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Labor Market Aspects of Industrial Restructuring in Canada

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Abstract

This note examines recent developments in the Canadian labor market to provide a partial assessment of the magnitude and nature of industrial restructuring in Canada. The implications of industrial restructuring for the medium- and long-term prospects for the Canadian economy are examined. The evidence presented in this note suggests that the recent increases in labor productivity may represent a cyclical phenomenon rather than a permanent increase in the rate of growth of productivity.

JEL Classification Numbers:

J20, E24, E32

1/ I would like to thank Trevor Alleyne and Jorge Márquez-Ruarte for helpful comments, Bob Billings for providing some of the data used in this paper, and Owi Ruivivar for research assistance. This paper was presented at the annual meetings of the Canadian Economics Association in Ottawa, Canada in June 1993. A revised version of the paper is to be published in a conference volume of *Canadian Business Economics*. The views expressed in this paper do not necessarily reflect those of the IMF.

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Summary

This paper investigates the hypothesis that the relatively slow recovery of output and employment in Canada after the last recession may be attributable to the short-term negative effects of industrial restructuring that have temporarily overwhelmed the longer-term positive effects and dampened the typical cyclical upswing in the economy. Recent developments in the Canadian labor market are examined to provide a partial assessment of the nature and magnitude of industrial restructuring in Canada.

Measures of dispersion in employment growth at the broadly defined (1-digit) sectoral level reveal little evidence of recent sectoral shifts prompted by restructuring. Within the manufacturing sector, the dispersion of employment growth has been relatively high since 1990, indicating that large interindustry shifts may have occured within manufacturing. Using labor reallocation measures over a three-year horizon, this paper also finds some evidence that long-term net flows of labor may be occurring across broadly defined sectors of the economy.

The implications of industrial restructuring for the medium- and long-term prospects for the Canadian economy are then examined. Although productivity levels have increased at both the aggregate and sectoral levels over the last few quarters, a large part of this increase may be attributable to relatively low levels of labor hoarding by firms in anticipation of prolonged weak aggregate demand conditions. Evidence of permanent gains in productivity growth arising from restructuring remains elusive.

The rising employment shares of low productivity sectors such as trade and services suggest that, even if the increase in the growth rate of manufacturing productivity proves to be permanent, aggregate labor productivity growth may not show substantial permanent improvement. The evidence presented in this paper suggests that the recent increases in labor productivity may represent a cyclical phenomenon rather than a permanent increase in the rate of growth of productivity.

I. Introduction

Many observers of the Canadian economy have hypothesized that an important reason for the relatively slow recovery of output and employment after the last recession is that the short-term negative effects of industrial restructuring may have temporarily overwhelmed the longer-term positive effects and dampened the typical cyclical upswing in the economy. Among the most frequently cited factors believed to have prompted this restructuring are: the implementation of the Free Trade Agreement (FTA) and the prospect of the ratification of the North American Free Trade Agreement; structural reforms such as the introduction of the Goods and Services Tax; and attempts by Canadian firms to restore their competitiveness which had eroded considerably in recent years.

Although anecdotal evidence on restructuring is often mentioned, little formal evidence is available. One of the main pieces of evidence that has been cited to support the hypothesis of restructuring is that, compared with the largely procyclical behavior of productivity in previous recessions, productivity levels have increased at a faster rate both during and after the last recession. As Chart 1 shows, however, much of this increase in productivity may be attributable to the sharper cyclical decline in employment than in output over the last few quarters. Whether this will translate into longer-term gains in productivity growth remains to be seen.

This note examines recent developments in the labor market to provide a partial assessment of the magnitude and nature of industrial restructuring and its implications for the medium- and long-term prospects for the Canadian economy. Employment and productivity levels disaggregated across broad sectors as well as disaggregated employment levels within the manufacturing sector are used in the analysis. In addition, sectoral unemployment rates and the evolution of sectoral employment shares and productivity levels are examined in order to assess the implications of restructuring for aggregate productivity and employment in the medium term.

The discussion in this note is organized around concepts borrowed from the labor economics literature. It is well accepted that large structural shocks typically tend to have an asymmetric effect across sectors in terms of productivity and output. As a consequence, structural changes such as the FTA are likely to lead to a substantial reallocation of labor across sectors. Rather than attempting to measure the gross or net flows of labor across sectors directly, this note adopts Lilien's measure of dispersion in employment growth to examine if there is any evidence of inter-sectoral shifts at the broadly defined (1-digit) sectoral level. If restructuring across industries is taking place in the Canadian economy, one would expect to see a relatively high dispersion of employment growth. However, it is possible that industrial restructuring may lead to employment flows that are not picked up by a measure of dispersion of employment growth if, in the midst of a downturn, all sectors are concurrently reducing their rates of employment growth or even reducing their employment levels. To account for

this possibility, this note also examines some longer-term measures of labor reallocation developed by Davis (1987).

The remainder of this note is organized as follows. The next section of the paper takes a closer look at some macroeconomic indicators and compares their behavior in the current recovery with their behavior in previous recoveries. Section III computes measures of sectoral dispersion in employment growth and measures of labor reallocation over longer horizons. Section IV contains an analysis of developments in sectoral productivity levels, employment shares, and unemployment rates. The final section summarizes the main results presented in this note and concludes.

II. Recent Developments in Some Important Macroeconomic Indicators

In this section, I briefly explore developments in some key macroeconomic indicators, particularly those related to the labor market, and provide a comparison with three previous recoveries. Chart 2 shows the behavior of output, employment, and productivity coming out of this recession and in the three previous recessions. 1/ The top panel of Chart 2 shows that, on average, output rose by about 6 percent in the 7 quarters following the 3 previous cyclical troughs while, in the current recovery, the increase was just over 2 percent. The picture for employment is striking. In the previous three recoveries, employment, which typically lags the cycle, rose steadily for about 6 quarters after the trough before levelling off. In the current recovery, aggregate employment remained steady and then actually began to decline 3 quarters into the recovery before returning, after 8 quarters, to its level at the trough.

The bottom panel of Chart 2 shows that, although productivity rose rapidly in the first 3 quarters after the trough, productivity growth since then has been quite similar to previous recessions. Thus, the distinguishing aspect of the current recovery is not the rapid growth in productivity but the fact that productivity growth has accounted for a disproportionately large share of output growth in this recovery.

Since productivity is measured here as output per employee, it is possible that average weekly hours per employee and overtime hours may have taken up some of the slack as employment levels were reduced. This would be consistent with a labor hoarding story, whereby employment increases would

