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THE DIMENSIONS OF "UNEMPLOYMENT IN CANADA:" A SPATIAL ANALYSIS

by

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CHAPTER I

INTRODUCTION

The problem of regional disparity in the Canadian economy is one of great concern both socially and economically, as well as politically. In Canada, the regional disparities are particularly obvious with the relatively prosperous regions being concentrated in the southern parts of Ontario, Quebec, Alberta, and south-west British Columbia while relatively depressed regions are especially prominent in the Maritimes, Northern Ontario and Quebec, parts of the Prairies, and south-east British Columbia.

One aspect of the problem is the very high and volatile unemployment rate in the relatively depressed regions, which has been contributed to by the retarded growth of those regions and by increasing regional disparities of income (Brewis, 1969, chapter 5).[*1] In fact the distribution of unemployment shows a striking regional pattern similar to the pattern of per capita incomes, with the per capita incomes of Ontario and British Columbia being well above the Canadian average and the Maritimes being well below (Denton, 1966, 1).[*2]

It is clear that large differences in unemployment levels among the regions of a system will give rise to a waste of resources and to serious social problems as well (Brechling, 1967, 1).[*3] The regional patterns of unemployment and per capita income indicate that this problem does exist in Canada, and it has had serious repercussions on

migration, Federal-Provincial relations, and the economic welfare of the people (Brewis, 1969, 84)*4. In some areas, manpower will be under-utilized resulting in some combination of a loss in earning power, a lower average disposable income, a lowering of the standard of living, and a net outmigration, often of the young and highly skilled. This is the case in many parts of the Maritimes. In other areas where unemployment levels are very low, labour shortages in key sectors of the economy may occur, causing production bottlenecks and contributing to inflationary pressures. Furthermore, the wealth of the nation will tend to flow to the well-off areas at the expense of the less well-off areas.

An obvious solution to these problems, and one which is advocated by most Federal governments, is to reduce the differences in unemployment rates between regions and to promote stability in regional economies. This is often attempted through expansionist, macro-economic fiscal and monetary policies which are designed to stimulate the economy and increase aggregate demand (Ostry and Zaidi, 1972, 127)*5. Many economists today believe that the volume of employment is uniquely correlated with the volume of aggregate demand and that to maintain high levels of employment, the nation must maintain high levels of spending (Peitchinis, 1970, 265)*6. This is largely because business cycle theory is essentially Keynesian in nature (Montague, 1970, 134). According to Keynesian economic theory, a contemporary view of post war unemployment can be described as follows:

> "The demand for goods and services does not always keep pace with the expansion of the labour force and

> the rise in output per man. Firms therefore lay off employees and fail to hire new members of the labour force at a sufficient rate. The result is a pool of potential workers who are unable to find jobs. Only policies to increase the growth of demand can create the jobs needed to absorb the unemployed" (Feldstein, 1973, 5).

However, serious doubts have recently been raised about the responsiveness of unemployment rates to changes in aggregate demand and the use of macro-economic policies in general as a solution to the problem. These doubts have arisen through failures of macro-economic policies to reduce the regional unemployment rates in many countries.

Since 1944, government policy in England has been concerned with reducing the large differences in unemployment rates between regions (Thirwall, 1966, 205) presumably by lowering the levels of unemployment in high unemployment regions. Thirwall (1966, 206-7) has measured the dispersion of regional unemployment rates by calculating the standard deviation of their distribution about the national unemployment rate for specific time periods. A decrease in the standard deviation over time indicates a lessening of the differences in unemployment levels between regions. He found that the high unemployment areas of the 1940's were still the high unemployment areas of the 1960's, and that differences in regional unemployment rates have shown no long term tendency to decrease.

An identical situation exists in Canada. In Canada attempts here to reduce regional disparities have ~~also~~ failed. There has been little or no change in differences in earned income levels between regions since the 1920's, and differences in unemployment rates between regions have

remained surprisingly constant since World War II (Denton, 1966, 5; Brewis, 1969, 24). The failure is in part due to the fact that fluctuations in the national unemployment rate are associated with unequal changes in unemployment rates in different parts of the country (Thirwall, 1966, 205) and the existence in the labour force of groups with critically different demographic characteristics (Feldstein, 1973, 7-9). The change in a region's level of unemployment in response to a change in the national unemployment rate will vary from region to region, depending on the following factors.

First of all, unemployment variations in response to cyclical fluctuations are a function of the industrial composition of the region and the spatial structure of the system of regions. Jeffrey (1970, 27) summarizes this concept as follows:

> "The local level of economic activity over time is seen as a product of national impulses, the impact of which is determined by the structural features of the local economy, and regional impulses which are transmitted through the system via hierarchical and internal linkages."

Regions with similar industrial compositions, but widely differing locations within the nation, or regions located within a subregion of the nation but possessing different industrial structures, can be expected to respond differently to national cyclical and regional economic impulses. The national cyclical impulses are the ones produced by the Federal fiscal and monetary policies including those formulated to reduce levels of unemployment.

Secondly, the demographic composition of the labour force will differ between regions. Swan (1972, 374) points out that the short run

elasticities of demand for various types of labour will differ, and regions with different proportions of these groups will have different average elasticities of demand for labour. The elasticity will depend on such factors as age structure, the types and levels of skills, the level of education, and again the industrial composition of the region. Variations in unemployment rates in response to cyclical fluctuations will vary from region to region as each region will have a different sensitivity to fluctuations in national unemployment levels and changes in aggregate demand.

When the national unemployment rate approaches the level considered by the Federal government to be full employment (about 3%), Denton (1966, 5) estimates that the unemployment rate for Ontario would fall to 2%, to between 2 and 3% in the Prairies and British Columbia, but would remain at a high 4.5 to 5% for Quebec and the Atlantic Provinces respectively. Some regions will suffer strong inflationary pressure on their labour markets, while others will suffer structural unemployment when the pressure of the increase in national aggregate demand does not drop their unemployment rates to a level coincident with that of full employment (Kaliski, 1968, 552). Even in times of high aggregate demand when unemployment is reduced to a low level nationally, extensive areas of the country will still suffer from high levels of unemployment and disparities in income. When the national unemployment rate rises, the differences between regional unemployment rates increase.

It appears that the unemployment rate cannot be treated as a homogeneous variable from the point of view of policy making as is

traditionally done. It is clear that the cyclical behaviour of the regions, the spatial pattern of regional economic interaction within the national system, and the characteristics and nature of unemployment must be understood before any attempt is made to develop policies on the problem of regional disparities.

The primary concern of this paper is to identify and compare the nature of and variations in unemployment levels among the regions. This will be done taking into account the nature and characteristics of unemployment. Because the study is concerned with regional unemployment, it is also necessary to identify the economic characteristics of the regions involved and the spatial pattern of economic interaction between them. A model developed by Brechling (1967) will be used for this purpose. As such, this type of study can provide a base from which to begin understanding the effectiveness of policies designed to lower regional unemployment levels as a step in reducing the economic disparities between regions in the Canadian economic system.

The analysis will be carried out using multiple regressions to decompose time series data on unemployment for 33 regions and 9 cities. Three components of regional unemployment will be estimated statistically and their contribution to the problem of regional unemployment determined.

The national cyclical component reflects the level of economic activity in the nation as a whole. The structural component is attributable to long-term non-cyclical characteristics of the regional economy and as such shows long term dislocations and trends in labour market

functioning in that particular region. The regional cyclical component, also specific to a region, shows the effect of regional cyclical impulses being transmitted through the system of regions. Regional cyclical impulses arise through the differential impact of national fiscal and monetary policies on the economic structures of the regions in the system and the effects of the differential impacts which are then transmitted to neighbouring regions via import-export linkages.

Although the demographic characteristics of the labour force are an important part of any such study, data are not available at the regional scale used in this analysis, but are available only at the 5 region level (the Atlantic region, Quebec, Ontario, the Prairies and British Columbia). Some general statements about the effect of the labour force characteristics on regional unemployment rates can be made and will be incorporated in the analysis.

The conceptual framework of the study is outlined in Chapter II and indicates the way in which the national cyclical, structural, and regional cyclical components are related. The origins of the corresponding impulses which produce these components, and the manner in which the impulses are transmitted is specified.

Chapter III contains a description of the types of unemployment and presents a model which is based on these types of unemployment and the cyclical impulses outlined in Chapter II. This is followed by a description of the data and regions used in the study.

The model specified in Chapter III is used to statistically derive the three major components of regional unemployment. The

parameters of the national cyclical, structural, and regional cyclical components will be evaluated in Chapters IV, V, and VI respectively.

Finally, some conclusions and some implications for Canadian economic policy will be presented in Chapter VII.

CHAPTER II

THE CONCEPTUAL FRAMEWORK

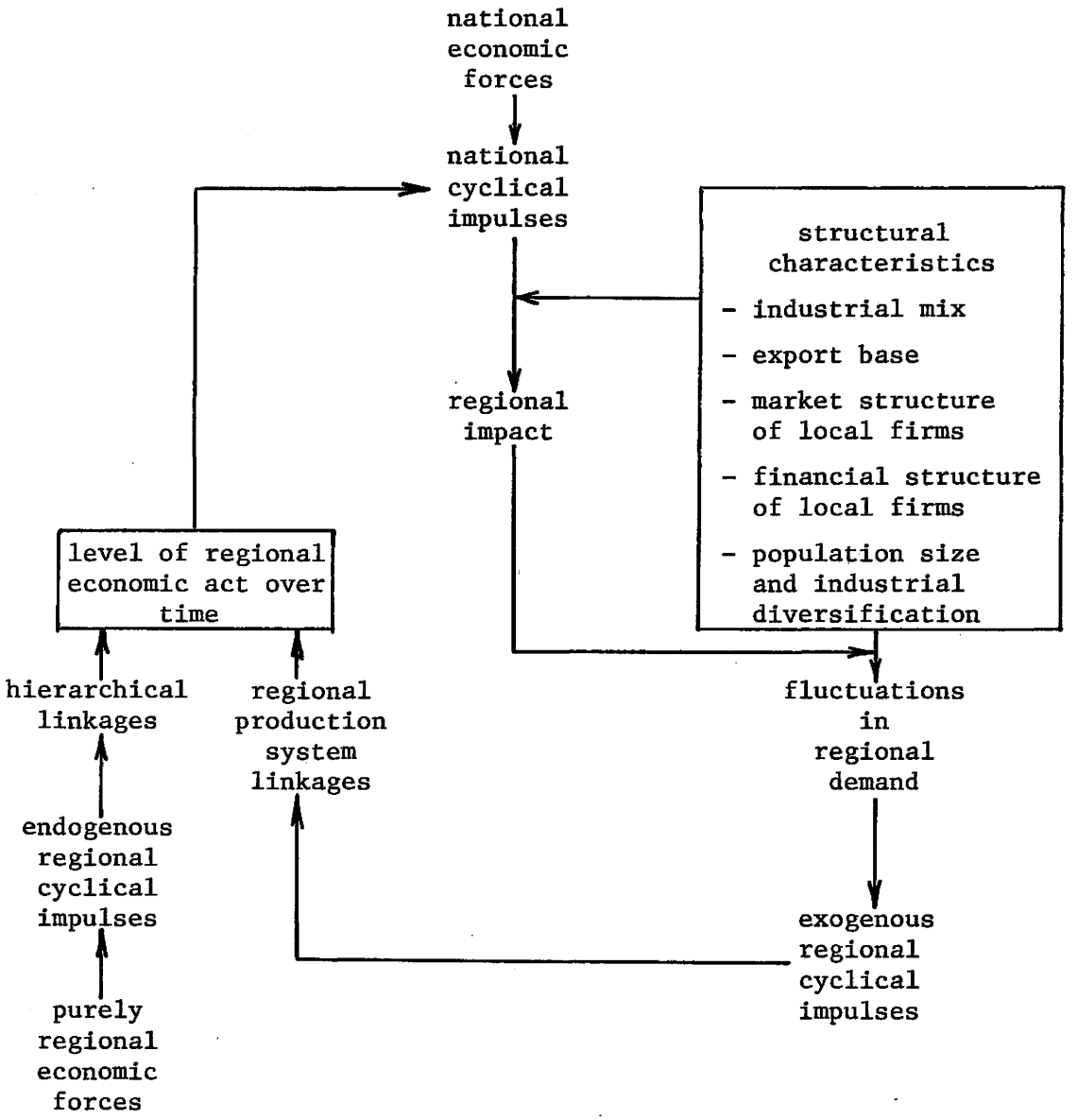
Previous work on business cycles and regional economic interaction has been done by Vining (1946a; 1946b; 1949), Brechling (1967), Casetti, King and Jeffrey (1971), and Sant (1973) among others. From their work it is possible to outline the basic ways by which cyclical impulses are transmitted through a system of regions.

In this chapter a conceptual framework of the way national and regional cyclical impulses influence the levels of economic activity and unemployment within a system of regions will be outlined. The conceptual framework was developed by Jeffrey (1972) and relevant parts are presented below and in Figure 1.

One of the important features of this type of framework is that it provides a link between business cycle theory and regional systems analysis. Industrial mix, export base and interregional multiplier models focus on tangible economic flows. Some of the limitations of these static equilibrium models can be avoided by the use of business cycle theory. Isard (1960, 220), and Jeffrey (1970, 7-18) discuss these limitations. Business cycles implicitly include the effects of interregional industrial and financial linkages and show the dynamics of regional change. They take into account leads and lags and assymetrical responses to given conditions of development (Sant, 1973, 1). The framework also includes a spatial dimension by illustrating regional

Figure 1

The Interaction of National and Regional Impulses and Their Effect on the Regional Economy



(Jeffrey and Webb, 1972, 143)

variations in the response to cyclical fluctuations. Special emphasis will be placed on the national cyclical impulses which are considered to have the greatest effect on regional unemployment levels (Sant, 1973, 4).

A system of regions is proposed such that regions differ in industrial structure and export base characteristics. Spatial links between the regions exist due to the structural links between economic activities within the system. Isard (1960) suggests that basically two types of short run economic impulses can be introduced into the system. National cyclical impulses generally act through the industrial structure or industrial mix of the regions and affect regions simultaneously. Regional cyclical impulses arise from particular regional responses to the impact of national cyclical impulses on local levels of economic activity and act mainly through interregional and regional multipliers producing both direct and indirect effects. Regional cyclical impulses can also arise from purely local phenomena.

National Cyclical Impulses and Industrial Structure

National cyclical impulses arise from forces which include changes in national fiscal or monetary policy, in consumer savings patterns, in business investment policies, in export demand, and in prices. These forces ~~are largely aspatial and as such,~~ act in a fairly uniform manner throughout the nation, but ~~differentially~~ affect ~~various~~ segments of the economy differently. The resulting impulses cause fluctuations in income and employment that will differ in intensity and possibly in timing between regions, depending only on the structural characteristics of the region. These fluctuations in turn will cause fluctuations in demand which will

differ in nature and intensity between regions and produce the regional cyclical impulses, to be discussed later in this chapter.

Structural characteristics of a region include features such as the industrial mix, the market structure of the region's major industries, the degree of industrial diversification, the rate of growth of its industries, and the demographic characteristics of the region's population and labour force. Because the industrial structure is specific to each region, the effects of national cyclical impulses will be specific to each region in terms of timing and amplitude.

Timing depends mainly on the marginal propensities of the other regions to import the goods produced by the carrier industries of the region in question where the carrier industries are those industries with markets outside their home region. This produces a lagged effect on changes in income and employment in the other regions and has a greater significance in the discussion of regional cyclical impulses below.

In a modern economy, the effects of national cyclical forces tend to diffuse quickly. Today's rapid circulation of information allows businessmen to anticipate changes in demand so that the expected transmission of economic impulses substitutes for their real transmission (Sant, 1973, 5). As a result, regional fluctuations due to national impulses, and especially employment fluctuations, will tend to be rather uniform in timing.

The amplitude of the fluctuations in regional unemployment levels due to national cyclical impulses, will exhibit greater variation between regions being a function of the region's industrial structure. Several characteristics of regional industrial structure will be

discussed here in a general sense. These characteristics will be used in the analysis of the national cyclical component of unemployment in Chapter IV. They will aid in explaining the effect of the impact of national cyclical impulses on the levels of unemployment in specific regions. These effects are outlined below.

The industrial mix of a region can be considered as the most important characteristic of a region's industrial structure. For example, industries with high income elasticities of demand for their products will be the most sensitive to national cyclical impulses. Primary industries, and investment and consumer durables industries tend to have high income elasticities of demand, and regions with a large proportion of these cyclically sensitive industries will tend to be sensitive to national cyclical fluctuations.

Borts (1960, 181) points out that supply considerations are important as well. Short run declines in demand due to a national business recession may make production impossible for unproductive firms, while progressive firms may be able to remain in business and cover some of their fixed costs. This can be extended to the interregional case where interregional variations in production and transportation costs will cause the average and marginal cost curves to vary between firms in the same industry in different regions (Jeffrey, 1970, 24). Regions dominated by groups of unprogressive firms will tend to be more susceptible to national cyclical impulses and will be, therefore, more cyclically unstable than regions dominated by progressive firms.

The amplitude will also be effected by the market structure of the region's major industries. Thompson (1965, 150) states that in a

highly competitive industry, the fall in demand and consequent impact on production and employment will be lessened by price reductions. If the industry is oligopolistic, prices may remain constant in a recession and the full impact of decreased demand will be met by decreases in production and employment. This point is stressed by Sant (1973, 12) and has important implications for some Canadian regions which specialize in a few natural resource products. Agricultural areas are an exception as this industry is fairly competitive and the demand for its products is relatively inelastic.

The degree of industrial diversification also affects the amplitude of regional cycles. The more diversified the industrial mix, the more the cycles of the various industries will tend to balance out, making the cyclical fluctuations of the region more closely resemble those of the nation (Isard, 1960, 183; Thompson, 1965, 147-148). #22 Regions with a highly diversified industrial mix will tend to be cyclically stable, but only if there are few structural links between the industries within that region.

Another factor affecting the timing and amplitude of regional cycles is the rate of growth of the region. #23 Isard (1960, 185) notes that regions with high growth rates suffer the same economic contractions in general and at the same time as the rest of the country, because new investment is sharply reduced everywhere. However, high growth areas recover more rapidly during the recovery period as new investments and expansions are most rapid in these areas. #24 Sant (1973, 13) found that the regions with the most stable industrial composition and the highest growth rates, would be the first to return to high

#25

levels of employment. Borts (1960) found that states in the U.S. with actual growth rates increasing over time had less cyclical amplitude than their industrial composition would suggest due to cost characteristics which stimulate growth. States with decreasing actual growth rates over time had more cyclical amplitude than their industrial mix would suggest due to the appearance of unprogressive firms, high cost production facilities and local cost characteristics which inhibit growth at the old rate and increase cyclical amplitudes.

The demographic and occupational characteristics of the region will also affect the region's response to national cyclical fluctuations. Vining (1949, 102-3) and Sant (1973, 12) have pointed out the importance of the demographic composition of the region in terms of its effect on fluctuations in demand, interregional trade and unemployment. In general, workers in construction, consumer durable and durable manufacturing industries will be the most sensitive to cyclical economic fluctuations. This also applies to the primary industries, with mining and forestry being more sensitive than agriculture. Service, light manufacturing, and consumer non-durable industries are least affected by cyclical fluctuations as the demand for their services and products is relatively inelastic. Because of the high fixed costs associated with them, skilled workers (some manufacturing, clerical, professional, service) will be relatively insensitive to cyclical fluctuations while semi-skilled workers will have more unstable unemployment rates. The high fixed costs are primarily training and recruitment costs, with the greater the skill, the greater the fixed costs. In a recession, the most skilled workers will generally be retained in order to protect the

investment in them and to avoid recurring these fixed costs in the next economic upswing. The less skilled workers, who are more easily recruited and trained, will usually be the first to be laid off.

These factors will also affect the duration of unemployment. It will tend to be longest for construction and primary occupations and unskilled workers, and shortest for agricultural and service occupations and skilled workers (Ostry and Zaidi, 1973, 140-142). The greater the duration of unemployment, the higher will be the regional unemployment rate.

These demographic and occupational characteristics have an important influence on fluctuations in income and unemployment due to the different preferences, employment skills and mobilities of the various labour force groups. Regions with large concentrations of very young or old, unskilled workers in primary industries can be expected to have high, fluctuating unemployment rates. Regions with concentrations of middle-aged, skilled workers or managers in service and consumer nondurables industries will tend to have stable, low levels of unemployment.

Regional Cyclical Impulses

Two types of regional cyclical impulses are postulated by Jeffrey (Jeffrey and Webb, 1972). Exogenous regional cyclical impulses arise in response to the changes in demand produced by the national cyclical impulses. This type of impulse will be transmitted to other regions and industries via import-export linkages, or as Jeffrey calls them, regional production system linkages. This type of impulse will have both direct and indirect effects. These effects have been outlined by Vining (1946a, 213-14) who describes the interregional transmission

of cycles in terms of Keynesian income analysis, as part of a region's income arises from exports and foreign investment. The result is a multi-regional circular flow system with equilibrium levels for all its parameters. The direct effects of the regional cyclical impulses will be felt through changes in the expenditures on the exports of other regions. The indirect effects will be felt through changes in expenditures on the residentary industries of the region, and then in the exports of the other regions in the system.

Endogenous regional cyclical impulses are created by purely regional economic forces which arise from regional phenomena such as a local strike, a plant closing, or a natural disaster. They too will have both direct and indirect effects, but are expected to be transmitted via hierarchical linkage within regional subsystems.

A description of the transmission of regional cyclical impulses and their effect on the local economy is found in Sant (1972, 3-12).

The Transmission of Regional Cyclical Impulses

The effect of transmitted changes in income and expenditures can be shown by using the following equation which includes an interregional trade multiplier:

$$\Delta Y = \Delta(I - Mi + Ei + Ec) \cdot \frac{1}{(1-c')(1-q')}$$

where ΔY represents the change in regional income, I is the value of final products attributable to investment expenditures, Mi is the value of imported investment goods, and Ei and Ec are the values of exports of investment goods and services. The remaining term is the inter-

regional multiplier where the denominator is the marginal propensity to import goods and services. The c' and q' terms depend on the change in total consumption expenditures, so that

$$c' = \frac{dC}{dY}$$

and

$$q' = \frac{dM_c}{dC}$$

where c' is the marginal propensity to consume and q' is the marginal rate of change of imports of consumer goods (dM_c) with a change in total consumption (dC). More complete discussion is given in Vining (1946a, 213-14).

