines	0621,0622- 0625,0629, 063	061,071- 073,079	061,071 073,077 079	7-10
6	Crude petroleum & natural gas	071	064	063-066	11
7	Quarrying, sand pits & mining serv.	081,082 091,092	083,087 096,098 099	083,087 092,099	12-13
8	Meat & poultry products	1011-1012	1011-1012	101,103	14-15
9	Fish products industry	102	102	111	16
10	Fruit and vegetables industries	103	103	112	17
11	Dairy products industries	104	104	105,107	18
12	Feed industry	1053	106	123	19
13	Misc. food product industries	106,109 1051-1052 1081-1083	105 1081-1083 1089	124,125 131,133 135,139	20,23,24
14	Biscuit, bread & other bakery prod.	1071-1072	1071,10721	128,1291	21,22
15	Beverage industries	111-114	1091-1094	141,143 145,147	25-28
16	Tobacco products industries	121,122	151,153	151,153	29
17	Rubber & footwear products ind.	151-159 1712	1623,1624 1629,174	161,163 169,174	30,33
18	Plastic products industries	161-169	1651,27332	27332,3851	31
19	Leather tanneries	1711	172	172	32

Concordance between the PL aggregation level and the link level of aggregation of industries of input-output tables

PL Level Industries

PL Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
20	Misc. leather & allied prod. ind.	1713,1719	179	179	34
21	Man-made fibre yarn & woven cloth	181,1829	181,183	183,201	35
22	Wool yarn & woven cloth industry	1821	182	193,197	36
23	Misc. textile products industries	191,193 1991-1995 1999	184,1851 1852,1871 1872,1891- 1894,1899	211-215 218	38-39
24	Carpet, mat & rug industry	192	186	216	40
25	Clothing industries exc. hosiery	183,243- 245,2491- 2493,2495 2499	175,2391 2392,243- 249	175,2391- 2392,242- 249	37,41
26	Hosiery industry	2494	231	231	42
27	Sawmills, planing & shingle mills	251	251	251	43
28	Veneer & plywood industries	252	252	252	44
29	Sash, door & other millwork ind.	254	254	254	45
30	Wooden box & coffin industries	256,258	256,258	256,258	46
31	Other wood industries	259	259	259	47
32	Household furniture industries	261	2619	2619	48
33	Office furniture industries	264	264	264	49
34	Other furniture & fixture ind.	269	269	266	50
35	Pulp & paper industries	271	271	271	51
36	Asphalt roofing industry	272	272	272	52
37	Paper box & bag industries	273	2731,2732 27331	2731,2732 27331	53
38	Other converted paper products ind.	279	274	274	54
39	Printing & publishing industry	281,283 284	286,288 289	286,288 289	55

Text table 1

Concordance between the PL aggregation level and the link level of aggregation of Industries of Input-output tables

PL Level Industries					
PL Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
40	Platemaking, typesetting & bindery	282	282	287,8932	56
41	Primary steel industries	291	291	291	57
42	Steel pipe & tube industry	292	292	292	58
43	Iron foundries	294	294	294	59
44	Non-ferrous smelting & refining ind.	295	295	295	60
45	Aluminum rolling casting, extruding	296	296	296	61
46	Copper rolling casting & extruding	297	297	297	62
47	Other metal rolling, casting etc.	299	299	298	63
48	Power boiler & struct. metal ind.	301,302	301,302	301,302	64
49	Ornamental & arch. metal prod. ind.	303	303	303	65
50	Stamped, pressed & coated metals	304	304	304	66
51	Wire & wire products industries	305	305	305	67
52	Hardware, tool & cutlery industries	306	306	306	68
53	Heating equipment industry	307	307	307	69
54	Machine shops industry	308	308	308	70
55	Other metal fabricating industries	309	309	309	71
56	Agriculture implement industry	311	311	311	72
57	Commercial refrigeration equipment	312	316	316	73
58	Other machinery & equipment ind.	319	315	315	74
59	Aircraft & aircraft parts industry	321	321	321	75
60	Motor vehicle industry	323	323	323	76
61	Truck, bus body & trailer industry	324	324	324	77
62	Motor vehicle parts & accessories	325	1652,188 325	2291,325 3852	78

Text table 1

Concordance between the PL aggregation level and the link level of aggregation of industries of input-output tables

PL Level Industries

PL Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
63	Railroad rolling stock industry	326	326	326	79
64	Shipbuilding and repair industry	327	327	327	80
65	Misc. transportation equipment ind.	328,329	328,329	328,329	81
66	Small electrical appliance industry	331	331	331	82
67	Major appliances (elec & non-elec.)	332	332	332	83
68	Record players, radio & tv receiver	334	334	334	84
69	Electronic equipment industries	335	335	335	85
70	Office, store & business machines	336	318	318	86
71	Communications, energy wire & cable	338	338	338	87
72	Other elect. & electronic products	333,337 3391-3399	268,333 336,3391 3399	268,336- 337,339	88-89
73	Clay products industry	351	351	351	90
74	Cement industry	352	352	341	91
75	Concrete products industry	354	354	347	92
76	Ready-mix concrete industry	355	355	348	93
77	Glass & glass products industries	356	356	356	94
78	Non-metallic mineral products nec	357-359	353,357- 359	343,345 352-355 357,359	95
79	Refined petroleum & coal products	361,369	365,369	365,369	96
80	Industrial chemicals industries nec	371	371	378	97
81	Plastic & synthetic resin industry	373	373	373	98
82	Pharmaceutical & medicine industry	374	374	374	99
83	Paint & varnish industry	375	375	375	100
84	Soap & cleaning compounds industry	376	376	376	101

