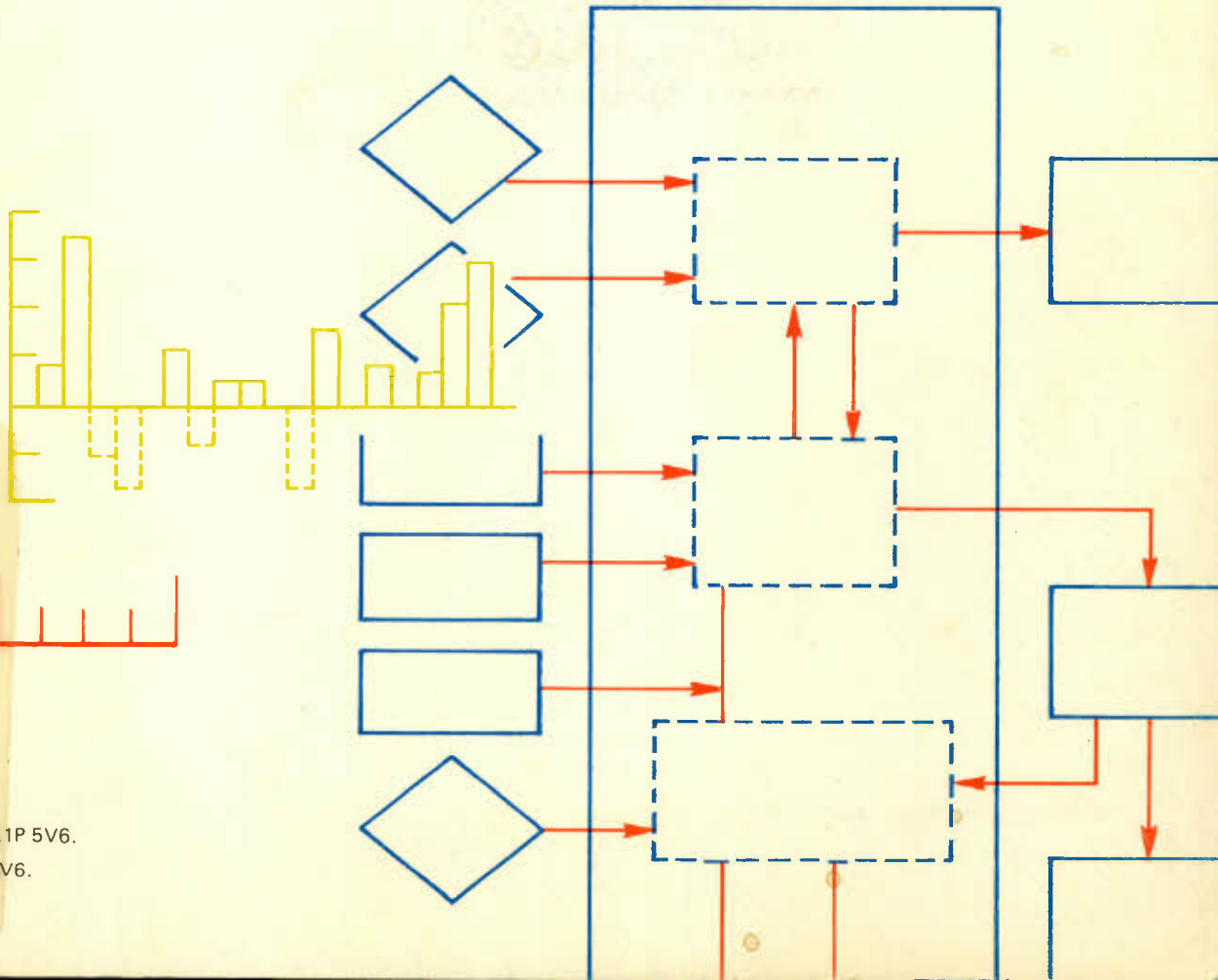A paper prepared for the
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DISCUSSION PAPER NO. 161

Wage Structure and Stagflation in the 1970s

by

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prepared for

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RÉSUMÉ

Ce document étudie, à partir des résultats de l'Enquête
annuelle sur les salaires du ministère canadien du Travail,
la structure des salaires de la décennie 1970-1980 selon le
poste occupé, le secteur industriel, la région et le statut
syndical. Il met particulièrement l'accent sur deux aspects
de la structure des salaires : ses effets sur l'inflation,
ainsi que son incidence sur la productivité et sur la
répartition des ressources.

De nombreux économistes font de la politique monétaire et
budgétaire le premier responsable de l'inflation, tandis que
pour d'autres, ce sont certains agents économiques,
notamment les travailleurs, qui font monter les coûts et les
prix. Pour ce qui est du marché du travail, on reproche aux
travailleurs, et tout particulièrement aux travailleurs
syndiqués, de vouloir se rattraper et se dépasser les uns
les autres, et de déséquilibrer la structure salariale tout
en faisant monter les prix. Et cependant, mise à part une
légère aggravation des différences salariales entre les
professions de 1971 à 1974, suivie par un resserement minime
entre 1974 et 1977, on constate au cours des années 1970 que
la hiérarchie des salaires selon les professions reste
stable quels que soient la région, le secteur industriel ou
le statut syndical considérés. Quant à l'écart des salaires
à l'intérieur des professions, il a en moyenne diminué
légèrement entre 1974 et 1977, mais il nous a été impossible
d'établir une comparaison avec la période 1971-1974.
L'analyse de régression visant à expliquer les fluctuations
relatives du salaire d'une spécialité entre 1974 et 1977 a
donné des résultats peu révélateurs ou inattendus.

Nous avons procédé à une évaluation du rôle des syndicats
dans l'inflation des salaires, entre 1974 et 1977, en
multipliant les variations des écarts de salaire entre
secteurs syndiqué et non syndiqué par le pourcentage de la
syndicalisation pendant la même période. On estime cette
part d'inflation attribuable à l'action syndicale à moins de
2 %, alors que les salaires augmentaient de 60 % pendant la
même période. Pour pouvoir chiffrer l'inflation imputable à
l'action syndicale, il faut donc identifier les
répercussions des augmentations de salaire du secteur
syndiqué sur le secteur non syndiqué; dans le cas, par
exemple, où on veut éviter la syndicalisation des ouvriers
d'une usine. Ce calcul est difficile, si l'on veut par
ailleurs rendre compte de la stabilité de la structure
salariale des années 70. Il est plus facile de soutenir que
la politique monétaire et budgétaire a répercuté un rythme
d'inflation des salaires égal dans tous les secteurs du
marché du travail pris en considération par cette étude.

Pour ce qui est de la productivité, l'étude se penche plus particulièrement sur la pénurie de main-d'oeuvre qualifiée ressentie ces dernières années dans tout le Canada, et surtout chez les travailleurs manuels. Il devrait normalement en résulter un élargissement de l'écart salarial entre ouvriers qualifiés et ouvriers non qualifiés. Toutefois cet écart a diminué au cours des années 70, notamment entre 1974 et 1977, surtout à cause de l'activité des syndicats, mais il s'est creusé pour toutes les professions dans le secteur non syndiqué, aggravation compensée par un resserrement dans le secteur syndiqué. En conclusion, le déséquilibre de la répartition des ressources de main-d'oeuvre, et surtout la pénurie d'ouvriers qualifiés, est sans doute un problème plus préoccupant que l'inflation des salaires pendant la décennie 1970.

SUMMARY

This paper uses the data from the annual Wages Survey of the Canada
Department of Labour to examine the structure of wages in the 1970s
according to occupation, industry, community and union status. Two
aspects of the structure of wages are considered: its effect upon
inflation and its effect upon productivity and resource allocation.

While most economists view inflation primarily as a product of monetary
and fiscal policy, others view a number of sectors of the economy,
including labour, to be responsible for pushing up costs and prices.
In the case of the labour market, workers, particularly unionized
workers, are blamed for trying to catch and surpass other workers and
thereby destabilize the wage structure while forcing up prices. Yet
this study finds the rankings of wages by occupation to be very stable
for the 1970s regardless of community, industry, or union status, although
there was a slight widening of occupational wage differentials in 1971-
1974 followed by a slight narrowing in 1974-1977. Wage differentials
within occupations also declined slightly on average between 1974 and
1977, but no comparison with the 1971-1974 period was possible. Regres-
sion analysis to explain changes in the relative position of the wage of
an occupation between 1974 and 1977 produced weak and often unexpected
results.

The contribution of unions to inflation between 1974 and 1977 was esti-
mated by examining changes in the union - nonunion wage differential
multiplied by the proportion of the labour force unionized during that
period. This contribution was estimated to be less than 2% compared to the
60% increase in wages during the period. To make a case for union-induced
inflation, therefore, one must make a case for unions increasing nonunion
wages - for example, to prevent unionization of nonunionized plants. This
argument is difficult to construct, since it must explain the stable wage
structure of the 1970s. It is easier to argue that monetary and fiscal
policy has accomodated wage inflation at a similar rate in all sectors of
the labour market considered in this paper.

Turning to productivity, the paper concentrates on the shortage of skilled
labour reported throughout Canada, particularly in non-office occupations,
during the past few years. Widening of skilled-unskilled wage differen-
tials should be expected to result. Yet these differentials generally
narrowed during the 1970s, particularly between 1974 and 1977. A major
factor in this narrowing during the 1974-1977 period appeared to be
union activity. The differentials actually widened in most occupations
for nonunionized employees but this was offset by the narrowing of
differentials for almost every occupation considered among unionized
employees. Of the two problems involving the Canadian wage structure,
therefore, distortion of the allocation of labour resources, in the form
of skill shortages in particular, may be more serious than wage inflation
in the 1970s according to the results of this paper.