The impulses with indirect effects will first be modified by the regional multiplier. There will be a change in the other regions' expenditures for the exports of a given region. This will cause changes in the levels of production and employment in the carrier industries of that region. The resulting change in regional income will act through the regional multiplier to produce an identical cyclical pattern in the passive industries of the region. The passive industries are those industries whose markets are solely within their home region.

The regional multiplier can be thought of as a ratio of employment in the carrier industries to employment in the passive industries. The larger this multiplier, the greater will be the fluctuations in regional income and employment with a given change in demand for the products of the carrier industries, and the more cyclically unstable will be the region's economy. Furthermore, the more sensitive a

region's carrier industries are to national cycles, the greater will be the region's economic fluctuations and instability. Typical of these characteristics are primary resource regions, or regions highly specialized in one or two types of goods.

The economic changes in the region, transmitted from the rest of the nation by that region's carrier industries, and having a direct effect on the passive industries of the region, will result in a change of income and therefore a change in expenditures on the exports of other regions. This indirect effect will act through the interregional multiplier equation outlined above, and the resulting cyclical impulse will act in the same manner as the one produced by the direct effect.

The Spatial Aspect of the Framework

It has already been shown that the national cyclical impulses will act in an aspatial manner. The spatial aspects will however, be significant for the transmission of regional cyclical impulses. Vining (1949, 102) found that two structurally identical regions may have different responses to economic changes because they export goods to markets with different structural characteristics. At the same time, Vining (1946b) believes that two regions with similar industrial structures and similar markets will behave in a similar manner, in terms of regional cyclical fluctuations. Jeffrey (Jeffrey and Webb, 1972, 142) uses the hypothesis that regions with similar short term regional cyclical fluctuations are exposed to similar forces through close interindustry and financial linkages. Isard (1960, 219) goes one step further by stating that contiguous groups of regions may have similar cyclical fluctuations and that different groups of regions will respond

differently to national cyclical impulses. This would be indicative of spatial links between the economic activities of groups of regions and would imply a distance-decay relationship.

In order to determine whether this has an effect on the unemployment rates of regions within such sub-systems, an attempt will be made in Chapter VI to define regional sub-systems within the Canadian regional system. If there has been an effect, it will be especially obvious where a region with an industrial structure different from its surrounding regions exhibits similar fluctuations in its regional cyclical component of unemployment, even though a different response would be expected, given its industrial structure.

Implications of the Conceptual Framework

If the values of the parameters of the regional multiplier expression differ among regions, then there will be regional variations in the transmission of changes in income, demand, and employment. Unfortunately the values of many of the parameters are difficult to calculate so that this type of model is important mainly in a qualitative sense. However, Vining did find by developing the qualitative aspect of the interregional multiplier that the ratio of the marginal to average multiplier gave a measure of the region's cyclical stability. The ratio is

$$\frac{(1-p)(1-q)}{(1-p')(1-q')}$$

where p is the average propensity to consume ($p = \frac{C}{Y}$), q is the proportion of local consumption expenditures accounted for by imports of consumer goods ($q = \frac{M_c}{C}$) and p' and q' are as defined previously, i.e.,

marginal propensity to consume and the marginal proportion of local consumption accounted for by imports of consumer goods.

In terms of a region's stability, the following ideas have been put forward (Vining, 1946a, 214; Jeffrey, 1970, 16).

1. The more a region depends on other regions for consumer goods, the greater will be q, and the greater will be the relative change in income and employment in response to a change in net investments and exports.
2. The less a region's short run income elasticity of demand for imported goods and services (Mi) the less will be q', and the greater will be the relative changes in income and employment in response to a change in net investments and exports.
3. The greater the income elasticity of demand of <u>other</u> regions for that region's exports (Ei and Ec), the greater the relative change in the region's net investment plus exports in response to a given change in national income.

From the preceding discussion, the conceptual framework can be summarized. National cyclical economic forces produce national impulses. These impulses differentially effect the carrier industries of the regions in the system producing fluctuations in income and employment in those regions. The fluctuations vary in amplitude and timing, depending on the structural characteristics of the regions. This results in fluctuations in demand, which vary in nature and amplitude among the industries and regions of the system. Because of the

differential nature of the response, certain industries in certain regions will be most heavily affected.

The resulting changes in the affected industries will be passed to other industries and regions via regional production system (import-export) linkages using the carrier industries as the mechanism of transmission. From interregional and international trade theory, it is expected that the strength of the economic linkages may exhibit distance decay characteristics. The effect of these exogenous regional cyclical impulses will be felt directly through changes in the expenditure on the exports of other regions, and indirectly through changes in the expenditures on passive industries in the home regions and then in the industries of other regions of the system. Ignoring spatial considerations, the linkages will be strongest between regions specializing in similar or complementary production activities.

At the same time, exogenous regional cyclical impulses will arise from purely regional cyclical forces. They will act through hierarchical linkages to affect regional levels of economic activity and may indicate regional sub-systems by their distinct cyclical patterns of response to the regional impulses acting through the sub-system's hierarchy.

CHAPTER III

THE MODEL

This chapter of the paper will first describe the various types of unemployment and their effect on the unemployment rate. The model used in the analysis is presented then and this is followed by a description of the data and regions employed in this study.

Types of Unemployment

It was previously suggested that macro-economic policies alone had failed to reduce unemployment levels. Part of the problem arises from treating the unemployment rate as a homogeneous variable from the point of view of policy making. Lazar and Donner (1972) state that the unemployment rate can be disaggregated into frictional, structural, seasonal and cyclical components to provide points of demarcation between the operation of general fiscal and monetary policy, and the operation of specific manpower programs. The first three components are considered to be caused by dislocations in labour market functioning; a mismatching of the demand and supply for labour. Cyclical unemployment, on the other hand, arises from inadequacies in short term demand. Among these types of unemployment there are important differences which cause them to respond to economic policies in dissimilar manners.

Frictional unemployment is short term unemployment, usually less than six weeks in length, and represents normal labour force adjustments

to market conditions. It results from the fact that the labour force is not instantly adaptable. The frictional unemployment rate can be considered as fairly constant over time with the Canadian rate being about 2.2 percent (Donner and Lazar, 1971a,1).

Structural unemployment is long term unemployment greater than six weeks in duration and is due to changes in consumer tastes, in technology, and in the spatial distributions of population and industry. The result, depending on the industrial structure of the area, the skill-mix of the labour force, or the size of the regional multiplier, is a mismatching of the demand and supply of labour for particular occupational groups in specific regions because the labour forces of those regions are unable to respond to the changes quickly enough. This increases the disequilibrium between the supply of, and demand for labour within the economic system. Structural unemployment is considered by many economists to be independent of the level of aggregate demand and they believe that an expansion of economic activity will not appreciably lower the level of structural unemployment (Kaliski, 1968; Kaliski, 1969; Donner and Lazar, 1971a). In the 1960's the level of structural unemployment in Canada was estimated at between 2.3 and 3.4 percent of the labour force (Donner and Lazar, 1971a, 10).

Seasonal unemployment usually results from marked climatic changes causing changes in production, or in demand. When inventories cannot be built up during times of low demand because the supply of the raw material is seasonal, or because the goods cannot be stored, then workers in affected industries will be laid off at those times of the year. Seasonal unemployment is fairly insensitive to changes in

aggregate demand and the unemployment rate attributed to it is about four percent in winter (Peitchinis, 1970, 260).

Cyclical unemployment is responsibe to changes in aggregate demand and in fact arises because of the short run inadequacies in aggregate demand produced by business cycle fluctuations. Different industries, occupational groups and skill groups will react in a dissimilar manner to economic policies which rely on changing aggregate demand to lower the unemployment rate.

The Model

Following the work of Brechling (1967), and Jeffrey and Webb (1972) a model of regional unemployment levels can be presented which incorporates the major types of unemployment and the transmission of economic impulses described in Chapter II. Linear regression techniques are used to serially decompose regional unemployment data into four types of unemployment. Seasonality effects are removed by the use of dummy variables, D_1, D_2, and D_3, which correspond to the first, second, and third quarters of the year (Johnston, 1972, 245-60; Suits, 1957, 548-51). The national cyclical, structural, and regional cyclical components of unemployment can then be estimated.

The national cyclical component of regional unemployment is that portion of a region's unemployment which is due to the level of economic activity in the nation as a whole. As such it reflects the effect of national cyclical impulses produced by national business cycles and federal fiscal and monetary policies. The national unemployment rate is used as an index of the level of national economic activity such that:

$$N_{jt} = a_j U_{t+n_j}$$

where N_{jt} is the national cyclical component of unemployment in the j^{th} region at time t,

U_t is the national unemployment rate at time t,

n_j is the length of the lead or lag in months,

and a_j is the elasticity of N_{jt} with respect to U_t.

Although the impact of national cyclical forces is generally uniform over space and time, some regions may lead or lag the nation in response to these forces. The extent of the lead or lag is shown by the n_j term.

The region's sensitivity to national cyclical forces will depend on the industrial structure of the region. Regions whose industrial mix is dominated by cyclically sensitive industries which react to national cyclical forces in a similar manner will tend to have high values for a_j. Values for a_j greater than unity indicate that the region's economic fluctuations are more severe than that of the nation's. If the value for a_j is unity, the region's cyclical fluctuations are equally severe as the nation's as a whole. Regions dominated by cyclically insensitive industries will tend to have values for a_j of less than unity indicating cycles less severe than those of the nation.

The structural component of a region's unemployment rate is caused by a long term disequilibrium between the demand and supply of labour within a region and is specific to the region. It arises from structural economic shifts within the system of regions as described previously.

The degree of structural imbalance within the system reflects the rate at which structural shifts are occurring and the ability of the labour force to adjust (Jeffrey and Webb, 1972, 146). This change can be described by a quadratic time trend which allows the level of structural unemployment to change at an increasing or decreasing rate (Brechling, 1967, 3) and is shown below as

$$S_{jt} = c_j + b_j t + d_j t^2$$

where S_{jt} is the structural component of unemployment in the jth region at time t,

c_j is S_{jt} at t equal 0,

and b_j and d_j are coefficients of the quadratic time trend for region j.

The S_{jt} term measures the degree and direction of structural imbalance within a regional labour market with respect to the national norm.

The regional cyclical component of regional unemployment R_{jt} is produced by economic fluctuations in the industries which dominate the region and it shows the effect of exogenous and endogenous regional cyclical impulses. This component is also specific to the region. Because it is difficult to isolate directly, it must be obtained as a residual from the regression. The R_{jt} term, however, will include random and error elements. If the industrial mix, labour force composition, or degree of frictional unemployment within the region differs greatly from the national norm, unemployment components of these factors will also be included in the regional cyclical component. When the R_{jt} values are positive, regional cyclical forces are acting to produce a

greater level of unemployment locally than would be expected given the national unemployment rate U_t and the opposite holds true for negative values of R_{jt}.

The full model can now be written as follows:

$$u_{jt} = N_{jt} + S_{jt} + R_{jt}$$

$$= a_j U_{t+n_j} + c_j + b_j t + d_j t^2 + d_1 D_1 + d_2 D_2 + d_3 D_3 + R_{jt}$$

where u_{jt} is the unemployment level in the j^{th} region at time t.

It has been previously stated that economic disparities between regions are partly a function of differentials in the level of unemployment between those regions. A reduction in these differentials will tend to reduce the degree of economic disparity between the regions. The ultimate case occurs when unemployment differentials have been reduced to zero, which means that all regions have levels of unemployment equal to that of the nation; and at the same time all have components of unemployment equal to the corresponding national components of unemployment. Then the parameters of the regression equations would have the following values:

$$a_j = 1$$

$$c_j = b_j = d_j = R_{jt} = d_1 = d_2 = d_3 = 0$$

Deviations from these values indicate differences in the level and composition of the unemployment rate between regions. The parameters for each region show the significance of each component of unemployment in that region and allow for a comparison of the nature of unemployment between regions in terms of the national cyclical, structural, regional

cyclical and seasonal components. A better understanding of the composition of unemployment regionally will allow predictions on how regions will respond to various government fiscal and monetary policies.

The Data

The use of unemployment data as indicators of economic activity can be justified in several ways. First of all, unemployment data are available for the small regions and short time periods required by this study. Secondly, unemployment rates show the effect of cyclical economic impulses, given their sensitivity to cyclical performance and changes in aggregate demand, more so than other indicators such as housing starts. Finally, they show the relative responses of regional economies to cyclical economic impulses, including the effect of intangible financial and industrial linkages. It is the relative responses and not the absolute changes in economic activity that are the concern of this paper.

There are some disadvantages to using unemployment data. The figures do not show underemployment or the number of people who are unemployed but not registered as part of the labour force and who would take a job if one existed. Nor does the unemployment rate reflect the effects of the interregional migrations of job seekers.

In spite of these disadvantages, the unemployment rate is still a valuable indicator. Prest (1968, 21) states that unemployment rates are the best single indicator of cyclical performance in the post-war period.

The data used in this study consist of monthly unemployment rates over a 90 month period, January 1966 to June 1973, for 33 economic

region groups, and nine major cities in Canada. The cities are part of the region groups. The time period covers the peak year of 1966, considered to have been one of full employment, and the recession and recovery which followed. Some of the data are available from publications of the Labour Force Division of Statistics Canada (Catalogue 71-001). The unpublished data were obtained from the same office.

The economic region groups consist of one or more economic regions which closely correspond to the 68 region set outlined by Camu, Sametz and Weeks (1964, chapter 10), and described in Methodology (Dominion Bureau of Statistics, 1965).

The economic regions themselves were defined according to several criteria which emphasize the homogeneity and functional completeness of each region. Structural criteria stress the homogeneity of an area, based on a common natural resource. Functional criteria stress the activities and relationships which tie an area together, especially transportation and the single labour market orientation of the area. Local transportation links are the major unifying factor outlining communting areas. Major transport links with the outside specify export connections. Production criteria emphasize the homogeneity of the structure of production and certain functional relationships such as a forest hinterland to a pulp industry. Finally, marketing criteria indicate the structure of internal consumption and marketing relationships with other regions.

The economic regions, as closely as possible, constitute homogeneous areas in terms of their economic structure and labour force, and this will aid in the analysis in the following chapters.

The economic region groups were formed in order to conform to release criteria and this applies mainly to areas with sparse populations and those specializing in primary industries. The economic region groups are shown in Figure 2.

The names of the region groups appear in Table 1. Each name was chosen to best identify the region group. As the city data are also included within the data of its region, it is necessary to treat cities and region groups separately in the following analysis. It is therefore possible to give the city and its region group the same name, allowing an easier identification of the region groups involved.

TABLE 1

Economic Region Groups and Cities

1. Avalon
2. Newfoundland-Labrador
3. Prince Edward Island (P.E.I.)
4. Cape Breton
5. Annapolis-North Shore
6. Halifax-South Shore
7. Moncton
8. Saint John
9. Upper St. John Valley
10. North-East New Brunswick
11. Gaspé-North Quebec
12. Laurentians-St. Maurice Valley
13. Montreal
14. Eastern Townships
15. West Quebec
16. Eastern Ontario
17. Toronto
18. Niagara
19. Central Ontario
20. South-West Ontario
21. Kitchener-Midlands
22. Northern Ontario
23. Winnipeg
24. South Manitoba
25. Regina
26. Saskatoon
27. Parklands
28. Medicine Hat-Lethbridge
29. Calgary
30. Edmonton
31. B.C. Interior
32. Vancouver
33. Vancouver Island

Cities

HX. Halifax
OH. Ottawa-Hull
MO. Montreal
TO. Toronto
HA. Hamilton
WI. Winnipeg
CA. Calgary
ED. Edmonton
VA. Vancouver

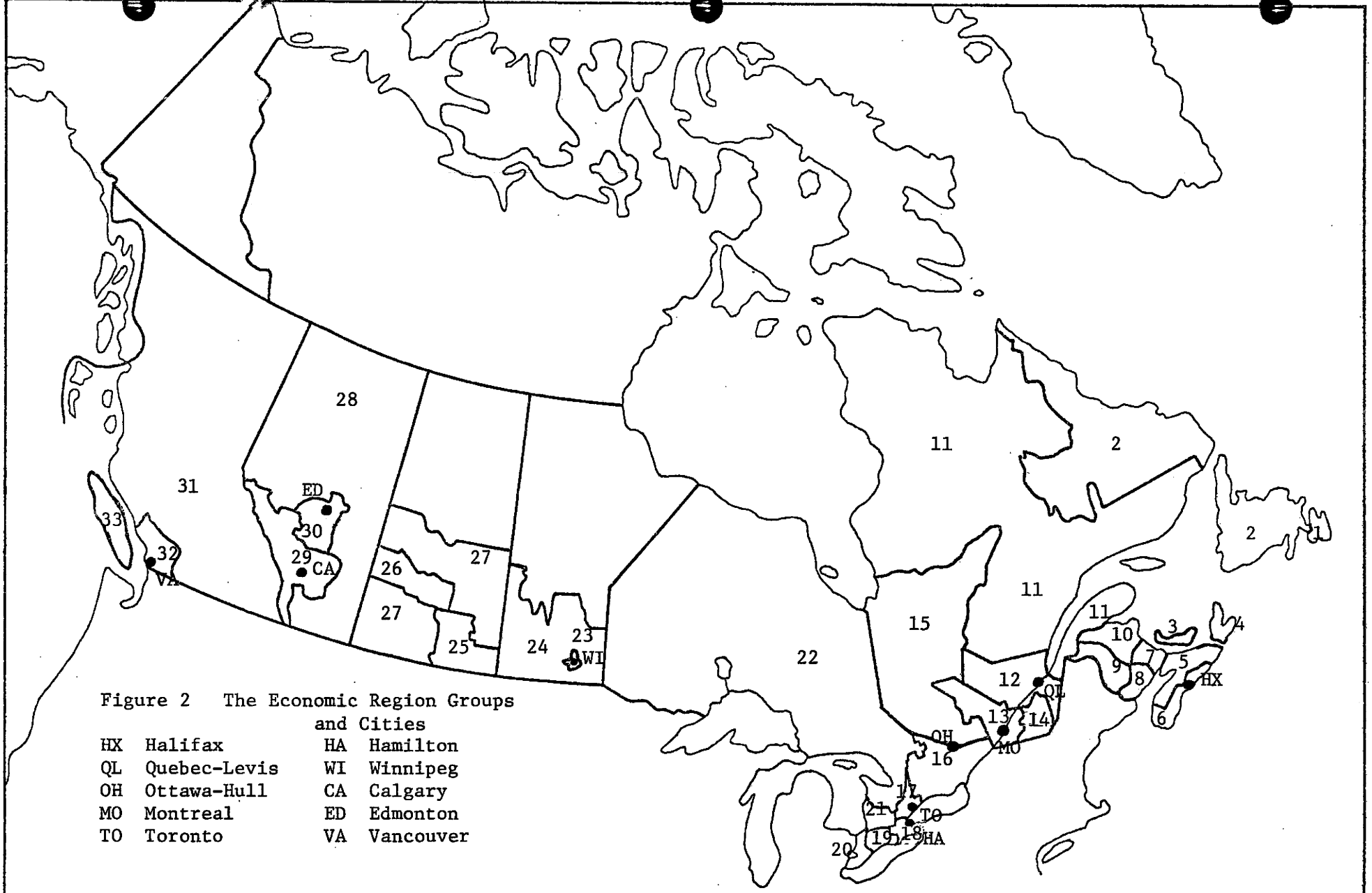


Figure 2 The Economic Region Groups and Cities

HX	Halifax	HA	Hamilton
QL	Quebec-Levis	WI	Winnipeg
OH	Ottawa-Hull	CA	Calgary
MO	Montreal	ED	Edmonton
TO	Toronto	VA	Vancouver

CHAPTER IV

THE NATIONAL CYCLICAL COMPONENT OF UNEMPLOYMENT

Two parameters describe the relationship between national and regional cyclical fluctuations in unemployment. The n_j term indicates the extent of the lead or lag between the regional and national unemployment rates and the a_j coefficient indicates the elasticity, or sensitivity, of the regional unemployment rate with respect to the national rate. These will be analyzed as will the coefficient of determination R^2, which indicates the importance of national cyclical forces in producing local, cyclical fluctuations in unemployment.

In the following analysis, the region groups and cities will be treated separately. The analysis will depend on the theoretical work presented in Chapter II as well as on detailed descriptions of the economic characteristics of each region for the study period. The regional and city classifications and descriptions are presented in Camu, Weeks and Sametz (1965) and supporting publications (Department of Treasury and Economics, Ontario, 1971; Hartwick and Crowley, 1972). These are summarized briefly in Table 2. Labour force characteristics are taken from several works including Ostry and Zaidi (1972) and Peitchinis (1970) among others.

Timing of Regional Responses to National Cyclical Fluctuations

In order to determine the correct values for the leads or lags, seven regressions were run for each region using assumed values for n_j

of -3, -2, -1, 0, +1, +2, and +3. The coefficient of determination R^2 was calculated for each regression and for each region, the regression with the highest R^2 and its corresponding lead or lag being retained. The full results are presented in Appendix A.

The regressions for Quebec City - Levis yielded negative a_j values which are theoretically meaningless. A graph of national unemployment plotted against regional unemployment (Figure 3) showed no relationship.

