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DIMENSIONS OF LABOUR MARKET CHANGE IN CANADA:
Intersectoral Shifts, Job and Worker Turnover

by

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Abstract

This paper measures different aspects of labour market change that the Canadian economy has absorbed since 1970. Debates about the economy's ability to adapt to change suffer from a lack of data on the amount of change that has been absorbed in the past. By examining three separate measures of change and relating them one to another, this paper attempts to overcome this deficiency. The first set of measures examine the extent of employment shifts between industries. The second set consist of job-change measures that capture the extent of employment growth and decline as a result of changes in producer employment levels. The third set of measures examine the size of worker separations.

The amount of change that takes place depends on the level at which it is measured and the time period used. Change is largest in the short run because it contains a transitory component that is reversed in the longer-run. Nevertheless, change in the long run is still relatively large. When change is measured as the employment that is lost from manufacturing industries that declined in size between 1970 and 1979, the degree of reallocation is found to be relatively small--less that 1 percentage point per year is lost over a ten year period. On the other hand, job growth and decline at the producer level shifts large amounts-- even in the long run. Over the period 1970-71 to 1980-81, some 3.6 per cent of manufacturing jobs were lost annually due to the decline of producers--for a cumulative total of some 31 per cent of 1970 employment levels. The largest amount of change is found when worker separations are measured. Each year between 1978 and 1986, the number of permanent separations was equal to over 20 per cent of the number of people holding jobs in the manufacturing sector.

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A) Introduction

This paper measures different aspects of the amount of labour market change that the Canadian economy has absorbed since 1970. Concern about the amount and type of labour market change is central to discussions of employment policy. Debates about the existence of structural unemployment or the implications of the new industrial realities in a global economy revolve around the extent to which there have been or will be structural shifts in the demand for different types of labour as new industries replace old. The contention that small firms are replacing larger ones and that they have become the engine of job creation[1] is partly a statement about the changing sectoral distribution of employment and partly a statement about a shift in the intraindustry distribution of employment.

Research studies abound on the employment effects that can be expected from fiscal, tax, or trade policy; but they generally concentrate on only one aspect of the process. They produce predictions of the amount of job change expected from an alteration in public policy without placing these estimates in context. For example, trade liberalization studies generally focus exclusively on predictions of the employment effect of tariff and non-tariff barrier reductions in particular industries, without providing a benchmark against which the effects of these predicted changes can be evaluated.[2]

Despite the importance of basic data on the size of the adjustment process to these issues, empirical work has either been lacking or deficient. While some studies cover certain aspects of inter and intraindustry employment change, they have rarely been related one to another; moreover, the quantitative measures have been inadequate in many cases. This study begins to provide the type of basic data that is needed.

Three separate measures of employment change are considered in this paper. The first set examine the extent of employment shifts between industries. The second set--job-change studies--focus on the firm and capture employment change within industries. The third set examine both the size of and the reasons for worker separations.

Each of these sets of measures calculate change at a different level. Figure 1 depicts the various stages. Employment growth for the economy is the net result of expansion in some industries and contraction in others. Employment change calculated at the industry level is the net result of employment expansion in some firms offset by employment contraction in other firms. In turn, employment change at the firm level is equal to the difference between gross inflows--accessions--due to new hires and rehires less gross outflows--separations--due to temporary and permanent separations of workers from firms.

The employment change figure derived at one level is the net result of what are larger offsetting gross measures of expansion and contraction at the next stage. Focusing on the economy as a whole potentially misses a large amount of churning at the level of the industry, firm, or worker. It also leaves the false impression that little change is occurring. On the other hand, discussions of change that focus exclusively on the least aggregated level -- that of worker separations and accessions --- risk finding so much change that its origins are difficult to ascertain. The various measures need to be compared so that they can be placed in perspective. Before we do so, it is useful to review the impact of existing studies.

B) Views of Change

One view of change, perhaps the most prevalent, is that reallocation is primarily an interindustry phenomenon. The dramatic long-run movement of labour out of agriculture in North America has undoubtedly influenced the importance given to studies of interindustry change. The current spate of work on the decline of the manufacturing sector and the rise in the service sector reinforces the emphasis that has been given to this aspect of change.[3]

The emphasis that inter as opposed to intraindustry change has received is also partly due to the picture that has been drawn by the field of industrial organization of the extent of intraindustry competition. Market structure has come to be associated with

Levels for Calculating Employment Change

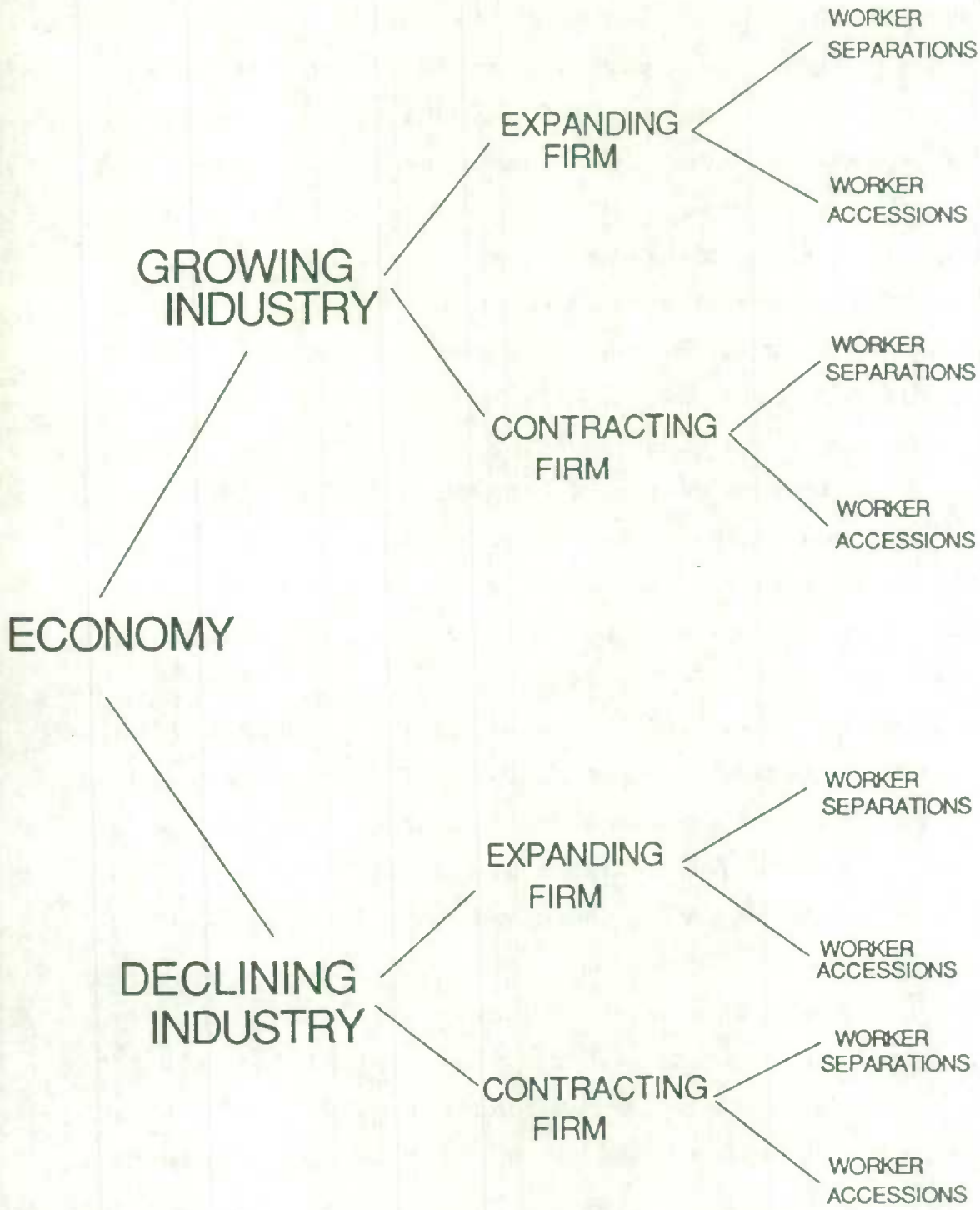


Figure 1

measures of firm size distributions (concentration measures) rather than with movement within these distributions (mobility measures).[4] Most studies of concentration have found the overall firm-size distribution to be relatively stable, and the impression has been left that there is little intraindustry change. There have been very few studies that have examined intraindustry change; moreover, the studies that do exist have been interpreted to confirm the picture of stability drawn by concentration ratios.[5] While economists such as Nelson and Winter (1982), Ijiri and Simon (1977), and Steindl (1965) have developed models with considerable intraindustry movement in firm relative sizes that produce firm-size distributions very similar to those actually observed, their work has not had a widespread impact upon the importance attributed to intraindustry mobility.

