REGIONAL UNEMPLOYMENT AND POLICY ANALYSIS: A GEOGRAPHICAL STUDY OF CANADIAN FEDERAL UNEMPLOYMENT POLICY, 1969-1976.

by

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ABSTRACT

This study is concerned with analysing and evaluating the impact of Canadian macroeconomic policy upon regional unemployment disparities over the 1969-1976 period. To accomplish this task, three interrelated steps are undertaken. First an economic model is developed which seeks to help explain why macroeconomic policy may have variable regional impacts. The model emphasizes the role that regional economic structures may have in promoting differential regional adjustment to national demand and money wage rate fluctuations. In particular the degree to which a region is dominated by high and low growth industries (defined on the basis of labour productivity, market concentration, demand elasticity and employment growth) is hypothesized to be a key factor in explaining regional adjustment.

Second, the actual impact of macroeconomic policy upon Canadian regional unemployment is estimated using the Recession-Recovery time series method developed by the National Bureau of Economic Research. These results are then evaluated according to a set of equity criteria which emphasize *absolute*, *comparative* and *relative* rules of social justice. Third, the results of analysis derived from the first two steps are linked with a set of predictive models to evaluate two alternative macro-policy scenarios and their implications for the future of Canadian regional unemployment disparities. The scenarios are those of the present Liberal Government and the New Democratic Party and the predictive models are based upon the Box and Jenkins time series techniques.

The economic model's hypotheses were generally confirmed and the model may provide a means of understanding why there may be differential regional adjustment to national demand and money wage rate fluctuations. It is found, although with some variations over a particular phase of the total 1969-1976 period, that the impact of macroeconomic policy was to widen Canadian regional unemployment disparities. Thus it is concluded that the effects of macro-policy over the 1969-1976 period are contrary to the interests of regional equity and social justice. In the interests of narrowing future regional unemployment disparities, a national full employment policy such as that advocated in the NDP scenario, is seen as preferable to the Liberal scenario. However these results and their relevance for policy makers are predicated upon developing a strategy that would significantly lower the rate of national money wage rate inflation.

A number of avenues for future research are noted: first, the development of more appropriate wage determination models in space; second, the development of more efficient space-time predictive models, and; third, the development of more general models of the State that could help explain its actions and its role in maintaining spatial inequality.

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INTRODUCTION

CHAPTER 1

AN INTRODUCTION TO REGIONAL LABOUR MARKET ANALYSIS

The focus of this dissertation is on the dimensions and patterns of Canadian regional unemployment disparities. It is argued that to understand such disparities we must first be aware of the *linkage* of the regional system to national fluctuations and the forces shaping the national economic environment. The thesis is that one force in particular, namely federal macroeconomic stabilization policy, has generated and reinforced regional unemployment disparities and is counter to the objectives of regional policy. Generally, the dissertation attempts to document and analyse the impact of national macroeconomic policies upon regional welfare.

1.1 Recent Trends in Unemployment and Inflation in Canada

The study is considered in the context of the recent (1969-1976) recession, argued by many to be rivalled only by the Great Depression of the 1930's in the scope and hardship imposed upon the over one million persons unemployed in Canada (see Economic Council of Canada, 1976a , for example). Levels of unemployment and inflation have been consistently higher than for any other period since the second world war. Figure 1.1 illustrates the pattern in aggregate unemployment and inflation over the period 1953-1976. While the 1958 and 1961 recessions are clearly important, Figure 1.1

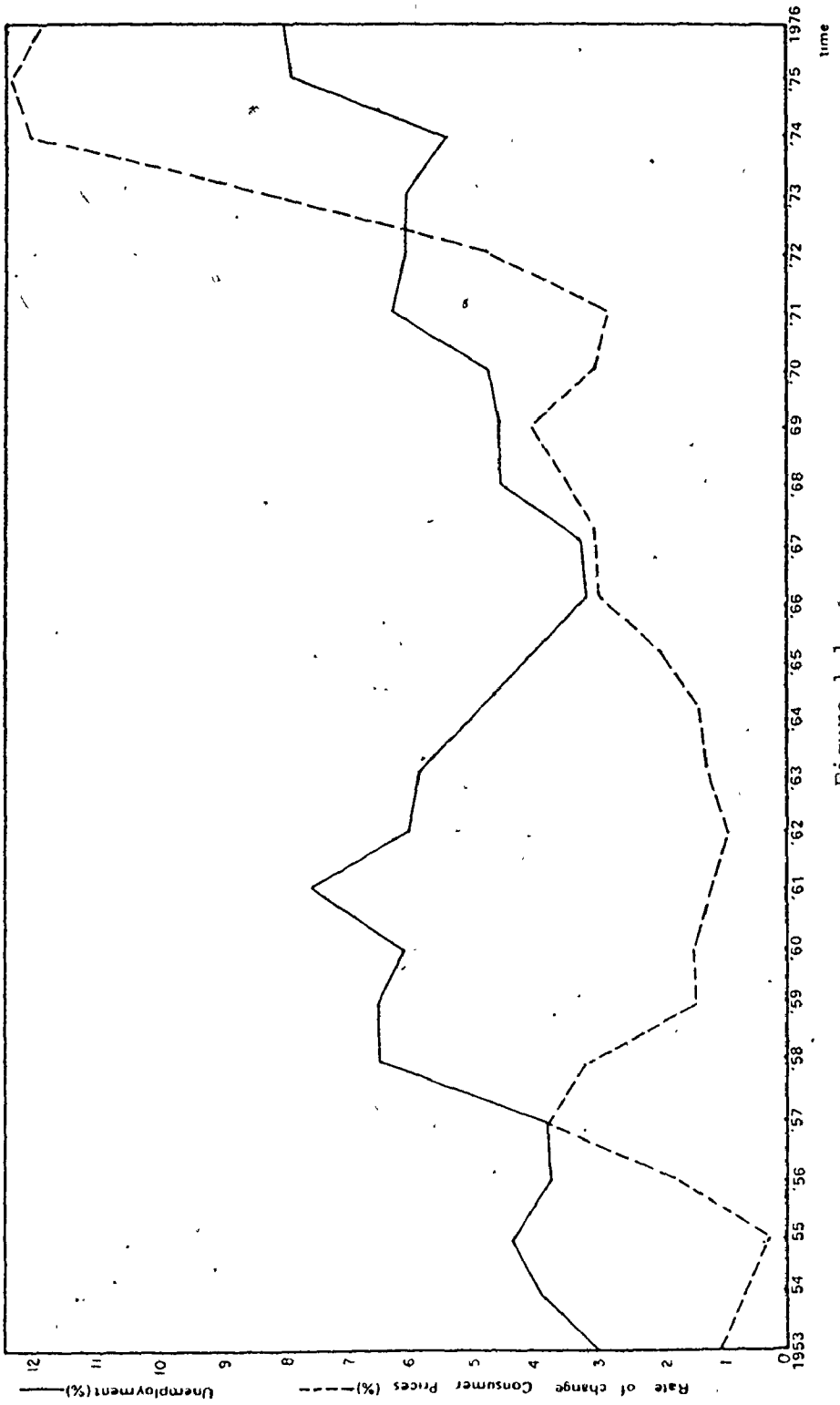

Figure 1.1

Pattern of Canadian Macro Indicators
1953—1976 (seasonally adjusted)

emphasizes the significant shift in the persistence and level of unemployment from 1961-1976. The rate of change in consumer prices similarly has seen no match since 1945.

The current episode is a major break in the economic growth which had been underway since the conclusion of World War II. The 'secular' expansion which reached virtually all western industrialized countries during the 1950's and 1960's can no longer be accepted as the 'norm' and large scale unemployment has been seen as a real possibility until at least the early 1980's (Kaldor, 1976). Instead of periodic bouts of cyclical unemployment and subsequent recovery and growth, the current recession has been seen as impervious to ready economic solutions. In Canada for example, the Economic Council has emphasized a long re-adjustment period, with emphasis on deriving more relevant and consistent policy solutions (Economic Council of Canada 1976b).

The combination of high unemployment and inflation has moved many economists to argue that the aggregate Phillips curve (the so-called trade-off between unemployment and inflation) has become more 'perverse' and unstable. In Canada, Rowley and Wilton (1977) suggest that there is in fact no real relationship between unemployment and inflation except that implied in policy choices over the past two decades. Thus the crisis in economic conditions has called into question both orthodox theory and policy practices. Hence, a wide debate has developed over the direction of macro-policy as well as the proper targets of economic performance (for unemployment and inflation in particular).

Canadian macroeconomic policy over the 1969-1976 period may have contributed, in large measure, to the stabilization problem, since the

federal government has successively attempted to control inflation and unemployment. In this context, the distributional consequences of stagflation and macro-policy have become more widely questioned, at least in Economics (see for example Gramlich, 1974). The spatial pattern of unemployment and the impact of macro-policy in terms of spatial equity, however virtually has been ignored by geographers. There are many implications that could be considered. For example, it could be questioned whether regional policy in Canada is adequate given the rapid increases in national and regional unemployment. As Chisholm (1976) has noted in the British case, the assumptions behind a given regional policy developed in the 1960's may be invalid in the face of prevailing stagflation conditions. Moreover, as macro-policy has attempted to come to grips with stagflation, these policies themselves may have had important implications for the effectiveness of regional policy. In general terms, this dissertation deals with the impact of Canadian federal macroeconomic policy designed to adjust and manipulate national employment fluctuations, upon regional unemployment in a period of relative economic crisis (1969-1976). Patterns of regional response, their welfare implications and costs, and the links between the national economic environment and the regional system are analysed. A model of regional response is developed and theoretical propositions concerning why regional responses may be differentiated are derived and tested.

1.2 Conceptual Framework

A given regional labour market can be conceived of as one element in the total national economy. The economic forces that may shape the

national economic environment component (in Figure 1.2, A) can be assumed to be linked and filtered through regional structural characteristics (factors B and C) to form a set of outcomes in the local labour market: unemployment (G), employment (H) or out-migration. These possible outcomes are then fed back into the total system and ultimately form the data upon which policy is formulated.

In understanding those forces that may shape the national economic environment (and hence regional labour market outcomes), little attention has been paid to the institutional characteristics of the economy. By virtue of this shortcoming, much of contemporary regional economic theory also tends to be limited as a means of understanding the functioning of the modern spatial economy (King and Clark, 1978). In essence, those forces (policy) which may condition the national economic environment have become so intertwined with the economic system that it is now difficult or almost impossible to separate them: The government has become an *endogenous*, not *exogenous* variable in the total economy.

Lindbeck has, in a different but related context, expressed this sentiment quite forcefully:

> "It is obvious that macroeconomic fluctuations today are so intimately connected with government policies that realistic explanations and forecasts of macroeconomic fluctuations require that government behaviour be analyzed as an integral part of the fluctuations."
>
> (Lindbeck, 1976, 11)

Writers such as Nordhaus (1975) and Robinson and Wilkinson (1977) have also argued that a major source of recurrent fluctuations can be directly attributed to government policy, thus it is difficult to avoid the conclusion that:

"Dramatic macroeconomic disturbances during the last decade, and

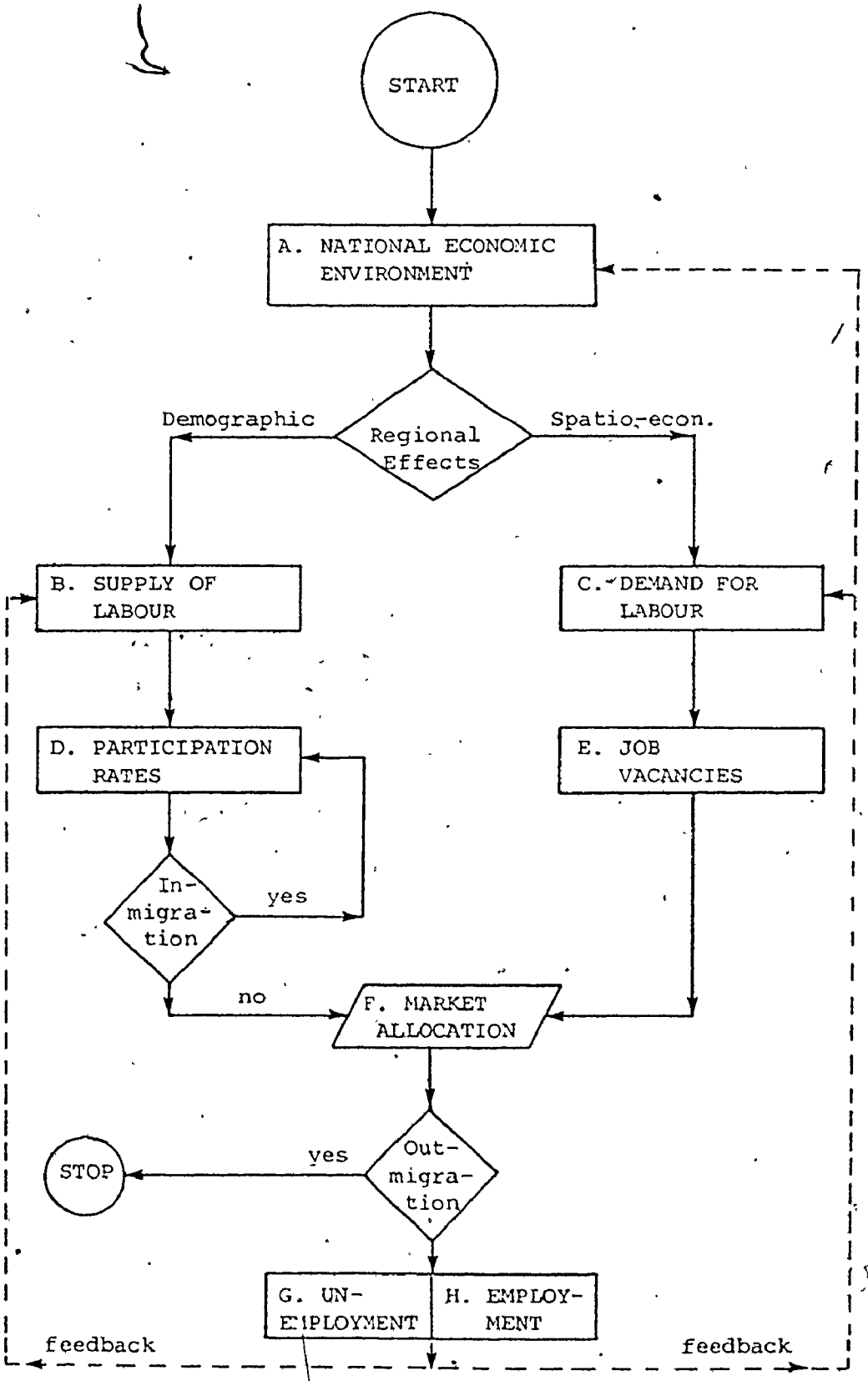

Figure 1.2

A National-Regional Labour Market System

> perhaps earlier as well, have been the result of government policies, rather than of instabilities in private behavior. In particular, it is difficult to avoid the empirical generalization that inflationary policies followed by restrictive, unemployment-creating actions have been a dominant macroeconomic feature."
>
> (Lindbeck, 1976, 17)

Recurrent booms (high employment and inflation) and recessions (unemployment and price stability) are then intimately linked with government policy to such an extent that the classical trade-cycle has been replaced by a 'political' business-cycle (Boddy and Crotty, 1975). Thus Adam Smith's neoclassical world has long passed and the government now affects every sector and region of the national economy. Of particular importance has been the increasingly political nature of government policy and the attendant distributive effects. Policy options and impacts have costs and benefits that are embedded implicitly in the total spatial-political economy.

Distributive effects can be direct (either intentional and/or unintentional) or indirect. Both are crucial however in understanding the functioning of the economy (Haveman and Margolis, 1973). In both instances, significant welfare issues are involved and the indirect effects of macro-policy upon the regional system may have had severe *conditioning* effects on the system's performance. The implications concerning the role of government policy in the economy for the regional economic system have been virtually unrecognized. While geographical research on spatial labour markets has utilized a number of models linking national fluctuations to regional unemployment, such models often have stopped short of identifying government policy as a source of fluctuation. Engerman's (1965) comment, that:

> "Most writers on cyclical stabilization ... explicitly or implicitly assume either that these responses (national aggregates to fiscal or monetary policy) affect the national economy in ways which are uniform, or that specific industrial or regional responses do not concern the policy maker."

is as relevant to economists and geographers now, as it was over a decade ago. In a sense, geographers have not been prepared to investigate the role of macroeconomic policy in much the same way as economists have ignored the spatial impact of national policies.

Discussion of the recent recession (1969-1976) and the impact of macro-policy upon regional labour market outcomes leads to three general questions that will be dealt with in this study. First why does macro-policy have a differential regional impact? In the light of recent stagflation conditions, can a model be derived that could help explain differential regional impact? Second, what have been the equity dimensions of macro-policy impact on the pattern of regional unemployment over the 1969-1976 period? Finally, given the above, what are the implications for future regional unemployment disparities in the context of current options for macroeconomic policy and national unemployment? These issues are developed with particular reference to federal Canadian macroeconomic employment policy, although it is recognized that Provincial governments have in the past attempted a limited form of stabilization policy themselves (see Auld, 1975a). This particular focus means that other federal regional policies, such as interprovincial fiscal transfers and the activities of the Department of Regional Economic Expansion (DREE), although important in their effects upon regional economic welfare (Gillespie and Kerr, 1977), will not be considered directly in this study.

1.3 Research Goals and Objectives

The primary goal of this study is to establish why and how macroeconomic policy may have generated or exacerbated regional welfare and unemployment disparities. To achieve this goal, a 'model' of policy analysis and evaluation is developed. In developing the analysis a number of interrelated objectives will be focussed upon. A first objective is to evaluate the relevant literature that deals with the theoretical and empirical issues of regional response, methods of estimating and predicting the spatial impact of policy and national fluctuations, and how public policy outcomes may be evaluated in equity terms. The rationale for this objective is that it is important to establish the relevance and applicability of existing models and methods with respect to the research area.

A second objective will be the development of a set of models that relate directly to the research problem; this will involve two considerations. First, a model must be developed that can provide a theoretical means of understanding what may cause the regional differentiation in the impact of macro-policy over the 1969-1976 period. In the context of Figure 1.2 this means linking elements A and G through a set of derived structural attributes embodied in B and C. Second, once this is established (or at least hypothesized) and tested, a means of empirically estimating the actual impact of policy also is needed, in essence, a direct statistical link between A and G. The third objective is to evaluate, in equity terms, the outcomes (G) with respect to macroeconomic employment policy. This will necessitate the development of an appropriate set of equity rules or evaluation criteria as well as a consideration of the efficacy of

regional unemployment insurance and its role in ameliorating the worst effects of higher unemployment. The final objective then will be to evaluate the prospects and future of regional unemployment disparities with particular regard to the lessons and insights derived from the earlier analysis. Thus, the three stage model is applied to the problem of predicting the temporal stability of the pattern of Canadian regional unemployment disparities under varying macroeconomic policy scenarios.

The method of policy analysis and evaluation presented in this study is then the product of a series of linked models, emphasizing the theoretical, empirical and equity dimensions of public policy impact. In evaluating public policy and regional welfare these models can be seen as a 'process' or logical series of steps that lead the research from reasons of why and how to questions of welfare and policy impact.

The dissertation is organized into three major parts. The purpose of the first part (including Chapter One) is to provide a conceptual overview of the problem and research objectives. Part two (Chapters Two and Three) introduces and derives the major theoretical and analytical tools of analysis. In Chapter Two particular attention is paid to the spatial labour market literature and its contribution to the problems of understanding regional response, impact estimation and regional forecasting. This leads directly to a discussion of current methods of public policy evaluation and equity. Chapter Three then sets out the models and procedures that will be used in the study.

The third section (comprising Chapters Four, Five, Six and Seven) is devoted to presenting the findings of the analyses. Thus Chapter Four tests the theoretical model of regional response as the first step in

understanding why public policy may be regionally differentiated. Chapter Five records the actual impact of policy and is devoted to applying the devised criteria of policy evaluation to the problem of regional welfare. In Chapter Six the implications of the preceding analyses are considered, and a predictive model developed of the possible future patterns of Canadian regional unemployment disparities. The analysis of policy impact in the preceding chapters are then brought to bear on the problems of future policy formulation and the spatial welfare impact of possible policy options. Finally, in Chapter Seven, the results of analysis are summarized, conclusions are drawn with respect to the thesis goals and objectives and future research directions are noted.

PART 2

MODELLING AND EVALUATING THE REGIONAL IMPACT OF ECONOMIC FLUCTUATIONS

CHAPTER 2

ANALYSING REGIONAL RESPONSE AND THE EQUITY OF PUBLIC POLICY IMPACTS

2.1 Understanding National Change and Regional Response

A principal objective of the study is to establish why national policies and economic fluctuations may have differential spatial impact. Cliff *et al.* (1975) argue that many national forces and particularly macroeconomic policy have had marked regional impacts on unemployment and their research has contributed to gaining a further awareness of the empirical dimensions of such impacts. However, as King (1976) has noted in a recent review of the spatial labour market literature, the spatio-economic mechanisms that could account for differential impact have only been hinted at. The lack of progress in this area of theoretical enquiry could be due to two reasons. First, the data requirements of econometric models designed to test theories are so great as to preclude their application at all but the national or perhaps provincial levels. Geographers are traditionally more interested in spatially disaggregated scales. The second problem is identification (Hepple, 1975). In essence, interregional models assume knowledge of spatio-economic structure and regional response that are more often unknown. Not only is this related to defining the appropriate time-space lags but also to identifying the scope and structure of interregional interactions. As Renshaw (1975) has recently noted, short

run migration, to take one example of these problem areas, is little understood.

Of the recent research on analysing the mechanisms of regional response a number of related approaches bear directly upon this thesis. Van Duijn (1972) develop an interregional model based on Metzler (1950) and Airov (1963). He analysed three sources of fluctuation: the production of consumption goods; the production of capital goods which, following Hicks, were seen as a major source of fluctuation; and finally government expenditures. In a simulation model, Van Duijn (1972) manipulated the three sources of fluctuation and related these to regional structure as well as to factor mobility and trade relationships. An important conclusion reached by the author was that trade is crucial in determing the degree of *trade-off* between national stability and regional equity. The specification of the government expenditure variable meant that sectoral expenditure and regional equity could also be analysed.