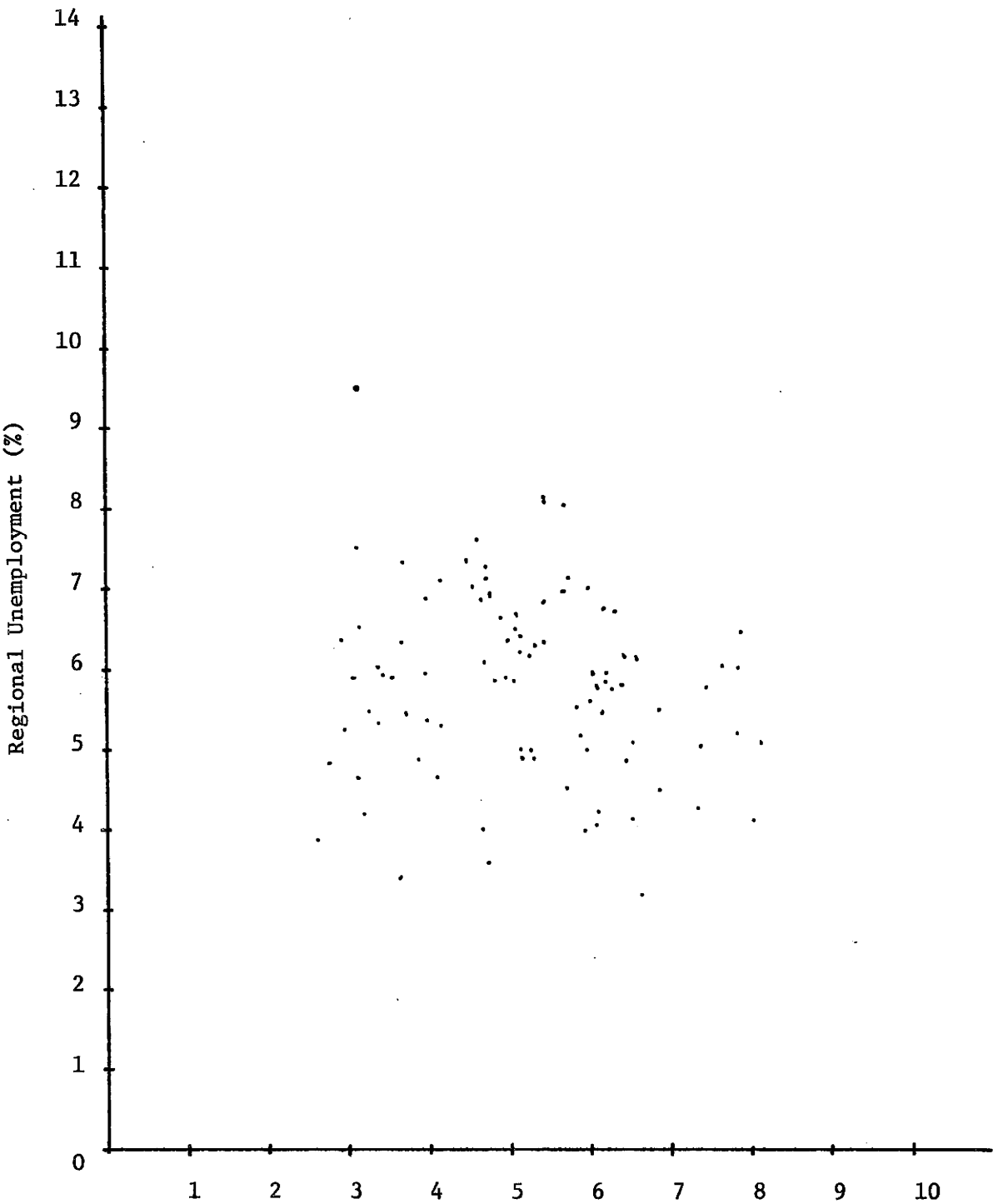
It is difficult to explain why there should be such a poor relationship. Possibly influences from outside the Canadian economic system play a strong role. Certainly much of the variance (0.70) is contained within the residual and error term. In any case, Quebec City - Levis subsequently was removed from the analysis.

Of the 33 regions, eight led or lagged the nation while the remaining 25 regions exhibited no lead or lag. The regional distribution of leads and lags shows a marked pattern (Figure 4). Leading regions are concentrated in Saskatchewan and Manitoba while lagging regions are found solely in the Maritimes and eastern Quebec. This pattern suggests a time lag due to the friction of distance with the cycles beginning in the mid-west reaching the far west and Ontario and the west part of Quebec next, and finally reaching the furthest region, the Maritimes and eastern Quebec. This is difficult to justify, but may be due to the specialized agricultural economies in the mid-west, and the isolation of the Maritimes from the rest of the national economic system.

The n_j values show the extent of the lead or lag given that the region and the nation have the same industrial structure (Jeffrey, 1970,

Figure 3

National and Regional Unemployment: Quebec-Levis



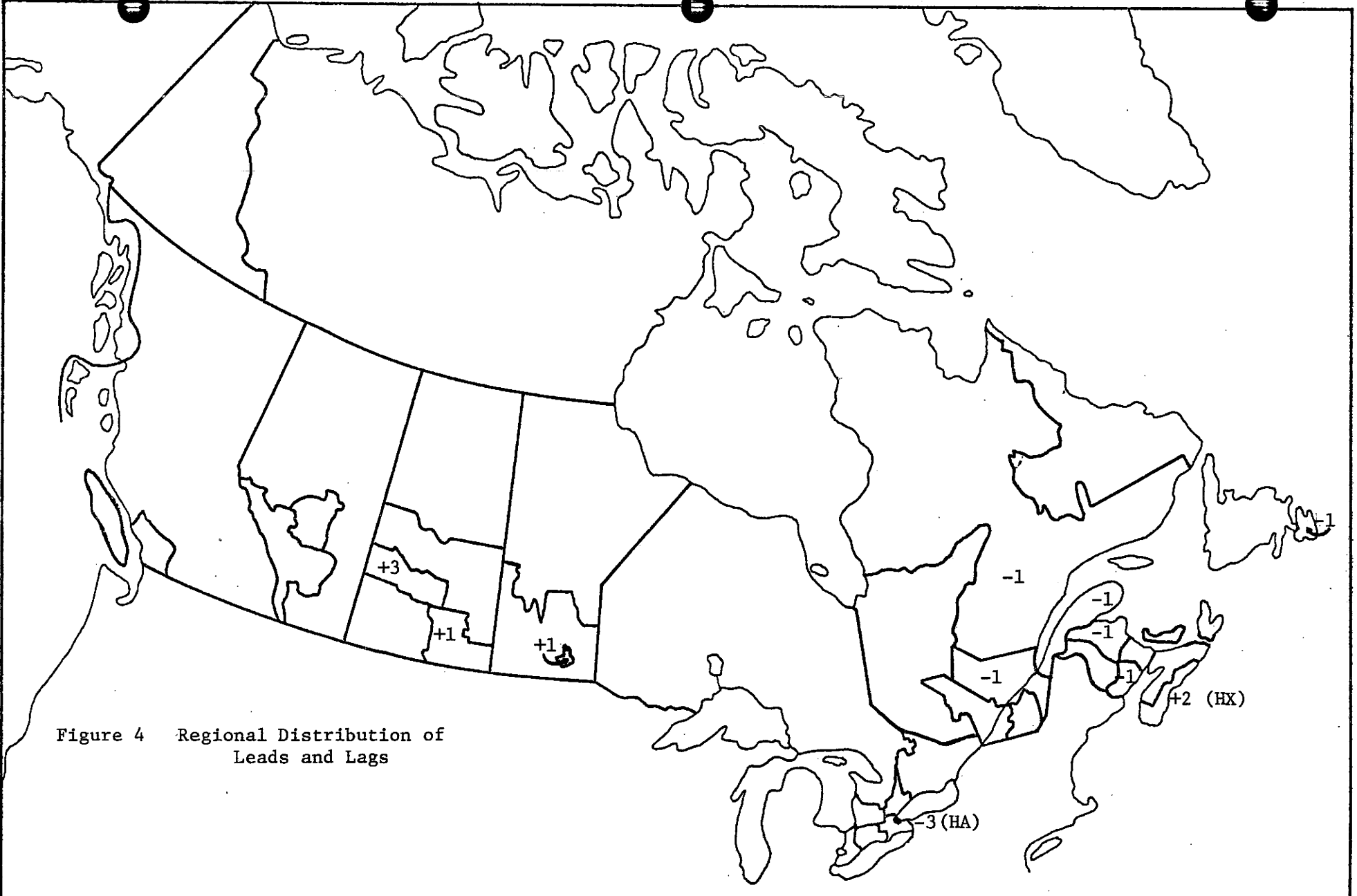


Figure 4 Regional Distribution of Leads and Lags

41). This is clearly not the case here, with southern Ontario and southern Quebec being highly industrialized and the rest of Canada being more agriculture and primary resource oriented. Some industries will respond to national cyclical fluctuations more rapidly than others and regions dominated by these types of industry may have a lead because of this. It was necessary therefore, to consider the industrial structure of the leading and lagging regions in order to determine whether industrial structure was significant in influencing the timing of regional responses.

The leading regions of Saskatoon, Regina, and Winnipeg rely on agriculture (wheat), manufacturing (agricultural products), and diversified manufacturing in Winnipeg's case. Lagging regions, Avalon, Saint John, North-East New Brunswick, Gaspe - North Quebec, and Laurentians - St. Maurice Valley, have an even greater variance in industrial structure (Table 2). Some regions specialize in primary industries (logging, fishing, agriculture), while others specialize in a few of the secondary manufacturing industries such as pulp and paper, food processing, textiles, chemicals, shipbuilding, and oil and sugar refining. Several regions within this group of lagging regions have similar industrial structures. However, other regions within this group have industrial structures which are quite different. At the same time, regions such as Northern Ontario and Interior British Columbia, which have industrial structures very similar to most of the regions in the lagging region grouping, were not included in that grouping. Therefore, it does not appear that industrial structure has had a significant influence on the timing of regional responses to national cyclical

TABLE 2

Regional Industrial Structures

1.	Avalon	FISHING and fish processing; SECONDARY INDUSTRY.
2.	Newfoundland-Labrador	MINING, iron-ore, non-ferrous (gypsum); FISHING; FORESTRY; MANUFACTURING, pulp and paper, cement; AGRICULTURE, mixed.
3.	Prince Edward Island (P.E.I.)	AGRICULTURE, mixed, potatoes; FISHING.
4.	Cape Breton	MANUFACTURING, iron and steel; MINING, coal; FISHING; AGRICULTURE, mixed.
5.	Annapolis-North Shore	MANUFACTURING, steel products, textiles, food processing; MINING, coal, salt, gypsum, barite; AGRICULTURE, mixed, specialized (i.e. apples); FISHING.
6.	Halifax-South Shore	MANUFACTURING, shipbuilding, electronics, auto assembly, textiles, etc.; FISHING.
7.	Moncton	SERVICE INDUSTRIES; MANUFACTURING, founderies, food processing, textiles; FISHING, lobster; AGRICULTURE, mixed.
8.	Saint John	Diversified Economy: MANUFACTURING, shipbuilding, oil and sugar refining, pulp, food processing, etc.; AGRICULTURE, mixed, dairy; FISHING; MINING, coal.
9.	Upper St. John Valley	AGRICULTURE, specialized (potatoes); FORESTRY; MANUFACTURING, pulp and paper, woodworking, textiles.
10.	North-East New Brunswick	MANUFACTURING, pulp and paper, lumber; FORESTRY; FISHING; some agriculture and mining.
11.	Gaspé-North Quebec	FORESTRY; MINING, iron ore; MANUFACTURING, aluminium, pulp and paper; AGRICULTURE, mixed, dairy; TOURISM; FISHING and trapping.
12.	Laurentians-St. Maurice Valley	MANUFACTURING, pulp and paper, chemicals, textiles, small industries, shipbuilding; TOURISM; AGRICULTURE, dairy, market garden; FORESTRY.

TABLE 2 (continued)

13.	Montreal	MANUFACTURING, extensive and highly diversified; SERVICES; AGRICULTURE, market garden, tobacco; TOURISM, year-round.
14.	Eastern Townships	MANUFACTURING, textiles; AGRICULTURE, mixed, dairy, livestock; MINING, asbestos.
15.	West Quebec	MANUFACTURING, pulp and paper, lumber; MINING, non-ferrous, gold; AGRICULTURE, marginal.
16.	Eastern Ontario	MANUFACTURING, pulp and paper, textiles, secondary industries; SERVICES, government, etc.; TOURISM; AGRICULTURE, dairy, intensive fruit and vegetable, canning.
17.	Toronto	MANUFACTURING, very extensive and varied; SERVICES; AGRICULTURE, market garden, fruit, dairy.
18.	Niagara	MANUFACTURING, diversified (heavy industry, steel, steel products); AGRICULTURE, specialized fruit, dairy; POWER, hydro-electric.
19.	Central Ontario	MANUFACTURING, heavy and diverse; AGRICULTURE, specialized (tobacco, dairy, fruit), mixed; FISHING.
20.	South-West Ontario	MANUFACTURING, heavy (auto, chemicals, petroleum, rubber, etc.); AGRICULTURE, specialized (vegetables), mixed.
21.	Kitchener-Midlands	MANUFACTURING, diverse; AGRICULTURE, dairy.
22.	Northern Ontario	MINING, nickle, gold, copper, iron, uranium; MANUFACTURING, steel, non-ferrous metals, pulp and paper, flour and feed, buses, trucks, lake ships; FORESTRY and trapping; TOURISM; AGRICULTURE, mixed, livestock.
23.	Winnipeg	MANUFACTURING, diverse (meat, clothing, steel products); SERVICES.

TABLE 2 (continued)

24.	South Manitoba	AGRICULTURE, wheat, specialized, dairy, mixed; MANUFACTURING, food processing, pulp and paper; FORESTRY.
25.	Regina	AGRICULTURE, wheat, mixed; MINING, coal; SERVICES, government, etc.; MANUFACTURING.
26.	Saskatoon	AGRICULTURE, wheat; MANUFACTURING, food processing.
27.	Parklands	AGRICULTURE, wheat, grains, livestock, mixed; MANUFACTURING, flour and oil refining; MINING, oil.
28.	Medicine Hat-Lethbridge	MINING, oil, gas; AGRICULTURE, mixed, livestock; MANUFACTURING, flour, sugar, clay products; FORESTRY.
29.	Calgary	MANUFACTURING, food processing, oil refining, chemicals; MINING, coal, oil; AGRICULTURE, mixed, livestock; FORESTRY; TOURISM.
30.	Edmonton	MANUFACTURING, food processing, oil refining; MINING, oil, gas, coal; AGRICULTURE, mixed; FORESTRY.
31.	B.C. Interior	FORESTRY; MANUFACTURING, varied (but especially forest products, and food processing),aluminium, fish products; MINING, various minerals, oil, gas; FISHING; AGRICULTURE, mixed, livestock, dairy.
32.	Vancouver	MANUFACTURING, varied (especially forest products and food processing); AGRICULTURE, dairy, fruit.
33.	Vancouver Island	MANUFACTURING, lumber, pulp and paper, ships; MINING, coal; FISHING.

TABLE 2 (continued)

Cities

HX.	Halifax	Services, Transportation, Government, Manufacturing.
OH.	Ottawa-Hull	Government, Services.
MO.	Montreal	Manufacturing, Services, Transportation.
TO.	Toronto	Manufacturing, Services, Transportation.
HA.	Hamilton	Manufacturing (steel and steel products), Services.
WI.	Winnipeg	Services, Transportation, Manufacturing.
CA.	Calgary	Services, Manufacturing, Transportation.
ED.	Edmonton	Services, Manufacturing, Transportation.
VA.	Vancouver	Services, Manufacturing (forestry products), Transportation.

Source: Camu, Weeks, Sametz (1964), among others.

impulses.

In considering the nine cities, it was expected that they would display no lead or lag, except in cases where the industrial structure differed significantly from the surrounding region (Jeffrey and Webb, 1972, 154). Winnipeg, Halifax, and Hamilton are such exceptions. Winnipeg is closely linked with the western regions, while being different structurally from the rest of Manitoba and leads those regions by one month. Halifax has a lead of two months over its surrounding region and the nation. While Halifax - South Shore is a diversified manufacturing region, the city of Halifax is primarily a service and administration centre. As the dominant and leading centres of the mid-west and east, and the main links to the rest of Canada, it is expected that these cities would exhibit a lead.

Hamilton is in a region which has no lead or lag, but exhibits a lag of three months itself. This may be due to Hamilton's specialization in primary iron and steel, an industry with production contracts signed some months in advance and very high fixed costs, which along with the technical difficulties of a shut down, tend to slow down any reaction to national cyclical impulses.

The large diversified cities of Toronto and Montreal are the major part of the national economy, while the cities of Edmonton, Calgary and Vancouver are strongly tied to their surrounding regions. Neither group exhibits a lead or lag. They provide the norm about which the other regions lead or lag (Jeffrey and Webb, 1972, 154; Hartwick and Crowley, 1972). It appears that industrial structure does have some influence on timing at the urban level.

Regional Sensitivity to National Cyclical Fluctuations

The region's sensitivity to national cyclical fluctuations is measured by the a_j parameter. Where a_j is less than unity, the region's fluctuations are less severe than the nation's; where greater than unity they are more severe than the nation's; and where equal to unity they are equally as severe as the nation's.

Within the regional system the a_j values range from a low of 0.41 for Saint John to a high of 2.59 for P.E.I., with a mean of 1.16 (Fig. 5). Nine regions have values significantly different from unity at the 95 percent level of significance. For the nine cities, the a_j values ranged from 0.29 for Halifax to 1.32 for Calgary, with a mean of 0.81. Three values were significant at the 95 percent level. It appears that on the whole the cities are more stable than the regional system and in most cases are more stable than the regions within which they are located.

Cyclically Sensitive Regions

Eleven regions have a_j values greater than unity, five of which are significant at the 95 percent level of significance. Almost all of these regions are concentrated in the Maritimes and British Columbia.

The economic characteristics of these regions and their dominant cities are presented in Table 2. The regions tend to specialize in some combination of the primary industries of forestry and mining. The result is a fairly limited economic base which concentrates on the processing of natural resources and their export to central Canada for final processing. The dominant type of good produced in these regions will tend to have a high income elasticity of demand.

TABLE 3

Cyclical Sensitivity (a_j)

1.	Avalon	1.01	24.	South Manitoba	1.23
2.	Newfoundland-Labrador	2.24*	25.	Regina	.78
3.	Prince Edward Island (P.E.I.)	2.59*	26.	Saskatoon	.54*
4.	Cape Breton	2.03*	27.	Parklands	.93
5.	Annapolis-North Shore	1.26	28.	Medicine Hat-Lethbridge	1.04
6.	Halifax-South Shore	.94	29.	Calgary	1.24
7.	Moncton	1.25	30.	Edmonton	.99
8.	Saint John	.41*	31.	B.C. Interior	1.37*
9.	Upper St. John Valley	1.29	32.	Vancouver	1.06
10.	North-East New Brunswick	1.90	33.	Vancouver Island	1.35
11.	Gaspé-North Quebec	2.52*			
12.	Laurentians-St. Maurice Valley	.72*			
13.	Montreal	.90		Cities	
14.	Eastern Townships	.90			
15.	West Quebec	1.07	HX.	Halifax	.29*
16.	Eastern Ontario	1.06	OH.	Ottawa-Hull	.75
17.	Toronto	.84	MO.	Montreal	.74*
18.	Niagara	.53*	TO.	Toronto	.82
19.	Central Ontario	.74	HA.	Hamilton	.58*
20.	South-West Ontario	.82	WI.	Winnipeg	.86
21.	Kitchener-Midlands	.81	CA.	Calgary	1.32
22.	Northern Ontario	.96	ED.	Edmonton	.98
23.	Winnipeg	.86	VA.	Vancouver	1.01

* Significant at 95% level (significant difference from unity).

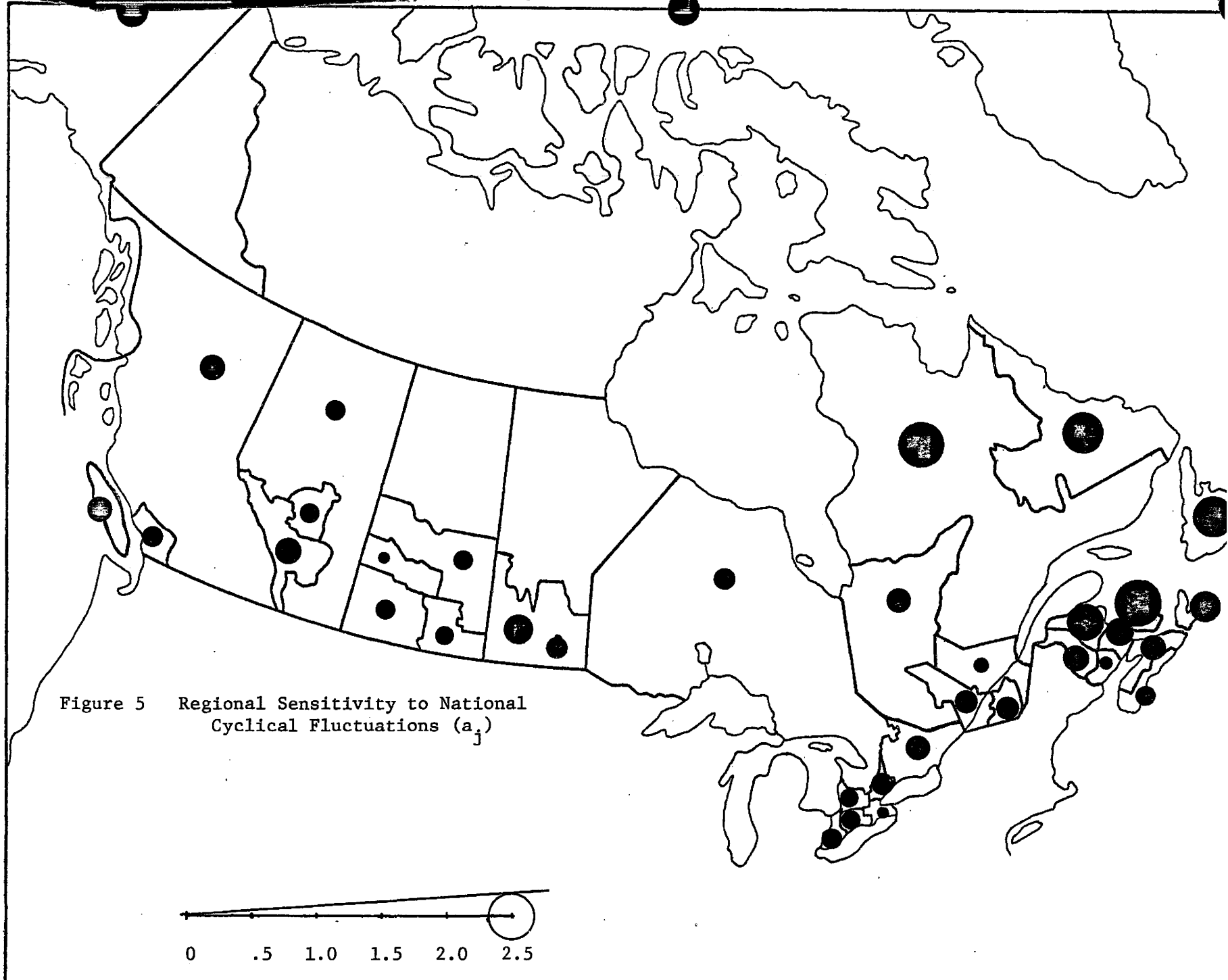


Figure 5 Regional Sensitivity to National Cyclical Fluctuations (a_j)

TABLE 4

Cyclically Sensitive Regions

*2. Newfoundland-Labrador

*3. Prince Edward Island (P.E.I.)

