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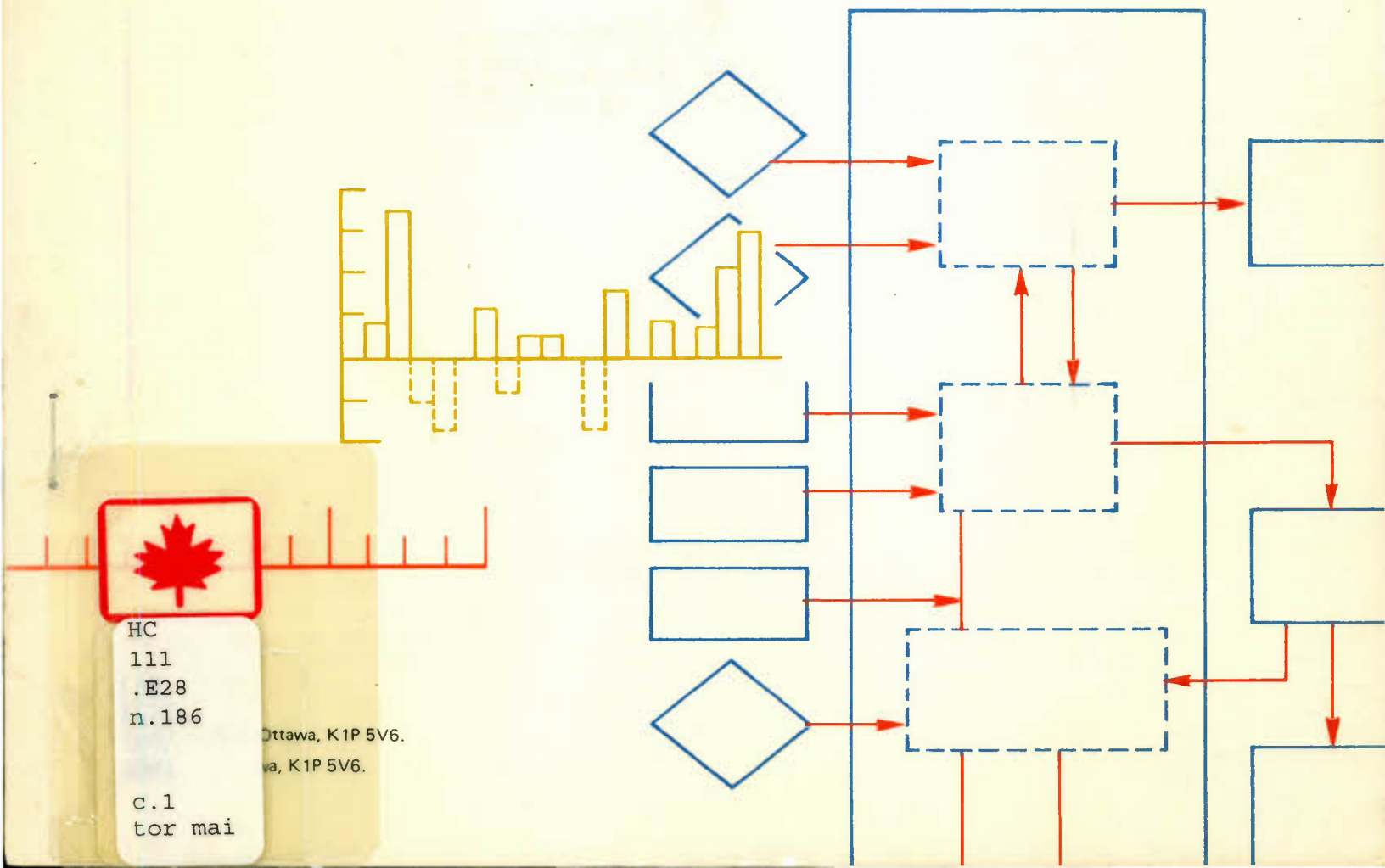

DISCUSSION PAPER NO. 186

Seasonal Unemployment in Newfoundland: Trends and Determinants

by

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Résumé

La présente étude a pour but d'examiner en profondeur l'importance du caractère saisonnier de l'économie terre-neuvienne. Deux mesures sont utilisées à cet effet. Les variations saisonnières sont examinées au fil des ans afin de voir s'il s'en dégage des tendances perceptibles. Pour jeter plus de lumière sur le sujet, les variations saisonnières dans l'emploi sont examinées selon l'âge et le sexe, de même que dans chaque industrie. En outre, l'auteur établit une comparaison avec le reste du pays. Il tente de découvrir certains facteurs sous-jacents du caractère saisonnier, en portant une attention particulière aux répercussions du programme d'assurance-chômage. Il examine enfin le rôle des variations saisonnières et de l'assurance-chômage sur la structure des revenus relatifs.

D'après les statistiques, les fluctuations saisonnières dans l'emploi, la population active et le chômage sont plus prononcées à Terre-Neuve que dans le reste du pays, bien qu'elles semblent avoir diminué en intensité dans les deux régions au cours des années. L'intensité du caractère saisonnier dans l'emploi et la population active selon les groupes d'âge et de sexe et dans l'emploi par industrie est régulièrement plus prononcée à Terre-Neuve. En outre, il semble que les fluctuations saisonnières de l'emploi dans les deux régions soient accompagnées de fluctuations presque identiques de la population active. Les répercussions de l'assurance-chômage sur

les variations saisonnières s'avèrent passablement différentes d'une industrie à l'autre et d'une région à l'autre quant à la portée et à l'orientation de ces répercussions. On obtient des résultats tout aussi différents en examinant le rôle des fluctuations saisonnières et du chômage sur la structure des revenus relatifs.

Abstract

This study is designed to provide an in-depth view of the importance of seasonality in the Newfoundland economy. Two measures of seasonality are used in this study. Seasonality is examined over time to determine whether a singificant trend emerges. To provide additional insight into this subject seasonality is examined by age and sex and by industry. Moreover, a comparison is made with the rest of Canada. An attempt is made to uncover some of the underlying determinants of seasonality with particular evidence paid to the impact of unemployment insurance. Finally, the role of seasonality and unemployment insurance on the structure of relative earnings is examined.

The evidence shows that seasonal fluctuations in employment, the labour force and unemployment are more severe in Newfoundland than in the rest of Canada, although the severity appears to have declined over time in both regions. The degree of seasonality in employment and the labour force by age-sex group and in employment by industry is consistently greater in Newfoundland. Furthermore, in both regions it appears that seasonal fluctuations in employment are accompanied by nearly identical fluctuations in the labour force. The impact of unemployment insurance on

seasonality proved to be quite diverse between industries and regions in terms of the significance and direction of the impact. Equally diverse results emerge when examining the role of seasonality and unemployment on the structure of relative earnings.

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Introduction

It is a well-known fact that Newfoundland's unemployment rate has persistently exceeded the unemployment rate in the rest of Canada. The fundamental purpose of this paper is to determine the importance of seasonal unemployment as a component of total unemployment and in explaining unemployment disparities between Newfoundland and the rest of Canada. A secondary purpose is to delineate the underlying determinants of seasonal unemployment in both regions.

The first section of this paper provides a very general discussion of the causes and economic significance of seasonal unemployment. A brief description of the measures of seasonal unemployment used in previous Canadian studies and those employed in this paper is contained in Section 2. The timing and magnitude of seasonal fluctuations in the aggregate labour force characteristics, employment and labour force by age and sex, and in employment by industry are examined in Section 3. In addition a decomposition of the difference in the seasonality of total non-agricultural employment between the two regions is provided with the aid of shift-share analysis. The final section of this paper represents an attempt to uncover some of the determinants of seasonal unemployment. Particular

attention is given to the relationship between changes in seasonality and labour market conditions and the impact of unemployment insurance upon seasonality. The impact of seasonality and unemployment insurance on relative earnings is examined as well.

1 THE CAUSES AND SIGNIFICANCE OF SEASONAL UNEMPLOYMENT: A GENERAL DISCUSSION

"Seasonal unemployment is the result of variations in economic activity that take place within the period of a single year" (Department of Labour, 1960, p. 444). The seasonal pattern of economic activity is a consequence of climatic conditions, institutional and social factors (eg. government policies, annual holidays, buying habits and building habits). As a result of its impact on the conditions of production and the demand for commodities, climate is by far the most important determinant of seasonal variations.[1] Industries such as agriculture, tourism, fishing, forestry and construction are affected directly by the climate. The inability to obtain the necessary raw materials culminates in a noticeable decline in activity within the agriculture and fishing industries during the winter which, in turn, affects the level of activity in the food-processing industry. On the other hand, the construction industry is affected by the climate in that certain operations are relatively more expensive and in some cases virtually impossible to undertake (eg. road paving) during the winter.[2]

The climate affects the demand conditions of particular industries; the most notable being the tourist

and certain goods-producing industries. Government policy in the form of winter employment creation programs influences in a very deliberate fashion the seasonal pattern of activity. Alternatively, certain policies (e.g. unemployment insurance) may inadvertently -- or be deliberately used to -- exaggerate the existing seasonal pattern insofar as they perpetuate a shift in activity from winter to summer.[3]

Virtually every branch of economic activity is interrelated, and hence, seasonal variations influence nearly every phase of economic life. More specifically, every industry supplies commodities and/or services while concurrently obtaining raw materials essential to its own production process. Consequently although certain industries are not affected directly by the climate (or institutional factors for that matter) seasonal variations will permeate their production schedules in response to the industries supplying factors of production or receiving output.[4]

The standard argument with respect to the economic significance of seasonal fluctuations in production states that in the presence of such fluctuations firms must plan their production schedule towards a brief period of peak activity each year, with the implication being that resource

requirements are in excess of what would be necessary had production taken place at a uniform rate throughout the year. Firms will gear their labour and capital requirements towards the period of peak activity while operating below capacity for the remainder of the year. A diversion of these resources to other economic activities during the off-season could result in increased employment and income. In other words, if the rate of commodity production coincided with its rate of demand, unused or under-utilized resources at particular intervals during the year could be avoided.

The problem of unused resources may manifest itself in another manner. Due to constraints on processing capacity, for example, the utilization of resources during the period of peak activity may fall below potential, requiring the resource to be employed in less valuable and/or productive ways. The "glut" season in the fishing industry represents a prime example of this particular manifestation. During the "glut" season the fishermen with their catches are frequently turned away at the fish processing plants for the simple reason that the plants are already operating at full capacity and lack the cold storage facilities necessary to preserve the quality of fish for an extended period of time. As a result a substantial amount

of fish is either destroyed or used in a less productive way (e.g. directly by the offal plant). Moreover, the amount of fish actually harvested during the "glut" season is likely to be less than it otherwise would be if processing and storage capacity are able to absorb the additional supply.[5]

It is further argued that wages in seasonal industries are higher than they otherwise would be giving rise to higher unit labour costs and hence higher prices.[6] Additional upward pressure on prices is likely to occur during the peak intervals of the year as demand for output from seasonal industries increases. Furthermore, if total annual output in a seasonal industry is less than it would have been had production taken place at a uniform rate, average costs will be greater as fixed costs are allocated over a lower quantity of output. The stockpiling of inventories of inputs and/or outputs which is characteristic of seasonal industries will undoubtedly entail additional costs to the firm. Finally, in as much as seasonal variations are the consequence of exogenous non-economic forces, their presence provides economists and policymakers alike with a distorted picture of the state of the economy.[7]

For an individual whose primary source of employment is seasonal in nature the decision to seek or

take part in additional wage work during the off-season will depend on his desire, need and/or ability to find such work. An individual could conceivably earn sufficient income from seasonal employment to satisfy his needs and he may have little desire or reason for year-round employment. One would expect this possibility to become increasingly plausible if such a decision is made in light of total family or household income, as opposed to the income of the head of the household alone. The availability of government transfer payments during the off-season will reduce the attractiveness of off-season wage work. Seasonal types of employment may simply be preferred by some individuals, constituting an entrenched feature of a particular lifestyle which, if altered, would entail both social and economic costs. The Newfoundland outport epitomizes this type of lifestyle with seasonal employment "being as natural as snow in the winter and open seas in the summer" (Philbrook, 1966, p. 185).

The amplitude and timing of seasonal variations may change from year to year for various reasons. A shift in the relative importance of certain industries will affect the magnitude and timing of seasonal variations insofar as industries vary in their vulnerability to climatic influences. Government policy with respect to seasonal employment (e.g. winter works programs) and unemployment insurance may affect an individual's decision to work during

the off-season. The attractiveness of seasonal occupations will be enhanced if the recent trend towards higher real incomes alters the trade-off between work and leisure in a manner which reduces the marginal utility of work relative to leisure. Technological developments that reduce the importance of climatic factors in the production schedule of an industry (or, simply reduce the cost of operating during the winter) will curb seasonality. The construction industry is often cited as having benefited from technological change in that the majority of its operations can now be undertaken year-round.[8] The introduction of deep-sea trawlers that can harvest fish year-round has without a doubt reduced seasonality in the fishing and fish-processing industries.[9]

Geographic and occupational immobility is often mentioned as a contributing factor to the seasonality of employment. An increase in population density and occupational opportunities will enhance mobility. Increased population density implies that the distance an unemployed individual must travel to seek a job will on average be shorter. The concomitant presence of increased occupational opportunities should increase the probability that the individual will find a suitable job. The resulting effect will be to reduce the seasonality of employment if, in fact,

individuals are inclined to seek employment during the off-season.[10]

To summarize, climatic factors assume the most important role in determining the timing and magnitude of seasonal variations in economic activity. Seasonal unemployment in Canada is essentially a winter phenomenon, as certain industries are forced to curtail operations due to their inability to obtain the necessary raw materials, the relatively high cost of operating during the winter and/or a decline in demand for their commodities.[11] Seasonal variations affect virtually every branch of economic activity, either directly or indirectly. Finally, the timing and magnitude of such variations are not static, but rather, vary over time in response to a multitude of factors.

2 MEASURES OF SEASONALITY

The separation of time series data into its seasonal and nonseasonal components has typically been achieved through the application of either one of two techniques. One technique uses a series of linear transformations known as moving averages to estimate the components of a time series; namely, the trend-cycle, seasonal and irregular components. The second technique uses regression analysis. Specifically, the components of a time series are estimated simultaneously by regressing the original series on a proper set of dummy and trend variables.[12] The former approach is now perhaps the more popular and is available in one form or another on most "packaged" computer programs.

The method of seasonal adjustment employed by Statistics Canada is a modified rendition of the U.S. bureau of the Census Method II-X-11.[13] Specifically, Statistics Canada uses the X-11-ARIMA method of seasonal adjustment developed by Dr. Estala Bee Dagum in 1974 and officially adopted by Statistics Canada in 1975.[14] In very brief and simple terms, the advantage of the Statistics Canada X-11-ARIMA seasonal adjustment method over other moving-average methods is that "it offers an ARIMA

[Autoregressive Integrated Moving Average] model for the series and minimizes the revision of the seasonals in mean square error" (Dagum, 1980, p. 7).

The seasonal adjustment procedure provides the analyst with a (seasonally adjusted) series from which the seasonal component has been eliminated in the sense that the original series has been "smoothed out" over the course of a year. The implicit relationship between the seasonally adjusted series (Y^a) and the original series (Y) is embodied in the seasonal factor (SF). The seasonal factor indicates the percentage deviation of the original variable from the annual average due solely to seasonal influences. Specifically, the seasonal factor is the ratio of the original variable to the seasonally adjusted variable.

(1) $$SF_{it} = Y_{it}/Y^a_{it}$$

where

i = month (quarter)

t = year

A seasonal factor which exceeds unity implies that the original variable is high due to seasonal influences while

the converse applies when the seasonal factor falls short of unity.[15] The sum of the 12 seasonal factors over the course of a year (for monthly data) is equal to unity. In other words, the annual averages of the original and seasonally adjusted variables will be equal.

It follows from the previous discussion that an examination of the seasonal factors of a time series will provide an indication of the timing and amplitude of seasonal fluctuations. The timing of seasonal fluctuations can be ascertained simply through identification of the peaks and troughs of the seasonal factors. The amplitude is best determined with the aid of summary measures of dispersion of the seasonal factors, the majority of which being derivatives of three basic measures; the range, standard deviation and variance. Alternatively, the seasonal component of a time series can be derived -- with the aid of certain assumptions -- using the original series or the difference between the original and seasonally adjusted series.[16]

A review of previous Canadian studies dealing with seasonal unemployment reveals little consensus as to what is the most appropriate measure if, indeed, such a measure

exists. Hardy (1972), for example, used the summer-to-winter percentage increase in unemployment as a measure of seasonal unemployment. The Department of Labour (1960) measured the seasonal swings in an identical fashion. However, in recognition of the fact that some persons drop out of the labour force during the winter -- as opposed to remaining in the ranks of the unemployed -- and that the magnitude of seasonal unemployment is dependent to some extent upon the cycle, seasonal unemployment was estimated under conditions of full employment. The percentage change in seasonal employment indexes between the months of August and February was utilized by Hartle (1958) to examine the trend in the amplitude of seasonal unemployment in Canada over the 1951-1957 period.

Smith (1965) examined two measures of seasonal unemployment. The first approach involved identifying the month of zero seasonal unemployment and calculating the magnitude of seasonal unemployment in the remaining months as deviations from the month of zero seasonal unemployment.[17] The second approach consisted of estimating the variance of the seasonal factors of unemployment. In a study which focused upon decomposing the unemployment rate, Denton and Ostry (1964) estimated the seasonal component using, in very simple terms, the difference between the

unadjusted and seasonally adjusted unemployment rate series. The measure thus obtained represented the amount by which the average annual unemployment rate would decline if the level of activity in the month where the unemployment rate was at its seasonal low were maintained throughout the year. In subsequent studies, Denton (1966) and Beaudry (1976) calculated seasonal unemployment in the same manner. Finally, Dawson et al. (1975) made used of several measures of dispersion of the seasonal factors to study the timing and amplitude of seasonal fluctuations in the Canadian labour force.

Although it is difficult to compare the various studies since they focus upon (among other things) different time periods, it seems unlikely that the choice of measure will significantly alter the nature of the results, particularly the comparative nature (i.e. Newfoundland vis-à-vis the rest of Canada). For the purposes of this study two measures of seasonality are used. The first measure is borrowed from Dawson et al. (1975, p. 7); the mean seasonal factor variation (MSFV). The MSFV is the mean monthly absolute difference of the seasonal factors from 100 per cent.[18]

$$(2) \qquad MSFV_t = 1/12 \sum_{i=1}^{12} \left| SF_{it} - 100 \right|$$

Clearly, the greater the MSFV, the greater the variation of the seasonal factors about their mean, and hence, the more pronounced are the effects of the seasons on the series in question.

The second measure of seasonality used in this paper is one which is conducive to expressing the seasonal component of a series in terms of actual units. The measure is identical to that used by Denton and Ostry (1964), Denton (1966) and Beaudry (1976). It involves calculating the seasonal deviation (SD) which represents the difference between the original and seasonally adjusted series:

$$(3) \qquad SD_{it} = Y_{it} - Y^{a}_{it}$$

The seasonal level (SL) for a particular month is then computed by subtracting from the corresponding seasonal deviation, the minimum or maximum -- for unemployment and employment respectively -- deviation for the year.[19]

$$(4) \qquad SL_{it} = SD_{it} - SD_{t,max(min)}$$

where: $SD_{t,max(min)}$ is the maximum (minimum) seasonal deviation in year t.

The average annual seasonal level is simply the average of the monthly seasonal levels.[20]

$$(5) \qquad SL_t = 1/12 \sum_{i=1}^{12} SL_{it}$$

To reiterate, in the case of unemployment (employment) the average annual seasonal level depicts the amount by which average annual unemployment (employment) would decline (increase) if the level of economic activity in the month where unemployment (employment) was at its seasonal low (high) were sustained throughout the year. The seasonal level of the labour force is obtained residually by subtracting the seasonal level of unemployment from that of employment.

3 SEASONAL PATTERNS IN THE NEWFOUNDLAND LABOUR FORCE

In this section the seasonal patterns of the aggregate labour force characteristics, of employment and the labour force by age-sex group, and of employment by industry are examined and compared for Newfoundland and the rest of Canada. The data employed in this section were taken from two sources. First, the aggregate and age-sex labour force data were obtained from the monthly Labour Force Survey (LFS) carried out by Statistics Canada. In 1975 the LFS was revised and carried out in parallel with the old survey. As a result the data from 1953-1974 have been adjusted to conform with the revised LFS on the basis of the observed relationship between the two survey in 1975.[21]

It should be noted that prior to 1966 the LFS was conducted solely on a regional basis. Data for Newfoundland were obtained from unpublished sources furnished by Statistics Canada and adjusted to conform to the revised survey in the manner described above.[22] The data were then seasonally adjusted using the multiplicative version of the Census Method II X-11 seasonal adjustment program. Although the relative merits of the X-11-ARIMA method of seasonal adjustment were put forth in the previous section, it was not readily available on the computer

package utilized for the purposes of this study. However, we do not expect this shortcoming to substantially alter the nature of the results presented in the following pages, particularly the comparative nature. Finally, the age-sex data were seasonally adjusted in the same fashion, although the presentation is confined to the 1975-1978 period as disaggregation of this nature was not available for Newfoundland prior to 1975.

The industry employment data were taken from the Statistics Canada publication, Estimates of Employees by Province and Industry (Cat. No. 72-516). Specifically, the data pertains to total non-agricultural employment by month, disaggregated into nine industry groups for the 1961-1978 period.[23] The choice of this particular source over the LFS estimates was made in view of the fact that the former provides a consistent series -- in both unadjusted and seasonally adjusted form - over a longer period of time than the latter. More importantly, it has been shown that the LFS estimates are less reliable in terms of the probability of sample errors.[24] The LFS is designed to provide accurate results specifically at the national level, while the Estimates of Employees is designed for accuracy at both the industry and provincial level. The seasonal factors for employment by industry were computed by taking the ratio of the unadjusted series to the seasonally adjusted series.