Most studies in geography have chosen not to focus on the sources of fluctuation (be they governmental or of the classical trade-cycle type) but rather on the spatial mechanisms that may dampen or amplify economic fluctuations. Bannister (1974), for example examined the importance of distance, the spatial hierarchy and the spatial economic structure on the patterns of economic change over space in Ontario. Although his results were not conclusive, there was some evidence of a 'trickle-down' pattern in short-run economic change. Such a result has obvious parallels to the early work of Hirschman (1958) and Myrdal (1956) on the 'trickle-down' and 'backwash' mechanisms of economic growth. However, there is a fundamental distinction to be made between 'trickle-down' effects in the

short-run and long-run. Kalecki (1971) demonstrated that the links between short-run fluctuations and the long-run trend are very complex; the long-run is not simply the summed effects of short-run fluctuations. In this respect, Bannister's work remains within the tradition established by King and his colleagues (for example King, Casetti and Jeffrey, 1972) who were primarily interested in the short-run space-time patterns of national change and regional impact.

Morgan Sant (1973) tested the hypothesis that sub-regional variations in the response to cyclical variations in the U.K. were a function of the spatial structure and industrial composition of a region. His model was specified as:

$$A_i = k - C_i - S_i + Y_i - (E_i - E_i^2) \qquad (2.1)$$

where: A_i = the amplitude of fluctuation of area i,

C_i = the position of the urban area in the central place hierarchy,

S_i = a measure of spatial structure,

Y_i = an indicator of the potential vulnerability of the area's industrial composition to demand fluctuations,

E_i = an element representing the growth of area i,

k = a constant, interpreted as the share of amplitude not attributable to spatial variations.

Again evidence of varying responses due to spatial attributes such as size of the urban area and position within the spatial structure were found and Sant also found strong linkages or correlations between the respective

economic responses of nearest neighbours. In many respects, however, the evidence of different levels of response over a wide set of spatial attributes does not constitute *per se* a theoretical understanding.

A study by Young (1975) attempted to deal with the relationships between structural unemployment, migration and the rate of response of a given region to macro expansionary policy in Canada over the period 1962-1963. This study emphasized industry structure, migration 'efficiency' and regional disparities as a means of understanding regional response. The thrust of the investigation was to isolate the dimensions of *structural* problems in a period which was judged to be one of national full employment. The data used were for Canadian Manpower centres and as such were disaggregated to below the economic region classification introduced by Camu *et al.* and used by various government agencies.

Weissbrod's (1975) study is probably the most significant one to date which deals with the mechanisms of spatio-economic adjustment. It was based, in part, upon the earlier arguments of King and Forster (1973). Weissbrod assumed a central-place hierarchy and analysed the importance of different combinations of labour skills and information on the process of wage rate change and regional unemployment. Thus the relative location of scarce labour skills in the urban hierarchy was of crucial importance. Cross-spectral methods were used to test two propositions: first, the wage-rate adjustment process in the dominating city must lead the process in cities lower in the hierarchy; and second, that relative wage inflation occurs simultaneously in centres of similar order. The results, based on an analysis of earning and unemployment data for six cities in southeastern Pennsylvania confirmed these two propositions.

A number of studies in economics (see Brechling 1973a) concerned with regional Phillips curves have also attempted to develop an understanding of the trade-off between inflation and unemployment, and the role that the spatial *dispersion* of regional unemployment could play in influencing national adjustment. Much of the conceptual and theoretical rationale for Brechling (1973) is to be found in the so-called new microeconomics of inflation and unemployment, developed by Phelps *et al.* (1970).

Phelps (1970) outlined the basic concept through a 'parable'. The aggregate labour market was seen as a system of islands (either firms or regions for example) lacking any inter-island communication links and consequently separated in space and time and with information as a scarce commodity. An employee only learns about variations in wages through searching; however, this entails direct costs (for example travel) and opportunity costs (lost wages and employment). It is then considered that as an individual firm adapts to a decrease in demand in a recession through offering lower wages, employees quit to search for better conditions. However, it is only after the search process has been undertaken in time and space that employees realize that little or nothing is gained as all firms have to similarly adapt. This parable has an obvious appeal in a geographic context; the 'friction' of space involves information adjustment 'costs' to individuals. This model has been modified to incorporate Phillips curve models for greater realism (see Friedman, 1975) such that (following Cripps, 1977):

$$\dot{W} = f(u) + \dot{p}^* \qquad (2.2)$$

where: u = rate of unemployment,

$\dot{W}$ = level of money wage rate change, and,

$\dot{P}^*$ = expected rate of inflation, and where the expected real value of money wages is dependent upon the levels of demand and supply in the labour market. This aspect itself is dependent upon the spatial distribution of unemployment and the spatial transmission of information concerning $\dot{W}$ and $\dot{P}^*$.

Cripps (1977) notes that equation (2.1) can then be extended such that:

$$\dot{P} = f(u) - \dot{W} + \dot{P}^* \qquad (2.3)$$

and the 'natural' rate of unemployment is given where $\dot{P} = \dot{P}^*$. According to Friedman (1975) the condition of $\dot{P} = \dot{P}^*$ can only be achieved where money supply is regulated to the long-run desired target of inflation.

As a model of national-regional labour market adjustment, this formulation involves a number of problems. First, it is difficult to believe that voluntary quits in the face of wage reductions are a major cause of the high levels of unemployment. Moreover, the concept of wage reduction is rather difficult to comprehend, in the Canadian context at least. Second, while it is clear that there are lags in the spread of information over space yet this is not the same as saying that the national economy is simply an aggregation of 'islands' that have little or no immediate interactions. Pred's (1973) work, for example, confirms that firm organization over space is far more complex than the island parable

would allow. Third, and perhaps most critically, the parable (in treating labour simply as a commodity) ignores more fundamental institutional agreements that settle wage rate claims independent of local or national labour market conditions (see Coutts, Tarling and Wilkinson, 1978). As Cripps (1977, 110-111) noted:

> "The institutional evidence and supporting econometric studies are by now sufficient to demonstrate that the Phillips curve, whether in its original or in its new form, and the associated postulate that money wages are determined by atomistic competition in the labour market, are incomplete and misleading in modern conditions. Excess demand provides at most only a minor component of a comprehensive explanation. It is unlikely that a perfect free market for labour has ever existed - the terms on which people work for hire having always been largely a matter of social convention."

The basic contention here is that the determination of money-wages and employment is largely an institutional matter, rather than the result of a pure local labour market mechanism.

The preceding discussion has three implications for the development of our primary research objective. First, it is apparent that little work has attempted to explain why regions may adjust differentially to national policy forces. In essence, the emphasis on establishing space-time patterns of aggregate economic activity has only implied superficially the causes of economic change and their integration within the space economy. Second, the complexity of interrelationships over time and space as well as the scale of data requirements, almost totally preclude the development of large-scale econometric models. So many relationships are unknown that the first steps in modelling are obliged to be relatively simple ones. Third, the work derived from Phelps *et al.* (1970), which is of direct relevance to this study, suffers from a number of problems that may severely limit its application. Thus, an alternative means of

understanding policy impact and regional adjustment in the context of current economic conditions will need to be developed.

2.2 Estimating the Regional Impact of National Fluctuations

A significant contribution of the spatial labour market literature that should not be overlooked has been the development of methods for estimating the regional impact of national fluctuations. This is particularly important given two principal objectives of this study: the estimation of macro-policy impacts over the 1969-1976 period and the consideration of future regional unemployment disparities in Canada. It should be noted at the outset however, that the focus of much of the spatial labour market literature has been on the patterns of regional response, not the impact of specific causes (Jeffrey, 1974, is an exception).

A key source of much of the work on the spatial character of labour markets has been the papers by Brechling (1967) and Thirlwall (1966), although earlier work by economists such as Singer (1939), Vining (1946, 1949) and Borts (1960) also has been referenced. In Brechling's (1967) model, the regional unemployment time series were decomposed *a priori* into a number of independent components. The model can be specified as:

$$U_{jt} = A_{jt} \cdot S_{jt} \cdot R_{jt} \qquad (2.4)$$

where: U_{jt} = the rate of unemployment in region j, time t,

A_{jt} = the aggregate cyclical component, or national unemployment rate at time t,

S_{jt} = the 'structual' component, region j, time t,

R_{jt} = regional cyclical component.

The first two components can be specified further as:

$$A_{jt} = a_j U_{(t+n)} \qquad (2.5)$$

where: a_j = measure of cyclical sensitivity such that: if $a_j > 1.00$, region j is more sensitive to cyclical fluctuations than the national series; and if $a_j < 1.00$, region j is less sensitive to cyclical fluctuations;

$(t+n)$ = a lead/lag (n) factor to account for differences in 'phase' between the national and regional series;

U = national unemployment;

and, $$S_{jt} = C_{jo} + b_j t + d_j t^2 \qquad (2.6)$$

where: C_{jo} = structural unemployment at the initial time period;

b_j and d_j = coefficients of a quadratic expression allowing for accelerating and decelerating changes in the structural component over time.

The component R_{jt}, involves the residuals from a least squares regression based on a formal specification of the above two components.

The model used a *causal* classification of unemployment and is thus an empirical estimation procedure as well as a means of understanding the causes of regional unemployment. The cyclical component, defined in terms of national unemployment, is the orthodox Keynesian demand-deficiency conceptualization. In Geography the model has been used to elaborate and

to suggest hypotheses concerning structure and response. There are a number of examples of the use of this model in the geographical literature (see King, Casetti and Jeffrey, 1972; Jeffrey and Webb, 1972; Casetti, King and Jeffrey, 1971 and two recent studies by Vaughan, 1976 and Vernez *et al.* 1977).

There are a number of problems inherent in the model, particularly in the derivation of least squares regression estimates and in the interpretation of the cyclical component over time. The least-squares problem is that of serial autocorrelation amongst the error terms. A characteristic of the model has been the use of the regression residuals as a means of identifying the pattern of regionally unique components. Brechling (1973b) even suggested that the Durbin-Watson statistic could be used to interpret the strength of the regional cyclical component. Many studies have been characterized by high R^2 and very low Durbin-Watson statistics implying strong serial autocorrelation. Yet recent research by Pierce (1977), and Granger and Newbold (1977) for example, argues that such methods are inappropriate in the analysis of economic time series data.

These authors reiterate a number of common problems in economic time series analysis. First, functionally related variables often are poorly related empirically and second, it is often difficult to imply causality between empirically related variables when a substantive theoretical foundation is lacking. Pierce (1977) also noted that even in testing the same relationships over time researchers often have achieved significantly different results, for no apparent reason. Both Pierce (1977) and Granger and Newbold (1977) noted that an important issue which is often poorly

handled, if at all, is that of serial autocorrelation of the error terms in a regression. There are a number of effects that result from serial autocorrelation. For example, an autoregressive (AR) autocorrelation structure could cause inefficient parameter estimation and biased significance tests. On the other hand, a moving average (MA) or mixed ARMA structure could cause biased and inconsistent parameter estimates as well as biased significance tests on the parameters. The results in both cases could lead the researcher to accept 'spurious' relationships caused by the mis-pecification of lag and error structures of the regression model. Thus, little faith probably can be placed in the Brechling-type estimations, particularly as the a_j coefficient is so important in suggesting the magnitude of cyclical or macro-policy impacts.

A second problem refers to a more general, or conceptual issue. Estimating the a_j coefficient is based on an implicit assumption that cyclical sensitivity is generally even throughout a business-cycle for a given region. That is, cyclical sensitivity is assumed to be the same whether in expansion or recession and over a number of business-cycles. It is difficult to justify such an assumption; for example, after recession some regions may not respond equally to the subsequent recovery. In essence, the impacts of macro-fluctuations and policy may be both different in space and time according to the particular phase of the 'business-cycle'.

Thirlwall's (1966) contribution also has been important. He developed the argument that:

> "... the persistence of regional unemployment discrepancies (commonly referred to as the regional problem) can be at least partially explained by the fact that fluctuations in the percentage level of

national unemployment have tended to be associated with unequal changes in the percentage levels of unemployment in different regions of the country."

(p.205).

The form of Thirlwall's model has some similarity to Brechling's (1967), although he concentrates only on the cyclical component and attempts to account for the problem of serial autocorrelation in a model specified as:

$$U_{i(t)} - U_{i(t-1)} = \beta_0 + \beta_1[U_{(t)} - U_{(t-1)}] + \varepsilon \qquad (2.7)$$

where: U_{it} = unemployment rate in region i, time t,

U_t = National unemployment rate, time t,

β_0 = constant, assumed to capture the structual elements that create initially higher regional unemployment rates,

β_1 = sensitivity parameter, where as in the Brechling (1967) formulation there are implied conditions for $\beta_1 > 1.00$ and $\beta_1 < 1.00$.

A number of studies, including Van Duijn (1975), Black and Slattery (1975) and a recent study by Tomczak (1978) using a modified Brechling-Thirlwall model have used this method with some success. Unlike Brechling, Thirlwall was concerned only with the cyclical component, and with developing hypotheses for its explanation. Equation (2.7) was tested for twenty-five industries over all regions in Great Britain. Thirlwall concluded that the link between industry and regional performance with respect to national fluctuation was not strong and at the same time he noted there was a problem in a number of regions of reabsorbing those unemployed after recession.

The estimation problem persists, although it is not as severe as in the Brechling (1967) model. It is doubtful whether simple differencing is adequate to account for autocorrelation; there is an implied weighting of 1.0 on the $U_{1(t-1)}$ and $U_{(t-1)}$ terms where it may or may not be relevant in each region. Little subsequent work has been done on the reabsorption problem and the arguments made with reference to the Brechling model can be repeated concerning the usefulness of the β_1 term over the total business-cycle.

A rather different procedure has been used by Thirlwall (1975). The model can be specified as:

$$U_t^r = f(V_t^r, U_t^{GB}) \qquad (2.8)$$

where: U_t^r = regional unemployment rate, time t,

V_t^r = regional vacancy rate, time t,

U_t^{GB} = national unemployment rate, time t.

Using the Koyck transformation of distributed lags, the following equation was estimated simultaneously over seven regions in Great Britain using two stage least squares and the Cochrane-Orcutt (1949) method. Thus:

$$U_t^r = A_0^* + bV_t^r + cU_t^{GB} + \lambda U_{t-1}^r + \varepsilon_t^* \qquad (2.9)$$

where: $A_0^* = A_0(1 - \lambda)$

$\varepsilon_t^* = \varepsilon_t - \lambda\varepsilon_{t-1}$

A further accounting equation was used to enforce consistency in estimation. As a method for forecasting it would seem adequate; moreover the use of

the Cochrane-Orcutt (1949) method to account for autocorrelation is a significant step. However, the error term itself may be a more complex and important element of the model than recognized. Further the model is 'deterministic', in the sense that it enforces a particular structure (*a priori*) in the relationship between regional and national unemployment.

Another stream of research, based initially on the Brechling/Thirlwall models, has been developed by Haggett and his colleagues. Haggett (1971) analysed cyclic fluctuations at four different spatial scales; the inter-regional level with comparisons being made between a specified base region and others; the inter-metropoliton level; the intra-region level (for example between sub-district employment offices and the regional series); and the urban-hierarchical scale. In this research, the focus was not only differences in spatial response, but also variations in response with regard to scale. Particular attention was focused upon the differences in lead-lag relationships over these different scales.

Bassett and Haggett (1971) and Hepple (1975) also used spectral analysis in studying cyclical sensitivity. The latter study is particularly instructive of the methodology utilized. Regional series were seen as endogenous to the total national system and as a function of the national series, defined exogenously. Using cross-spectral analysis, coherence estimates were generated over the lowest frequencies, with response patterns of the regional system being related to the degree of coherence at a given frequency. Estimates of the phase or gain of the endogenous series with respect to the exogenous series were then utilized to approximate lead-lag relationships.

There are numberous advantages in using such techniques, especially in the total use of the time series, with autocorrelation explicitly linked to the functioning of the system. However, for the problem of estimating response over and within a given business-cycle, the models seem inappropriate. In particular, resolutions at very low frequencies require a large number of data points, the general rule being seven times the duration of one cycle. Thus, there may be a strong tendency to lose information concerning a given cycle. Similarly, analysis over many different cycles implies causality that may in fact not link all periods; that is, there is an implicit assumption that the causes of the business-cycle itself have been relatively uniform over the past thirty years. Yet as was noted earlier, the current crisis argues strongly against such an assumption.

In summary, many of the methods for estimating the impact of national fluctuations or national policy upon regional unemployment are either statistically unreliable or conceptually inappropriate. A different approach is needed to answer the question of the degree to which macro-policy may have contributed to regional unemployment disparities.

An alternative method gaining greater attention in the geographical literature is the set of techniques that could be loosely termed Box-Jenkins (1976). Unlike the previously reviewed methods, Box-Jenkins methods enable the direct linkage of autocorrelated error structures with the time series being modelled. These time series methods have been termed autoregressive, integrated moving average models (ARIMA) and since Bennett's (1974) introduction of them to spatial forecasting, they have been applied to a variety of problems (for example, population forecasting;

Bennett, 1975). Martin and Oeppen (1975) have extended their flexibility to incorporate space-time forecasting and work is progressing in this area (see Haggett *et al.*, 1977). The advantages of these techniques are their statistical efficacy, efficiency and flexibility. Consequently, they offer a useful alternative to the simple lagged structure models that have dominated economic forecasting and the estimation temporal relationships hitherto. These points will be taken up in chapter three.

2.3 Evaluating Public Policy Outcomes

An important goal of this study, noted in Section 1.3 is to develop a means of evaluating the impact of macroeconomic policy upon regional welfare. This is step three of the policy analysis method first introduced in chapter one and follows, in sequence, questions of why policy impact may be regionally differentiated and how such impacts may be estimated and predicted. The purpose of this section is to consider the relevant literature with respect to the problems of establishing operational rules (or 'standards') of equity and efficiency.

Economic efficiency could be defined simply as the maximization of output (or profit) from a given level of resources or constraints. Morrill and Symons (1977) for example, argued that an efficient location for a firm is one at which a firm maximizes profit. The sum of individual decisions in a perfectly competive system is then an efficient production landscape. Measuring private or market efficiency is a relatively easy task, for example, profits or costs. Measuring and defining public policy efficiency is a more complex task. A convenient means of conceptualizing the problem is that the government optimizes some objective function (or

set of objectives, however derived) subject to a set of constraints (for example budget or political support). However, both elements in such a programming formulation entail a qualitative as well as a quantitative interpretation. Further, the objectives and constraints may not be well specified and could be left unstated or obfuscated for a variety of reasons, for example, political rivalry.

For the purposes of this study, national efficiency does not need to be more than qualitatively expressed. Thus, the programming framework may be an appropriate means of conceptualizing the issues involved in macroeconomic policy. This requires however a relatively clear statement of Canadian policy and its formulation.

Public equity is a far more complex issue. While many would agree that it is a concept of fundamental importance in policy analysis, few would agree on its definition or measurement. Both aspects are crucial prerequisites for evaluating regional outcomes in this study. In many respects, public policy tends to reflect, often implicitly, what Mishan (1971) termed 'ethical' standards or concepts of societal justice. Rawls (1971) considered that two principles of justice are particularly important, given liberal western democracy: maximum individual freedom compatible with the freedom of others, and social and economic inequalities arranged so as to 'reasonably' benefit everyone. This is not to say that government policies necessarily are designed with these principles in mind, rather that they are ethical notions of how justice ought to be structured in society: equity is foremost a normative view of society, implying values and ideology.

The operational definition of equity is subject to debate. Bowie

(1971, p.4), argued that equity or distributive justice ... "refers to the just distribution of benefits and burdens among a group of people". Given this definition and the notion of ethical standards, a wide range of measures could be envisaged. For example a common standard is *market equity*, or what could be termed distribution according to merit. To illustrate, a region with relatively low income may be allocated funds by a central government in proportion to its contribution to total national income. Theoretical justification for this notion is found in the welfare economics literature and the conceptualization of a system of general equilibrium in which efficiency implies pareto-optimality and units receive benefits on the basis of their marginal productivity.

This conceptualization of equity has been criticized vociferously in Economics (see Dobb, 1969) and, more recently in Geography. Smith (1977) for example, argued that the 'reality' of the space-economy means that the properties of the general equilibrium model are never attained. Amongst factors important in this regard are the presence of monopolies (both sectoral and spatial) and the inability of labour and capital to adjust according to their marginal product over space. Olsson (1974) was more critical of the distributional assumptions implied in *market equity*. He argued that the *status quo* is reinforced, existing inequalities are continued and the process of areal welfare differentiation is allowed to continue.

Stronger equity standards also have been utilized. An important option is *equality of opportunity*. For instance, regional policy, particularly in Canada; has sought to share or distribute government grants in proportion to regional population regardless of the relative regional

contributions to total government income. Equity is then judged to be a right of an individual regardless of location, productivity or societal attributes, and the previous distribution is judged to be unimportant with respect to current distributive consequences. An even stronger rule is *equality of results*, where a standard of service or the provision of public goods is determined *a priori* and policy seeks to raise every region to that standard regardless of existing inequalities. This may mean concentrating all government expenditures in one region perhaps as one kind of growth pole strategy. In essence, unequals are treated unequally (Levy *et al.*, 1974).

Even given a particular view of equity, the means of operationally measuring it may be particularly difficult. Important contributions to the development of operational measures of equity in the geographical context are Morrill (1974) and Smith (1977), who used access to opportunity, Lorenz and Gini coefficients. The use of statistical measures such as averages and standard deviations have been popular as a means of describing inequalities and their deviations from the 'norm'. However, as Smith (1977) noted they have seen little use in qualitatively evaluating more complex distributive outcomes.

Unfortunately, many of the stronger ethical and philosophical elements of equity have remained divorced from measures of statistical inequality. Harvey (1973) summed up the problem when he considered, in a related problem of theory development and application in Geography, that:

> "there is a clear disparity between the sophisticated theoretical and methodological frameworks which we are using and our ability to say anything really meaningful about events (or policy) as they un-

fold around us"

(Harvey, 1973, p.128).

The problem is that there are few guides in the literature to the choice of an appropriate equity measures, even in a qualitative sense. Clearly, an ethical judgement is necessary as well as a hierarchy of equity standards for evaluating policy outcomes. To evaluate any policy in equity terms, we must be explicit as to our assumptions of societal justice and be able to formulate a set of rules that embody in a spatial setting those principles. The significance of the literature reviewed is to be found in the options presented as available for application, and the realization of the ethical nature of equity.