I. INTRODUCTION: STAGFLATION, WAGES AND UNEMPLOYMENT

A new word has entered the economist's vocabulary to describe the economic
performance of the 1970s - stagflation. It denotes the coincidence of
historically low rates of economic growth with historically high rates
of price inflation. The purpose of this paper is to examine the role
that the structure of wages may have played in the Canadian stagflationary
experience.

Conventional Keynesian economic theory argues that price inflation will
occur when the economy approaches its maximum potential growth rate as
shortages arise for materials and final products. Conversely, price
inflation should decline when the economy is growing at rates well below
its potential since shortages will disappear and, in some cases, be
replaced by surpluses of material and products. Since government monetary
and fiscal policy can determine the growth rate of the economy relative to
its potential, it can also determine the rate of inflation in the economy
at the same, or at a slightly later, time.

The first two columns of Table 1 indicate that the economy performed
according to the conventional wisdom prior to 1974. It experienced
relatively high inflation rates when the rate of growth of Gross National
Product was high, such as in 1969 and 1972-73, and low inflation rates
during and following the mild growth recession in 1970. Since 1974, how-
ever, the rate of price inflation has remained relatively high through two
recessions in 1975 and 1977 and the expected positive correlation between
the rate of growth and the rate of inflation has disappeared.

The bottom rows of Table 1 indicate the stagflation dilemma: during the
last five years the average rate of price inflation has been double what
it was in the previous five-year period while the average rate of growth
of the Gross National Product has almost been cut in half. Part of the
explanation for the lower rate of economic growth is that the government
has restrained the economy below potential in order to combat the alarming
trend toward higher price inflation. The resistance of price inflation to
traditional deflationary policies adopted by the government is the major
concern of economic policy makers.

Economists have become more and more interested in the role of the labour
market in the relationship between economic growth and price inflation.
On the one hand, low rates of economic growth are associated with low rates
of growth of employment, and therefore with high rates of unemployment
unless the rate of labour force entry is falling sufficiently to offset the
slow employment growth. Since the rate of labour force entry has been
steadily rising in Canada during the 1970s the third column of Table 1
shows that unemployment rates have also been rising since the period of
slow growth began in 1974. On the other hand workers base wage claims on
the expected rate of inflation to protect their purchasing power, and upon
past unanticipated rates of inflation, and wages are an important component
of unit production costs and prices. Hence Table 1 shows that rates of wage
change, measured in columns 4 and 5 by average hourly earnings in manufac-
turing and by base rate settlements in large bargaining units, have

generally followed the upward trend of prices with the possible exception of 1978. Policy analysts fear that wage rates will increase sharply in 1979 and subsequent years as workers attempt to recover losses in purchasing power in 1977-78 and as workers anticipate the continuation of inflation rates near 9%.

TABLE I

	Real GNP	CPI	Unemployment Rate	Avg.Hr. Earnings in Mfg.	Wage Settlements[1]
1969	5.3	4.6	4.4	8.1%	7.5%
1970	2.5	3.3	5.7	7.9	8.5
1971	6.9	2.9	6.2	9.0	7.8
1972	6.1	4.8	6.2	7.9	7.7
1973	7.5	7.5	5.6	8.8	9.8
1974	3.6	10.9	5.3	13.5	14.3
1975	1.3	10.8	6.9	15.8	17.1
1976	5.5	7.5	7.1	13.8	10.2
1977	2.7	8.0	8.1	10.8	7.7
1978	3.5	9.0	8.4	7.1	7.0
1968-1973	5.7%	4.6%	5.6%	8.3%	8.3%
1974-1978	3.3	9.2	7.2	12.1%	11.3

[1] Average annual compound increase in the base rates of settlements involving 500 or more employees.

Source: Bank of Canada Review (May, 1979) Tables 53, 57, 62 and 63.

As unemployment rates rise, economists generally expect rates of wage inflation to moderate relative to the prevailing rate of price inflation. Surplus labour, the threat of further layoffs, and the lack of alternative employment opportunities allow employers to resist wage demands more effectively. This inverse relationship between the unemployment rate and wage inflation, the Phillips curve, provides a link between the rate of growth and the rate of price inflation as growth affects unemployment which affects wage inflation which affects price inflation. Not surprisingly, then, the Phillips curve relationship appears to have broken down in the 1974-1978 period as unemployment rates and the rate of wage inflation have both risen. This apparent breakdown is seen to be one important aspect of the stagflation problem.

Economists concerned with such macroeconomic issues as stagflation and the Phillips curve normally speak of a single aggregate wage level and a single rate of change of wages, as is presented in Table 1. Yet wages vary according to the characteristics of the worker (such as his training and occupation), according to the characteristics of the job performed (such as the working conditions and industry) and according to the geographic location of the employment. Wage structure is concerned with the relationship between wage rates and any combination of these characteristics. For example, the generally positive correlation between wage rates and years of schooling is one aspect of wage structure.

This paper is concerned with the role of wage structure in declining growth rates and rising rates of price inflation in Canada in the 1970s. On the one hand, the wage structure allocates different types of workers to different types of jobs in various locations. Trained workers, for example, require higher wage rates than untrained workers to compensate them for whatever cost is involved in the acquisition of that additional training. If they did not receive sufficient compensation due, for example, to wage bargaining effects to be discussed in the next paragraph, these workers would forego training. If that foregone training were in demand and therefore productive, output would fall. Hence wage structure may affect worker productivity and thereby economic growth.

On the other hand, trends in the wage structure provide a basis for wage bargaining. If the wage paid to trained workers falls for example, educated workers may try to restore previous wage differentials with untrained workers. To the extent that employers of trained workers agree with their arguments, or are too vulnerable to resist their demands, previous wage differentials between trained and untrained workers may be restored. Untrained workers may, however, resist these efforts to erode recently established wage differentials with trained workers and attempt to re-establish them or to narrow them even further. Resistance to these wage claims in the form of restrictive monetary and fiscal policy may be effective, but at the cost of higher unemployment and slower growth in the short run. Hence government policy may accomodate these wage claims to some extent and changes in the wage structure, sometimes known as "leapfrogging", will raise aggregate wage levels and thereby price inflation while also retarding economic growth to the extent that government policy is not fully accomodative.

Examination of the effect of all aspects of wage structure on productivity and inflation is clearly beyond the scope of a single paper. Hence, only a few frequently discussed relationships will be considered. In the next section, some important factors affecting the structure of wages will be described briefly. In the third section some analysis of the role of wage structure in inflation will be presented. In the final section some possible effects of wage structure on productivity will be examined.

II. AN OVERVIEW OF FACTORS AFFECTING THE STRUCTUE OF WAGES

Economists have traditionally examined wage differences in terms of counterbalancing circumstances and lack of competition. The counter-balancing circumstances, or net advantages of employment can be further divided into differences in the cost of learning the business such as apprenticeship programs and education, or differences in the work itself, such as its agreeableness, responsibility, constancy, probability of success or social status. The lack of competition may result from institutional barriers, such as trade unions and other employee associa-tions, and from transaction and mobility costs that force wages to rise temporarily in certain jobs where demand is high to attract new workers.

Since 1960 much of the attention in the academic literature has been on the cost of learning the business, or training, as the basis for the human capital approach to the analysis of wage structure. Training may be either acquired in institutions, and referred to as schooling or education, or in the workplace. Although education is considered to be general training that raises productivity in a number of different jobs, on-the-job training may be specific to the particular enterprise providing the training. Although Becker's pioneering work on human capital theory made this distinction between general and specific training, most sub-sequent research has concentrated on general training that resides in the individual and not the job he occupies. Hence human capital wage differentials are based upon differences in the training required in different occupations and upon differences in work experience in a given occupation, rather than upon differences among firms or industries in the specific training they provide.

In the 1970s several dissenting views on the human capital approach to wage structure have argued that more emphasis should be given to specific training. To the extent that specific training varies according to technological and organizational factors, wages may vary according to industry and establishment size.[1]

Industrial wage differentials for a given occupation, with specified general training requirements, may also arise because of factors other than specific training, such as differences in the nature of the work or lack of competition. Differences in the work mentioned above are likely, however, to differ among occupations to a far greater extent than among industries for any given occupation. Differences in the extent of union organization and coverage by a collective agreement among industries would likely be far more significant, since union wages may be as much as 40% above nonunion wages in Canada.[2] Mobility costs could force firms to pay significantly higher wages in the short run in industries where employ-ment growth is rapid, although evidence to this effect is weak.[3] Finally, mobility costs may lead in particular to geographical wage differentials for a given occupation and industry where employment growth and consequent labour shortages are confined to particular communities or regions.

The function of the wage structure in an economy is to allocate workers to particular occupations and, within those occupations, to particular industries, firms and communities. Suppose that there is a shortage of welders for the petroleum industry in northern Alberta. Wages will rise for welders in that area to attract the requisite skills. Three sources of labour supply are available. First, welders in other industries in northern Alberta may move into the petroleum industry if wage differentials compensate for job transfer costs, such as loss of seniority and pension rights. This is likely to create shortages of welders in these other industries in northern Alberta and cause the wages of welders to rise in general in the area. Secondly, welders from other parts of Canada may move to northern Alberta, particularly if they are unemployed in their home region or if wage differentials are sufficient to offset moving costs. Thirdly, more northern Albertans may train to be welders, either at the initiative of the petroleum firms or the provincial and federal governments' manpower programs. Those who undertake this training are likely to be those with an aptitude and preference for welding and who have financial support to undertake the training program. Manpower programs normally attempt to provide such financial support to low-income and unemployed workers to give them the opportunity to acquire skills and raise their productivity and income.