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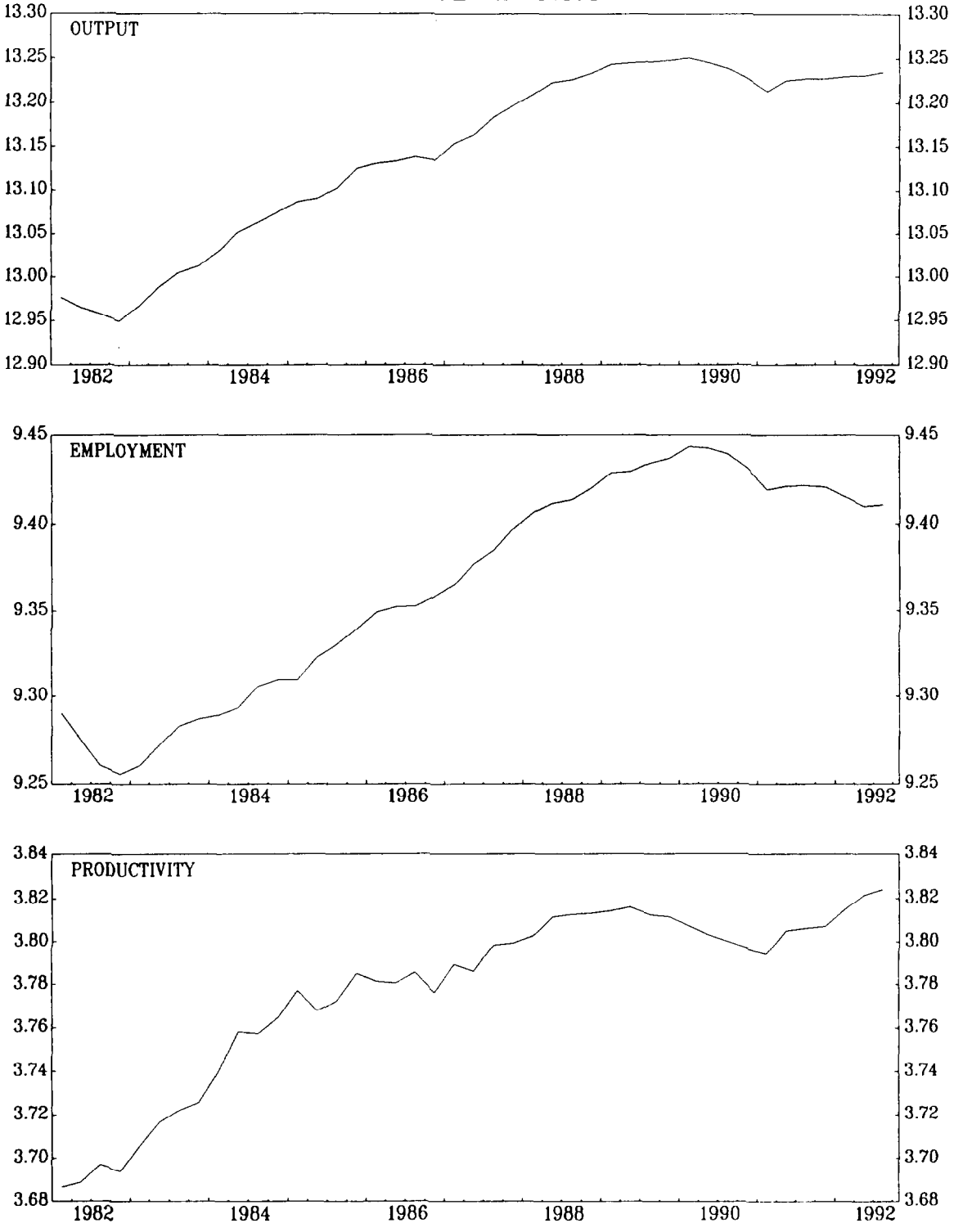
1/ The three previous recession troughs, as defined by Statistics Canada, were in 1970:Q2, 1980:Q2, and 1982:Q4. The proximity of the last two recession troughs, separated by only 10 quarters, is a potential problem. However, the cycle comparison charts did not change substantially when the horizon was limited to 6 quarters before and after the trough. Hence, I have left the horizon at 8 quarters centered around the trough in order to include more recent data.

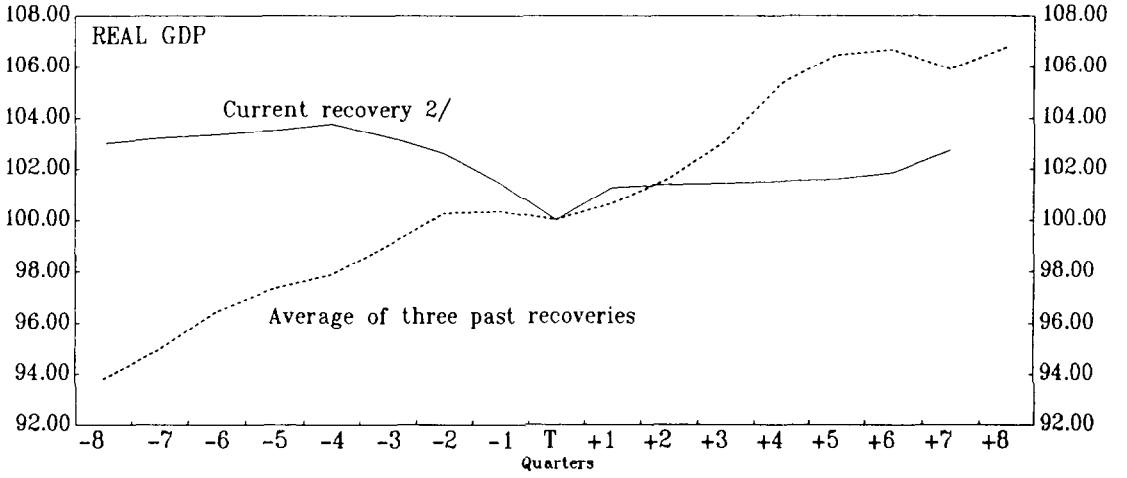
CHART 1
CANADA
OUTPUT, EMPLOYMENT, AND PRODUCTIVITY 1/
1982:1-1992:3

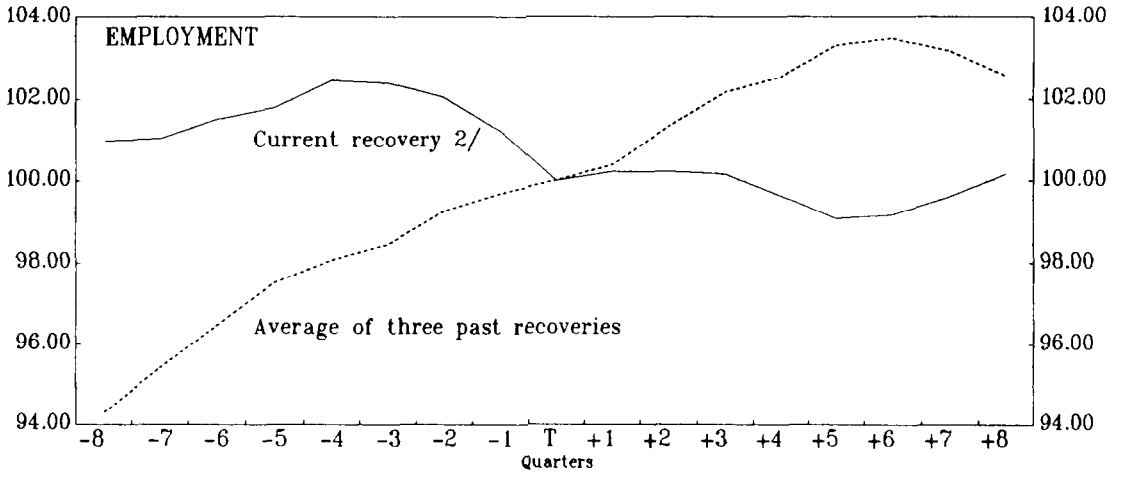


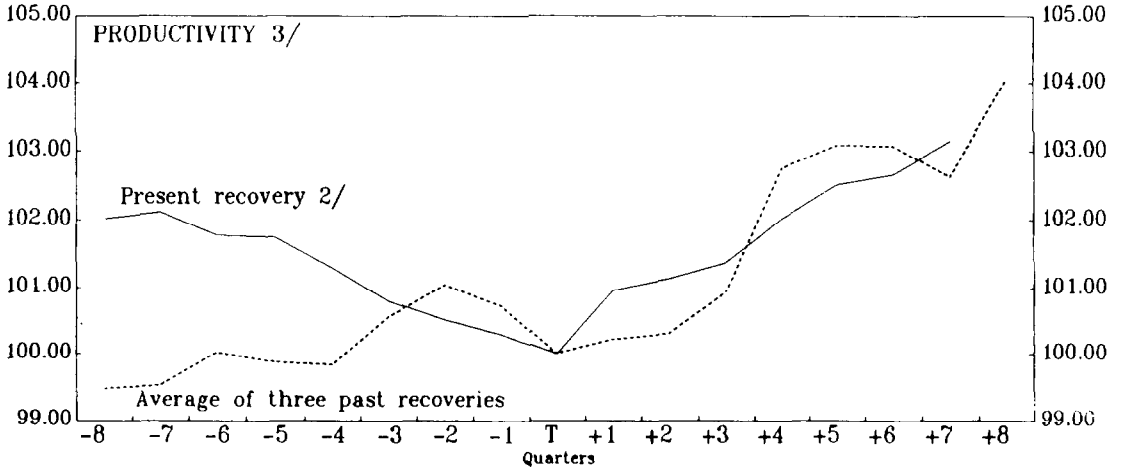
1/ All data in this chart are expressed in logarithms.