There have been some empirical studies that suggest the dimensions of change within industries are far larger than usually appreciated. The U.S. Department of Commerce studies done by Churchill (1954a, 1954b, 1955, 1959a, 1959b) provide measures of firm entry and exit. They failed to receive much attention for several reasons. First, they measured impact in terms of numbers of businesses rather than employment. Second, they found that most entering firms died quickly, and by not measuring the importance of entrants over a longer period, they left the impression that entry had no lasting effect. Third, in measuring only entry and exit and not change in the continuing firm population, they examined only part of the turnover story.

More recently, studies of job change have provided more detailed insight into the workings of intraindustry competition.[6] Developed initially by researchers who were not so much interested in the intensity of competition as in measuring the source and intensity of job growth, these studies focused on the extent to which employment growth and decline could be found simultaneously in the same industry or region. These job-change studies have had more influence on our view of intraindustry change, though here too several deficiencies have attenuated the impact of their findings. First, the data have mainly come from private sources in both the United States and the United Kingdom.[7] Debates about the accuracy of the data have detracted from many of the early findings of these studies. Second, the data have not always been in a form that would allow critical

distinctions to be made. In particular, the difference between employment growth due to entrants and that due to continuing firm expansion has not been measured with a great deal of accuracy. Entry in many studies contains a merger component and is, therefore, not really job creation.[8] Third, most of the studies have not been able to distinguish between short and long-run turnover. They generally measure one or the other, but not both. As a result, they cannot separate transitory from structural change. If much of short-run or year-to-year employment change in continuing firms is reversed in the long run, job-change studies based on short-run data overestimate structural change. Finally, the greatest problem with job-change studies is that they have failed to link firm employment change to worker separations. As such, they have left a critical question unanswered, since the amount of job change has not been directly related to the number of workers being reallocated. These deficiencies have meant that it is difficult to determine whether the job turnover being reported in these studies contains a large transitory element and, therefore, whether it has only a marginal relationship to the amount of labour actually being reallocated.

While job-change studies are of more recent vintage, separations data showing a considerable annual turnover in workers have been available for some time.[9] They too have had only a limited effect upon how change is viewed.[10] In some cases, the detail necessary to distinguish the separations that occurred because of a voluntary return to school or retirement as opposed to a forced layoff was unavailable.[11] This has made it difficult to evaluate whether the separations being discussed were directly related to fluctuations in firm fortunes or whether they arose from personal reasons like sickness or pregnancy. While a certain component of the non-layoff category will be indirectly related to the same factors that produce layoffs, a portion is not. The latter component is often regarded differently by those considering the size of separations brought about by structural change.[12] In addition, even when data on layoffs per se were available, they were rarely divided between those who were only temporarily separated from their employer and those who moved to other employers. Feldstein's (1975) attempt to do so garnered interest because of its focus on the size of the temporary rather than the

permanent component.[13] Partially for this reason, separations data have not been widely used to characterize the amount of reallocation that was taking place in labour markets.[14]

The purpose of this paper is to quantify some of the pressures being placed on the Canadian labour force by change and to do so in a way that overcomes the deficiencies in the literature described above. Three questions are posed. Are intersectoral shifts in the relative size of industries important? To what extent are jobs reallocated because some firms expand and others contract? How does job change at the industry and firm level translate into worker separations? The Canadian economy is chosen for the analysis because data are available that allow all three issues to be addressed.

C) InterIndustry Shifts in Employment

i) Employment Share

Most discussions of structural adaptation focus on the employment change that is associated with the decline of some industries and the emergence of others. In the past, it was contraction in the agricultural sector that garnered attention; more recently, it has been the rise in the service sector that has provided the main focus of studies. Between 1951 and 1981, the share of the Canadian labour force in agriculture fell from 15.6 to 4.1 per cent (Picot, 1986). Employment in the goods-producing sector (agriculture, resources, manufacturing, and construction) declined from 53 to only 34 per cent of the experienced labour force. About half of this decline has been offset by increases in the commercial service sector -- from 12.4 to 22.1 per cent; the other half by the non-commercial (public service) sector. When such long-run comparisons are made, the cumulative effect of interindustry shifts in employment is clearly important. In order to place more precision on these observations and to compare job change across countries or over time, summary statistics are required that encapsulate the totality of all the sectoral or industry share changes.

A commonly-used measure of structural change is the dissimilarity index.[15] This measure uses the difference in employment share of each industry between two points in

time and is defined as the sum of the absolute value of the employment share changes of all industries divided by two. It captures the percentage of those workers who are moving out of sectors that are losing relative position and into those that are gaining employment share. It can be calculated by comparing industry employment shares in adjacent years or by comparing shares between endpoints that are separated by several years. The former is a short-run measure; the latter is a longer-run measure. When estimated over year-to-year periods, the dissimilarity index captures both permanent and transitory components in employment share change. Calculated over longer periods to remove the transient component, but reduced to an equivalent annual rate of change, the dissimilarity index provides an estimate of the annual amount of structural change taking place.

When labour force share changes across the Canadian economy are used to calculate the dissimilarity index at the 2-digit (44 industry) level for the census years 1951, 1961, 1971 and 1981, the equivalent annual rates of decadal change are 1 percent or less.[16] Choosing a finer level of industry detail does not greatly affect the results. Charette et al. (1986) calculate the dissimilarity index using total employment for a 12 sector aggregation and a 186 sector aggregation of the Canadian economy using 1961 as the initial year and 1979 as the terminal year. The equivalent annual rate of long-run employment change in the first case is .70 of a percentage point; in the second case, it is 1 percentage point.

Because these results are calculated for industries defined at a relatively aggregated level, they may hide larger shifts in the distribution of employment that occur within subsectors. At least for the manufacturing sector, this does not appear to be the case. When the dissimilarity index is calculated for Canadian manufacturing industries at the 2-digit level, between .59 and .36 of a percentage point of total manufacturing employment was transferred from losers to winners annually when ten year periods (1951-61, 1961-71, and 1972-81) are used to compare industry employment shares. Over twenty year periods, the equivalent annual rate was even lower -- around .30 of a percentage point of total manufacturing employment.

The length of period over which the interindustry shifts are calculated generally

affects the size of the measured change. The equivalent annual rates of change yielded by the dissimilarity index are lower, the longer is the period of measurement. This implies that some of the year-to-year change is reversed in the long run. Table 1 contains values of the dissimilarity index calculated at the 2-digit industry level for the Canadian manufacturing sector for selected periods between 1960 and 1983.[17] Both the average equivalent annual employment change derived from using endpoints and the actual average year-to-year changes derived from annual employment share changes within these endpoints are reported.

The cyclical effect is quite evident. The average year-to-year changes within periods are always larger than the equivalent annual rate calculated using only the initial and terminal years. In addition, the longer periods (1960-68, 1960-79, 1958-82) have the lowest equivalent annual rates of interindustry job change.

ii) Employment Levels

Although the dissimilarity index has been used to measure employment change, it should be applied cautiously to infer the amount of adjustment that is imposed on the labour force as a result of the rise and decline of industries. The dissimilarity index takes on a non-zero value as long as the growth rates for all industries are not the same. All industries may have positive but differing growth rates and the index will nevertheless take on a non-zero value. Since the notion of a structural adjustment problem is often associated with an absolute decline in an industry's level of employment and not just a reduction in its share of the workforce, the rate of contraction in those industries with declining employment provides a useful alternate measure of change at the industry level.

When actual employment decline is calculated as a proportion of total base year employment, the rate of job loss in both the short and the longer run is small. If the 4-digit level of the manufacturing sector is used, the average annual rate of employment decline for the years 1970-79 is 2.1 per cent. Charette et al.(1986) measure short-run industry job decline using a 186-industry economy-wide disaggregation over the period 1961-79. On average, employment loss in those industries that declined between two successive years is less that .94 of a percentage point of aggregate employment.

Table 1

Structural Change Indices[1] for the Manufacturing Sector, at the Two-Digit Level, Canada, Selected Periods, 1958-1982

	Average Annual Changes In Employment	
	Equivalent[2] (1)	Actual[3] (2)
	per cent	
1960-64	0.69	0.97
1964-68	0.68	1.15
1968-72	0.39	1.17
1972-79	0.44	1.34
1979-83	0.97	1.69
1960-68	0.56	1.06
1968-79	0.35	1.28
1960-79	0.33	1.19
1958-82	0.23	1.26

1. The structural change index compares the share of employment accounted 1st by each industry between a base and terminal year. The absolute difference is then taken, summed and halved.

2. For the "equivalent" column the structural change index is estimated by comparing the employment distributions in the base and the terminal year for each period and the equivalent annual average is estimated.

3. For the 'actual' column,the structural change index is estimated by comparing successive years within the base and terminal years of the period. The average is then taken.

Source: Baldwin, J.R. and P.K. Gorecki: 1990. Structural Change and the Adjustment Process: Perspectives of Firms Growth and Worker Turnover. Ottawa: Economic Council of Canada

Both the dissimilarity index and various measures of contraction in manufacturing industries that were in decline were also calculated by comparing employment in 1970 to 1975, 1975 to 1979 and 1970 to 1979 for the 167 4-digit industry level of the Canadian manufacturing sector. The results are presented in Table 2. On the basis of the equivalent annual value derived from the dissimilarity index, about 1 percentage point of employment was shifted from those industries losing employment share to those gaining it for the 5-year intervals and .5 of a percentage point over the decade. This is about the result produced by the 2-digit manufacturing industry data for the period 1972-79 reported in Table 1.