Collective bargaining and other institutions may frustrate this realloca-tion process by preventing requisite wage differentials or by establishing barriers to entry to the occupation. In such cases, the shortage of welders could be expected to slow down production and reduce the produc-tivity of the entire workforce of the petroleum industry in northern Alberta. Of course, unions may also assist the reallocation process by encouraging welders in affiliated locals across Canada to move to northern Alberta, particularly if the unions also permit higher wages to be paid to them if they move to compensate for the moving costs they will incur.

In summary, then, we would like to have information on Canadian wage rates by occupation (to allow for differences in training) and by level of experience. We would also like to have some industrial and geographical breakdown within occupations to account for net advantages and mobility costs, and would like to have a breakdown by union - non-union status. This type of information is available, to a limited extent, in the wages survey of the Canada Department of Labour. This unique source of annual data on occupational wages in Canada by selected characteristics is des-cribed in Appendix I.

Before turning to the evidence from the survey, it should be noted that both compensation to workers and labour costs to employers should include fringe benefits as well as wages. Evidence on fringe benefits is less readily available than evidence on wages, and more difficult to interpret. Conclusions reached from evidence on wages in this study hold only insofar as the amount of fringe benefits workers in an organization receive is generally not inversely correlated with their wages.[4]

III. WAGE STRUCTURE AND INFLATION

An important question in the analysis of inflation continues to be the
role of demand and supply forces. The conventional view among economists
is that inflation is generated and maintained by excessive expansion of
the money supply and by government expenditure designed to stimulate
economic activity and reduce unemployment. This "demand pull" inflation
can be reduced most effectively by government policies to restrict the
growth of the money supply and its own expenditures. If the level of
unemployment or economic growth that results from stable prices is
unacceptable, the solution is not to overstimulate the economy and renew
inflation for temporary improvements in these indicators but to intervene
in particular sectors where employment and growth are unsatisfactory.
Three areas have been cited in the recent Canadian debate. First, the
rising participation rates of youth and married females have created a
large and sudden surplus of inexperienced workers who have had difficulty
obtaining employment. Hence government manpower programs to subsidize the
training of inexperienced workers, such as the Job Experience Training
(JET) program, have been developed. Secondly, increases in unemployment
insurance benefits since 1971 are thought to have increased the incentives
to be unemployed by extending job search duration and by increasing the
frequency of job turnover. The recent decision to reduce unemployment
benefits should have the opposite effect and reduce unemployment. Finally,
there has been discussion of a possible industrial strategy to shift the
economy away from industries with low growth and employment potential,
such as clothing and textiles, toward industries with better prospects.
This strategy could involve such programs as the reduction of tariff and
non-tariff barriers and adjustment assistance for displaced workers.

A second view of inflation, less popular among economists[5] if not the
general public, is that some suppliers either generate or perpetuate
a bout of inflation by raising prices when excess demand does not warrant
it. These cost increases force prices to rise in other sectors that use
those products, resulting in cost push inflation. Economists may argue
that cost push inflation requires monetary or fiscal validation; that is,
if the government does not overstimulate the economy then these price
increases will be checked rapidly by reduced demand and by excess supplies
of goods and services. The counterargument is either that the money supply
cannot be controlled sufficiently well by the federal government to prevent
monetary validation or that the excess supply in the economy is too high
a price to pay to stop inflation, particularly if the cost push pressures
are frequent. A preferable policy to restriction of the money supply and
government expenditure may be direct elimination of the cost push pressures
by wage and price regulation or by elimination of the power of certain
suppliers to raise prices regardless of excess demand conditions.

Labour is one area where cost push pressures have been thought to originate.
Concern over the power to raise wages has been particularly acute with
regard to sectors where there is a monopoly of labour supply, such as the
unionized sectors and sectors dominated by professional associations, and

in the public sector where employer resistance is suspect.[6] This power
may not be exerted continuously because of its adverse impact on employ-
ment. These sectors may push harder for higher wages when output and
employment growth is strong, for example, and layoffs of current employees
will not occur.[7] Hence restrictive monetary and fiscal policy will affect
wage settlements in these sectors as well but to a lesser extent than
would be the case in the absence of monopoly power. This paper will
examine the role of unions and occupations in the public administration
sector in the inflationary process, but lack of data for the professional
occupations prohibits analysis of their role in cost push inflation.

Before focussing on wages, it should be noted that cost push inflation
may arise outside the labour market. Prices of raw materials may increase,
the obvious example being petroleum since the formation of the cartel,
the Organization of Petroleum Exporting Countries, in 1974. There might
be a general rise in import prices due to depreciation of the Canadian
dollar that cannot be attributed to the difference between Canadian and
foreign rates of price inflation. Finally, cost push inflation may
originate in the product market because of profit-taking by firms with
control over their prices.[8] These price increases may then be transmitted
through the labour market by workers seeking to account for a higher cost
of living in bargaining for specific real, rather than money, wage levels.
In such cases the impetus to cost push inflation does not lie in the
labour market but in other sectors of the economy, although there may be
concern with the behaviour of the labour market in transmitting the
inflation.

Changes in the Canadian Wage Structure 1971-1977

We will refer subsequently to cost push inflation that originates in the
labour market, or that originates elsewhere and is magnified by the
labour market, as wage push inflation. Such inflation would be expected
to generate some instability in the occupational wage structure as those
workers with power to raise wages generated wage increases in excess of
those of other workers in similar economic circumstances. Thus, for
example, our earlier discussion suggested that unionized workers should
improve their standing in relation to nonunionized workers in the same
occupation, particularly in industries where employer resistance is
relatively weak such as public administration. In addition, such improve-
ments may be expected to be based on attempts to have parity or better
with higher paid, and perhaps equally powerful, workers in other occupations.
Since all wages are not negotiated at the same time, we would expect to
observe a continual process of erosion and restoration of
occupational wage differentials, commonly referred to as "leapfrogging"[9],
in addition to permanent interchanging of positions in the wage hierarchy
as more powerful groups of workers move up.

Such instability may also be a consequence of demand pull inflation if it
is uneven across sectors at any point in time. Wages may rise at different
rates in different industries where competition exists in order to reallo-
cate workers from lagging sectors to those growing rapidly. Hence the wage

structure may be unstable across industries but not within industries
unless the excess demand for labour is concentrated in particular
occupations. Hence evidence of an unstable wage structure may support
either cost push or demand pull inflation, but evidence of wage stability
appears to be consistent only with demand pull inflation in the absence
of significant sectoral demand shifts or in the absence of significant
response to those shifts due to lack of competition.[10]

Appendix II compares the ranking of the occupational wage for various
years in the 1970s for various communities and for Canada by means of
Spearman correlation. The generally high values of the coefficients in
all cases, corresponding to low significance probability measures, indi-
cate the stability of the Canadian occupational wage structure in this
decade over time periods ranging from one to six years.

Perfect stability of the wage structure, indicated by a Spearman correla-
tion coefficient of 1.000, would not be expected due to shifts in the
supply and demand for different types of labour, changes in the extent of
unionization of various occupations, and changes in the industrial compo-
sition of occupations. Yet highly unstable occupational rankings are
found only in Calgary in nonmanufacturing for 1971 compared with 1974 and
1977. The wage instability was less pronounced in 1974-77 than it was in
1971-74, however, despite the higher inflation rates during the former
period. Furthermore, those sectors where instability might be expected
to be greatest, the unionized sector and public administration, exhibit
very stable occupational wage structures for all periods and communities
examined. When the unionized and nonunionized sectors are combined, there
is no evidence of unionized workers leapfrogging one another or passing
other nonunionized workers. Hence, even with as fine occupational categories
as we have available in this sample, evidence of occupational wage instabi-
lity or leapfrogging implied by cost push inflation cannot be substantiated.

Another method of examining the stability of the occupational wage structure
is to consider the actual changes in the level of the wage of each occupa-
tion relative to other wages or to the average wage of all occuaptions
in the sample. Although the occupational wage rankings were stable, there
may have been substantial changes in the absolute or relative wage differ-
entials, which will be the subject of further investigation later in the
context of skill differentials. Table 2 simply shows the standard deviation
of occupational wage and salary rates as a proportion of the average wage
or salary, a statistic referred to as the coefficient of variation, for
various sectors, time periods and communities.

Table 2 indicates a general increase in the coefficient of variation from
1971 to 1974 in the cities examined, followed by a general decline in that
measure from 1974 to 1977. In other words relative wage differentials may
have widened from 1971 to 1974 and narrowed between 1974 and 1977. For
Canada as a whole during the period 1975-1976, however, the coefficient
of variation showed no discernible trend. Although wage rate differentials

appeared to have widened considerably between 1971 and 1974, this may
be due to the lack of comparability between the 1971 and the 1974 and
1977 samples. Many occupations were not reported in 1971, such as
those related to electronic data processing, and this reduced the
sample size for wage earners in particular in 1971. The less dramatic
widening of differentials indicated by the data on salary rates, where
few of the occupations reported in 1974 and 1977 were not reported in
1971, is likely to be more indicative of actual wage patterns.

It is also possible to examine the changes in the distribution of wages
within occupations from the data. Table 3 shows the intraoccupational
wage dispersion for various communities and years. The data suggests a
slight narrowing of wages within occupations during the mid-seventies,
although this trend was reversed for Canada as a whole between 1976
and 1977.

Finally, one can attempt to explain any changes that occurred in the
wage or salary rate of an occupation relative to the average wage of
all occupations (DWREL) on the basis of the factors mentioned in section
two. The following explanatory variables were used: the change in the
proportion of the occupation unionized (DU) to reflect changes in compe-
titive conditions, the change in the proportion of the occupation in
establishments with 500 or more employees (DLG1) or 100 or more employees
(DLG2) and the change in the proportion of the occupation in manufacturing
(DNM) or transportation (DNTS) or trade (DNTD) or finance (DNF) or public
administration (DNPA) to reflect changes in the nature of the work or the
extent of specific training, and the proportionate change in employment
in the occupation (DN) to reflect changes in labour demand. The detailed
results are shown in Appendix III.