*4. Cape Breton

*11. Gaspe-North Quebec

*31. B.C. Interior

---

5. Annapolis-North Shore

7. Moncton

9. Upper St. John Valley

10. North-East New Brunswick

24. South Manitoba

33. Vancouver Island

* regions with a_j values differing significantly from 1 at 95% level.

As these regions are highly dependent on outside markets for their products and dependent on imports for consumption goods, whose demand is relatively inelastic, they will be, therefore, highly susceptible to national cyclical fluctuations.

Because the economic base of these regions is so limited, the severe cyclical fluctuations of the primary industries in them are not dampened by the cycles of other industries within the region. P.E.I. is a notable exception. Although cyclical fluctuations in agriculture are less severe than in other primary industries, and P.E.I. is heavily dependent on agriculture (mixed, potatoes) and fishing, it is the region most sensitive to national cyclical fluctuations. This may be because the small amount of manufacturing industry on P.E.I. is marginal, and any economic downswing has serious repercussions on the level of unemployment, especially in the important tourist industries.

In any case, the severity of the unemployment cycle is aggravated by the oligopolistic structure of the large scale primary resource firms in these regions, by the slow or negative growth rates associated with the primary industries, especially forestry, agriculture and fishing, and by the relatively unprogressive nature of the firms of these regions as compared to the innovative firms in Central Canada. The Maritimes and British Columbia have a higher proportion of slow growth firms and industries than the other Canadian regions (Brewis, 1969, 73; Department of Treasury and Economics, 1971).

In economic downswings, workers have difficulty being reabsorbed into the labour force because of the lack of occupationally related industries in the depressed regions. Since much of the labour force

consists of unskilled or semi-skilled primary industry workers, the full effect of an economic downswing is passed on to the labour force in the form of layoffs. These occupational and skill labour force groups characteristically have the greatest elasticity of demand with respect to gross domestic product. Ostry (Ostry and Zaidi, 1972, 140) points out that the absolute increase in unemployment is the highest in the above groups, the ones with the highest unemployment rates. Furthermore, the period of unemployment is the longest for construction, primary, and unskilled labour force groups and this will increase the employment rate during recessions.

The result is a group of regions which tend to be sensitive to national cyclical fluctuations with the less sensitive regions of the group having a greater degree of industrial diversification and producing goods which are more highly processed.

Cyclically Insensitive Regions

Twelve regions have a_j values less than unity, four of which are significant at the 95 percent level of significance. Most of these regions are concentrated in the industrial heartland of Canada - the St. Lawrence - Great Lakes Lowland. Their structural characteristics are the opposite to those of the cyclically sensitive regions (Table 5).

The major feature of these regions is the highly diversified economic base and the importance of service industries. Although durable goods production is important here, consumer goods, non-durable goods, and services are a major part of the area's gross domestic product. These industries tend to be cyclically stable with their light manufacturing and service industries being the least affected by cyclical

TABLE 5

Cyclically Insensitive Regions

*8.	Saint John
*12.	Laurentians-St. Maurice Valley
*18.	Niagara
*26.	Saskatoon
13.	Montreal
14.	Eastern Townships
17.	Toronto
19.	Central Ontario
20.	South-West Ontario
21.	Kitchener-Midlands
23.	Winnipeg
25.	Regina

Cities

*HX.	Halifax
*HA.	Hamilton
*MO.	Montreal
OH.	Ottawa-Hull
TO.	Toronto

* regions with a_j values differing significantly from 1 at 95% level.

* cities with a_j values differing significantly from 1 at 95% level.

fluctuations, due to those industries' low income elasticities of demand. The firm structure tends to be less oligopolistic with the large number of small firms making price competition important. This area also has the nation's largest concentration of high growth rate firms and industries. Furthermore, the labour force in the above industries tends to be highly skilled. These assertions are taken from the works of several authors who were referenced at the beginning of this chapter.

Overall, the economy of these regions is fairly stable, the labour force is less prone to layoffs, and unemployment tends to be of a shorter duration than in the cyclically sensitive regions.

Regions with less manufacturing and a greater dependency on agriculture and the manufacturing of agriculture products, as in the cases of Regina, Saskatoon, and Winnipeg, are also stable due to the non-durable, final consumption nature of their goods and the tremendous importance of service industries in the regional centres of the area. The high degree of mechanization in this type of agriculture (wheat, livestock) means that these regions are less likely to have severe fluctuations in unemployment than the labour intensive, mixed agriculture regions in the Maritimes.

The southern New Brunswick area is the only stable region in the Maritimes and is so because of its highly diversified manufacturing economy.

The major cities tend to be cyclically stable for much the same reasons as listed above. Their mean a_j value is 0.81. Manufacturing is highly diversified and final consumption oriented in some (Montreal, Toronto, Winnipeg) while services and administrative activities are very

important in others, especially Halifax, Ottawa, and again Winnipeg (Table 5). In general, the major urban centres tend to be less cyclically sensitive than their surrounding regions because of the greater degree of diversification, the greater importance of services, and other characteristics which promote stability. Hamilton with a heavy dependence on primary iron and steel, and Calgary are exceptions and are more cyclically sensitive than their surrounding regions, but not greatly so. These cities are highly specialized in the processing of raw materials and this contributes to their cyclical sensitivity. Halifax, on the other hand is a good example of a cyclically insensitive city. Its a_j value is 0.29 while the surrounding region of Halifax - South Shore has an a_j value of 0.94. This is because of the great importance of service industries and government services in Halifax (Hartwick and Crowley, 1972).

Edmonton, Calgary and Vancouver are less cyclically insensitive with a_j values of 0.98, 1.32, and 1.01 respectively. This is mainly because of the greater importance of primary activities in Alberta (agriculture, oil) and British Columbia (forestry, fishing) and their limited economic bases and the fact that those cities process the raw materials; however, these a_j values are still considered to be relatively low.

Regions With Cyclical Sensitivity Approximating that of the Nation

Nine regions have a_j values very close to unity, as do the cities of Edmonton, Calgary and Vancouver discussed above.

In general these regions and cities tend to have a mix of industries whose stable and unstable characteristics balance out. Eastern

TABLE 6

Regions With Cyclical Sensitivity Approximating That of the Nation's

1. Avalon
6. Halifax-South Shore
16. Eastern Ontario
22. Northern Ontario
27. Parklands
28. Medicine Hat-Lethbridge
29. Calgary
30. Edmonton
32. Vancouver

Cities

CA. Calgary
ED. Edmonton
VA. Vancouver

Ontario is an example where the destabilizing effects on the economy of a dependence on primary industries (pulp and paper, agriculture) are balanced by the stabilizing effects produced by the small consumer oriented manufacturing industries and government services in the region. A more detailed discussion of these regions is not possible without a greater knowledge of their industrial structures, as the interactions and relative importance of the industrial characteristics within the regions are difficult to predict.

It is interesting to note that many of these regions are concentrated in the far west. The provinces of British Columbia and Alberta are trying to diversify their industrial bases and reduce the reliance on primary industries. This may have some bearing on the a_j values of the major cities of the area (Edmonton, Calgary, Vancouver). This diversifying attempt is also true for Northern Ontario, Eastern Ontario and North Quebec, regions which border the stable industrial regions of the Great Lakes - St. Lawrence Lowland.

The Spatial Pattern of Cyclical Sensitivity

Jeffrey (1970, 61) carried out a regression analysis on the national cyclical component of regional unemployment using the percent employment in durable goods, population size, and rates of growth, among others, as the independent variables. The residuals from this analysis showed a distinct spatial pattern which led Jeffrey to conclude that a city's, or region's, cyclical instability is related not only to its industrial structure, but also to the cyclical responses of the other cities or regions within its national subsystem. It may be hypothesized that a city like Hamilton which specializes in the manufacture of

durable, non-final goods is more cyclically stable (a_j = 0.58) than would normally be expected, because of the cyclical stability of the surrounding Niagara region (a_j = 0.53). This same argument may be applied to regions such as Northern Ontario and West Quebec. At the same time other regions may have a degree of cyclical instability greater than would be expected because of the high cyclical instability of the other regions in the system. Avalon, the industrially diversified Halifax - South Shore region, and Vancouver may be examples of this. Without resorting to a further analysis it is difficult to speculate on the importance of spatial location in determining a region's cyclical sensitivity. It is interesting to note that with only a few exceptions, regions with similar cyclical sensitivities tend to cluster together as illustrated in Fig. 5. This may indicate the similar industrial structures and markets of the regions within the clusters. This point will be further considered in the analysis of the regional cyclical impulses in Chapter VI.

The Level of Unemployment and Regional Cyclical Sensitivity

By using a log-linear or multiplicative structure for his regressions, Brechling (1967, 11) found a negative association between the a_j values and the mean levels of unemployment for the 10 economic regions of Great Britain. This implies that a given fall in national unemployment leads to a proportionately greater fall in unemployment in low unemployment regions than in high unemployment regions. Low unemployment regions suffer a greater increase in pressure on their labour markets than do high unemployment regions when the economy is expanding, and a greater decrease in pressure when the economy is contracting.

This study uses an arithmetically linear structure for the regressions, therefore, any changes in unemployment rates will be absolute and not proportionate changes. Thus the observations of Brechling cannot be tested here, however, the absolute changes in unemployment levels can be studied. The regional unemployment level u_{jt} was plotted against the national cyclical sensitivity parameter a_j in Fig. 6. The a_j values here are positively associated with mean levels of unemployment. The rank correlation coefficient between the two variables is 0.504, which is significant at the 95 percent level. This implies that low unemployment regions will experience smaller absolute changes in unemployment during national cyclical fluctuations than will high unemployment regions.

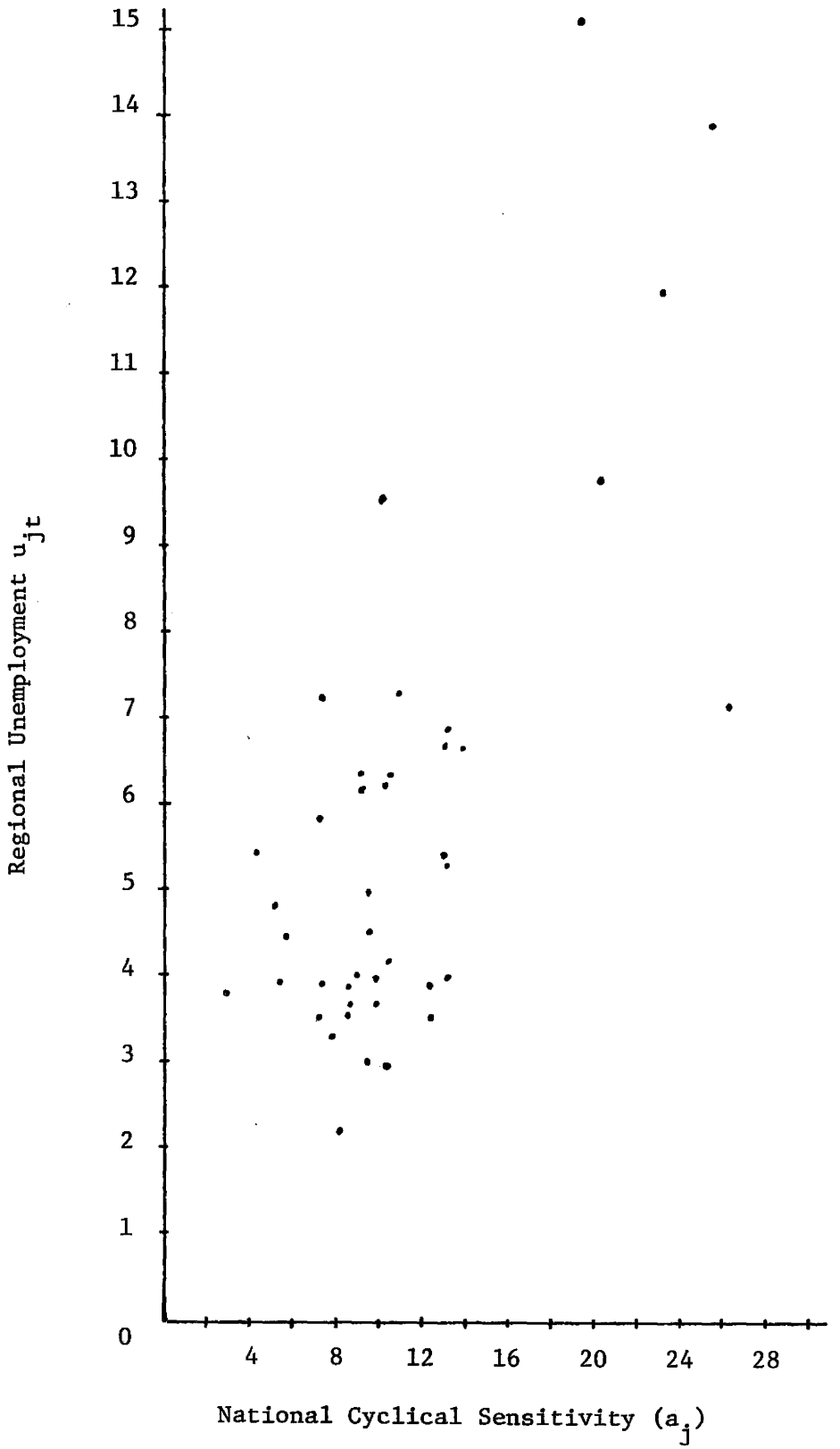
In general, when the economy is expanding/contracting, relatively prosperous (low-unemployment regions) will experience proportionately greater and absolutely smaller reductions/increases in their unemployment rate than will relatively depressed regions. In the case of this study, a_j values tend to be high in the relatively depressed high unemployment regions, and low in the relatively prosperous, low unemployment regions (Fig. 5). This is supported by the results of the work by Brechling (1967).

The Relative Importance of National and Regional Factors

The coefficient of determination R^2 measures the extent to which the regional unemployment series can be predicted in terms of the national unemployment series with the seasonal and structural effects removed. The greater the R^2 value, the greater will be the importance of national as opposed to regional economic impulses in accounting for fluctuations in the levels of regional economic activity and unemployment.

Figure 6

Regional Unemployment Levels and National Cyclical Sensitivity



Jeffrey (1970) states that an R^2 value of 0.80 indicates that 80 percent of the fluctuations in regional unemployment levels can be accounted for by the level of economic activity in the nation as a whole, while the remaining 20 percent is accounted for by purely regional forces. It is not true for this study as the R^2 value applies to structural and seasonality effects as well as the effects of national cyclical impulses. However, given that the effects due to national cyclical impulses will have the greatest effect on unemployment levels (Sant, 1973, 4) and that all regions will have components of structural and seasonal unemployment, the R^2 values can be compared between regions. The greater the R^2 value the less will be the importance of regional cyclical impulses in accounting for fluctuations in the levels of unemployment.

The distribution of R^2 values is shown in Fig. 7. The values range between 0.46 for South-West Ontario to 0.95 for the Montreal region and show a fairly distinct spatial pattern. Three parts of Canada have groups of regions with relatively low R^2 values.

The regions of southern Ontario, except the Toronto region, have values ranging between 0.46 and 0.74. With their large population, diversified industrial base and high proportion of final consumption goods, these regions form an almost independent, self-sufficient subsystem where regional impulses between the closely linked industries provide a major influence on unemployment fluctuations (Hartwick and Crowley, 1972). The strong influence of the U.S. manufacturing belt (Ray, 1965) also plays a significant role as this factor would influence the residuals R_{jt} and therefore the R^2 value. This is because many of the investment decisions and economic impulses come from the U.S. and not

TABLE 7

The R^2 Values

1.	Avalon	.77	24.	South Manitoba	.80
2.	Newfoundland-Labrador	.79	25.	Regina	.75
3.	Prince Edward Island (P.E.I.)	.67	26.	Saskatoon	.73
4.	Cape Breton	.66	27.	Parklands	.69
5.	Annapolis-North Shore	.73	28.	Medicine Hat-Lethbridge	.83
6.	Halifax-South Shore	.84	29.	Calgary	.76
7.	Moncton	.58	30.	Edmonton	.82
8.	Saint John	.50	31.	B.C. Interior	.76
9.	Upper St. John Valley	.68	32.	Vancouver	.74
10.	North-East New Brunswick	.64	33.	Vancouver Island	.56
11.	Gaspé-North Quebec	.80			
12.	Laurentians-St. Maurice Valley	.81			
13.	Montreal	.95		Cities	
14.	Eastern Townships	.81			
15.	West Quebec	.71	HX.	Halifax	.44
16.	Eastern Ontario	.74	OH.	Ottawa-Hull	.39
17.	Toronto	.83	MO.	Montreal	.93
18.	Niagara	.66	TO.	Toronto	.84
19.	Central Ontario	.64	HA.	Hamilton	.48
20.	South-West Ontario	.46	WI.	Winnipeg	.67
21.	Kitchener-Midlands	.70	CA.	Calgary	.75
22.	Northern Ontario	.83	ED.	Edmonton	.78
23.	Winnipeg	.67	VA.	Vancouver	.73

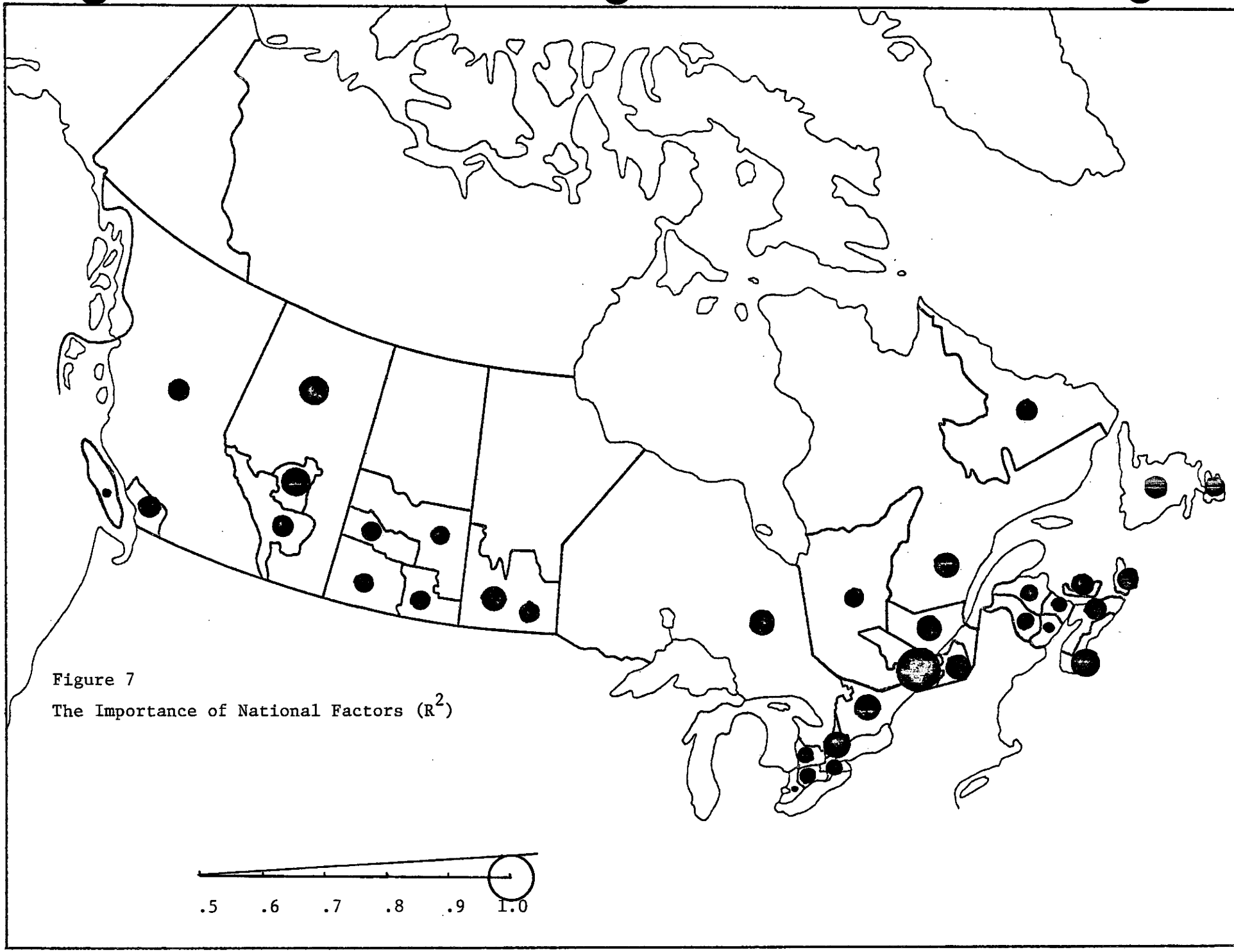


Figure 7

The Importance of National Factors (R^2)

from within the Canadian economic system, and their strong effect on the levels of unemployment in southern Ontario regions will show up as part of the error term within the residuals.

A second group of relatively low R^2 values, 0.69 to 0.75, occurs in Saskatchewan. Because of the great dependence on agricultural products in this area, local factors such as weather could be expected to be very significant. The supply of grains is relatively inelastic in terms of national economic fluctuations as shown by the large surpluses of the early 1960's and the present shortages in the U.S.

The low R^2 values in much of the Maritimes result from the area's isolation. This part of Canada forms a distinct regional subsystem. The influence of foreign market demands on the raw materials of the area may have some significance.

On the west coast, the low R^2 values for the Victoria region can be explained by the local importance of foreign markets (Japan) for the natural resources (forest products, minerals) of this part of the nation. Again the error term in the residual will be large.

The remaining regions have relatively high R^2 values. They are generally isolated, sparsely populated regions with little internal infrastructure and depend on a few primary resources which are sensitive to national cyclical fluctuations. In fact, their major linkages are through the largest Canadian cities which are strongly influenced by the national cyclical impulses and readily transmit them to the above regions. The Laurentian - St. Maurice Valley and the Eastern Townships regions are strongly linked to Montreal (Camu, Weeks and Sametz, 1965; Hartwick and Crowley, 1972).

The cities in the study generally have low R^2 values. Because of the primate nature of the Canadian urban system, and the lack of strong inter-urban linkages as in the U.S., most Canadian cities are mainly concerned with and influenced by local factors in their surrounding regional subsystem. An urban system is considered primate when a stratum of small towns and cities is dominated by one or more very large cities and there are dificiencies in numbers of cities of intermediate sizes.