Between 1970 and 1975, the mean rate of employment decline for the contracting industries was 3.6 per cent of total base year employment; in the second period from 1975-79, it was 3.0 per cent. This translates to an equivalent annual rate of employment decline of between .6 and .7 of one per cent. Over the decade between 1970 and 1979, the equivalent annual loss of employment was less than .4 of one percentage point.

In summary, despite the myriad of influences and the different character of the changes that have affected the structure of industry demand for labour, the shifts in employment that have taken place across industries, while large when cumulated over longer periods, are much less so when measured on an annual basis. This conclusion is generally independent of the summary statistic that has been used and, to a large extent, the level of industry classification. Whether measured by the dissimilarity index, or the rate of job loss only in those industries that declined, the employment which is redistributed annually among industries is generally below 1 percentage point of the total. Whether this is large or small needs to be assessed in relationship to other dimensions of change.

Table 2

Rates of Decline for Industries[1] in the Manufacturing Sector, Canada, Selected Periods, 1970-79

	1970-75	1975-79	1970-79
Dissimilarity index [2]	5.84	5.69	5.03
Average employment growth per industry	10.77 (0.02)[3]	5.03 (1.63)[3]	16.03 (2.64)[3]
Number of industries with declining employment	56	76	55
Percentage of all industries declining	33.5	45.5	32.9
Employment (base year) in declining indusries as a percentage of total sector employment	35	37	28
Mean decline rate for declining industries as percentage of employment in own industry	-12.46 (1.40)[3]	-11.18 (1.20)[3]	-16.32 (1.90)[3]
Gross decline as % of total sector employment in base year[4]	-3.6	-3.0	-4.0

1. Uses 167 four-digit industries

2. For the equivalent column the structural change when is estimated by comparing the employment distributions in the base and the terminal year of each period. The absolute difference is then taken, summed, and halved.

3. Standard error of the mean

4. Estimated by comparing base and terminal year period. Equivalent annual averages as not reported.

Source: Baldwin, J.R. and P.K. Gorecki: 1990. Structural Change and the Adjustment Process: Perspectives of Firm Growth and Worker Turnover. Ottawa: Economic Council of Canada

D) Job Change Measured at the Producer Level

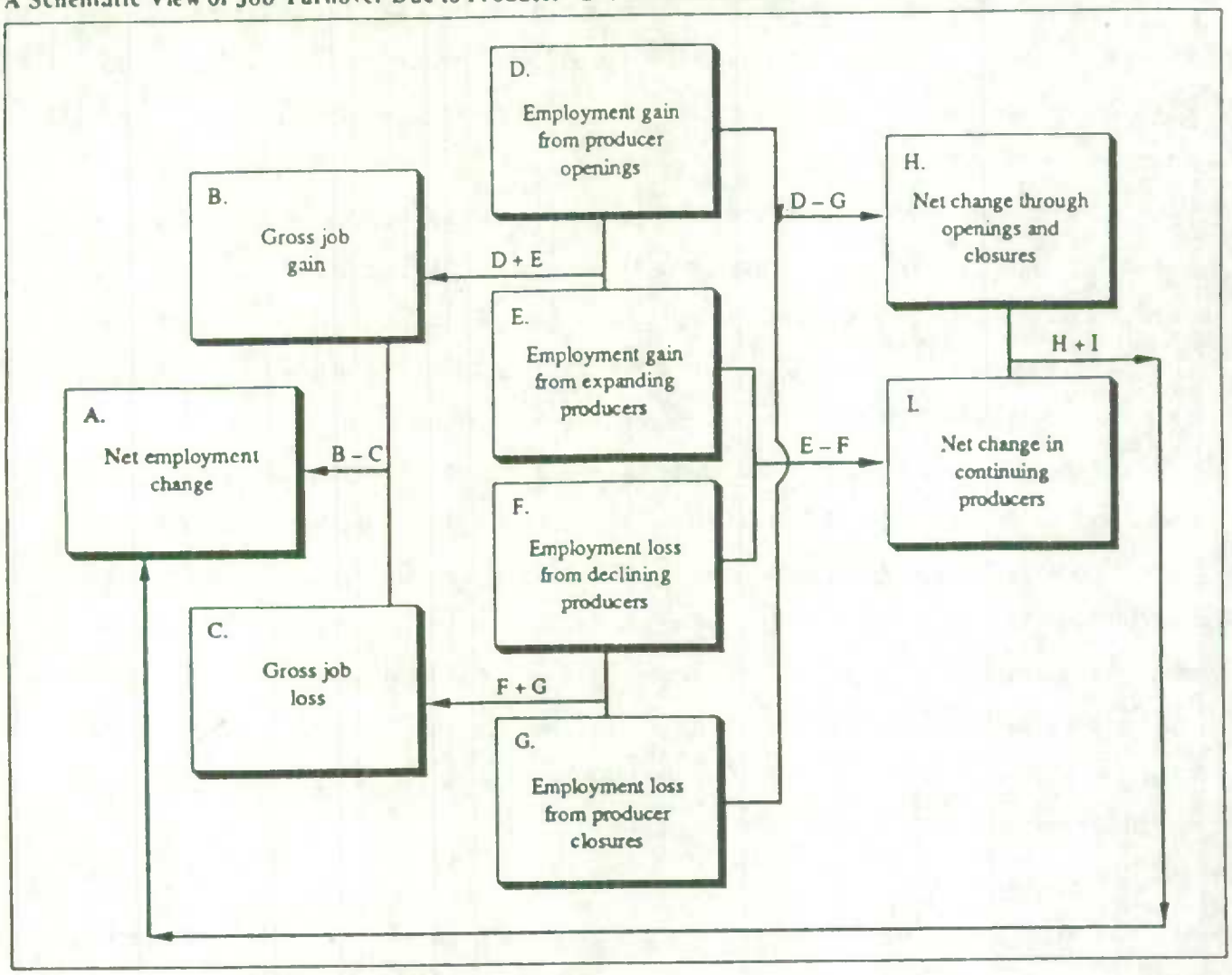
Employment changes occur not just because resources are transferred between industries but also because of a reallocation among producers. Each firm's growth contains components that are due to industry- and to firm-specific effects. Some growth or decline occurs because a firm belongs to an industry that is growing or declining; some growth or contraction occurs because a firm is changing relative position within an industry. Measures of net change in employment calculated from industry employment statistics do not capture the underlying churning that is taking place within industries as a result of the competitive process. Job-change studies, which capture the growth and decline of positions or employment associated with the growth and decline of firms, provide a measure of the importance of this phenomenon. Since job change, measured at the producer level, includes both the effects of interindustry as well as intraindustry changes, comparing the magnitude of job change measured at the producer level to that which results from industry shifts permits an evaluation of the magnitude of the additional effect of intraindustry change.

Firms grow and decline because of management mistakes, better returns in another type of business, or changing market conditions. Employment fluctuates in response to these changes in firm fortunes, through the creation of new jobs, and the loss of existing jobs. Job growth may originate from new plant creation or the expansion of existing plants. Job loss may occur because of plant closure or the contraction of existing plants.

Figure 2 provides a summary of the processes at work. Net employment change (A) is the difference between gross job gain (B) and gross job loss (C). Gross job gain is the sum of employment gain from the birth of new producers (D) and from growth in expanding but continuing firms (E). Gross job loss consists of job loss due to closures (G) plus job contraction in continuing firms (F)

Job change may be measured in the short or long run. Annualized equivalent long-run and short-run rates of job change can be quite different if much of the short-run gain

A Schematic View of Job Turnover Due to Producer[1] Growth and Decline



1 Producer in this context could be either the firm or the establishment.
Source Based on OECD (1987), Chart 4.1, p. 98.

FIGURE 2

and losses for continuing firms are temporary and are reversed quickly. Several studies (Hall,1987; Leonard,1987) suggest that substantial reversals do occur. Short-run job change calculations then overestimate the amount of job trunover due to structural change. On the other hand, long-run job change calculations are not devoid of problems. Such studies may be appropriate for calculations of changes in intraindustry structural change in relative firm position; but they may not reflect the actual amount of labour displacement that is the result of changing producer fortunes. This is because measures of job change capture only the net outcome of the interaction between the number of positions offered by employers and worker response to job variability. Measures of job change capture only part of what is happening to the labour force -- albeit an important part that all too often tends to be ignored. Short-run fluctuations in output and employment will more closely approximate the worker turnover that results from these job changes if the associated annual layoffs move to other employers during temporary year-to-year declines in employment. If many of those who do lose their positions due to firm instability in the short run wait for the firm to recover and then return to their previous employer, short-term measures of job change will overstate the effect of firm-level employment instability on the labour market. Because of these considerations, it is useful to measure job change in both the short and the long run so that both can be compared to worker separations data that will be presented below.