2.4 Summary

This chapter has been concerned with previous contributions to the problems of understanding, estimating and evaluating the impact of macroeconomic policy upon regional welfare. Based on this review a number of conclusions are derived that bear directly upon the models and methods that will be needed to achieve the dissertation's objectives. We require: (i) a theoretical model which is capable of explaining why macro-economic policy may have differential regional impacts (that is, a structural model of the regional impact of national demand and money wage rate fluctuations); (ii) an operational version of this model and a consistent empirical method of describing the regional impact of policy over time and space; and (iii) a method of evaluation which will allow objective and comparable equity judgements to be made regarding first, the set of regional outcomes identified and second, the implications of two macroeconomic policy

scenarios for the future path of national unemployment.

Methods that are derived or applied with respect to estimating and predicting the *actual* impact of policy on regional welfare should also have a number of characteristics. First, they should be statistically efficient, and hence account for problems of serial autocorrelation that are inherent in many time-series regression procedures. Second, such methods also should be relevant in the sense of being able to discern differences in policy impact over space and time. Thus, the estimation methods must have an ability to distinguish between different phases of a given economic cycle. Third, with respect to predicting policy impact and the temporal stability of regional unemployment disparities, the models developed should be relatively simple for interpretive and evaluative purposes.

Finally, with respect to evaluating the equity consequences of macro-policy impact, a number of issues will need to be considered. There is the ethical sense of equity, the current policy objectives (both macro-economic and regional) that could reflect basic societal values, and finally, a consistent hierarchical set of rules reflecting varying strengths of equity standards.

CHAPTER 3

ANALYTICAL PROCEDURES

3.1 A Model of Regional Adjustment

The model of regional adjustment presented in this section has the following general characteristics. First, it deals exclusively with national fluctuations in demand and money wage rate conditions over the short-run time span where labour and capital are relatively fixed locationally and sectorally. Second, the model focusses upon the recent problems (1969-1976) of stagflation and disequilibrium; and third, the role of expectations and uncertainty are central to the functioning of the model. Indeed, following Davidson (1972, ch.2), this model may be characterized as neo-Keynesian. The central issue is not the determination of the path or conditions for labour market equilibrium, as in the neoclassical model, but rather how and why a firm will adjust to short-run fluctuations, regardless of equilibrium (Pissarides, 1976). The analytical unit is a 'representative' firm which has a location in space and time.

3.1.1 Assumptions

Firms are assumed to operate under conditions of pure competition with labour, subject to diminishing marginal product, the only variable input. Second it is assumed that the supply of labour is fixed with downwardly rigid money wages in a labour market at less than full employment.

The competitive assumption implies marginal cost pricing on the part of any given firm so that:

$$p^* = \frac{w}{m} \tag{3.1}$$

where $m = f(L)$, $\frac{dm}{dL} < 0$, and

p^* = the expected market price for producing a given quantity of output O,

w = money wage rate,

m = marginal product of labour,

$(\frac{w}{m})$ = marginal cost.

Re-arranging expression (3:1) produces the usual implicit labour demand function, $w = P^*m$; that is labour is paid the expected value of its marginal product and is represented in figure 3.3. Given a fixed money wage rate the labour supply curve is L_s (see figure 3.3). Hence figure 5.3 represents the conventional Keynesian labour market. Given that the money wage is above its market clearing value, employment (unemployment) will be demand derived.

3.1.2 Conceptual overview

The role of expectations

An important element of the model is uncertainty and its effects upon economic activity. Interpretations of uncertainty in space traditionally have dealt with it as a problem of risk to which a probability distribution can be linked (see Webber, 1972; for example). In this tradition, Curry's (1976) description of a stochastic world in which random shocks are integrated with process is suggestive of a world in which

there is not complete knowledge of the future. In contrast, the model developed in this section follows the work of Keynes (1936) and Shackle (1974), where uncertainty has a different meaning.

Essentially, Keynes (1936) developed a model in a world where individual short-run expectations may be falsified by the passage of subsequent events, although they may have little to do with the state of long-run expectations. Basically, not only may expectations be falsified but the future remains unknown and beyond the simple imposition of risk and probability. The process of adapting to unrealized expectations links immediate expectations with past performance and is inherently a disequilibrium dynamic formulation. Keynes (1936, 50-51) noted:

> "The process of revision of short-term expectations is a gradual and continuous one carried out largely in the light of realized results; so that expected and realized results run into and over-lap one-another in their influence. For although output and employment are determined by the producers short-term expectations and not by past results, the most recent results usually play a predominant part in determining what these expectations are."

The relationship between expectations, output and employment can be illustrated with reference to the following example and figures 3.1, 3.2 and 3.3. Suppose that the goods market is in equilibrium at a point such as E in figure 3.1 where the market price is P_0. Further assume the typical firm A fully anticipates this price so that $P^* = P_0$. Thus firm A produces the quantity of goods (q_0), employing a certain quantity of labour (L_0) (the exact relationship being determined by A's production function). To produce q_0 firm A must however lay-out money wages ($w = wL_0$) on the expectation of being able to sell that quantity of goods produced. In time (t) this expectation is infact realized since $P^* = P_0$. Imagine however that in time (t + 1) market demand for firm A's product falls (a

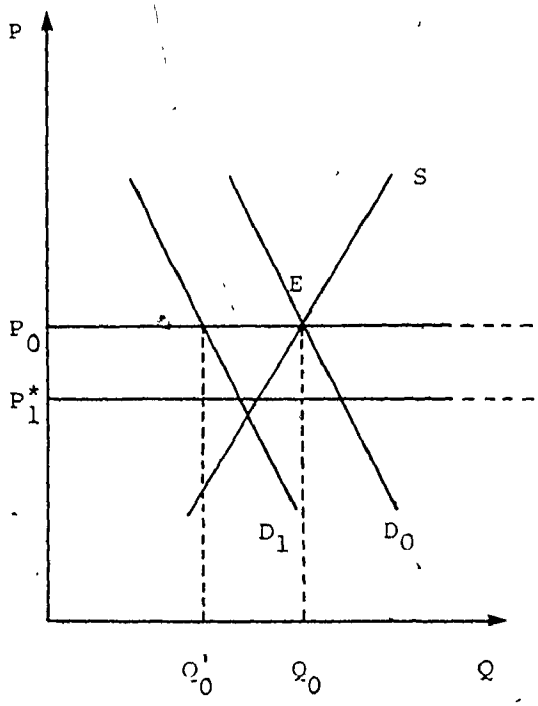

Figure 3.1 The Industry (Region)

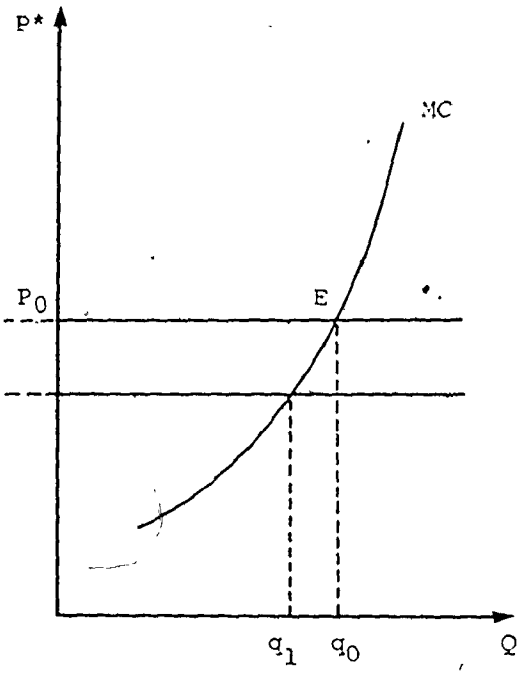

Figure 3.2 The Firm

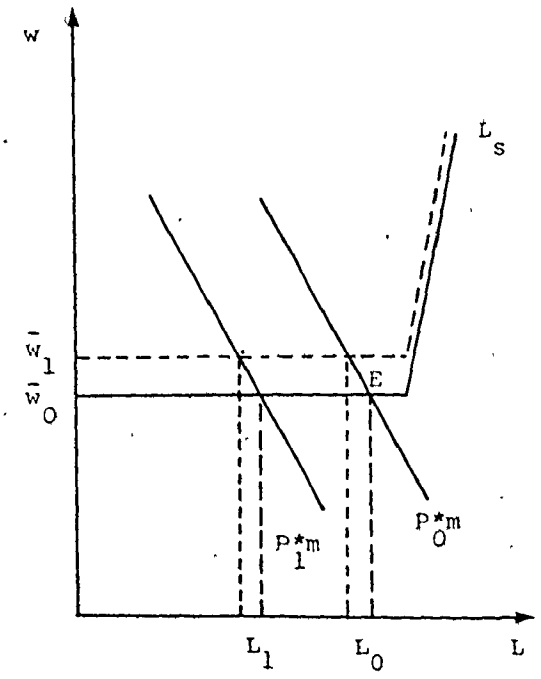

Figure 3.3 The Labour Market

shift of D_0 to D_1 in figure 3.1) - a number of outcomes will result.

First, assume expectations are unchanged. The typical firm will continue to produce q_0 where $P^* = P_0 = \frac{w}{m}$. By implication the market supply will be Q_0 while the market demand will be Q_0'. The typical firm will find itself unable to sell all of its output, given aggregate excess supply. In the face of excess supply we may assume the firm will adjust its expected price downwards to, say, P_1^*, in which case the typical firm cuts output from q_0 to q_1 (see figure 3.2), reducing its use of labour. In the aggregate, this can be represented in figure 3.3 by a leftward shift in the labour demand curve. Unemployment will rise as equilibrium labour input falls from L_0 to L_1.[1]

While we are concerned here primarily with impact multipliers, it can be seen that this will not be the end of the story. With the fall in output, employment and prices, incomes of consumers will fall which might be expected to lead to further reduction in goods demand. This will produce the usual Keynesian multiplier effects as demand continues to shift inwards. Given stability, a new short-run equilibrium will be re-established, at lower output, income and employment where expectations have caught-up with the market clearing price and demand has ceased falling.

A similar conceptualization, although derived from different theoretical roots (basically cost minimizing behaviour) has been proposed by Barro and Grossman (1971, 1976). They suggested that if trade and exchange were allowed to take place at prices that did not represent equilibrium

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[1] $w = P_m^*(L)$ implying $\frac{dL}{dP^*} = -m' < 0$.

prices (that is, in the absence of the Walrasian autioneer and the principle of recontracting), then two important qualifications to the orthodox macroeconomics of exchange and production would occur. First, given such prices, there would be no longer an automatic equivalence between the quantity of goods transacted and the quantity of goods supplied or demanded. Second, consumers and producers could no longer *expect* with absolute certainty to buy and sell all they wanted at the prevailing prices. Instead, in situations where there is excess demand or supply, the short-side (or short-run time period) of the market would prevail.

To illustrate the implications of this analysis for regional unemployment, consider the following case:

Case I, Two regions i and j

Assume: (a) Initial competitive assumptions, (b) two regions i and j where region i is specialized in the production of consumer durables while region j specializes in agricultural products, (c) suppose in time (t) the government engineers a fall in consumer demand through, for example, an income tax increase.

Implications

(i) In time (t + 1) as demand falls the impact, in terms of lower employment, is likely to be concentrated in region i as its goods are more income and price elastic. (ii) By the above analysis, employment will initially fall in both regions but one may expect a greater increase in unemployment in region i than in region j. (iii) The more rapid increase in unemployment in region i suggests a greater fall in incomes. This will lead to the above multiplier effects which could be expected to spill over into region j. Nonetheless, given the income elasticity of demand for

durables, these multiplier effects could still be expected to have greatest effect on region i's unemployment.[2]

These implications then imply two propositions:

[A] Restriction on aggregate demand will create more unemployment in regions specializing in durable manufacturing goods production than in regions specializing in agricultural goods production.

[B] The impact of national fluctuations in demand, in the short-run, is likely to be reflected in changes in all region's unemployment rates.

The role of money wages

As many authors have noted (see for example Hicks, 1974) Keynes was not concerned with what causes changes in money wages. Rather, he was concerned with the effect of money wages on the level of employment. Recently however, debate in the Economics literature has proliferated with respect to the process of wage determination, inflation and economic policy (see Wiles, 1973; for example). The view taken in this thesis was expressed best by Hicks (1974), who argued for the inclusion of a social-political mechanism of wage rate determination as a fundamental element in the functioning of the economy. Hicks (1974) emphasized the issue of fairness with respect to wage and price increases; this concept embodies the principle that wages are not simply pushed by a dominant trade-union but that employers tend to pay money wages in comparison to other reference

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[2] The disturbance to aggregate demand might arise initially as a result of a fall in export demand for agricultural products. The impact of this will be to initially reduce employment the most in region j. However given income inelastic demand for agricultural products, it is conceivable that most of the subsequent multiplier effects will fall on region i so that, in the end, region i is still the hardest hit.

groups in the community. Thus wage rate increases may not be related to the level of unemployment or even productivity but rather to the influence of class bargaining and the social context. Robinson (1972) also argued that this process is superimposed on the economy which is dichotomized into high growth (HGI) versus low growth industries (LGI), where the former may pay progressively higher wages to attract both a quality and quantity of labour and the latter, to maintain fairness as well as yielding to union and industry pressure, has to follow the general trend in money wage rate increases. This assumption is then more than "Keynesian" wage rigidity and Phillip's curve demand inflation; in this context, wages are institutionally determined and flow to all sectors of the economy without regard to productivity, market structure, demand elasticity, the demand for labour or the spatial configuration of economic activity (see Kaldor, 1970 on this point). This is what Hicks (1974) characterized as Stage II, the stagflation of the 1970's.

To trace the implications of such wage behaviour on output and employment a typical firm could be envisaged as operating in the following manner. With an expected price P* for firm A's product and a money-wage rate (w) determined exogenously, any change in w would necessitate an adjustment by the typical firm through m in the short-run. An increase in w (from $\bar{w}_0$ to $\bar{w}_1$ as in figure 3.3 for example) under conditions of constant prices P^*_0, would increase the average cost of producing a given unit of output. This would result in a decrease in firm A's output and a cut back on its level of employment (in figure 3.3 this implies a shift up the P^*m_0 curve). Such adjustment behaviour is the product of our initial assumptions of profit maximization and the limiting assumptions that labour is subject

to diminishing marginal product and is the only variable input factor in the short-run.

If such an adjustment were general for the total industry aggregate output would be cut back so that the market price will increase as supply decreases. Such price inflation is only possible if the product is not subject to exogenous market pricing forces. The consequence of money-wage rate changes in one market (sectoral or spatial) is that they become inputs to the behaviour of other markets with no guarantee that the structures of other markets will be able to absorb an exogenously determined wage rate increase without increasing unemployment. The following case can be used to illustrate our point.

Case II, Two regions i and j

Assume: (a) As in Case I, (b) two regions where $\frac{dm_i}{dt} > \frac{dm_j}{dt}$, (c) assume that on the basis of such an increase in m_i, the money-wage rate is also bargained upwards in time (t), $\bar{w}_0$ to $\bar{w}_1$ in figure 3.3, in region i so as just to match the increase in m_i. However also assume that the wage rate increase is passed on in total to region j.

Implications

(i) In time (t + 1) the effect of an increase in $\bar{w}$ for region i will be to maintain the level of employment and generate additional demand in the local economy. (ii) Region i could also then be characterized as a growth economy as output itself would also rise through increased labour productivity. (iii) The effect on region j however will be to reduce the level of employment and increase region j's unemployment rate.[3]

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[3] It should also be noted however that expansion in region i also implies an expansion in demand for secondary input materials. For example heavy steel construction demands iron ore which could come from region j. Thus there may also be positive spill-over effects in the scenario outlined above.

These implications then imply a further proposition:

[C] Money-wage rate inflation may have either a positive or negative effect on local unemployment. The exact effect will depend on the spatial concentration of industries and their differential labour productivity growth patterns.

The role of spatial-sectoral duality

A number of authors have also argued that the structure of capitalism itself makes simultaneous inflation and unemployment a necessary outcome. Robinson and Wilkinson (1977) for example, argued that without institutional (for example trade-unions) pressures for increases in money-wages, high productivity and growth industries would stagnate as mass consumption could not match productive capacity. Yet such wage-rate increases become extra costs for marginal and less productive industries. The characteristics of this dualism can be seen as:

Primary sector or high growth industries (HGI)	Secondary sector or low growth industries (LGI)
High growth	Low growth
High productivity	Low productivity
Income elastic demand	Income in-elastic demand
High market concentration	Low concentration

(see Bluestone, 1971).

Such duality may also be an important factor in stagflation. Means (1975a) claimed that much of current price inflation can be related to highly concentrated (primary) sectors administrating price increases. This planned sector has market characteristics such that wage-price increases are not

absorbed in the form of lower profits but rather passed on to the secondary sector in the form of higher prices. This latter sector may not be able (due to low productivity and competition) to increase prices and thus may have to absorb wage rate increases internally. This then leads to the possibility that wage-price increases in the primary sector create the conditions for higher unemployment in other sectors. Because of size and growth characteristics, Galbraith (1975) has claimed that the secondary sector must depend on the market for investment funds, while the planned sector develops such funds internally. This implies that the government policy designed for deflation (higher corporate taxation, budget surplus and high interest rates) are likely to affect the secondary sector before the primary sector. Hotson *et al.* (1976) recently extended this analysis by claiming that corporate taxation and manipulation of corporate depreciation allowances have two effects. First, they appear as higher costs to the primary sector and hence feed inflation; second, such policies in the secondary sector appear as immediate expenditure leaks and hence lead to higher unemployment.

3.1.3 Empirical form

Given the above conceptual overview, a response model is empirically defined in this section. The empirical model draws its rationale for the inclusion of certain variables from the preceding discussion although it is emphasized that subsequent analysis is designed to describe the regional impact of national fluctuations, not explained through a formal test of the derived hypothesis.

Let U_t^R = unemployment in region R, time (t), be the dependent variable or the measure of regional response over time.

U_{t-1}^R = unemployment in region R, time (t-1), be independent such that it reflects conditions in the local market in time (t-1). U_t^R is assumed to vary directly with U_{t-1}^R;

U_t^N = unemployment at the national scale, time (t), an independent variable where U_t^R varies directly with U_t^N. Thus U_t^N is assumed to represent national cyclical or demand changes (cf. Thirlwall, 1966) attributable, at least in part, to government macro-policy; and let;

MW_t^N = money wage rate per hour worked in Canadian manufacturing industries, time (t). An independent variable designed to capture the response of regions to money wage rate inflation. The parameter sign could be positive or negative.

In the context of the model discussed above, which is primarly a price-fixed model, the appropriate variable should, more realistically be, $\frac{MW_t^N}{p_t^R}$. However since real wage data are not available at the regional level and that price data is also very limited the money-wage rate variable was included. Clearly if prices were to rise in a given region so as to match an increase in MW_t^N, then there may be no discernable impact of MW_t^N on U_t^R. However it is that effect which is unknown in the Canadian regional context and it is an important objective in this dissertation to describe the regional variations of the impact of MW_t^N on U_t^R.

In general terms, the empirical model is stated as follows:

$$U_t^R = \beta_0 + \beta_1 U_{t-1}^R + \beta_2 U_t^N + \beta_3 MW_t^N + \varepsilon_t \qquad (3.2)$$

where: $\beta_2, \beta_3 \lessgtr 0$.

To accommodate the recent criticisms of Pierce (1977) (noted earlier in Chapter Two) concerning estimating economic relationships over time, the model can be re-specified such that:

$$[U_t^R - \rho U_{t-1}^R] = \beta_0[1 - \rho] + \beta_1[U_{t-1}^R - \rho U_{t-2}^R] + \beta_2[U_t^N - \rho U_{t-1}^N] + \beta_3[MW_t^N - \rho MW_{t-1}^N] + \varepsilon_t. \qquad (3.3)$$

where: $\beta_2, \beta_3 \lessgtr 0$.

This then becomes a dynamic model of adjustment, emphasizing not the actual levels at any given time but rather the adjustment to changes in the independent variables over time and the relative significance of these independent variables in explaining adjustment. The ρ coefficient is derived from the Cochrane-Orcutt (1949) method of ordinary least squares (OLS) regression and is defined as the first-order autoregressive parameter derived from the regression error structure. The procedure involves first estimating the OLS regression model in the form of equation 3.2, then after inspection of the error terms and using a preliminary estimate of ρ, the equation is re-estimated in the form of equation 3.3. This process is repeated until the ρ parameter is stable and the final model then can be evaluated.

The regression model specified in equation (3.3) is to be estimated for all forty-two Canadian Labour Force Survey regions. A number of writers, including Denton (1963, 1977), have argued that in similar circumstances such a system of equations and the estimation of their parameters should be subject to an aggregation constraint (a forty-third equation in the present case) such that $\sum_{R=1}^{R=42} a_t^R U_t^R = U_t^N$. Denton (1977) argued that this would remove the possibilities of parameter bias or inconsistency by weighting each variable by the actual work force of the given region. However, in our case this is not appropriate as a condition for such an estimation procedure is not met; that is, identical sets of regressors. Both the α parameter and the use of U_{t-1}^R (the lagged regional unemployment rate) as an independent variable, mean that each regression equation is unique to each particular region and that, in fact $\sum_{1}^{42} U_t^R \neq U_t^N$. It was judged that the problems of serial autocorrelation may be more significant than the suggested problems of aggregation bias, and consequently the Cochrane-Orcutt (1949) method was utilized.

3.2 Estimating the Regional Impact of Macro-Policy

3.2.1 The National Bureau of Economic Research method

The review in chapter two emphasized that many of the orthodox methods for evaluating the impact of national cyclical fluctuations and hence macro-policy are inappropriate. There were two reasons cited for this: first, there are technical problems in estimating the regression coefficients, and second, such methods are unable to discriminate effectively between different phases of any given business-cycle. An optional method is the National Bureau of Economic Research (NBER) Recession-

Recovery method (Bry and Boschan, 1971) and this is used in estimating the actual impact of macro-policy over the 1969-1976 period.