Montreal and Toronto are exceptions. Because they are Canada's twin primate cities, they are very closely linked with the national economy and in fact are a major part of the Canadian economy with their industries and some of their services having national markets. They have R^2 values of 0.84 and 0.95 respectively.

Overview

There appears to be little correlation between the distribution of leads and lags and the distribution of a_j values. Both cyclically sensitive and insensitive regions showed lags. Similarly there is little correlation between the distribution of a_j values and the distribution of R^2 values. Cyclically sensitive regions had both high and low R^2 values, as did cyclically insensitive regions. This indicates the complexity of the regional economic system and the variation in relative importance between regions of the various factors which influence the n_j, a_j and R^2 values.

Some generalizations can be made concerning the above values. The southern Ontario area is cyclically stable, approximates the nation in the timing of its cyclical response, and is strongly influenced by

regional factors. The southern Quebec area is also cyclically stable and approximates the nation in the timing of its cyclical response, but is strongly influenced by national factors. The Maritimes area is cyclically unstable, strongly influenced by regional factors and lags the nation in the timing of its response by one month. The Mid-west is as cyclically stable as the nation, influenced moderately by regional factors, and leads the nation in the timing of its cyclical response by up to 3 months. Finally, the far west equals the cyclical stability of the nation, except for the unstable British Columbia Interior region, is strongly influenced by national factors, and approximates the nation in the timing of its cyclical response.

According to the definition of the problem of regional unemployment in Chapter III, the deviations of the n_j and a_j values from zero and unity respectively, indicate that the problem of large differences in the levels of unemployment due to the influence of national cyclical impulses and the problem of regional economic disparity, are present in 13 of the 33 regions and 4 of the 9 cities in the Canadian economic system. The full significance of these facts will be presented in the conclusions in Chapter VII.

CHAPTER V

THE STRUCTURAL COMPONENT OF REGIONAL UNEMPLOYMENT

This chapter will be devoted to a discussion of structural unemployment in the regional economic system. The component is assumed to be a quadratic function of time and can be described by four parameters. The S_{jt} value measures the degree and direction of structural imbalance within a single regional labour market with respect to the national norm. The greater the deviation of S_{jt} from zero, the greater the degree of structural imbalance, with negative values indicating long term pressure on the labour market and positive values indicating high levels of long term structural unemployment.

The c_j parameter is simply the S_{jt} value at time t equal zero. In this case the c_j value indicates the level of regional structural imbalance in January, 1966.

The b_j and d_j parameters are coefficients of the quadratic time trend and indicate the direction and rate of change of the S_{jt} values, which can change smoothly over time at an increasing or decreasing rate.

The incidence of structural unemployment in January, 1966, as shown by the c_j values, will be discussed first, and will be followed by a discussion of the S_{j89} values which show the structural unemployment in June, 1973. Then the trends in structural unemployment within the regional economic system will be analyzed. A reference to seasonal unemployment is included at the end of this chapter.

Structural Unemployment January 1966

The c_j values ranging from a low of -2.40 to a high of 9.60 are presented in Table 8. Because dummy variables are used to remove the effects of seasonality on the unemployment rate, the c_j values must be calculated by averaging the regression constant and the three dummy variable coefficients which are appropriate to the four quarters of the year (Brechling, 1967, 12).

A total of 15 of the 33 regions had c_j values which differed from zero by more than five standard errors and a further 6 regions differed by more than three standard errors. It appears that the c_j values significantly differ from zero for many of the regions, indicating that there is a great deal of structural imbalance in the local labour markets of the system.

The distribution of c_j values is shown in Figure 8, and a distinct spatial pattern is apparent. For the most part, the Maritimes and eastern Quebec regions have high positive values indicating excessive amounts of structural unemployment. Much of southern Ontario, Manitoba, Saskatchewan and Alberta have high negative values, indicative of long term pressure on the local labour markets.

The excessive structural unemployment in the Maritimes and eastern Quebec is partly due to their dependence on only one or two major industries, especially non-agricultural primary industries. Kaliski (1969, 262) found that certain industrial and occupational groups are excessively prone to structural unemployment. They include workers in the forestry, fishing, and trapping industries and unskilled workers.

TABLE 8

Elements of Structural Unemployment

		S_{jt}			
		$t=0(c_j)$	$t=89$	b_j	d_j
1.	Avalon	5.72*	7.56	-.1457*	.00187*
2.	Newfoundland-Labrador	-1.28	-1.63	-.0087	-.00027
3.	Prince Edward Island (P.E.I.)	-2.33*	-7.79	-.1521*	-.00102*
4.	Cape Breton	.33	- .89	-.0564	.00048
5.	Annapolis-North Shore	1.17*	.34	-.0601*	.00057*
6.	Halifax-South Shore	1.96*	.27	-.0991*	.00090*
7.	Moncton	2.47*	- .97	-.0769*	.00043
8.	Saint John	3.08*	3.84	-.0048	.00015
9.	Upper St. John Valley	- .81	-1.38	-.0215	.00017
10.	North-East New Brunswick	9.60*	4.97	-.2123*	.00180*
11.	Gaspé-North Quebec	1.62*	-1.70	.0054	-.00048
12.	Laurentians-St. Maurice Valley	3.33*	2.95	.0136	-.00020
13.	Montreal	.03	1.42	.0592*	-.00049*
14.	Eastern Townships	.03	2.50	.0500*	-.00025
15.	West Quebec	1.27*	3.81	-.0311	.00067
16.	Eastern Ontario	- .45	-2.38	-.0208	-.00001
17.	Toronto	- .85*	- .61	-.0017	.00005
18.	Niagara	1.33*	2.06	.0251	-.00019
19.	Central Ontario	- .22	- .42	-.0094	.00008
20.	South-West Ontario	-1.31*	-1.46	.0597*	-.00069*
21.	Kitchener-Midlands	-2.40*	-2.24	.0250	-.00026
22.	Northern Ontario	- .10	.23	-.0373*	.00046*
23.	Winnipeg	- .42	- .37	-.0137	.00016

(continued)

TABLE 8 (continued)

		$t=0(c_j)$	$t=89$	b_j	d_j
24.	South Manitoba	-2.23*	-3.42	-.0196	.00007
25.	Regina	-1.29*	.13	-.0009	.00019
26.	Saskatoon	- .87*	2.57	.0457	-.00008
27.	Parklands	-2.21*	-2.57	.0289	-.00037
28.	Medicine Hat-Lethbridge	-2.00*	-2.74	-.0128	.00005
29.	Calgary	-1.85*	-2.38	-.0478*	.00047
30.	Edmonton	-1.41*	-1.28	-.0111	.00014
31.	B.C. Interior	.23	-1.43	-.0133	-.00006
32.	Vancouver	.66	-1.16	-.0015	.00008
33.	Vancouver Island	- .20	-1.49	-.0714*	.00064*
		Cities			
HX.	Halifax	2.45*	3.32	-.0286	.00043*
OH.	Ottawa-Hull	.88*	.19	-.0531*	.00051*
MO.	Montreal	.22	2.03	.0702*	-.00056*
TO.	Toronto	- .84*	- .36	-.0071	.00014
HA.	Hamilton	.98*	.98	.0311*	-.00035*
WI.	Winnipeg	- .42	- .37	-.0137	.00016
CA.	Calgary	-2.02*	-2.59	-.0501*	.00049*
ED.	Edmonton	-1.17*	- .65	-.0120	.00020
VA.	Vancouver	.64	1.61	-.0016	.00014

* Significant at the 95% level: in the case of t=0, greater than three standard errors.

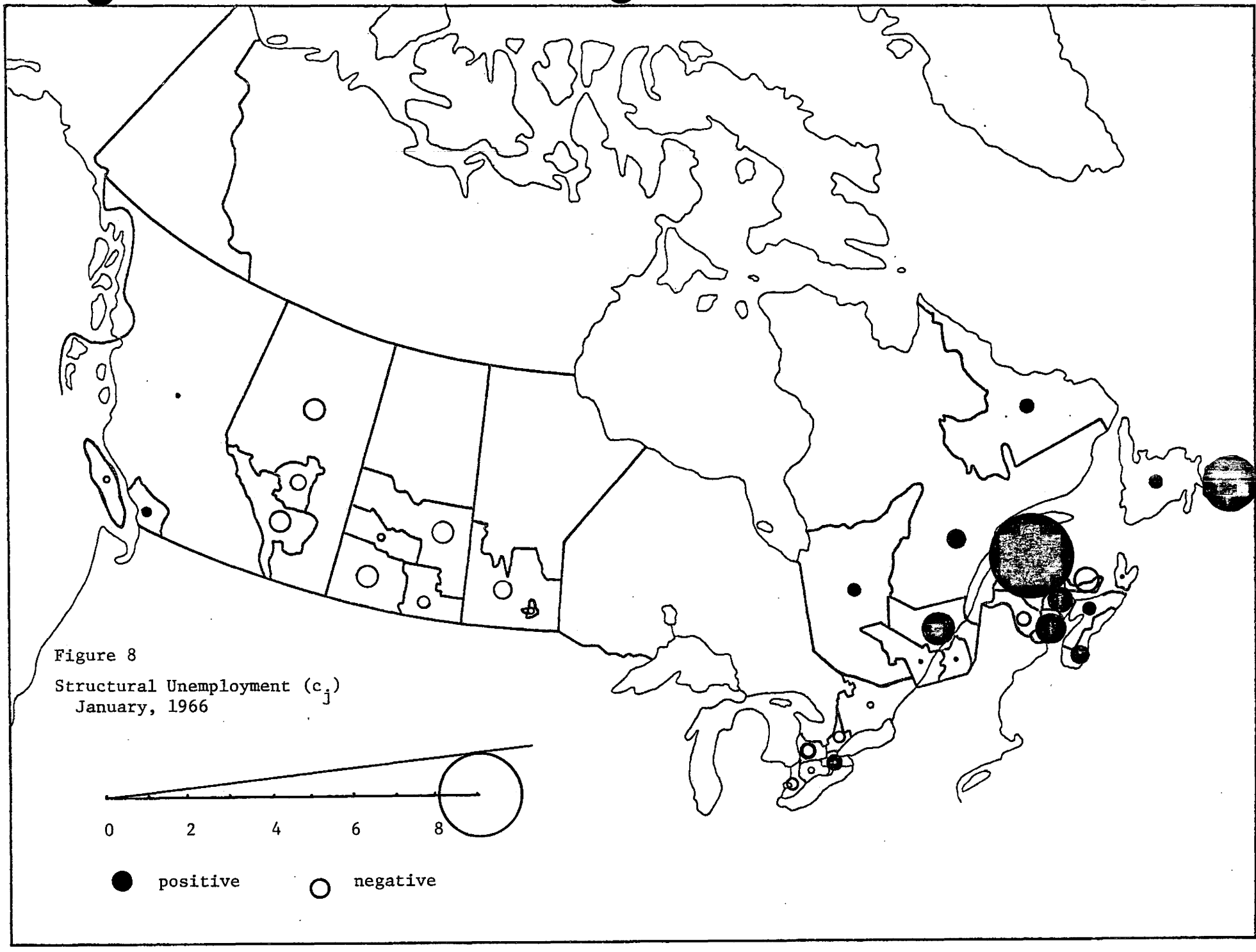


Figure 8

Structural Unemployment (c_j)
January, 1966

Donner and Lazar (1971a, 17) noted that skill obsolescence set in at the higher working ages. The Maritimes and eastern Quebec regions have both an unfavourable age structure and a comparatively low level of skill in the labour force. Furthermore, the industries which these regions depend on are characterized by slow or negative growth rates (Brewis, 1969, 73), and have been subject to major structural shifts. An example is the shift in market demand for forestry products in favour of British Columbia and at the expense of the eastern regions.

The southern Ontario regions and Alberta have experienced pressure on their labour markets because of the rapid growth rates of the industries there and in southern Ontario's case because of the degree of industrial diversification as well. The pressures on the labour forces of Manitoba, Saskatchewan and P.E.I. are partly due to their decline in population in many areas and especially in agricultural areas (Department of Regional Economic Expansion, 1973, 2).

Of the nine cities in the study, five had c_j values which differed from zero by five standard errors, and two more differed by more than three standard errors. Halifax, Ottawa-Hull, and Hamilton had high levels of structural unemployment much the same as their surrounding regions. This is probably due to the slow growth rates of these cities. Toronto, Calgary, and Edmonton, three of the fastest growing cities, experienced pressure on their labour markets, as was the case for their surrounding regions.

Structural Unemployment June 1973

By June of 1973, this pattern had changed somewhat (Figure 9). Many regions in the Maritimes and eastern Quebec had experienced a

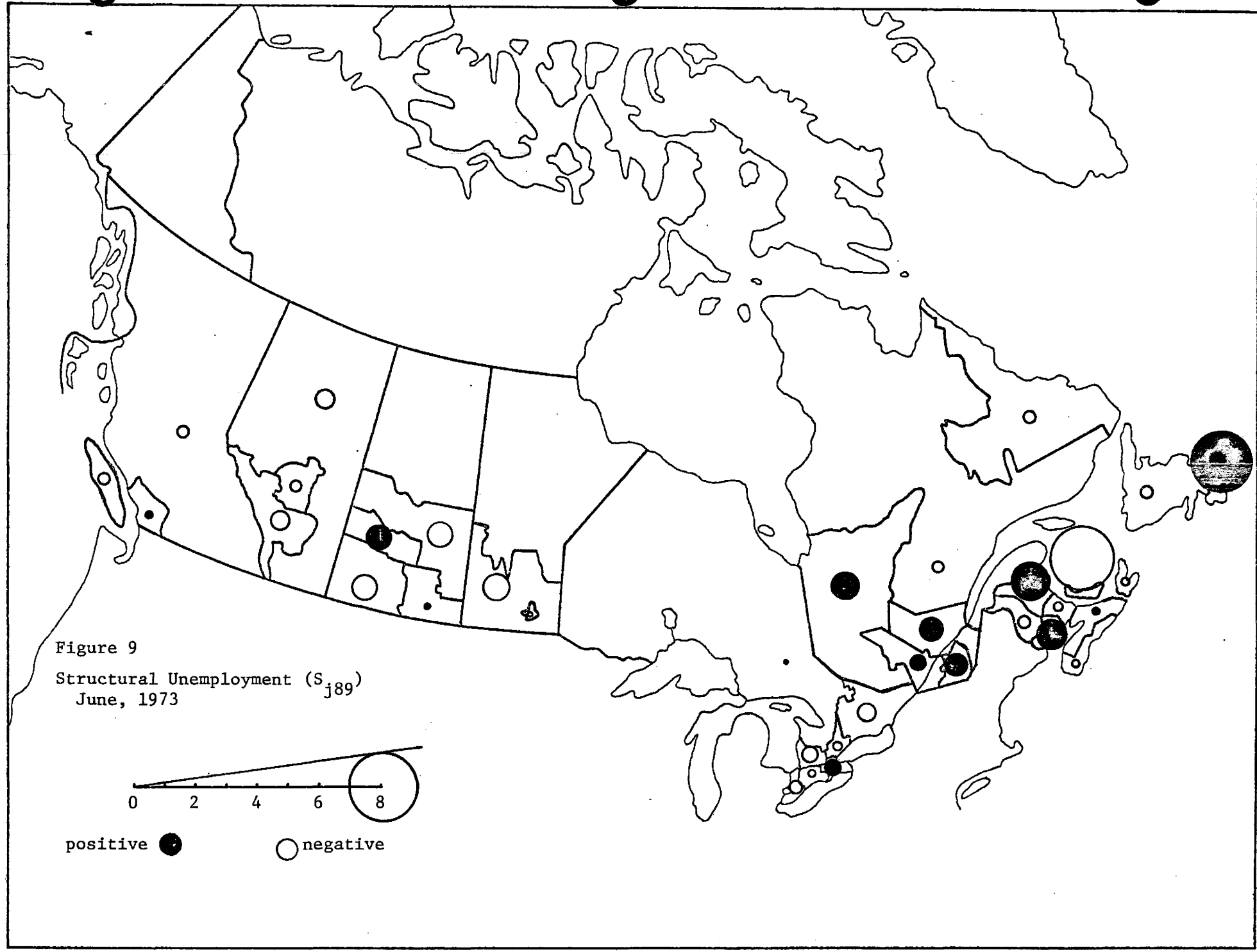


Figure 9

Structural Unemployment (S_{j89})
June, 1973

large decrease in their levels of structural unemployment and had even begun to feel pressure on their labour markets. A few regions, Avalon, Saint John, Eastern Townships, Montreal, West Quebec, had their levels of structural unemployment rise, while others, Laurentians-St. Maurice Valley, North East New Brunswick, simply maintained high levels.

The southern Ontario regions and most of the western Canada regions still had significant pressure on their labour markets. Parts of British Columbia and Manitoba, which felt increasing pressure on their labour markets, and the Saskatoon and Regina regions with their increasing levels of structural unemployment, were the only areas to experience a large change.

The city pattern became fragmented by 1973. Halifax, Hamilton, and then Montreal had excessive structural unemployment. Toronto's and Ottawa's labour markets had become balanced. The western cities were still experiencing pressure on their labour markets, with the exception of Vancouver which had a moderately high level of structural unemployment.

In any case, structural imbalance in the Canadian regional economic system was as prevalent at the end of the study period as it was at the beginning.

Changes In Structural Unemployment 1966-1973

Changes in the degree of structural imbalance over time are illustrated in Figure 10. The size and statistical significance of the time trends which make up these changes are determined by the b_j and d_j coefficients shown in Table 8. Since the S_{jt} value represents the degree of structural imbalance in a single region j at time t, the mean $S_{.t}$ value indicates the average degree of structural imbalance in the

TABLE 9

Changes In The Levels Of Structural Unemployment

		ΔS_{jt}			ΔS_{jt}
1.	Avalon	+1.84	24.	South Manitoba	-1.19
2.	Newfoundland-Labrador	-2.91	25.	Regina	+1.42
3.	Prince Edward Island (P.E.I.)	-5.46	26.	Saskatoon	+3.44
4.	Cape Breton	-1.22	27.	Parklands	- .36
5.	Annapolis-North Shore	- .83	28.	Medicine Hat-Lethbridge	- .74
6.	Halifax-South Shore	-1.69	29.	Calgary	- .53
7.	Moncton	-3.44	30.	Edmonton	+ .13
8.	Saint John	+ .76	31.	B.C. Interior	-1.66
9.	Upper St. John Valley	- .57	32.	Vancouver	+ .50
10.	North-East New Brunswick	-4.63	33.	Vancouver Island	-1.29
11.	Gaspé-North Quebec	-3.32			
12.	Laurentians-St. Maurice Valley	- .38			
13.	Montreal	+1.39		Cities	
14.	Eastern Townships	+2.47			
15.	West Quebec	+2.54	HX.	Halifax	+ .87
16.	Eastern Ontario	-1.93	OH.	Ottawa-Hull	- .69
17.	Toronto	+ .24	MO.	Montreal	+1.81
18.	Niagara	+ .73	TO.	Toronto	+ .48
19.	Central Ontario	- .20	HA.	Hamilton	.00
20.	South-West Ontario	- .15	WI.	Winnipeg	+ .05
21.	Kitchener-Midlands	+ .16	CA.	Calgary	- .57
22.	Northern Ontario	+ .33	ED.	Edmonton	+ .52
23.	Winnipeg	+ .05	VA.	Vancouver	+ .97

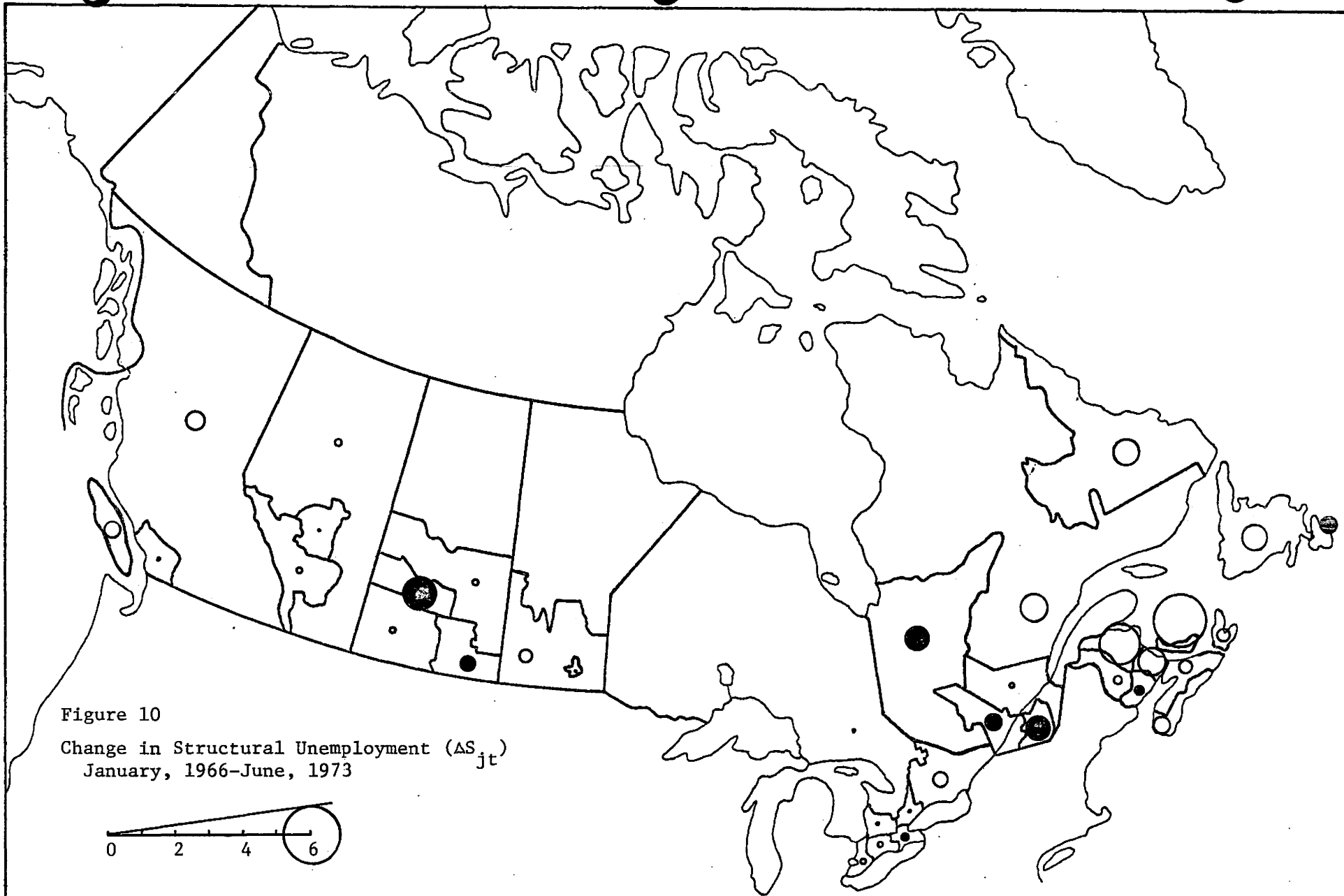


Figure 10

Change in Structural Unemployment (ΔS_{jt})
January, 1966-June, 1973

system at time t. The dispersion of $S._t$ values around zero, as shown by the standard deviation, indicates the degree of structural imbalance in the regional system at time t. An increasing standard deviation over time indicates an increasing degree of structural imbalance which implies that the labour force is not mobile enough to shift between industries and regions in response to structural shifts.