a) Job Change Measured in the Short Run (Annual Rates of Employment Change)

Measures of short-run job change that avoid many of the problems that have beset earlier studies can be derived from annual changes in employment for establishments in the Canadian manufacturing sector over the period 1970 to 1982.[18] Establishments are followed over the decade and classified as new (entrants), disappearances (exits),[19] expanding but continuing, contracting but continuing, and finally those with constant employment. The rates of employment change relative to total manufacturing sector employment are reported in Table 3 for entering and exiting establishments and in Table

Table 3

Annual Establishment Entry and Exit Rates in the Manufacturing Sector,[1] Canada, 1970-81

	Employment affected[2]			
	Entry[3] (1)	Exit[4] (2)	Net change[5] (3)	Turnover[6] (4)
	(Per Cent)			
1970-71	2.12	1.80	0.32	3.9
1971-72	1.84	1.96	-0.12	3.8
1972-73	1.80	1.59	0.21	3.4
1973-74	2.12	1.77	0.35	3.9
1974-75	2.13	1.88	0.25	4.0
1975-76	1.14	2.45	-1.31	3.6
1976-77	0.90	2.09	-1.19	3.0
1977-78	1.49	1.86	-0.37	3.4
1978-79	1.14	1.42	-0.28	2.6
1979-80	1.77	1.90	-0.13	3.7
1980-81	1.27	2.61	-1.34	3.9
Mean	1.61	1.94	-0.33	3.6

1. The manufacturing sector is defined using the 1970 SIC between 1970 and 1981 inclusive.

2. All rates are calculated as percentages of sector total employment in the base year.

3. Entry is defined as occurring in the year the establishment first filed an Annual Census of Manufactures questionnaire.

4. Exit is defined as occuring in the year the establishment last files an Annual Census of Manufactures questionnaires.

5. Column (1) - (2)

6. Column (1) + (2)

Source: Baldwin, J.R. and P.K. Gorecki: 1990. Structural Change and the Adjustment Process: Perspectives of Firm Growth and Worker Turnover. Ottawa: Economic Council of Canada

Table 4

Annual Rate of Change in Employment[1] in Continuing Establishments in the Manufacturing Sector, Canada, 1970-81

	Continuing establishments[2]			
	Growing (1)	Declining (2)	Net change[3] (3)	Turnover[4] (4)
	(Per Cent)			
1970-71	6.6	6.8	-0.2	13.4
1971-72	8.6	4.7	3.9	13.3
1972-73	9.6	4.3	5.3	13.9
1973-74	7.8	5.8	2.0	13.6
1974-75	6.5	9.8	-3.3	16.3
1975-76	7.7	7.1	0.5	14.8
1976-77	6.5	7.0	-0.4	13.5
1977-78	8.3	5.7	2.6	14.0
1978-79	8.8	5.7	3.0	14.5
1979-80	6.6	7.8	-1.2	14.4
1980-81	6.7	6.6	0.1	13.3
Mean	7.6	6.5	1.1	14.1
Standard error of mean	0.33	0.46	...	...

1. All rates are calculated as percentages of total sector employment in base year.

2. Continuing establishments existed in both years (e.g., in 1970 and 1971)

3. Column 3 = column 1 - column 2

4. Column 4 = column 1 + column 2

Source: Baldwin, J.R. and P.K. Gorecki: 1990. Structural Change and the Adjustment Process: Perspectives of Firm Growth and Worker Turnover. Ottawa: Economic Council of Canada

4 for continuing establishments that were expanding and contracting.[20]

The amount of job growth and decline is large relative to net employment change. On average, net growth in continuing establishments between 1970 and 1981 was 1.1 per cent per year (Table 4). But this net figure was the result of an average annual job loss in contracting establishments of 6.5 per cent of total employment and a growth of 7.6 per cent in expanding establishments. Entering and exiting establishments together contributed a small negative annual average net growth of -0.3 per cent but annual job loss due to exiting establishments was equal to 1.9 per cent of employment (Table 3) and entering establishments, on average, added 1.6 per cent to total employment each year. Together, total employment gain in expanding plants as well as new plants (gross job gain) averaged 9.2 per cent per year. Total employment loss in contracting and exiting establishments (gross job loss) averaged over 8 per cent per year during the period.

One measure of job churning that has been used to characterize the volatility of an industry is total job turnover (OECD, 1987). It is defined as the gross number of jobs lost plus the gross number of jobs gained. If those workers losing jobs in contracting and exiting plants do not correspond to those gaining jobs in expanding and entering plants, this measure captures the maximum percentage of employees affected by the plant expansion and contraction process. Total job turnover amounted to some 18 per cent annually of total employment in the manufacturing sector, even though net employment change was less than 1 per cent per year.

Whether we concentrate separately on measures of gross job gain and loss or on total job turnover, it is clear that focusing on the net change in employment understates the amount of employment churning that has occurred. It is also evident that short-run employment turnover, when measured at the establishment level, is much greater than when the effects of interindustry decline alone are estimated. Gross job loss at some 8.2 per cent is well above the short-run job decline rate that is derived by measuring annual employment decline at the 4-digit industry level in manufacturing. At that level, the average annual rate of decline, defined relative to total manufacturing employment, was only 2.1 per cent between 1970 and 1979. This emphasizes how much more important, in

the short run, the intraindustry competitive process is in potentially reallocating workers than is the interindustry process that is related to the growth and decline of whole industries.

b) Job Change Measured in the Longer Run (5- and 10-year rates of change)

The importance of longer-run job change from entry and exit as well as from expansion and contraction in the continuing sector is calculated by comparing the size of establishments in 1971 to their size in 1976, 1976 to 1981, and 1971 to 1981. The rates of job change calculated for entry, exit, and expanding and contracting establishments over these periods are reported in Table 5. Three sets of results are tabulated. The first set contains the cumulative rate of job change obtained from comparing the employment of plants at the beginning and end of the period. The second set contains the equivalent annual rates derived from these cumulative rates of change. The third set contains the average annual rates derived from the year-to-year changes calculated within the periods 1971-76, 1976-81, and 1971-81.

The equivalent annual values of the amount of gross job change (from both exits and decline, entry and growth) measured over five- and ten-year periods are somewhat lower than the corresponding figures derived from the year-to-year changes within each period. Over the period from 1971 to 1981, the annual gross job-loss rate due to the combined effect of exit and contraction implied by the yearly changes was 8.3 per cent; whereas, the long-run equivalent annual rate for gross job loss was only 3.6 per cent -- less that half the annual or short-run rate. Somewhat the same relationship holds between job-expansion rates calculated from a comparison of the employment of establishments in 1971 and 1981 and from year-to-year changes.

The difference between the long- and short-run gross rates of change comes primarily from the lower long-run job-contraction and job-expansion rates in continuing establishments. The annual continuing firm job-contraction rates were some 6 per cent in each of the five-year periods; the equivalent annual long-run job-contraction rate was only

Table 5

Components of Job Gain and Loss in Manufacturing Establishments, Measured over Five and Ten Year Intervals, Canada, 1971-81[1]

	Entry rate	Continuing establishment growth rate	Total job growth rate	Entry/ total growth rate	Exit rate	Continuing establishment decline rate	Total job decline rate	Exit/ Total decline rate
				(Per Cent)				
Cumulative change from comparing endpoints								
1971-76	9.24	16.50	25.74	35.9	10.28	9.95	20.33	50.8
1976-81	10.26	15.10	25.36	40.5	9.95	11.39	21.34	46.6
1971-81	19.19	21.10	40.29	47.6	18.73	11.89	30.62	61.2
Implicit annual rates of change from comparing endpoints								
1971-76	1.78	3.10	4.68	...	2.15	2.07	4.42	...
1976-81	1.97	2.81	4.62	...	2.07	2.39	4.69	...
1971-81	1.77	1.93	3.44	...	2.05	1.25	3.59	...
Average annual rates derived from change based on year-to-year rates								
1971-76	1.26	8.04	...	...	1.78	6.36	...	...
1976-81	1.74	7.38	...	...	1.90	6.56	...	...
1971-81	1.50	7.70	...	...	1.84	6.46	...	...

1. The entry and exit rates in Panel C differ slightly from those reported in Table 3. For the reasons behind this, see Baldwin and Gorecki (1990).

Source: Baldwin, J.R. and P.K. Gorecki: 1990. Structural Change and the Adjustment Process: Perspectives of Firm Growth and Worker Turnover. Ottawa: Economic Council of Canada

about 2 per cent. Substantial reversals in the short-run fortunes of continuing plants took place.

By way of contrast, the equivalent annual long-run job-change rates due to exit and entry were quite similar to the annual or short-run rates. Entry is not an ephemeral phenomenon. Slowly but surely, its effects cumulated year by year as the growth of successful entrants and the arrival of new entry cohorts was enough to offset the very high death rates of new plants.[21]

While the equivalent annual rates of employment change are lower in the long run, the cumulative long-run change is nevertheless substantial. Gross job gain is about 25 per cent of base year employment for each of the two five-year periods and 40 per cent for the ten-year period. Gross job loss is some 20 per cent for each of the two five-year periods and 31 per cent for the decade 1971-81. Some 19 per cent of 1971 employment disappeared by 1981 as a result of plant exits; some 12 per cent as a result of plant decline.