The explanatory power of these regressions was generally very low, perhaps
due to the general stability of the wage structure and the consequently
small variations in DWREL or perhaps due to bias in the employment
estimates derived from the Wages Survey as discussed in Appendix I.
Furthermore, the results for several of the explanatory variables are
unexpected. The coefficient of DU is negative and significant for Canada
and negative, but insignificant, for Toronto. This sign indicates that
increased unionization of an occupation relative to other occupations
reduces its wage relative to those occupations. Union growth does not
appear to pay, perhaps because unions expand by organizing workers who
are lower paid than they are. For Canada and Montreal, the coefficient
for DLG2 is negative, indicating that growth in firm size leads to lower
wages, despite the fact that larger firms are generally found to pay
higher wages, about 7-10% more in our sample. The coefficient for DN
is negative, although insignificant, when entered into the regressions
although we would expect that greater relative employment growth in an
occupation would raise wages, other things being equal.[11] This suggests
that sectoral demand shifts did not affect interoccupational wage differ-
ences as might be expected. Finally, the industry variables are never
consistently negative or positive with the exception of trade, which
depresses relative occupational wage differentials as expected.[12] Public
administration was found to raise wages significantly in Toronto and Halifax
but not elsewhere, and the variable was insignificant for Canada as a whole.

TABLE 2

The Coefficient of Variation of Canadian Occupational Wage Rates for Various Components and Years

Year	Canada			Toronto			Montreal			Vancouver		
	All	Union	Public Admin	All	Union	Public Admin	All	Union	Public Admin	All	Union	Public Admin
1971				0.14		0.10	0.12		0.11	0.09		0.13
1974				0.22	0.20	0.17	0.21	0.18	0.17	0.20	0.19	0.12
1975	0.21	0.18	0.19									
1976	0.21	0.17	0.16									
1977	0.21	0.18	0.17	0.20	0.16	0.19	0.20	0.16	0.13	0.17	0.16	0.15

The Coefficient of Variation of Canadian Occupational Salary Rates

Year	Canada			Toronto			Montreal			Vancouver		
	All	Union	Public Admin	All	Union	Public Admin	All	Union	Public Admin	All	Union	Public Admin
1971				0.23		0.23	0.23		0.26	0.23		0.25
1974				0.26	0.30	0.31	0.29	0.26	0.29	0.24	0.24	0.28
1975	0.26	0.25	0.26									
1976	0.26	0.25	0.26									
1977	0.26	0.25	0.26	0.26	0.28	0.27	0.27	0.23	0.27	0.24	0.20	0.24

TABLE 3

Intraoccupational Wage Dispersion[1] for Various Communities and Years

Year	Canada	Toronto	Montreal	Vancouver
1974		0.22	0.25	0.22
1975	0.27			
1976	0.25			
1977	0.26	0.22	0.22	0.21

---

[1] The interquartile range divided by the median. This information was not available in the 1971 survey.

The Effects of Unions on Canadian Wage Inflation 1974-1977

The previous section found that unions had little impact on the structure of occupational wages in Canada in the mid-1970s. The rankings of both unionized and combined unionized and non-unionized occupational wages were stable from 1974-1977, although relative wage differentials in the unionized sector appear from Table 2 to have narrowed to a greater extent than overall wages.[13] Hence low-wage unionists may have advanced, or high-wage unionists may have lost ground, relative to all workers without significantly disturbing the occupational wage rankings.

In this section we will examine the effect of union wage gains on wage inflation. We will begin with a discussion of the measurement of union wage effects before turning to the empirical evidence. The conventional method of measuring the effect of unions on wages is to compare the wages of comparable unionized and nonunionized workers. In this case we are examining workers in the same fine occupational category, so that workers should have similar training, although the industrial composition of the groups may vary. It must be noted, however, that occupational training may differ systematically by union status because higher union wage rates could attract better qualified workers. Hence the observed union-nonunion wage differentials by occupation may overestimate the effect attributable to union status.

A second measurement problem arises because the threat of unionization may cause employers of nonunion workers to raise their wages above what they would have been in the absence of a union. This would cause the union-nonunion wage differential to underestimate the union wage effect. The threat effect can be minimized by measuring the differential as broadly as possible across communities and industries.[14] Both the above problems,

however, are particularly important regarding the level of the union
wage effect. We will be concerned with changes in the union wage
effect rather than its level so that problems will arise only if
there are systematic changes in skill differentials by union status
or in the size of the unmeasured threat effect during the period under
consideration.

Do union members receive higher wages? According to the Wages Survey
for Canada the answer is yes - about 8.4% in 1975, 12.3% in 1976 and
12.0% in 1977 on average for the 73 occupations included. The latter
results are within the range of 10-17% found for Canada by Starr (1973)
and for the United States in a variety of studies reviewed by Lewis
(1963), although they are substantially below the estimates for Canada
by Macdonald and Evans (1979). Furthermore, the wage differential
appears to have increased from 1975 to 1977 by about 3.6%, which may
have contributed to recent inflation.

What happens when unions raise their wages above what they would have
been without further union activity? Behaviour of real wages, that is
wages adjusted to reflect actual purchasing power, in the nonunionized
sector is crucial. If the union raises wages further than is dictated
by market forces, fewer workers are employed at union rates than other-
wise.[15] In other words, employers of unionized labour economize on
this factor by substituting other factors for it or, if they are unable
to hold down prices by such actions, by losing sales and reducing output.
These workers are thereby released to find jobs in the nonunionized
sector. If real wages in this sector are sufficiently flexible these
workers will be rapidly absorbed. Real wages will be lower in the
nonunionized sector than they would have been in the absence of union
activity to widen differentials, encouraging the substitution of
nonunionized for unionized labour and the sales of products using cheaper
nonunionized labour relatively intensively. If real wages in the non-
unionized sector are inflexible downward, however, absorption of workers
will proceed more slowly unless conditions of excess labour demand
permit these workers to be absorbed without a fall in real wages in the
nonunionized sector. In the latter case, however, real wages will still
be below what they would have been in the absence of the union activity.

Obviously, the more flexible real wages are the smaller the effect of
the union activity on wages and prices in the economy because the
increase in union wages is counterbalanced by a decrease in nonunion
wages, compared to what they would have been in the absence of the union
activity to raise wages. Consider, therefore, the case of inflexible
or sticky nonunion wages as an upper limit to the effect of unions on
current wage inflation. The union effect is simply the union-nonunion
differential multiplied by the proportion of the labour force that is
unionized. The effect of unions on wage inflation in any period is then
the change in the product of these two variables during the period,
since this represents the change in the wage bill attributable to union
activity during the period.

What happened to these variables between 1974 and 1977? Table 4
shows the information available from the Wages Survey. There was an
increase of less than two percent in wages attributable to the union-
nonunion wage differential. This compares with an increase of more
than 40% in wages between 1975 and 1977 and an increase of more than
60% between 1974 and 1977, as shown in Table 1. In other words, the
union effect on wage inflation between 1974 and 1977 appears to be small,
less than one-twentieth the total effect.

TABLE 4

Changes in the Union-Nonunion Wage Differential Multiplied by the Proportion
Unionized (Average of 73 Occupations)

	1974	1975	1977	Difference
Canada		.0401	.0573	.0172
Seven communities[1]	.0284		.0417	.0133

[1] Average for Toronto, Montreal, Halifax, Winnipeg, Regina, Calgary and
Vancouver weighted by the total labour forces in those communities.

This estimate of the contribution of unions to inflation may be too low
if, during the period under study, there were a substantial organization of
workers who earned less than their union counterparts and who could not
attain wage parity with them in the first contract. This was one possible
interpretation of the regression results in Appendix II that indicated a
negative relationship between union growth and wage advancement by occupation.
There are two factors that suggest that the effect on the estimates in
Table 4 should be small. First, the effect of unionization presented there
properly compares union and nonunion wages in the same occupation so that
expansion of a union into lower-paid occupations will not depress its
effect on wages unless the union-nonunion wage differential established in
these occupations is lower. Secondly, wage differences among old and new
union members in the same occupation will not be large enough to affect the
results significantly unless union membership grew rapidly in formerly
unorganized sectors of the economy during the period under consideration.
In fact, union growth was quite modest relative to overall employment
growth in the economy, increasing from 35.8% of the non-agricultural paid
labour force in 1974 to 38.2% in 1977.[16]

A second underestimate of the union effect on inflation may arise from
response bias in the estimates of union employment as discussed in Appendix I,
although there is no evidence of significant bias between surveys. Between
1975 and 1977 the survey revealed union growth to be negligible, however,
while modest growth did apparently occur. Adjustment for this modest growth
could raise the estimated union effect on inflation a small amount to about

2.2%, while even a response bias as high as 20% would not generate a union effect exceeding 3%.

To make a case for union-induced inflation of any significant magnitude it would appear from the above evidence that one must make a case for union wage increases raising nonunion wages above what they would have been otherwise, that is above what is dictated by demand and supply conditions and the levels of the money supply and prices. It is difficult, however, to argue that the aforementioned threat effect is sufficiently widespread to accomplish this, since there are large sectors of finance, trade, and services where the threat of unionization is non-existant. It is also difficult to make this argument when nonunionized workers outnumber unionized workers among the non-agricultural labour force by about 2 to 1. Yet unless the effect is widespread we would notice substantial changes in the structure of wages over time as sectors where the threat effect operates outpace sectors where it does not. We have seen that such changes were not observed in the nonunionized sector in the 1970s.