Chart 2
CANADA

OUTPUT, EMPLOYMENT AND PRODUCTIVITY: COMPARISONS BETWEEN CURRENT AND PAST ECONOMIC RECOVERIES 1/







1/ Levels for the troughs of each cycle are indexed to 100.
2/ The trough of the current recession occurred in 1991Q1.
3/ Productivity is defined as real GDP/ total employment.

occur first at the intensive margin (weekly hours worked) rather than the extensive margin (persons employed). 1/ This could lead to an overstatement of productivity increases if employees rather than aggregate manhours were used as the measure of labor input. The lower panel of Chart 4 suggests that this explanation is not a likely one. Average weekly hours in the economy have declined steadily starting about 8 quarters before the recession trough and have just recently flattened out. In other words, output per manhour may have risen even more than output per worker.

Another interesting fact about the Canadian labor market is that the unemployment rate, after increasing steadily since 1989, has declined marginally in the most recent quarter for which data is available. As the lower panel of Chart 3 shows, however, the increase in the unemployment rate since 1989 was actually tempered by a steady decline in the participation rate. The recent decline in the unemployment rate despite the absence of employment growth may also be attributable to a further drop in the participation rate.

The obvious question that arises at this juncture is why employment has not risen despite increases in productivity as would be predicted by most economic models. One reason may be that the substantial uncertainty regarding employment prospects may be restraining employers from hiring workers. Another explanation is provided by recent developments in real wages. Although the rate of increase in wage settlements has slowed considerably in recent quarters, the rapid reduction in inflation has led to an increase in the average real wage. Average real weekly earnings have increased by about 3 percent since the recession trough (top panel of Chart 4), which matches the increase in productivity.

A third potential explanation is that the increase in productivity is due to a substantial degree of restructuring in Canadian industry. However, whether productivity growth has been increased permanently remains an open question. Not enough data has accumulated yet to convincingly make the case that industrial restructuring has occurred and that it has permanently raised productivity growth. Anecdotal evidence aside, one is constrained to look at indirect pieces of evidence to examine the issue of restructuring. Accordingly, in the following section, I examine some evidence from the labor market. I begin by reviewing some concepts from the sectoral shifts literature, which provides a useful framework for organizing and interpreting the disaggregated labor market data.

1/ Some observers have noted that the sharp decline in employment in this recession was due to the fact that much less labor was hoarded in this recession than in previous ones.

III. The Sectoral Shifts Hypothesis

The sectoral shifts literature (see Lilien (1982, 1990) and references therein) argues that a large fraction of unemployment fluctuations can be attributed to inter-sectoral shifts in the composition of labor demand. Dispersion across sectors in the growth rate of employment demand leads to an increase in search unemployment as the net flow of workers across sectors increases. 1/ A variant of Lilien's (1990) measure of employment dispersion is used here to examine the contribution of sectoral shifts to recent unemployment. 2/ The time series for the dispersion measure is defined as follows:

$$\sigma_t^2 = \sum_{i=1}^{N} \left\{\frac{x_{it}}{x_t}\right\} \left\{\Delta x_{it} - \Delta x_t\right\}^2$$

where x_{it} is employment in sector i at time t, x_t is aggregate employment at time t, and the operator Δ represents the growth rate of a variable.

The dispersion measure is computed using quarterly employment data from 1970:1 to 1992:3 for nine sectors (1-digit SIC classification). 3/ Dividing each industry's weight by the variance over time of that industry's employment growth (in order to adjust for the effects of differing cyclical sensitivities of employment growth across industries) made little difference to any of the results. Chart 5 plots σ_t^2, the aggregate unemployment rate, and detrended output. 4/ Since the beginning of 1990, the aggregate unemployment rate and the dispersion measure have been negatively correlated. Although the dispersion measure did rise in 1989 and 1990, it has fallen off since the beginning of 1991. The large spikes in employment dispersion that accompanied previous recessions are not evident in the case

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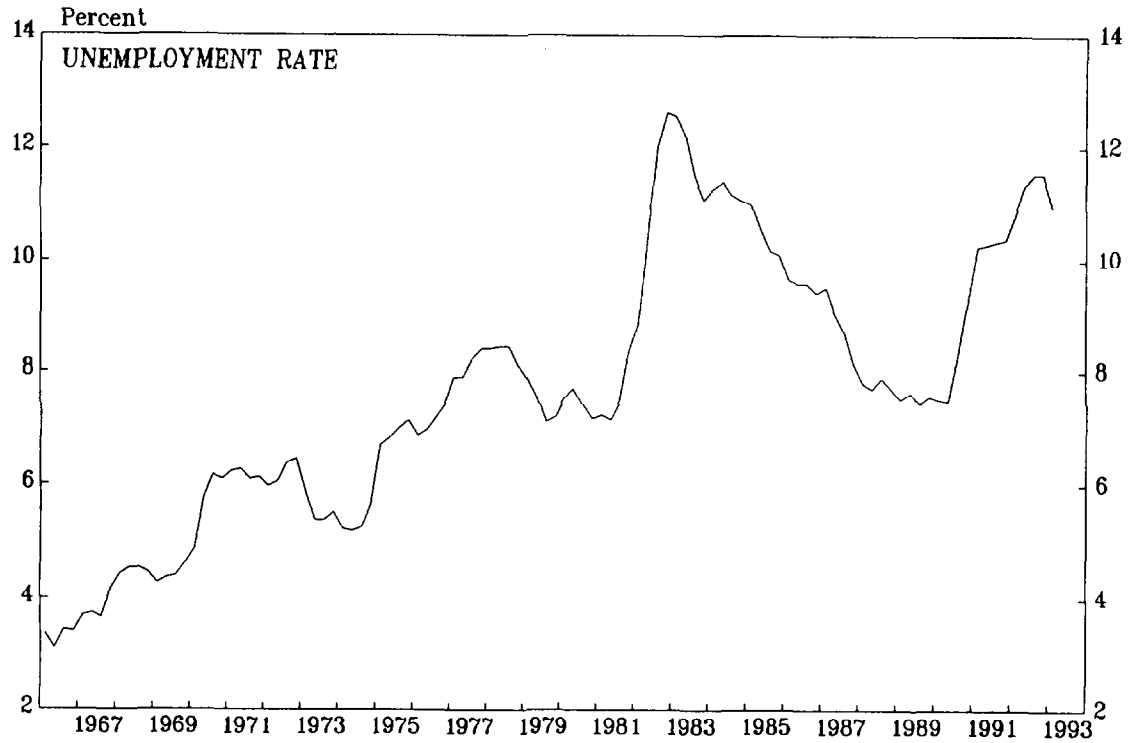
1/ On average, gross flows across sectors tend to dominate net flows. However, the ratio of net to gross flows rises in downturns (when employment dispersion usually rises).

2/ Abraham and Katz (1986) argue that Lilien's (1982) dispersion measure may be contaminated by the effects of aggregate demand shocks.

3/ The nine sectors at the 1-digit level are: manufacturing; construction; wholesale and retail trade; public administration; agriculture; other primary industries; transportation and utilities; finance, insurance, and real estate (FIRE); and personal and business services.

4/ In this note, detrended output refers to output that was detrended using an estimated linear trend, allowing for breaks in the slope of the trend function in 1973:1 and 1982:1.