This long-run rate of job loss calculated from establishment data is large compared to the long-run rate of job decline that is yielded by employment contractions measured at the industry level. The sum of the employment contractions in all manufacturing industries that declined between 1970 and 1979, calculated at the 4-digit industry level, was only 4 per cent of base year employment (Table 2). As with the short-run data, moving from the industry to the producer level to measure the importance of employment contraction increases the rate of contraction. In the case of the short-run data, there was a four- to five-fold increase. When long-run data were used, there was an eight-fold increase.

c) Inter versus IntraIndustry Job Shifting (Share Change)

Measurement of job-change at the producer level normally focuses on rates of employment growth and decline. That need not be the case. Just as the distribution of jobs between industries is of intrinsic interest, so too is the distribution of jobs within industries. The change in this distribution provides a measure of the importance of the change in relative establishment position. It can be compared to the measures of share change developed previously at the industry.

Employment share change can be measured at different levels. First, employment share can be calculated for all producers and the share for each producer can be defined relative to total employment in all manufacturing industries. Share change at this level captures the totality of change -- both intraindustry and interindustry. Secondly, share change can be measured using the shares of individual industries relative to total manufacturing sector employment. Change estimated at the industry level measures interindustry shifts in relative shares. It captures only part of the change going on across all firms. It will be the same as the first measure if all establishments in an industry grow and decline in step with the industry. Therefore, a comparison of the first to the second indicates how much more important intraindustry change is than interindustry change. Finally, share change can be measured for establsihments within a specific manufacturing industry relative to that industry's employment level. This latter measure captures shifts going on in relative position within industries. When averaged across all manufacturing industries, it provides a measure of average intraindustry change.

If Sij stands for the share of the j'th establishment located in the i'th industry as a percentage of total manufacturing sector employment, the subscript 1 and 0 stand for the two time periods being compared, and the dissimilarity index is used to measure change, then these measures can be written as

i) Total Change $\left(\sum_i \sum_j |s_{ij1} - s_{ij0}|\right)/2$

ii) Interindustry Change $\left(\sum_i \left| \sum_j s_{ij1} - \Sigma s_{ij0} \right|\right)/2$

iii) Intraindustry Change for Industry i $\left(\sum_j \left| \frac{s_{ij1}}{\sum_j s_{ij1}} - \frac{s_{ij0}}{\sum_j s_{ij0}} \right|\right)/2$

The values of the dissimilarity index for these three categories are presented in column 1 of Table 6. The minimum value of each index is zero; the maximum value is 1. The index compares manufacturing sector establishment employment shares in 1970 and 1979 and uses the 4-digit industry level of aggregation. Some 31 per cent of total employment is transferred from losers to gainers in total (index i). Only 7 per cent is transferred if industry shares are used (index ii). This is less than one-quarter of the value of the total change produced using index i. If dissimilarity index is calculated within each of the 167 industries (index iii), 33 per cent of an industry's employment (as opposed to total manufacturing sector employment) is transferred on average from losers to gainers. Whether it is the percentage of total change accounted for by interindustry shifts or the relative size of the average intraindustry and interindustry reallocation that is used for evaluation, intraindustry reallocation dominates the adjustment process in terms of the percentage of resources being shifted.

d) Industry Job Change: An Overview

In conclusion, whether annual or decadal comparisons are used, whether rates of job growth and contraction or shifts in employment shares are used, employment reallocation measured at the firm level is large relative to traditional measures of

interindustry reallocation. Intraindustry competition is all too frequently ignored in discussions of dislocation in favour of the structural factors relating to the growth and decline of whole industries. The Canadian evidence for the manufacturing sector indicates that the fate of workers' jobs is more closely tied to the fate of their firm's relative position within an industry than it is to the fate of their industry.

Comparison of the short and long-run results yields a second important conclusion. When measured over year-to-year periods, the continuing segment dominates the job turnover process. The mean exit rate is only 23 per cent of the mean gross job-loss rate. Exit and entry are relatively unimportant as a source of job dislocation if short-run data are used. This is no longer the case when the period of a decade is used. Over the decade 1971-81, employment loss due to exit at 19 per cent is considerably more important than the 12 per cent job loss due to long-run contraction in the continuing segment. Entry too increases its relative importance but not by quite the same extent. Between 1971 and 1981, establishment entry adds 19 per cent of 1971 employment in the manufacturing sector; the expansion of continuing establishments contributes 21 per cent. Most of the employment created by new plant construction comes from firm entry rather than from continuing firms -- almost 80 per cent when 1970 and 1979 are used for the end-point comparisons.[22] Therefore, contrary to the impression left by other studies,[23] plant exit and entry have a substantial cumulative effect over time, and much of this is related to the emergence of new firms and the exiting of old ones.

E) Worker Turnover Derived from Separations Data

A different measure of the impact of change on labour markets is provided by labour force separations data. Separations data directly measure worker turnover. Labour markets adjust continuously for two separate but related reasons. Some of the adjustment is firm-initiated (displacements). Workers may be laid-off and forced to move because of the changing fortunes of firms. Other separations (attritions) will occur as workers quit and move to new employers. Attritions also include those who withdraw from the labour

force for reasons of sickness, pregnancy, retirement, or schooling. While the distinction is not perfect, displacements are often regarded as being initiated by firms while attritions are more likely to be initiated by workers.

Not all separations lead to a reallocation of labour. Many will be temporary. After pregnancy and sickness, workers often return to their previous employer. Workers who are laid off for seasonal reasons or because of temporary reductions in demand due to business cycle downturns will often be recalled to their previous employer. It is, therefore, important to draw a distinction between a temporary separation and a permanent one.

The various categories of worker turnover are outlined in Figure 3. Workers in a firm in year t (P) can be divided into those continuously employed (Q), those laid-off (R), and those who quit or separate for other reasons (S). Employment in the same firm in period t+1 (Y) consists of those continuously employed (Q), recalls from layoffs (U), returns from quits and other attritions (W) plus new hires (T). Those who are permanently laid-off (V) or those who leave permanently for other reasons (X) make up the group that are reallocated as the result of both demand and labour supply decisions (Z). It is evident that employment levels in two years can be the same (P=Y), but reallocation may nevertheless be taking place if new hires just offset permanent separations (if T>0 and T=V+X).

The concepts of job change and worker turnover are related. Labour turnover consists of separations (R+S=U+W+V+X) from and accessions (T+U+W) to the firm during the period. The difference between accessions and separations (T-V-X) is equal to the difference between employment in the firm at the beginning and the end of the period.

a) The Relationship between Studies of Job Change and Worker Separations

While the two concepts of job change and worker turnover are related, they measure quite different phenomena. Job-change studies measure the extent to which jobs or positions at the producer level have increase or decreased. Worker-turnover studies focus on the number of people who flow in and out of an industry. Their relationship is

Table 6

Decomposition of Share Change
Index for Manufacturing, Canada
1970 versus 1979

Calculated	Dissimilarity Index [2]
Across all Plants	.31
Across Industries	.07
Average Within Industry Component across 167 Industries	.33

Note: 1) The indices are calculated using total sector employment for the years 1970 and 1979. Small plants and headquarters will not count.

2) The dissimilarity index is defined in the text.

Source: Special Tabulations: Business and Labour Market Analysis Group, Statistics Canada