What we have found is steadily rising wages in all sectors of the economy covered by the Wages Survey, regardless of the presence of a union. The stability of the wage structure suggests that wage inflation has been based upon general economic conditions or demand-pull factors rather than cost-push pressures in certain sectors. If unions and public servants, among others, have been leading wages upwards, their efforts have been so rapidly validated by monetary and fiscal policy that their culpability would be difficult to establish.

IV. <u>WAGE STRUCTURE AND PRODUCTIVITY</u>

As mentioned in the introduction, the 1970s have been characterized
not only by high wage and price inflation but also by low productivity
growth. Wage structure is only one possible cause of low productivity
growth, however, since such factors as low rate of capital accumulation
or inefficient organization of production may also be involved. This
final section will consider only the effects of wage structure on
productivity.

As discussed earlier, wage structure may affect productivity by inhibiting
the efficient allocation of labour to particular occupations, industries
and communities. The shortages of labour that result from the interplay
of market forces may persist due to inadequate wage differentials between
areas of labour shortage and areas of labour surplus, since wages are
one important inducement to labour mobility. Such shortages reduce
productivity in the particular job with ramifications throughout the
plant and the economy.

The existence of shortages of skilled tradesmen in Canada in the 1970s
is one phenomenon that has been discussed frequently. For example,
interviews with 60 companies and unions in the Toronto, Hamilton, and
Guelph industrial areas between October, 1976 and March, 1977, indicated
general concern about skill shortages throughout manufacturing.[17]

More comprehensive evidence on skill shortages is available from the
quarterly Forward Occupational Imbalance Listing of the Department of
Employment and Immigration. The Listing forecasts shortages and surpluses
of labour by occupation and by province using data on occupational unemploy-
ment and vacancy rates and forecasts of growth in labour demand by
occupation. The results, presented in Appendix IV, may be summarized as
follows: For skilled tradesman in occupations comparable to those surveyed
by the Department of Labour (tool and die makers, welder-fitters, machinists,
maintenance electricians, millwrights, carpenters, and pipe fitters) there
was no evidence of surplus labour and numerous instances of expected labour
shortage, particularly in Ontario and Quebec; for unskilled workers compar-
able to those surveyed by the Department of Labour (carpenter's helpers,
labourers, material handlers) there was no evidence of labour shortage and
numerous cases of expected surplus labour, particularly in Quebec and
Ontario. In other words, during the latter portion of the period under
investigation, the evidence suggests general shortages of skilled tradesmen
and general surpluses of their unskilled co-workers.

One aspect of the problem appears to be high apprenticeship attrition
rates. In Ontario institutions, for example, attrition rates have exceeded
33% over the past ten years.[18] Apprenticeship attrition rates appear to
be high in industrial training programs as well. A survey by the Machinery
and Equipment Manufacturers' Association of Canada found attrition rates
of 24% in that industry.[19] In addition, as long as skill shortages persist,
piracy - luring of apprentices to other companies once their training has

been completed - can be expected to impose an additional risk on firms
conducting apprenticeship programs.

The earlier discussion of the role of wage structure indicated that,
when a particular type of labour is in short supply, its wage is
expected to rise relative to other workers who are not in short supply
in order to induce requisite skill accumulation. In particular, its
wage should rise relative to unskilled workers in the same plant or
type of work. This is because unskilled workers are rarely in short
supply but also because unskilled workers in the same plant or type of
work should provide a readily accessible source of potential apprentices
or trainees.[20] Other factors - such as the information, mobility and
job training components of Canadian manpower policy - may also be
improved to deal with such shortages, but they may not be able to over-
come inadequate monetary incentives to training, if they exist.
Greater emphasis on industrial training programs rather than institutional
training programs may reduce apprenticeship attrition rates by making the
course content more relevant, but the role of wage incentives in reducing
quit rates should not be overlooked. If apprenticeship programs are not
rewarding they will tend to be used as interim employment by some when
other, more lucrative and less skilled, job opportunities are not available
producing high apprenticeship attrition rates. When such vacancies are
plentiful, apprenticeships will not even be begun by individuals so that
attrition rates will fall but shortages of skilled workers will persist.

What is the appropriate wage differential for a particular skill? That
is very difficult to estimate since the supply response depends upon such
intangibles as personal job preferences. Our major concern here will not
be with the differential itself but with the direction of change in the
differential which, under conditions of excess labour demand, we expect
to be increasing to alleviate the shortage.

The skill differentials in twenty-one occupations are shown in Appendix V
for Canada, Toronto, Montreal and Vancouver in the 1970s. This informa-
tion updates earlier studies summarized in Ostry and Zaidi (1979). The
occupations can be divided into office occupations (the first thirteen)
and non-office or manual occupations (the last eight).

Table 5 shows the proportion of skill differentials that are widening
in each category from the data in Appendix V. Table 6 shows the same inform-
ation for non-office occupations, where skill shortages are observed to be
particularly acute. Table 5 indicates that the majority of the skill
differentials considered narrowed in the 1970s, while Table 6 shows a
similar trend for the non-office occupations with the exception of Vancouver
between 1971 and 1974 and manufacturing in Vancouver from 1974 to 1977.
Hence the expected widening of skill differentials to alleviate skill
shortages did not occur, except perhaps in Vancouver.

The union-nonunion breakdown for 1974-1977 is particularly interesting.
Although skill differentials among unionized workers fell in almost every

TABLE 5

Proportion of Skill Differentials that are Widening[1] for Various Communities and Years in Canada in the 1970's

Community & Years	All industries	Manufacturing	Nonmanufacturing	Union	Non-Union
Canada 1975-1977	.00	.10	.05	.00	.24
Toronto 1974-1977	.12	.35	.19	.20	.67
Montreal 1974-1977	.05	.26	.20	.05	.38
Vancouver 1974-1977	.43	.26	.42	.29	.47
Toronto 1971-1974	.33	.33	.40		
Montreal 1971-1974	.24	.45	.30		
Vancouver 1971-1974	.38	.84	.25		
Toronto 1971-1977	.16	.24	.29		
Montreal 1971-1977	.05	.05	.10		
Vancouver 1971-1977	.14	.40	.20		

[1]If skill differential is unchanged or one of the years for comparison is not available, then the observation is excluded.

Source: Appendix V

TABLE 6

Proportion of Skill Differentials that are
Widening for Non-office Occupations

Community & Years	All industries	Manufacturing	Nonmanufacturing	Union	Non-Union
Canada 1975-1977	.00	.13	.00	.00	.38
Toronto 1974-1977	.00	.17	.13	.13	1.00
Montreal 1974-1977	.00	.14	.14	.00	.63
Vancouver 1974-1977	.00	.50	.00	.00	1.00
Toronto 1971-1974	.29	.38	.63		
Montreal 1971-1974	.17	.88	.25		
Vancouver 1971-1974	.88	.71	.57		
Toronto 1971-1977	.00	.13	.13		
Montreal 1971-1977	.13	.14	.00		
Vancouver 1971-1977	.00	.71	.00		

Source^ Appendix V

case between 1974 and 1977, the trend was far less clear among nonunion workers. In Toronto more differentials widened than narrowed, while nonunionized non-office skill differentials were clearly widening in Toronto, Montreal and Vancouver if not for Canada as a whole. In Toronto only one of eight non-office differentials increased among unionized workers, but among non-unionized workers every non-office differential increased. In Vancouver every differential narrowed among unionized workers and widened among non-unionized workers!

An alternative interpretation of these results is that rapid expansion of employment among skilled workers during 1974-1977 increased the number of inexperienced skilled workers, who received a lower wage than the average skilled worker and therefore depressed skilled wages relative to unskilled wages even though skilled wage scales may be rising relative to unskilled wages. There is no evidence in the survey, however, of significant differences in the growth rates of skilled and unskilled union members to support this view. Furthermore, it is difficult to understand why the same effect should not have depressed nonunionized skilled wages, unless employment growth was confined to unionized workers during the period. On the contrary, the modest growth in the proportion of all workers unionized between 1974 and 1977 suggests similar employment growth rates in both sectors.

The limited evidence available on skill shortages, and on skill differentials from the wages survey, suggests that nonunionized skill differentials are widening in many areas to help to alleviate skill shortages, but unionized differentials are narrowing to frustrate this objective. Union power is generally viewed as a power to raise wage levels, but it is less commonly observed to be a power to compress skill differentials within the same union or across unions. If, however, unions disregard skill shortages and insist on compression of skill differentials when market conditions (expressed in the non-unionized sector) dictate a widening of these differentials, then skill shortages will persist and will likely get worse.

This is not to say that unions are entirely to blame for skill shortages, even on the basis of the limited amount of evidence for the short time span presented here. Consider, for example, the Anti-Inflation Program. By establishing a ceiling on wage increases the program may have frustrated attempts to widen skill differentials. Furthermore, since only the average wage increase was controlled, unions could make sure that unskilled workers did not suffer as much as skilled workers in the interest of equity, thereby compressing skill differentials. Such effects, if they occurred, may become established norms for skill differentials in post-control bargaining. Another example might be minimum wage legislation, where rapid increases may compress the wage structure by increasing the wages of unskilled workers to a greater extent than skilled workers, although this effect does not account for the difference in the behaviour of nonunionized and unionized differentials observed in many instances.

Concern with Canada's stagflation in the 1970s has concentrated upon the power of groups in society to distort the wage structure and thereby raise aggregate wage levels. These distortions, however, may also have a powerful impact on the allocation of labour resources and thereby on the productivity of workers. This study suggests that the latter problem may deserve more attention in the future. Since the lags involved in correcting the misallocation of labour resources involved in manpower training may be as long as seven years, there is an urgent need for further research in this area.