Chart 3
CANADA
UNEMPLOYMENT RATE



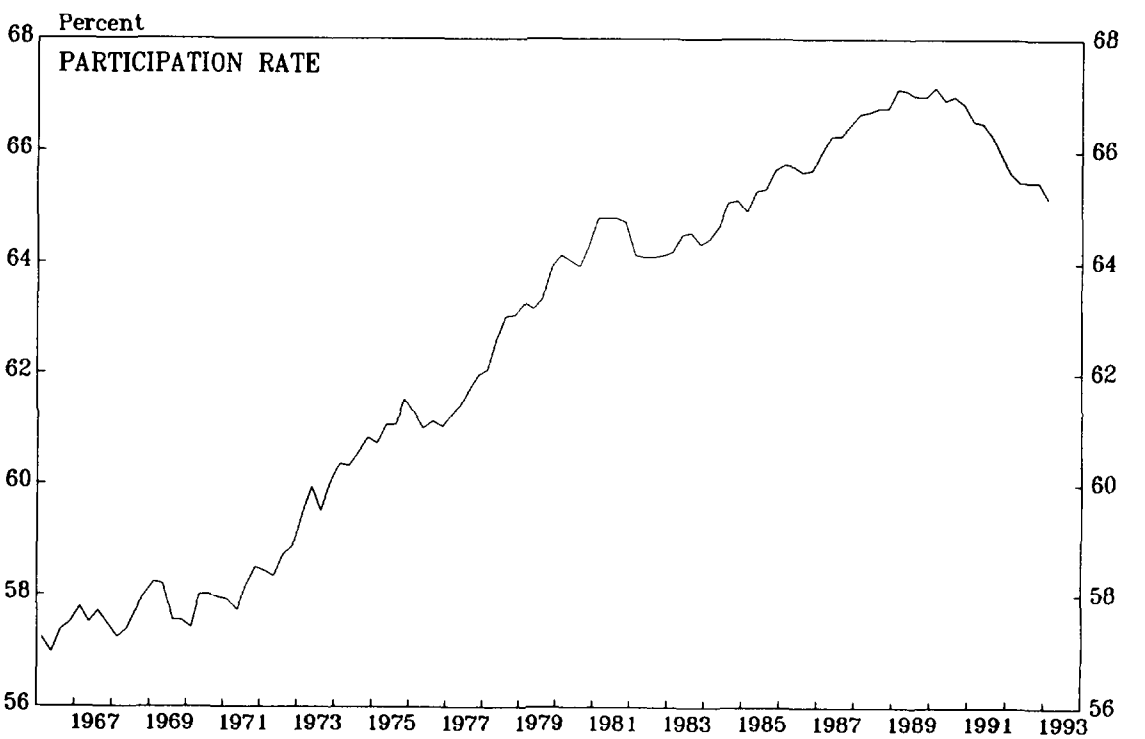
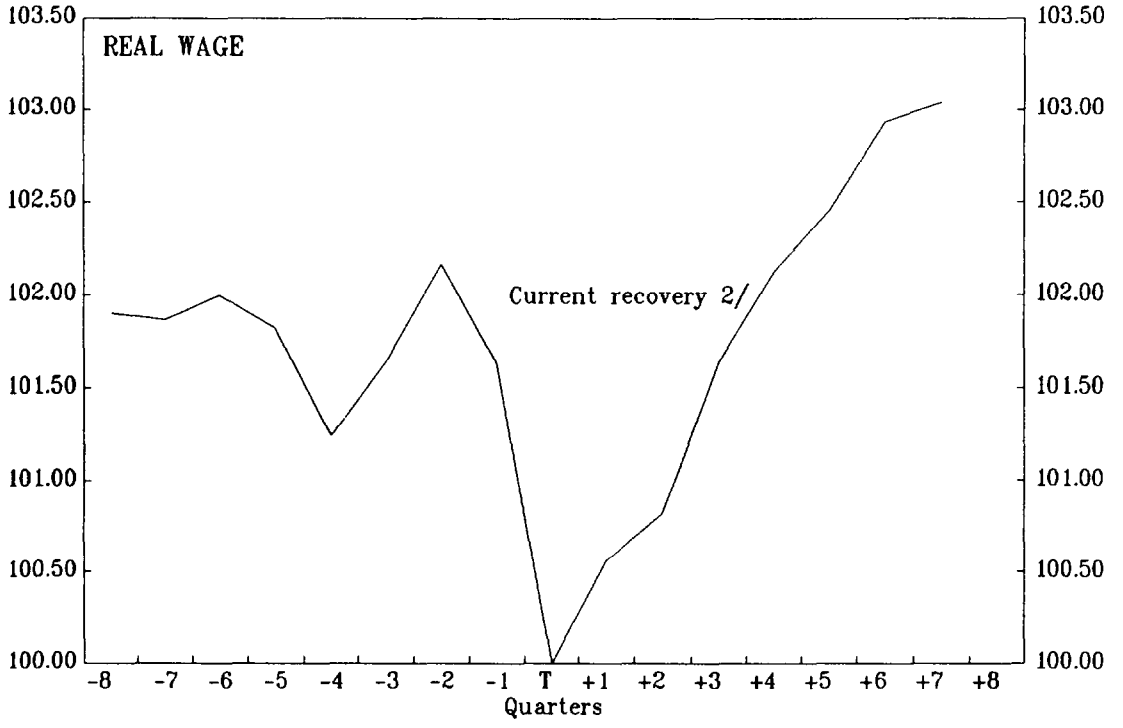
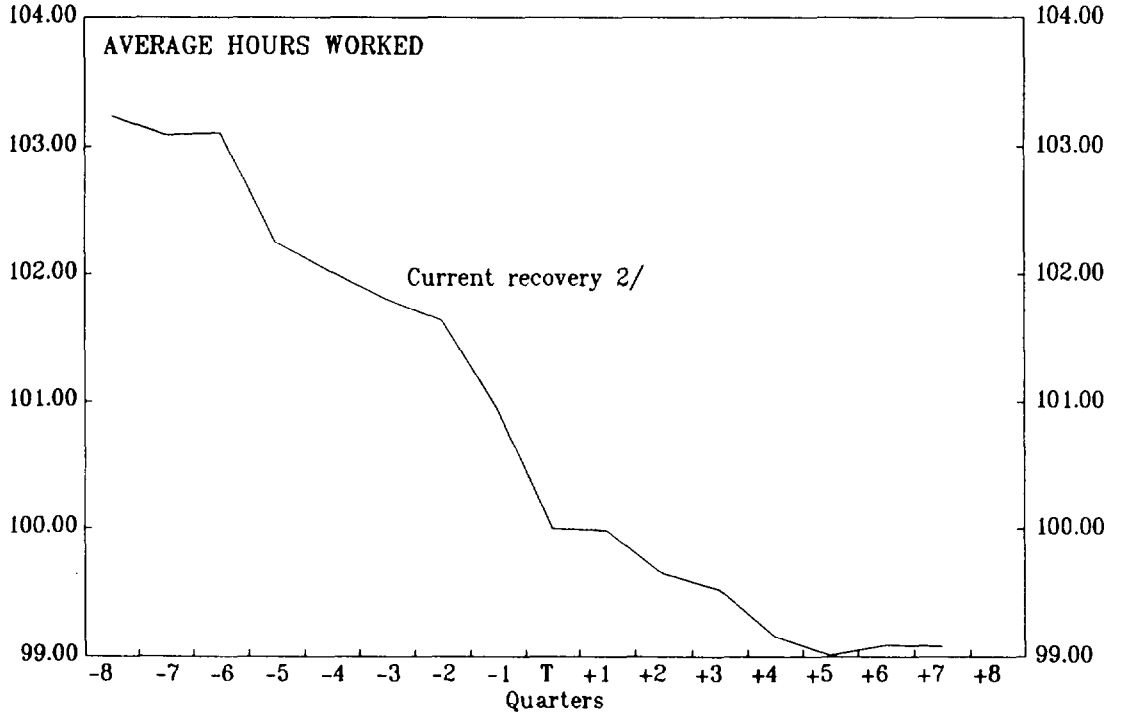