A Schematic View of Worker Turnover Due to Separations

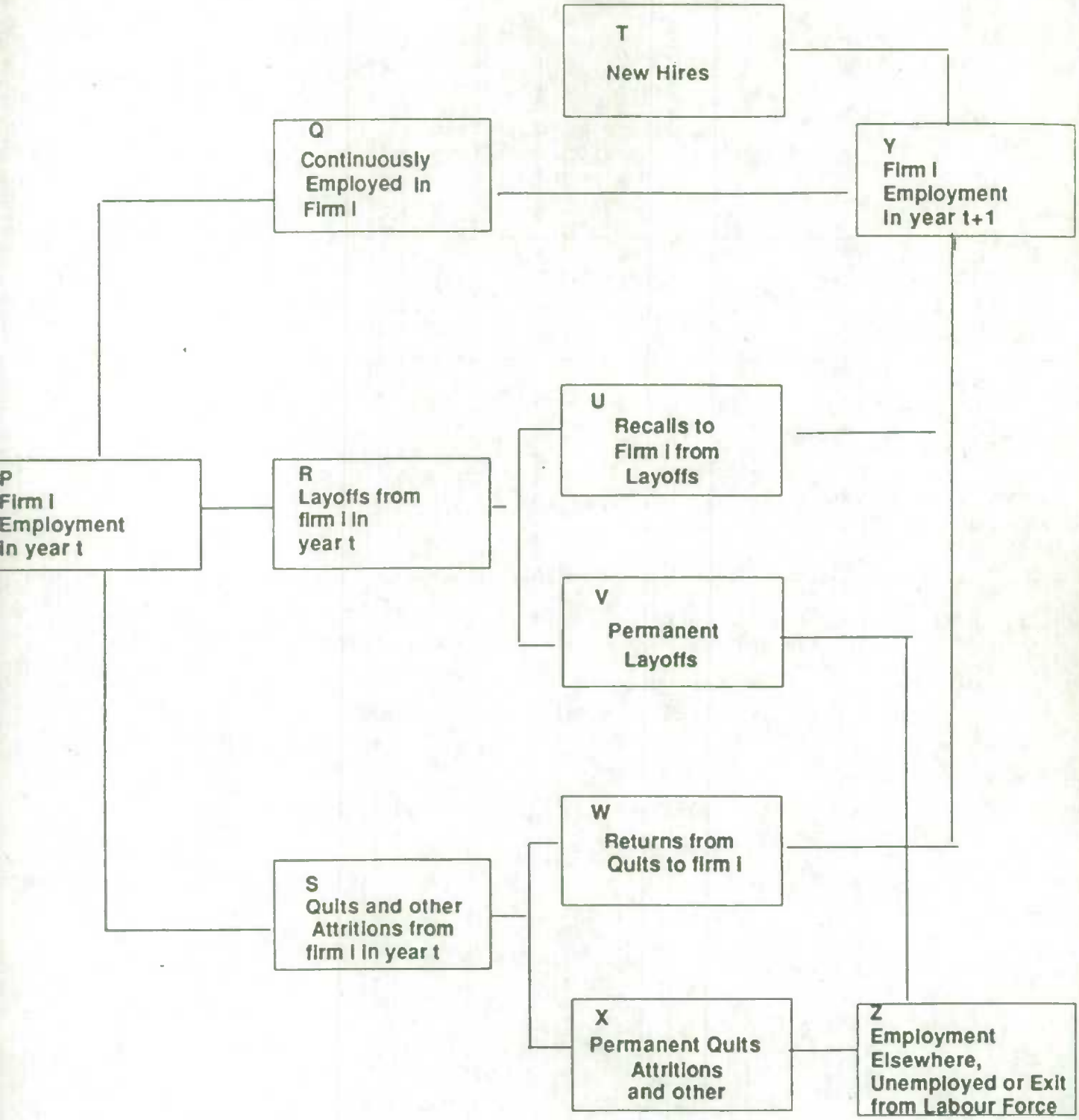


FIGURE 3

analogous to that between net change in employment and job turnover described in Figure 1. While net employment change (A) is equal to gross job gain minus gross job loss (B-C), examination of net employment change alone hides a considerable amount of churning at the firm level. Similarly, examining the components of job change (job gain and job loss) by focusing on employment differences alone may hide considerable churning in the labour force.

Job-change studies are best aimed at the phenomena that they measure directly -- the growth and decline of producers. However, job-change studies are sometimes used to make statements about the effect of firm size variability on labour markets. They are less suited for this task. Without additional information concerning the response of worker separations to job change, job-change studies can be used only imperfectly to infer the amount and type of dislocation of the workforce caused by the rise and decline of producers.

Job-change studies quantify the amount of reallocation experienced by workers only imperfectly for the same reasons that measures of interindustry change poorly capture the underlying amount of churning in firm and establishment employment. On the one hand, job loss may overestimate forced displacements. Job loss at the firm level may be incurred without any forced labour displacements, if voluntary attritions are large enough to absorb job losses. It is, therefore, important to know the relative size of the two main separations components -- displacements as opposed to attritions -- and how a change in the number of positions is translated into one or other of these components. On the other hand, job-change measures may underestimate forced worker reallocation. Employment change, when measured on a year-to-year basis, will miss seasonal fluctuations in positions available. This will cause measures of year-to-year position or job change to underestimate the amount of turnover that is occurring. Separations rates that measure all separations that take place during a year will overcome this latter shortcoming.

Even if neither of these two problems exist, yearly job-change measures may still not reflect the amount of forced relocation. Year-to-year changes in employment may all be reflected in displacements, but these displacements may only be temporary. Much of

year-to-year job contraction in continuing establishments is reversed in the longer run. Workers who are laid-off during these cyclical swings may return to the same employer in the next upswing. In this case, the short-run job-change measures will overstate the actual reallocation that is taking place. Separations data that measure the temporary and the permanent components of displacements and attritions permit us to ask whether year-to-year fluctuations in employment are reflected in temporary as opposed to permanent displacements and, thus, in labour reallocation.

While the concepts of job or position change and worker turnover are related, they measure quite different phenomena. Neither by itself is adequate; but taken together, they complement one another.

b) Worker Separations

The separations data that have been available in the past suffer from several problems. Canadian data have not been available since 1966.[24] U.S monthly separations rates, defined relative to number of employees, exist up to the year 1981. For the period from 1971-81, the U. S. separations rate from all causes averaged 4.2 per cent per month, the layoff component averaged 1.4 per cent and quits 1.9 per cent. The monthly total separations rate translates into a yearly rate of over 48 per cent; the monthly layoff rate into an annual rate of 16.8 per cent. Many separations will be temporary; but derivations of estimates of the permanent as opposed to the temporary component have left a margin of uncertainty as to its actual magnitude. Feldstein (1975) uses the ratio of the rehire rate to the layoff rate to approximate the percentage of layoffs who return within a month. This will provide an estimate of the return rate with a upward bias since some of the rehires will have come from layoffs in previous periods. Lilien (1980) uses regression analysis and a lagged relationship and estimates a 68 per cent recall rate for layoffs. Despite this ingenuity to measure the extent of return, considerable uncertainty remains as to the actual magnitude of the permanent separations component.

Canadian worker separations data have recently become available that overcome

many of the previous problems. These data come from comprehensive administrative records associated with Canada's national unemployment insurance programme that must be filed by employers when an employee has an interruption of earnings.[25] These separations data are broken into sufficiently fine subdivisions to allay the criticism that most of the change being caught by such data is either inconsequential or consists of such a miscellany that it is unrelated to the issue at hand -- that being the matter of change brought about by inter and intraindustry restructuring.

Separations are broken into ten categories: layoffs, labour disputes, return to school, illness/injury, quits, pregnancy, early retirement, work-sharing, apprenticeship training and "other".[26] Outside of layoffs, quits, and "other", the remaining categories individually accounted for a relatively small percentage of total separations on average. For instance, "return to school" accounted annually, on average, for only 3.9 per cent of total separations in all sectors of the Canadian economy between 1974 and 1986: "illness or injury" for 3.8 per cent: "pregnancy" for only 2.2 per cent. Those who would argue that separations related to such factors should be removed from analyses of change brought about by structural realignment can do so with these data. When this is done, layoffs, the displacement component, and quits, the main attrition component, are important. Layoffs accounted annually for 44.2 per cent of all separations: quits for 23.7 per cent, on average. Figure 4 contains a chart depicting the distribution of reasons for separations in the Canadian economy for the period 1974-86.

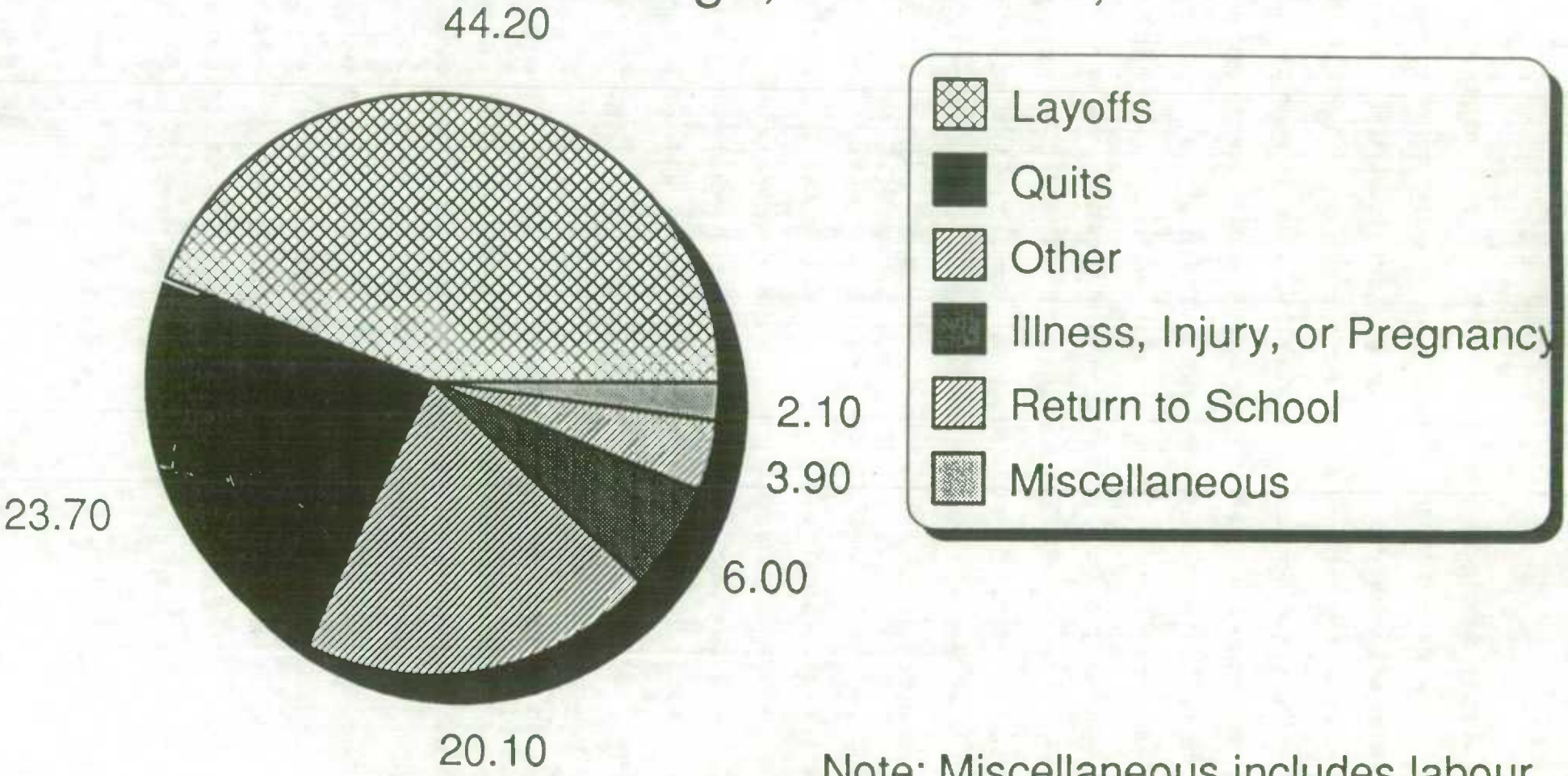
A more fundamental improvement in these statistics arises from their division into temporary as opposed to permanent separations using longitudinal records on work history. Separations are divided into those workers who returned to the same employer within a two-year time period[27] and those who did not. The former are termed temporary; the latter are referred to as permanent, not because the affected workers necessarily fail to obtain further employment, but because change forces them to alter their status. They either leave the labour force or move to a new employer.