3.1 AGGREGATE SEASONAL PATTERNS

The average monthly seasonal factors for the 1953-1960, 1961-1969 and 1970-1978 periods are presented in diagrammatic form in Chart I. The impact of seasonal forces is most apparent in the unemployment series for both regions. The timing of the seasonal peaks and troughs in unemployment varies significantly between the two regions (see Table 1). Whereas the seasonal peak occurs during April in Newfoundland, January is the seasonally high month for the rest of Canada. On the other hand, the seasonal low occurs in September in both regions. In Newfoundland, the occurrence of the seasonal peak in April could be the result of several factors. For example, woods operations come to a virtual standstill during April due to the spring thaw which brings forth conditions (i.e. mud, flooding, etc.) inhibiting the efficient continuation of activity. Furthermore, road clearing which is an essential service in some parts of Newfoundland during the winter begins to wind down in April.

Seasonal employment fluctuations should for the most part be an image of unemployment fluctuations with the seasonal peaks and troughs corresponding to the respective troughs and peaks in unemployment. However, the accuracy of

Chart 1

SEASONAL FACTORS FOR EMPLOYMENT, LABOUR FORCE AND UNEMPLOYMENT: AVERAGE FOR SELECTED PERIODS

Employment

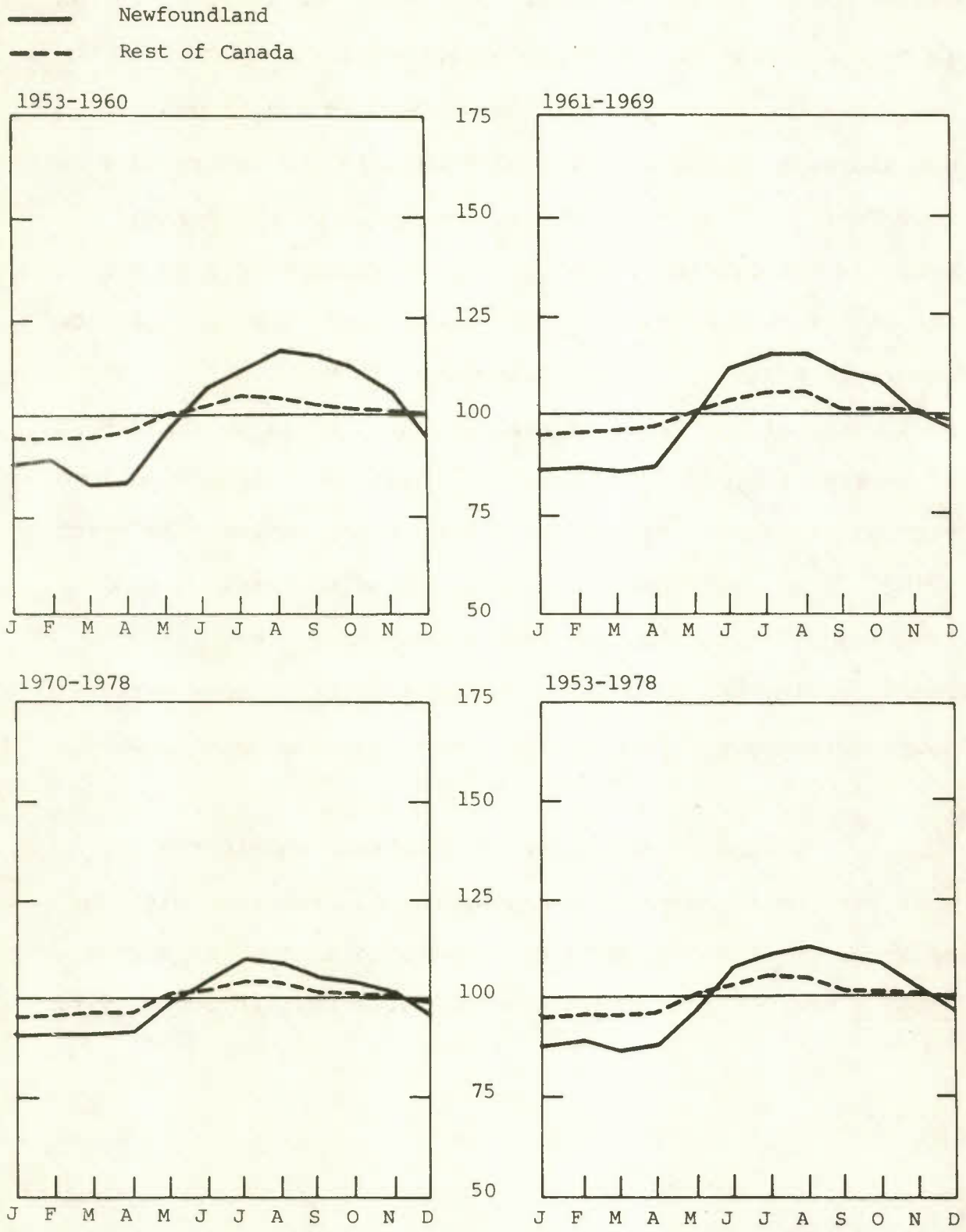


CHART 1 (cont'd)

Labour Force

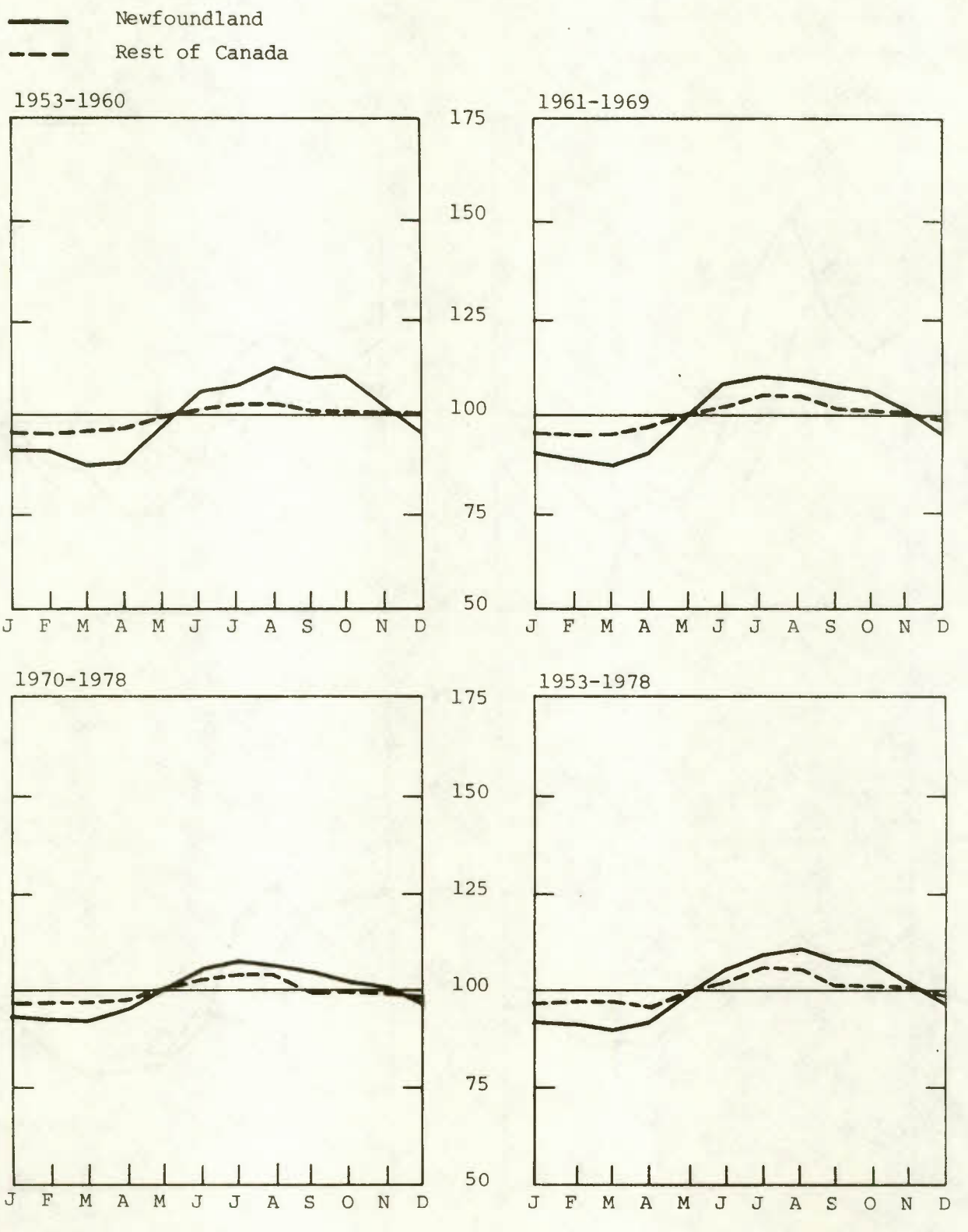


CHART 1 (cont'd)

Unemployment

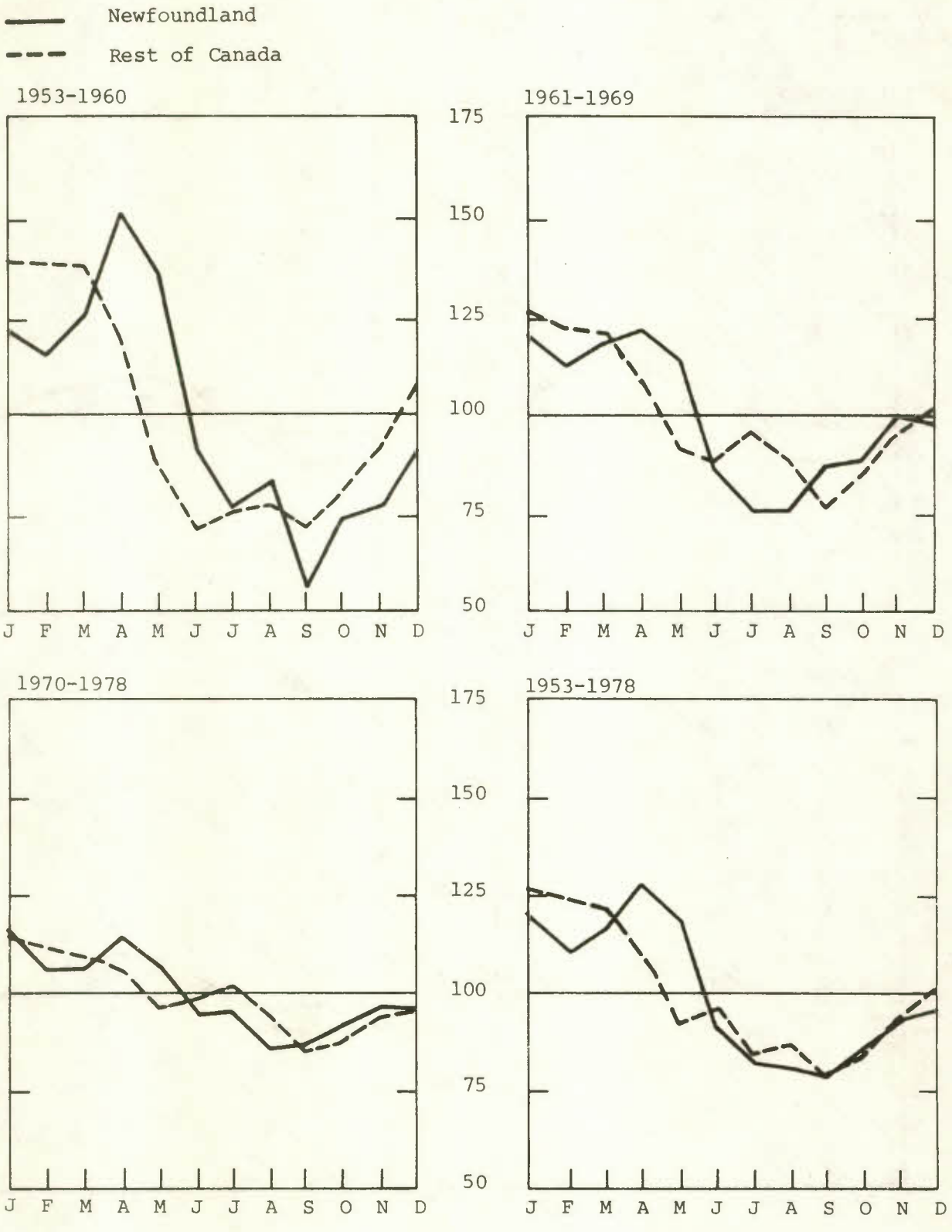


TABLE 1

TIMING OF SEASONAL PATTERNS IN EMPLOYMENT, UNEMPLOYMENT, AND LABOUR FORCE FOR SELECTED PERIODS

	EMPLOYMENT				UNEMPLOYMENT				LABOUR FORCE			
	NEWFOUNDLAND		REST OF CANADA		NEWFOUNDLAND		REST OF CANADA		NEWFOUNDLAND		REST OF CANADA	
	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH
1953-60	August (115.4)	March (83.7)	July (104.9)	Feb&Mar (94.6)	April (151.2)	Sept. (57.)	Jan. (139.7)	June (70.4)	Aug. (112.5)	March (87.2)	July&Aug. (103.5)	Feb. (96.5)
1961-69	July&Aug. (113.8)	March (85.1)	July (105.4)	Jan. (95.0)	April (122.7)	June (75.5)	Jan. (127.3)	Sept. (76.1)	July (110.3)	March (88.3)	July (104.6)	Jan,Feb&Mar (96.6)
1970-78	July (110.0)	Jan. (90.7)	July (104.9)	Jan. (95.7)	Jan. (115.6)	August (86.1)	Jan. (115.4)	Sept. (86.8)	July (108.5)	Feb. (93.0)	July (104.7)	Jan. (97.)
1953-78	August (112.9)	March (86.9)	July (105.0)	Jan. (95.1)	April (128.7)	Sept. (78.2)	Jan. (127.1)	Sept. (78.7)	Aug. (109.8)	March (89.7)	July (104.2)	Jan,Feb&Mar (96.8)

Source Calculated.

this statement depends upon seasonal movements in the labour force. Whereas in Newfoundland the seasonal peak in employment typically occurs in August, unemployment has its trough in September. The presence of students in the labour force during August and their subsequent exit in September most likely accounts for this discrepancy. The seasonal trough in employment occurs during March in Newfoundland, while the seasonal peak and trough months are July and January respectively in the rest of Canada. Seasonal fluctuations in employment are relatively more pronounced in Newfoundland.

The seasonal low in the labour force occurs during the winter months for both regions reflecting, perhaps (in addition to the exit of students), a certain preference of individuals engaged in seasonal work to leave the labour force during the off-season. In Newfoundland where the fish-processing industry is a very large employer and highly seasonal it is convenient for the wives of fishermen to work in the fish plants during the summer and return home during the winter with their husbands. It is equally probable that a disproportionately large number of "discouraged workers" prevail during the winter months since employment opportunities are especially limited.[25] Finally, the seasonal high occurs during the summer months of July and August for both regions as student participation in the labour force is at its peak.

An examination of the MSFV for unemployment (see Table 2) reveals that the impact of the seasons has declined substantially over time. Specifically, in Newfoundland the amplitude of seasonal fluctuations has declined from 24.7 percentage points during the 1953-1960 period to 8.4 percentage points in the 1970-1978 (a decline of 66 per cent). A decline from 24.1 to 7.4 percentage points (69 per cent) was evidenced in the rest of Canada for the corresponding periods. The magnitude of seasonal fluctuations in unemployment is surprisingly similar for both Newfoundland and the rest of Canada, with the former experiencing slightly greater variation.

Unlike the case with unemployment, seasonal employment fluctuations are substantially more pronounced in Newfoundland. More importantly it is clear that for both regions a decline in the amplitude of the variation has taken place. In more specific terms a decline of 4.5 (42 per cent) and .7 (22 per cent) percentage points in the MSFV occurred for Newfoundland and the rest of Canada respectively between the periods 1953-1960 and 1970-1978. For the rest of Canada the effects of seasonality on the labour force have remained virtually unchanged since 1953, with a decline of only .1 percentage points (5 per cent) in the MSFV occurring between the 1953-1960 and 1970-1978 periods. On the other hand, a decline of 3.1 percentage points (39 per cent) in the amplitude of seasonality was

TABLE 2

MEAN SEASONAL FACTOR VARIATION (MSFV)
AVERAGES FOR SELECTED PERIODS

PERIODS	NEWFOUNDLAND			REST OF CANADA		
	EMPLOYMENT	UNEMPLOYMENT	LABOUR FORCE	EMPLOYMENT	UNEMPLOYMENT	LABOUR FORCE
1953-60	10.8	24.7	7.9	3.2	24.1	2.1
1961-69	9.8	15.0	7.7	2.9	13.7	2.2
1970-78	6.3	8.4	4.8	2.5	7.4	2.0
1953-78	8.9	15.7	6.7	2.9	14.7	2.1

Source: Calculated.

evidenced in Newfoundland over the same period. The labour force fluctuations are on the whole relatively more conspicuous in Newfoundland.

It is interesting to note the remarkable similarity in both regions between the timing and magnitude of seasonal variations in employment and the labour force. Indeed, although the magnitudes vary slightly due in part to the differences in the numbers involved, the seasonal peaks and troughs are virtually identical. One implication of this observation is that seasonal variations in the labour force appear to consist primarily of persons moving directly from out of the labour force into employment and vice versa. In other words any decline in the seasonality of unemployment could be a result of an increase in the seasonality of employment and the labour force. Insofar as this is the case, then an additional implication emerges; namely, that the use of unemployment statistics alone to ascertain the number of persons affected by seasonality would be biased in a downward direction.

The seasonal levels (SL) for unemployment, employment and the labour force (Table 3) exhibit characteristics of the inter-temporal and comparative nature similar to those embodied in the MSFV measure. First, the seasonal levels when expressed as a percentage of their respective average annual averages are greater in Newfoundland than in

the rest of Canada. Second, the seasonal levels have declined in both regions over the 1953-1978 period. It is clear that the seasonal level of employment far exceeds that of unemployment; the difference representing seasonal increases in the labour force. For example, in 1978 the seasonal level of employment in Newfoundland indicates that average annual employment would have been greater by approximately 19 thousand if employment had been kept perpetually at its seasonal peak. On the other hand unemployment would have declined by only 4 thousand if maintained at its seasonal low. The implied increase in the labour force is 15 thousand. The same generalization emerges upon examination of the data for the rest of Canada. These figures provide additional evidence of the close affiliation between seasonal movements in employment and the labour force.

The seasonal level of the unemployment rate was derived for both regions (Table 3).[27] We have chosen to include this calculation since the unemployment rate -- however inadequate it may be -- is the summary statistic most often cited by economists and politicians alike when referring to the state of the labour market or the economy in general. In 1978, Newfoundland's unemployment rate would have been 2.5 percentage points lower in the absence of seasonal influences (or if the unemployment rate had been maintained at its seasonal low), whereas for the rest of

TABLE 3

SEASONAL LEVEL - EMPLOYMENT, UNEMPLOYMENT, LABOUR FORCE, AND THE UNEMPLOYMENT RATE: AVERAGES FOR SELECTED PERIODS

	EMPLOYMENT		UNEMPLOYMENT		LABOUR FORCE		UNEMPLOYMENT RATE	
	(000's)	% OF ANNUAL E	(000's)	% OF ANNUAL U	(000's)	% OF ANNUAL LF		SEASONAL/ ACTUAL
Newfoundland								
1953-60	14.3	14.4	3.8	3.8	10.5	10.6	3.9	51.1
1961-69	16.0	13.1	2.9	2.5	13.1	10.7	3.1	33.1
1970-78	15.4	9.0	3.0	1.6	12.4	7.3	2.3	20.4
1953-78	15.2	12.1	3.2	2.6	12.1	9.5	3.1	34.2
Rest of Canada								
1953-60	271.2	4.6	81.9	1.4	189.2	3.3	1.5	31.5
1961-69	345.3	4.8	79.6	1.1	265.7	3.7	1.2	25.2
1970-78	435.6	4.6	72.7	.9	354.0	3.7	.9	13.7
1953-78	353.8	4.7	77.9	1.1	272.7	3.6	1.2	23.2

Source: Calculated.

Canada a decline of 1 percentage point would have prevailed. The seasonal level expressed as a percentage of the average annual unemployment rate has fallen markedly over time in both regions. Specifically, it has fallen from a high of roughly 66 per cent in 1957 to 14 per cent in 1977 in Newfoundland. The concomitant highs and lows for the rest of Canada have been 36 per cent in 1956 and 10 per cent in 1975. In other words the seasonal component has declined in its contribution to the total unemployment rate and to the explanation of regional unemployment rate disparities.

A numerical example will provide clarification of the latter point. During the 1953-1960 period the ratio of Newfoundland's unemployment rate to the unemployment rate in the rest of Canada was, on average, 1.71. In the absence of seasonal influences (i.e. net of the seasonal level) the ratio would have been 1.30. The corresponding ratios for the 1970-1978 period was 1.86 and 1.75 respectively. Therefore, although the elimination of seasonal influences in both regions would serve to reduce regional unemployment rate disparities, it appears that of late its contribution to the elimination of such disparities has fallen.

3.2. SEASONAL PATTERNS BY AGE AND SEX

In this brief subsection a description of the seasonal patterns in employment and the labour force for

particular age-sex groups is provided. Prior to 1975 employment, unemployment and labour force data by age-sex group for Newfoundland were not published and hence the presentation is confined to the 1975-1978 period. Moreover, as a result of the large sampling errors involved we have not been able to obtain as detailed an age breakdown as possible and have refrained from using unemployment data.

Seasonal fluctuations in employment vary substantially between the various groups as well as between Newfoundland and the rest of Canada. (See Charts 2-3 and Tables 4-5). The amplitude of the fluctuations -- as measured by the MSFV -- are wider within each age-sex group in Newfoundland than their counterparts in the rest of Canada. In addition the timing of the fluctuations varies between age-sex groups and regions.