The b_j and d_j coefficients indicate that 14 of the 33 regions have significant trends in their levels of structural unemployment. Eight of these are concentrated in the Maritimes and Quebec. The remainder are scattered evenly throughout the nation. Five of the nine cities in the study also have significant time trends.

Some of the regions such as South-West Ontario, Northern Ontario, and Parklands, which have significant time trends, did not have degrees of structural imbalance at the end of the period much different from those at the beginning. This is because the level of structural imbalance which had been increasing or decreasing over time reversed its direction at some time during the study period, and by the end of the study period had returned to its original level. At the same time, regions such as North Quebec-Gaspe, Newfoundland-Labrador, and Saskatoon, showed relatively large changes in their levels of structural imbalance, although the b_j and d_j coefficients of the time trend were not significant. In the Newfoundland-Labrador case, both coefficients were of the same sign, while for other regions the d_j coefficients were so close to zero they did not affect the slow trend generated by the b_j coefficients. This allowed a considerable change to accumulate over the study period.

The structural shifts which produce the long-term dislocations

in labour market functioning may be aggregate shifts in final demand or changes in technology, the effects of which are concentrated locally, or purely regional shifts resulting from changing locational patterns of industry and population (Casetti, King and Jeffrey, 1971, 241). The industrial mix, size of the regional multiplier, skill mix of the labour force, regional migration, are some of the factors which will affect the structural component of regional unemployment.

It is difficult to make specific explanations of changes in the levels of structural imbalance within regions without knowing in detail the industrial and employment structures of each region and the local structural changes which took place there. On a more general level, it appears that many of the regions considered to be depressed by the Department of Regional Economic Expansion (Figure 11), experienced marked changes in their levels of structural imbalance, or had significant time trends. Only a few non-depressed regions had these characteristics. The remainder of the analysis will be carried out with respect to these two groups of regions.

The mean $S_{.t}$ values were plotted for the 17 depressed regions, the 16 non-depressed regions, the 33 region system, and the nine cities (Figure 12).

The level of structural imbalance in the entire system fell from a high of 0.4 to a low of -0.32 before returning to -0.10 at the end of the study period. The moderate average level of structural unemployment of 1966 had been replaced by a low average pressure on the labour market in 1968. From then, until the end of the study period in 1973, the mean level of structural imbalance approached zero.

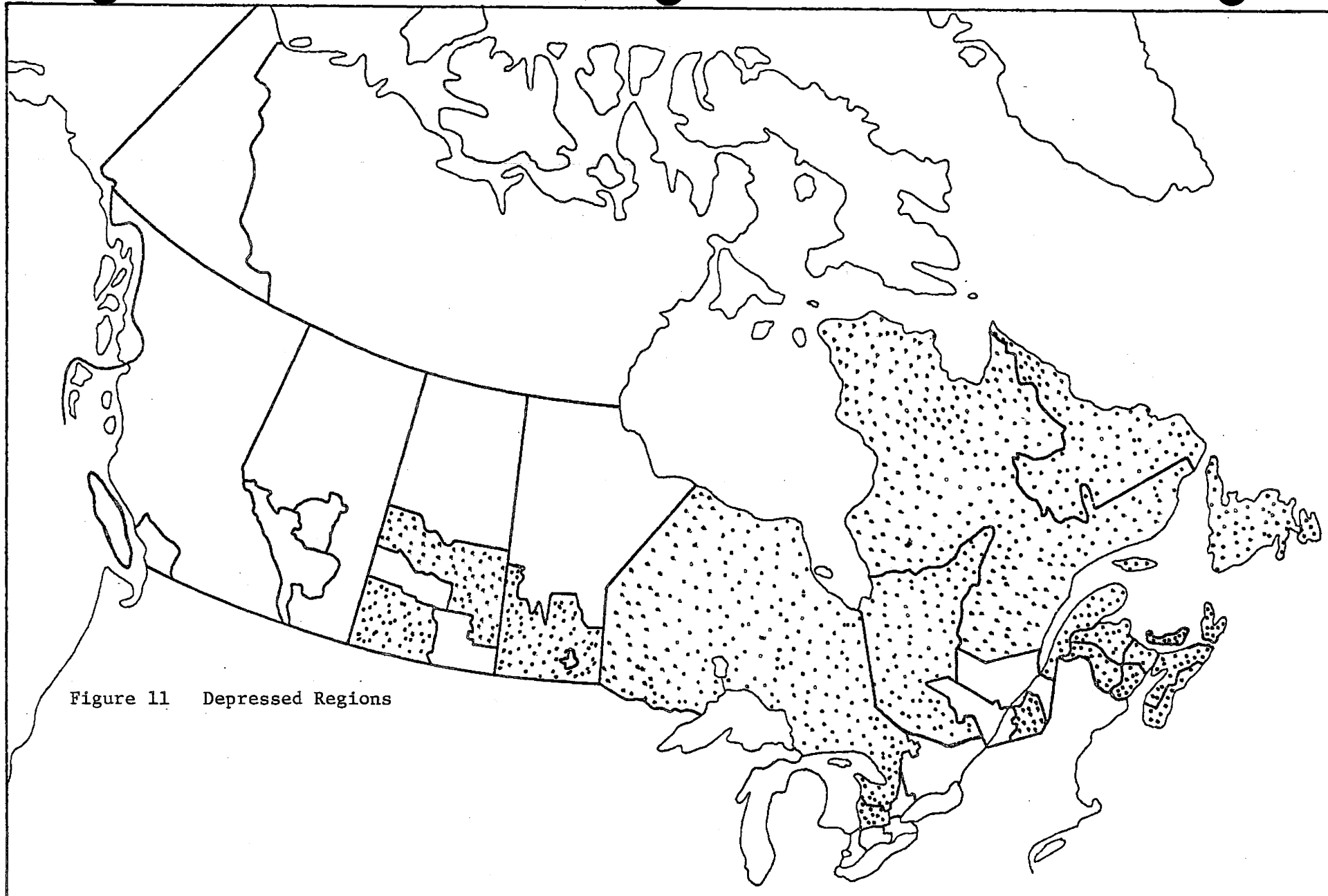
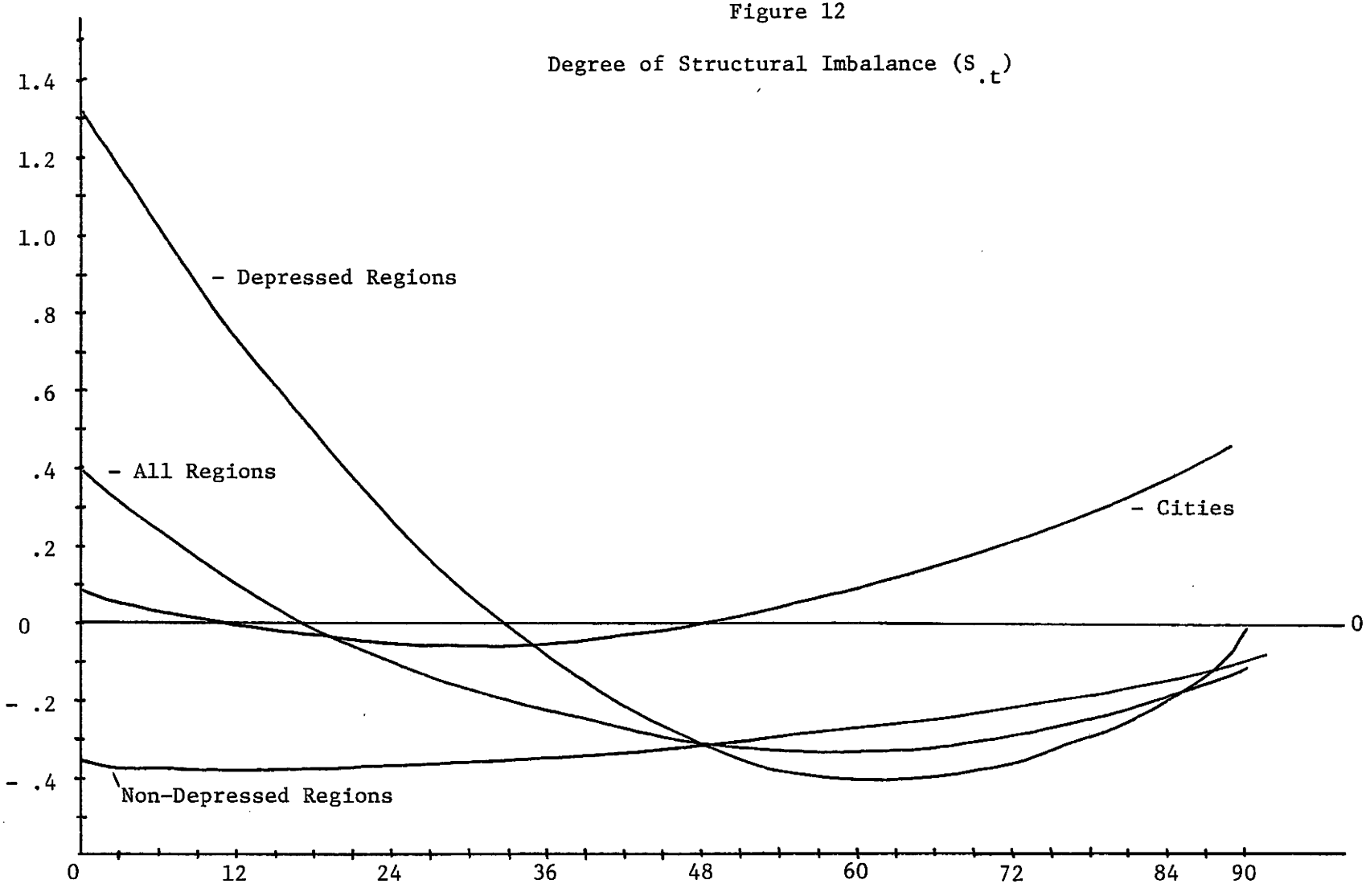


Figure 11 Depressed Regions

Depressed Regions

Figure 12

Degree of Structural Imbalance ($S_{.t}$)



Much of the change can be explained by the behaviour of the depressed regions. Their mean level of structural unemployment ($S_{.t}$ = 1.30) declined to the point where there was some pressure on the labour markets of these regions by 1971 ($S_{.t}$ = -0.37) and the mean in 1973 was near zero ($S_{.t}$ = -0.02).

Many of the depressed regions have had extensive labour force retraining through specific Department of Labour retraining programs. Furthermore, some new industry has been attracted to these areas through incentive programs such as those launched by DREE in the 1960's. This has diversified the industrial base and reduced the dependence on primary resource extraction to some extent. Many of these regions have experienced a significant outmigration of their populations (Department of Regional Economic Expansion, 1973, 2). The above factors have contributed to the drop in excessive levels of structural unemployment in those regions.

Other depressed regions including P.E.I., and parts of Saskatchewan have experienced increased pressure on their labour markets because of their loss of population. This loss is prominent in agricultural areas where there are often shortages of farm workers. The same problem also exists in the forestry and mining industries in parts of Northern Ontario and Northern Quebec (Department of Treasury and Economics, 1971).

The mean level of structural imbalance in the non-depressed regions has remained fairly constant over the study period with values ranging from -0.37 in 1966 to -0.25 in 1973. The growth in job opportunities in these regions has been keeping pace with the growth of the

labour force. Furthermore, the labour force here is relatively mobile between industries and occupations due to the diversified nature of these areas' industrial structures and the relatively high levels of education and skill in the labour force. The non-depressed regions are less vulnerable to structural shifts than are the depressed regions.

The $S_{.t}$ values for the cities, which are near zero from 1966 to 1970, began to increase and by June, 1973 showed an average value of 4.7, indicative of high levels of structural unemployment. This trend was prominent mainly in Halifax, Montreal, and Vancouver and may reflect the migration of the unemployed from surrounding regions into the major centres in search of work or to use these places as jumping off points to Central Canada. The trend may also show the relatively slow growth in job opportunities in these cities.

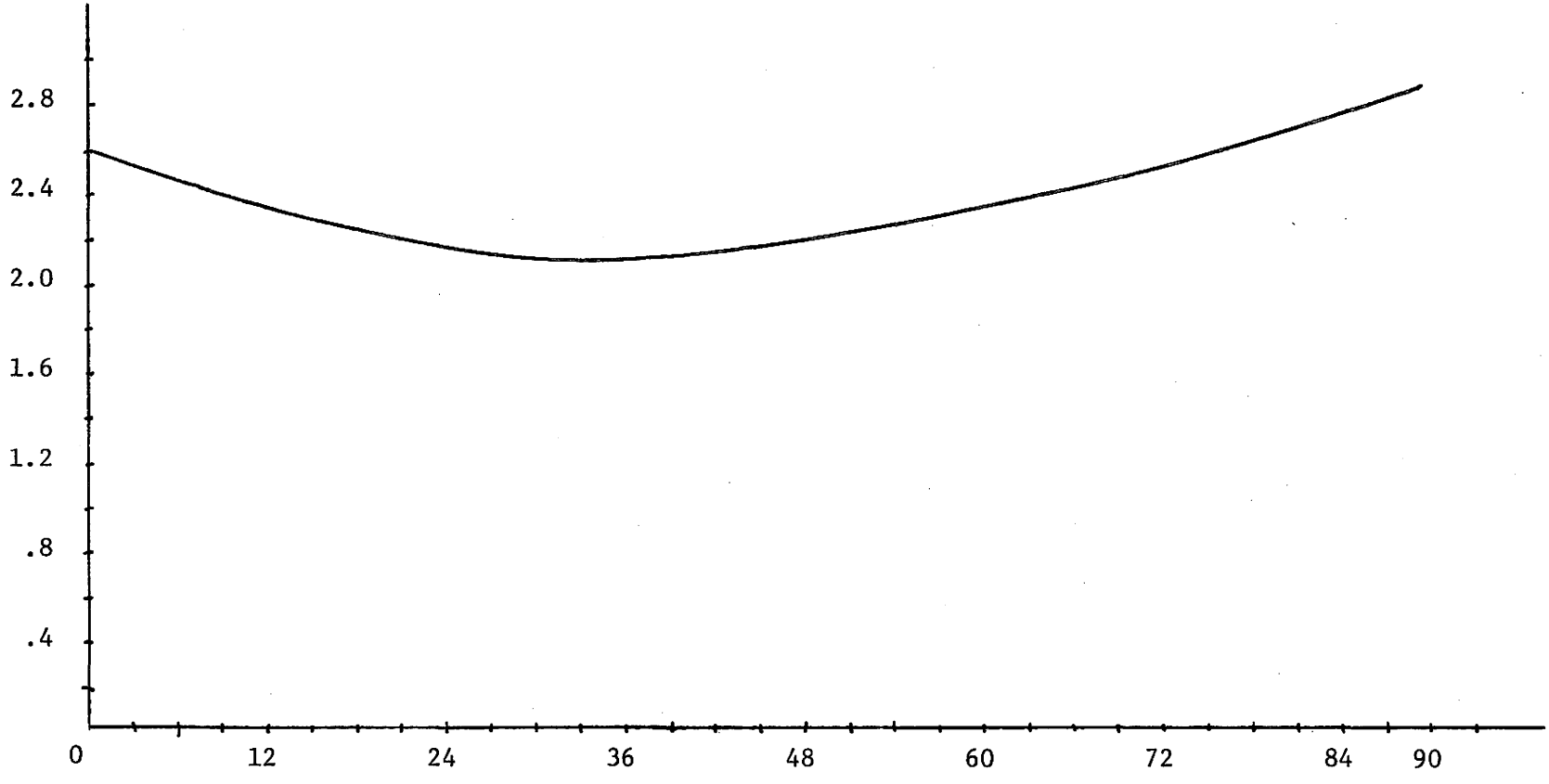
The trend in the variance of $S_{.t}$ values (Figure 13) indicates that there has been no significant reduction in the degree of structural imbalance within the system, and in fact there has been a slight increase. The standard deviation of $S_{.t}$ in January 1966 was 2.52. This value decreased to 2.07 in June of 1968 but rose to 2.83 by June of 1973. Although many depressed regions decreased their levels of structural unemployment over the study period, others retained or even increased their high levels. At the same time some non-depressed regions, a few of which had balanced labour markets in 1966, increased their levels of structural imbalance. This is especially true for the western regions, including Saskatoon, British Columbia Interior, and Vancouver Island.

Overview

Many of the regions in the Canadian economic system had c_j values

Figure 13

Variance of $S_{.t}$



significantly different from zero in January 1966, indicative of a high degree of structural imbalance in their labour markets. Most of these regions also had significant time trends as shown by the values of their b_j and d_j coefficients.

Although the mean $S_{.t}$ value approached zero by the end of the study period, due to the reduction of the excessively high levels of structural unemployment in the Maritimes and Quebec, the increasing variance of $S_{.t}$ above zero, and the remaining high degree of structural imbalance within many individual labour markets shows that structural unemployment is still a major problem in the regional economic system.

Seasonal Unemployment

Due to the great seasonal variations in Canadian climate, large seasonal fluctuations in the levels of unemployment can be expected. Because of their industrial structures some regions are more prone to seasonal unemployment than others. Since this is a recurring problem in these regions, a brief discussion of seasonal unemployment is included in this chapter on structural unemployment.

Seasonal unemployment may be measured by the ratio of the difference in the number of persons unemployed in the first quarter of a year and the 3rd quarter of the previous year, to the number unemployed in the 3rd quarter of the previous year (Hardy, 1970, 6). In general, seasonal unemployment adds 3 to 4 percentage points to the unemployment rate, not including students and others who voluntarily leave the labour force in the fall (Peitchinis, 1970, 260).

Seasonality differentially affects various industries and regions. Ostry (Ostry and Zaidi, 1972, 137) notes that seasonal unemployment rates

are highest in the logging and construction industries and in agriculture. Seasonal variations in the employment rate are as follows: Canada 4.4%, Maritimes 8.6%, Quebec 4.4%, Ontario 2.9%, the Prairies 5.9%, and B.C. 4.1% (Denton, 1966, 8). It is clear that the areas which specialize in primary activities are most susceptible to seasonality.

Figure 14 shows the regions which have values for the seasonal dummy variable coefficients, d_1, d_2, and d_3 greater than two and greater than three times their standard errors (Table 10). Sixteen regions have coefficient values greater than three times their standard errors, and a further nine regions have coefficient values greater than two times their standard errors. The nine cities generally reflect the same unemployment response to seasonality as their surrounding regions. Clearly seasonal unemployment is a very significant problem within the Canadian regional economic system.

Furthermore, the coefficient values tend to be positive in areas of high structural unemployment which are generally the areas dependent on non-agricultural primary industries, and negative in the areas which have pressure on their labour markets, the predominately agricultural areas. The former suffer from production slowdowns in the winter months, which result in high levels of seasonal unemployment. This is the case in the Maritimes and Quebec. P.E.I. and many western regions suffer from labour shortages in the planting and harvesting seasons.

The regions of the Great Lakes - St. Lawrence Lowland, which rely on manufacturing and service industries and have diversified

industrial structures, show few effects of seasonality.

TABLE 10

Seasonal Unemployment

		d_1	d_2	d_3
1.	Avalon	1.54*	-1.25	-2.69**
2.	Newfoundland-Labrador	3.13**	1.42*	- .46
3.	Prince Edward Island (P.E.I.)	.33	-1.78*	-1.20
4.	Cape Breton	.15	.34	1.76*
5.	Annapolis-North Shore	1.56*	.24	- .30
6.	Halifax-South Shore	1.07**	- .13	- .03
7.	Moncton	1.74*	1.00	- .43
8.	Saint John	1.04*	.25	- .55
9.	Upper St. John Valley	.85	.43	.01
10.	North-East New Brunswick	7.65**	- .37	-5.43**
11.	Gaspe'-North Quebec	3.12**	.54	-1.96**
12.	Laurentians-St. Maurice Valley	1.70**	.45	- .65**
13.	Montreal	- .14	- .20	- .11
14.	Eastern Townships	.99*	.17	- .12
15.	West Quebec	.63	.96	.02
16.	Eastern Ontario	- .49	- .06	.33
17.	Toronto	- .40	.17	.52**
18.	Niagara	.22	.30	.38
19.	Central Ontario	.23	.17	.34
20.	South-West Ontario	.32	.83	1.03**
21.	Kitchener-Midlands	- .52	- .06	.13
22.	Northern Ontario	- .13	.41	.39
23.	Winnipeg	.45	.55*	1.06**

(continued)

TABLE 10 (continued)

		d_1	d_2	d_3
24.	South Manitoba	.62	-1.08**	- .75**
25.	Regina	.68*	.08	.15
26.	Saskatoon	2.79**	1.49**	.71
27.	Parklands	.13	- .72*	- .65*
28.	Medicine Hat-Lethbridge	- .95**	- .91**	- .68**
29.	Calgary	- .86*	-1.00**	- .09
30.	Edmonton	- .84**	- .32	- .04
31.	B.C. Interior	-1.09**	- .41	- .76*
32.	Vancouver	- .88*	- .67*	- .49
33.	Vancouver Island	-1.70**	-1.06**	- .02
	Cities			
HX.	Halifax	1.05**	1.31**	.76**
OH.	Ottawa-Hull	.83	- .25	.14
MO.	Montreal	- .28	- .13	- .00
TO.	Toronto	- .36	.29	.39*
HA.	Hamilton	.72**	- .25	- .21
WI.	Winnipeg	.45	.55*	1.06**
CA.	Calgary	- .84	-1.11**	.01
ED.	Edmonton	- .77*	- .29	- .04
VA.	Vancouver	- .97*	- .44	- .24

** Greater than 3 standard errors.

* Greater than 2 standard errors.