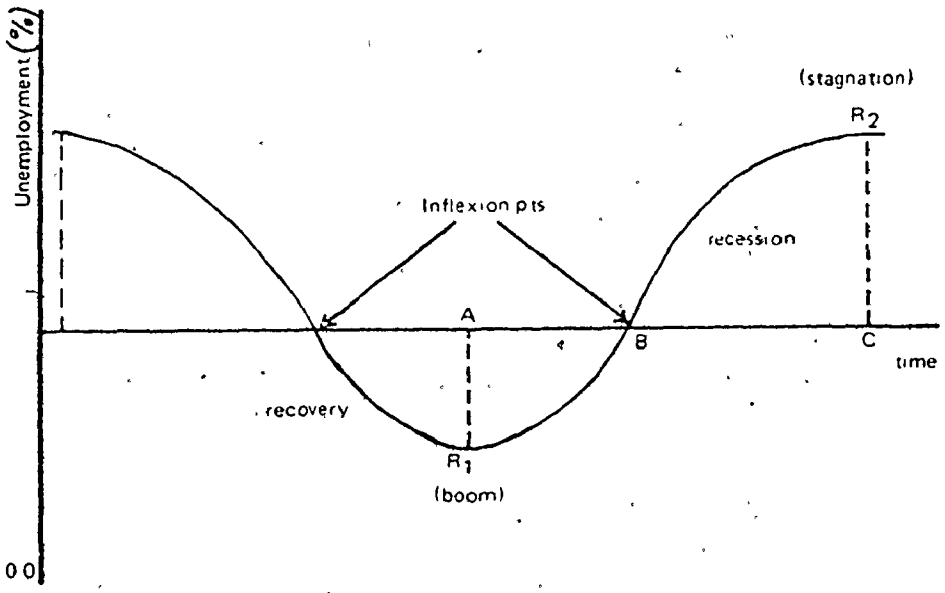
Using the national unemployment series as a 'reference curve' a number of steps are involved in analysis. First, identification is made of turning points in the reference series by using weighted three-month moving average Spencer curves (Bry and Boschan, 1971). This method is prefaced on an assumption of a fifteen month minimum duration between successive peaks-troughs-peaks. The method identifies the dates of cyclical turning and the duration (in months) of each phase of the cycle. Two further measures are computed. Cycle relatives, defined as the ratio of the moving average at, for example, the initial trough (point A in figure 3.1) to the general mean of unemployment over the total period under enquiry. For example, let R_1 be the cycle-relative at A, and R_2 the cycle relative at the subsequent recession (point C). The second measure, amplitude is then:

$$\text{Amplitude} = \frac{R_1 - R_2}{\text{duration (time)}} \qquad (3.4)$$

It should be noted that the use of cycle-relatives standardizes each series for the effects of trend over the long-term. Thus for each phase of the cycle, the appropriate macro-policies will be noted and impact estimated which in turn will relate to criteria of equity evaluation.

A number of assumptions are implicit in this method. No attempt is made to 'filter' the trend or irregular components from the cycle. As Waterman (1972) has noted, such decomposition ignores the interaction between such components and the irregular 'shocks' that may be vital in

Figure 3.1



Major Reference Points in the NBER Recession-Recovery Analysis (After Bry and Boschan [1971])

understanding the direction of the economy. Further, following Pasinetti (1974), it is argued that the process of fluctuation is neither as regular nor as finely replicated as models such as Brechling's (1967) would assume. With the overwhelming significance of macro-policy in the modern economy, each episode tends to reflect the type and direction of policy rather than the classical trade-cycle mechanisms (Lindbeck, 1975), and in our analysis changes in Canadian macro-policy will be considered directly.

3.2.2 A method of predicting the impact of policy

Our concern is also with the future or possible impact of macro-policy as well as estimating the actual impact of previous policy. Hence the policy analysis method, presented in Chapter One, is dependent upon developing as well a means of predicting regional unemployment outcomes on the basis of variations in macro-policy options. Discussion in Chapter Two served to highlight two issues with respect to prediction: first, the model developed must be statistically efficient particularly with respect to the problems of serial autocorrelations; and second, it should be relatively simple. In this context, the Box and Jenkins (1976) models that are developed in this section will be used to derive implications for two alternative macro-policy scenarios. deLeon (1973) has noted that a scenario is not exact prediction; in essence a scenario attempts to trace what *might* or *may* happen in the event of certain policies being implemented. To develop an understanding of what may happen, a means of estimating the empirical relationships between macro-policy (where national unemployment is used as an 'indicator') and regional unemployment is needed. The Box-Jenkins models are introduced here in order to estimate temporal

lead-lag relationships, the degree of relationship between the two series (national and regional unemployment) and the parameter values that give a clue to the statistical significance of the relationship.

The Box-Jenkins procedures are prefaced upon a number of conceptual and mathematical tools (see Anderson 1976a, b and Newbold, 1975 for more pedagogic treatments). A given regional unemployment time-series typically may be thought of as a discrete stochastic series. That is, 'recordings' of unemployment are taken or sampled at discrete, monthly time intervals. A series, or the underlying process may be termed stochastic in the sense that any time series can be thought of as the realization of a set of random variables. Random in this context, implies either a lack of knowledge of the underlying process, and/or, the process may be subject to exogenous 'shocks' with warning. For example, for any given region the impact of national fluctuations generated externally to that region may appear random in character. The Box-Jenkins (1976) approach does not imply any equilibrium structure nor demand any specification of causality in selected variables. There are a number of steps in the modelling process. First, in the simple univariate case, *identification*; this step uses the autocorrelation and partial autocorrelation functions of a given series in comparison with actual theoretical patterns for different orders of autoregressive (AR) and moving average (MA) models. *Estimation*, the second step then estimates, using Marquardt's algorithm in a Maximum Likelihood framework, the parameters of the initially identified process. The last stage, *diagnostic checking*, is essentially the checking of residuals for model adequacy. Hence, if inadequate, the process is begun again. The criterion for selecting the number of parameters is parsimony; that

is, the model contains the minimum number of parameters necessary to most accurately model the real world (Bennett, 1974).

Given these concepts a family of models can be developed from the following general specification:

$$\phi_p (B) \nabla^d Z_b = \theta_q (B) a_t \qquad (3.5)$$

where: (p, d, q) are non-negative integers

B = a backward operator such that: $BZ_t = Z_{t-1}$,

∇^d = a difference operator such that: $(1 - B) Z_t = Z_t - Z_{t-1}$, (to induce stationarity)

a_t = random disturbances or shocks assumed to be randomly distributed with zero mean and variance σ_a,

ϕ_p = $1 - \phi_1 B - \ldots - \phi_p B^p$ are termed autoregressive parameters which, once p is identified, are to be estimated,

θ_q = $1 - \theta_1 B - \ldots - \theta_q B^q$ are termed moving average parameters, again, to be estimated,

Z_t = $\bar{Z}_t - \mu_1$ where in the case of a stationary process, the observation at time t is subtracted from the mean of all observations in the sample period.

As a means of illustrating the types and structures of these models, a number of simple cases are noted below.

[A] An ARMA process (0, 0, 1) may be defined as:

$$Z_t = (1 - \theta_1 B) a_t$$

$$Z_t = a_t - \theta_1 a_{t-1}$$

This is a moving average process of order one, where Z_t is related to the error term, weighted for time (t-1). This also may be extended such that:

$$Z_t = (1 - \theta_1 B - \ldots - \theta_q B^q)\, a_t.$$

[B] An ARMA process (1, 0, 0) may be defined as:

$$Z_t(1 - \phi_1 B) = a_t$$

$$Z_t - \phi_1 Z_{t-1} = a_t$$

This is an autogressive model of order one, related to previous weight observations, plus random term a_t. This model is clearly related to Thirlwall (1966), however, the a_t term in Box-Jenkins is modelled as an integral part of the total process.

[C] An ARMA process (1, 0, 1) may then be defined as:

$$Z_t(1 - \phi_1 B) = (1 - \theta B)\, a_t$$

$$Z_t = \phi_1 Z_{t-1} + a_t - \theta_1 a_{t-1}$$

[D] In reality very few economic process are stationary, thus model [C] could be extended as an ARIMA model of the form (1, 1, 1) which can be further defined as:

$$Z_t(1 - B)(1 - \phi_1 B) = (1 - \theta_1 B)\, a_t$$

where:

$$W_t = Z_t(1 - B) = Z_t - Z_{t-1}$$

$$W_t = \phi_1 W_{t-1} + a_t - \theta_1 a_{t-1}$$

An extension is worth noting in the regional unemployment case where unseasonally adjusted data are being used for the forecasting period. Observations twelve months apart as well as the simple month-to-month

relationships, may be related; an example is noted in [E].

[E] An ARMA process $(1, 0, 0)_{12}$ $(1, 0, 0)$

$$(1 - \phi_1^* B^{12})\ (1 - \phi_1 B)\ Z_t = a_t$$

$$Z_t = \phi_1 Z_{t-1} + \phi^* Z_{t-12} - \phi_1 \phi^* Z_{t-13} + a_t$$

This process can be extended similarly to moving average as well as more general autoregressive, integrated moving average processes.

In analysing regional unemployment under an assumption of a link between national and regional unemployment, the univariate modelling is the first step in the procedure. That is, the national series (or input series X_t) is first modelled and then, second, linked to the regional series (or output series Y_t) in a transfer function. The input series X_t can be defined as causally related to the output series Y_t, in the sense that "Y_t can be better predicted using past values of X than by not doing so" (Pierce and Haugh, 1977). In our case there are clear theoretical reasons to suppose not only empirical causality but also functional relationship. Figure 3.2 outlines this approach, where the form of the transfer function model can be identified from the following

$$Y_t = \frac{\omega(B)}{\delta(B)} B^b X_t + \frac{\theta(B)}{\phi(B)\nabla^d} a_t \qquad (3.6)$$

or,

$$Y_t = \nu_0 X_t + \nu_1 X_{t-1} + \nu_2 X_{t-2} + \ldots + N_t$$

$$Y_t = \nu(B)\ X_t^b + N_t \qquad (3.7)$$

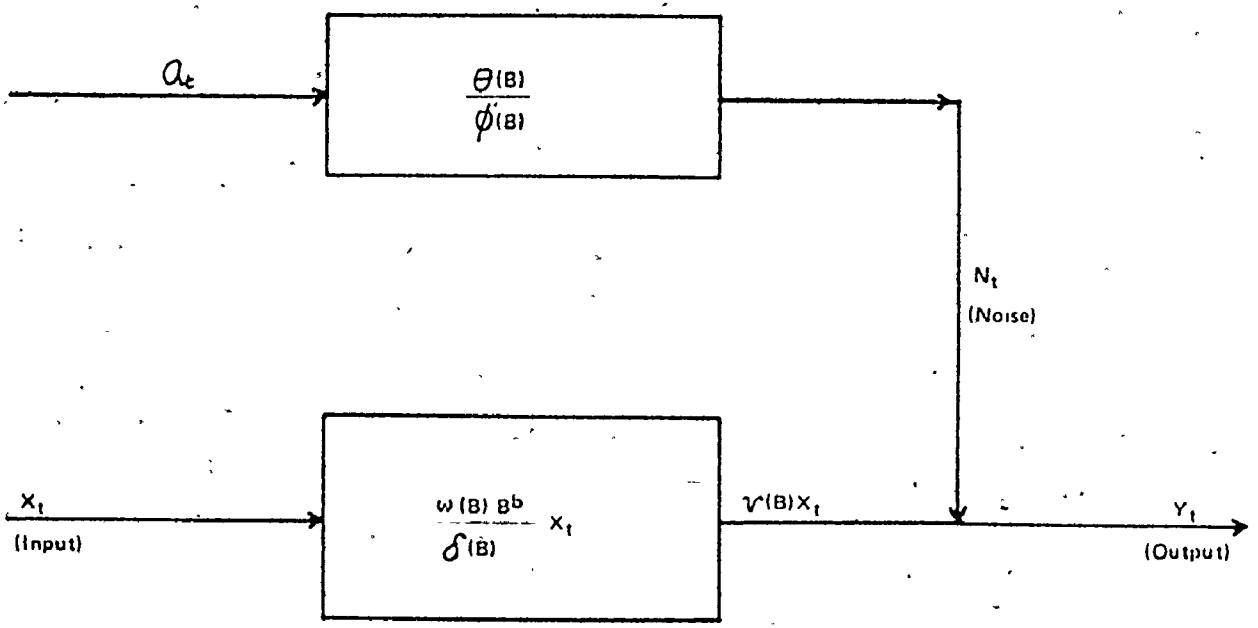


Figure 3.2

Transfer Function Model: Analysis of National (X_t) and Regional (Y_t) Unemployment (After Box and Jenkins (1976)).

After filtering the regional series through the national model, the residuals of the two series are compared through the cross-correlation function. Filtering has a rather different meaning in this case than in Bassett and Haggett (1971) study. In their filtering procedure, they removed trend, seasonal and 'so-called' irregular components and then compared what they identified as the cyclical component between series. This suffers from the criticisms by Box and Newbold (1971), noted earlier in chapter two and such 'conditioning' may imply structure in what may be otherwise random noise (Slutsky, 1937). Stokes *et al.* (1975) performed a similar step to this study, however it was limited in the sense that they did not compare residuals in the cross-correlation function. In general, two elements are of particular interest in understanding what impact the national series would have on regional series. First, the definition of lead/lag relationships, and second the 'ν' weight on the national series for each region.

It should be noted that there are no clear rules of model design in response function modelling. As Pierce and Haugh (1977) commented, the modelling experiment is conditioned by the actual series under consideration and the personal preferences of the researcher. Hence, the autocorrelation structure of many economic time series imply a certain type of model although, not the actual form of the model. The real issue according to Pierce and Haugh (1977) is the problem of spurious regression and consequently spurious causal association, issues that have been of central concern in this study.

3.3 Evaluating Equity, Efficiency and the Regional Impact of Policy

Given the development of a theoretical model explaining differential regional impact and a set of empirical methods devoted to estimating the actual and possible regional impact of macro-policy over time and space, the third step is to evaluate the results generated from those models in terms of equity and efficiency. To accomplish this task a set of equity rules are needed and this is the subject of this section.

The concept of national macro-policy efficiency is relatively easy to define. Simply, policy makers attempt to attain policy goals with the minimum of cost. This 'cost' can either be direct (for example unemployment) or indirect in the sense of opportunity cost (for example, lost output and income). Efficiency in resolving a national macro-policy problem then revolves around often quantitatively expressed costs and benefits given certain constraints. In Canada macro-policy has two, often supposedly contrary goals (Reuber, 1964); high employment and price stability. Since the 1945 White Paper on reconstruction and employment these two elements have come to dominate macro-policy. The operational targets can be briefly noted as 4.0-4.5% unemployment and 2.0-3.0% inflation (Senate of Canada, 1971). The means or instruments utilized to achieve such targets traditionally have been fiscal and monetary policies (see Auld, 1975b, for a more detailed description) although recently incomes policies have assumed greater importance. Supplementary labour market policies have been developed over the 1969-1976 period and in particular the Department of Manpower and Immigration (DMI) has used mobility, retaining and job search policies to improve the spatial and sectoral allocation mechanisms of the Canadian labour market.

In contrast, regional equity is very difficult to define. Inherently

it involves one's values and ideology. Yet at the same time it would seem relatively easy to describe as unjust or discriminatory, differential welfare costs to individuals simply on the basis of where they may live. In evaluating the distributive outcomes of policy it is clear that even within the Economics literature there is deep confusion and dissent (Dobb, 1969) while in the Geographical literature the welfare focus and related methods of analysis are also very controversial (see for example Dear, 1978 and Smith, 1977).

Following our discussion in Chapter Two, four rules or criteria of regional equity will be used to evaluate the regional impact of macro-policy.

(i) *Equity is assumed to decrease with an absolute increase in unemployment.* That is, the level of unemployment in any given region is seen to be an important indicator of welfare where, for example, a decrease in the rate of unemployment will increase regional economic welfare or equity. This conception is inherent in government programs such as Unemployment Insurance. As Haveman (1973) has noted higher absolute rates of unemployment mean both private and social costs to the community which have often been measured in terms of lost income or lost production.

(ii) *Equity for a given region is assumed to decrease if that region shares increases in unemployment disproportionately with respect to the total regional system.* Following Palmer (1971), a key issue in deciding the justice of an outcome is the degree of spatial differentiation of policy impact. If the impact of macro-policy was spread evenly across space, then the distributional problem would be negligible; however the inequality inherent in differential geographical impacts is of crucial significance.

This involves Sen's (1970) conception of 'universalization' which may be interpreted to mean that it is unjust for differential equity to occur simply on the basis of location in the space-economy. To analyse differential equity, a datum point or series is a necessary basis for comparison. Perhaps most convenient and obvious is to use the national level as the average level of welfare. Haveman (1973) has also noted that such evaluation should occur over time and space as compensation between different business-cycle episodes is a real possibility.

Equity rules (i) and (ii) have a strong rationale for application in our analysis as the Department of Regional Economic Expansion (DREE) has used these two criteria in outlining the Department's goals and objectives with respect to regional disparities. The primary goal of DREE has been to ensure adequate opportunity, employment and income without regard to location. This has involved particular attention being paid to levels of disparities between regions. Actual targets are not as well defined, but Schramm (1976) noted, for example, that DREE's basic objectives could be expressed in the following terms:

> "(a) reduction of unemployment in regions have consistently higher rates of unemployment than the national average; (b) reduction of relatively high underemployment and low productivity employment in the slow growth regions to a level closer to that in the rest of the country; and (c) increase in the labour force participation rates in the slow growth regions so that they are closer to the national average."
>
> (Schramm, 1976, 12)

A number of instruments have been used by DREE: direct job creation by providing incentives to industry to either relocate or establish; infrastructure development; and special assistance which has been composed of retaining, technical assistance and income assistance.

(iii) *Equity for a given region is seen to decrease even if regional unemployment equals national unemployment but existing regional disparities are such that the region is already at a disadvantage.* This equity rule invokes the concept of fairness and Rawls' (1971) argument for treating unequals unequally. It is clear that if unemployment increases even marginally in an already depressed region this may be judged as unfair or unjust compared to a greater rise in unemployment in a more prosperous region. The existing distributions of wealth, income and job opportunities are then important criteria in judging a distributive outcome. This implies that a fundamental practice for a more just society is to protect and increase the level of welfare of the worst-off in the spatial economy.

(iv) Finally, a rule of justice or equity must be made explicit with regard to the temporal and spatial stability of a given distribution. *Equity can be judged not only with regard to the stage of welfare at any point in time but also with respect to the future path of unemployment disparities.* Clearly, this is not a rule in the same sense as the first three given above. The reason for this is simply one of emphasis inherent in the objectives of this study. That is, a significant welfare issue is the temporal stability of Canadian regional unemployment and the possible future patterns of interregional disparities.

These four criteria are not exhaustive of all possible means of evaluating the equity of a given distributive outcome. However, they do represent important justice goals reflected in the literature on distributive justice and also in the objectives of Canadian regional policy. Further, there is a *hierarchy* inherent in the ordering of the criteria. In this sense, the first criterion reflects a relatively weak equity rule,

the second a little stronger and the third even more so, reflecting Rawls' fairness concept. In analysing the distributive consequences of macro-policy no one element is given pre-eminence, rather as a set they form the basis for normative judgements.

3.4 Data

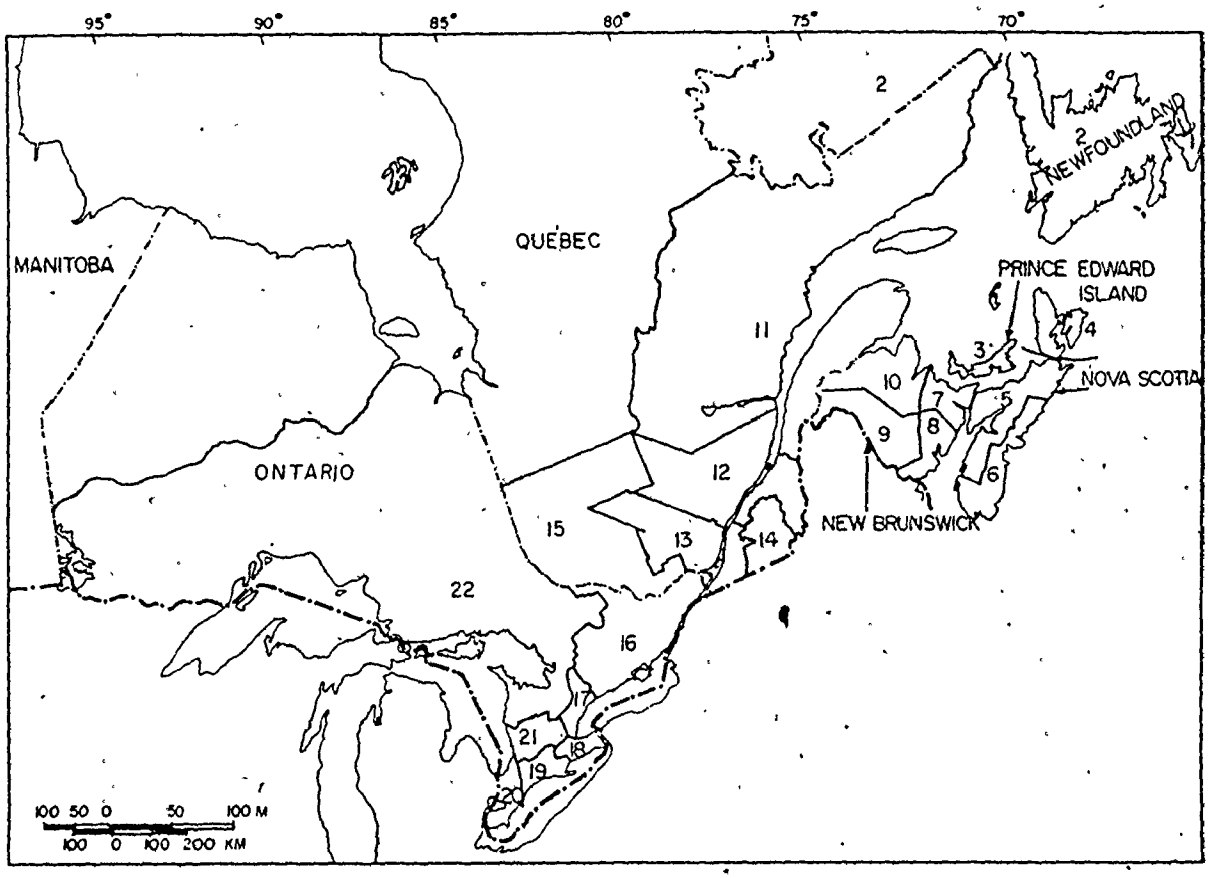
To develop the objectives and test the substantive hypotheses of this study a particular set of data is required. Data that reflect national fluctuations and macroeconomic policy variations are prerequisites as well as data that reflect regional variations in welfare over time and space. Moreover, the data series should reflect also recent stagflation and recession at the national and regional scales. It is clear from the objectives of this study that the distribution and variations in national and regional unemployment are of vital significance. In Knox's (1975) terms, unemployment reflects fundamental policy goals, outputs of the spatio-economic system, and significant welfare criteria central to the social and political goals of Canadian society.