Concordance between the PL aggregation level and the link level of aggregation of industries of input-output tables

PL Level Industries					
PL Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
85	Toilet preparations industry	377	377	377	102
86	Chemical & Chemical Products nec	372,379	372,379	371-372 379	103
87	Jewellery & precious metal ind.	392	392	382	104
88	Sporting goods & toy industries	393	393	393	105
89	Sign and display industry	397	397	397	106
90	Other manufacturing industries nec	391,3991-3994,3999	391,3991-3994,3999	381,383 384,395 398,399	107-108
91	Construction industry	401-449	404-421	404-421	109-117
92	Air transport & services incidental	451,452	501-502	501-502	118
93	Railway transport & rel. services	453	503	506	119
94	Water transport & rel. services	454,455	504,505	504,505	120
95	Truck and other transport ind.	456,4572-4575,4589 4592,4599 996,9991	506-508 517,519	507-508 517,519	121,123 125
96	Urban transit system industry	4571	509	509	122
97	Highway & bridge maintenance ind.	4591	516	516	126
98	Pipeline transport industries	461	515	515	127
99	Storage and warehousing industries	471,479	524,527	524-527	128
100	Telecommunication broadcasting ind.	481	543	543	129
101	Telecommunication carriers & other	482,483	544,545	544,545	130
102	Electric power systems industry	491	572	572	132
103	Gas distribution systems industry	492	574	574	133
104	Wholesale & retail trade ind.	501-599 601-692	10722,2611 602-629 631-699	1292,2611 602-629 631-699	135,136

Text table 1

Concordance between the PL aggregation level and the link level of aggregation of Industries of Input-output tables

PL Level Industries

PL Codes	Industry Title	1980 SIC	1970 SIC	1960 SIC	Link Code
105	Finance, insurance & real est. ind.	701-705 709,711- 729,731- 733,741- 743,7499 7511,7512 759,761	7011-7016 7019,703 705-707 715,7211 7212,735 7371	702,704 7311,7312 735,7371	137-139
106	Service industries	771-777 779,911- 914,921 922,961 962,963- 969,971- 973,979 982,983 991-995 9999,4842 4581	841-845 849,851- 855,861- 864,866 867,869 871,872 874,876 877,879 881,886 891-8931 894-899 512	851,853- 859,861 862,864 866,869 871,872 874-879 891,8931 894-899 512	142-144 148-154 124
107	Educational service industries	851-859	801-809	801-809	145
108	Hospitals	861	821	821	146
109	Other health services	8621,863 865,866 8671,8679 868,8691- 8693,8699	822-827	823-827	147

Text table 2

Concordance between the PS aggregation level and the Input-output link aggregation level.

PS Level Industries			
PS Codes	**Industry Title**	**Link Code**	**PL Code**
1	Agricultural & related services ind.	1	1
2	Fishing & trapping industries	2	2
3	Logging & forestry industries	3	3
4	Mining, quarrying & oil well ind.	4-13	4-7
5	Manufacturing industries	14-108	8-90
6	Construction industries	109-117	91
7	Transportation & storage industries	118-123 125-128	92-99
8	Telecommunication industries	129,130	100-101
9	Electric power & gas dist. ind.	132,133	102,103
10	Wholesale and retail trade industries	135,136	104
11	Finance, insurance & real est. ind.	137-139	105
12	Community, business, person. serv. ind.	124,142-154	106-109

Text table 3

Concordance between the PM aggregation level and the Input-output link aggregation level.

PM Level Industries Manufacturing			
PM Codes	**Industry Title**	**Link Code**	**PL Code**
5	Food industries	14-24	8-14
6	Beverage industries	25-28	15
7	Tobacco products industries	29	16
8	Plastic products industries	31	18
9	Rubber, leather & allied prod. ind.	30,32-34	17,19,20
10	Textile, textile products & clothing ind.	35-42	21-26
11	Wood industries	43-47	27-31
12	Furniture & fixture industries	48-50	32-34
13	Paper & allied products industries	51-54	35-38
14	Printing, publishing & allied ind.	55,56	39,40
15	Primary metal industries	57-63	41-47
16	Fabricated metal products industries	64-71	48-55
17	Machinery industries	72-74	56-58
18	Transportation equipment industries	75-81	59-65
19	Electrical & electronic products	82-89	66-72
20	Non-metallic mineral products ind.	90-95	73-78
21	Refined petroleum & coal products	96	79
22	Chemical & chemical products industries	97-103	80-86
23	Other manufacturing industries	104-108	87-90

APPENDIX 4

Quality ratings of multifactor productivity and related data.