APPENDIX I

A Discussion of the Wages Survey Conducted
by the Department of Labour

The Canada Department of Labour conducts a national survey of employers
of twenty or more persons to ascertain wage rates, salaries and hours of
labour for the last normal pay period prior to October 1 for numerous
office and service occupations, maintenance trades and specific industry
jobs as well as for non-production labourers. The occupational defini-
tions are finer in many instances than the Canadian Classification and
Dictionary of Occupations used by Statistics Canada. Various levels of
occupational experience - such as junior, intermediate and senior - are
often included. This permits analysis of the Canadian occupational wage
structure at a higher level of disaggregation than is available from
other data sources, such as the Census, although there may still be
substantial wage variation within occupational categories even at the
level of the firm. Since the data is available for industry, union
status, and establishment size for 22 communities, the effects of these
characteristics on the occupational wage structure can also be examined.

The data consists of 73 cross-industry occupations and nearly one thousand
industry-specific occupations. It was decided to analyze the cross-
industry occupations first because of their greater impact on the general
level of wages and prices, because of their greater statistical reliability
due to the larger number of observations in each case, and because the
industry-specific occupations are not disaggregated by union status. Due
to resource limitations the analysis of the industry-specific occupations
was eventually abandoned.

The cross-industry occupations do not represent the full spectrum of
occupations in Canada. The major omissions, in addition to the industry-
specific occupations mentioned above, are the construction industry and
professional occupations. The unweighted average of the average weekly
earnings in the 73 cross-industry occupations is only $237.01 for Canada
in 1977 while the industrial composite figure from Statistics Canada is
$249.95. Nevertheless, the data represents a wide variety of non-profes-
sional occupations in Canada.[21]

In addition to any bias arising from the exclusion of firms with fewer
than twenty employees, bias may arise due to non-response. Although all
firms on the ES1 list compiled by Statistics Canada - plus firms in
health, higher education, and welfare - are sent the survey form, there
is no legal requirement that firms comply. Effort to contact non-respondents
is limited to selected large firms that are known to have significant impact
on a particular industry-specific occupational wage. The response rates are
shown below for 1976 and 1977 (preliminary).

TABLE 7

RESPONSE RATES TO THE CANADA WAGE SURVEY, 1976
AND 1977 (PRELIMINARY)

	1976			1977 (preliminary figures)			
Canada							
- all firms	72%(19,273 respondents)			67%(18,131 respondents)			
- less than 500 employees	72%(18,251	"	)	67%(17,013	"	)	
- greater than 500 "	74%(1,016	"	)	76%(1,118	"	)	
Montreal							
- all firms	67%(2,638	"	)	65%(2,351	"	)	
- less than 500 employees				65%(2,181	"	)	
- greater than 500 "				74%(133	"	)	
Toronto							
- all firms	69%(3,101	"	)	67%(2,844	"	)	
- less than 500 employees				67%(2,668	"	)	
- greater than 500 "				70%(139	"	)	
Vancouver							
- all firms	70%(1,162	"	)	67%(1,022	"	)	
- less than 500 employees				67%(959	"	)	
- greater than 500 "				64%(47	"	)	
Halifax	69%(255	"	)	63%(219	"	)	
Winnipeg	73%(725	"	)	56%(550	"	)	
Regina	49%(151	"	)	46%(142	"	)	
Calgary	68%(518	"	)	60%(446	"	)	

Source: Unpublished data from the Labour Data Branch, Canada Department
of Labour

Although the 1977 figures are preliminary and may be revised upward, the
table suggests a fairly stable response rate between 1976 and 1977, the
only years for which such figures are readily available. The response rate of
firms with 500 or more employees, where non-response bias is expected to be
most serious, is generally above the average of all firms. Furthermore, since
the study is restricted to cross-industry occupations, a large proportion of
the respondents (particularly the large firms) are likely to reply in each
occupational category so that the large numbers of respondents suggests that
the contribution of any firm to the occupational wage data should be small
for Canada and the larger communities (Toronto, Montreal and Vancouver) at

least. The study therefore concentrates on this data, for which response
bias should not be a problem.

Variations in response rates, particularly among large firms, can signi-
ficantly influence estimates of occupational employment levels, however,
since we are concerned with a population size and not an average derived
from a sample of that population. Hence use of the survey for employment
estimates, as is done in the regression analysis in Appendix III, should
proceed with considerable caution.

Although the study is restricted to the current decade, there are problems
concerning data consistency. The survey provides data for Canada as a
whole only since 1975, so that data for the individual communities had to
be analyzed, or aggregated and analyzed, prior to that time. Because of
the aforementioned potential for bias in the estimation of occupational
employment levels which determine the weight assigned to community wage
levels in the data for Canada the wages data for Canada may be less reliable
than the wage data for the communities in any case. Resource limitations
restricted the number of communities that could be examined to Vancouver,
Calgary, Regina, Winnipeg, Toronto, Montreal, and Halifax. Furthermore
the data is not disaggregated by union status or establishment size prior
to 1974. Many occupations, particularly in the area of electronic data
processing, were not covered in earlier years so that, while 73 occupations
could be compared between 1974 and 1977, only 45 occupations could be
compared between 1971 and 1977. This still provided a sufficiently large
sample to examine various aspects of the change in the occupational wage
structure during the 1970s.

Appendix II The Stability of Canadian Occupational Wages in the 1970s

The table presents Spearman correlation coefficients (with significance probability measures below each, in parentheses) for wage rates and salary rates across the following regional column groups, each subdivided by pairs of years:

CANADA | TORONTO | MONTREAL | HALIFAX | WINNIPEG | REGINA | CALGARY | VANCOUVER

Row categories:

Wage Rates
- All Workers
- Unionised [1]
- Nonunionised
- Union, Nonunion Combined
- Manufacturing
- Nonmanufacturing
- Mfg., Nonmfg. Combined
- Transportation
- Trade
- Public Administration
- Service

Salary Rates
- All workers
- Unionised
- Nonunionised
- Union, Nonunion
- Manufacturing
- Nonmanufacturing
- Mfg., Nonmfg.
- Transportation
- Trade
- Finance [4]
- Public Administration
- Service

1 Includes workers not affiliated with a union but covered by a collective agreement

2 Spearman correlation coefficient

3 Significance probability measure, indicating stable wage structure between time periods if small

4 No observations for wage rates in finance industries

5 Insufficient observations (less than 8)

Source: Canada Department of Labour. _Wage Rates, Salaries and Hours of Labour;_ Various issues.

Appendix III   Ordinary Least Squares Regression Estimates of the Change in the Occupational Wage or Salary Rate Relative to the Average of All Occupations (DWREL) for Various Communities and Years in Canada in the 1970's.

Community and Years	Intercept	DU^1	DLG1	DLG2	DNM	DNTS	DNTD	DNF	DNPA	DN	F-statistic
Canada 1975-1977	-0.01	-0.27[3] (2.3)	0.37 (2.0)	-0.30 (1.5)	0.18 (1.0)	NE^2	-0.55 (2.0)	-0.12 (0.7)	NE	-0.04 (1.6)	1.72
Toronto 1974-1977	0.00	-0.22 (1.2)	NE	0.22 (1.3)	0.19 (1.7)	-0.03 (0.1)	NE	0.08 (0.7)	0.42 (2.1)	NE	1.55
Montreal 1974-1977	-0.02	NE	NE	-0.39 (3.2)	-0.21 (1.2)	NE	-0.28 (1.9)	NE	NE	NE	3.67*
Halifax 1974-1977	0.01	NE	NE	NE	NE	NE	NE	NE	0.20 (2.7)	NE	7.08*
Winnipeg 1974-1977	-0.08	0.18 (1.3)	0.26 (1.8)	0.55 (2.0)	NE	0.05 (0.3)	-0.17 (1.0)	0.35 (1.7)	-0.12 (1.0)	-0.18 (3.5)	3.66*
Vancouver 1974-1977	-0.00	0.20 (2.0)	NE	NE	NE	NE	NE	NE	-0.10 (1.0)	-0.06 (1.1)	1.50

Note: Regina and Calgary were deleted due to an insufficient number of observations

1. DU is the change in the proportion of the occupation covered by a collective agreement; DLG1 (DLG2) is the change in the proportion of the occupation in establishments with 500 (100) or more employees; DNM (DNTS, DNTD, DNF, DNPA) is the change in the proportion of the occupation in manufacturing (transportation, trade, finance, public administration; and DN is the proportionate change in employment in the occupation.

2. Not entered/into the model because it did not meet the 0.5 significance level for selection; the variable did not likely contribute to the explanation of DWREL.
(NE)

3. t - statistic.

* Significant at the 5% level of confidence; indicates that the hypothesis that all variables are insignificant can be rejected at that level

APPENDIX IV

Excess Demand or Excess Supply Conditions in Various Skilled and
Unskilled Occupations, 1975 and 1977 (in brackets)

OCCUPATION	ATLANTIC PROVINCES	QUEBEC	ONTARIO	PRAIRIES PROVINCES	BRITISH COLUMBIA
Tool & Die makers	SD[1]	MD(SD)	SD(MD)		(SD)
Welder-fitters		SD	MD(SD)		
Machinists	SD	MD(SD[2])	MD(SD-MD)	SD	(SD)
Electrical repairs	SD(SD)	SD(SD)	SD(SD)		(ED)
Millwright	MD-ED(MD)	SD	MD(SD)	MD	MD(ED)
Carpenter	SD-MD(SD)		(SD)	(SD)	(ED)
Pipe fitters	MD-ED(SD)		(SD)		(SD)
Carpenters helpers	MS (SS-MS)			(SS)	
Labourers	(MS-ES)	ES(ES)	(MS)	(MS-ES)	
Material handlers	(SS)	ES(ES)			

[1]SD - slight excess demand; MD-modest excess demand; ED - extreme excess demand; SS - slight excess supply;
MS - moderate excess supply; ES - extreme excess supply.