The more importance choice is that of the particular unemployment series to be used, and at what spatial scales the data should be collected. Many Canadian studies on regional unemployment have been quite broad in their spatial scale. For example, Martin (1976) and Thirsk (1973) used provincial data. Kaliski (1968) and Young (1975) by contrast, used sub-provincial data based on National employment service data (the earlier Canada Manpower centres), and Marchand (1974) used data for fifteen urban areas in Quebec. Only Strom's (1975) and Tomczak's (1978) studies however, are relevant to the current episode of inflation and unemployment, Kaliski

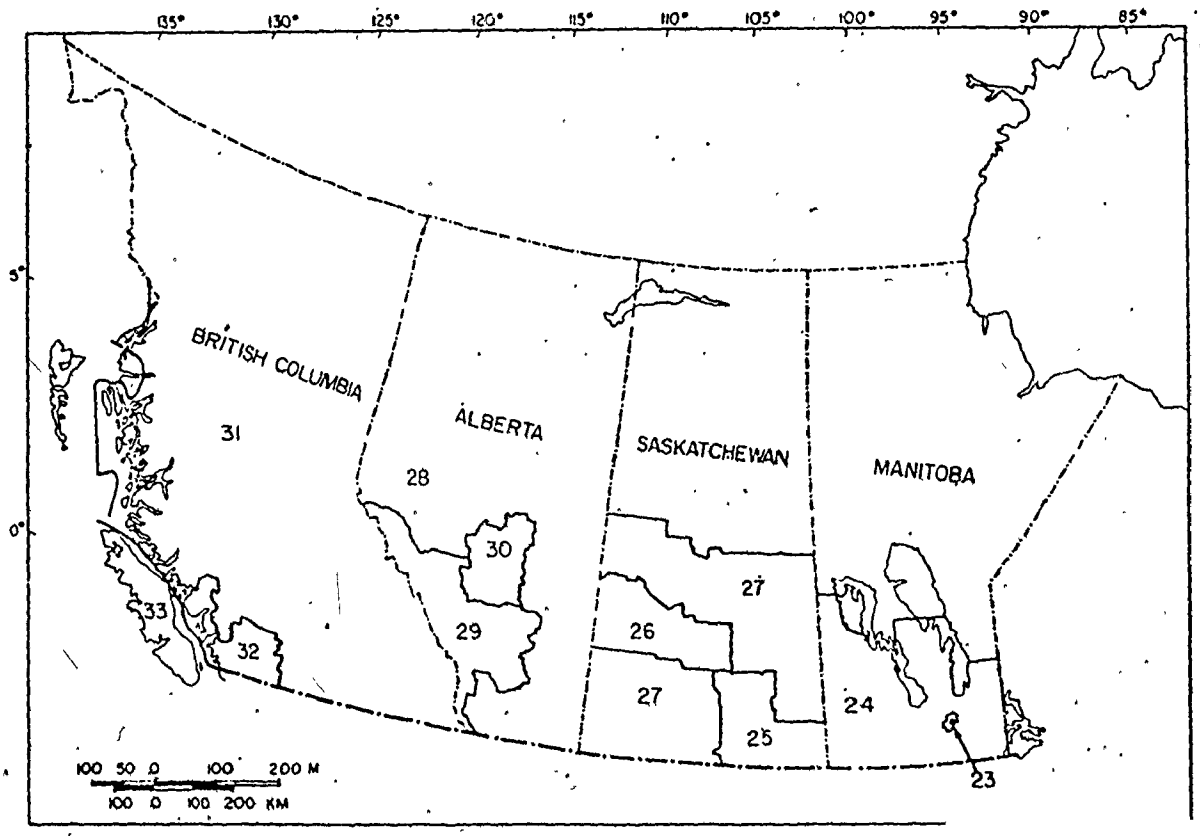
and Young's studies being based on cross-sectional data for the early 1960's and Marchand's study, on data for 1961-1971. Strom (1975) utilized regional unemployment time series data made available by Statistics Canada through their Labour Force Survey. The advantages of these series over the Manpower data, for example, are their relative consistency in regard to the collection of unemployment estimates, and the fact that government programmes such as Unemployment Insurance, direct job creation and DREE often depend on these series. The Labour Force Survey also is the source for the estimated national unemployment rate. Tomczak's (1978) study used employment data for fifty-two urban centres in Canada. Although relevant to this thesis, our objectives concerning the analysis of regional equity, unemployment and the impact of policy, are rather different and consequently our focus remains with the regional unemployment data.

Maps 3.1 (a) and (b) describe the Statistics Canada Labour Force Survey regions. All provinces are represented and the emphasis on population distribution as the criterion for boundary selection. These regions are constructed from the Camu *et al.* (1964) definition of functional economic regions for Canada (see Appendix A for a profile of the employment structure of these regions) and consist of thirty-three non-metropolitan and nine metropolitan regions (the key to the numbered regions can be found in Table 4.1). The Labour Force Survey is conducted each month by Statistics Canada and is based on a sample of, on the average, 3,000 households over those regions noted in map 3.1 (a) and (b). The unemployed are defined as those persons during the interview week who are either without work and seeking work, or who are laid-off temporarily. Thus, the unemployment rate in region R, time t is:

Map 1(a) Eastern Labour Survey regions



Map 1(b) Western Labour Survey regions



$$U_t^R = \frac{\bar{U}^R}{L.F._t^R} \times 100 \qquad (3.8)$$

where: $\bar{U}_t^R$ = numbers unemployed in region R, time t, and;

$L.F._t^R$ = estimated labour force in region R, time t.

This definition attempts to include only those people involuntarily unemployed, and not those unemployed due to illness or for other voluntary reasons. The labour force participation rate is defined as all those in the labour force (employed plus unemployed) divided by all those people over 14 years of age, eligible to work. Note that those people who are unemployed but not seeking work are defined neither as employed nor unemployed. These data were made available by Statistics Canada in published and unpublished forms for all regions at monthly intervals over the period, 1966-1976. Unfortunately, after January 1976 the boundaries of the regions were so altered as to make impossible further consistent time-series analysis.

Data are also needed for testing the model of regional adjustment, both national money-wage data, and structural data reflecting high and low growth industries over the set of Labour Force Survey regions. Money-wage data were derived from the monthly survey of wages and salaries conducted by Statistics Canada. These are based on the hourly rate of pay for all Canadian manufacturing industries aggregated to the national level. The data are not price deflated and are aggregate over all regions and sectors. Structural data on local regional characteristics are derived from the 1970 Geographic Survey of Employment (Statistics Canada) which is based upon the Camu *et al.* (1964) regional economic system. More recent

data were deemed inappropriate since they would simply serve to reflect the impact of the current recession rather than the structure of industry and employment before the recent economic crisis. The industrial structure of regional employment were used to imply economic structure not variations in employment itself.

PART 3

THE REGIONAL IMPACT OF MACRO-POLICY

CHAPTER 4

REGIONAL ADJUSTMENT TO NATIONAL FLUCTUATIONS

In this chapter a critical examination of the theoretical model of regional adjustment, developed in section 3.1, is conducted with the object of establishing empirically the extent to which the model can help explain why macro-policy is regionally differentiated. Attention is paid in particular to the form of the estimated function, parameter values, signs and significance levels. It should be emphasized that the model is not a definitive test of the impact of macro-policy and stagflation; rather the empirical model is a partial and heuristic means of understanding hypothesized aspects of regional adjustment.

4.1 Model Form

Following section 3.1, the model of regional adjustment that is to be examined is of the form:

$$[U_t^R - \rho U_{t-1}^R] = \beta_0[1 - \rho] + \beta_1[U_{t-1}^R - \rho U_{t-2}^R] + \beta_2[U_t^N - \rho U_{t-1}^N] + \beta_3[MW_t^N - \rho MW_{t-1}^N] + \varepsilon_t \quad (4.1)$$

where: $\beta_2, \beta_3 \lesseqgtr 0$.

Consideration was also given to incorporating the supply response of labour

to changing economic conditions, by weighting regional unemployment by local participation rates. In doing this it was hoped to account for biases in the estimation of regional adjustment that could occur simply on the basis of people leaving the labour market rather than becoming involuntarily unemployed. However, preliminary testing of the relationship between regional labour force participation rates and national unemployment fluctuations disclosed that very little relationship existed. This is consistent with many time-series macroeconomic studies of participation rate behaviour (see Hartley and Revanker, 1974) and consequently, the labour supply response was not incorporated in the analysis.

The model (equation 4.1) was estimated using the OLS-Cochrane and Orcutt (1949) regression method with a number of preliminary steps. First, all variables were deseasonalized and transformed to logarithms ($\log_e$) prior to estimating the model. The beta coefficients can be then interpreted as *beta-elasticities* measuring the response of the dependent variable to unit changes over time in the independent variables (Brechling, 1967). Second, the model was estimated over the period July 1969 to December 1975. The initial point was chosen because a number of earlier commentators (see Donner *et al.*, 1973), backed-up by recent studies on Canadian business fluctuations (Chung, 1976), considered July 1969 to be the start of the recent recessionary period. December 1975, was chosen as the terminal date because no data were available (see section 3.4) beyond that point.

4.2 Calibration and Results

Table 4.1 gives the estimates obtained from estimating equation 4.1. The results are recorded according to the region and are presented in a summary form. Each variable is dealt with separately and attention drawn to its parameter value, sign and significance with respect to each region and also with respect to the Canadian regional system.

4.2.1 National money wage rates (MW_t^N)

An immediate observation that can be made with reference to this national money wage variable and its significance for regional unemployment, is the general east-west dichotomy. Table 4.2 shows that the eastern regions (including Quebec and the Maritime regions) generally have positive parameters while the western regions (the Prairies) have negative parameters. Two of the three eastern regions with negative signs are the metropolitan regions of Montréal and Toronto. Of the western regions with positive signs, both are in British Columbia. Of the eight non-metropolitan regions with significant and positive parameters in the east, five are in the Maritimes, one in Quebec and the two others in central and southwestern Ontario. The one metropolitan region with a significant and positive b_3 parameter in the east is Quebec-Levis. In understanding the beta-elasticities it should be remembered that the differenced and logged form of the variable implies change and adjustment over time. For example, in region ten, North-east New Brunswick, a one percent increase in MW_t^N over one time period (t) to the next (t + 1), would cause a 1.23% increase in regional unemployment. In contrast, in the western region of Medicine-Hat/Lethbridge, a 1% increase in MW_t^N would stimulate a 1.54% decrease in local unemployment. The impact

Table 4.1

OLS estimates (adjusted for serial autocorrelation using the Cochrane-Orcutt, 1949 method) 1969(7) - 1975(12).

Region	Model Parameters† b_0	b_1	b_2	b_3	F value	R^2	Durbin-Watson Statistic	Final rho (ρ)
Avalon	1.200	- 0.082 (0.180)**	+ 0.026 (0.264)	+ 0.940* (0.221)	76.349	0.758	1.952	0.651
Newfound-land/ Labrador	0.775	+ 0.274 (0.191)	+ 0.177 (0.200)	+ 0.980* (0.157)	101.218	0.806	2.324	0.500
P.E.I.	0.232	- 0.194 (0.189)	+ 0.896 (0.566)	+ 0.169 (0.436)	14.045	0.366	2.070	0.596
Cape Breton	0.364	- 0.060 (0.205)	+ 0.889* (0.257)	+ 0.394* (0.187)	38.280	0.611	1.916	0.525
Annapolis S. Shore	0.689	+ 1.281* (0.137)	+ 0.193 (0.134)	+ 0.048 (0.090)	26.674	0.523	1.903	-0.231
Halifax N. Shore	0.189	+ 0.758* (0.147)	+ 0.541* (0.129)	+ 0.082 (0.066)	45.515	0.651	2.106	-0.093
Moncton	0.089	+ 0.718* (0.193)	+ 0.394 (0.252)	+ 0.527* (0.183)	27.167	0.526	1.913	0.170
St. John Valley	1.586	- 0.113 (0.175)	+ 0.499 (0.364)	- 0.546* (0.264)	8.334	0.255	2.017	0.468
Upper St. John Valley	-0.146	- 0.006 (0.174)	+ 0.877* (0.305)	- 0.289 (0.224)	20.886	0.462	2.024	0.533

Table 4.1 (cont'd)

Region	Model Parameters†				F value	R^2	Durbin-Watson Statistic	Final rho (ρ)
	b_0	b_1	b_2	b_3				
N.E. New Brunswick	1.103	+ 0.083 (0.215)	- 0.061 (0.298)	+ 1.233* (0.228)	61.020	0.715	2.059	0.498
Gaspé-N. Quebec	0.965	+ 0.312* (0.120)	+ 0.603* (0.215)	+ 0.253 (0.205)	61.294	0.715	1.594	0.743
Laurentians	0.860	- 0.042 (0.185)	+ 0.394* (0.156)	+ 0.345* (0.112)	31.210	0.562	2.048	0.466
Montreal Region	0.801	+ 0.062 (0.139)	+ 0.893* (0.080)	- 0.399* (0.050)	146.705	0.857	2.065	0.268
Eastern Townships	0.258	+ 0.217 (0.194)	+ 0.785* (0.237)	- 0.181 (0.182)	66.765	0.732	2.115	0.638
Western Quebec	-0.101	+ 1.103* (0.202)	+ 0.712* (0.220)	+ 0.116 (0.128)	67.242	0.734	2.102	0.259
Eastern Ontario	-0.025	+ 0.848* (0.106)	+ 0.617* (0.148)	+ 0.074 (0.671)	97.581	0.800	1.901	-0.139
Toronto Region	-0.303	+ 0.633* (0.101)	+ 0.903* (0.144)	- 0.064 (0.052)	178.498	0.880	1.961	0.011
Niagara	-0.445	- 0.099 (0.167)	+ 1.055* (0.226)	+ 0.215 (0.153)	32.683	0.573	2.036	0.427
Central Ontario	-1.804	- 0.062 (0.139)	+ 1.436* (0.356)	+ 0.511* (0.249)	32.828	0.574	1.978	0.436

Table 4.1 (cont'd)

Region	Model Parameters†				F value	R^2	Durbin-Watson Statistic	Final rho (ρ)
	b_0	b_1	b_2	b_3				
Southwest Ontario	-0.205	+ 0.066 (0.169)	+ 0.382 (0.456)	+ 0.824* (0.374)	37.74	0.608	1.940	0.648
Kitchener	-4.320	- 0.093 (0.519)	+ 2.830* (0.519)	+ 0.230 (0.379)	44.253	0.645	1.662	0.557
Northern Ontario	-0.446	+ 0.172 (0.172)	+ 1.016* (0.197)	+ 0.160 (0.121)	48.750	0.667	2.063	0.349
Winnipeg	-0.799	+ 0.091 (0.321)	+ 1.713* (0.321)	- 0.673* (0.209)	55.303	0.694	1.700	0.477
South Manitoba	-0.454	- 0.167 (0.102)	+ 1.664* (0.458)	- 0.939* (0.377)	28.911	0.543	1.889	0.660
Regina	2.953	- 0.287* (0.092)	+ 0.211 (0.524)	- 1.515* (0.499)	34.273	0.584	1.947	0.729
Saskatoon	0.794	- 0.602* (0.123)	+ 1.280* (0.626)	- 1.041 (0.581)	14.453	0.372	1.927	0.728
Parklands	1.259	+ 0.312* (0.084)	+ 0.448 (0.239)	- 0.774* (0.198)	30.349	0.555	2.040	0.084
Medicine-Hat/ Lethbridge	0.153	- 0.033 (0.085)	+ 1.650* (0.361)	- 1.544* (0.266)	45.563	0.651	2.049	0.407
Calgary Region	0.933	+ 0.949* (0.092)	+ 0.311 (0.170)	- 0.297* (0.097)	41.676	0.631	1.871	-0.355

Table 4.1 (cont'd)

Region	Model Parameters† b_0	b_1	b_2	b_3	F value	R^2	Durbin-Watson Statistic	Final rho (ρ)
Edmonton Region	0.175	+ 0.596* (0.099)	+ 0.872* (0.180)	- 0.413* (0.108)	40.210	0.623	1.917	-0.219
C. Interior	-0.013	+ 0.192 (0.195)	+ 0.978* (0.178)	+ 0.082 (0.108)	47.506	0.661	2.103	0.337
Vancouver Region	0.256	- 0.368* (0.177)	+ 1.394* (0.193)	- 0.426* (0.144)	92.092	0.791	2.034	0.613
Vancouver Island	-0.078	+ 0.342 (0.208)	+ 0.741* (0.263)	+ 0.317 (0.171)	43.690	0.642	1.877	0.387
Calgary	0.773	+ 0.877* (0.104)	+ 0.450* (0.191)	- 0.324* (0.110)	28.683	0.541	1.845	-0.349
Edmonton	0.222	+ 0.624* (0.111)	+ 0.846* (0.198)	- 0.380* (0.117)	24.427	0.501	1.981	-0.273
Halifax	0.474	+ 0.798* (0.125)	+ 0.336* (0.253)	+ 0.061 (0.093)	18.297	0.429	2.032	-0.205
Hamilton	0.310	+ 0.809* (0.138)	+ 0.494* (0.188)	+ 0.008 (0.106)	19.470	0.444	2.073	-0.157
Montreal	0.740	+ 0.171 (0.144)	+ 0.886* (0.091)	- 0.431* (0.060)	106.657	0.814	2.073	0.243
ttawa-ull	-2.695	- 0.130 (0.114)	+ 2.024* (0.384)	+ 0.410 (0.249)	58.587	0.706	1.911	0.498

Table 4.1 (cont'd)

Region	Model Parameters†				F value	R^2	Durbin-Watson Statistic	Final rho (ρ)
	b_0	b_1	b_2	b_3				
Quebec-Levis	1.109	- 0.080 (0.175)	- 0.205 (0.301)	+ 0.598* (0.223)	16.841	0.409	2.108	0.526
Toronto	-0.308	+ 0.649* (0.093)	+ 0.852* (0.141)	- 0.002 (0.053)	158.578	0.867	2.011	-0.093
Vancouver	0.426	- 0.437* (0.169)	+ 1.473* (0.207)	- 0.649* (0.166)	91.448	0.789	2.088	0.640

Summary form of equation 4.2

Significant at the 95% level

Standard errors

of MW_t^N in the east varies from a maximum parameter (b_3) value of 1.23 to a minimum of 0.354. In most Ontario regions, the parameters are positive but not significant while in Quebec the majority of regions do not have a significant b_3 parameter value. The parameter values of MW_t^N in the Prairie regions are generally larger than the parameter values of the eastern regions.

There are a number of implications to be drawn from these results. First, stagflation - simultaneously high money wage inflation and unemployment - creates problems particularly for Maritime regions. In essence, increasing money wage rates add to the problem of regional unemployment which may already be under considerable pressure from macro-policies directed to deflating the national economy. Thus, there is evidence for what could be termed, a 'reverse' Phillips curve. Second, although there is also evidence of a positive association between U_t^R and MW_t^N in Ontario, most parameter values are not statistically significant. This implies that stagflation may not be a problem for the spatio-economic core of Canada. It could be contended that the source of MW_t^N determination is often Ontario and creating disturbances with a 'spill-over' of such determinations into the Maritimes may cause increases in Maritime unemployment but not significantly affect the Ontario economy. There are two exceptions to this general statement in Ontario: southwest Ontario (region twenty) which is dominated by the auto-industry, and Kitchener (region nineteen) also with a strong transportation equipment industry. These regions have positive and significant MW_t^N terms which implies that if money wage rate increases in Canada, are greater than those in the United States (which they have been over the 1970-76 period) this could lead auto companies

to decrease production in Canadian branch plants and switch to United States production facilities.

Evidence from a variety of sources (see Economic Council of Canada 1976a, b; 1977) has been noted that suggests strong economic expansion in the western regions under conditions of national stagnation over the 1969-1976 period. This prompts the conclusions that either the Prairie regions themselves were the source of rapid money wage expansion based primarly on the tightness of local labour markets, or, that money-wage contracts concluded elsewhere in the country generated further economic growth in the western regions simply because the cost-structure of prairie economies were able to absorb wage-rate increases. The latter conclusion clearly is related to the proposed model and analyses of Chapter Three. The exceptions to the generally positive MW_t^N parameter values of the west are the Interior B.C. and Vancouver Island regions which offer indirect evidence of the latter conclusion. Both regions are dominated by wood processing industries with cost-structures either less competitive than or equal to those of United States competitors. The positive signs suggest that recent industry claims that money-wages rates are reducing international competitiveness may be well founded.

The results with respect to the sign, significance and value of the b_3 national money wage rate, parameter suggest strong links between national aggregate wage rate conditions and the performance of local economies. Regional abilities to cope with or adjust to increasing money-wage rates vary greatly; further, the strongly regionalized impact of national stagflation conditions have also some tendency to affect adversely those regions already designated high unemployment development areas by

Table 4.2

The sign and significance of the national money wage parameter

Non-Metropolitan Regions			Metropolitan Regions		
Regional Group	b_3 +ve	b_3 -ve	Regional Group	b_3 +ve	b_3 -ve
East	8	2	East	1	1
West	-	8	West	-	3

Table 4.3

The sign and significance of the national unemployment parameter

Non-Metropolitan Regions			Metropolitan Regions		
Regional Group	b_2 +ve	b_2 -ve	Regional Group	b_2 +ve	b_2 -ve
East	14	-	East	5	-
West	8	-	West	3	-

Table 4.4

The sign and significance of the lagged regional unemployment parameter

Non-Metropolitan Regions			Metropolitan Regions		
Regional Group	b_1 +ve	b_1 -ve	Regional Group	b_1 +ve	b_1 -ve
East	6	-	East	3	-
West	3	3	West	2	1

DREE (for example Cape Breton Island).