The multifactor productivity estimates presented in this publication are assigned quality ratings in order to provide an overall assessment of their relative quality. Data quality assessment is a subjective process which depends on a large number of factors. One is whether the basic data are obtained from a census or survey obtained by sampling. The quality of these sources is affected by factors such as questionnaire design, response rate, editing and the degree of imputations. In the case of sampled data, quality is further dependent on sample design and sample size. In addition, some statistical information is derived residually while some other is estimated.

The quality rating for multifactor productivity relies on the quality rating for gross output, intermediate inputs and the primary inputs of capital and labour.

The quality ratings of the productivity data sources coincide with the data quality ratings of the source. Thus, inputs and outputs in current and constant prices from the Input-Output tables carry the quality ratings of the tables as described in Appendix A of *The Input-Output Structure of the Canadian Economy*, Catalogue 15-201. Capital stock data quality is based on the ratings of business investment as given by the Input-Output tables. The quality ratings at the aggregation level L are given for outputs, inputs and GDP in current and constant dollars in the above publication. The quality ratings for various levels of capital expenditures are also given in current and constants dollars in the same publication. The quality ratings of employment and labour compensation are discussed in Appendix 4 of part 1 in the Labour Productivity part of this publication.

The quality ratings of basic data at the aggregation level PS and PM are obtained by weighted ratings using value shares as weights. The quality assessment of multifactor productivity estimates is based on the combined quality ratings of input of labour, capital and intermediate inputs. The final quality rating of multifactor productivity is calculated for 109 business sector industries and aggregated to the PS and PM levels. When applicable, ratings shown in text tables 4 and 5 of this appendix are rounded to the nearest highest quality rating to account for the quality increasing effect of aggregation.

Quality ratings in 1988 show an improvement over those of 1987. This is due to quality improvements of output, capital and intermediate inputs. The new method of establishing quality ratings of labour input based on the relative quality of data components (as opposed to rating the data source as in previous years) does affect labour input ratings at disaggregated levels.

Text table 4

Quality ratings of the components of multifactor productivity estimates by industry at aggregation level PS and for the business sector industries, 1988

Industry Title	Gross Output		Labour Inputs		Capital Inputs		Intermediate Inputs		GDP		MFP Index
	C$	K$	C$	pers.*	C$	K$	C$	K$	C$	K$	
Agricultural & related services ind.	2	2	3	3	2	2	2	2	2	2	2
Manufacturing industries	1	1	1	2	1	2	1	1	1	1	1
Construction industries	2	3	2	2	2	3	3	3	3	3	3
Transportation & storage ind.	1	2	2	2	1	2	2	2	2	2	2
Telecommunication industries	1	1	1	1	2	2	2	2	1	2	1
Wholesale and retail trade	1	2	2	2	2	2	3	3	2	2	2
Business sector	...	...	1	1	1	2	...	...	1	1	1

* Persons at work

Text table 5

Quality ratings of the components of multifactor productivity estimates by manufacturing industry at aggregation Level PM, 1988

Industry Title	Gross Output		Labour Inputs		Capital Inputs		Intermediate Inputs		MFP Index
	C$	K$	C$	pers.*	C$	K$	C$	K$	
Food industries	1	1	1	1	1	2	1	2	1
Beverage industries	1	2	1	1	1	2	2	2	2
Tobacco products industries	1	1	1	1	1	2	1	1	1
Plastic products industries	1	1	1	3	1	3	1	1	1
Rubber & leather	1	1	1	2	1	2	1	1	1
Textile, textile prod. & clothing ind.	1	1	1	2	1	2	1	1	1
Wood industries	1	1	1	2	1	2	1	2	1
Furniture & fixture industries	1	1	1	3	1	2	1	1	1
Paper & allied products industries	1	1	1	1	1	2	1	1	1
Printing, publishing & allied ind.	1	2	1	3	1	2	2	2	2
Primary metal industries	1	1	1	1	1	3	1	2	1
Fabricated metal product industries	1	1	1	3	1	3	1	1	1
Machinery industries	1	1	1	3	1	3	1	1	1
Transportation equipment industries	1	1	1	1	1	2	1	2	1
Electrical & electronic products	1	2	1	1	1	2	1	2	1
Non-metallic mineral products ind.	1	1	1	2	1	2	1	1	1
Refined petroleum & coal products	1	1	1	1	1	3	1	2	1
Chemical & chemical products ind.	1	1	1	1	1	3	2	2	1
Other manufacturing industries	1	1	1	3	1	2	1	1	1

* Persons at work

APPENDIX 5

Multifactor productivity and related data in CANSIM

TECHNICAL SERIES

INPUT-OUTPUT DIVISION

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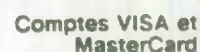
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