Chart 4
CANADA
LABOR MARKET INDICATORS 1/



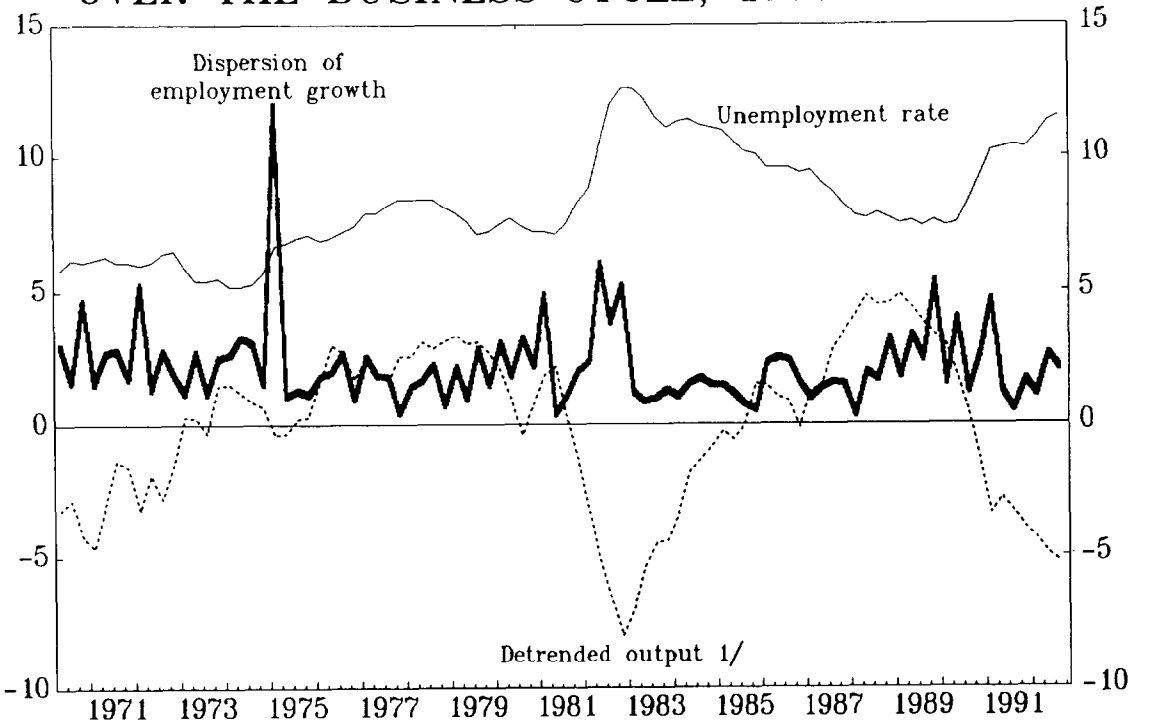


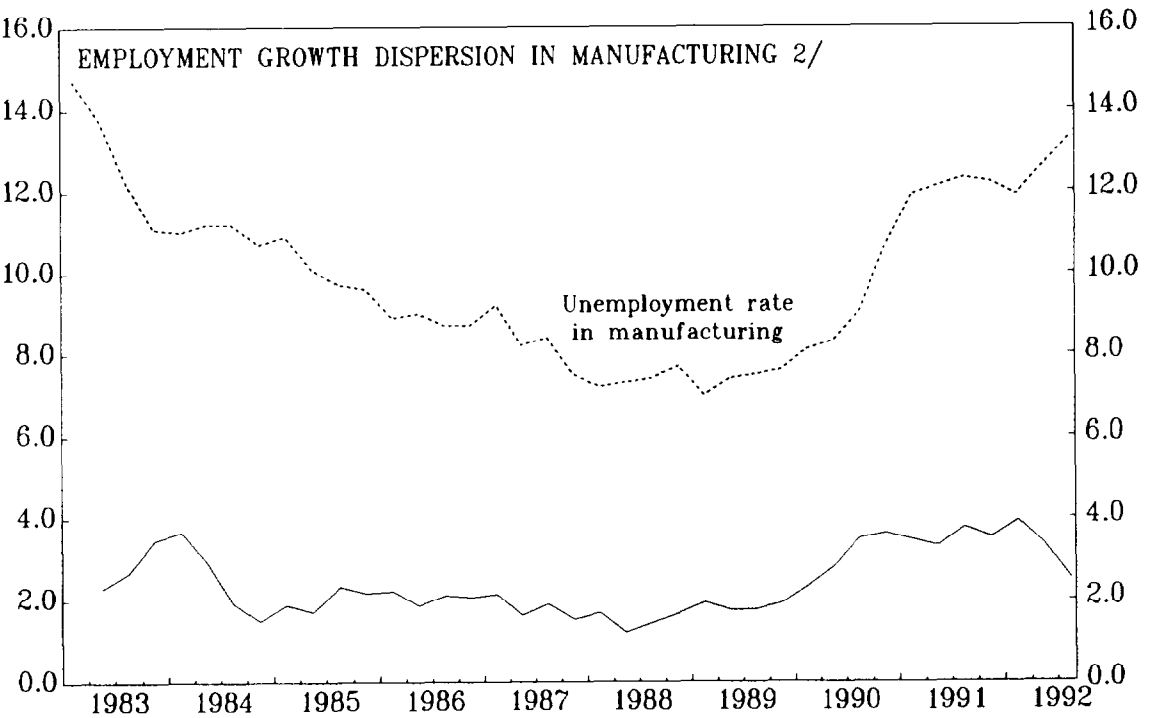
1/ Levels for the troughs of each cycle are indexed to 100.
2/ The trough of the current recession occurred in 1991Q1.

CHART 5

CANADA

EMPLOYMENT GROWTH DISPERSION OVER THE BUSINESS CYCLE, 1970:2-1992:3





1/ Output was detrended by estimating a segmented linear trend using quarterly data from 1966:1 through 1992:3 and allowing for two breaks in the trend function: in 1973:1 and 1982:1.
2/ Three-quarter centered moving average of dispersion measure.

of the recent recession. 1/ Preliminary evidence thus suggests that sectoral shifts across 1-digit sectors may not have played a major role in the recent rise in unemployment.

It is possible that a finer level of disaggregation may provide better evidence about sectoral shifts. For instance, there may be large net flows of labor across industries within a particular sector that dominate the flows across more broadly defined sectors. To examine this, a dispersion measure was computed for 23 industries within the manufacturing sector. The lower panel of Chart 5 presents a measure of the dispersion of employment growth within manufacturing. It is apparent that there is some evidence of inter-industry shifts within manufacturing since 1990 as the dispersion measure has remained rather high since 1990.

Next, I turn to an examination of the dispersion in employment growth over longer horizons, adopting Davis's (1987) extension of the sectoral shifts literature in the form of his hypothesis of labor-reallocation timing. The basic idea is that labor reallocation caused by a new shock can reinforce (or counteract) the recent past pattern of labor reallocation and thereby increase (or reduce) the unemployment attributable to sectoral shifts. 2/ Hence, it is useful to condition current flows of labor on past patterns of labor reallocation.

This is particularly relevant in the context of the current high unemployment rate as recent shocks to the Canadian economy may have reinforced the patterns of labor reallocation initiated after the FTA, which has been in place for about four years. If long-term restructuring in the Canadian economy is indeed taking place, one would expect to see consistent patterns of labor flows towards industries that are improving their long-term productivity at a relatively faster rate. This would be picked up by a long-term measure of labor reallocation even if the recession was causing slower (or even negative) employment growth in all sectors.

1/ The large spike in the dispersion measure in 1975 is partly due to a decline in manufacturing employment concurrent with increases in employment in services and trade. The employment data appear to be generally consistent over the sample period used in this study. I would like to thank Bob Billings of the Department of Finance for help in verifying some of the disaggregated data used in this section.

2/ For example, a shock that has a favorable effect on productivity and relative wages in a particular sector would gradually lead to net flows of labor into that sector. A subsequent shock with a similar beneficial effect on productivity in that sector would reinforce the earlier shock and increase employment dispersion in the short run. On the other hand, a shock that reversed the initial favorable productivity shock would reduce net inflows of labor into that sector and reduce employment dispersion.

Following Davis, a cross-sectoral covariance measure of dispersion in employment growth is constructed as follows:

$$\sigma^2_{t,j} = \sum_{i=1}^{N} \left\{\frac{x_{it}}{x_t}\right\} (\Delta x_{it} - \Delta x_t) (\Delta_j x_{it-1} - \Delta_j x_{t-1})$$

where Δ_j represents the percentage change in a variable over j periods. Relatively large (small) values for $\sigma^2_{t,j}$ indicate that the time t direction of labor reallocation reinforces (reverses) the time t-1 reallocation over the preceding j-period horizon. The sectoral shifts hypothesis predicts a positive correlation between the aggregate unemployment rate and the above cross-sectoral covariance measure of employment dispersion.