4.2.2 National unemployment (U_t^N)

Consideration of the signs of the b_2 parameters lead to rather different results than those discussed in section 4.2.1. If Tables 4.1 and 4.3 are consulted it is clear that of all the Canadian regions only the regions of N.E. New Brunswick and Quebec-Levis have negative signs and these are not significant. In fact, in direct contrast to the results with respect to money wage rates, thirty of the forty-two regions have positive and significant beta-elasticities for the U_t^N variable. While in section 4.2.1 the regions with significant parameter estimates in the east were in the Maritimes, now in the case of the national unemployment variable most are in Ontario and Quebec. Regions in the west with significant b_2 parameter estimates include Winnipeg, South Manitoba, Saskatoon, Medicine Hat, Edmonton and all of the regions in British Columbia.

The interpretation of elasticities in this context is open to the criticisms noted in Chapter Two concerning the Brechling and Thirlwall models. It cannot be assumed that the 'business-cycle' is symmetrical for both increases and decreases in unemployment. Clearly, the elasticities are average responses and moreover they are particular to a given period. But given that the concern here is with parameter significance and not so much with estimating the actual impact of macro-policy (see Chapter 5), then a number of comments can be made. First, Ontario regions generally have quite high beta-elasticities. For example, for Kitchener, region twenty-one, a 1% increase in national unemployment on the average would induce a 2.83% increase in regional unemployment. The lowest significant

Ontario regional b_2 coefficient was 0.617 in Eastern Ontario, region sixteen, while the average was 1.309. Western regions similarly have quite high significant beta-elasticities. In South Manitoba, region twenty-four for example, a 1% increase in U_t^N would induce on average a 1.665% increase in unemployment in that region. The lowest beta-coefficient is 0.741, Vancouver Island, and the average b_2 coefficient for western regions was 1.286. Metropolitan regions had in general lower beta-coefficients, with the exception of the value for Quebec-Levis, with by far the greatest value in Ottawa-Hull (2.024). On average however, the metropolitan regions beta-coefficient value was 0.920.

The greater sensitivity of Ontario regions to national unemployment (and hence demand conditions), is in direct contrast to their relative lack of sensitivity to changes in money-wage rates. These regions are more demand and consumer good orientated with most regions having at least 10% of their total manufacturing employment (in 1970) devoted to electrical products and a further 30% made-up of textiles, auto manufacturing, chemicals and machinery industries (see Appendix A). On average, few Ontario regions have a food and beverage component greater than 10%. Within Quebec however, each region is not dominated to such an extent by consumer demand industries and this may be reflected in their lower b_2 beta-coefficients. In contrast to the Ontario regions, those Prairie regions with significant b_2 terms have manufacturing structures which include very few consumer demand industries, and their quite low values could also be thought to reflect their economic structure. Interior B.C. and Vancouver Island which have a strong wood industry component and are consequently tied directly to housing construction also show large b_2

terms and this is reflected in the b_2 values of Maritime regions such as Halifax N. Shore, Upper St. John Valley and Gaspé-N. Quebec which have significant b_2 parameter estimates.

Macroeconomic policies of demand restriction at the national level instituted by the federal government may have significant impacts for the central spatio-economic core of the economy, particularly Ontario regions, but less so for Prairie regions due in part to compensatory money-wage forces. This is not an unusual result since the orthodox macro-economic policy of reducing expenditure and lowering demand should be expected to have its greatest impact on regions specializing in demand industries. This would imply a wide variation in the ability of Canadian regions to adjust to national money wage and demand fluctuations. At the same time however the Prairie regions over the period 1969-1976, have been able to cope with restrictive demand policies and yet at the same time expand employment and money-wages. The implications for the Maritime regions of the variations in national unemployment and demand fluctuations, may not be as important as in Ontario for example. Nevertheless, there is evidence that national unemployment is often a significant variable that could help explain differential regional adjustments. Coupled with the importance of the MW_t^N variable, many of the Maritime regions could be seen to be intimately linked to the functioning of the national economy.

4.2.3 Lagged regional unemployment (U_{t-1}^R)

Very few eastern regions have significant b_1 terms (see Tables 4.1 and 4.4) and all that are significant are positive and concentrated

in Nova Scotia and northern New Brunswick. There are two exceptions Western Quebec and Eastern Ontario, which have significant b_1 parameter estimates. The b_1 parameter estimates for the Western regions are more difficult to generalize, and are equally likely to have either a positive or negative sign and to be associated with negative b_3 coefficients. Both Calgary and Edmonton have positive and significant b_1 terms while Vancouver is significant but negative. The largest beta-elasticity is to be found in region five (Annapolis South Shore), and it suggests that a 1% increase or decrease in regional unemployment would induce a 1.281% increase or decrease in regional unemployment

4.2.4 Significance of the general relationship

In Chapter Three it was noted that an appropriate means of testing economic relationships over time was a regression model, differenced and adjusted for serial autocorrelation amongst the error terms. In testing the relationship hypothesized in equation 4.1 it was found that many regions had R^2 values greater than 0.6 and F ratios significant at the 99% level. At the same time, the Durbin-Watson test for serial autocorrelation confirmed that there was no significant autocorrelation for almost all regions. Only P.E.I., St. John Valley and Regina, had R^2 values that could be described as very low and only in Gaspé-N. Quebec was an ambiguous result obtained for the presence or absence of serial autocorrelation. In almost all cases, the ρ value (the 1st order AR coefficient) was at least 0.4, signifying an important weighting to previous observations for all variables in time (the exceptions being in the Toronto region, Parklands and the Toronto metropolitan region). In

essence, the relationship performed quite well although in a number of cases only one independent variable was significant.

4.3 The Results and Model

In the context of seeking to establish reasons why macro-economic policy impact may be regionally differentiated, Chapter Three was concerned with a model that emphasized those attributes of a given region that might influence regional adjustment. The results noted in this chapter provide some measure of acceptance for the propositions derived in Chapter Three. However, there is a problem in relating time-series results to cross-sectional regional characteristics: The correlations between structural attributes and parameter signs and values may only establish association not causality, and while the traditional means of resolving this problem is a pooled econometric model, in this dissertation such an approach was considered inappropriate since 'pooling' implies that the estimated parameters come from the same population regardless of region. Consequently the pooled model would tend to reduce the interregional parameter variations, which are central to this study. It is possible however, to draw some further inferences from the results summarized in Tables 4.1-4.4, keeping in mind the conceptual overview developed in Section 3.1.

4.3.1 Demand policies and regional adjustment

In Section 3.1 it argued that demand restriction policies in the form of, for example, increased income tax could generate differential regional adjustments, It was proposed that:

[A] Restriction on aggregate demand will create more unemployment in

regions specializing in durable manufacturing goods production than in regions specializing in agricultural goods production.

[B] The impact of national fluctuations in demand, in the short-run is likely to be reflected in changes in all region's unemployment rates.

The implication of the results (Tables 4.1 and 4.3) is that propositions [A] and [B] should be accepted for this study. In particular, it was noted that Ontario regions on the average are affected most through changes in macro-economic policy and trends and cycles in national unemployment. However, apart from noting that stagflation is very much spatially polarized and that effects of MW_t^N and U_t^N in combination create wide variations in regional adjustment, it is difficult to discriminate between marginal variations in consumer demand and the impacts upon consumer demand industries. This is particularly true in the case of Quebec regions versus Ontario regions.

There remains a problem of interpretation of the results for Ottawa-Hull. While it could be argued intuitively that the Ottawa-Hull economy should be very stable due to the government service sector components, this is not the case. One explanation is to be found in the rather *dualistic* structure of the city-region. Western Quebec and the city of Hull are dominated by wood, printing and publishing industries, which were noted above as being associated significantly with strong demand and wage fluctuations over the 1969-1976 period. On the other hand, Ottawa and the Eastern Ontario region have rather more diverse economies and they reflect the pattern for most Ontario regions. For instance, over 40% of total manufacturing employment in 1970 in Eastern Ontario was accounted for by high growth and technological industries

such as electrical and machinery products. Although these were subject also to demand pressures, the impact on them and hence on regional unemployment of wage fluctuations and demand policies has not been as great.

In general, metropolitan regions were less sensitive to demand pressures. Hamilton and Halifax with their steel and fabricating industries did not appear on the average to be as affected as surrounding regions. Also, Montreal and Toronto had below average U_t^N parameter terms, particularly compared to Vancouver. These two cities are also the most diversified in Canada and have quite similar industrial structures, except that Montreal has a higher component in clothing industries.

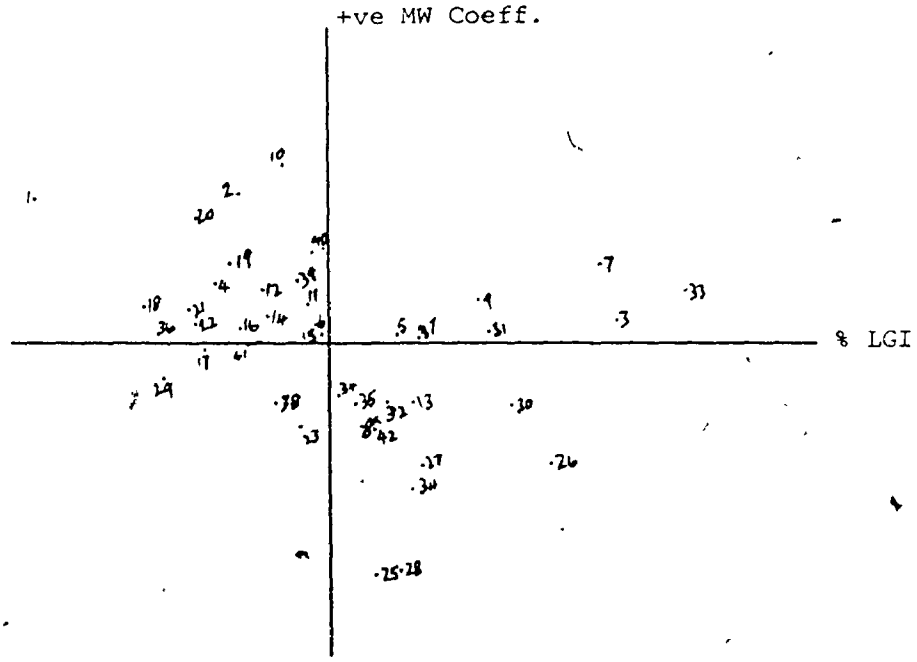
4.3.2 National money wage rates and regional adjustment

In section 3.1 it was argued that variations in national money wage rates could have the following impacts:

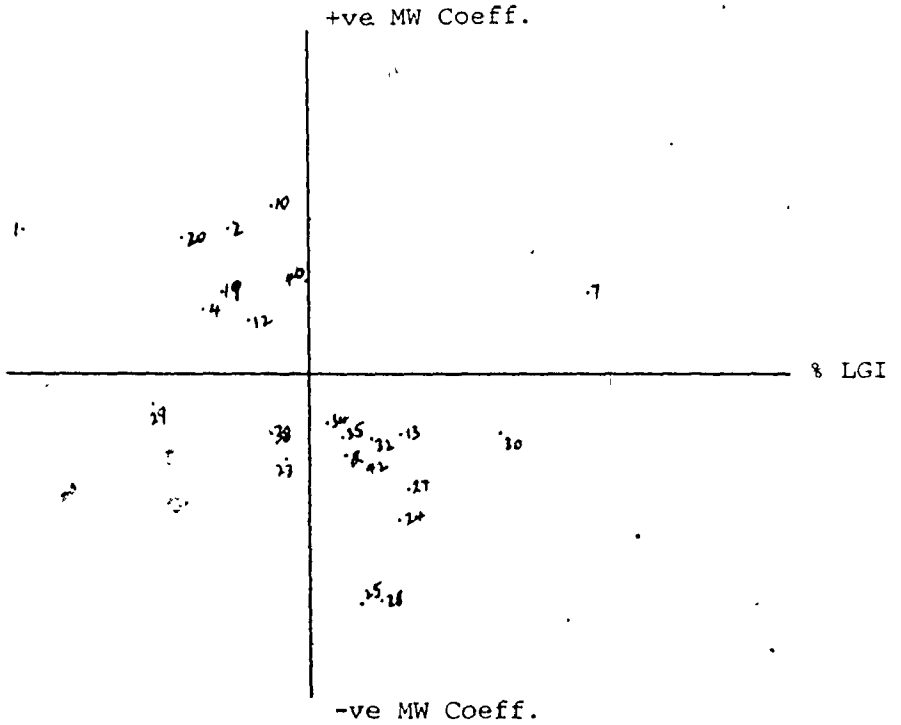
[C] Money-wage rate inflation may have either a positive or negative effect on local unemployment. The exact effect will depend on the spatial concentration of industries and their differential labour productivity growth patterns.

It was considered also that for regions dominated by low growth industries, the appropriate sign for the b_3 parameter would be positive, while for regions with a more balanced industrial structure the sign could be negative. The results, at first sight, would seem to validate the proposition [C]. The Maritime regions which have a large component of low growth industries and industrial stagnation have positive and significant b_3 coefficients. Central Canadian regions generally have statistically insignificant parameter estimates and the Western regions have negative parameter signs. There

Figure 4.1



Average proportion of low growth industries for all regions = 39.0



Average proportion of low growth industries for significant parameter regions = 38.0

is a problem in interpretation here however, and Figure 4.1 highlights the issue: The Prairie regions have a higher proportion of defined low growth industries than the Maritimes and yet the signs are reversed.

The problem is simply that of adequately defining low growth industries. It was argued in Section 3.1 that a low growth industry could be defined in terms of low labour productivity, low industry concentration and low employment growth; following this general characterization a group of such industries was defined for Canada and these are detailed in Appendix A. The problem of interpretation is due to the relatively broad SIC classifications used by the Department of Industry, Trade and Commerce, the source of our data used in making the classification. Thus, while the Food and Beverage Industry group, for example, is defined as a low growth industry there are clear differences of labour and capital productivity between Prairie range agriculture and the smaller lot, labour intensive agriculture of the Maritimes. If the Maritimes low growth industry proportion is compared directly to other regions and account is taken of recent trends in Prairie economic development proposition [C] could be tentatively accepted. That the Prairie regions have negative b_3 parameter signs reflects the productivity of labour in agriculture as well as the growth since 1970 of the capital intensive oil, gas and chemical industries, industries which could be defined as high growth, highly concentrated and with high labour productivity (see Appendix A). Both Calgary and Edmonton, even in 1970 (the start of the oil boom and exploration), showed signs of growth in chemical based products. At the same time, with higher energy prices since 1974, the Prairies in particular may have benefitted from price inflation, in contrast to the experience of

the Maritime regions.

4.3.3 Summary

The model of regional adjustment emphasized the problem of short-run expectations and uncertainty from what could be termed a neo-Keynesian perspective (Kregel, 1976). It was argued that regional adjustment was conditioned by the immediate past performance of national aggregates and local conditions. Thus *expected* or *anticipated* wage rate increases may cause over-adjustment in local firms as local conditions themselves may affect employers' perception of likely market conditions. In many regions, the coefficient for either U_t^N or MW_t^N is significant and due to the difference structure of these variables, the coefficients relate change or adjustment in one variable to change over time in the independent variable. In this respect, both aggregate variables imply a significant degree of local adjustment to national fluctuations, which generally has gone unrecognized in the literature. Alonso (1975) claimed that a basic characteristic of many peripheral regions is their relative isolation from broad national economic forces. Yet on the basis of results in Table 4.1 it could be argued that peripheral regions are *too well* integrated with national forces and that changes in national money wage rates and macroeconomic policy induced demand conditions have a direct and perverse response in changes in regional unemployment. Thus, the island 'parable' attributed to Phelps (1970) earlier, may be rather irrelevant as national conditions of wage determination flow over time and space according to institutional constraints. Lagged regional unemployment and its change over time has relatively little significance for many regions as only in

three Maritime regions is this parameter (b_1) significant, and in only one of those cases is that parameter along significant. In the western regional system, those regions with significant b_1 terms also have significant b_3 or b_2 terms.

At this juncture however, two points should be noted. First, even with increasing unemployment, Maritime regions also have been impacted by increasing national money wage rates. Thus stagflation has in effect tended to become spatially concentrated in the most depressed regions of Canada. Second, although the Ontario and Quebec regions are influenced by macro-economic policies designed to reduce demand there is not the same influence of the money wage effect. Thus, under conditions of expansion but high wage inflation it could be contended that most Ontario regions would benefit substantially more than Maritime regions. At the same time, Prairie regions continue to growth and have extremely low levels of regional unemployment *despite* national conditions.

CHAPTER 5

THE REGIONAL CONSEQUENCES OF MACRO-POLICIES

The purpose of this chapter is to estimate the regional impact and to evaluate the equity consequences of macroeconomic policies over the 1969-1976 period. To accomplish this task, the NBER time-series techniques introduced in Chapter Three are used in conjunction with the set of equity criteria derived for evaluating regional impact. The chapter is organized in the following manner: first, the Canadian national unemployment series (1968-1976) is used as a 'reference curve' to establish particular phases of national economic expansion and contraction; second, these periods are used then as the temporal basis for analysing macro-policy and regional impact. This involves for each phase a brief account of the types and directions of macro-policy as well as the performance of each region in quantitative and qualitative (equity) terms.

5.1 Dating Canadian Fluctuations

To develop a reference point for impact analysis, it was noted in Chapter Three that the national unemployment series would be used as a datum series. The NBER 'turning-point' procedure creates two sets of measures: the degree of change in the reference series and the timing of such changes. Subsequently, definition of the time-periods and phases of the business-cycle (for example, recession-recovery) are generated for

the total period under investigation. The national unemployment series is used for two reasons. First, the series itself is an important policy variable, rivalled only in the domestic context by the rate of inflation as the basis for macro-stabilization policy decisions. Second, unemployment is also an important measure of economic activity, used for example by Statistics Canada in analysing the path and prospects for economic growth.

The NBER use turning-point determination as a first step in time-series analysis and as the input to subsequent recession-recovery analysis. The results of turning-point determination for Canadian national unemployment (seasonally adjusted as in the analysis in Chapter Four) are presented in Table 5.1:

Table 5.1 Canadian turning-point analysis (1966-1976)

Peak (Year & mth.)	Standing % Unemployment	Trough (Year & mth.)	Standing % Unemployment
1968(3)	5.0	1968(9)	4.3
1972(10)	6.7	1974(6)	4.9
1975(12)	7.5	--	--

It should be noted that 'peak' refers to the maximum point of a recession and thus 'trough' refers to a relative boom (see Figure 3.1). In this study, the following national economic phases are used in analysing the impact of macro-policy upon regional unemployment:

1969(7) to 1972(10) - recession (18 months);

1972(10) to 1974(6) - relative recovery (20 months);

1974(6) to 1975(12) - stagflation (18 months).

The initial phase was modified to be consistent with the beginnings of the major policy 'interval', 1969-1976. As has been argued previously, the major purpose of this analysis is a review of policy impact and therefore, the actual phases used in the analysis should be consistent with the policy interval. Apart from the initial turning-point (1968(3)) there is strong consistency between the type and direction of macroeconomic policy decisions and respective phases of the cycle.

The turning-points are in broad agreement with Chung's (1976) work on turning-points in Canadian housing and business construction indices, although Chung used quarterly data. The terminal date 1975(12) is predetermined by data availability, although 1975(12) was pinpointed also by the NBER procedure as a relative peak in unemployment. It is also clear that macroeconomic policy developments in October and November of 1975 by the Canadian federal government implied the beginning of a new phase in policy application as well.

5.2 The Macro-Policy Record and Distributive Consequences

5.2.1 Recession: The 1969(7) - 1972(10) phase

> "(This Budget) is intended to show that we really mean business in the fight against inflation."
>
> "It is the policy of the government to restrain the growth of total spending in the economy, for that is a necessary condition for achieving our primary economic objective."
>
> (Minister of Finance, Budget Speeches, June, 1969 and March 1970)

These two quotations from the Minister of Finance reflected the primary concern of the period, inflation. Moreover, as E. Broadbent (1970)

and Rowley and Wilton (1977) have noted, this reflected a more pervasive belief that lower inflation could only be bought at the expense of higher aggregate unemployment. This phase represented the beginnings of the 1970's recession. Through the year 1968(7) to 1969(6) both the government and independent observers cautioned against higher inflation. The national rate of unemployment continued its downward trend towards the 4.0% mark and the shares of total income by labour increased at the expense of capital. This general trend was noted also in the United States (Boddy and Crotty, 1975) and reflected the peak in economic expansion which had been underway since the 1961 recession. By the June 1969 budget, inflation was recorded at 7.0% p.a., which can be contrasted to the long-run target of between 1.0% - 2.0% (see Figure 1.1).

In this context, many commentators (for example Donner *et al.*, 1973) have noted that the Canadian government instituted a strong restrictive policy--a drastic cut in government expenditures, a federal surplus of $1.084 million and a total all-government surplus of $2.2 billion, a restricted money supply, higher interest charges and higher taxation. At the same time in the United States, the Nixon Administration instituted a similar policy of what Means (1975b) has called 'planned stagnation'. Given the strong interdependency between the two national economies (Ray, 1967), the combination of both sets of policies was to precipitate a serious decline in aggregate economic activity and employment in Canada.

With a number of minor policy adjustments in Canada (basically for welfare assistance including both selective Manpower policies and Unemployment Insurance), the aggregate unemployment rate did not peak and turn down until 1972(10). In the period 1969(7)-1972(10) inflation

remained quite high although shares of total income by labour were seen to decline. In late 1970 further minor adjustments were instituted--a stimulus to construction through the Central Mortgage and Housing Corporation (CMHC) in high unemployment areas, loans for provincial capital projects, assistance to ship building and textiles as well as capital-cost allowances. By October 1971 it was clear however, that the planned recession did not control inflation and unemployment rose to record levels.