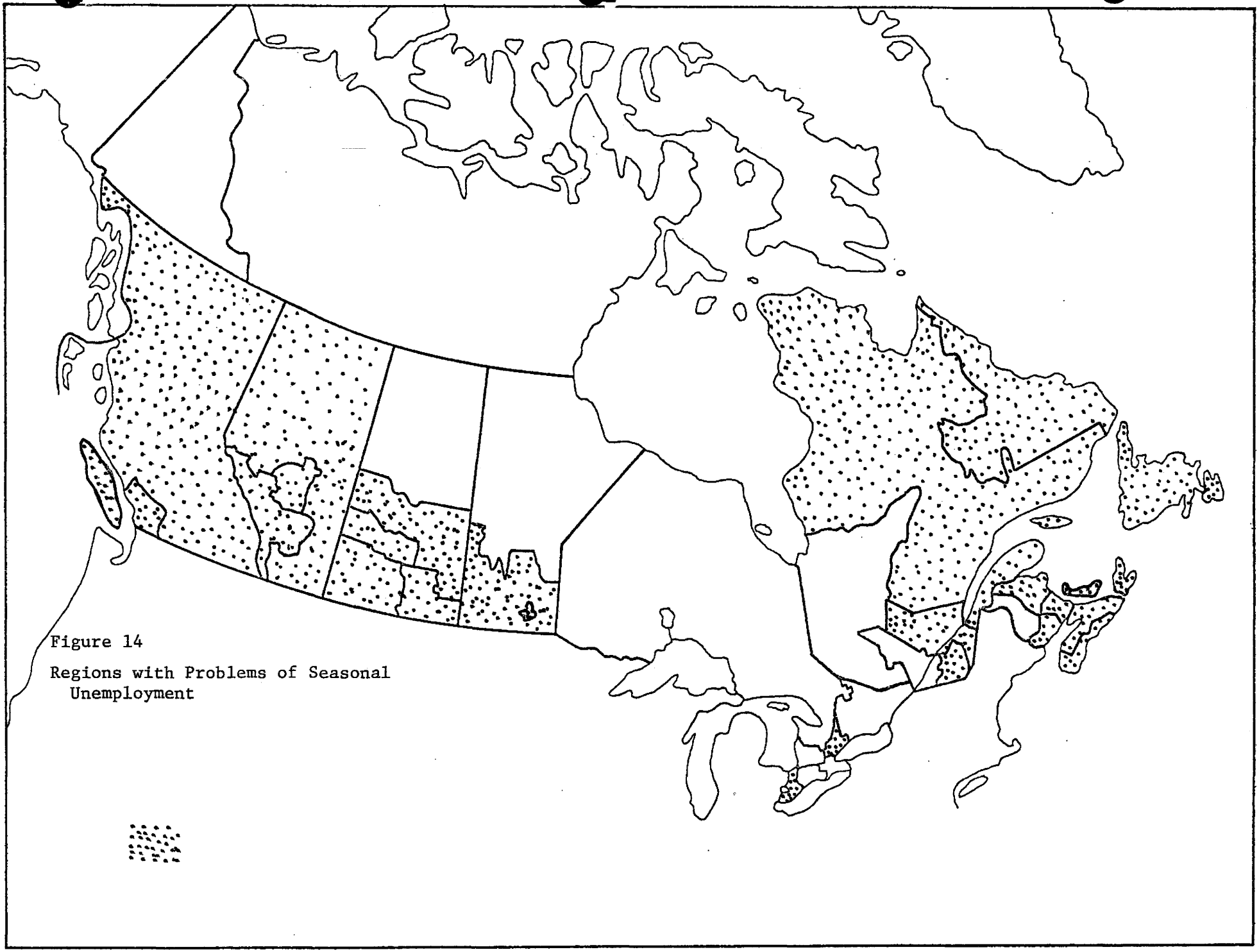


Figure 14

Regions with Problems of Seasonal Unemployment

CHAPTER VI

THE REGIONAL CYCLICAL COMPONENT OF REGIONAL UNEMPLOYMENT

The regional cyclical component of unemployment, R_{jt}, will be discussed in this chapter. Because there is no readily available independent information on the causes of this component of regional unemployment, it must be assumed that the residuals from the regression equations reflect the regional cyclical component R_{jt}. The residual series for each region will first be tested for positive auto-correlation to measure the significance of the regional cycles.

Two properties of the residual cycles are of special interest. The amplitudes of the regional cycles will be discussed and compared to the a_j values of their respective regions. Then, the cyclical patterns of the regional cyclical component will be studied through the use of a correlation and linkage analysis in an attempt to determine the spatial patterns of the transmission of these cycles.

Auto-Correlation In The Residuals

The residual series are made up of the regional cyclical components of unemployment but also include error elements which may alter or obliterate any cyclical pattern. A Durbin-Watson analysis of the residuals is necessary in order to determine whether the residuals are positively auto-correlated and show a cyclical pattern.

The results of this test are listed in Table 11. A d-statistic of 2 indicates zero auto-correlation. Lower values of d indicate

TABLE 11

The Durbin-Watson Statistic

1.	Avalon	1.31*	24.	South Manitoba	1.27*
2.	Newfoundland-Labrador	1.51*	25.	Regina	.77*
3.	Prince Edward Island (P.E.I.)	1.14*	26.	Saskatoon	1.22*
4.	Cape Breton	.98*	27.	Parklands	1.13*
5.	Annapolis-North Shore	1.02*	28.	Medicine Hat-Lethbridge	1.66
6.	Halifax-South Shore	1.23*	29.	Calgary	1.08*
7.	Moncton	1.43*	30.	Edmonton	1.60
8.	Saint John	1.57	31.	B.C. Interior	1.23*
9.	Upper St. John Valley	1.07*	32.	Vancouver	1.10*
10.	North-East New Brunswick	1.22*	33.	Vancouver Island	1.24*
11.	Gaspé-North Quebec	1.23*			
12.	Laurentians-St. Maurice Valley	1.13*			
13.	Montreal	1.30*		Cities	
14.	Eastern Townships	.66*			
15.	West Quebec	.98*	HX.	Halifax	1.26*
16.	Eastern Ontario	1.24*	OH.	Ottawa-Hull	1.02*
17.	Toronto	1.12*	MO.	Montreal	1.08*
18.	Niagara	1.32*	TO.	Toronto	1.11*
19.	Central Ontario	1.39*	HA.	Hamilton	1.21*
20.	South-West Ontario	.87*	WI.	Winnipeg	1.14*
21.	Kitchener-Midlands	1.06*	CA.	Calgary	1.10*
22.	Northern Ontario	1.49	ED.	Edmonton	1.61
23.	Winnipeg	1.14*	VA.	Vancouver	1.08*

* Significant at the 95% level.

positive auto-corretation.

Twenty-eight of the 33 regions and eight of the nine cities have d-statistics which are significantly different from 2 at the 95 percent level of significance. Therefore, most of the regions and cities in this study have distinct cycles of unemployment attributable to the regional cyclical component of unemployment R_{jt}. The remaining five regions and single city, while not having d-statistics which are significant in indicating the existence of regional cycles of unemployment, also do not have d-statistic values close enough to 2 to significantly reject the possibility of a cyclical pattern among the residuals.

The Amplitudes of the Regional Cycles

The amplitudes of the residual cycles are measured by the residual standard errors, the square roots of the mean squared residuals. These residual standard errors can be taken to measure the mean of the R_{jt} for each region (Brechling, 1967, 17), and are presented in Table 12. Their distribution is shown in Figure 15.

The standard error values range from a low of 0.35 for the Montreal Region to a high of 4.72 for the Upper Saint John Valley. A marked spatial pattern of values is apparent. The most unstable regions, with respect to the regional cyclical component of unemployment, are in the Maritimes and Quebec. The most stable regions are in the Great Lakes - St. Lawrence Lowland. The western regions have values ranging between these two extremes, although most regions have residual cycles with relatively small amplitudes, their standard error values being less than unity. This pattern is similar to the pattern of a_j values, which

TABLE 12

Regional and National Cyclical Amplitudes

		Residual Std. Error (S.E.)	a_j	S.E./a_j
1.	Avalon	1.61	1.01	1.59
2.	Newfoundland-Labrador	1.99	2.24	.89
3.	Prince Edward Island (P.E.I.)	2.33	2.59	.90
4.	Cape Breton	1.77	2.03	.87
5.	Annapolis-North Shore	1.34	1.26	1.06
6.	Halifax-South Shore	.68	.94	.72
7.	Moncton	1.82	1.25	1.46
8.	Saint John	1.13	.41	2.76
9.	Upper St. John Valley	1.35	1.29	1.05
10.	North-East New Brunswick	4.72	1.90	2.48
11.	Gaspe'- North Quebec	2.18	2.52	.87
12.	Laurentians - St. Maurice Valley	.79	.72	1.10
13.	Montreal	.35	.90	.39
14.	Eastern Townships	1.02	.90	1.13
15.	West Quebec	1.50	1.07	1.40
16.	Eastern Ontario	.61	1.06	.58
17.	Toronto	.50	.84	.60
18.	Niagara	.68	.53	1.28
19.	Central Ontario	.77	.74	1.04
20.	South-West Ontario	1.36	.82	1.66
21.	Kitchener-Midlands	.72	.81	.89
22.	Northern Ontario	.63	.96	.66
23.	Winnipeg	.79	.86	.92
24.	South Manitoba	.76	1.23	.62
25.	Regina	.90	.78	1.15

TABLE 12 (continued)

26.	Saskatoon	1.10	.54	2.03
27.	Parklands	.99	.93	1.06
28.	Medicine Hat - Lethbridge	.53	1.04	.55
29.	Calgary	.82	1.24	.66
30.	Edmonton	.60	.99	.61
31.	B.C. Interior	.87	1.37	.64
32.	Vancouver	.89	1.06	.84
33.	Vancouver Island	1.16	1.35	.86
	Cities			
HX.	Halifax	.83	.29	2.86
OH.	Ottawa-Hull	.95	.75	1.27
MO.	Montreal	.43	.58	1.50
TO.	Toronto	.50	.74	.58
HA.	Hamilton	.87	.82	.61
WI.	Winnipeg	.79	.86	.92
CA.	Calgary	.92	1.32	.70
ED.	Edmonton	.72	.98	.73
VA.	Vancouver	.91	1.01	.90

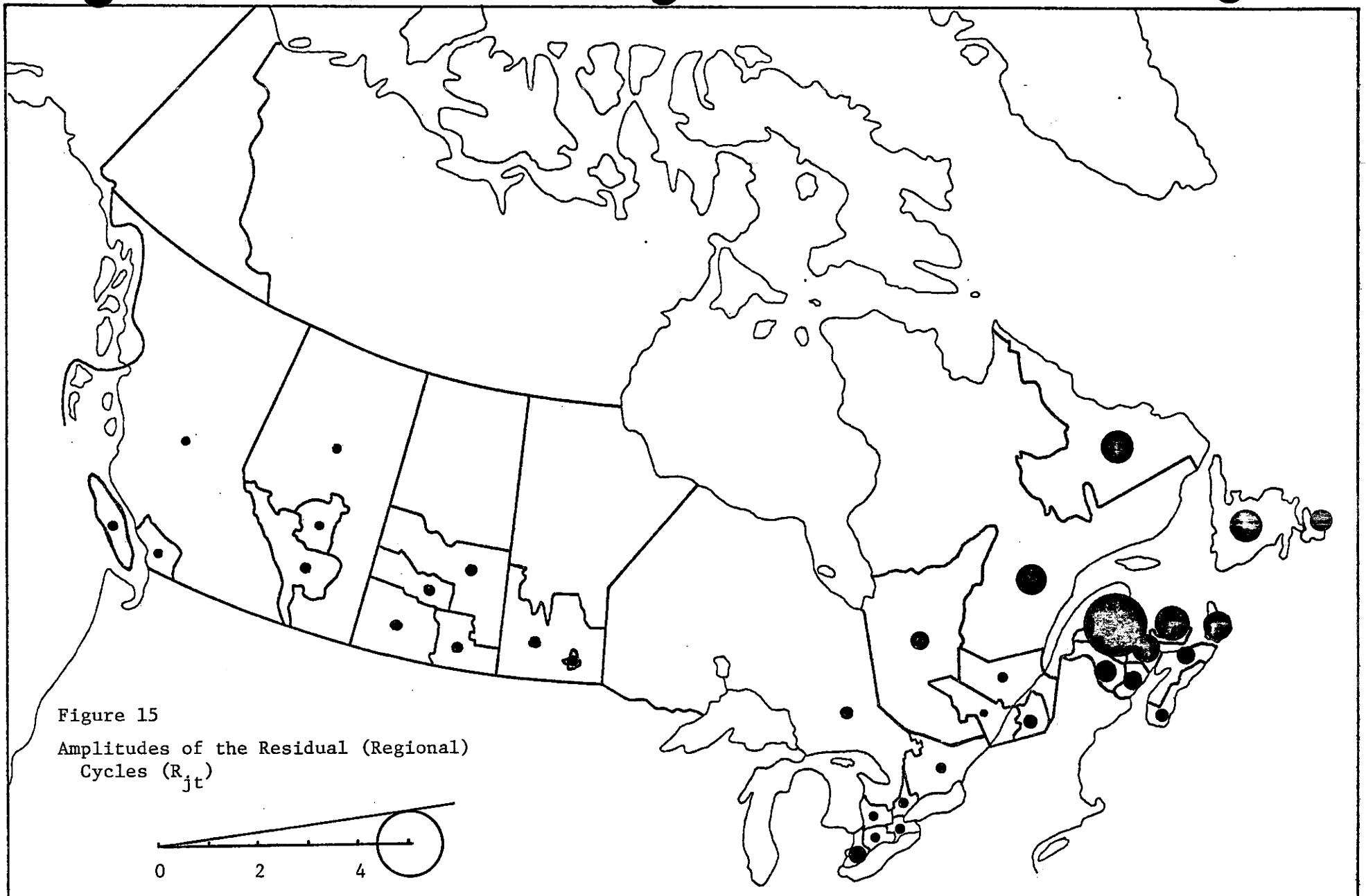


Figure 15

Amplitudes of the Residual (Regional) Cycles (R_{jt})

indicate regional sensitivities to national cyclical impulses (Figure 5). A Spearman's rank correlation was applied to the a_j and standard error values for the 33 regions and a correlation coefficient of r = 0.528 was obtained. This value is significant at the 99 percent level of confidence and indicates a relationship between the two sets of data. This is not surprising as many of the factors which influence a region's a_j value, such as export base characteristics, the degree of industrial diversification, and labour force characteristics, among others, also influence the region's sensitivity to regional cyclical forces (Sant, 1973, 5-6). The effect of these factors on regional sensitivities in terms of fluctuations in unemployment levels has been discussed in Chapters II and IV. The characteristics of the economies of these areas have been summarized in a very general sense. Briefly, the Maritime and Quebec regions rely on primary industries (forestry, fishing, mining) for their export base. This rather narrow base produces non-final durable goods, which have relatively high income elasticities of demand, for further processing in central Canada. The area's imports consist of consumer durable goods which have lower income elasticities of demand. The regions of the Great Lakes - St. Lawrence Lowland have a more diversified economic base which produces a large volume of consumer durable and non-durable goods and services for local consumption as well as export. The western regions depend on agriculture to a greater extent than the Maritimes and this primary industry is more cyclically stable than the other primary industries. Some areas, Calgary, Edmonton, are diversifying their economic bases, but for the most part they ship non-durable consumption goods to central Canada for further processing or

final use. The mean of the standard errors for the 33 regions is 1.19 while it is only 0.77 for the 9 cities. This may be due to the cities' greater dependence on the more stable service industries and non-durable goods.

In spite of the expected close similarity of a region's sensitivity to national and regional cyclical impulses, some regions display a marked difference between these two measures. The ratios of the standard error of the R_{jt} value to the a_j value of its respective region are listed in Table 12. Large values above unity indicate that the region's cyclical fluctuations in unemployment levels due to regional cyclical impulses are greater than would be expected given the region's sensitivity to national cyclical impulses. Small values below unity indicated the opposite.

These differences may result from spatial factors or purely local phenomena. A region's trading relationships with other regions, or special economic characteristics within that region may give it the ability to dampen the impact of regional cyclical impulses, or on the other hand amplify the effect of those impulses (Sant, 1973). Without knowing the economic characteristics and trading relationships of the regions involved it is difficult to explain the large differences between the residual standard errors and a_j values. Although data on the economic characteristics of the regions was unavailable in greater detail, a correlation and linkage analysis was used in an attempt to reveal patterns of interregional trade. These patterns play a vital role as the transmission of regional cyclical impulses is via import-export linkages.

Correlation and Linkage Analysis

First, a correlation analysis was performed on the residual series. The results are presented in Table 13. Jeffrey (1972, 66) points out that correlation between regional residual series provides a measure of interregional cyclical interaction and that regions with similar regional cycles are exposed to similar cyclical forces.

An examination of Table 13 reveals several clusters of regions which have significantly correlated regional cycles of unemployment. The regions and cities are entered in the table in order of their location in Canada, ranging from east to west. There are four positively correlated clusters along the main diagonal corresponding to regional groupings commonly referred to as the Maritimes, Southern Ontario, the Prairies, and British Columbia. The clusters of regions located along the main diagonal represent groups of regions which are spatially close together. Because of the distance-decay relationship which exists in interregional trade, it is expected that such groupings would appear. These groupings are also expected on the basis of the similar and complementary industrial structures within each group. Similar results were achieved by Hartwick and Crowley (1972) in their work on Canadian cities.

It is important to note the many anomalies in Table 13. One example includes the Halifax-South Shore, Cape Breton, and Annapolis-North Shore regions (regions 6, 4 and 5 respectively) which are not correlated with the other Maritime regions. Without more detailed knowledge of the industrial structures and trading relationships of the regions in question it is difficult to explain their behaviour. At this point it

TABLE 13

Regional Cycle Correlation Matrix

	1	2	3	4	5	6	HX	7	8	9	10	11	12	13	MO	14	15	OH	16	17	TO	18	HA	19	20	21	22	23	24	25	26	27	28	29	CA	30	ED	31	32	VA	33	
1		0	0	−	0	.	−	0	0	0	0	0	.	.	.	.	−	θ	−	θ	θ	−	−	−	θ	.	−	−	0	0	.	.	.	−	−	−	−	.	−	−	θ	1
2			0	0	0	.	−	0	0	0	0	0	0	−	−	.	.	θ	θ	θ	θ	θ	−	−	θ	−	−	θ	0	0	0	0	.	−	−	−	−	0	θ	θ	θ	2
3				0	0	.	−	0	.	.	0	.	.	.	−	−	.	.	.	θ	θ	θ	−	−	θ	.	.	θ	0	−	0	0	0	θ	θ	−	θ	.	θ	θ	−	3
4					.	.	.	.	−	−	.	.	.	.	.	−	0	.	.	−	−	−	.	−	−	.	.	.	−	.	.	−	.	θ	θ	−	−	−	θ	θ	θ	4
5					.	−	.	.	.	0	.	.	θ	θ	−	0	.	.	θ	θ	−	.	.	−	0	−	−	0	−	.	.	.	θ	θ	.	−	.	θ	θ	θ	5
6						0	−	.	−	−	θ	θ	0	.	.	.	.	.	.	.	−	.	.	−	.	−	−	−	−	−	−	−	−	−	θ	θ	−	−	−	.	6
HX							−	−	.	θ	−	−	0	0	−	.	.	.	.	.	.	.	.	.	.	.	.	θ	−	.	−	−	.	.	−	−	θ	−	−	.	H
7								0	0	0	0	0	−	−	.	−	θ	θ	θ	θ	θ	−	−	θ	−	−	−	.	0	0	0	.	−	−	.	.	.	θ	θ	θ	7
8									0	0	0	0	−	−	−	−	−	θ	θ	θ	−	−	−	−	θ	−	−	.	.	−	0	−	.	.	.	0	.	−	−	−	8
9										0	0	0	−	−	−	θ	θ	−	θ	θ	−	−	−	−	θ	−	θ	−	−	.	.	−	.	−	.	0	.	θ	θ	θ	9
10											0	0	θ	θ	.	.	θ	θ	θ	θ	θ	.	−	θ	−	−	θ	0	0	0	0	.	θ	θ	.	.	.	θ	θ	θ	1
11												0	θ	θ	.	−	θ	θ	θ	θ	θ	−	θ	θ	−	−	θ	.	.	0	0	−	.	−	.	0	−	−	θ	θ	1
12													−	−	−	.	θ	−	θ	θ	−	−	θ	θ	−	.	−	−	.	0	.	−	−	−	.	.	.	−	−	θ	1
13														0	−	θ	.	.	.	−	.	−	−	.	.	.	−	−	−	−	−	−	.	θ	θ	−	−	.	.	1
MO															.	θ	−	−	−	−	−	−	θ	−	.	0	−	.	.	−	−	−	.	θ	θ	−	.	.	.	M
14																−	−	−	−	−	θ	θ	θ	−	−	θ	−	0	.	.	.	.	.	.	.	.	.	.	.	1
15																	0	.	.	.	−	.	.	.	0	.	.	.	.	.	−	0	θ	θ	−	−	−	−	−	θ	1
OH																		0	0	0	.	−	.	.	0	.	.	.	θ	−	θ	−	θ	−	−	−	−	.	.	−	0
16																			0	0	.	.	−	−	.	.	−	−	θ	−	θ	−	−	−	−	−	−	.	.	.	1
17																				0	0	0	0	0	.	.	.	θ	θ	θ	θ	−	.	.	.	.	θ	.	.	0	1
TO																					0	0	.	0	.	.	.	θ	θ	θ	θ	−	.	.	.	.	−	.	.	−	T
18																						0	0	.	0	.	.	−	θ	.	θ	−	−	.	.	.	.	−	.	.	.	1
HA																							0	.	.	.	−	θ	.	−	−	−	−	−	−	−	.	−	−	−	H
19																								0	.	−	0	θ	−	θ	−	.	−	−	θ	θ	−	−	−	−	1
20																									0	.	−	−	−	−	.	−	.	.	0	.	−	−	−	.	2
21																										0	−	.	−	.	−	−	θ	θ	.	.	θ	−	−	.	2
22																											θ	−	−	.	.	.	θ	θ	−	−	−	.	.	.	2
WI23																												−	.	−	θ	−	.	.	θ	θ	0	.	.	.	2
24																													0	0	0	.	−	−	.	−	0	−	−	−	2
25																														∘	0	.	.	.	−	−	.	−	−	−	2
26																															0	.	−	−	.	.	−	θ	−	θ	2
27																																.	0	.	.	.	.	θ	θ	−	2
28																																	−	−	−	.	.	.	−	2
29																																		0	.	.	.	.	.	0	2
CA																																			.	.	.	.	.	0	C
30																																				0	−	−	−	.	3
ED																																					−	−	−	.	E
31																																						−	−	.	3
32																																							0	0	3
VA																																								0	V
33																																									3

θ negative correlation significant at 95% level

0 positive correlation significant at 95% level

. positive correlation

− negative correlation

can only be said four regional cyclical patterns were found, the Maritimes and Prairies having positive correlations with each other, and the Southern Ontario and B.C. regions being negatively correlated with them.