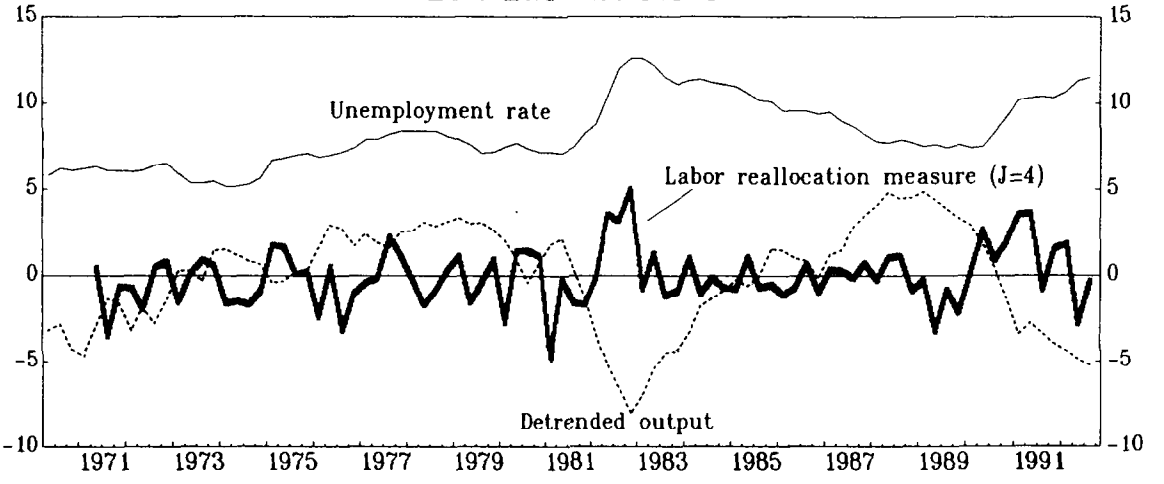
Chart 6 plots the aggregate unemployment rate and the variable $\sigma^2_{t,j}$ for three different values of j. For j=4, the labor reallocation measure is close to zero in the second half of 1992 (top panel of Chart 6). However, when j is increased to 8, this measure is positive after the first quarter of 1992 (second panel of Chart 6). When j=12, this labor reallocation measure turns strongly positive and is, in fact, at its highest level over the sample period (third panel of Chart 6). The correlation between the aggregate unemployment rate and this labor reallocation measure is as high as 0.39 since 1989. This measure provides some indication that industrial restructuring that may have begun towards the end of the 1980s has been reinforced by recent shocks. While the magnitude of inter-sectoral shifts during the last recession has not been very large, it appears that the inter-sectoral flows of labor over the last few quarters have reinforced the flows that occurred over the preceding two or three year horizon.

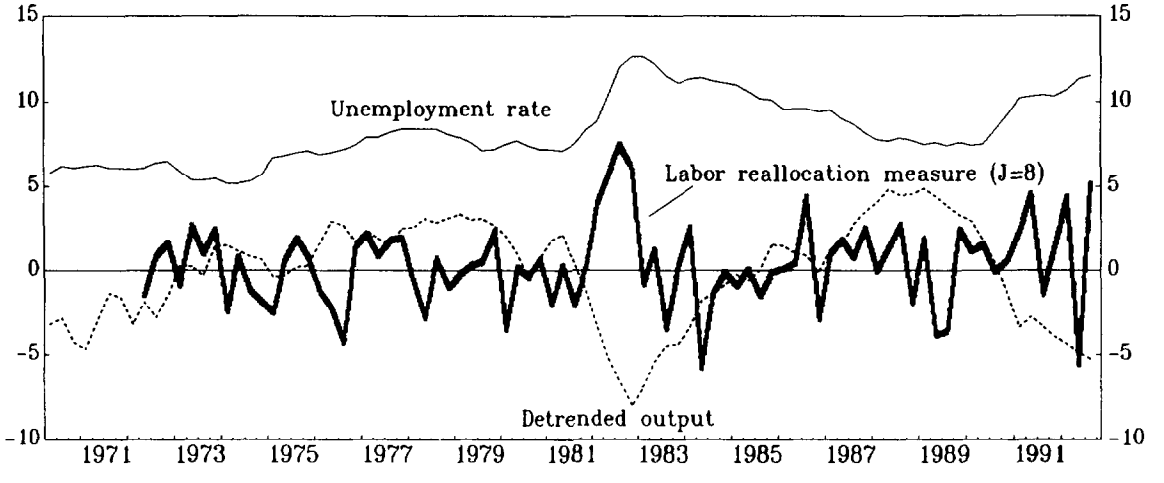
IV. Sectoral Productivity Levels, Employment Shares, and Unemployment Rates

This section begins with an analysis of sectoral productivity levels. To focus the analysis on the main sectors of the economy, three sectors--government, agriculture, and other primary industries--are excluded. Short-term productivity fluctuations in these sectors are difficult to interpret and, together, these three sectors account for just over 10 percent of aggregate employment. Another important point here is that, at the 1-digit level of disaggregation used in this note, the service sector refers only to business and personal services. This sector has a much lower level of average productivity than sectors such as trade and finance, insurance, and real estate (F.I.R.E.) which are often included under the rubric of service-producing (as opposed to goods-producing) sectors.

Chart 7 shows the productivity levels of six sectors, differentiated into high productivity and low productivity sectors, from 1982:1 to 1992:3. The largest increases in productivity since 1989 are clearly in construction