The administered recession although not halting inflation had important impacts upon the spatial economy. Table 5.2 and Figure 5.1 summarize the consequences. The reference series (Canadian national unemployment) rose from a cycle relative to 1969(7) of 4.6% to 6.6% at 1972(10) and the amplitude over this phase was 1.13. The Maritime regions (1 to 10, and Halifax in Figure 5.1 and Table 5.2) varied widely with North-east New Brunswick exhibiting a high initial cycle-relative (15.0%) yet very low amplitude (0.48). On the other hand, Prince Edward Island with a comparitively low initial cycle-relative (R_1) of 5.6% had a high amplitude of 2.32. In general, Newfoundland, Prince Edward Island (P.E.I.) and Nova Scotia experienced amplitudes greater than the reference series, while New Brunswick experienced comparitively very low amplitudes. Regions in eastern Quebec were also similar to New Brunswick in that R_1 generally was quite higher than the reference series, and yet the amplitudes were relatively low for example, 0.84 for the Eastern Townships. Regions in Ontario, Manitoba, Saskatchewan and Alberta however, generally had higher amplitudes than the reference series (many in the 2.00-3.00 range) although often very low initial cycle relatives. Exceptions were the Niagara region, South-west Ontario (which actually exhibited evidence of a negative amplitude) and

Table 5.2 Estimates of the impact of aggregate fluctuations upon the regional distribution of unemployment 1969-1975.

REGION	CYCLE-RELATIVES				Comparitive Ampl./mth.		
	R_1 1969(7)	R_2 1972(10)	R_3 1974(6)	R_1^1 1975(12)	RISE 1969(7) to 1972(10)	FALL 1972(10) to 1974(6)	RISE 1974(6) to 1975(12)
National Aggregate	4.6	6.6	5.1	6.9	1.13	-1.18	2.06
01 Avalon	7.9	13.2	16.7	12.5	1.70	1.29	-1.37
02 Newfoundland/ Labrador	12.6	13.2	19.0	21.4	0.13	2.16	0.72
03 P.E.I.	5.7	11.1	5.6	9.4	2.32	-2.45	3.76
04 Cape Breton	8.7	14.6	10.6	13.6	1.71	-1.36	1.57
05 Annapolis S. Shore	4.6	7.2	5.8	8.0	1.46	-0.99	2.10
06 Halifax N. Shore	4.6	5.5	4.2	6.8	0.53	-1.23	3.51
07 Moncton	7.2	7.3	5.9	14.5	0.001	-0.94	8.14
08 St. John Valley	5.9	6.6	4.5	4.3	0.29	-1.61	-0.24
09 Upper St. John Valley	6.2	7.3	5.7	8.2	0.42	-1.09	2.43
10 North-East New Brunswick	15.6	17.8	21.8	23.0	0.48	1.11	0.32
11 Gaspé- North Quebec	13.4	17.3	15.9	22.4	0.72	-0.40	2.29
12 Laurentians	6.6	8.2	7.2	11.2	0.63	-0.63	3.08

Table 5.2 (cont'd)

REGION	R_1	R_2	R_3	R_1^1	RISE	FALL	RISE
13 Montreal Region	6.1	7.5	5.6	6.4	0.54	-1.23	0.81
14 Eastern Townships	5.8	7.8	5.4	9.3	0.84	-1.51	4.00
15 Western Quebec	5.2	10.8	6.0	11.9	2.66	-2.22	5.46
16 Eastern Ontario	3.0	5.0	4.3	6.0	1.69	-0.73	2.19
17 Toronto Region	2.7	5.1	3.1	5.8	2.13	-1.94	4.84
18 Niagara	4.6	4.8	4.3	6.6	0.009	-0.52	2.97
19 Central Ontario	2.4	4.0	3.4	6.0	1.63	-0.71	4.25
20 Southwest Ontario	4.3	4.0	5.3	6.6	-0.15	1.57	1.36
21 Kitchener	1.3	2.5	2.0	4.3	2.12	-1.00	6.73
22 Northern Ontario	3.6	7.8	3.7	6.7	2.91	-2.63	4.59
23 Winnipeg	2.0	5.0	2.9	3.8	3.64	-2.10	1.72
24 South Manitoba	2.6	4.7	2.9	2.6	2.02	-1.91	-0.47
25 Regina	2.2	4.5	2.7	2.1	2.53	-2.03	-1.07
26 Saskatoon	4.6	6.8	3.6	4.0	1.17	-2.34	0.69
27 Parklands	4.1	3.5	1.7	3.5	-0.35	-2.57	5.8
28 Medicine Hat/ Lethbridge	2.0	4.0	1.6	1.6	2.62	-3.01	0.17

Table 5.2 (cont'd)

REGION	R_1	R_2	R_3	R_1^1	RISE	FALL	RISE
29 Calgary Region	2.5	5.0	3.1	2.5	2.50	-1.86	-1.03
30 Edmonton Region	3.2	5.3	2.5	3.2	1.64	-2.67	1.76
31 B.C. Interior	5.9	7.6	6.2	8.4	0.72	-0.92	2.05
32 Vancouver Region	4.3	8.1	5.3	7.1	2.15	-1.73	1.93
33 Vancouver Island	2.9	6.1	6.4	7.7	2.85	0.21	1.12
CA Calgary	2.6	5.2	3.5	2.9	2.53	-1.65	-0.95
ED Edmonton	3.6	5.6	2.8	3.6	1.35	-2.50	1.58
HX Halifax	4.2	5.0	3.2	5.6	0.45	-1.78	4.16
HM Hamilton	5.3	4.3	3.3	5.8	-0.44	-1.15	4.19
MO Montreal	6.0	7.0	5.1	6.1	0.41	-1.38	1.13
OH Ottawa-Hull	1.7	5.6	3.5	6.5	5.57	-1.90	4.93
QL Quebec-Levis	6.7	6.2	7.2	9.1	-0.17	0.75	1.53
TO Toronto	2.6	5.1	3.1	5.9	2.40	-1.93	4.90
VA Vancouver	4.3	8.3	4.9	6.9	2.27	-2.05	2.37

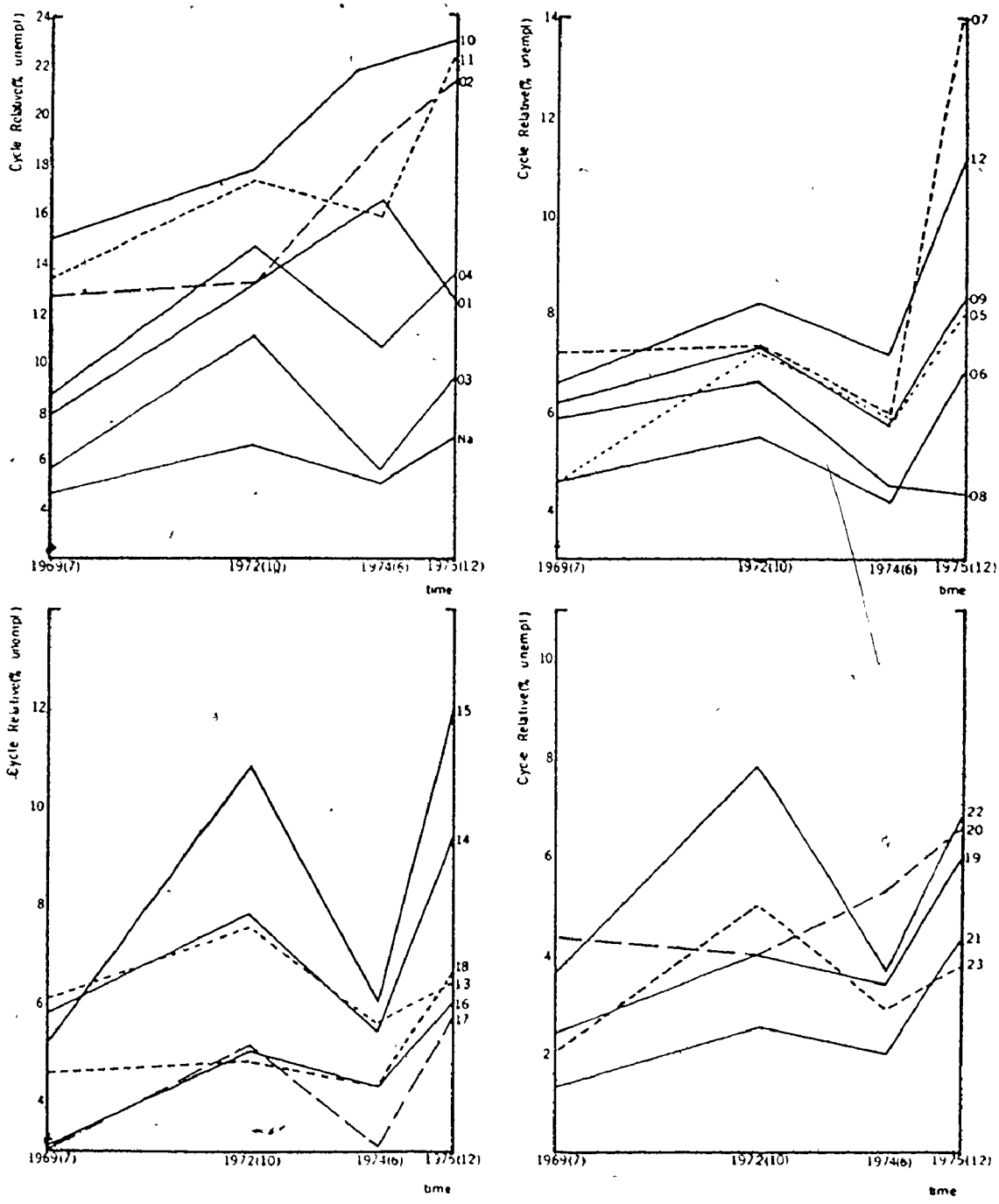


Figure 5.1 Summary of Regional Performance, 1969(7) - 1975(10)

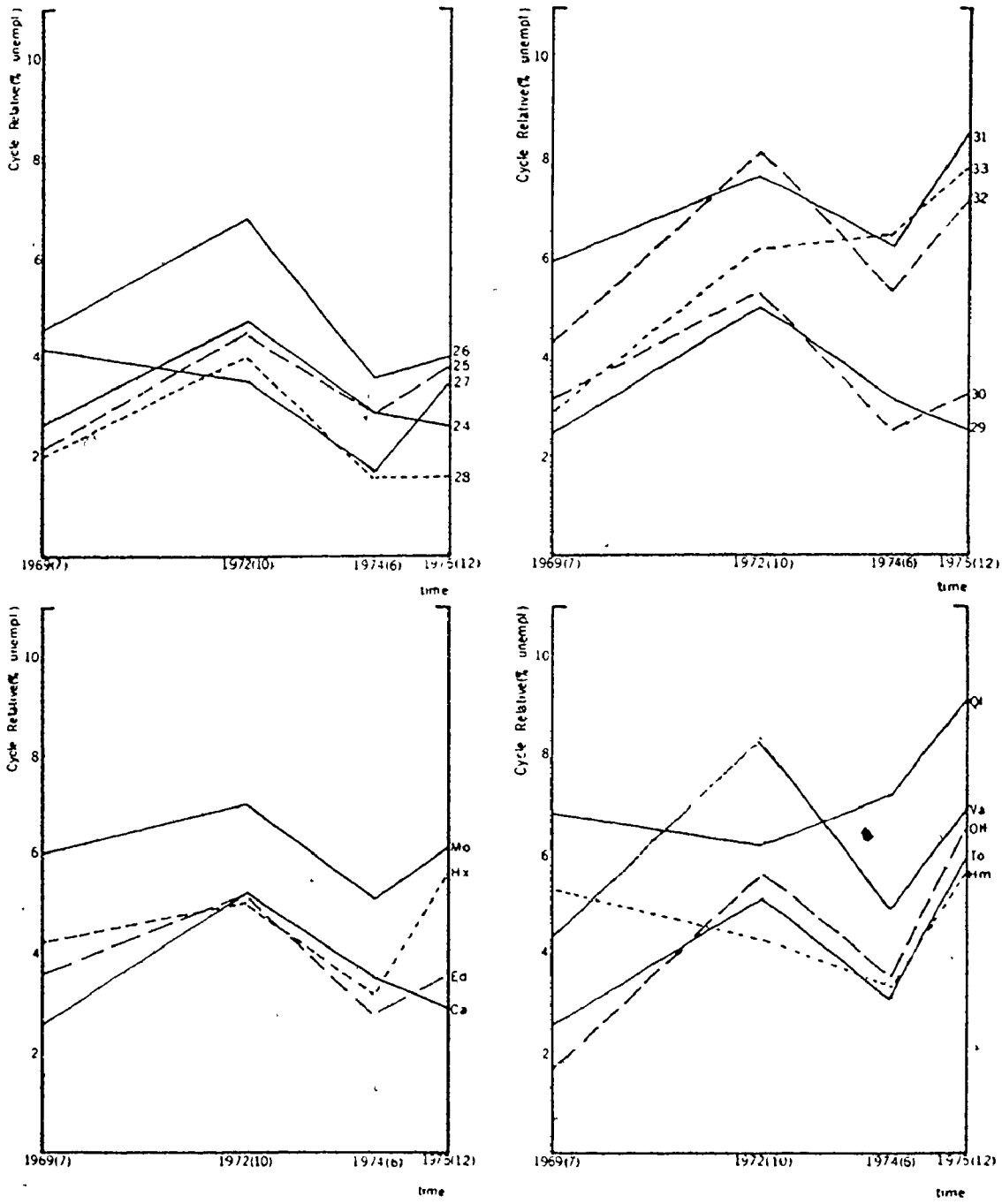


Figure 5.1 Summary of Regional Performance, 1969(7) - 1975(12)

the Parklands region of Saskatchewan.

Among the British Columbian regions there was considerable variations. The B.C. Interior had a high R_1 but low amplitude; the Vancouver region had an average R_1 but quite high amplitude, while Vancouver Island responded like many of central and western regions with a low R_1 and high amplitude. The metropolitan regions generally reflected the response of surrounding regions, the notable exception being Ottawa-Hull with the second lowest cycle relative at 1969(7) of 1.7% but an extremely high amplitude of 5.57.

Following the discussion in Chapter Three of the welfare consequences of macroeconomic policy, a group of equity criteria are used in evaluating the 'normative' impact of policy. These include the absolute increase or decrease in a given region's level of unemployment, the comparative interregional distribution of unemployment changes, and the change in existing regional disparities. The fourth criterion, the impact with respect to future levels of regional welfare will be dealt with in Chapter Six in conjunction with a more general evaluation of macroeconomic policy and the future of regional unemployment. Given these criteria of equity evaluation a number of statements can be made that summarize the welfare implications of macroeconomic policy impacts over the period 1969(7)-1972(10).

First, in terms of absolute equity the impact of macro-policy was not spatially uniform. Moreover, a number of regions (particularly eastern ones) were affected far less than the national reference series would suggest although almost all regions showed an increase in the levels of unemployment. Consequently, the initial evaluation must be that macro-

policy in this phase led to a decrease in what we define as regional equity. Second, in terms of interregional equity, it is clear that impact was concentrated in a broad group of regions including the north-eastern Maritimes, the Prairies and the metropolitan regions of Ottawa-Hull, Toronto and Vancouver. The consequences were that a group of regions (including P.E.I., Cape Breton, Winnipeg and Medicine-Hat) were made comparatively worse-off. Hence, with respect to existing regional disparities: those regions with initially very high cycle-relatives (that is, those with high unemployment levels) were impacted greater than the national norm (national unemployment); regions with cycle-relatives 2.0-3.0 points higher than the national series were impacted less than the national norm; and regions with cycle-relatives lower or similar to the national series were impacted the greatest, and consistently above the national norm.

In equity terms then, the regional impact of macroeconomic policy in the 1969(7)-1972(10) period was quite complex. While regional equity in general decreased, some regions bore the burden more than others (generally those with initially higher than average levels of regional prosperity). Evaluating macroeconomic policy impact then leads to a conclusion that those regions worst off (initially) were to some extent 'protected' while the more prosperous regions bore more of the burden, which in terms of the previously defined equity criteria, was a relatively desirable outcome.

Equity considerations for this phase are then rather unusual given that other researchers often have found that the greatest regional impact of cyclical unemployment usually are concentrated in the more depressed regions (cf. Chisholm, 1976). A minor qualification to this

should be noted. Avalon, P.E.I. and Cape Breton, regions with a long standing involvement with DREE in regional development, were impacted more than the national average. Further, even those regions of the Maritimes that were impacted less than the average, exhibited very high cycle-relatives at the peak of recession 1972(10). For example, North-east New Brunswick, had an R_2 of 17.8% and amplitude of 0.48 does not compare to the worst impacted region Ottawa-Hull, an R_2 of 5.6% and amplitude of 5.57. While relative disparities may have declined marginally, absolute levels of unemployment in the Maritimes continued to increase. The political consequences of higher aggregate unemployment were however, quite dramatic as the government sought to contain both higher unemployment and inflation.

5.2.2 Relative 'recovery': The 1972(10) - 1974(6) phase

> "My first words to this House as Minister of Finance last February were that my most urgent priority was jobs. This remains my first priority."
>
> "The purpose of this budget is - first and foremost - to bring about a substantial reduction in unemployment."
>
> (Minister of Finance, Budget Speeches, May 1972 and February 1973)

The political consequences of higher unemployment are clearly reflected in the change of emphasis in government macroeconomic policy with respect to its goals. Unemployment became the principal issue and fiscal policy reflected this goal. The phase 1972(10)-1974(6) could be characterized as one in which there were attempts by both the Canadian and United States governments to provide the stimulus for economic recovery. In Canada, budget deficits and selective job creation programs (for regions

of high unemployment) were instituted. At the same time in the United States the Nixon administration attempted to deal with the problem with a rapid expansion of money supply, large budget deficits and a price control program.

By December 1972, the Canadian government claimed that the worst had passed and that the twin problems of inflation and unemployment could be cured by expansion. The rate of inflation in this phase only fell marginally and by early 1974 the effects of higher energy prices had begun to affect the inflation rate. The Canadian aggregate rate of unemployment fell however from a cycle-relative of 6.6% at 1972(10) to 5.1% in 1974(6), the amplitude being -1.18, just matching the earlier rise. This phase was claimed by many to be the completion of one business-cycle and the change to expansionary policy was seen by the Economic Council of Canada (1973) as a reorientation, after a mild recession, back to a growing economy. The Council characterized policy over the 1968-1973 period in the following terms:

> "- a vigorous move towards fiscal policy restraint from early 1968 to mid-1969, with the maintenance of a relatively tight fiscal policy setting up to mid-1972 and the adoption of a strong expansionary stance from mid-1971 to date; and
>
> - severe monetary restraint between the spring and autumn of 1969, followed by very strong expansion up to mid-1972 and a return to more moderate money supply growth in recent months."
>
> (Economic Council of Canada, 1973, 80)

The impact of expansionary policies upon the regional system varied considerably. With respect to Table 5.2 and Figure 5.1 a number of observations can be made. First, six regions showed no sign of recovery and in fact, those regions, including Avalon, Newfoundland-Labrador and Northeast New Brunswick slipped rapidly and deeper into recession. Second,

those Maritime and Quebec regions with initially lower amplitudes in recession than the reference series, had reabsorption amplitudes greater than their previous amplitudes, and in a number of cases performed 'better' than the reference series. Ontario regions in general did not match their initial amplitudes in recession and their amplitudes of recovery over the 1972(10)-1974(6) phase were generally less than the national reference series. The greatest amplitude in recovery was -3.01 for Medicine Hat and this reflected the general economic expansion of the Prairie regions which were consistently 1.00 point higher than the reference series in reabsorption and more often than not, matched their previous recession amplitudes. Regions in British Columbia again showed wide variations in behaviour. The metropolitan regions reflected behaviour in their broader macro-regional contexts although Ottawa-Hull did not compensate for initial heavy losses of employment by an equal reabsorption.

It is more difficult to evaluate and generalize the regional impact of macro-policy in this particular phase. Generally, the impact was more localized and limited very much to particular regions of Canada. In terms of absolute equity judgements, it is clear that many regions experienced a decline in unemployment and consequently an increase in their levels of welfare and equity. However, a small number of regions actually exhibited increases in unemployment which was against the general national trend. A group of Maritime regions were amongst those that did not recover, which given their individual unemployment levels, was a significant welfare problem.

In terms of interregional welfare and equity, the impact of macro-policy clearly benefited some regions more than others. In general,

eastern Quebec and Maritime regions responded to economic recovery with a higher amplitude than their initial amplitudes in recession. On balance then, those regions 'benefitted' from the upswing in the cycle and increased their levels of local welfare. Amplitudes over this phase for Western Quebec and Ontario regions were smaller in magnitude than their initial amplitudes of recession, and incidentaly less than the national reference series. The major focus for response was clearly in the Prairies where many regions had amplitudes of response greater than the initial phase and greater than the national reference series. Welfare effects were then concentrated in space and in a large number of cases did not compensate for initial unemployment resulting from earlier macroeconomic policy.

Finally, with respect to equity and existing regional disparities, a number of tentative conclusions can be drawn. First, regions with very high unemployment rates did not benefit from economic expansion and if anything, equity or welfare again tended to decline in these regions. Second, regions with cycle relatives at 1972(10) higher than the national average tended to perform far better than more prosperous regions and consequently, evidence of spatial convergence in regional welfare could be noted. Thus Canadian regions tended to be more equal, although on average with higher rates of unemployment.

The effect of recovery was to make the north-eastern Maritimes worse-off, absolutely and comparatively; to make many Eastern regions better off, absolutely and comparatively, and to make Ontario worse-off comparatively. The real successes in recovery were to be found in the western regions particularly when only one Maritime approached the national full

employment goal. The expansion to 1974(6) was limited and did not approach the Full Employment goal of between 3.0% and 4.0% unemployment, at the same time inflation had continued throughout this phase. Many commentators have argued that the United States and Canadian policies in fact dramatically failed to contain inflation and approach full employment (see Crotty and Rapping, 1975; for example).