Men are subject to substantially greater seasonal interruptions in employment than women in both regions, which could be a reflection of the types of industries which employ men and not women (e.g. the forestry and construction industries as opposed to the service industries). A detailed examination of the age-sex groups reveals that men under 25 (i.e. the 15-19 and 20-24 groups) are subject to the greatest seasonal variability in employment. The men 15-19 group (i.e. students) in particular is subject to the greatest seasonal variability. In comparative terms the

seasonal variability within this group is nearly twice as great in Newfoundland than in the rest of Canada. In fact, the seasonal variability of employment for each age-sex group in Newfoundland exceeds that of their counterparts in the rest of Canada.

Seasonal labour force fluctuations by age-sex group exhibit the same characteristics as their employment counterparts, although the fluctuations appear for the most part to be relatively less pronounced. More specifically, the amplitude of the fluctuations are on the whole relatively greater in Newfoundland, with the men under 25 group once again exhibiting the greatest variability. It is interesting to note once more the similarity between seasonal employment and labour force fluctuations of corresponding age-sex groups in both regions. Finally, it appears that, in as much as the seasonal variability in employment and the labour force in Newfoundland is relatively greater for each age-sex group, changing the age-sex structure of the Newfoundland population would contribute little to reducing the disparity in seasonal unemployment between Newfoundland and the rest of Canada.

3.3 SEASONAL PATTERNS IN INDUSTRY EMPLOYMENT

Regional disparities in seasonal unemployment may be the result of several factors. Regions will differ

CHART 2

SEASONAL FACTORS OF EMPLOYMENT BY AGE AND SEX:

1975-1978 AVERAGE

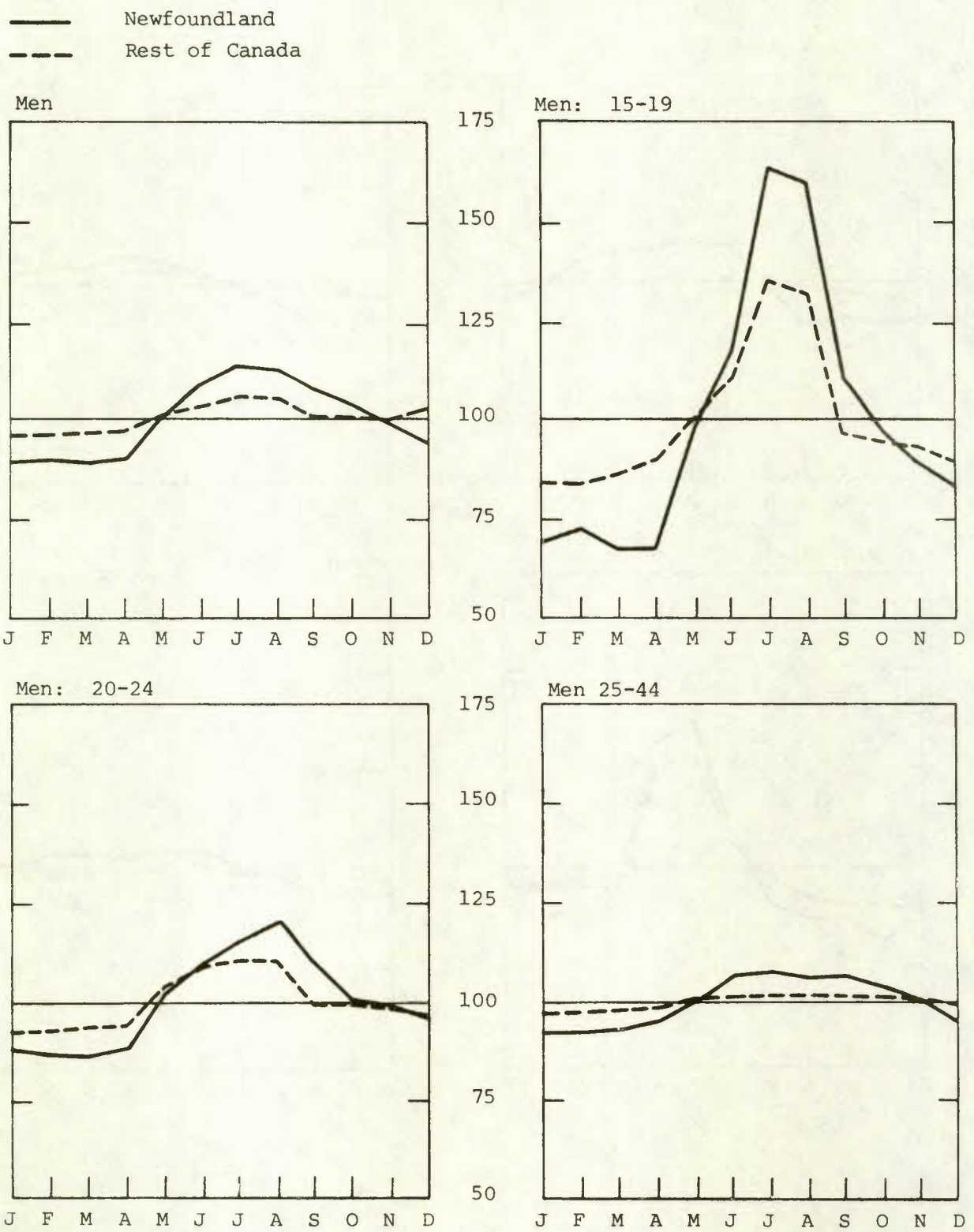


CHART 2 (cont'd)

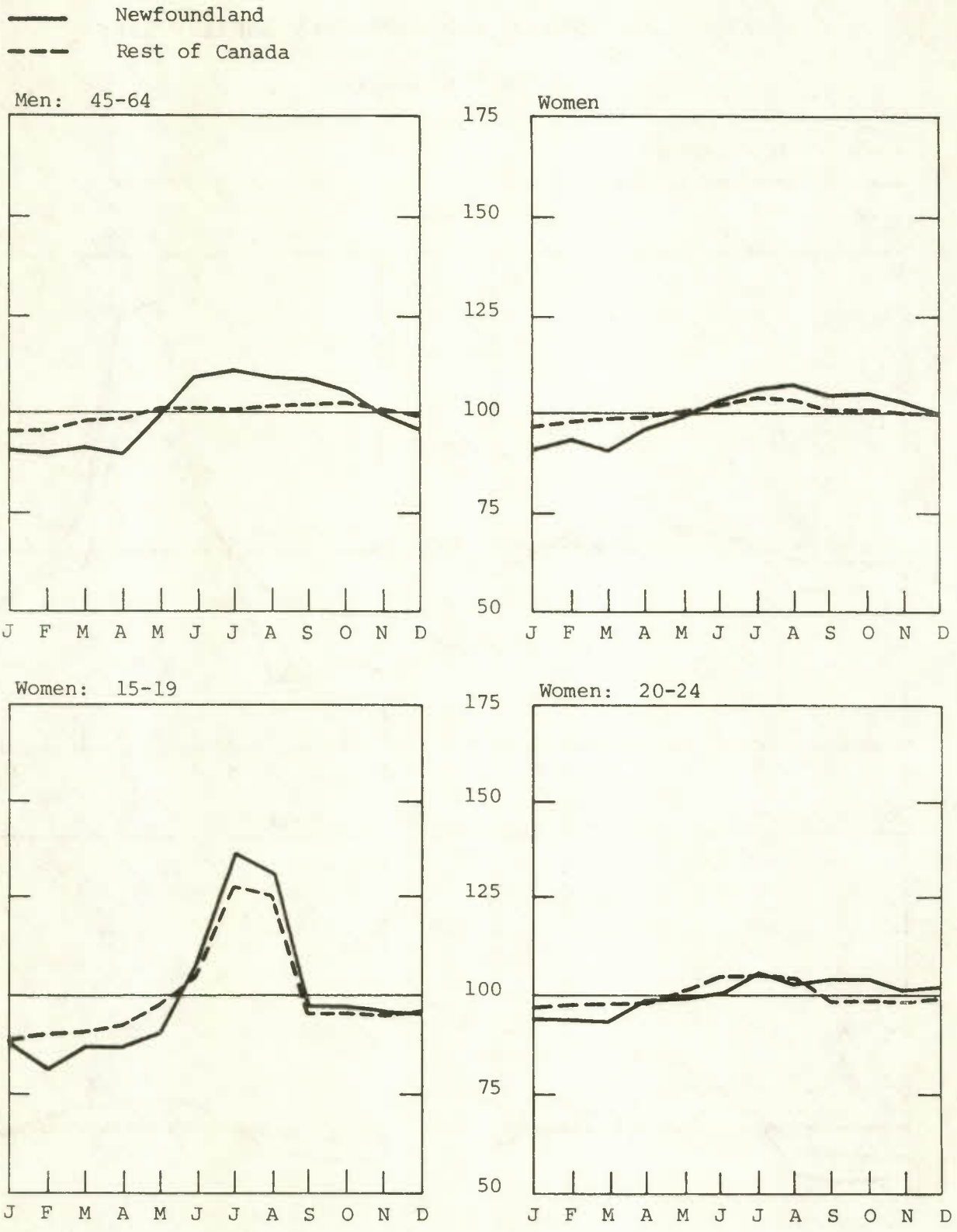


CHART 2 (cont'd)

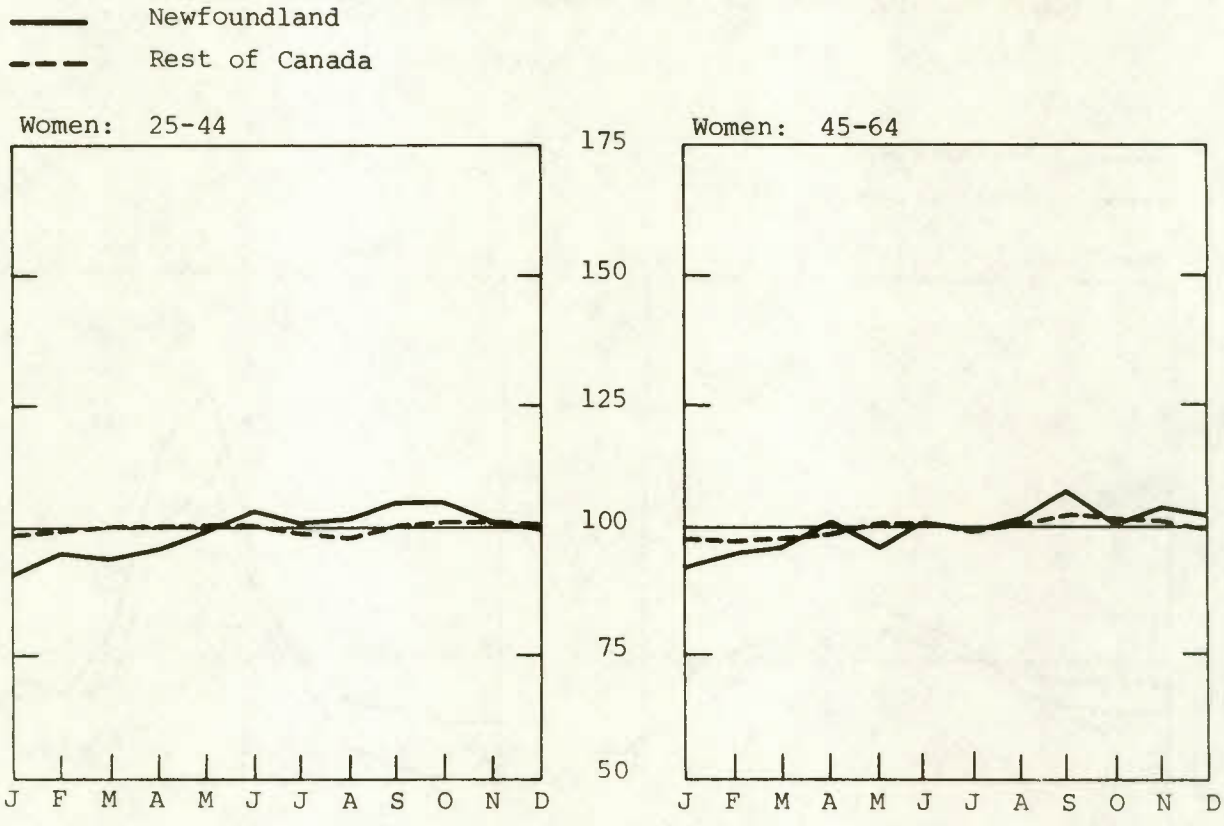
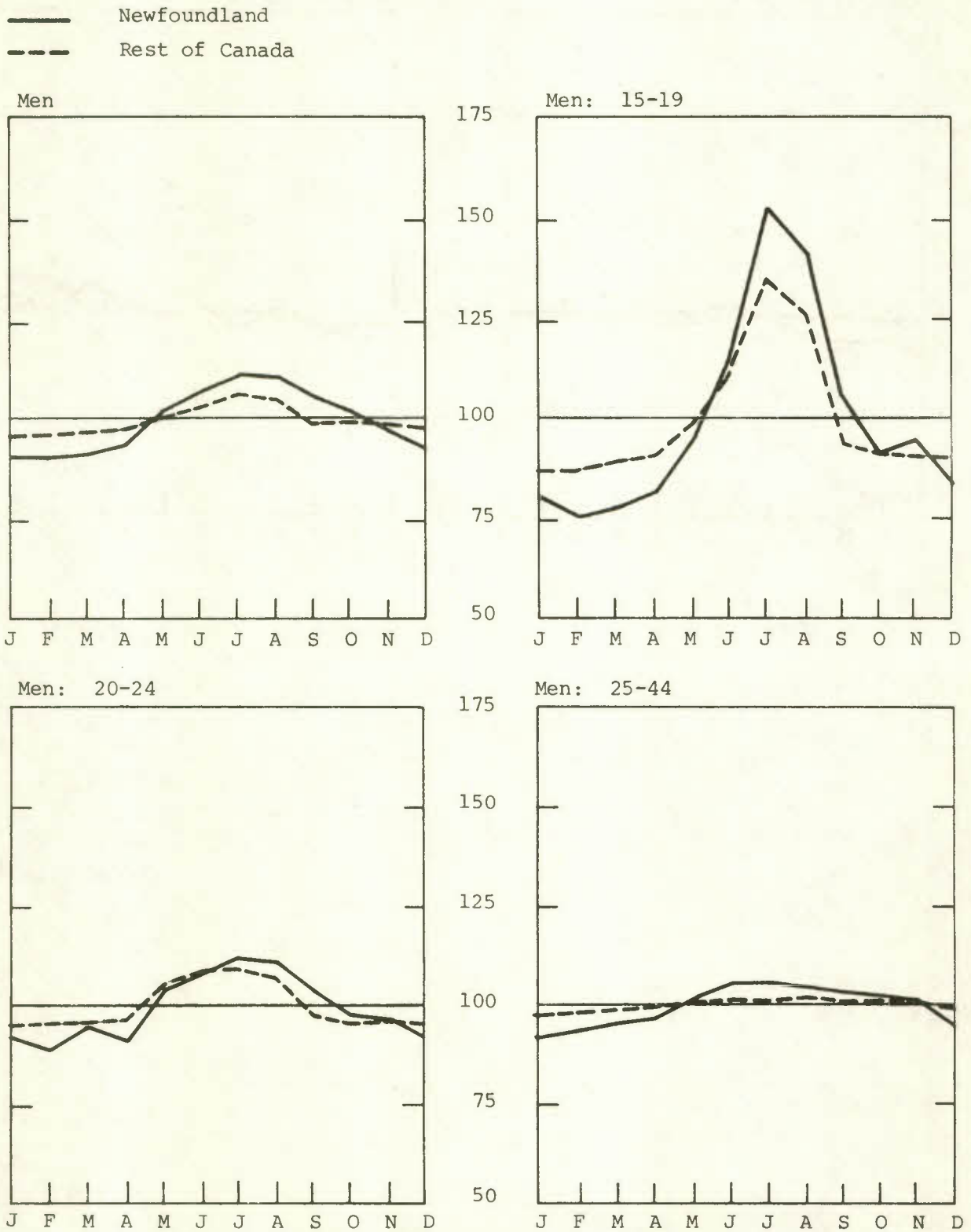


CHART 3

SEASONAL FACTORS OF THE LABOUR FORCE BY AGE AND SEX:

1975-1978 AVERAGE



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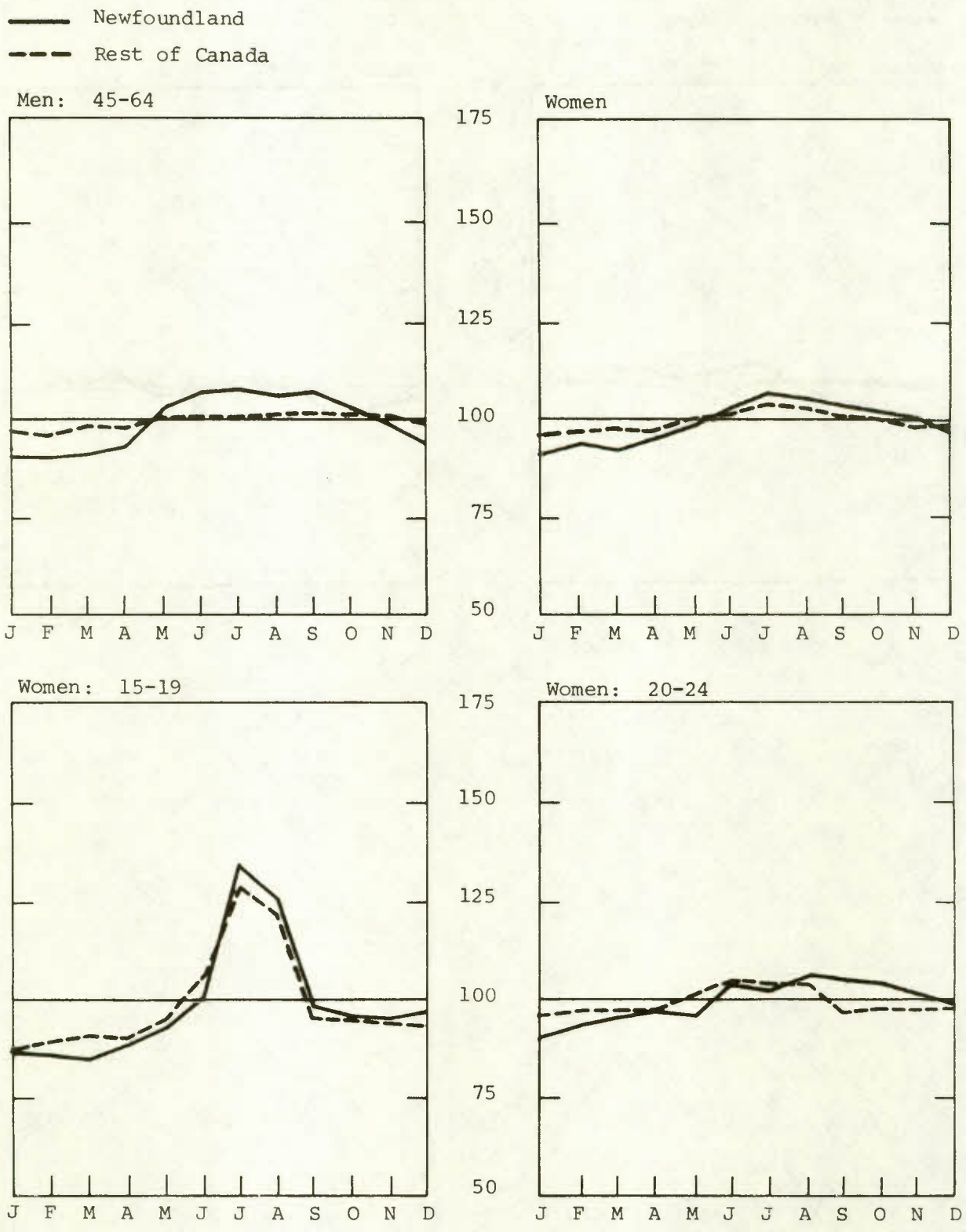

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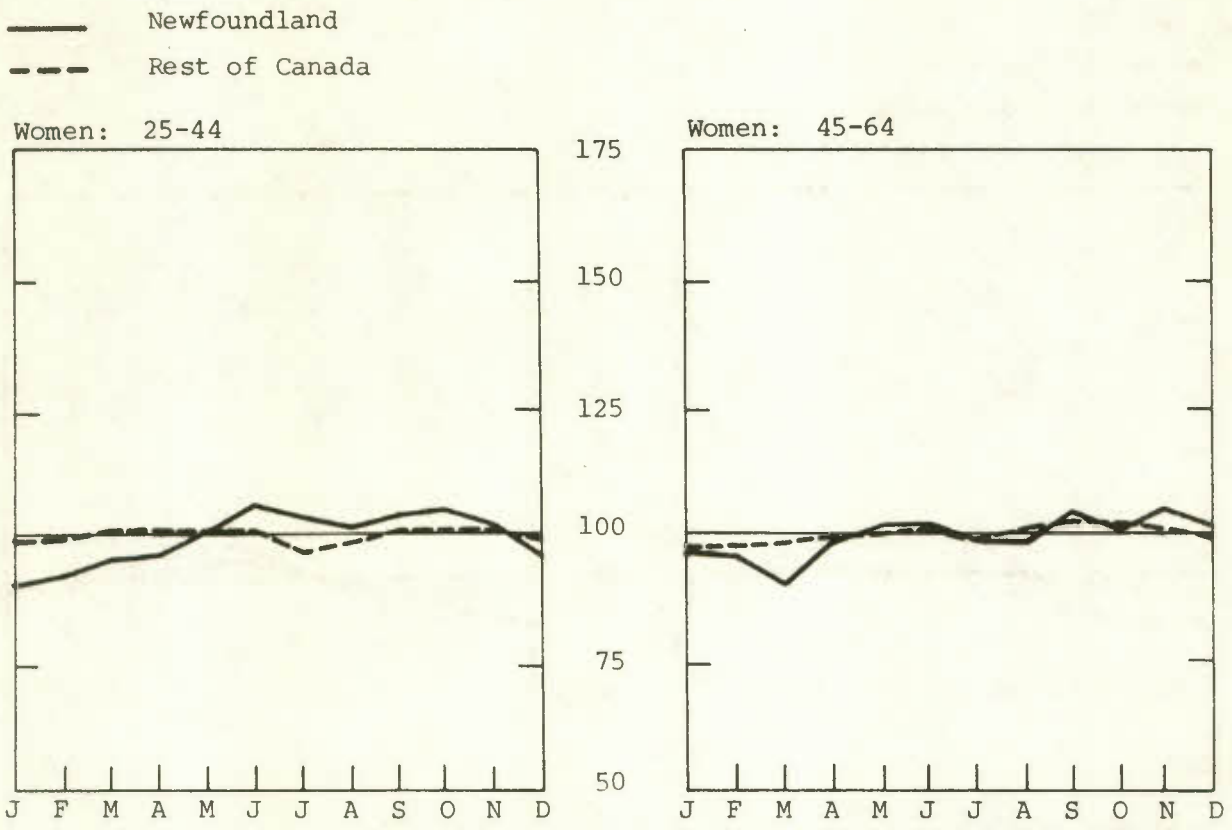