Average annual permanent and total separations rates for the Canadian economy are presented in Figure 5. These separations rates are calculated for each year during the

Figure 4

The Distribution of Worker Separations

Annual Average, All Sectors, 1974-86



Note: Miscellaneous includes labour dispute, early retirement and work-sharing

period 1974-86 as the number of separations divided by the number of individuals holding a job.[28] The latter is defined as the number of employed individuals for whom an employer files a tax form with the government.[29] Separations are divided into layoffs (lack of work), quits, and all other causes.

On average, the total separations rate was 46 per cent per year. A substantial percentage (45) of this was temporary. Nonetheless, the permanent rate from all causes, at 25.6 per cent, was still substantial. While total layoffs were twice as important as quits, a larger percentage of layoffs were temporary. Thus, permanent quits and layoffs each accounted for about the same percentage of total permanent separations. The average permanent layoff rate was 8.4 per cent; the permanent quit rate was 9.2 per cent. The permanent separations rate for all the remaining attrition categories was 8.0 per cent.[30] Thus displacements, which are the category most closely associated with fluctuations in firm fortunes, accounted for about one-third of all permanent separations.

Annual separations rates for the manufacturing sector during the period between 1978 and 1984 are presented in Table 7, along with an estimate of the gross job loss rate in this sector. Once again, both the total and permanent components of layoffs, quits and all other causes are given. The permanent layoff rate averaged 7.5 per cent of those with their major job in manufacturing.[31] The permanent quit rate averaged 8.3 per cent. The total permanent separations rate was 23.2 per cent.[32] The rate then at which workers in the manufacturing sector permanently separate is some 3 times the rate at which employment declines annually in exiting and contracting firms.

Of special interest, however, is the relationship between forced displacements (layoffs) and the measure of job change. Layoffs are often used to proxy the effects on the labour force of firm decline. Before the permanent separations rate is compared to the job-loss rate, the relationship between the two should be noted. As was described in Figure 3, employment in year 1 (P) consists of those workers who continue with the firm without interruption to the second year (Q), workers who are laid-off (R), and those who quit or separate for other reasons (S). Employment in year 2 (Y) is equal to the sum of those in the continuing segment (Q), those who were laid-off but are rehired (U), those attritions

who are rehired (W), and finally new hires (T). Then

#1) $P = Q + R + S$

#2) $Y = Q + U + W + T$

Each of the two rehire components are related to the corresponding separations categories by the equations:

#3) $U = r1 * R$

#4) $W = r2 * S$, where r1 and r2 are the rehire rates.

Then the measure of job loss that is captured in job-loss studies is

#5) $(Y-P)/P = T/P - [(1 - r1)*R]/P - [(1 - r2)*S]/P$

The percentage change in employment is equal to the new hiring rate (T/P) less the permanent layoff rate (R/P corrected for recalls), and the permanent attrition rate (quits plus other separations, (S/P corrected for recalls).

The measure of forced employment change derived from job loss studies (Y-P)/P may not equal forced displacement from layoffs for several reasons. First, job loss is derived from just employment decline in that segment of the establishment population whose average annual employment has declined. From equation #5, it is apparent that job loss will equal non-recalled displacements for declining establishments only if there are no quits and new-hires or if the two just offset one another. With no new hires and some quits, job loss will overstate forced displacements; but the reverse could also occur. In declining firms, new hires are not likely to offset quits and job-loss should overstate displacement. All this is predicated on there being little marginal turnover. If a small number of jobs are, however, constantly turned over during the course of the year, both permanent displacements and attritions, on the one hand, and new hires, on the other hand, will increase while leaving the net job change unaffected in equation #5. In this case, job loss will underestimate the permanent displacement effect.

There is a second reason that job-loss rates may provide a poor proxy for forced displacement. The growing and new establishment segment does not make any contribution to the measure of job loss derived from job-change studies. An establishment whose employment increases between two years may experience seasonal or other cyclical

Table 7

Annual Worker Separation Rates in the Canadian Manufacturing Sector, 1978-84

Year	Gross Job Loss[1]	From Layoffs[2]		From Quits		From All Causes	
		Permanent[3]	All	Permanent[2]	All	Permanent[3]	All
1978	7.4	7.0	22.3	9.8	11.8	24.6	53.4
1979	8.0	6.5	22.9	11.9	14.0	27.1	55.9
1980	7.3	6.8	26.9	9.7	11.7	24.4	57.3
1981	12.9	7.5	32.0	10.5	12.2	26.1	62.6
1982	12.8	9.7	46.3	5.1	6.1	20.9	77.1
1983	7.0	7.6	30.5	4.6	5.6	17.8	52.6
1984	7.3	7.5	30.0	6.5	7.8	21.2	57.4
Mean	9.0	7.5	30.2	8.3	9.9	23.2	59.5
Standard Error of Mean	1.0	0.4	3.0	1.1	1.3	1.3	3.2

Notes: 1) Taken from the LEAP file(Statistics Canada(1988). It includes job loss from both firm exit and contraction.
2) Separated for lack of work.
3) Separations who did not return to the same employer within two years.

declines in employment of less than a year in duration. These contractions may lead to permanent worker separations. These separations will not be counted in the job-loss numbers generated by job-change studies and will cause job-loss rates to understate the forced displacement effect.

Before the job-loss and the forced displacement rates that were reported previously are compared, it is useful to recall that each was calculated to a different base. Job-loss rates were calculated relative to employment. Worker separations rates were calculated relative to the number of people holding a job in an industry. The two concepts are linked since the number of jobs can be written as the number of people employed at the beginning of the year (P) and the number of new hires (T). Thus, in a two period world, jobs (Z) can be written

#6) $Z = P + T$

Then we can rewrite #5 <u>without</u> quits and new hires as

#7 $(Y-P)/P = [(r1-1)*R]/Z * Z/P$

where Z/P is the ratio of number of people holding jobs over the course of a year to the employment in the industry at the beginning of the period.[33] Therefore, even if there is no bias in the job-loss statistic as a measure of forced displacements, the job loss rate and the displacement rate, as calculated herein, will not be the same. In order to compare the two, the ratio of jobs/employment (Z/P) is required. For the manufacturing sector, this ratio is about 1.39 for the period being used here.[34] That is, the administrative data being used indicate that there are about 1.39 as many people with their major job in manufacturing as the Census of Manufactures lists as the employment level.

What then is the relationship between the permanent separations rate and the job loss rate? The average permanent layoff rate for the period 1978-84 was 7.5 per cent of all those with a major job in the manufacturing sector; 10.5 per cent of average Census of Manufactures employment using the appropriate correction factor. This is close to the average annual 9.0 per cent job loss rate for the same period (column 1, Table 7).[35] Permanent displacements then are slightly above annual job-loss estimates for this period.