CHART 6
CANADA
A MEASURE OF LABOR REALLOCATION
1971:2-1992:3





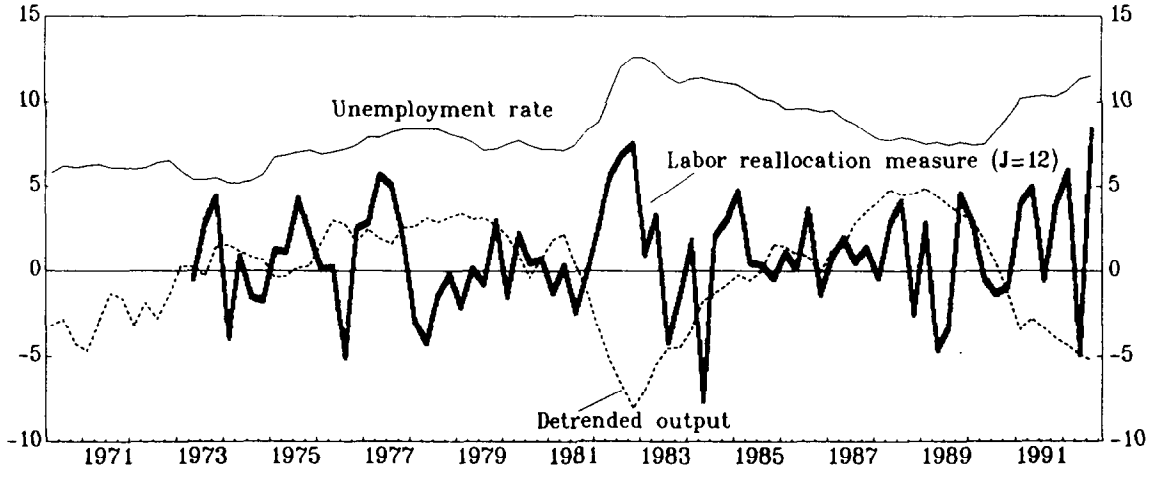
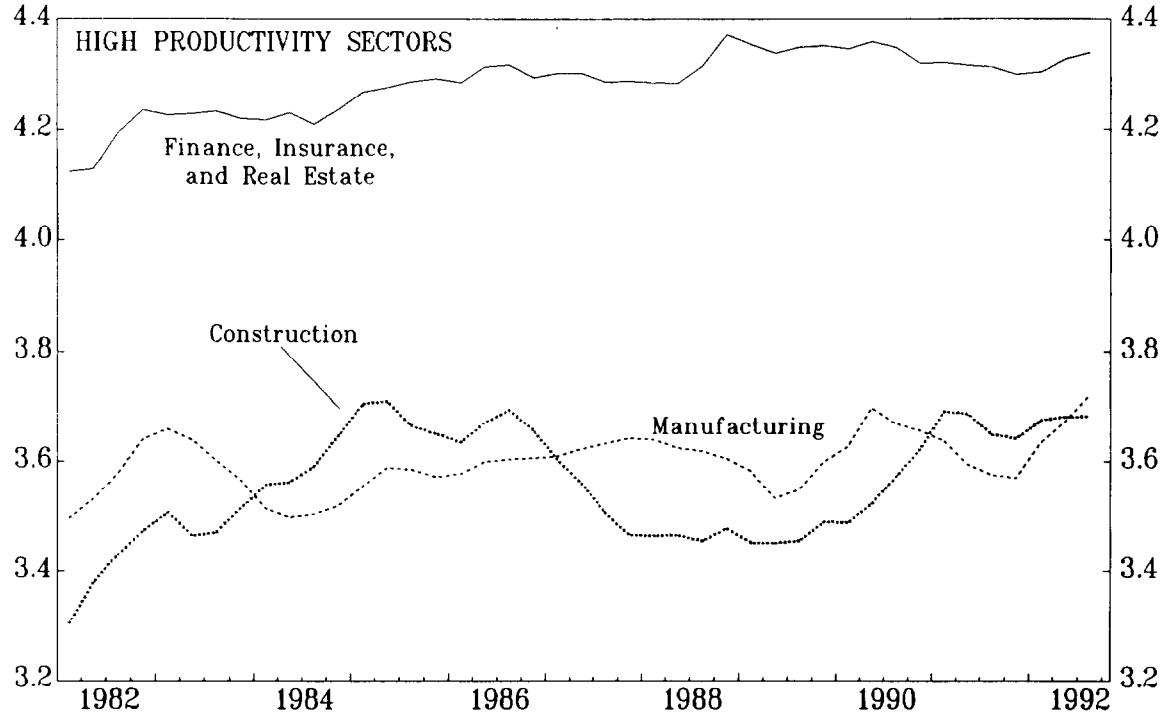
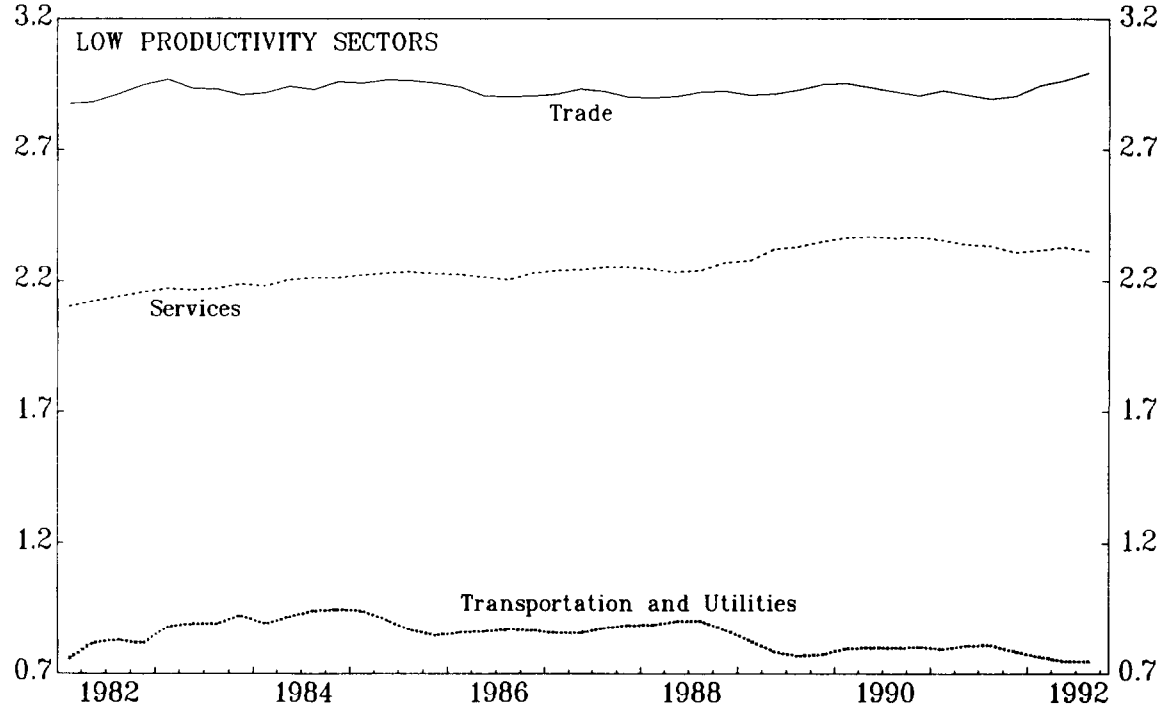


CHART 7
CANADA
SECTORAL PRODUCTIVITY LEVELS 1/
1982:1-1992:3





1/ Productivity levels are expressed in logarithms.

and manufacturing. However, it is in these two sectors that employment levels have dropped most sharply since the first quarter of 1990. In F.I.R.E. and in the three low productivity sectors, productivity has not fluctuated much over the cycle and the declines in employment levels since the onset of the recession have been very small.

Differentiating the impact of cyclical employment reductions on productivity from the impact of restructuring that could yield permanent gains in productivity growth in these sectors is clearly not straightforward and sufficient data are not available to make this distinction conclusively. Note that the data presented above are not inconsistent with the notion that cyclical reductions in employment and lower levels of labor hoarding in a nticipation of a prolonged downturn may have led to temporary increases in productivity in some sectors as aggregate demand turned out to be less weak than anticipated.

Another factor that could affect aggregate productivity growth in the medium term is the distribution of the employed workforce across low and high productivity sectors. The evolution of employment levels for the three biggest sectors in Canada (in terms of employment) illustrates the increase in the employment shares of services and trade relative to manufacturing. While the levels of employment in services and trade in 1992:3 are about double their respective levels in 1970, manufacturing employment, after increasing somewhat over the 1980s, is at the same level in 1992 as it was in 1970. Chart 8 shows the employment shares (as percentages of aggregate employment) of the six major sectors. From 1970:1 to 1992:3, the share of services employment has increased from 25.6 percent to 36.2 percent and employment in trade has gone from 16.5 percent to 17.7 percent. Over the same period, the share of manufacturing employment has declined from 22.7 percent in 1970:1 to 14.6 percent in 1992:3.

Much of the secular increase in employment seems to be in the low productivity sectors of the Canadian economy rather than in the high productivity sectors. Thus, even if labor productivity in manufacturing has been permanently increased as a result of restructuring and employment in that sector rebounds in the near term, the prospects for sustained increases in productivity growth in the economy as a whole seem less certain.

Finally, to gauge the effects of restructuring on unemployment, the time-series behavior of sectoral unemployment rates is examined. Since job search is a time-consuming process, large net flows of workers across sectors prompted by sector-specific shocks would tend to increase the dispersion of sectoral unemployment rates. Further, as pointed out by Oi (1987), large net flows of labor into sectors that historically have higher levels of equilibrium frictional unemployment (independent of the cycle) could raise the aggregate level of frictional unemployment in the economy and thereby affect the natural rate of unemployment.

Chart 9 presents quarterly data on unemployment rates in 6 sectors from 1975:1 to 1992:3. 1/ Comparing Charts 5 and 9, it is apparent that unemployment rates vary markedly across sectors when the dispersion of employment and the aggregate unemployment rate are high. Since 1990, the unemployment rates in all sectors have risen quite sharply and the dispersion of unemployment rates has increased, although not as much as in the 1982 recession. The unemployment rate in the construction sector, which is historically higher than in other sectors, has risen substantially and is close to its peak level attained in the 1982 recession. 2/

Unfortunately, since the sectoral unemployment data begin in 1975 and cover only one full cycle, it is difficult to draw any firm conclusions about the equilibrium levels of frictional unemployment in different sectors.

V. Concluding Remarks

This paper has examined some aspects of recent labor market dynamics in Canada in order to gain some understanding of the process and consequences of industrial restructuring in Canada. Measures of dispersion in employment growth at the 1-digit sectoral level revealed little evidence of sectoral shifts prompted by restructuring. Within the manufacturing sector, the dispersion of employment growth has been relatively high since 1990, indicating that there have been large inter-industry shifts within manufacturing. Using labor reallocation measures over a three-year horizon, this note has also found some evidence that long-term net flows of labor may be occurring across broadly defined sectors of the economy. These flows may have been obscured in recent quarters by the general downturn in the Canadian economy. The dispersion of sectoral unemployment rates has increased somewhat in recent quarters although unemployment rates in all sectors have been moving in the same direction.

While productivity levels have increased both at the aggregate and the sectoral levels over the last few quarters, a large part of this increase may be attributable to the shedding of excess labor and to lower levels of labor hoarding by firms in anticipation of prolonged weak aggregate demand conditions. Evidence of permanent gains in productivity growth arising from restructuring remains elusive. The rising employment shares of low

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1/ Sectoral unemployment rates were available only for six sectors (agriculture and other primary goods industries were combined into one sector for this chart). Data were not available for F.I.R.E. and government.