TABLE 4

TIMING OF SEASONAL PATTERNS IN EMPLOYMENT AND THE LABOUR FORCE BY AGE AND SEX: 1975-78 AVERAGE

	EMPLOYMENT				LABOUR FORCE			
	NEWFOUNDLAND		REST OF CANADA		NEWFOUNDLAND		REST OF CANADA	
AGE-SEX GROUP	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH
MEN	July(114.3)	Jan(89.1)	July(105.7)	Jan(95.7)	July(111.4)	Feb(91.4)	July(105.0)	Feb (97.3)
WOMEN	Aug (107.4)	Jan(91.8)	July(103.6)	Jan(96.7)	July(107.5)	Jan(92.6)	July(103.9)	Jan (97.2)
MEN: 15-19	July(163.6)	Mar(67.7)	July(135.9)	Feb(84.0)	July(152.9)	Feb(75.9)	July(135.5)	Feb (88.2)
MEN: 20-24	Aug (120.8)	Feb(86.1)	July(110.2)	Jan(92.2)	July(112.2)	Feb(90.0)	July(108.6)	Feb (95.4)
MEN: 25-44	July(107.9)	Jan(92.0)	Aug (102.0)	Jan(97.6)	July(105.6)	Jan(93.2)	Aug (100.9)	Jan (98.8)
MEN: 45-64	July(111.0)	Apr(89.8)	Oct (102.0)	Feb(97.4)	July(108.6)	Feb(91.7)	Sept(101.1)	Feb (98.4)
WOMEN: 15-19	July(136.4)	Feb(81.3)	July(127.6)	Jan(88.6)	July(135.2)	Feb(88.0)	July(129.6)	Jan (88.7)
WOMEN: 20-24	July(106.2)	Mar(93.1)	July(103.4)	Jan(96.7)	Aug (105.8)	Jan(90.4)	June(105.0)	Jan (97.5)
WOMEN: 25-44	Oct (106.4)	Jan(91.6)	Oct (101.3)	Aug(97.7)	June(107.0)	Jan(92.3)	Oct (101.1)	July(98.3)
WOMEN: 45-64	Sept(108.1)	Jan(92.9)	Sept(102.8)	Feb(97.5)	Sept(104.0)	Mar(92.1)	Sept(102.7)	Feb (98.3)

TABLE 5

MEAN SEASONAL FACTOR VARIATION IN EMPLOYMENT AND THE LABOUR FORCE BY AGE AND SEX: 1975-78 AVERAGE

AGE-SEX GROUP	EMPLOYMENT		LABOUR FORCE	
	NEWFOUNDLAND	REST OF CANADA	NEWFOUNDLAND	REST OF CANADA
MEN	8.2	2.9	5.5	2.2
WOMEN	4.8	1.7	4.3	1.7
MEN: 15-19	26.7	13.6	15.8	12.2
MEN: 20-24	9.6	5.7	6.5	4.8
MEN: 25-44	5.5	1.6	4.0	.6
MEN: 45-64	7.4	1.6	5.8	.7
WOMEN: 15-19	12.7	9.8	10.5	9.9
WOMEN: 20-24	3.6	2.7	4.3	2.6
WOMEN: 25-44	3.8	1.0	4.1	.7
WOMEN: 45-64	3.6	1.4	2.5	1.1

Source Calculated.

according as the proportion of industries in each region particularly sensitive to climatic conditions varies (industry mix or industrial structure effect). Alternatively, seasonal fluctuations in identical industries may vary across regions due to differences in technology, government policies, buying and building habits, etc. (intra-industry effect). In addition to examining the timing and magnitude of seasonality in non-agricultural (non-fishing) employment by industry, an attempt is made here to delineate the contribution of the industrial structure and intra-industry effects to the overall differences in seasonal unemployment between Newfoundland and the rest of Canada.

The average seasonal factors for each industry and region are presented in Chart 4, with their respective measures of dispersion and timing contained in Tables 6-7. For expository purposes we have broken the period down into two equal sub-periods; 1961-1969 and 1970-1978. Before proceeding in detail at the industry level, some very general yet interesting observations can be made concerning the evidence presented. Seasonal fluctuations in total non-agricultural (non-fishing) employment are more pronounced in Newfoundland. In both regions, the forestry and construction industries are by far the most volatile in terms of seasonal influences. Over the period under scrutiny the magnitude of seasonal fluctuations in

employment has declined in nearly every industry.[28] Finally, with the exception of the community, business and personal services industry, seasonal employment fluctuations in each industry in Newfoundland are more pronounced than their counterparts in the rest of Canada.

The effects of seasonality are quite evident in the forestry industry. Clearly, the amplitude of the fluctuations is far greater in Newfoundland which could be a reflection of the peculiar nature of the industry in the province. For example, the preponderance of sawmills operating sporadically throughout the year no doubt contributes to the seasonality within the industry. Sawmills typically do not operate during the winter as climatic conditions inhibit easy access to the woods. As a result it becomes more efficient to operate at full capacity for part the year as opposed to operating at less than full capacity year round. Technological developments such as the power saw, mechanical loaders and skidders, trucks, etc. facilitate year round employment. However, the nature of Newfoundland's forests (i.e. small stem diameter, short and slow growing) and the surrounding terrain (i.e. rocky) sometimes precludes the efficient employment of such developments.

Mining typically takes place year round but the types of activities employing different numbers vary during

the year. This is evident in the very mild seasonal employment fluctuations within the mining industry in both regions. For more than a decade the Newfoundland mining industry has been dominated by iron ore mining in western Labrador. The overall scenario in terms of employment, production, etc. is determined largely by developments taking place at these operations. For example, the rather unusual timing of the seasonal peaks and troughs in Newfoundland during the 1970-1978 period may be attributed to the industrial disputes that have taken place at the Labrador operations.

Differences in the magnitude of seasonal employment fluctuations between the two regions are nowhere more apparent than in the manufacturing industry. Whereas such fluctuations are virtually non-existent in the rest of Canada, only the forestry and construction industries surpass the manufacturing industry in Newfoundland in terms of amplitude. Total manufacturing encompasses a variety of industries with the fish-processing industry being a very large component in Newfoundland and of relatively minor importance in the rest of Canada.[29] The fish-processing industry is highly seasonal as its production schedule is influenced by the seasonality of its primary input (i.e. fish). The importance of the fish-processing industry in the manufacturing sector within Newfoundland undoubtedly accounts for most of the differences in seasonal amplitudes in manufacturing employment between the two regions.

CHART 4

SEASONAL FACTORS OF EMPLOYMENT BY INDUSTRY
AVERAGES FOR SELECTED PERIODS

Total Non-Agricultural

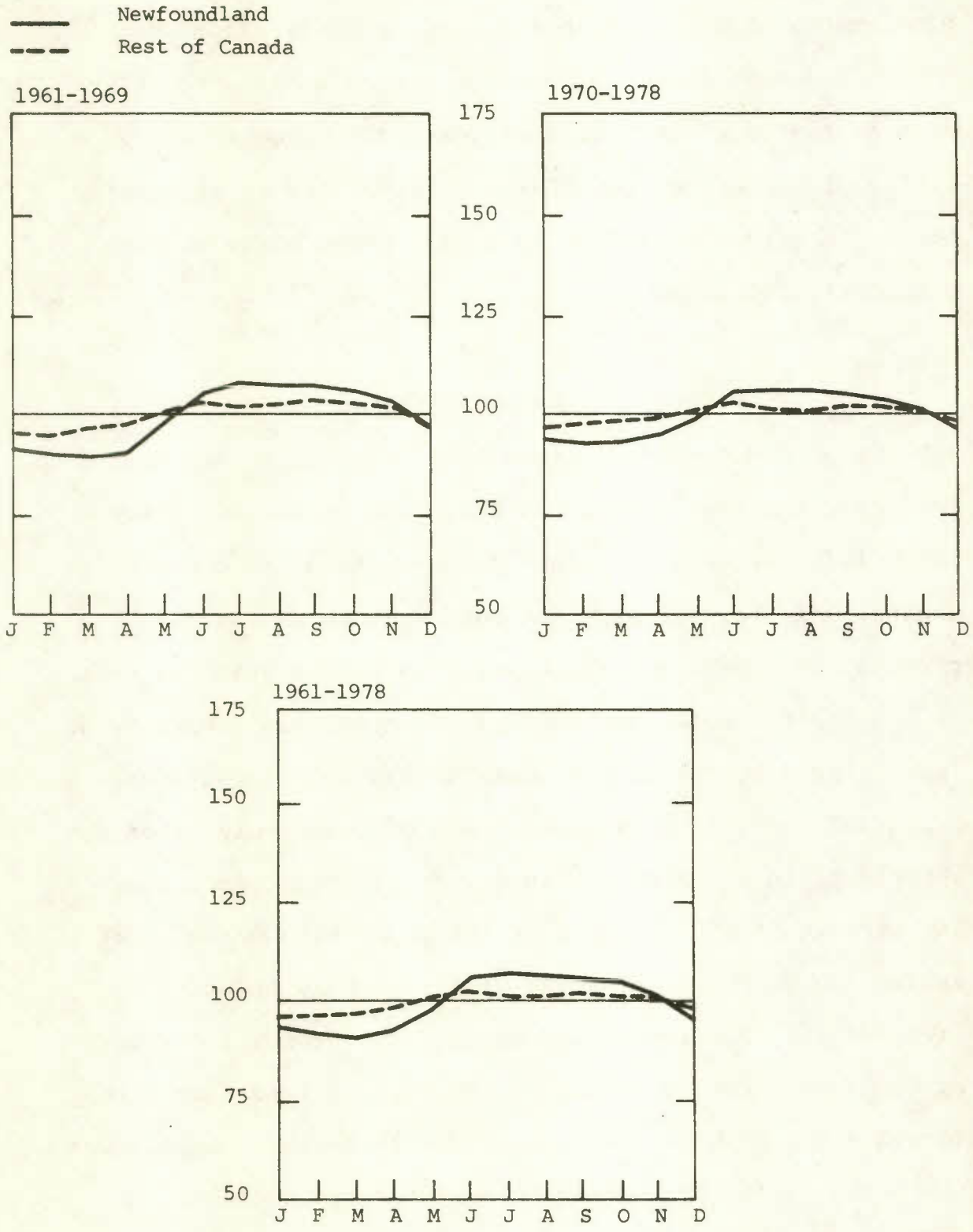


CHART 4 (cont'd)

Forestry

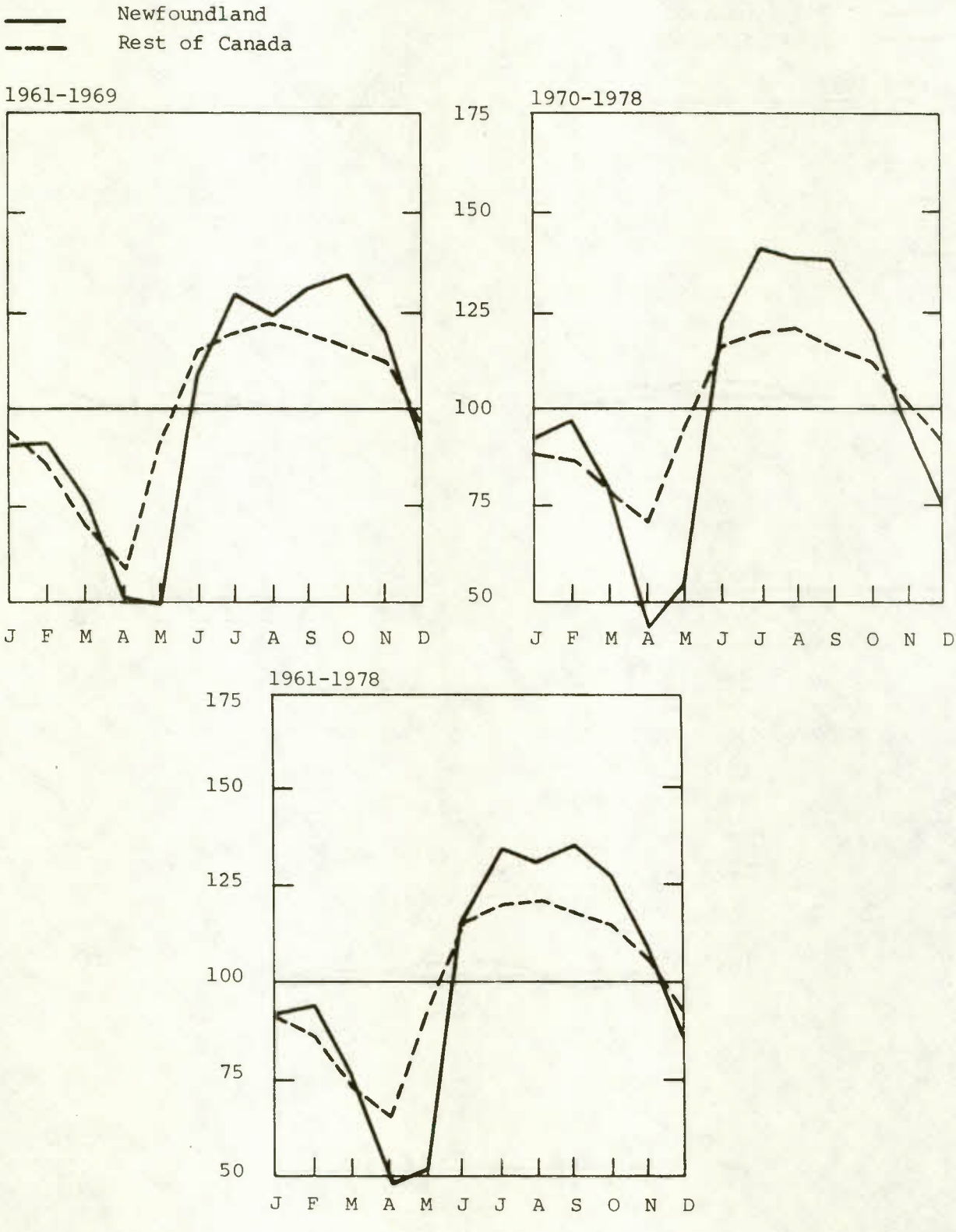


CHART 4 (cont'd)

Mining

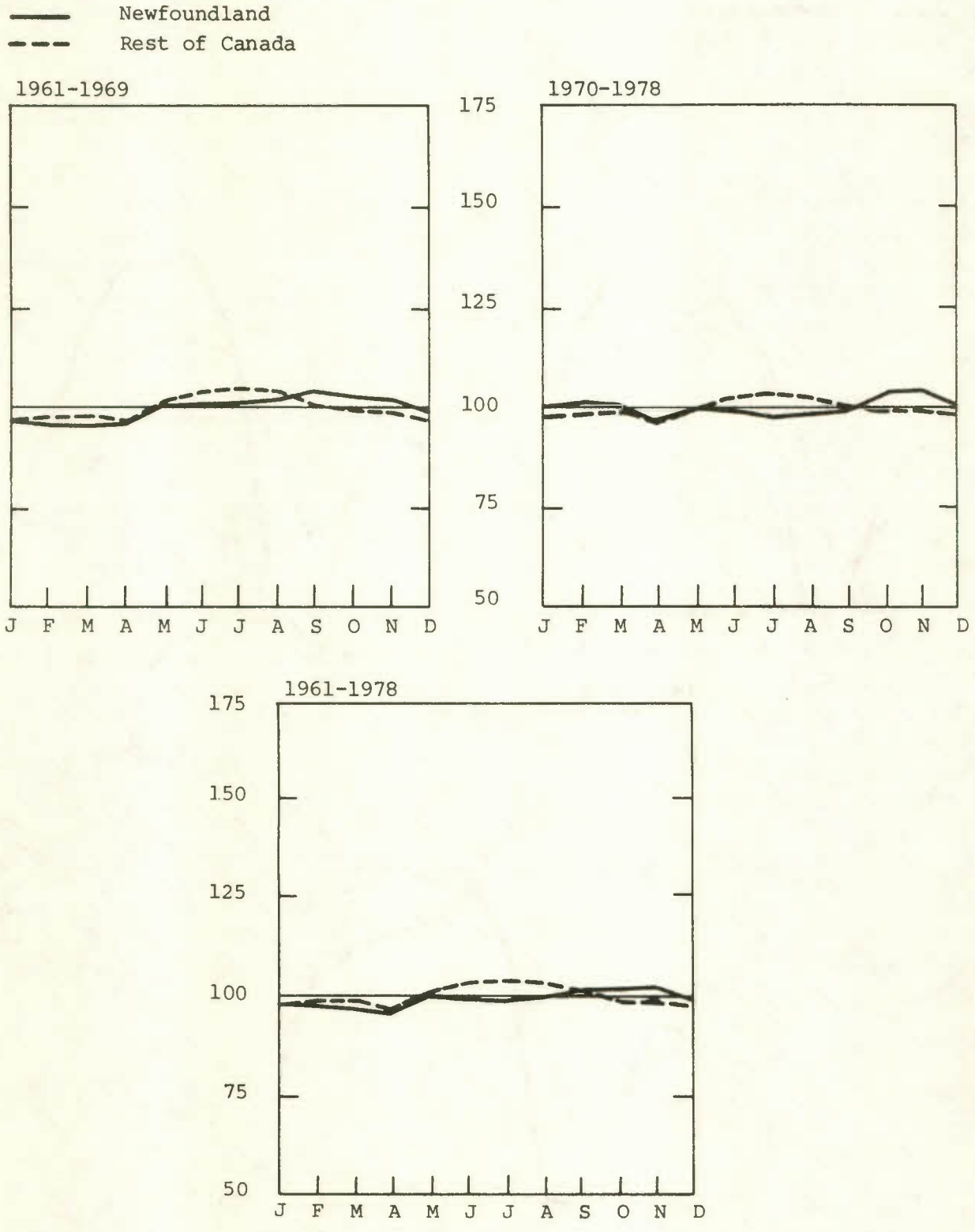


CHART 4 (cont'd)

Manufacturing

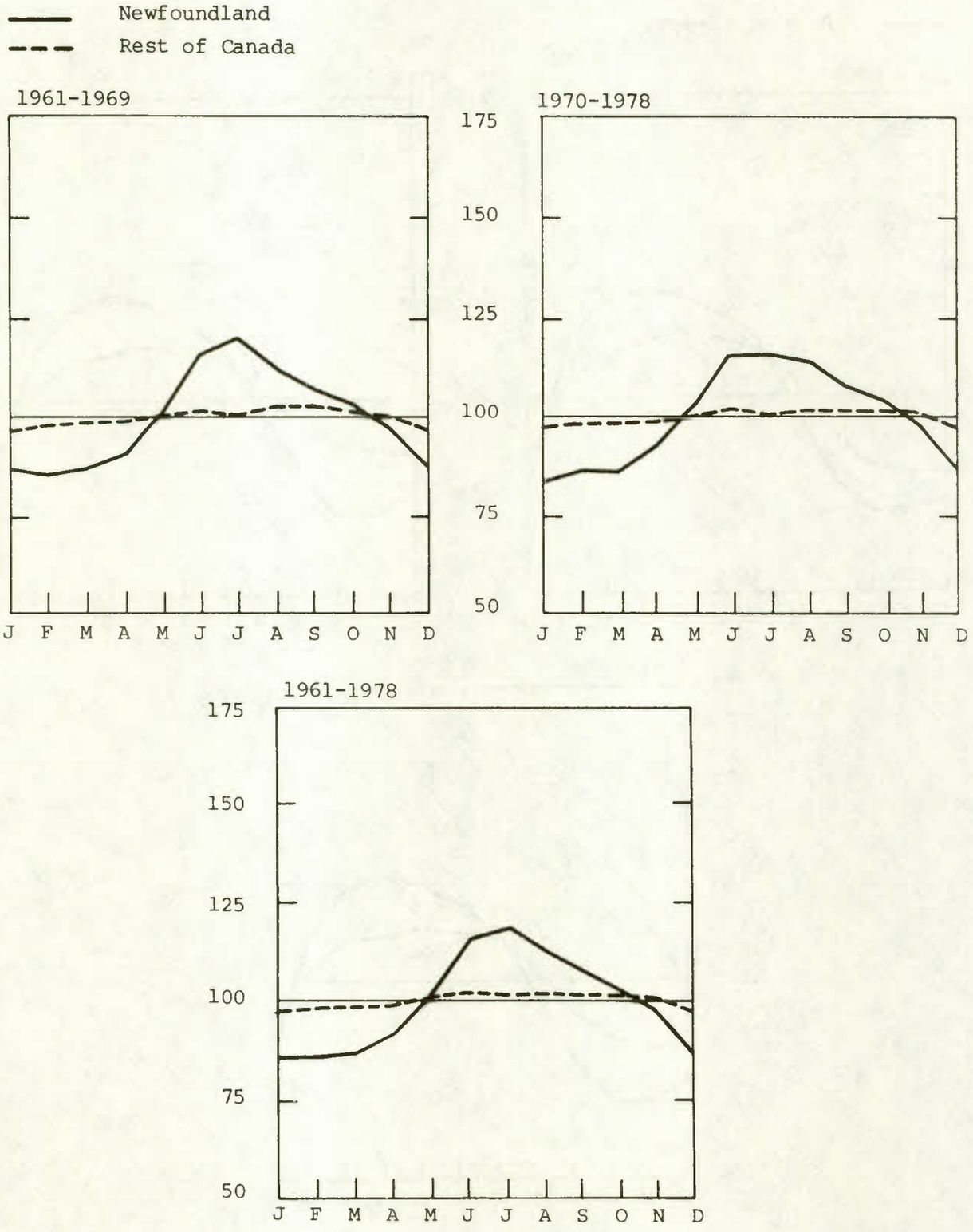


CHART 4 (cont'd)