F) Conclusion

Several conclusions emerge from this paper. First, while change is pervasive, the amount that is found depends upon the level at which it is measured. If employment at the manufacturing level is examined, year-to-year decline rates in the 1970s were about 2 per cent annually. If establishment level data are employed, gross job loss was about 9 per cent. On the other hand, separations rates of workers ranged upwards of 50 per cent. These estimates, however, cannot be treated as benchmarks against which the requirements of restructuring are to be gauged. This is because a substantial portion of each of these short-run estimates of change involves temporary movements.

Change, when measured over the longer run, is less than when measured over the short run. The amount of change that is found by comparing points ten years apart is not just the sum of the change measured on a year-to-year basis for each of the intervening years. Typically, it is considerably less. This is the case whether change is measured at the industry, establishment or worker level. Employment declines for those manufacturing industries that contracted is less than .5 of one percentage point per year over the period from 1970 to 1979. Gross job loss is only 3.6 per cent per year over almost the same period. Total permanent worker separations averaged 25.6 per cent annually over the period 1974-84. Thus, a good portion of the short-run change in each area -- inter-industry change, firm decline, and worker separations -- is reversed in the longer run.

The long-run component of change, while lower than the short-run measure, is still important. Over thirty per cent of jobs in 1970 have disappeared a decade later because of exit or contraction in producers that are still extant. That around 25 per cent of workers with a major job in manufacturing permanently leave their jobs each year means that substantial worker turnover accompanies the producer growth and decline process.

The picture this gives is one of substantial ongoing change in the economy. It is a picture that is not always appreciated. For example, the data on job change indicate that there is a substantial reallocation of shares from some producers to others. Moreover, it emphasizes the importance of entry and exit. When growth and decline is measured over

adjacent years, entry and exit account for only about one-sixth of gross job gain or loss. However, these results are modified when five- and ten-year periods of comparison are used. Plant entry and exit become just as important as expansion and contraction in the continuing sector.

To many, entry and exit is a phenomenon of little importance. Entry and exit are perceived to involve small establishments and, therefore, to be a fringe phenomenon. Job-change studies are regarded as interesting but capturing primarily short-run phenomenon and having little to do with structural change. Entry can be characterized as temporary -- a situation where entrants generally fail quite quickly -- or important in a permanent sense. In the latter case, the cumulative effect of entry is important because the growth of some entrants is sufficient to offset those who die quickly, and over time, the cumulative effect of succeeding entry cohorts is enough to account for a substantial portion of market share over time. The results reported herein show that the long-run entry rates, when annualized for the difference in period covered, are about the same as the short-run entry rates. This means that, in every entry cohort, there is enough expansion of existing entrants to let the process of entry inexorably to accumulate. By the end of the 1970s, establishment entry had added about 20 per cent to 1970 employment levels.

This paper also attempts to rectify a gap in our knowledge about the extent of permanent worker turnover and its sources in the Canadian labour force. However, it is by comparing the job-change estimates and the worker-turnover data that perhaps the most interesting observations can be made. In the past, each type of study has been done independently of the other. Job-change studies alone beg the question of how employment change affects the labour force. Worker-turnover studies in isolation leave uncertainty as to how supply responds to changes in the demand for labour at the firm level and to what extent there is a different response to temporary as opposed to permanent shifts in the fortunes of producers.

The existence of a difference between short- and long-run job change statistics has meant that job-change studies, without accompanying worker-turnover studies, cannot be used to infer the amount of reallocation being forced upon labour. Short-run job change

may overestimate the actual displacement of workers. If short-run fluctuations in employment are transitory to the firm, they may also be so for workers. If year-to-year temporary fluctuations in firm employment lead primarily to temporary layoffs, then job-change figures derived from annual data may overestimate the amount of permanent worker displacement.

The Canadian data show this is not the case. The close relationship between the annual rate of forced worker displacement through layoffs and the rate of short-run job change indicates that short-run job-change rates, at least in the Canadian manufacturing sector, do not overstate the rate of forced displacement due to lay-offs. While a substantial number of total layoffs are temporary, permanent layoffs are at least as large as the number of jobs lost at the establishment level in the short run. Permanent layoffs are those workers who do not return to the same firm within two years of separation. Thus, while yearly fluctuations in employment may be essentially transitory for the firm, this is not so for workers.

NOTES:

1. For examples, see Ontario (1989), United States (1984), Birch (1981).

2. See Johnson (1978) for a plea for such information for trade policy purposes.

3. Lawrence (1984), Cohen and Zysman (1987).

4. For exceptions, see Hymer and Pashigian (1962), Caves and Porter (1977,1978), Baldwin and Gorecki (1989b).

5. See, for example, the section in Scherer (1980, pp. 74-75), a widely-used industrial organization text. Quoting Gort's (1963) article, Scherer notes that mobility statistics do not change the general picture of stability in the world that concentration statistics provide.

6. See Birch (1979, 1981, 1987), Dunne, Roberts and Samuelson (1989), and Leonard (1987) for U.S studies; Storey and Johnson (1987a, 1987b) for the European Economic Community, Gallagher and Stewart (1986) for the U.K.; Cramer (1987) for Germany, and Canada, Department of Regional and Economic Expansion (1985, 1986).

7. One of the exceptions is Dunne, Roberts and Samuelson (1989), who like ourselves have used Census of Manufactures data in a study of U.S job turnover.

8. See Johnson and Storey (1985), Storey and Johnson (1986), Baldwin and Gorecki (1990) for a discussion of some of the problems.

9. United States (1983).

10. For example, see the labour economics textbook by Marshall et al. (1984) that pays little attention to the issue of worker turnover as part of labour market dynamics. The text by Ehrenberg and Smith (1989) primarily considers worker turnover in relation to voluntary mobility (ch. 10). When it does consider the relationship to worker turnover to unemployment, it stresses the temporary nature of most separations (p. 589), thereby downplaying the importance of the permanent component.

11. A more extensive discussion of the problems can be found in Kaliski (1981).

12. For one such view, see Brechling (1978).

13. Marshall et al. (1984), p. 384; Ehrenberg and Smith (1989), p. 589.

14. See Charette et al. (1986), Lawrence (1984) and Turvey (1977) for applications of the use of this index to the measurement of structural change.

15. See Baldwin and Gorecki (1990) for an extensive discussion of the measurement of intersectoral shifts in employment.

16. Initial and terminal years were chosen for which capacity utilization statistics were relatively similar.

17. The data came from a longitudinal data base that was created from the Canadian Census of Manufactures and which avoids many of the problems of false births and deaths that previous studies in job-change have had. For a detailed description of the data bases, see Baldwin and Gorecki (1989c, 1990). Establishments are used to calculate gross job gain and loss in order to avoid the false birth and death problem due to mergers that can arise when firm data are used.

18. Entry and exit may occur via plant switches or transfers from outside the manufacturing sector, though this occurrence is relatively rare.

19. Employment here is the census concept of total wage and salary earners. It is an annual average concept. A plant with 100 workers that functions for half the year will be counted as having 50 workers.

20. For a discussion of the exit pattern of entrants, see Baldwin and Gorecki (1989a).

21. See Baldwin and Gorecki (1987) for a discussion of the importance of the alternative forms of entry.

22. Johnson (1986), Gould and Keeble (1984), Storey (1985), Cross (1981).

23. The Canadian publication "Hirings and Separations Rates in Central Industries, "Catalogue #72-006" was discontinued in 1966.

24. For a discussion of the data, see Baldwin and Gorecki (1990).

25. Regular retirement falls into the "other" category. When those aged 65 and above are removed from the data base, the rate of permanent separation does not change significantly.

26. A two year period rather that a one year period was chosen so as to provide conservative estimates of the permanent separation rate. About 3.1 per cent of workers who cannot be found in an employer in the first year after separation come back to that employer in the second year after separation -- in the period 1978 to 1984.

27. Other calculations of the separations rate that use employment rather than jobs could have been used ; but it proved easier to obtain consistency in the estimates of the numerator and denominator with the rate calculated as reported herein, since the same industry codes were on both separations and the job data.

28. This will omit a small number of individuals whose earnings are sufficiently small that no tax form (that is, a T4S) is filed for the employee by the employer.

29. If only those individuals who are no longer with the employer one year, rather than two years, after separation are used to measure the permanent separations, the the total permanent separations rate would have been increased by 2.8 per cent and the permanent layoff rate by 5.0 per cent.

30. A major job is defined as a job with the largest earnings. A job is defined as a tax filing for an individual by an employer. For the concept of employer used, see Baldwin and Gorecki (1990).

31. If only those individuals who are no longer with the employer one year, rather than two years, after separation are used to measure the permanent separations, the the total permanent separations rate would have been increased by 3.3 per cent and the permanent layoff rate by 5.5 per cent.

32. In a multiperiod model, the relationship is no longer as precise.

33. This is calculated as the mean of the ratio of the number of major jobs in manufacturing to employment as reported in the Census of Manufactures for the years 1978-84.

34. This estimate comes not from the Census of Manufactures but from a separate longitudinal file (LEAP). See Statistics Canada (1988) for a description of this file.

Baldwin and Gorecki (1990) compare the results of the Census file and the LEAP file for the manufacturing sector and find the results quite similar for some purposes.

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