[2]Some evidence of slight excess supply as well.

Source: Department of Employment and Immigration, Forward Occupation Imbalance Listing, vol. 1 no. 3
(Oct. 31, 1975) and vol. 3 no. 3 (Oct. 3, 1977) Ottawa: Department of Supply and Services.

Appendix V   Skill Differentials[1] in 21 Occupations in the 1970's for Canada

Occupations Compared[2]	All Industries			Manufacturing			Non-manufacturing			Union			Nonunion		
	1975	1976	1977	1975	1976	1977	1975	1976	1977	1975	1976	1977	1975	1976	1977
Draughtsman, Sr. Vs. Jr.	1.54	1.47	1.44	1.51	1.48	1.48	1.56	1.48	1.43	1.41	1.33	1.29	1.62	1.59	1.59
Accounting clerk, Sr. Vs. Jr.	1.33	1.31	1.30	1.35	1.34	1.28	1.32	1.30	1.31	1.27	1.21	1.20	1.36	1.35	1.34
Female accounting clerk, Sr. Vs. Jr.	1.21	1.19	1.19	1.21	1.22	1.20	1.20	1.19	1.18	1.19	1.16	1.19	1.22	1.22	1.20
General office clerk, Sr. Vs. Jr.	1.57	1.52	1.48	1.51	1.50	1.46	1.58	1.52	1.48	1.52	1.45	1.40	1.64	1.62	1.63
Female Office clerk, Sr. Vs. Jr.	1.41	1.38	1.41	1.35	1.35	1.42	1.43	1.38	1.41	1.41	1.31	1.34	1.40	1.39	1.42
Senior draughtsman Vs. Office boy	2.28	2.05	2.08	2.03	2.01	1.96	2.36	2.08	2.11	2.32	1.89	1.96	2.26	2.20	2.19
Senior accounting clerk Vs. Office boy	1.75	1.59	1.60	1.66	1.61	1.56	1.75	1.57	1.59	1.89	1.54	1.60	1.71	1.66	1.63
Senior general office clerk Vs. Office boy	1.13	1.06	1.11	1.15	1.14	1.15	1.12	1.04	1.11	1.18	1.01	1.10	1.12	1.09	1.08
Senior bookkeeper Vs. Office boy	1.88	1.71	1.74	1.73	1.71	1.68	1.92	1.70	1.75	1.95	1.61	1.66	1.85	1.80	1.82
Cost clerk Vs. Office boy	1.73	1.57	1.59	1.58	1.55	1.52	1.77	1.57	1.62	1.91	1.57	1.63	1.67	1.63	1.63
Order clerk Vs. Office boy	1.61	1.47	1.49	1.52	1.49	1.48	1.60	1.44	1.47	1.69	1.43	1.49	1.57	1.54	1.54
Female secretary, Sr. Vs. Jr.	1.15	1.13	1.13	1.14	1.12	1.11	1.15	1.13	1.13	1.15	1.08	1.09	1.16	1.16	1.17
Female typist, Sr. Vs. Jr.	1.12	1.12	1.12	1.19	1.19	1.16	1.11	1.12	1.12	1.08	1.09	1.06	1.17	1.17	1.16
Carpenter Vs. Labourer[3]	1.26	1.26	1.24	1.28	1.30	1.29	1.25	1.24	1.22	1.24	1.25	1.23	1.33	1.32	1.35
Electrical repairman Vs. Labourer	1.41	1.39	1.36	1.44	1.42	1.40	1.39	1.36	1.31	1.36	1.34	1.32	1.59	1.57	1.54
Maintenance Machinist Vs. Labourer	1.32	1.31	1.28	1.34	1.33	1.31	1.31	1.30	1.25	1.29	1.27	1.25	1.42	1.42	1.41
Millwright Vs. Labourer	1.38	1.37	1.34	1.39	1.39	1.37	1.40	1.36	1.32	1.34	1.32	1.31	1.55	1.54	1.49
Pipe fitter vs. Labourer	1.40	1.39	1.36	1.44	1.45	1.42	1.34	1.31	1.27	1.34	1.34	1.32	1.67	1.60	1.62
Tool & Die Maker Vs. Labourer	1.36	1.32	1.32	1.38	1.34	1.34	1.29	1.32	1.22	1.32	1.29	1.29	1.51	1.48	1.52
Welder Vs. Labourer	1.36	1.36	1.32	1.37	1.37	1.34	1.36	1.35	1.30	1.33	1.32	1.30	1.48	1.49	1.45
Stationary Engineer, Class 1 Vs. Class 4	1.31	1.27	1.27	1.29	1.24	1.26	1.32	1.30	1.27	1.30	1.24	1.21	1.40	1.44	1.48

1. Skilled wage divided by unskilled wage
2. Males unless otherwise stated
3. Labourer non-production

Source: Canada Department of Labour. Wages Rates Salaries and Hours of Labour. Various issues.

Appendix V (continued). Skill Differentials in 21 Occupations in the 1970's for Toronto

Occupations Compared	All Industries			Manufacturing			Non-manufacturing			Union		Nonunion	
	1971	1974	1977	1971	1974	1977	1971	1974	1977	1974	1977	1974	1977
Draughtsman, Sr. vs. Jr.	1.53	1.67	1.57	1.53	1.63	1.48	1.57	1.70	1.61	1.56	1.51	1.70	1.55
Accounting Clerk, Sr. vs. Jr.	1.36	1.29	1.34	1.34	1.31	1.27	1.36	1.27	1.37	1.15	1.25	1.35	1.37
Female Accounting Clerk, Sr. vs. Jr.	1.25	1.23	1.21	1.24	1.19	1.22	1.25	1.24	1.21	1.28	1.23	1.22	1.22
General Office clerk, Sr. vs. Jr.	1.63	1.57	1.52	1.62	1.56	1.44	1.66	1.58	1.54	1.42	1.30	1.64	1.61
Female Office clerk, Sr. vs. Jr.	1.43	1.43	1.43	1.38	1.44	1.45	1.47	1.43	1.42	1.37	1.26	1.43	1.44
Sr. Draughtsman vs. Office Boy	2.30	2.36	2.25	2.19	2.10	2.04	2.40	2.46	2.31	2.41	2.24	2.34	2.24
Sr. Accounting Clerk vs. Office Boy	1.80	1.67	1.60	1.82	1.64	1.53	1.78	1.65	1.62	1.82	1.79	1.64	1.59
Sr. General Office Clerk vs. Office Boy	1.12	1.12	1.12	1.17	1.10	1.18	1.10	1.12	1.11	1.24	1.24	1.07	1.07
Sr. Bookkeeper vs. Office Boy	1.93	1.83	1.82	1.86	1.65	1.70	1.98	1.92	1.85	1.92	1.81	1.83	1.83
Cost Clerk vs. Office Boy	1.63	1.64	1.64	1.62	1.56	1.56	1.61	1.60	1.66	1.60	1.65	1.64	1.64
Order clerk vs. Office Boy	1.61	1.55	1.55	1.60	1.46	1.50	1.63	1.57	1.55	1.51	1.54	1.55	1.56
Female Secretary, Sr. vs. Jr.	1.14	1.16	1.17	1.12	1.14	1.14	1.16	1.16	1.18	1.14	1.10	1.16	1.19
Female Typist, Sr. vs. Jr.	1.17	1.14	1.12	1.17	1.20	1.18	1.17	1.13	1.11	1.10	1.07	1.14	1.13
Carpenter vs. Labourer	1.31	1.30	1.22	1.35	1.29	1.31	1.23	1.30	1.18	1.29	1.19	1.38	1.38
Electrical Repairman vs. Labourer	1.46	1.44	1.37	1.51	1.50	1.50	1.37	1.39	1.29	1.40	1.31	1.50	1.56
Maintenance Machinist vs. Labourer	1.42	1.36	1.28	1.45	1.42	1.39	1.33	1.30	1.21	1.33	1.23	1.45	1.49
Millwright vs. Labourer	1.51	1.39	1.31	1.52	1.43	1.43	1.54	1.38	1.24	1.36	1.26	1.44	1.48
Pipe Fitter vs. Labourer	1.44	1.44	1.35	1.51	1.54	1.49	1.32	1.35	1.24	1.39	1.27	1.52	1.54
Tool and Die Maker vs. Labourer	1.47	1.46	1.34	1.51	1.52	1.46	1.44	1.34	1.10	1.42	1.28	1.62	1.62
Welder vs. Labourer	1.25	1.33	1.24	1.25	1.37	1.32	1.27	1.31	1.21	1.31	1.20	1.38	1.41
Stationary Engineer, Class 1 vs. Class 4	1.42	1.44	1.39	1.55	1.53	1.47	1.32	1.35	1.36	1.33	1.35	1.53	1.56

Appendix V (continued). Skill Differentials in 21 Occupations in the 1970's for Montreal