Construction

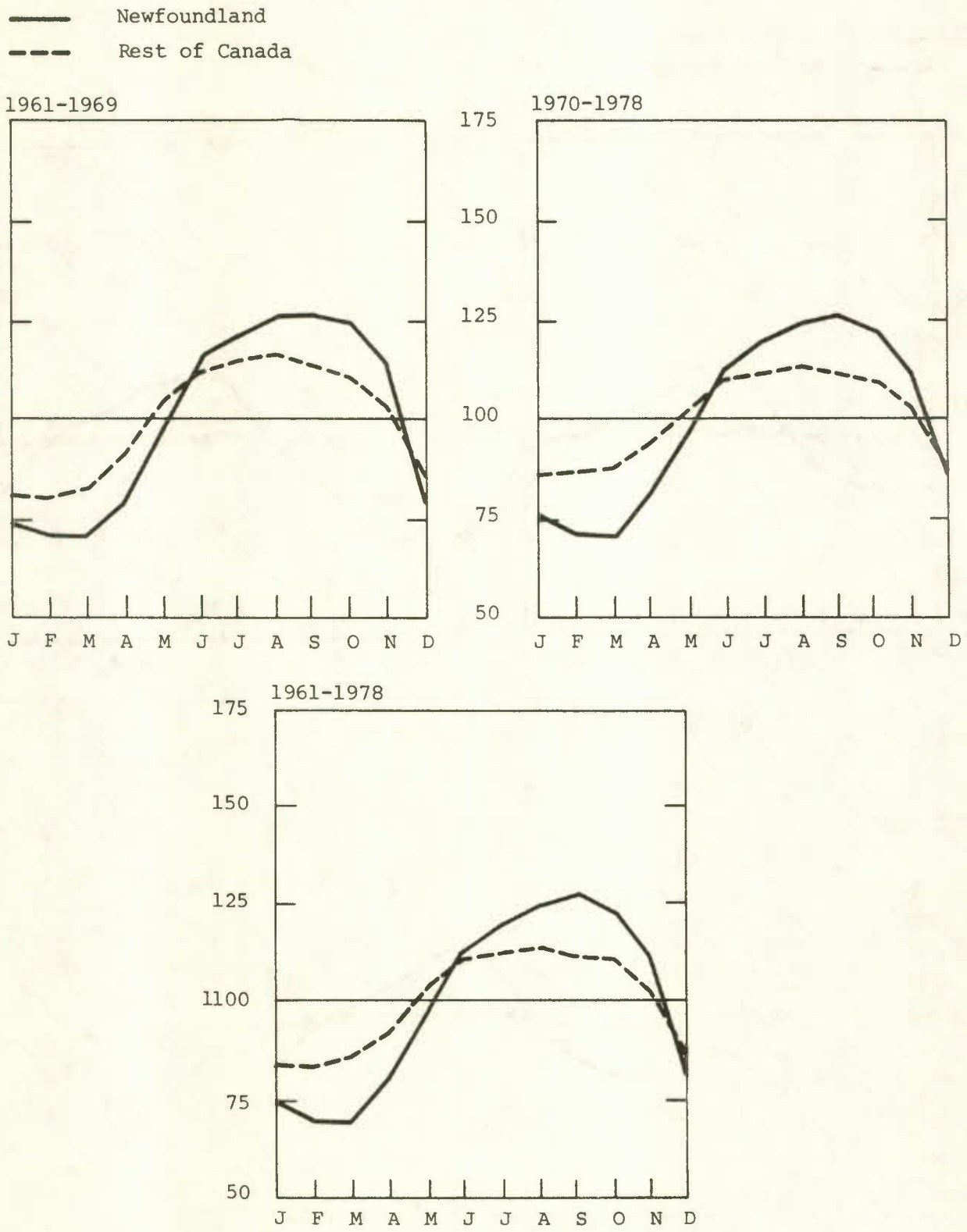


CHART 4 (cont'd)

Transportation, Communications and Other Utilities

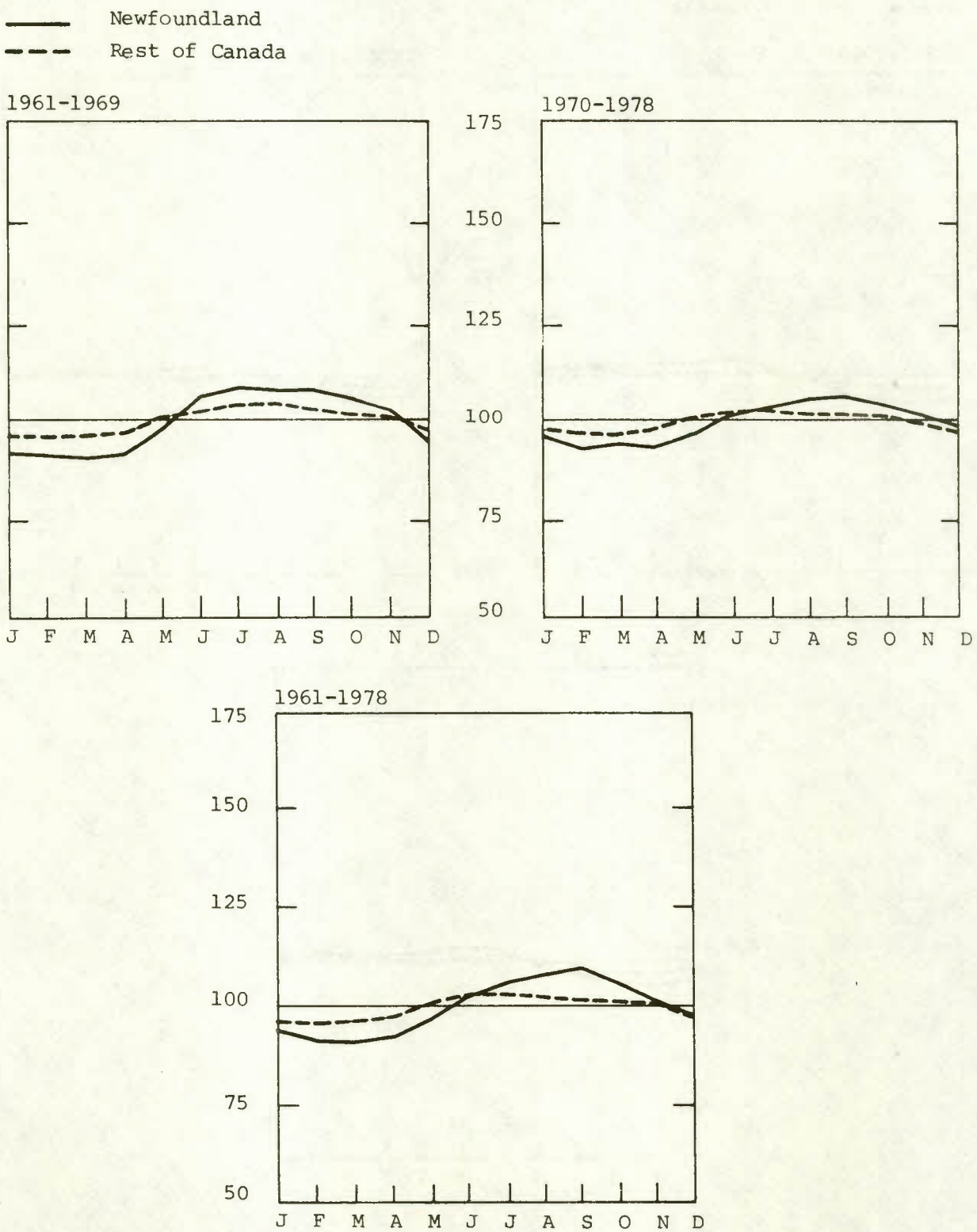


CHART 4 (cont'd)

Trade

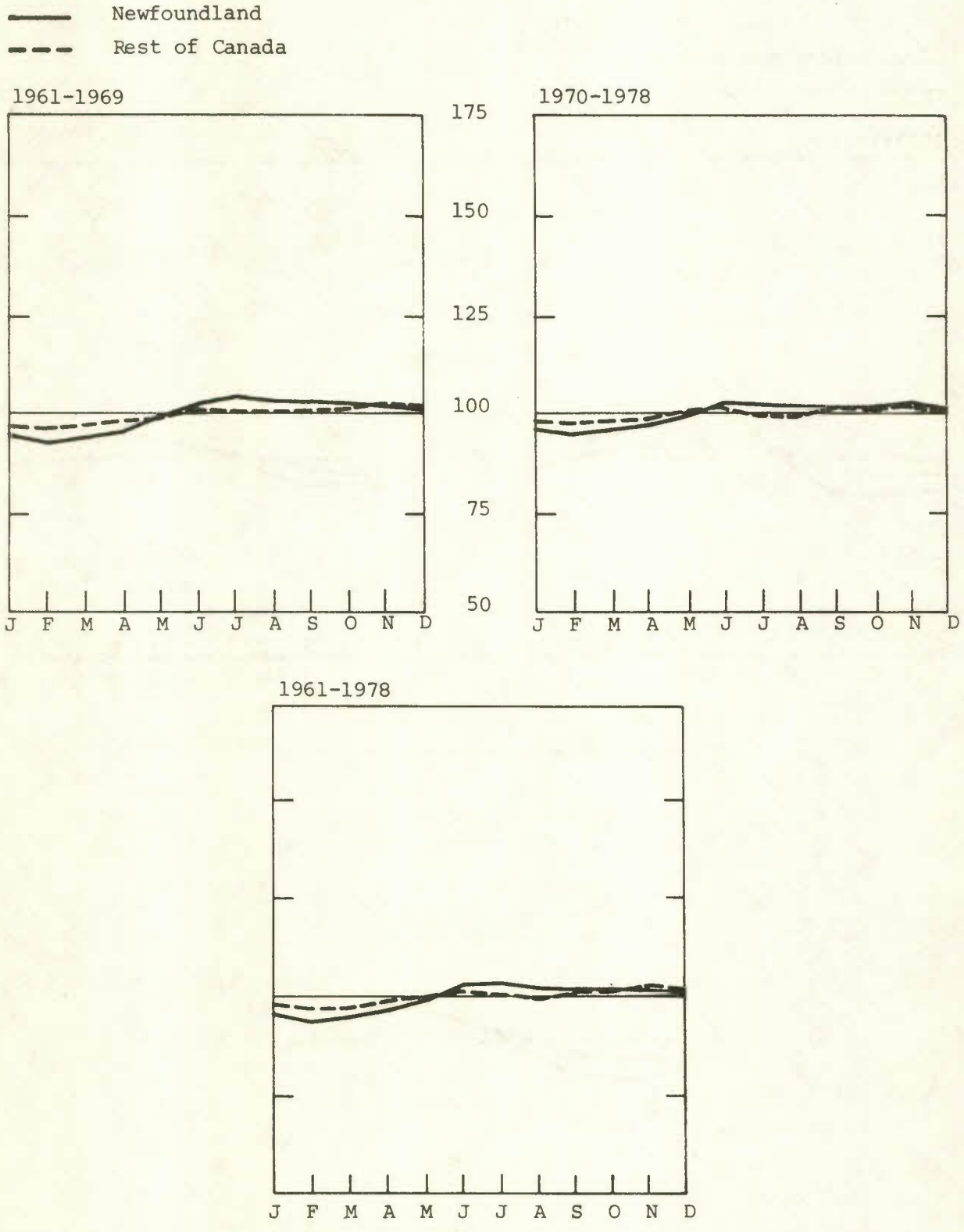
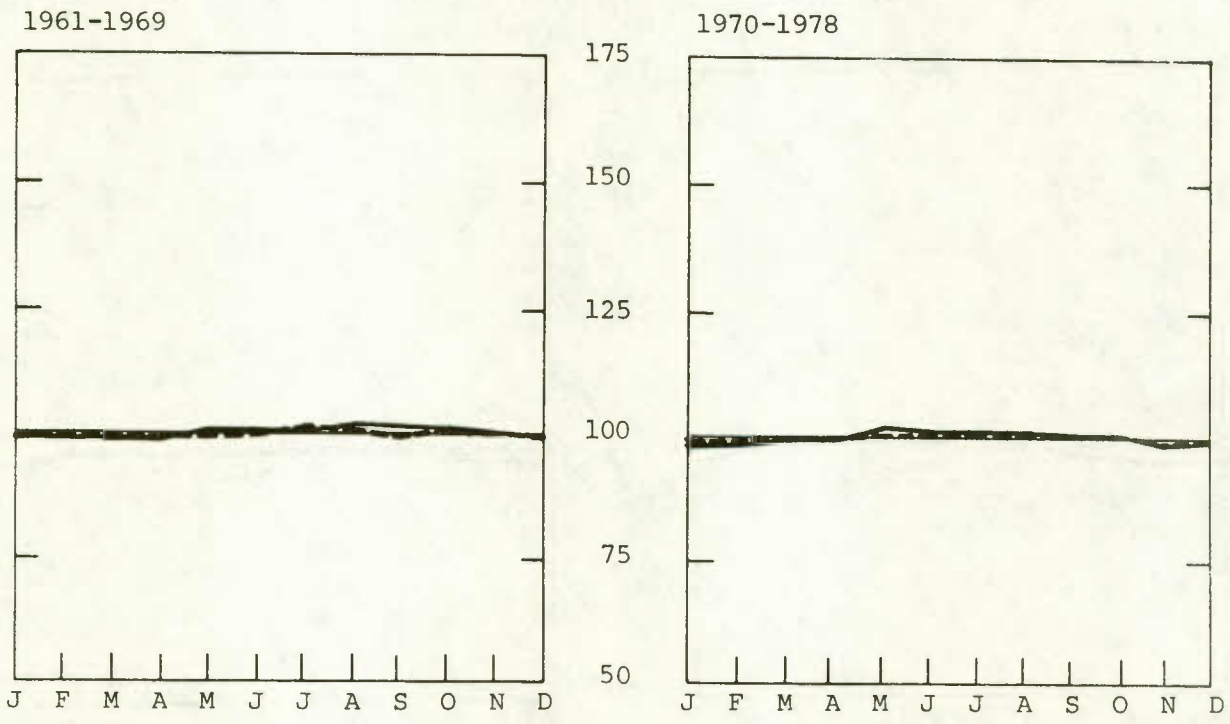


CHART 4 (cont'd)

Finance, Insurance and Real Estate



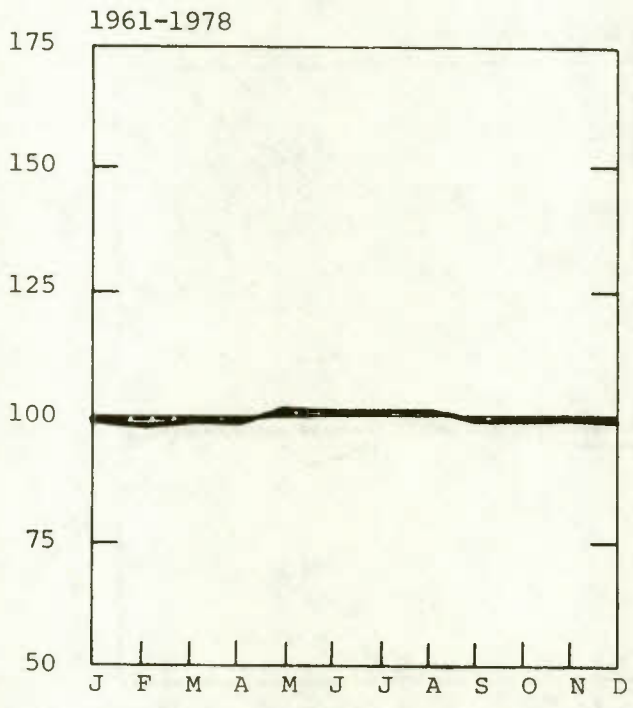


CHART 4 (cont'd)

Community, Business and Personal Services

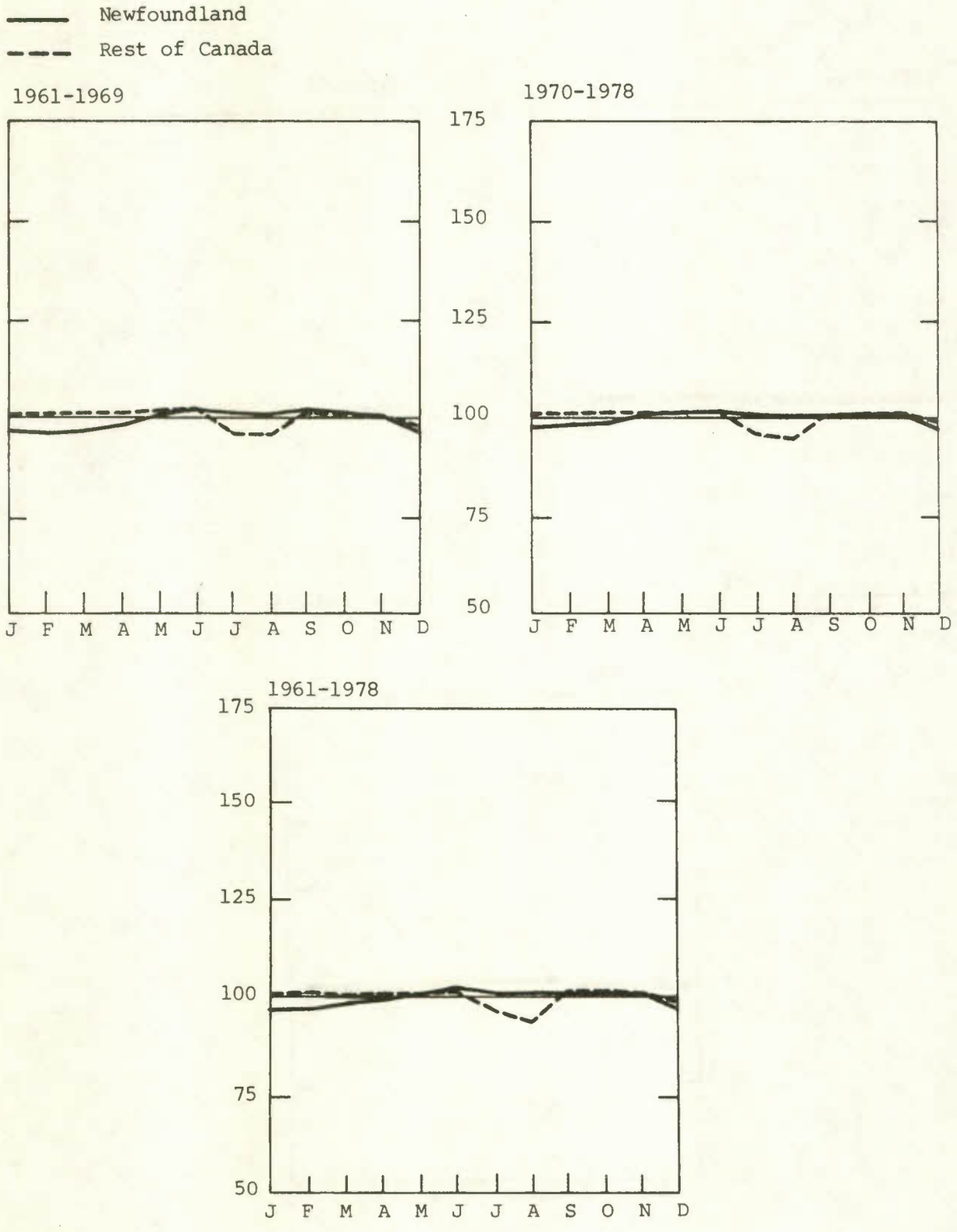


CHART 4 (cont'd)