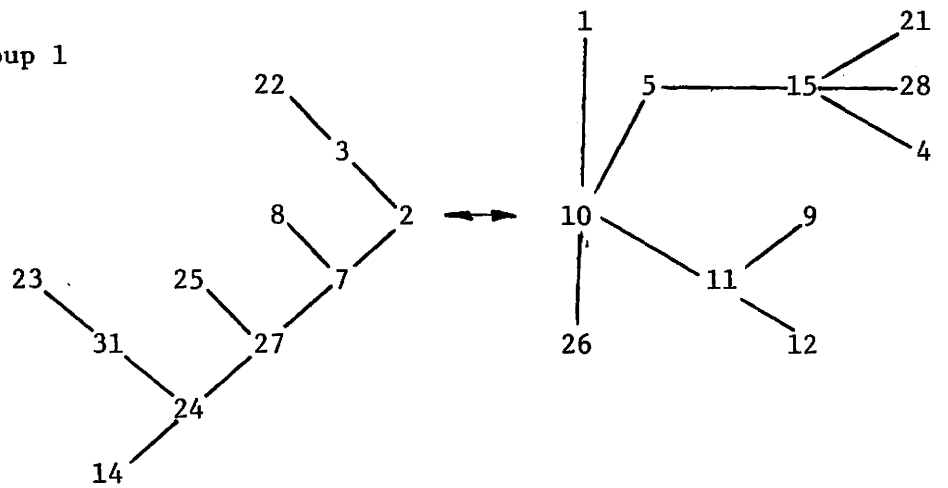
To further illustrate the spatial linkages between regions, a linkage analysis was performed on the 33 regions (McQuitty, 1957 , 207-227). The results presented in Figures 16 and 17 are difficult to explain. Two thirds of the regions fall into a single linked group which includes most of the relatively depressed regions and those which depend mainly on natural resources or agriculture. The remaining four groups consist of only two to four regions each. While some of the groupings seem logical (Ottawa-Toronto, Victoria-Vancouver-Calgary) others such as Halifax-Montreal are more difficult to explain. Furthermore, the lack of detail here does not aid greatly in the total analysis.

In summary, it appears that there are four regional cyclical patterns, the Maritimes and Prairies being positively associated and the southern Ontario and British Columbia regions being negatively correlated with them. Furthermore, the amplitudes of these regional cycles appear to be greatest in the Maritimes and eastern Quebec, smallest in the Great Lakes - St. Lawrence Lowland and inbetween these two extremes in the Prairies and British Columbia.

FIGURE 16

Linkage Analysis of Regions

Group 1



Group 2 — 32 ⟷ 33 - 29

Group 3 — 16 - 17 ⟷ 20 - 30

Group 4 — 6 ⟷ 13

Group 5 — 18 ⟷ 19

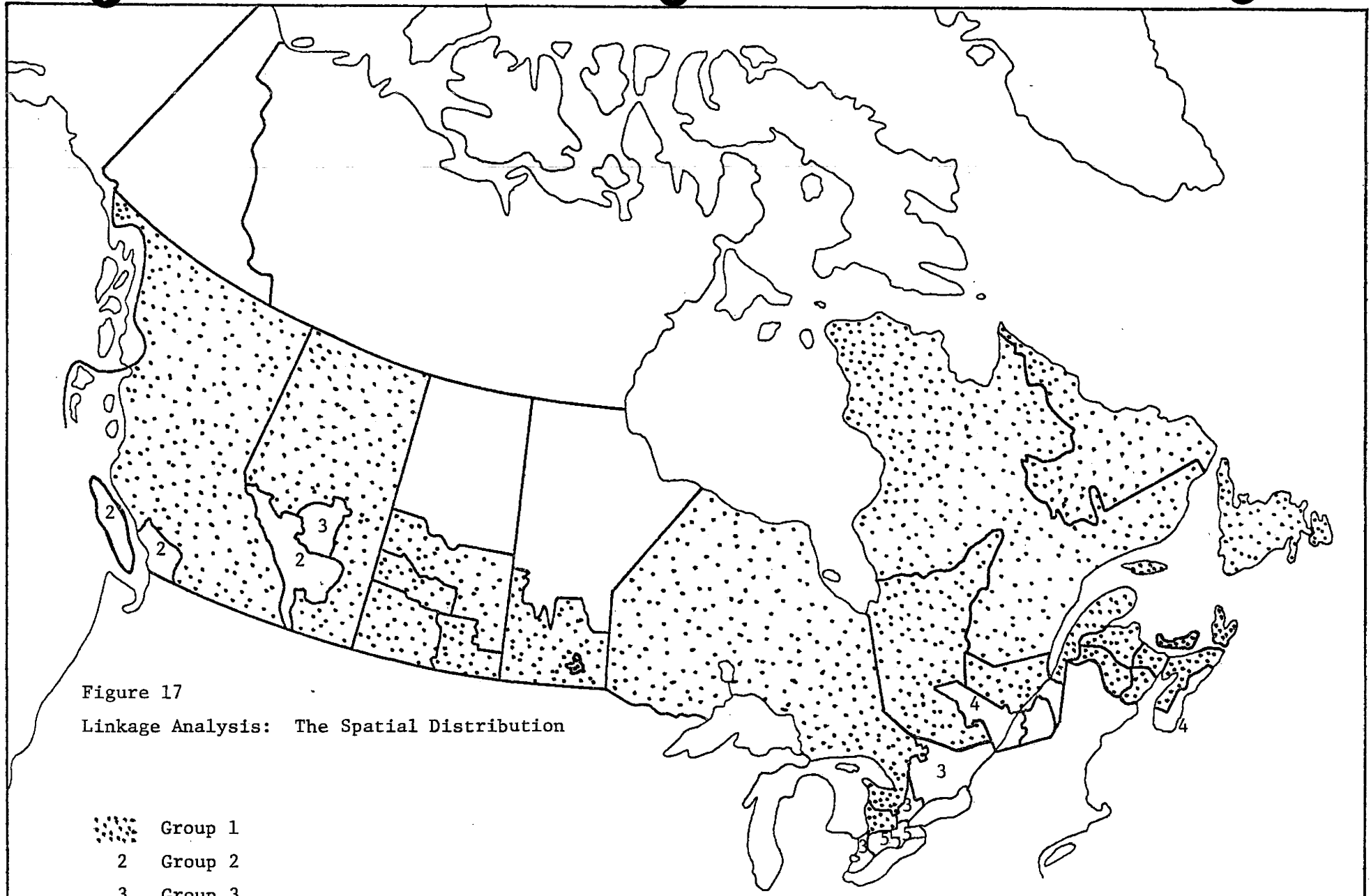


Figure 17

Linkage Analysis: The Spatial Distribution

Group 1
2 Group 2
3 Group 3
4 Group 4
5 Group 5

CHAPTER VII

CONCLUSIONS AND POLICY IMPLICATIONS

In Chapter III the problem of regional unemployment was said to be greater, the less closely the regional unemployment level U_{jt} conformed to the national level of unemployment U_{jt}. These disparities in unemployment levels may be brought about by several factors which are manifested in the various categories of unemployment represented by the parameters of the regression equation of Chapter III,

$$U_{jt} = a_j U_{t+n_j} + c_j + b_j t + d_j t^2 + d_1 D_1 + d_2 D_2 + d_3 D_3 + R_{jt} .$$

The disparities arise from leads or lags in the relationship between u_{jt} and $U_{jt}(n_j \neq 0)$, by a non-proportionate influence of U_{jt} on $u_{jt}(n_j \neq 1)$, by an independent constant in $u_{jt}(c_j \neq 0)$, by an independent time trend in $u_{jt}(b_j \neq 0$ or $d_j \neq 0)$, by independent seasonality influences$(d_1 \neq 0$, $d_2 \neq 0$, or $d_3 \neq 0)$ and finally by an independent regional cyclical component $(R_{jt} \neq 0)$. Appendix A shows that virtually everyone of the 33 regions and nine cities in the study has at least one parameter differing significantly from unity or zero, whichever may be the case. These are listed below:

	$a_j \neq 1$	$n_j \neq 0$	$c_j \neq 0$	b_j or $d_j \neq 0$	d_1, d_2, or $d_3 \neq 0$
Regions (33)	9	8	21	14	25
Cities (9)	3	2	6	5	6

It appears that nearly all regions and cities suffer from some problems of regional unemployment. However, no index of this problem has been

constructed as it would mean assigning arbitrary weights to the various components. The equations

$$a_j = 1$$

and

$$n_j = c_j = b_j = d_j = d_1 = d_2 = d_3 = 0$$

give us norms with which particular estimated values of the parameters can be compared. In general, a particular regional unemployment problem can be measured by the deviations of the region's parameters from the norms specified in the above equations. At this point it is not possible to determine just how severe a problem of regional unemployment exists in a particular region given just its parameters' deviations from their norms. Does an a_j value of 1.4 for a region indicate a large or small problem of regional unemployment? Where several parameters deviate from their norms in an offsetting manner their joint impact upon the region's unemployment rate will be of a very complex nature and difficult to analyse.

Even without an index, it is clear that the Maritime and eastern Quebec regions have the most severe problems of regional unemployment as revealed by their high regional unemployment rates which include relatively large components of seasonal and structural unemployment. On the other hand, the regions of southern Ontario have regional unemployment problems due to their very low unemployment rates.

Some policy implications can be drawn from this study. First of all, the policies of the Federal government to lower levels of unemployment through the lowering of the national unemployment rate have not been very successful. While some regions have lessened their problem

such as the Halifax area,
over the study period (Halifax-South Shore), other regions have had their unemployment problems worsen (Gaspe-North Quebec). Some regions are more responsive to changes in aggregate demand and national fiscal and monetary policies. Certain regions will suffer from inflationary pressure on their labour markets while the level of national unemployment is still high, while other regions will retain high levels of unemployment even after the national level of unemployment has been appreciably lowered.

Secondly, it seems unlikely that inequalities in the level of unemployment between regions can be eliminated simply by lowering the national unemployment rate, due to the different manner in which the various components of unemployment will act and their relative weight or importance in each region. Furthermore, it appears that there are no automatic market forces which will bring about the desired change. Therefore, the Federal and Provincial governments must concentrate on differential policy measures to ensure that regions suffer or benefit equally as national conditions improve or deteriorate. It is necessary for these governments to attack the problem of unemployment on a regional basis with policies aimed specifically at the components of unemployment which contribute the most to the problem in that region. Furthermore, it may also be necessary to design and pursue a vigorous regional policy in the comparatively prosperous regions to complement the policies in the depressed regions where traditionally little emphasis has been placed.

APPENDIX A

Regression Parameters

		Reg. Cons.	b_j	d_j	a_j	n_j	d_1	d_2	d_3	R^2
1.	Avalon	6.32	-.1457*	.00187*	1.01	-1	1.54*	-1.25	-2.69**	.77
2.	Newfoundland-Labrador	.26	-.0087	-.00027	2.24*	0	3.13**	1.42*	- .46	.79
3.	Prince Edward Island (P.E.I.)	-1.67	-.1521*	.00102*	2.59*	0	.33	-1.78*	-1.20	.67
4.	Cape Breton	- .23	-.0564	.00048	2.03*	0	.15	.34	1.76*	.66
5.	Annapolis-North Shore	.79	-.0601*	.00057*	1.26	0	1.56*	.24	- .30	.73
6.	Halifax-South Shore	1.73	-.0991*	.00090*	.94	0	1.07**	- .13	- .03	.84
7.	Moncton	1.89	-.0769*	.00043	1.25	0	1.74*	1.00	- .43	.58
8.	Saint John	2.89	-.0048	.00015	.41*	-1	1.04*	.25	- .55	.50
9.	Upper St. John Valley	-1.14	-.0215	.00017	1.29	0	.85	.43	.01	.68
10.	North-East New Brunswick	9.13	-.2123*	.00180*	1.90	-1	7.65**	- .37	-5.43**	.64
11.	Gaspé-North Quebec	1.20	.0054	-.00048	2.52*	-1	3.12**	.54	-1.96**	.80
12.	Laurentians-St. Maurice Valley	2.95	.0136	-.00020	.72*	-1	1.70**	.45	- .65**	.81
13.	Montreal	.15	.0592*	-.00049*	.90	0	- .14	- .20	- .11	.95
14.	Eastern Townships	- .22	.0500*	-.00025	.90	0	.99*	.17	- .12	.81
15.	West Quebec	.86	-.0311	.00067*	1.07	0	.63	.96	.02	.71
16.	Eastern Ontario	- .39	-.0208	-.00001	1.06	0	- .49	- .06	.33	.74
17.	Toronto	- .92	-.0017	.00005	.84	0	- .40	.17	.52**	.83
18.	Niagara	1.11	.0251	-.00019	.53*	0	.22	.30	.38	.66
19.	Central Ontario	- .41	-.0094	.00008	.74	0	.23	.17	.34	.64

APPENDIX A (continued)

20.	South-West Ontario	-1.86	.0597*	-.00069*	.82	0	.32	.83	1.03**	.46
21.	Kitchener-Midlands	-2.29	.0250	-.00026	.81	0	- .52	- .06	.13	.70
22.	Northern Ontario	- .27	-.0373*	.00046*	.96	0	- .13	.41	.39	.83
23.	Winnipeg	- .93	-.0137	.00016	.86	+1	.45	.55*	1.06**	.67
24.	South Manitoba	-1.62	-.0196	.00007	1.23	0	.62	-1.08**	- .75**	.80
25.	Regina	-1.52	-.0009	.00019	.78	+1	.68*	.08	.15	.75
26.	Saskatoon	-2.12	.0457	-.00008	.54*	+3	2.79**	1.49**	.71	.73
27.	Parklands	-1.90	.0289	-.00037*	.93	0	.13	- .72*	- .65*	.69
28.	Medicine Hat-Lethbridge	-1.37	-.0128	.00005	1.04	0	- .95**	- .91**	- .68**	.83
29.	Calgary	-1.37	-.0478**	.00047*	1.24	0	- .86*	-1.00**	- .09	.76
30.	Edmonton	-1.11	-.0111	.00014	.99	0	- .84**	- .32	- .04	.82
31.	B.C. Interior	.79	-.0133	-.00006	1.37*	0	-1.09**	- .41	- .76**	.76
32.	Vancouver	1.17	-.0015	.00008	1.06	0	- .88*	- .67*	- .49	.74
33.	Vancouver Island	.50	-.0714*	.00064*	1.35	0	-1.70**	-1.06**	- .02	.56
HX.	Halifax	1.67	-.0286	.00043*	.29*	+2	1.05**	1.31**	.76*	.44
QL.	Quebec-Levis	7.22	.0483*	-.00027	- .53	+3	.62	- .30	- .80	.30
OH.	Ottawa-Hull	1.11	-.0531*	.00051*	.75	0	.83	- .25	.14	.39
HA.	Hamilton	.91	.0311*	.00035*	.58*	-3	.72**	- .25	- .21	.48
MO.	Montreal	.32	.0702*	-.00056*	.74*	0	- .28	- .13	- .00	.93
TO.	Toronto	- .92	-.0071	.00014	.82	0	- .36	.29	.39*	.84
CA.	Calgary	-1.54	-.0501*	.00049*	1.32	0	- .84	-1.11**	.01	.75

APPENDIX A (continued)

ED.	Edmonton	- .89	-.0120	.00020	.98	0 - .77*	- .29	- .04	.78
VA.	Vancouver	1.05	-.0016	.00014	1.01	0 - .97*	- .44	- .24	.73

* significant at 95% level

in the case of d_1, d_2, and d_3 this means

* greater than 2 standard errors

** greater than 3 standard errors

BIBLIOGRAPHY

Borts, G. H. (1960), Regional Cycles of Manufacturing Employment in the United States, 1914-1953. New York: National Bureau of Economic Research.

Brechling, F. (1967), "Trends and Cycles in British Regional Unemployment". Oxford Economic Papers, Vol. 19, pp. 1-21.

Brewis, T. N. (1969), Regional Economic Policies in Canada. Toronto: MacMillan Company of Canada Ltd.

Camu, P., Weeks, E. P., and Sametz, Z. W. (1964), Economic Geography of Canada. Toronto: MacMillan Company of Canada Ltd.

Canada, Department of Regional Economic Expansion (1973), Annual Report, 1971/72.

Canada, Dominion Bureau of Statistics (1965), Canadian Labour Force Survey: Methodology. (Cat. No. 71-504, Occasional).

Canada, Statistics Canada ( ), The Labour Force. (Cat. No. 71-001, various dates).

Cosetti, E., King, L., and Jeffrey, D. (1971), "Structural Imbalance in the U.S. Urban Economic System, 1960-1965". Geographical Analysis, Vol. 3, pp. 239-255.

Corina, J. (1972), Labour Market Economics. London: Heinemann Educational Books.

Denton, F. T. (1966), "An Analysis of Interregional Difference in Manpower Utilization and Earnings". Staff Study No. 15, Economic Council of Canada.

Donner, A., and Lazar, F. (1971a), "Estimating the Canadian Natural Rate of Unemployment". Working Paper 71-20, Department of Economics, McMaster University.

_____, and _____. (1971b), "An Econometric Study of Segmented Labour Markets and the Structure of Unemployment; The Canadian Experience". Working Paper 71-21, Department of Economics, McMaster University.

Feldstein, M. (1973), "The Economics of the New Unemployment". The Public Interest, No. 33, pp. 4-42.

Haggett, P. (1971), "Leads and Lags in Inter-regional Systems: A Study of the Cyclic Fluctuations in the Southwest Economy." In Chisholm, M., and Manners, G. (eds.), Spatial Problems of the British Economy, London: Cambridge University Press, pp. 69-95.

Hardy, H. M. (1970), "Seasonal Unemployment in Canada, 1955-1970." Working Paper 70-21, Department of Economics, McMaster University.

Hartwick, J. M., and Crowley, R. W. (1972), Urban Economic Growth: The Canadian Case. Ottawa: Queen's Printer.

Isard, W. (1960), Methods of Regional Analysis: An Introduction to Regional Science. Cambridge, Mass.: The M.I.T. Press.

Jeffrey, D. (1970), Economic Impulses in an Urban System. (Unpublished Ph.D. dissertation, Ohio State University).

Jeffrey, D., and Webb, D. J. (1972), "Economic Fluctuations in the Australian Regional System 1955-1970." Australian Geographical Studies, Vol. 10, pp. 141-160.

Johnston, J. (1972), Econometric Methods. (2nd ed.) New York: McGraw-Hill.

Kaliski, S. F. (1964), "The Relationship Between Unemployment and the Rate of Change of Money Wages in Canada." International Economic Review, Vol. 5, No. 1, pp. 1-3.

_____. (1968), "Structural Unemployment in Canada: Towards a Definition of the Geographic Dimension." Canadian Journal of Economics, Vol. 1, No. 3, pp. 551-565.

_____. (1969), "Structural Unemployment in Canada: The Occupational Dimension." Canadian Journal of Economics, Vol. 2, No. 2, pp. 250-267.

King, L., Casetti, E., and Jeffrey, D. (1969), "Economic Impulses in a Regional System of Cities: A Study of Spatial Interaction." Regional Studies, Vol. 3, pp. 213-218.

Lazar, F., and Donner, A. (1972), "The Dimension of Canadian Youth Unemployment: A Theoretical Explanation." Working Paper 72-13, Department of Economics, McMaster University.

McQuitty, L. L. (1957), "Elementary Linkage Analysis." Educational and Psychological Measurement, Vol. 17, pp. 207-229.

Montague, J. T. (1970), Labour Markets In Canada: Processes and Institutions. Toronto: Prentice-Hall of Canada Ltd.

Ontario, Department of Treasury and Economics (1971), Design For Development: Northwestern Ontario Region.

Ostry, S. and Zaidi, M. A. (1972), Labour Economics in Canada. (2nd ed.) Toronto: MacMillan of Canada.

Peitchinis, S. G. (1970), Canadian Labour Economics: An Introductory Analysis. Toronto: McGraw-Hill of Canada Ltd.

Prest, A. R. (ed.) (1968), The U.K. Economy. London: Weidenfeld and Nicholson.

Ray, D. M. (1965), Market Potential and Economic Shadow. Chicago: University of Chicago Press.

Sant, M. (1973), The Geography of Business Cycles. A Study of Economic Fluctuations in East Anglia, 1951-68. London: London School of Economics and Political Science.

Suits, D. B. (1957), "Use of Dummy Variables in Regression Equations." Jour. Amer. Statistical Association, Vol. 52, pp. 548-551.

Swan, N. M. (1972), "Differences in the Response of the Demand for Labour to Variations in Output Among Canadian Regions." Canadian Journal of Economics, Vol. 5, No. 3, pp. 373-385.

Thirwall, A. P. (1966), "Regional Unemployment as a Cyclical Phenomenon." Scottish Journal of Political Economy, Vol. 13, pp. 205-218.

Thompson, W. (1965), A Preface to Urban Economics. Baltimore: John Hopkins Press.

Vining, R. (1946a), "The Region as a Concept in Business Cycle Analysis." Econometrica, Vol. 14, pp. 201-218.

_____. (1946b), "Location of Industry and Regional Patterns of Business Cycle Behaviour." Econometrica, Vol. 14, pp. 37-68.

_____. (1949), "The Region as an Economic Entity and Certain Variations to be Observed in the Study of Systems of Regions." Pap. Proc. American Economic Association, Vol. 39, pp. 89-104.