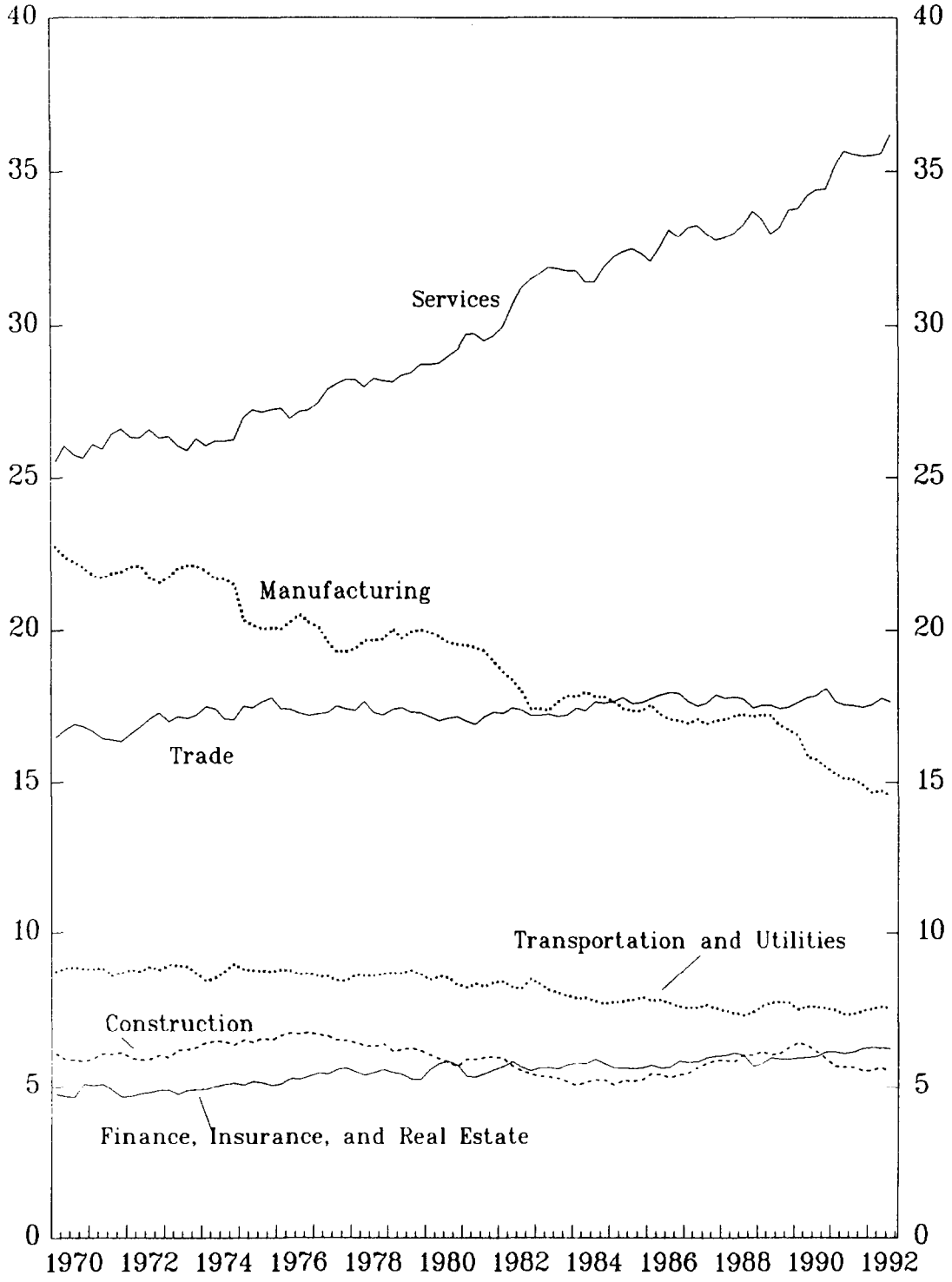
2/ The construction sector typically tends to have a strongly countercyclical unemployment rate as it has high-wage jobs that require sector-specific human capital. As a result, construction workers who are laid off in a downturn tend to wait in that sector for conditions to improve rather than move to other sectors.

CHART 8

CANADA

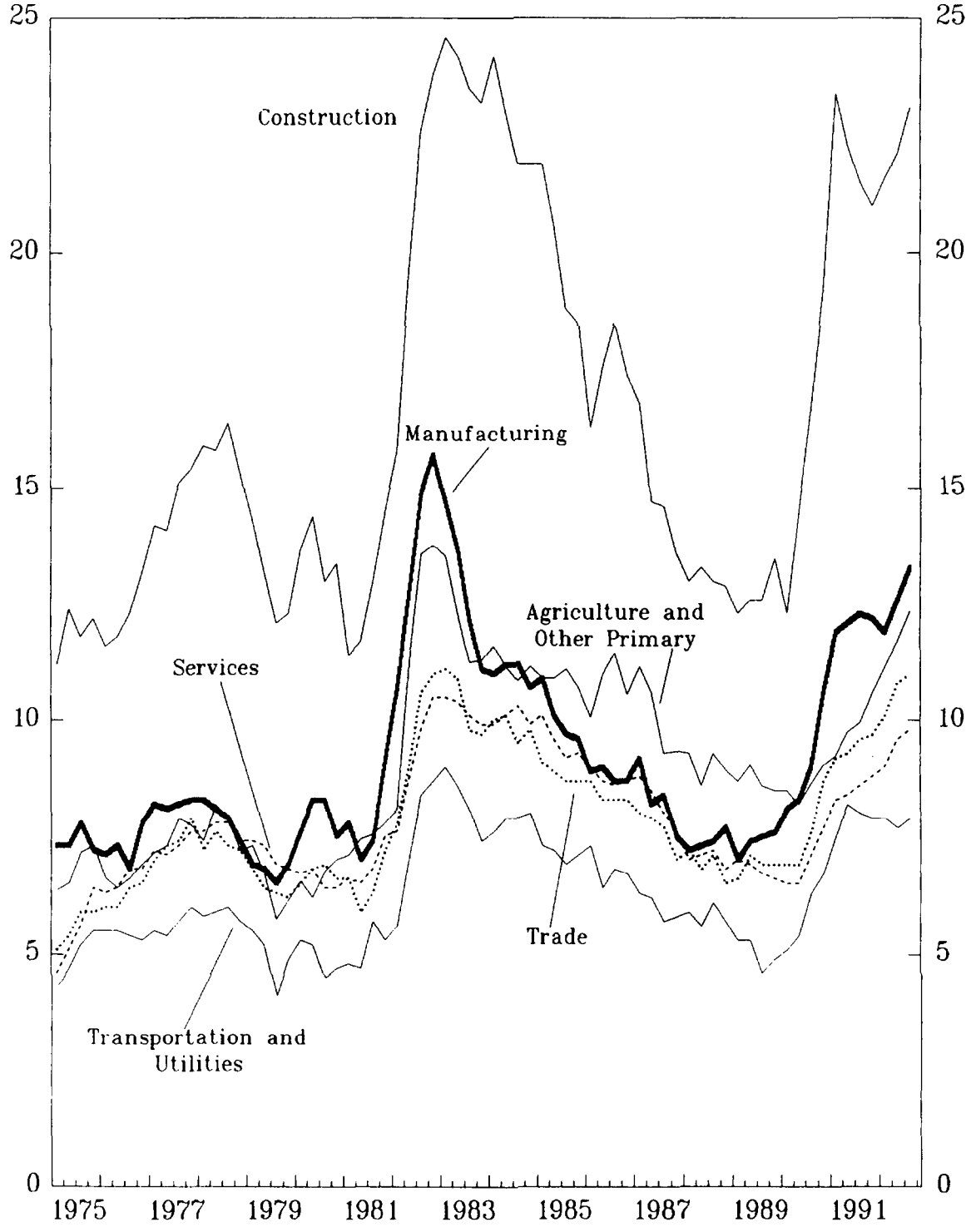
EMPLOYMENT SHARES 1/

1970:1-1992:3



1/ Employment share for each sector is expressed as a percentage of aggregate employment.

CHART 9
CANADA
SECTORAL UNEMPLOYMENT RATES
1975:1-1992:3



productivity sectors such as trade and services suggest that, even if the increase in manufacturing productivity should prove to be permanent, aggregate labor productivity growth may not show substantial long-lasting improvements.

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