Public Administration

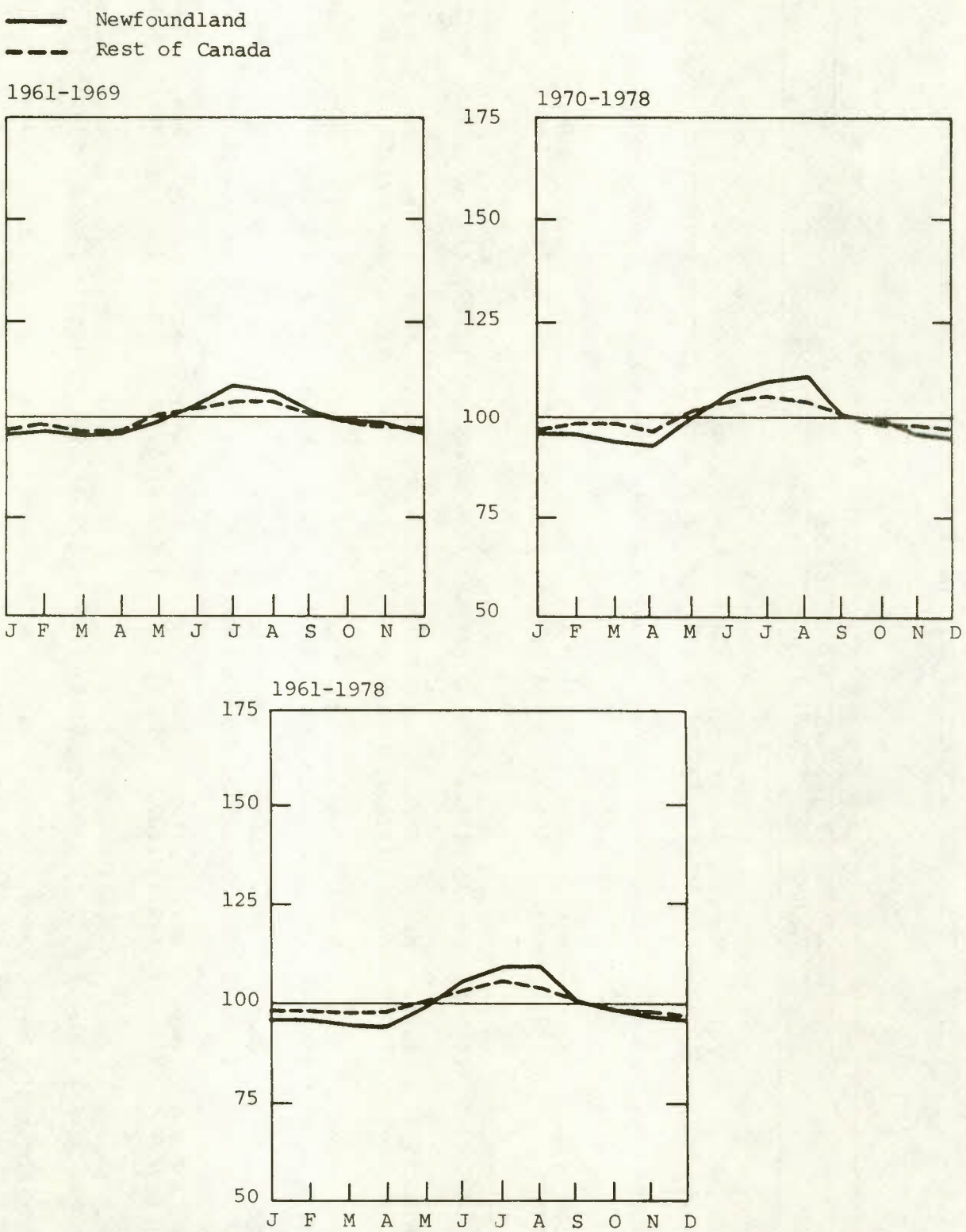


TABLE 6

TIMING OF SEASONAL PATTERNS IN EMPLOYMENT BY INDUSTRY FOR SELECTED PERIODS

	NEWFOUNDLAND						REST OF CANADA					
	1961-69		1970-78		1961-78		1961-69		1970-78		1961-78	
	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH	PEAK	TROUGH
TOTAL-NON AGRICULTURAL	July (108.9)	March (90.3)	August (106.5)	Feb. (93.5)	July (107.6)	March (91.9)	June (103.)	Feb. (96.9)	June (102.8)	Jan. (97.8)	June (102.9)	Jan. (97.4)
FORESTRY	Oct. (134.6)	May (49.3)	July (140.2)	April (44.9)	July (134.8)	April (47.5)	Aug. (121.1)	April (59.8)	Aug. (121.0)	April (72.0)	Aug. (121.0)	April (65.9)
MINING (INCL. MILLING)	Sept. (104.7)	March (95.1)	Nov. (104.3)	April (96.7)	Nov. (103.5)	April (96.6)	July (104.8)	Jan. (97.3)	July (103.7)	Jan. (98.3)	July (104.2)	April (96.9)
MANUFACTURING	July (119.5)	Feb. (85.7)	July (116.3)	Jan. (84.6)	July (117.9)	Jan. (86.)	Aug. (102.8)	Jan. (97.7)	June (102.6)	Jan. (97.6)	June (102.5)	Jan. (97.6)
CONSTRUCTION	Sept. (127.2)	March (70.4)	Sept. (126.2)	March (70.1)	Sept. (126.7)	March (70.2)	Aug. (115.9)	Feb. (81.7)	Aug. (113.3)	Jan. (85.4)	Aug. (106.3)	Feb. (83.6)
TRANS., COMM., & OTHER UTIL.	June (108.9)	March (90.3)	Sept. (107.3)	Feb. (93.8)	Sept. (109.1)	March (91.3)	Aug. (104.6)	Feb. (95.1)	June (103.1)	Feb. (97.1)	July (103.6)	Feb. (96.1)
TRADE	July (104.8)	Feb. (93.3)	June (103.5)	Feb. (94.0)	July (103.9)	Feb. (93.7)	Nov. (103.)	Feb. (96.7)	Nov. (102.3)	Feb. (97.8)	Nov. (102.6)	Feb. (97.2)
FIN., INS., & REAL ESTATE	Aug. (101.5)	April (98.4)	May (107.)	Feb. (98.3)	June (108.8)	Feb. (98.8)	July (101.0)	April (99.4)	July (101.3)	Jan. (99.3)	July (101.1)	Jan. (99.4)
COMM., BUS., PERSONAL SERVS.	June (103.5)	Feb. (97.1)	June (102.5)	Jan. (98.1)	June (103.)	Jan. (97.8)	June (101.8)	Aug. (95.1)	June (102.2)	Aug. (94.5)	June (102.2)	Aug. (94.8)
PUBLIC ADMIN.	July (108.6)	March (95.0)	Aug. (110.3)	March (94.0)	July (109.2)	April (94.6)	July (104.8)	April (97.2)	July (105.6)	Jan. (97.2)	July (105.2)	Jan. (97.2)

TABLE 7

MEAN SEASONAL FACTOR VARIATION IN EMPLOYMENT BY INDUSTRY:
AVERAGES FOR SELECTED PERIODS

	TOTAL NON-AGRICULTURAL	FORESTRY	MINING (INCL. MILLING)	MANUFACTURING	CONSTRUCTION	TRANSP. COMMUN. & OTHER UTIL.	TRADE	FINANCE, INSURANCE & REAL ESTATE	COMMUNITY BUSINESS & PERSONAL SERVICES	PUBLIC ADMINISTRATION
Newfoundland										
1961-69	6.9	25.0	2.8	10.6	21.3	7.2	3.8	.83	2.0	3.9
1970-78	4.8	27.0	2.1	10.4	19.6	4.3	3.1	.97	1.1	5.1
1961-78	5.8	26.	2.4	10.5	20.4	5.7	3.4	.09	1.5	4.5
Rest of Canada										
1961-69	2.1	17.4	2.5	1.7	12.6	3.1	1.6	.49	1.5	2.4
1970-78	1.4	14.7	1.9	1.5	10.1	2.0	1.2	.59	1.8	2.6
1961-78	1.7	16.0	2.2	1.6	11.3	2.5	1.4	.54	1.6	2.5

Source: Calculated.

Seasonal fluctuations are endemic in the construction industry in both regions. The seasonal peaks and troughs in construction employment vary between the two regions reflecting the fact winter in Newfoundland is late in arriving and leaving. Whereas the seasonal peak and trough months are August and February respectively in the rest of Canada, March and September are the corresponding months in Newfoundland. The relatively larger seasonal variation in the Newfoundland construction industry could be the result of several factors. Although a number of new techniques have been introduced in road building and concrete forming, Newfoundland's familiarity with such techniques usually lags behind that of the rest of Canada.[30] Insofar as technological developments reduce the cost of winter operations, the supposed lag in the application of technical change will result in disparities in the magnitude of seasonal fluctuations, other things remaining equal.

The work force in the Newfoundland construction industry -- apart from supervisory personnel -- consists predominantly of individuals from rural Newfoundland. It has been suggested that there prevails a strong inclination among the workers to leave their jobs and return home for the winter to partake in such activities as boat and house repair, hunting and trapping. The presence of unemployment insurance has rendered this supposed exodus relatively less

expensive in terms of foregone earnings and has resulted in implicit agreements between employer and employee to classify the latter as being laid-off during the winter. The implication is that much of the seasonal unemployment within the industry could be of a voluntary nature. However, one would expect that such an arrangement is as likely to prevail in the rural areas throughout the rest of Canada as it is in Newfoundland.

Finally, the impact of the climate varies between activities and, insofar as construction activity in Newfoundland is of the "outdoor" type (i.e. construction of roads, sewer systems and wharves), the relatively more pronounced seasonality is not surprising.

Employment in transportation, communications and other utilities is not immune to the effects of the seasons. Given the location of Newfoundland with respect to the North American and European markets, in addition to the widely dispersed settlements within the province, transportation assumes a very crucial role in Newfoundland's economy. The relatively wider fluctuations in Newfoundland depicts a particular dependence on marine coastal services which are forced to curtail operations in the winter due to ice conditions off the coasts of Labrador and the northeast portion of the Island. In addition, much of the fish caught off the Province's coasts is transported by truck across the

Island to be exported or distributed to the many isolated seasonal fish processing plants. Since the fishing and fish-processing industries are themselves seasonal, employment in the transportation industry (trucking) will be affected.

The presence of seasonal variations in the trade industry is not unusual in view of its inter-connections with other industries. For example, a seasonal decline in construction activity will bring forth a concomitant decline in the demand for building materials which will affect employment in the trade industry. Individuals tend to spend money when they earn it, and therefore, the seasonality in the trade industry is merely a reflection of the seasonality in related industries. Accordingly, the relatively greater seasonal variation in the Newfoundland trade industry depicts the more striking presence of seasonality in the Newfoundland economy as a whole.[31] The service and finance, insurance and real estate industries are subject to relatively small seasonal employment fluctuations in both regions. Public administration on the other hand exhibits wider variations that have shown a tendency to increase over time which could be the result of the recent inclination on the part of both the federal and provincial governments to increase student hiring during the summer.

3.4 SEASONALITY: A DECOMPOSITION

With the aid of the seasonal levels of employment for each industry, the difference in the seasonality of non-agricultural (non-fishing) employment between the two regions can be decomposed through the use of shift-share analysis into two components: the industrial structure and intra-industry effects. The seasonal levels of employment by industry for selected periods, and their respective contributions to the total seasonal level, are found in Table 8.[32] Clearly, in the case of Newfoundland the construction and manufacturing industries are the major contributors to the total seasonal level, followed by the transportation, forestry and public administration industries. In the rest of Canada the construction industry is again at the forefront in terms of contribution, with manufacturing and total industries close behind.

The calculations in Table 9 can be utilized to explain the disparity between the two regions in the total seasonal levels. The seasonal level of total non-agricultural employment expressed as a ratio of the annual average of total non-agricultural employment (A) is simply an average of the industry ratios (a) weighted by the industry's share of total employment (b).

6) $A = \sum_{i=1} a_i b_i$ Where i is the industry

TABLE 8

SEASONAL LEVEL OF NON-AGRICULTURAL (NON-FISHING) EMPLOYMENT BY INDUSTRY IN THOUSANDS (AS A % OF TOTAL) FOR SELECTED PERIODS[1]

	TOTAL NON-AGRICULTURAL (NON-FISHING)	FORESTRY	MINING (INCL. MILLING)	CONSTRUCTION	MANUFACTURING	TRANSP. COMMUN. & OTHER UTIL.	TRADE	FINANCE, INSURANCE & REAL ESTATE	COMMUNITY BUSINESS & PERSONAL SERVICES	PUBLIC ADMINISTRATION
Newfoundland										
1961-69	9.8	1.4	.2	2.3	2.2	1.6	.7	-	.8	.6
	(100)	(14.3)	(2.0)	(23.5)	(22.4)	(16.3)	(7.1)		(8.2)	(6.1)
1970-78	9.9	.9	.3	2.2	2.4	1.2	.8	.1	.9	1.1
	(100)	(9.1)	(3.0)	(22.2)	(24.2)	(12.1)	(8.1)	(1.0)	(9.1)	(11.1)
1961-78	9.85	1.15	.25	2.25	2.3	1.4	.75	-	.85	.85
	(100)	(11.7)	(2.5)	(22.8)	(23.4)	(14.2)	(7.6)		(8.6)	(8.6)
Rest of Canada										
1961-69	221.3	14.5	5.3	53.4	41.8	27.8	26.6	2.6	31.5	17.9
	(100)	(6.6)	(2.4)	(24.1)	(18.9)	(12.6)	(12.0)	(1.2)	(14.2)	(8.1)
1970-78	245.2	12.6	4.7	55.6	44.6	23.2	30.5	5.3	47.0	30.7
	(100)	(5.0)	(1.8)	(21.9)	(17.8)	(9.1)	(12.0)	(2.1)	(18.5)	(12.1)
1961-78	237.7	13.5	5.0	54.5	43.2	25.5	28.5	3.9	39.2	24.3
	(100)	(5.7)	(2.1)	(22.9)	(18.2)	(10.7)	(12.0)	(1.6)	(16.5)	(10.2)

Source: Calculated.

1 The seasonal level for total non-agricultural employment is equal to the sum of the industry seasonal levels. The numbers in brackets represent the seasonal level of the particular industry, expressed as a percentage of the total non-agricultural seasonal level.

Using the subscripts n and r to represent Newfoundland and the rest of Canada we have:

7) $A_n = \sum_{i=1} a_{in} b_{in}$

8) $A_r = \sum_{i=1} a_{ir} b_{ir}$

We know by definition:

9) $\sum_{i=1} b_{ir} = \sum_{i=1} b_{in} = 1$

The difference in the total seasonal levels expressed in ratio form between the two regions ($A_n - A_r$) can be explained by regional differences in the extent of seasonality between identical industries ($a_{in} - a_{ir}$) - region specific differences - and differences in industrial structure ($b_{in} - b_{ir}$). For exposition let:

10) $\Delta b_i = b_{in} - b_{ir}$ or $b_{in} = \Delta b_i + b_{ir}$

11) $\Delta a_i = a_{in} - a_{ir}$ or $a_{in} = \Delta a_i + a_{ir}$

Therefore:

12) $A_n = \sum_{i=1} (\Delta a_i + a_{ir})(\Delta b_i + b_{ir})$

$$= \sum_{i=1} \Delta a_i b_{ir} + \sum_{i=1} a_{ir} \Delta b_i + \sum_{i=1} \Delta a_i \Delta b_i + \sum_{i=1} a_{ir} b_{ir}$$

Since $A_r = \sum_{i=1} a_{ir} b_{ir}$ from (9)

13) $$A_n - A_r = \underset{(1)}{\sum_{i=1} \Delta a_i b_{ir}} + \underset{(2)}{\sum_{i=1} a_{ir} \Delta b_i} + \underset{(3)}{\sum_{i=1} \Delta a_i \Delta b_i}$$

where: (1) intra-industry effect (2) inter-industry effect
(3) interaction effect

Equation 13 provides a decomposition of the difference in the seasonal levels of non-agricultural employment for Newfoundland and the rest of Canada. To reiterate, the intra-industry effect measures the contribution of region-specific differences in seasonality between industries to the total difference. The contribution of regional differences in industrial structure is captured in the inter-industry term. Finally, the interaction effect measures the joint effect of industry-specific and industrial composition differences.

It should be noted that the measure secured for the intra and inter-industry effects depends on the relative importance of the interaction effect. If the interaction effect is relatively large the problem becomes one of allocating the interaction term between the two components of the total difference. More simply put, seasonality is a concept that cannot be unambiguously broken into two components. On the other hand, if the interaction effect is relatively small, the manner in which the effect is allocated becomes inconsequential. Our calculations reveal that the

interaction effect is large relative to the other effects and therefore we have presented the range for the intra and inter-industry effects.

Table 9 presents the results of the decomposition exercise. The figures indicate that the disparity in seasonal levels between the two regions can be explained largely in terms of region-specific differences. That is, it is a result of all industries in Newfoundland being, on average, more susceptible to seasonal influences than their counterparts in the rest of Canada. The inter-industry effect is of relatively less importance in terms of contribution to the total difference which means that Newfoundland's seasonality cannot, for the most part, be blamed on having too large a proportion of its labour force employed in seasonally-proned industries. The main trouble is that all industries are more seasonal in Newfoundland.[33] The negative interaction term implies that the rest of Canada is relatively less endowed with industries subject to greater seasonality. Insofar as the differences in seasonality between Newfoundland and the rest of Canada reflects a problem unique to Newfoundland and its industries it follows that policy prescriptions should be industry specific if such differences are to be eliminated.

TABLE 9

DECOMPOSITION OF THE DIFFERENCE IN THE SEASONAL LEVEL OF NON-AGRICULTURAL EMPLOYMENT FOR NEWFOUNDLAND AND THE REST OF CANADA

PERIOD	TOTAL DIFFERENCE $A_n - A_r$	INTRA-INDUSTRY EFFECT ($\Sigma \Delta a_i b_{ir}$)	INTER-INDUSTRY EFFECT ($\Sigma a_{ir} \Delta b_i$)	INTERACTION EFFECT ($\Sigma \Delta a_i \Delta b_i$)
		- per cent -		
1961-69	7.0	7./5.8	1.2/0	-1.2
1970-78	4.4	5.7/4.3	.1/-1.3	-1.4
1961-78	5.5	6.3/5.0	.5/-.8	-1.3

Source Calculated.

The evidence presented in the preceding pages suggests that the differences in seasonality between Newfoundland and the rest of Canada is not caused by Newfoundland concentrating too much of its employment in seasonal industries, but that seasonality is a problem that offsets all industries within the province. The problem is not with the province's industry structure but with seasonality per se.

4 SEASONALITY AND THE LABOUR MARKET

In this section, attention is given to the relationship between changes in seasonality and labour market conditions. Specifically, the extent to which changes in seasonality represent changes in the demand for labour as opposed to independent trends, and the impact of unemployment insurance on seasonality is determined. The final task entails examining how relative wages are affected by changes in seasonality and unemployment insurance.

Given the labour market characterization of perfect competition and a homogeneous labour force, anticipated employment instability (seasonal variations) implies, among other things, an equalization of annual incomes in all employments to achieve labour market equilibrium (O'Connor, 1961, p. 128). It follows that a zero marginal valuation on leisure implies that wage rates in seasonal employments be sufficiently greater per week worked to insure equalization of wages per annum, whereas a positive marginal valuation on leisure suggests that a relatively smaller weekly wage differential between seasonal and non-seasonal employments will prevail, ceteris paribus.

However, given a positive value on leisure, weekly wage rates must be positively correlated with the degree of seasonality prevalent in the industry ceteris paribus. A

contrary relationship is tantamount to the value of leisure for an individual unemployed year-round being in excess of the value of money income from year-round employment, other things remaining equal (O'Connor, 1963, p. 129).

Insofar as the utility derived from an additional unit of leisure varies between individuals, it would be reasonable to find that certain individuals prefer seasonal employment and therefore are willing to pay a premium under the guise of relatively lower wages to secure such employment. Seasonal fluctuations in the supply of labour will emerge, precluding an unambiguous determination of the wage structure (i.e., seasonal vs non-seasonal industries). Wage levels need not necessarily be higher in a seasonal industry if such factors as wage parity, unions, labour productivity, labour demand, etc., are taken into consideration.

It is equally possible that individuals employed in seasonal industries will seek employment in non-seasonal industries (or at least seasonal industries with offsetting peaks and troughs) during the off-season.[34] If, for example, the value of money income plus leisure accruing to individuals in seasonal industries is less than the value of money income from the two employments (i.e., seasonal and non-seasonal) combined, it would only be logical for individuals to seek employment in the off-season.[35]

Under such conditions, the total supply of work effort will increase, causing a decline in the aggregate wage level. Once again, little can be said about the wage structure other than the fact that its determination depends primarily upon the value individuals place on leisure.

Although the discussion in the preceding pages is over-simplified, it nonetheless highlights the fundamental relationship between relative wages and the degree of seasonality: that weekly wage rates in seasonal industries will in general be positively related to the seasonal instability of the industry. The wage structure on the other hand cannot be determined a priori since it depends on a multitude of factors. If demand conditions are allowed to vary, the analysis becomes very complex. An increase in the seasonality of the demand for labour will doubtless affect the seasonality of the supply of labour reflecting the affiliation between the demand and supply of labour and the wage rate (Smith, 1965, p. 201). Furthermore, seasonality is not independent of the business cycle. Employers may find it to their advantage to mitigate seasonal variations in production as demand increases which, in turn, implies a concomitant reduction in the seasonality of labour demand. The extent to which the seasonality in the demand for labour in the economy as a whole is affected will depend upon the distribution of the increase in demand between seasonal and in non-seasonal industries and their respective demand elasticities for labour.

Unemployment insurance (UI) or any subsequent increase in its generosity will affect the seasonality of employment in a positive fashion and reduce relative wages in seasonal industries.[36] Specifically, a nonexperienced-rated unemployment insurance scheme in which benefits are a proportion of weekly earnings not only alters the costs of becoming unemployed but, more importantly, alters the relative cost of unemployment between seasonal and non-seasonal industries.[37]

To reiterate, labour will tend to be allocated between the types of industries until annual incomes are equalized. Unemployment insurance will initially render seasonal industries relatively more attractive as annual incomes exceed those in non-seasonal industries by an amount equivalent to the total of UI benefits received over the course of the year. As a result, the supply of labour in seasonal industries will increase reflecting interindustry movements of labour and the entry of marginal workers into the labour force. Wages in seasonal industries will decline or, in the case of increasing labour productivity over time, real incomes or product demand will rise at a less rapid rate over time than wages in non-seasonal industries. Insofar as an increase in the share of total employment in seasonal industries transpires then in aggregate seasonality will increase, other things remaining equal. Finally, following the work of Feldstein (1976), unemployment insurance may

increase the seasonality of employment and reduce the relative wages of seasonal workers if employers find it to their advantage to increase the use of temporary layoffs to produce a given output.

4.1 THE MODEL AND THE RESULTS

In the following pages, some rather simple tests have been undertaken in an attempt to delineate the underlying determinants of seasonality and to examine the validity of the supposed relationship between seasonality and relative earnings. The model specifications presented are admittedly simplistic and thus the reader is cautioned with respect to interpreting the results at face value. Despite these shortcomings, the analysis should provide some insight as to the general nature and significance of the relationships hypothesized above.