Occupations Compared	All Industries			Manufacturing			Non-manufacturing			Union		Nonunion	
	1971	1974	1977	1971	1974	1977	1971	1974	1977	1974	1977	1974	1977
Draughtsman, Sr. vs. Jr.	1.61	1.62	1.53	NA	1.56	1.60	1.58	1.68	1.51	1.59	1.27	1.64	1.69
Accounting Clerk, Sr. vs. Jr.	1.40	1.33	1.35	1.43	1.36	1.36	1.38	1.32	1.35	1.28	1.31	1.35	1.36
Female Accounting Clerk, Sr. vs. Jr.	1.30	1.27	1.23	1.27	1.26	1.24	1.30	1.27	1.22	1.23	1.17	1.27	1.25
General Office Clerk, Sr. vs. Jr.	1.71	1.69	1.62	1.66	1.58	1.61	1.73	1.70	1.61	1.66	1.55	1.71	1.65
Female Office Clerk, Sr. vs. Jr.	1.55	1.50	1.41	1.51	1.49	1.37	1.58	1.52	1.41	1.59	1.37	1.44	1.39
Sr. Draughtsman vs. Office Boy	2.43	2.39	2.13	2.48	2.26	2.21	2.40	2.46	2.14	2.26	2.01	2.44	2.21
Sr. Accounting Clerk vs. Office Boy	1.99	1.72	1.63	2.03	1.72	1.71	1.95	1.71	1.62	1.72	1.61	1.74	1.65
Sr. General Office Clerk vs. Office Boy	1.15	1.09	1.06	1.27	1.18	1.19	1.10	1.07	1.04	1.04	1.02	1.14	1.08
Sr. Bookkeeper vs. Office Boy	1.91	2.13	1.80	1.99	2.48	1.94	1.87	1.89	1.78	1.84	1.77	2.20	1.86
Cost Clerk vs. Office Boy	1.68	1.74	1.59	1.76	1.71	1.69	1.58	1.69	1.57	1.88	1.63	1.73	1.63
Order Clerk vs. Office Boy	1.67	1.60	1.51	1.73	1.58	1.64	1.62	1.58	1.47	1.57	1.42	1.62	1.57
Female Secretary, Sr. vs. Jr.	1.16	1.16	1.14	1.17	1.15	1.11	1.15	1.15	1.16	1.11	1.09	1.18	1.19
Female Typist, Sr. vs. Jr.	1.18	1.18	1.15	1.20	1.34	1.15	1.18	1.13	1.14	1.07	1.04	1.22	1.19
Carpenter vs. Labourer	1.32	1.28	1.24	1.26	1.31	1.23	1.35	1.26	1.25	1.26	1.19	1.29	1.33
Electrical Repairman vs. Labourer	1.47	1.41	1.36	1.46	1.50	1.41	1.47	1.37	1.34	1.38	1.31	1.49	1.40
Maintenance Machinist vs. Labourer	1.40	1.38	1.35	1.38	1.39	1.34	1.42	1.38	1.35	1.37	1.30	1.32	1.33
Millwright vs. Labourer	1.40	1.36	1.34	1.35	1.41	1.34	1.51	1.26	1.29	1.35	1.30	1.33	1.40
Pipe Fitter vs. Labourer	1.48	1.48	1.40	1.50	1.56	1.45	1.46	1.42	1.37	1.42	1.34	1.82	1.61
Tool and Die Maker vs. Labourer	1.38	1.38	1.34	1.38	1.40	1.32	1.34	1.35	1.35	1.40	1.30	1.39	1.36
Welder vs. Labourer	1.29	1.33	1.32	1.22	1.30	1.30	1.40	1.37	1.32	1.33	1.30	1.20	1.33
Stationary Engineer, Class 1 vs. Class 4	1.32	1.31	1.30	1.28	1.18	1.28	1.36	1.43	1.31	1.28	1.28	1.42	1.44

Appendix **V** (continued). Skill Differentials in 21 Occupations in the 1970's for Vancouver

Occupations Compared	All Industries			Manufacturing			Non-manufacturing			Union		Nonunion	
	1971	1974	1977	1971	1974	1977	1971	1974	1977	1974	1977	1974	1977
Draughtsman, Sr. vs. Jr.	1.42	1.56	1.43	1.48	1.61	1.38	1.39	1.55	1.44	1.42	1.19	1.61	1.54
Accounting Clerk, Sr. vs. Jr.	1.43	1.33	1.25	1.32	1.32	1.25	1.45	1.31	1.26	1.35	1.20	1.33	1.26
Female Accounting Clerk, Sr. vs. Jr.	1.26	1.18	1.16	1.21	1.22	1.19	1.27	1.18	1.15	1.20	1.16	1.19	1.18
General Office Clerk, Sr. vs. Jr.	1.80	1.54	1.43	1.53	1.67	1.52	1.82	1.53	1.43	1.32	1.28	1.73	1.71
Female Office Clerk, Sr. vs. Jr.	1.45	1.36	1.37	1.28	1.37	1.36	1.47	1.37	1.37	1.26	1.17	1.44	1.43
Sr. Draughtsman vs. Office Boy	2.21	1.93	2.24	2.12	2.36	2.09	2.24	1.93	2.27	1.70	1.91	2.37	2.33
Sr. Accounting Clerk vs. Office Boy	1.87	1.48	1.69	1.89	1.97	1.61	1.84	1.43	1.69	1.35	1.49	1.81	1.73
Sr. General Office Clerk vs. Office Boy	1.11	1.02	1.24	1.29	1.35	1.19	1.11	1.02	1.26	1.10	1.23	1.14	1.12
Sr. Bookkeeper vs. Office Boy	1.92	1.62	1.90	1.82	2.00	1.76	1.95	1.62	1.92	1.65	1.87	1.93	1.94
Cost Clerk vs. Office Boy	1.79	1.47	1.73	1.69	1.86	1.55	1.82	1.43	1.80	1.62	1.53	1.73	1.72
Order Clerk vs. Office Boy	1.67	1.41	1.64	1.67	1.77	1.59	1.63	1.39	1.64	1.52	1.88	1.66	1.63
Female Secretary, Sr. vs. Jr.	1.14	1.10	1.12	1.11	1.17	1.19	1.15	1.09	1.11	1.10	1.03	1.17	1.19
Female Typist, Sr. vs. Jr.	1.18	1.05	1.12	1.27	1.16	1.17	1.18	1.05	1.12	1.00	1.02	1.13	1.15
Carpenter vs. Labourer	1.35	1.38	1.34	1.31	1.30	1.38	1.43	1.39	1.32	1.38	1.34	1.39	1.41
Electrical Repairman vs. Labourer	1.48	1.46	1.34	1.36	1.39	1.34	1.59	1.47	1.34	1.47	1.34	1.41	1.45
Maintenance Machinist vs. Labourer	1.34	1.40	1.29	1.32	1.29	1.31	1.34	1.40	1.26	1.42	1.28	1.38	1.46
Millwright vs. Labourer	1.43	1.50	1.32	1.33	1.40	1.36	1.51	1.44	1.25	1.50	1.31	1.53	1.54
Pipe Fitter vs. Labourer	1.35	1.46	1.33	1.34	1.44	1.36	1.36	1.37	1.30	1.44	1.31	1.82	NA
Tool and Die Maker vs. Labourer	1.38	1.46	1.32	1.27	1.33	1.33	NA	NA	1.30	1.44	1.28	1.61	1.65
Welder vs. Labourer	1.38	1.47	1.33	1.28	1.33	1.33	1.47	1.52	1.33	1.47	1.32	1.49	1.50
Stationary Engineer, Class 1 vs. Class 4	1.14	1.23	1.11	NA	1.17	1.19	1.20	1.31	1.05	1.21	1.11	1.39	NA

FOOTNOTES

[1] See, for example, Doeringer and Piore (1971) or Thurow (1975).
While Doeringer and Piore emphasize that larger firms provide
greater specific training, leading to higher wages to reduce
turnover it may also be the case that the same occupation requires
more general training in larger firms. A senior bookkeeper may
require managerial and supervisory training in a large firm but not
in a small one with no other bookkeepers, for example.

[2] See Kumar (1975). Other recent estimates by Starr (1973) and Macdonald
and Evans (1979) suggest that the differential is between 10% and 20%
for the economy as a whole.

[3] See Ostry and Zaidi, Pages 362-364.

[4] Fringe benefits as a proportion of regular wages are fairly constant
across industries. See, for example, Ostry and Zaidi (1979), page 207.

[5] but see, for example, Lipsey (1976), pages 30-35. For a stronger and
more recent statement on this issue, see Donner and Peters (1979).

[6] See, for example, the arguments by Cousineau and Lacroix (1977) concerning
public sector bargaining.

[7] Rees (1962).

[8] It is not clear however, why these firms were not maximizing profits
previously and what may have changed to affect their goals or circumstances.

[9] Wiles (1973).

[10] There is also the possibility that stability may arise from counter-
balancing of cost push and demand pull effects, but this is unlikely.

[11] We have not allowed for changes in occupational labour supply, but we
have tried to account for changes in industrial and labour organization.

[12] Wages in trade in an occupation are about 6% lower on average than wages
for all industries for that occupation in the survey.

[13] We will return to this point in the consideration of skill differentials.

[14] Rees (1973), pages 150-153, discusses this effect in more detail.

[15] Unless the demand for labour is perfectly inelastic. Lewis (1963)
rejected this possibility for the data available to him.

Footnotes (cont'd)

[16] Canada Department of Labour, Labour Organization in Canada 1978, page 10.

[17] Toronto Globe and Mail, December 12, 1978

[18] Toronto Globe and Mail, October 31, 1978

[19] Ottawa Citizen, July 30, 1979

[20] Demand for skilled labour will fall as a consequence of higher wages. The proportion of the shortage alleviated by supply expansion, as opposed to demand contraction, will depend upon the elasticity of supply relative to the elasticity of demand. Since the supply of a particular type of labour is expected to be highly elastic, especially when unemployment rates are high, the shortage is expected to be eliminated primarily by increased labour supply assuming that there are no barriers to entry. This supply will, of course, involve some substantial time lags for training to be conducted.

[21] The Wages of professional workers have been examined extensively elsewhere, but for earlier periods and in a somewhat different manner to this paper. See, for example, Ostry and Zaidi (1979, Chapter 11), Meltz and Stager (1977), Dodge and Stager (1974), Peitchinis (1969), and Wilkinson (1964).

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