The general form of the seasonality equation is given below.

$$14) \quad SU_t = \alpha_0 + \alpha_1 Cyc_t + \alpha_2 T + \alpha_3 UI_t + e_t$$

where: SU_t = measure of seasonality

Cyc_t = cyclical variable

T = time trend

UI = unemployment insurance variable

e_t = error term

Seasonality is specified to be a function of a cyclical variable representing the degree of tightness or slackness in the labour market, a trend variable to account for independent long-run movements in seasonality and an unemployment insurance variable reflecting the generosity of Canada's unemployment insurance program.

The general specification of seasonality given above has been utilized in several Canadian studies.[38] Kaliski (1976) in particular focused upon the effect of the 1971 revisions in Canada's unemployment insurance program on the amplitude of seasonal variations in employment of various industries and upon relative wages. Whereas the evidence confirmed the hypothesized relationship between seasonality and unemployment insurance, it proved inconclusive in the case of relative wages.

The impact of the removal of seasonal limitations within the Swedish unemployment insurance program in 1964 was examined by Edebalk et al. (1978). This study focused upon the building industry (construction workers and painters) and found that seasonal unemployment increased within the industry during the latter part of the off-season. O'Connor (1962) analyzed the movement in employment and wages in "moderately" seasonal industries following the introduction in the U.S.A. during the late 1930's of an unemployment insurance program. The rules of the program were such that

industries not subject to seasonal variations and those with very pronounced seasonal variations were excluded. The results were in keeping with the theory as employment increased and relative wages decreased within "moderately" seasonal industries. The effect of the 1975 introduction of an unemployment insurance program for U.S. agricultural workers was analyzed by Chiswick (1978) with the findings once again conforming to theoretical expectations.

Halpin (1979) examined the effect of unemployment insurance on seasonality within the context of experience-rating. In more specific terms, the impact of experience rating on seasonal swings in employment in three industries in the U.S.A. was examined. The results showed that the reaction to experience-rating differed between the industries, indicating that different limitations with regards to stabilizing employment prevail for each industry. In two of the three industries examined (the highway construction and outwear industry) experience-rating appeared to be effective in stabilizing employment.

Several cyclical variables were tested in the specification above with the most notable being the unemployment rate, the annual percentage change in employment, the employment/population ratio and the deviation of employment from its long-run trend. The latter form was chosen primarily because it is believed to be the most accurate indication

of the state of the labour market.[39] As previously mentioned, seasonality is not independent of the business cycle. The seasonality of employment may become more pronounced during recessions reflecting both supply and demand side responses. On the supply side, individuals that have lost their jobs may seek and accept seasonal jobs as a second best alternative. Employers, on the other hand, will have less need to hoard labour to ensure their future availability when a large body of unemployed workers to draw from already exists. Moreover, the weakened income positions of employers during recessions makes it very difficult to pay for underutilized labour. Alternatively, insofar as costs are associated with laying-off, hiring and (re)training workers, employers may exhibit a certain reluctance to lay-off workers, and thus, the seasonality of employment may be little affected by the business cycle.

The amplitude of seasonal labour force fluctuations may decline during recessions if secondary workers enter the labour force to seek full-time employment when the primary workers are laid off, or if marginal seasonal workers leave the labour force in response to increased competition from primary or better qualified workers. If, however, the secondary workers that enter the labour force and/or the primary workers that have been laid off seek and accept seasonal or short-term jobs (or whatever is currently available), seasonal labour force fluctuations may increase during recessions.

Seasonal unemployment fluctuations will increase during recessions in response to concomitants increases in the seasonality of employment. If the majority of individuals become discouraged and choose to drop out of the labour force when laid-off, then unemployment and the seasonality of unemployment may change very little. On the other hand, the presence of unemployment insurance should inhibit such an exodus from the labour and thus serve to increase seasonal unemployment.

The choice of the appropriate unemployment insurance variable is a very important and somewhat controversial matter.[40] The UI program is complicated in terms of eligibility requirements and benefit entitlement, in addition to the fact that amendments to the above parameters have taken place over time. The most dramatic transformation in Canada's UI scheme took place in 1971 as the generosity of the program was enhanced considerably. In more specific terms, the unemployment insurance benefit rate was increased to 66 2/3 per cent of average weekly earnings and the maximum weekly benefit payable was raised from $53. to $100.[41] More importantly, the maximum number of benefit entitlement weeks corresponding to the minimum required weeks of insurable employment increased substantially and became dependent upon the national unemployment rate and the relationship between the regional and national rates.[42] Finally, in late 1977, the UI program was amended in a manner

which served to reduce the overall generosity of the program.[43]

The variable we have chosen to reflect the UI scheme represents the ratio of the maximim benefit entitlement weeks corresponding to the minimum required weeks of insurable employment (E/C) multiplied by the real maximum benefit payable net of UI taxes.[44] In very simple terms, the variable represents the maximum return to an individual - in terms of UI benefits - per UI contribution week. It is believed that this variable is relatively more acurate in its representation of changes in the income-leisure opportunity locus brought about by the various UI amendments.[45]

Equation 14 was estimated for Newfoundland and the rest of Canada with both the MSFV and the seasonal level (expressed as a percentage of the annual average) as the dependent variable. The regressions were computed for the basic labour force characteristics - employment, unemployment and the labour force - over the 1953-1978 period, while the industry employment regressions were estimated over the 1961-1978 period. For the basic labour force characteristics the cyclical variable represents the deviation of total employment from its long run trend. Industry-specific employment deviations were used in the industry regressions. Finally, it should be noted that the industry regressions are presented in descending order of their degree of seasonality (as measured by the MSFV).

The variability of the results between the two regions and between industries is quite evident. The regressions results for the MFSV (Tables 10-11) reveal that the seasonality of total employment in both regions is inversely related to the cyclical variable, indicating that as the economy goes into a recession the seasonality of employment is likely to increase. In Newfoundland, a similar relationship prevails in the construction, public administration, mining and finance industries. In addition to the construction and public administration industries, the seasonality of employment in the manufacturing and trade industries is negatively correlated with their respective cyclical variables in the rest of Canada. A positive correlation between the seasonality of employment in the transportation industry in the rest of Canada and the cyclical variable. Seasonal fluctuations in the labour force and in the number of unemployed in both regions did not show any significant correlation with the cyclical variable.

The trend variable consistently emerges with a significant negative coefficient, reaffirming the conclusions drawn from the evidence presented in the previous section. The finance industry is the exception in Newfoundland as a significant positive coefficient accompanies the trend variable. In the rest of Canada the seasonality of employment both the finance and public administration industries

TABLE 10

REGRESSION RESULTS FOR THE MEAN SEASONAL FACTOR
VARIATION: NEWFOUNDLAND (t-statistics in parenthesis)
$MFSV_t = \alpha_0 + \alpha_1 Cyc_t + \alpha_2 T + \alpha_3 UI + e_t$

$MSFV_t$ for:	α_0	α_1	α_2	α_3	$\bar{R}^2$	S.E.E.	D.W.[1]	F-statistic[2]
Employment	32.2	-20.0	-.270	.001	.866	.90	.6	54.7
	(11.3)	(7.2)	(7.2)	(.6)				
Labour Force	13.4	-4.6	-.140	-.003	.731	.88	.6	23.7
	(4.8)	(1.7)	(3.8)	(1.6)				
Unemployment	26.9	.583	-1.00	.006	.975	1.11	.4	326.1
	(6.7)	(.2)	(21.8)	(2.7)				
Industry Employment								
Total Non Agricultural	10.3	-2.44	.263	.001	.931	.333	.7	77.5
	(4.2)	(1.0)	(10.0)	(1.6)				
Forestry	22.3	2.1	.126	.003	.417	1.3	.6	5.0
	(9.6)	(1.0)	(1.2)	(.9)				
Construction	24.5	-2.1	-.249	.002	.882	.41	2.1	43.4
	(32.8)	(3.0)	(7.7)	(1.7)				
Manufacturing	7.13	3.5	-.017	.00001	.019	.31	.4	1.1
	(2.7)	(1.5)	(.7)	(.01)				
Transportation, etc.	10.3	-1.5	-.406	.003	.909	.55	.4	57.5
	(3.8)	(.6)	(9.2)	(2.2)				
Public Administration	9.1	-5.3	.034	.003	.890	.22	1.8	46.9
	(7.3)	(4.4)	(1.6)	(4.3)				
Trade	6.7	-2.7	-.064	-.001	.601	.27	.4	9.5
	(4.2)	(1.7)	(3.0)	(.1)				
Mining	6.8	-2.8	-.253	.004	.715	.64	1.07	15.2
	(6.2)	(2.6)	(4.9)	(2.3)				
Community, Business and Personal Services	1.4	.73	-.050	-.001	.947	.11	1.68	102.8
	(2.4)	(1.2)	(5.5)	(4.9)				
Finance, etc.	2.6	-1.9	.032	-.0004	.508	.14	.6	6.9
	(3.8)	(2.8)	(2.9)	(1.3)				

1 The upper and lower bounds of the Durbin-Watson statistic at the 95 per cent significance level are $d_L = 1.22$, $d_u = 1.55$ for the labour force equations and $d_L = 1.05$; $d_u = 1.53$ for the industry employment equations.

2 The critical value of the F-statistic at the 95 per cent significance level is 3.42 for the labour force equations and 3.68 for the industry employment equations.

TABLE 11

REGRESSION RESULTS FOR THE MEAN SEASONAL FACTOR
VARIATION: REST OF CANADA (t-statistics in parenthesis)

$$MFSV_t = \alpha_0 + \alpha_1 Cyc + \alpha_2 T + \alpha_3 UI + e_t$$

$MSFV_t$ for:	α_0	α_1	α_2	α_3	$\bar{R}^2$	S.E.E.	D.W.[1]	F-statistic[2]
Employment	8.3	-4.9	-.049	.0008	.829	.14	.5	41.3
	(4.6)	(2.7)	(7.6)	(1.5)				
Labour Force	-.745	2.9	.0006	-.0008	.125	.15	1.53	2.2
	(.4)	(1.6)	(.1)	(1.4)				
Unemployment	6.0	20.5	-1.0	.010	.948	1.6	.3	152.9
	(.3)	(1.0)	(13.8)	(1.7)				
Industry Employment								
Total Non Agricultural	4.80	-2.39	-.071	-.0001	.884	.141	.5	44.0
	(2.6)	(1.3)	(6.3)	(.2)				
Forestry	14.3	3.8	-.184	-.005	.837	.63	1.94	30.0
	(5.4)	(1.4)	(3.4)	(1.7)				
Construction	22.3	-8.3	-.383	.005	.928	.46	.7	74.2
	(10.0)	(3.7)	(10.4)	(2.9)				
Public Administration	5.6	-3.3	.029	-.00005	.704	.11	.4	14.5
	(3.9)	(2.3)	(2.4)	(.1)				
Transportation, etc.	-4.1	7.7	-.110	.0003	.900	.21	.5	52.0
	(1.2)	(2.3)	(6.4)	(.4)				
Mining	1.5	1.4	-.122	.002	.882	.18	.5	43.4
	(.6)	(.6)	(8.1)	(2.4)				
Community, Business and Personal Services	-3.3	4.9	.003	.001	.731	.11	1.22	16.4
	(3.8)	(5.5)	(.3)	(2.3)				
Manufacturing	3.6	-1.8	-.024	.0003	.756	.07	.9	18.5
	(8.1)	(4.0)	(4.2)	(1.0)				
Trade	3.6	-1.8	-.047	.0002	.940	.06	.9	90.5
	(4.1)	(2.0)	(9.1)	(.9)				
Finance, etc.	.873	-.458	.019	-.0004	.897	.02	1.7	50.5
	(2.7)	(1.4)	(8.8)	(3.4)				

1 See footnote Table 10.

2 See footnote Table 10.

has increased over time as the significant positive trend coefficient indicates.

The impact of unemployment insurance on seasonality is quite diverse. In Newfoundland, for example, unemployment insurance appears to have had a significant positive impact on the seasonality of employment in the transportation, public administration and mining industries, whereas a significant negative impact is evident in the services industry. Moreover, unemployment insurance has had a positive impact upon the seasonality of total unemployment in Newfoundland, although it has apparently had no effect upon employment and the labour force. The construction, mining and services industries in the rest of Canada have been positively affected by unemployment insurance, whereas the converse holds for the finance industry. Unemployment insurance has had no significant impact on the seasonality of employment, unemployment and the labour force in the rest of Canada.

The results for the seasonal level regressions are very similar in nature to those presented for the MFSV (Tables 12-13). Specifically, the affiliation between the seasonality of employment and the cyclical variable is predominantly negative for Newfoundland and the rest of Canada at both the aggregate and industry levels. Similarly the trend coefficients are generally negative and

TABLE 12

REGRESSION RESULTS FOR THE SEASONAL LEVEL:
NEWFOUNDLAND (t-statistics in parenthesis)

$$SL_t = \alpha_0 + \alpha_1 Cyc_t + \alpha_2 T + \alpha_3 UI_t + \alpha_4 T^2 + e_t$$

Seasonal Level for:	α_0	α_1	α_2	α_3	α_4	$\bar{R}^2$	S.E.E.	D.W.[1]	F-statistic[2]
Employment	41.4	-23.9	.342	.002	-	.829	1.25	.4	41.5
	(10.5)	(6.2)	(6.6)	(.8)					
Labour Force	8.13	3.36	-.121	-.004	-	.589	1.26	.6	13.0
	(2.0)	(.9)	(2.3)	(1.8)					
Unemployment	52.7	2.46	-2.23	.020	-	.832	6.54	1.40	42.2
	(2.5)	(.1)	(8.3)	(1.6)					
Industry Employment									
Total Non-Agricultural	23.6	-10.8	-.431	.003	-	.952	.427	1.10	113.1
	(7.6)	(3.5)	(12.8)	(3.1)					
Forestry	82.1	-29.1	-4.59	.019	.248	.703	3.39	2.24	11.1
	(9.6)	(4.2)	(6.2)	(2.3)	(5.9)				
Construction	34.6	-7.14	.043	-.005	-	.537	1.03	1.92	7.58
	(18.7)	(4.0)	(.5)	(1.9)					
Manufacturing	15.9	4.87	-.312	-.0008	-	.860	.710	1.19	35.8
	(2.7)	(.8)	(5.48)	(.5)					
Transportation, etc.	7.4	5.23	-.431	.001	-	.918	.635	.5	64.1
	(5.4)	(1.7)	(8.5)	(.9)					
Public Administration	22.3	-13.8	.036	.004	-	.753	.570	2.0	18.3
	(7.1)	(4.5)	(.7)	(2.6)					
Trade	8.9	-3.7	-.127	.0002	-	.846	.279	1.08	32.2
	(5.3)	(2.2)	(5.8)	(.3)					
Mining	15.9	-8.34	-.447	.0077	-	.704	1.33	1.51	14.4
	(7.0)	(3.7)	(4.1)	(2.4)					
Services, etc.	9.0	-4.88	-.138	.0002	-	.774	.390	.6	20.4
	(4.4)	(2.4)	(4.4)	(.3)					
Finance, etc.	4.26	-4.48	.086	.0048	-	.625	.952	1.50	10.4
	(.9)	(1.0)	(1.2)	(2.2)					

1 See footnote Table 10.
2 See footnote Table 10.

TABLE 13

REGRESSION RESULTS FOR THE SEASONAL LEVEL:
REST OF CANADA (t-statistics in parenthesis)

$$SL_t = \alpha_0 + \alpha_1 Cyc_t + \alpha_2 T + \alpha_3 UI_t + \alpha_4 T^2 + e_t$$

Seasonal Level for:	α_0	α_1	α_2	α_3	α_4	$\bar{R}^2$	S.E.E.	D.W.[1]	F-statistic[2]
Employment	11.9	-6.9	-.003	-.003	-	.527	.109	1.95	10.3
	(8.8)	(5.2)	(.6)	(.8)					
Labour Force	-2.8	6.0	.034	-.001	-	.252	.292	.7	3.8
	(.8)	(1.7)	(2.6)	(1.1)					
Unemployment	38.4	-6.2	-.679	-.020	-	.904	2.20	1.19	79.9
	(1.4)	(.2)	(6.9)	(2.5)					
Industry Employment									
Total Non-Agricultural	7.0	-2.66	-.076	.0005	-	.967	.069	.8	165.7
	(7.8)	(3.0)	(13.8)	(1.7)					
Forestry	15.8	4.06	.585	-.0097	-.024	.297	1.26	1.71	2.8
	(2.8)	(.7)	(2.6)	(1.7)	(1.8)				
Construction	27.1	-9.54	-.382	.003	-	.986	.219	1.59	399.7
	(25.4)	(9.0)	(21.8)	(3.5)					
Public Administration	4.47	-.032	.107	-.001	-	.953	.1	.8	116.5
	(3.2)	(.02)	(9.1)	(1.5)					
Transportation, etc	8.46	13.8	-.193	.002	-	.820	.402	.6	26.8
	(1.3)	(2.1)	(5.8)	(1.4)					
Mining	.186	5.35	-.189	.0036	-	.786	.4	.8	21.9
	(.04)	(1.1)	(6.1)	(2.3)					
Services	1.08	1.24	-.013	.0001	-	.454	.1	.5	5.7
	(2.0)	(2.3)	(2.2)	(.4)					
Manufacturing	5.43	-2.53	-.036	.0008	-	.700	.1	.5	14.2
	(8.0)	(3.7)	(4.1)	(1.8)					
Trade	3.81	-.563	-.045	-.001	-	.826	.2	.9	27.8
	(1.5)	(.7)	(3.1)	(1.7)					
Finance, etc.	3.17	-2.34	.048	-.0005	-	.784	.114	.5	21.6
	(2.2)	(1.6)	(4.8)	(1.0)					

1 See footnote Table 10.

2 See footnote Table 10.

significant: in this case the finance industry in the rest of Canada is the only exception. The impact of unemployment insurance is once again very disparate between the regions and industries. A significant positive effect appears again for the Newfoundland public administration and mining industries, in addition to the finance and total non-agricultural industries. In the rest of Canada both the construction and mining industries reappear with positive and significant unemployment insurance effects. Unemployment insurance no longer has a significant impact on the seasonality of employment in the finance industry, whereas a significant negative coefficient now accompanies the UI variable in the forestry equation.

It is a difficult task to explain the impact of unemployment insurance between regions and industries. It appears as if the impact of UI on seasonality is a complicated matter being peculiar to each industry and region. For example, it would be logical to expect the impact of unemployment insurance to prevail in a positive fashion in an industry with a work force dominated by secondary workers who are likely to be receiving wages at or close to the minimum wage and who typically have a weak attachment to the labour force. A most appropriate example is the service industry. The results from the MSFV equations would seem to confirm this for the rest of Canada while they are somewhat contradictory for Newfoundland. In fact, unemployment

insurance appears to have had a significant negative impact on the seasonality of employment in certain industries, a finding that is contrary to our theoretical expectations.

The regional differentiation embodied in Canada's UI program undoubtedly accounts for some of the varying impact of unemployment insurance between the two regions examined. On the other hand, it is a much more onerous task to pinpoint the reasons underlying the differential impact of unemployment insurance across industries. The theoretical discussion presented at the outset of this section implied that the impact of unemployment insurance would prevail predominantly in seasonal industries, reflecting interindustry movements of labour. The regression results do not appear to confirm this hypothesis. It may be that, for whatever reason, interindustry movements of labour are of an inconsequential magnitude and that the impact of unemployment insurance is manifested at the level of the firm in the increased use of temporary layoffs.

A departure from the specification of Equation 14 was required for two industries. First, in the MSFV regressions it is obvious from Table 10 that seasonality in the Newfoundland manufacturing industry is not very well explained over the 1961-1978 period with the above specification. In view of the fact that the fish-processing industry constitutes a major proportion of manufacturing

employment in Newfoundland and that between 1975 and 1977 the depletion of fish stocks resulted in a dramatic fall in employment in the industry, the equation was re-estimated over the 1961-1974 period.[47] The results of this exercise are given below (Equation 15) and they indicate a substantial improvement in the "fit" of the equation as evidenced by the increased explanatory power and lower standard error.

$$(15)\quad MSFV_t = \underset{(9.7)}{8.26} + \underset{(3.1)}{2.63}Cyc_t - \underset{(8.9)}{.079} + \underset{(1.3)}{.0003}UI$$

$$\bar{R}^2 = .922 \quad S.E.E. = .090 \quad D.W. = 1.32 \quad F_{stat} = 52.6$$

In order to explicitly test whether or not the depletion of fish stocks affected the seasonality of employment in the Newfoundland manufacturing industry a dummy variable (DFISH) with a value of -1 for the 1975-1977 period and zero otherwise, was included in the equation (Equation 15'). The dummy variable is significant, with a negative sign, implying that the decline in the fish stocks (and fish landings and employment) during the 1975-1977 period resulted in an increase in the seasonality of employment in the fish processing plants and thus in total

$$15')\quad MSFV_t = \underset{(3.0)}{6.91} + \underset{(1.7)}{3.76}Cyc_t - \underset{(1.3)}{.029}T - \underset{(0.4)}{.0003}UI - \underset{(2.4)}{.50}DFISH$$

$$\bar{R}^2 \quad .260 = S.E.E. \quad .272 = D.W. \quad .714 = F_{stat} = 2.5$$

manufacturing employment. However, although the explanatory power of the equation was increased considerably with the inclusion of the dummy variable, it nonetheless remains relatively low. This suggests that important explanatory variables have been excluded from the equation.[47]

The second departure from Equation 14 occurs in the seasonal level regressions for the forestry industry in both Newfoundland and the rest of Canada. Specifically, as is evident from Tables 12 and 13, the forestry regressions included both a linear and quadratic trend. The results of the equations excluding the quadratic trend - which are not reported here - were to say the least not very encouraging in terms of explanatory power. Both trend variables enter the equations with significant coefficients and the addition of the quadratic trend improves the explanatory power of the equations considerably. The explanatory power of the forestry equation for the rest of Canada still remains relatively low suggesting once again that important explanatory variables have been excluded.[48]

The second task of this section consisted of testing whether unemployment insurance has had a significant impact on relative wages in seasonal industries. In addition, the relationship between relative wages and the degree of seasonality in the industry is examined. The methodology utilized to test the above corollaries is

borrowed largely from Kaliski (1976) and is admittedly over-simplified. Specifically, the test consisted of regressing relative earnings in industry i, in region r on the deviation of industry employment about its long run trend (Cyc), a linear time trend (T), a measure of the seasonality of employment in the industry (SU) and an unemployment insurance variable (UI).[49] The relationship was estimated for both regions over the 1961-1978 period. The analysis is limited to six industry groups (construction, forestry, mining, manufacturing, transportation and trade) since to our knowledge earnings for the finance, services and public administration industries are not available for Newfoundland over an extended period of time. We do not, however, view this as a shortcoming since the industries under scrutiny are relatively more susceptible to the influence of the seasons and therefore more likely to be affected by unemployment insurance in the manner hypothesized in the text. The specification is presented below in algebraic terms.

$$16) \quad (W_i/W)_{rt} = B_0 + B_1 Cyc_{irt} + B_2 T + B_3 SU_{irt} + B_4 UI_{rt} + e_t$$

where: $(W_i/W)_{rt}$ average weekly earnings in industry i, region r, relative to average weekly earnings; industrial composite, in region r, t - time period; Cyc, T, Su, UI - see text.

The deviation of industry employment from its long run trend was included in the equation in recognition of the

disparate impact of the business cycle between industries. The significance and sign of the accompanying coefficient will vary according as the sensitivity of industries to the business cycle and the precise manner in which they react varies. Whereas a negative coefficient will prevail if a preponderance of unskilled, low-wage earners are laid off as employment falls below its long run trend, a positive coefficient will be the norm if relative earnings fall in response to a decline in employment below trend. The linear trend variable appears on the right-hand side of Equation 16 to pick up the influence of institutional subtleties such as changes in monopoly and/or union power and other long run qualitative factors. The degree of seasonality should in general be positively related to relative earnings. If, however, an increase in the seasonality of demand for labour (employment) affects the seasonality of labour supply the separate impacts on the weekly wage rate may be offsetting, implying that an insignificant coefficient will accompany the seasonality variable. A negative coefficient should prevail for the unemployment insurance variable since an increase in the generosity of the unemployment insurance scheme will, ceteris paribus, result in a relative decline in the cost of seasonal employment. On the other hand if the structure of relative earnings does not adjust or other influences such as wage parity prevail, an insignificant and perhaps positive coefficient will emerge.

The results of this exercise are presented in Table 14. In terms of goodness of "fit" the equations are much more promising for the rest of Canada than they are for Newfoundland. In the Newfoundland equations the cyclical variable is occasionally significant and only in the forestry industry equation do either the seasonality or unemployment insurance variables emerge significantly different from zero. In this case both variables appear with positive signs. The Newfoundland construction, manufacturing and trade industry equations are particularly poor in terms of 'goodness of fit'. As a result these equations were re-estimated with both a quadratic and linear trend variable and a substantial improvement was witnessed.

16') Construction

$$(W_i/W)t = \underset{(.7)}{-.836} - \underset{(2.3)}{.408}Cyc_{it} + \underset{(3.0)}{.097}T - \underset{(2.7)}{.004}T^2 + \underset{(1.8)}{.098}SU_{it} + \underset{(.1)}{.00002}UI_t$$

$\bar{R}^2 = .542$ S.E.E. = .066 D.W. = 1.52 $F_{stat} = 5.0$

Manufacturing

$$(W_i/W_{ic})t = \underset{(3.8)}{1.3} + \underset{(1.2)}{.198}Cyc_{it} - \underset{(3.1)}{.021}T + \underset{(2.9)}{.001}T^2 - \underset{(.3)}{.046}SU_{it} + \underset{(.2)}{.00001}UI_t$$

$\bar{R}^2 = .464$ S.E.E. = .019 D.W. = 1.43 $F_{stat} = 3.9$

Trade

$$(W_i/W_{ic})t = \underset{(2.5)}{.382} + \underset{(.1)}{.011}Cyc_{it} + \underset{(3.2)}{.019}T - \underset{(3.5)}{.001}T^2 + \underset{(3.1)}{.079}SU_{it} + \underset{(1.6)}{.00006}UI_t$$

$\bar{R}^2 = .496$ S.E.E. = .015 D.W. = 1.28 $F_{stat} = 4.35$

TABLE 14

REGRESSION RESULTS FOR THE EFFECTS OF SEASONALITY AND UNEMPLOYMENT INSURANCE ON RELATIVE EARNINGS: NEWFOUNDLAND AND THE REST OF CANADA

$$(W_i/W)_{rt} = \beta_0 + \beta_1 Cyc_{irt} + \beta_2 T + \beta_3 SU_{irt} + \beta_4 UI_{rt} + e_t$$

Dependent Variable	β_0	β_1	β_2	β_3	β_4	$\bar{R}^2$	S.E.E.	D.W.[1]	F-statistic[2]
Newfoundland									
Forestry	-.176	.128	-.011	.044	.0004	.683	.070	1.22	10.2
	(.5)	(1.0)	(1.8)	(3.0)	(2.5)				
Construction	1.2	-.115	.014	.002	-.00005	.313	.081	.9	2.9
	(.9)	(.6)	(1.0)	(.04)	(.2)				
Manufacturing	.496	.133	-.002	.033	.00007	.159	.024	1.45	1.8
	(2.0)	(.6)	(1.0)	(1.6)	(1.2)				
Transportation, etc.	1.2	-.277	.009	.005	-.00002	.918	.012	2.67	48.6
	(14.3)	(4.7)	(3.6)	(.9)	(.5)				
Trade	.673	.056	-.001	.006	-.00001	.054	.020	.8	1.2
	(3.7)	(.4)	(.7)	(.3)	(.2)				
Mining	1.1	.264	.010	-.005	-.00006	.463	.063	1.89	4.7
	(5.3)	(2.0)	(1.2)	(.2)	(.4)				
Rest of Canada									
Forestry	.802	.058	.016	.066	.0002	.939	.023	1.79	66.9
	(4.8)	(.6)	(5.9)	(.6)	(1.6)				
Construction	1.5	-.083	.015	-.022	.0002	.977	.020	1.45	183.0
	(5.2)	(.6)	(3.1)	(1.9)	(2.1)				
Transportation	1.1	-.120	.008	.013	-.00002	.943	.008	1.55	70.7
	(8.1)	(.8)	(6.0)	(1.3)	(.6)				
Mining	.348	.551	.020	.089	-.00002	.904	.020	1.33	40.8
	(1.3)	(2.1)	(4.9)	(2.9)	(.2)				
Manufacturing	.985	-.037	.003	.053	-.00005	.874	.004	2.0	30.5
	(18.5)	(1.1)	(7.4)	(3.9)	(3.6)				
Trade	.770	.037	-.004	.010	.00006	.909	.006	1.0	43.6
	(5.7)	(.4)	(2.9)	(.4)	(2.0)				

1 The upper and lower bounds of the Durbin-Watson statistic at the 95 per cent significance level are $d_L = .93$, $d_u = 1.69$.

2 The critical value of the F-statistic at the 95 per cent significance level is 3.34.

In each of the above equations the trend variables emerge significant and with opposite signs. The degree of seasonality has a positive influence on relative wages in the trade industry, although it has no significant influence in the construction and manufacturing industries. Finally, unemployment insurance does not appear to play a significant role in the determination of relative wages in the three industries.

For the rest of Canada the trend variable is consistently significant and positive for each industry with the exception of the trade industry. Relative wages in the mining and manufacturing industries are positively and significantly related to the degree of seasonality within the industry. A somewhat surprising result prevails for the construction industry where it appears that the degree of seasonality has a significant negative impact on relative wages while, on the other hand, unemployment insurance has a positive impact. Unemployment insurance is positively affiliated with relative earnings in the trade industry. Manufacturing is the only industry for which a significant negative coefficient accompanies the UI variable. An additional attempt to delineate the impact of seasonality and unemployment insurance on relative earnings was undertaken wherein weekly earnings in industry i in Newfoundland relative to their counterparts in the rest of Canada were regressed on the same set of regressors given in

Equation 16.[50] Unfortunately this exercise did not produce relatively more encouraging (nor dramatically different) results. Once again, for the sake brevity we have refrained from presenting the results here.

At the risk of sounding overly pessimistic, the results presented in this section could not be considered substantive. In particular these results are subject to certain qualifications that must be considered and that may aid in explaining their diverse nature. To begin with the measure of seasonality utilized here - or any measure of seasonality based on aggregate data - is likely to be an underestimate of the true measure of seasonality since the accuracy of the data itself is compromised in the aggregation process.[51] In both sets of equations there is evidence of serial correlation in the error terms implying that the t-statistics are biased upwards. Given that we did not attempt to present a 'complete' model of seasonality and relative earnings serial correlation was expected. Furthermore, with reference to the seasonality equations, it has been pointed out that the seasonal factors embodied in the seasonal adjustment program are not independent of one another. In other words the MSFV measure (and to a lesser extent, the seasonal level) are not independently determined from year to year.[52] In this case the Durbin-Watson statistic is an appropriate test for the implied autocorrelation.[53]

Attempts to model the parameters of the unemployment insurance program and their subsequent impact on an individual's income-leisure opportunity locus using aggregate data is without a doubt an over-simplification. The supply of work effort is a multi-faceted decision varying from one individual to the next and thus it is unlikely that it can be accurately depicted by the generalizations that permeate an aggregate analysis of this nature. Furthermore the preceding analysis has completely disregarded changes in demand. For example, unemployment insurance itself is likely to alter the demand for labour since it provides monetary compensation to unemployed workers, which can be considered a Keynesian-like injection into the economy. Assuming that this injection could not have occurred without unemployment insurance reform (i.e. it is not offset by lower transfers or government expenditures elsewhere) it is likely to affect the demand for labour and therefore may offset the increase in seasonal unemployment predicted above. It is equally probable that unemployment insurance acts as a labour subsidy; decreasing total unemployment while at the same time increasing the seasonality of unemployment through an increase in temporary layoffs.

Clearly, the relationships between seasonality, unemployment, earnings and unemployment insurance are not as simple and well defined as we have established them to be, yet it would indeed be very difficult to be more specific using such aggregate data.

5 CONCLUSIONS

This paper has focused upon the degree to which the influence of the seasons permeate the economies of Newfoundland and the rest of Canada. A straight forward discussion concerning the causes and economic significance of seasonality was presented in the opening section of the paper. Two measures of seasonality were utilized and although they differed in both derivation and underlying rationale, identical conclusions emerged; namely that seasonal variations are relatively more conspicuous in Newfoundland. Specifically, seasonal fluctuations in employment, labour force and unemployment are more severe in Newfoundland than in the rest of Canada, although the severity appears to have declined over time in both regions. Moreover for both regions a surprisingly close affiliation between the variance of employment and the labour force over the twelve months of any particular year was revealed; the implication being that seasonal fluctuations in employment are accompanied by nearly identical fluctuations in the labour force, and thus, that the use of unemployment statistics alone to determine the number of people affected by the seasons underestimates the true magnitude.

An examination of the seasonality in employment and the labour force by age-sex group showed without

exception the influence of the seasons to be more pronounced in Newfoundland. A similar conclusion emerged upon comparing the seasonality of employment by industry between the two regions. With the aid of a simple classification technique (i.e. shift-share analysis) it was found that regional differences in the extent of seasonality in non-agricultural employment are due primarily to greater seasonality in all industries in Newfoundland, not to a greater preponderance of seasonal industries in the province's industrial structure. Finally, the relationship between seasonality and unemployment insurance, in addition to the relative earnings corollary, were examined using OLS regression analysis. The results emanating from this exercise proved to be quite diverse (i.e. between regions and across industries). More importantly, the results were subject to certain qualifications which precluded the derivation of any substantive conclusions.

FOOTNOTES

1 The terms of seasonal pattern, seasonal variations, seasonality and seasonal unemployment are used interchangeably throughout this paper.

2 See B. Geiger, et al. (1980).

3 T. Courchene (1978). Unemployment insurance and its supposed impact on the amplitude of seasonal fluctuations in employment is addressed in detail in a later section of this chapter.

4 For a more detailed discussion see S. Kuznets (1933).

5 The discussion in this and preceding pages has ignored such institutional features as monopoly power and vertical integration which could conceivably affect the timing and magnitude of seasonal fluctuations. Our analysis is presented within the context of the numerous interrelationships between economic agents within Canada. Clearly, if we include the connections between countries the discussion will become awkward since such connections are numerous and unique as climatic conditions, buying and building habits, government policies, etc., usually vary to a greater degree between countries as opposed to within a country. These particular exclusions will not, however, alter the substance of our discussion; namely that seasonal variations permeate virtually every aspect of economic life and give rise to unused or under-utilized resources.

6 In very simple terms, in order to attract labour relatively higher wages per week must prevail in seasonal industries to annual incomes in seasonal work that is similar to annual incomes in full time employment.

7 For further discussion along these lines see, Department of Labour, (1960), Kuznets, (1933), Dagum (1979) and Smith (1968).

8 Geiger, et al., (1980).

9 Conversely, technological developments which culminate in a shift in operation from winter to summer will serve to widen seasonal fluctuations in economic activity. For example, the logging industry has witnessed a shift in operations from winter to fall in response to the increased use of trucks and tractors.

10 The substance of the two previous paragraphs was borrowed largely from Smith, (1968), pp. 201-203.

11 See, for example: Department of Labour, (1960), Hardy (1972), and Dawson et al., (1975).

12 Lovell (1963) has shown that regressing the original series on a proper set of independent variables is commensurate to any statistical method of seasonal adjustment possessing particular desirable properties.

13 See Shiskin, et al., (1967).

14 Dagum (1980).

15 Smith, (1968), p. 193.

16 The term seasonal component is used here in the context of the actual number of seasonally unemployed.

17 The month of zero seasonal unemployment was identified by examination of the monthly seasonal factors of unemployment.

18 The mean of the monthly seasonal factors is equal to 100 when expressed in percentage terms.

19 See Denton and Ostry (1964, p. 26), Denton (1966, p. 21) and Beaudry (1976, p. 2).

20 The observed minimum (maximum) deviation varies in both timing and magnitude from year to year. Consequently, to obtain a more precise estimate of the seasonal level for the intervening months, the corresponding minimum (maximum) deviations for these months were obtained through linear interpolation. For a diagrammatic representation of the above see Beaudry (1976, p. 3).

21 Statistics Canada (1976).

22 Statistics Canada (1973).

23 The estimates of employees by province and industry were secured from various sources; namely,

1) Employment, payrolls and manhour surveys;
2) Employment sample surveys;
3) Other employment surveys; and
4) Labour Force Survey.

24 See Hinton (1976). It should be noted that the definitions of employment vary between the two sources. Whereas the LFS asks an individual whether he worked during the reference week, the Estimates of Employees queries the establishment about the number of individuals that received payment for working. It is expected that the LFS estimates will yield a slightly higher level of employment.

25 In a recent study by Statistics Canada (1978) the desire for work of individuals not in the labour force during the month of March 1978 was examined. In Newfoundland (the rest of Canada) approximately 20 (155) thousand of the persons not in the labour force and that had worked in the previous twelve months, expressed a desire and were available for work. Moreover of those that expected to return to their original employers within six months, approximately 37 (49) per cent had not bothered to seek work in the past twelve months in Newfoundland (the rest of Canada). These results confirm to a certain extent both statements made above.

26 Unadjusted data was used in this exercise.

27 The calculation is identical to that of unemployment.

28 The industries that have experienced an increase in the magnitude of seasonal fluctuations are finance, insurance and real estate and public administration in Newfoundland, while the above industries and community, business and personal services have increased in the rest of Canada.

29 In 1976 total production and salaried employees in the fish-processing industry was 5,777 and 13,791 in Newfoundland and the rest of Canada respectively. This translates into 39.5 per cent of total manufacturing employment in Newfoundland as opposed to less than 1 per cent in the rest of Canada. These numbers were obtained from the Census of Manufacturers, 1976 (Cat. No. 32-216). The data for Newfoundland are underestimated since not all fish plants in the province are included. Also, it should be noted that the data are an average over the fiscal year beginning April 1st and ending March 31st.

30 See Geiger et al. (1980).

31 It should be noted, however, that spending will not fluctuate to the same extent as employment given the presence of unemployment insurance. The stabilizing role of unemployment insurance probably accounts for the relatively mild seasonal fluctuations in the trade industry since individuals that become seasonally unemployed are not without a source of income.

32 The seasonal level for total non-agricultural employment is equal to the sum of the industry seasonal levels. It should be noted that the seasonal level of total non-agricultural employment would not be equal to the industry sum had it been calculated separately. This is not surprising since the seasonal peak and trough months vary between industries and are in some cases offsetting. Hence, the total non-agricultural series will reflect this through the averaging processes of the seasonal adjustment procedure. The seasonal level of non-agricultural will, therefore, render a number which is less than that obtained when summed over the nine industry groups. We do not expect this anomaly to alter the general nature of our results.

33 It is possible to determine the contribution of each industry to the total intra and inter-industry effects. Recall, for example, that the intra-industry effect is equal to $\Sigma\Delta a_i b_{ir}$. Therefore, $\Delta a_i b_{ir}$ represents the contribution of a particular industry, and when expressed as a ratio of the total effect we have the relative contribution of the industry. For the 1961-1978 period, we find that the differences in the extent of seasonality in the manufacturing industries between the two regions accounts for approximately 63 per cent of the total intra-industry effect. On the other hand, differences in the share of total non-agricultural employment in the forestry and construction industries account for 66 and 47 per cent respectively of the total inter-industry effect. The manufacturing industry accounts for -74 per cent of the total inter-industry effect reflecting the relatively small share of manufacturing employment in total non-agricultural employment in Newfoundland.

34 This is sometimes referred to as dovetailing. See O'Connor (1961).

35 It would be equally plausible to have individuals employed year-round seek work in seasonal industries.

36 See O'Connor (1962); Smith (1965); Feldstein (1976) and Kaliski (1976).

37 A nonexperienced-rated unemployment insurance scheme is one in which employers do not bear the full cost of the periods of unemployment experienced by their employees.

38 See, for example, Denton et al. (1975), Dawson et al. (1975) and Kaliski (1976).

39 The deviation of employment from its long-run trend represents the anti-logs of the residuals obtained from regressing the natural logarithm of employment on a time trend variable. At the industry level, the cyclical variable is the deviation of employment of the industry in question from its long-run trend.

40 It should be noted that due to data limitations, our analysis is limited to examining the effects of the 1971 and 1977 revisions in the UI Act as opposed to studying the effect of the initial introduction of unemployment insurance.

41 The maximum weekly benefit payable was thereafter subject to indexation in accordance with an average annual earnings index. In addition, unemployment insurance benefits became taxable in 1971.

42 Prior to 1971, the minimum number of required insurable employment weeks was equal to thirty of which eight were required in the year immediately preceding the receipt of benefits. The corresponding benefit entitlement weeks was equal to fifteen. Following the 1971 amendments, eight weeks became the required minimum contribution, with which an individual could receive up to forty-four weeks of benefits.

43 Specifically, the minimum contribution weeks were increased and became inversely related to the regional unemployment rate. The corresponding entitlement weeks were reduced as well and became dependent primarily upon the regional unemployment rate. For a detailed description of these and prior amendments, see: Statistical Report on the Operation of the Unemployment Insurance Act (Cat. No. 73-001), various issues.

44 The estimate of the UI tax rate is an average for the 1973-1975 period as estimated by J.E. Cloutier (1978). Table 13, p. 40.

45 This variable is without a doubt an extreme representation of the generousity of the UI program. In addition, it could be argued that the inclusion of a UI benefit/average weekly earnings variable to represent the relative cost of becoming unemployed is warranted. A variable of this nature is subject to various shortcomings (See Kaliski, 1975), some of which are specifically related to the use of aggregate data. Although a benefit/wage variable is a theoretically legitimate variable to include, it is obviously affected by the composition of the unemployed in terms of the distribution of wages. Therefore, the average weekly wages of the unemployed "group" would be most relevant, but data of this nature is not available at the aggregate level.

46 In 1975 Newfoundland fish landings were at their lowest (222,989 tons) in more than twenty years, while employment in fish processing plants was at its lowest level (4,344 man-years) since 1967. B.C. Bursey, 'Economic Growth and Development in Newfoundland,' Volume IV, Economic Council of Canada, mimeograph, 1980, p. 191 and 225.

47 As is the case in most aggregate time series analysis a great degree of collinearity prevail between the independent variables which makes a precise estimate of the coefficients a very difficult task. Furthermore the use of additional observations could substantially alter the "goodness of fit" and the magnitude and size of the coefficients.

48 The inclusion of a quadratic trend in the MSFV forestry equations for Newfoundland and the rest of Canada, served to substantially improve the goodness of fit for the former region with little change occurring for the latter region. The Newfoundland equation is as follows:

$$\underset{}{MSFV_t} = \underset{(18.0)}{29.5} - \underset{(-2.0)}{2.7Cyc_t} - \underset{(5.0)}{.718T} + \underset{(6.4)}{.051T^2} + \underset{(1.1)}{.002UI_t}$$

$\bar{R}^2 = 848$ S.E.E. = .648 D.W. = 1.11 $F_{stat} = 24.7$

49 The UI variable is identical to that used in the previous specification.

50 The equations were estimated with the independent variables expressed in relative terms as well, but with little success.

51 Smith (1965) p. 195.

52 Dawson et. al., (1975) pp. 53-54. In addition it is pointed out that as a result a great deal of skepticism arises concerning the actual degrees of freedom in the analysis.

53 Kaliski (1976) p. 708.

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