5.2.3 Stagflation: The 1974(6) - 1975(12) phase

> "The essential purpose of this budget is to maintain economic growth and reinforce the attack against inflation."
>
> "We are confronted with the twin problems of inflation and slower growth ... the common objectives must be to bring the rate of inflation down to acceptable levels."
>
> "The aim of this budget is to prepare the Canadian economy for a resumption of economic growth without inflation. I believe the key to achieving this aim is to reduce the increase in costs and prices ..."
>
> (Minister of Finance, Budget Speeches, May 1974, November 1974 and June 1975)

Again, the budget statements reflected a renewed attempt to decrease inflation as the primary goal of economic policy. Unemployment was relegated at best to secondary status. The phase 1974(6)-1975(12) emphasized the policy dilemma facing many western countries, that summarized by the term stagflation. In the United States, the policy response under both Nixon and Ford was a further administered recession. Means (1975b) has noted that this was accomplished through a very tight monetary policy, government spending restraint and higher interest rates. At the same time, the Canadian government pursued a similar approach with a surplus budget and high interest rates. In October 1974, voluntary wage-price controls were introduced and these became mandatory in late 1975. The

thrust of Canadian policy was to control inflation through higher unemployment (cf. Rowley and Wilton, 1977) and at the end of this phase greater restrictions were placed on eligibility for unemployment insurance.

The impact of these policies upon the national unemployment rate was to increase it from a cycle-relative of 5.1% in 1974(6) to 6.9% in 1975(12). In 1976-1977 this was to rise to over 8.0%. The increase in the rate of inflation did show signs of slowing although the actual rate did not decline markedly. Boddy and Crotty (1975) again noted a trend downwards in the shares of total income by labour. The recession begun in 1969(7) became the worst since the 1930's and this was expressed in the magnitude of many regional amplitudes.

The impact on regional unemployment disparities of macroeconomic policy, in this phase, was quite different from the phase 1969(7)-1972(10). Apart from Newfoundland and Montreal virtually all of the Maritime and Quebec regions exhibited greater amplitudes than the reference series. Moncton in particular is worthy of attention with an amplitude of 8.14, the highest of all regions, compared to the national reference series amplitude of 2.06. This result is in direct contrast to the results of the initial phase. Two exceptions are worth noting: Newfoundland/Labrador and North-east New Brunswick had very high cycle relatives but low amplitudes suggesting perhaps that these regions may have reached their limit in cyclical sensitivity. On the average, Ontario regions also exhibited higher amplitudes than the national reference series. The Prairie regions however showed no signs of severe impact, rather they tended to show signs of continued expansion of growth. Again, metropolitan regions varied with the major regions with which they are associated.

The equity or welfare consequences of this phase and the attendant macroeconomic policy is again rather different to those of the immediately preceeding period. In absolute terms, equity declined almost uniformly across all regions as regional unemployment increased. Exceptions to this, as noted above, were in the Prairies. Moreover, the rapid increase in unemployment meant that the absolute regional impact was greater in this phase than in 1969(7)-1972(10). Thus, amplitudes were uniformly larger, particularly in the metropolitan regions but also in most other regions as well.

The interregional distribution of impact and equity also changed from the first episode. The greatest impact was felt in Ontario, although Maritime regions exhibited signs of greater than average impact. At the same time Prairie regions were affected far less and there is then reason to suggest a continuation of the economic boom in the part of Canada. The outcome in terms of interregional equity was a continued spatial polarization in economic success and a relatively even interregional distribution of the burden of higher unemployment.

Considering the distribution of higher unemployment according to existing regional disparities, it becomes clear that in this sense of equity the impact of macro-policy may have exacerbated regional disparities. Regions with high cycle relatives (at both 1969(7) and 1974(6)) had greater than average amplitudes in this last phase while regions with low cycle relatives had very low and even negative amplitudes. Consequently, those regions already disadvantaged had become more so, even though middle order regions (in terms of their cycle-relatives) had amplitudes generally larger than the national norm.

5.3 Regional Equity and Unemployment Insurance

The previous section dealt with the spatial impact of macro-policy and its probable equity or welfare effects in Canada over the 1969(7)-1975(12) period. The Canadian federal government sought through a variety of programs, particularly Unemployment Insurance (UI), to at least compensate for variable increases in regional unemployment. Clearly, if this program had been responsive over time and space to changes in unemployment induced by macro-policy then much of the criticism concerning the absolute equity or welfare costs of macro-policies may be limited. In this section, an attempt is made to ascertain whether or not UIC policies off-set the effect of changes in unemployment and regional equity.

The provision and utilization of unemployment insurance is a contentious issue in a number of countries and Canada is no exception. There are two basic objectives in the Canadian program, first, to speed and facilitate the efficient labour market adjustment to job vacancies and unemployment, and second, to ameloriate the welfare costs for workers who become involuntarily unemployed. UI benefits in Canada are related not only to worker contribution and the aggregate unemployment level but also to regional rates of unemployment. This programme was instituted in Canada in 1971 and revised in the 1976 budget. Table 5.3 summarizes the supplementary benefits as they are related to regional unemployment rates.

If Tables 5.4 and 5.5 are considered, a number of issues and problems inherent in the regional provision of unemployment insurance and consequently, in its ability to compensate for adverse macro-policy impacts become clear. First, within certain UIC regions for 1975(12) for example,

there is considerable variance in the Labour Force Survey subregional cycle-relative unemployment estimates. At the one extreme is UIC region thirteen which is composed of five Labour Force Subregions that have cycle-relatives ranging from 4.3% to 23.0% with a Provincial group average of 10.4%, while at the other extreme are the Western UIC regions (one, three and four) that have remarkably homogeneous intra-regional structures. For UIC region thirteen the situation implies an absolute equity or welfare cost for many of the unemployed in the form of lost benefits due to an inadequate recognition of the level of local unemployment problems.

A more crucial problem relates to those regions (eastern in particular) already disadvantaged and suffering massive unemployment and with 1974(6)-1975(12) amplitude values implying further economic disallocation. In this case UIC regional benefit scales would seem to be inadequate and place an arbitrary welfare cost on those unemployed simply because of their location. For an individual located, for example in region 10, benefits clearly are not related to conditions in the local labour market. Further, given a maximum of 52 weeks for UIC benefits, the scales of unemployment over the total period 1969(7)-1975(12) would seem to suggest that reabsorption into the work-force must be extremely difficult. In essence, where the recession has continued since 1969(7) without substantial recovery, many unemployed must have become ineligible for benefits due to the spatial scale and time restraints of the benefit schedules.

Clearly, there exist substantial variations in regional sensitivity to macro-policy and absolute rates of unemployment both within and between UIC regions. This results, in some cases, in UIC schedules being unrelated

Table 5.3 UIC Benefit Schedule (1976)

Regional Unemployment Rate (%)	Supplementary Benefit Weeks
4 and under	0
4.1 - 4.5	2
4.6 - 5.0	4
5.1 - 5.5	6
5.6 - 6.0	8
6.1 - 6.5	10
6.6 - 7.0	12
7.1 - 7.5	14
7.6 - 8.0	16
8.1 - 8.5	18
8.6 and over	20

(Canadian Government, Budget Papers, 1976, Appendix E)

Table 5.4 A comparison of the two regional divisions

UIC (1976)	Labour Force Survey Regions (1975)*
1. Vancouver-Victoria	32, 33, Vanc.
2. Southern B.C.	31
3. Alberta	28, 29, 30, Cal., Edmont.
4. Saskatchewan	25, 26, 27
5. Manitoba	23, 24
6. Northern Ontario	22
7. London-Windsor	19, 20
8. Hamilton - Toronto	17, 18, 19, 21, Ham., Tor.
9. Eastern Ontario	16, Ott.
10. Montreal	13, Mtl.
11. Eastern Townships	14
12. St. Lawrence-Gaspe	11, 12, 15, Queb.-Levis
13. New Brunswick-P.E.I.	3, 7, 8, 9, 10
14. Nova Scotia	4, 5, 6, Halifax
15. Newfoundland	1, 2
16. Rest of Canada	-

Table 5.5 Selected UIC Intra-Regional Unemployment Patterns

Region	1974(6) - 1975(12) Amplitude	Cycle-Relative % Unemployment 1972(12)
1. Vancouver-Victoria	--	8.0
Labour Force Region 32	1.93	7.1
33	1.12	7.7
Vancouver	2.37	6.9
3. Alberta	--	2.8
Labour Force Region 28	0.17	1.6
29	-1.03	2.5
30	1.76	3.2
Calgary	-0.95	2.9
Edmonton	1.58	3.6
4. Saskatchewan	--	4.1
Labour Force Region 25	-1.07	2.1
26	0.69	4.0
27	5.80	3.5
9. Hamilton-Toronto	--	6.0
Labour Force Region 17	4.84	5.8
18	2.97	6.6
19	4.25	6.0
21	6.73	4.3
Hamilton	4.19	5.8
Toronto	4.90	5.9
12. St. Lawrence-Gaspe	--	10.0
Labour Force Region 11	2.29	22.4
12	3.08	11.2
15	5.46	11.9
Quebec-Levis	1.53	9.1
13. New Brunswick-P.E.I.	--	10.4
Labour Force Region 3	3.76	9.4
7	8.14	14.5
8	-0.24	4.3
9	2.43	8.2
10	0.32	23.0
14. Nova Scotia	--	8.1
Labour Force Region 4	1.57	13.6
5	2.10	8.0
6	3.51	6.8
Halifax	4.16	5.6

to local conditions, to regional disparities, and to where the impact of macro-policy has been the greatest. This is particularly true of the Maritimes and Quebec, although not so much of Ontario and the west. Moreover, the problem of differential responses of regions to changes in business-cycle conditions is virtually unrecognized; that is, economic expansion in the 1972(10)-1974(6) phase did not reach a number of Maritime regions experiencing very high rates of unemployment. Consequently, opportunities for work and re-establishment of benefit eligibility were very inadequate compared to those in Ontario and western regions where, even if amplitudes were not as large, the absolute scale of the unemployment problem was less.

5.4 Summary

The impact of macroeconomic policy on spatial unemployment and welfare over the 1969(7)-1975(12) period was variable both over space and time. In the initial phase, 1969(7)-1972(10), the impact of a policy induced recession was very much concentrated in regions generally considered prosperous with reference to the aggregate series. However, in the second recessional phase, the stagflation of 1974(6)-1975(12), the impact shifted and was concentrated in areas already depressed while regions already quite prosperous continued to grow and expand. In essence, a further spatial polarization in welfare emerged over the total period. The intervening recovery saw many depressed regions recover dramatically although in absolute terms they did not even approach the unemployment levels targeted as national full employment. In general, regional unemployment disparities in recession have widened although in recovery some convergence was evident. Macro-

economic policy, in inducing recession, tended to polarize so-called spread effects but dispersed widely the backwash effects.

Although this chapter focused on the possible equity consequences of government induced change it must also be recognized that many other factors may influence the level of economic activity. For example variations in the exchange rate (fixed and appreciating in the first phase and declining in the last phase) could account for variations in the regional impact of national economic fluctuations. Thus the spatial impacts and equity consequences of macro-policy are inevitably conditioned by changes in the economy at large.

CHAPTER 6

MACRO-POLICY AND PREDICTING REGIONAL UNEMPLOYMENT

6.1 A Statistical Model of National and Regional Unemployment

The next step, given the analysis in Chapters Four and Five on the reasons for, and dimensions of, the differential regional impact of national policies, is to seek an understanding of the relative temporal stability of the relationship between national and regional unemployment. The previously derived results are linked qualitatively with a statistical model of regional and national unemployment and consideration is given then to the possible impact on regional unemployment disparities of alternative macro-policy scenarios. In particular, two alternative macro-policy scenarios are considered: (i) a program of continuing high unemployment and economic stagnation designed to 'fight' inflation, which could be characterized as the Liberal option, and (ii) a program of full employment designed to bring about simultaneously low unemployment and low inflation, which could be characterized as the New Democratic Party (NDP) option.

The statistical model, developed using Box-Jenkins techniques, is based upon the performance of national and regional unemployment over the past decade. The parameters, estimated relationships and lead-lag patterns which are derived are used to predict the possible temporal pattern of regional unemployment disparities in the immediate future (to 1981).

As was emphasized earlier the Box-Jenkins methods simply but efficiently in terms of problems of serial autocorrelation amongst the residuals, record on a statistical basis, relationships which are derived from previous time-series data. Inevitably the scenarios of future temporal and spatial patterns of Canadian unemployment are tentative and are to be treated cautiously. As Granger and Newbold (1977) noted, the prediction of future economic patterns is rather hazardous as such predictions are prone to error simply because the economy may never replicate the past upon which all the models are based.

6.1.1 Modelling the input series

The first step in the modelling procedure is to develop an autoregressive, integrated moving average (ARIMA) model of national unemployment. This first step involves estimating X_t of the input series (see Figure 3.3) through which each regional series (or output Y_t) is to be filtered. The national and regional series are taken over the period 1966(1) to 1975(12) and they are not seasonally adjusted, as in the two previous chapters. This longer time period is used for reasons of statistical efficiency (that is, the longer the data series, the more accurate the estimation techniques). Stokes *et al.* (1975) used an ARIMA six-month seasonal model for United States national unemployment, but here the model specified for the Canadian series was a twelve-month seasonal ARIMA model. Table 6.1 presents the autocorrelation and partial autocorrelations for X_t without any form of differencing. Following Box and Jenkins (1976, appendix A9.1, 329) and the discussion in Chapter Three, a model of the following form was postulated:

Table 6.1

Sample autocorrelations and partial autocorrelations

for national unemployment

k (lags)	1	2	3	4	5	6	7	8	9	10
r_k	0.893	0.698	0.457	0.226	0.071	-0.008	0.004	0.095	0.258	0.429
$\tilde{\phi}_{kk}$	0.893	-0.488	-0.227	0.018	0.245	0.031	0.155	0.182	0.335	0.006
k (lags)	11	12	13	14	15	16	17	18	19	20
r_k	0.562	0.612	0.526	0.372	0.152	-0.004	-0.126	-0.183	-0.160	-0.074
$\tilde{\phi}_{kk}$	-0.009	-0.112	-0.356	0.095	0.064	-0.064	0.074	-0.006	0.019	-0.102
k (lags)	21	22	23	24	25	26	27	28	29	30
r_k	0.077	0.244	0.375	0.438	0.379	0.259	0.106	-0.047	-0.143	-0.184
$\tilde{\phi}_{kk}$	0.174	0.104	-0.041	0.016	-0.184	0.093	0.051	-0.034	0.069	0.011

* 95% significance limit on correlations = $\pm$ 0.183

Table 6.2

Analysis of alternative ARIMA models for X_t

Model	Parameters θ_1	θ_2	θ_3	ϕ	Box-Pierce Q Stat.*	Var. of residuals	$\sum[\hat{a}_t]^2$
1. (0,1,1) (0,1,1)12	0.72	--	0.05	--	29.94	0.06	7.6
2. (0,1,1) (0,1,2)12	0.77	-0.04	-0.07	--	26.92	0.05	6.5
3. (0,1,1) (1,1,2)12	0.47	0.41	-0.06	-0.44	25.79	0.05	6.2

* d.f. = 30

$$W_t = (1 - \theta B)(1 - \theta B^{12})\, a_t, \qquad (6.1)$$

where W_t was previously transformed such that:

$$W_t = (1 - B)(1 - B^{12}) = \nabla\nabla^{12} Z_t. \qquad (6.2)$$

The model then attempts to incorporate both the seasonal component and the shifts in the series noted in Chapters 4 and 5.

In Tables 6.2 and 6.3 the results obtained using equation 6.2 (model 1) are presented. The Box-Pierce Q statistic implied no significant lack of fit and inspection of the residual autocorrelations highlighted two significant lags at K = 3 and 21. Experiments using the following modified version of equation 6.1 then were undertaken.

$$W_t = (1 - \theta_1 B)(1 - \theta_2 B^{12} - \theta_3 B^{24}), a_t \qquad (6.3)$$

The results for this model (2) also are summarized in Tables 6.2 and 6.3. A number of tests were conducted on these results. First, the hypothesis (H_o) that the extra parameter did not significantly reduce the sum of squared residuals from model 1 to 2, was tested. Thus.

$$H_o: \beta_{q+1} = \beta_{q+2} = \ldots = \beta_p = 0$$

$$\frac{(RSS_1 - RSS_2)/p\text{-}1}{RSS_2/n\text{-}p} \sim F(p\text{-}1,\ n\text{-}p)$$

Table 6.3

Residual autocorrelations for two alternative ARIMA models of national unemployment

k (lags)	Model 1									
1 - 10	0.009	0.161	-0.185	0.076	-0.081	-0.018	-0.093	0.058	0.008	-0.139
11 - 20	0.109	0.031	-0.025	-0.075	-0.104	0.052	-0.064	0.057	-0.064	0.033
21 - 30	-0.203	-0.121	-0.050	0.069	-0.045	0.031	-0.046	0.103	0.056	0.087

k (lags)	Model 2									
1 - 10	0.001	0.033	-0.133	0.097	-0.023	-0.134	-0.014	0.021	0.061	-0.184
11 - 20	0.114	0.054	-0.045	-0.126	-0.034	0.066	0.003	-0.040	-0.020	0.063
21 - 30	-0.166	-0.154	-0.052	0.096	-0.082	0.034	-0.027	0.072	0.067	0.018

On testing models 1 and 2 it was found that H_o could not be accepted and that the extra parameter did in fact reduce the sum of squared residuals in model 2 at the 95% level of significance.

Using the second test, the Box-Pierce Q statistic, it was found that for both models, there were no grounds for questioning the adequacy of fit. The final test of parameter significance using the 'student' t distribution, concluded that only θ_2 (the twelve month seasonal parameter) and θ_1 (the first-order moving-average term) were significant at the 95% level. However, given the prime importance of $\Sigma[\hat{a}]^2$ and $\sigma\hat{a}$ in determining the *degree* of model fit, the third parameter was also included. It should be noted that there is no one test that could identify a definitive or unique model form. Rather, the Box-Jenkins techniques emphasize a three stage process of identification, estimation and diagnostic checking as a means of testing for model adequacy. The derived model (2) of national unemployment does have some similarity to the more common types of economic series models as noted by Box and Jenkins (1976, Ch. 9).

The national unemployment model is then dynamic and responsive to seasonal and month to month changes. This implies that the 'process', exhibited in the raw series at least, is nonstationary and with no convergence tendencies. Thus, it also implies that the process will not return to an equilibrium or a mean value, but rather than with successive shocks the process will continue to display wide changes in the levels of national unemployment. In a sense, the model evidences a point made by Kalecki (1971) that many economic systems are dynamic in their response to exogenous shocks outside of the more general identified mechanisms. The shocks themselves become incorporated into the total process and its

future form. It also means however, that the potential shock of a change in government policy may be able to shift significantly the path of the process.

6.1.2 Transfer function model of national and regional unemployment

In linking empirically national and regional unemployment the former series becomes analogous to an impulse and the latter series to a response. Thus, X_t (the national series) is modified or filtered through regional economic characteristics to create an outcome, Y_t (the regional unemployment series). Box and Jenkins (1976) proposed a number of steps in the transfer function methodology; first, pre-whitening or filtering of both X_t and Y_t, then cross-correlation analysis and thence, the development of a transfer function of the general form:

$$Y_t = \gamma(B)\, X_t^b + N_t \qquad (6.4)$$

Through the iterative process of identification, estimation and diagnostic checking of residuals a final model is developed for each region. In section 6.1.3 each step is noted and the results of analysis presented.

6.1.3 The cross-correlation function

In this process each regional series was filtered through the national model and the residuals compared through the cross-correlation function (over lags -20 and +20) to those derived from the national model. The results of the cross-correlation analysis for a selected group of regions are outlined in Table 6.4. Significant 'spikes' are those

Table 6.4

Cross correlations* of the national unemployment model and selected regions

Avalon (region one)

k	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7
	-0.075	-0.105	-0.001	-0.109	-0.009	-0.038	-0.025	0.113	-0.040	0.109	0.006	0.143	-0.040	0.123
k	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
	-0.023	0.017	-0.290	-0.019	-0.128	-0.117	0.212	-0.014	0.177	-0.146	0.239	0.004	0.031	-0.128
k	8	9	10	11	12	13	14	15	16	17	18	19	20	
	0.084	-0.112	-0.040	-0.067	0.031	0.173	-0.147	-0.050	-0.090	0.129	0.086	0.087	-0.033	

Western Quebec (region fifteen)

k	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7
	0.128	0.101	0.024	-0.010	-0.042	-0.096	0.025	-0.027	-0.022	0.132	-0.062	-0.088	0.101	0.008
k	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
	-0.154	0.012	-0.058	0.066	0.053	-0.106	0.268	-0.001	0.031	0.033	-0.077	0.059	0.042	0.078
k	8	9	10	11	12	13	14	15	16	17	18	19	20	
	-0.042	-0.097	-0.021	0.060	0.203	-0.056	0.036	-0.062	0.073	-0.087	-0.063	0.159	-0.030	

B.C. Interior (region thirty-one)

k	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7
	0.122	-0.008	-0.093	0.049	-0.114	-0.020	-0.005	-0.050	-0.070	-0.037	0.119	0.029	0.149	-0.041
k	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
	-0.024	-0.113	0.073	-0.046	0.149	-0.123	0.381	-0.026	0.240	-0.140	0.085	-0.133	-0.023	-0.030
k	8	9	10	11	12	13	14	15	16	17	18	19	20	
	-0.055	0.152	-0.079	-0.003	-0.096	0.081	-0.080	-0.015	-0.010	-0.123	-0.041	-0.024	0.075	

* 95% significance level = 0.183

> + 0.183 and, for example, in region one (Avalon) a values of -0.290 and 0.239 at K = -4 and +4 implies that this region leads and lags the national series by four months as well as showing simultaneous movements at K = 0 (0.212). In contrast, region thirty-one (B.C. Interior) lags behind the national series at K = 2 (0.240) as well as showing simultaneous movement also at K = 0 (0.381). Lead-lag results as well as tests for the significance of fit are noted in Table 6.5 for all the regional series.

The Box-Pierce Q statistic implies that the national model has only a lack of significant fit for the Calgary metropolitan area (at the 95% significance level). For most series, the national model is adequate although closer inspection of the residuals and their cross correlations at different lags highlights a number of qualifications. First, a number of regions Cape Breton (04), St. John Valley (8) and Calgary region (29) have no cross-correlation values significant at the 95% level. This suggests that either the N_t component dominates the signal of each region so as to mask the national influences or that double differencing [$(1-B)(1-B^{12})$] filters-out some of the minor or very small effects. In general, inspection of the cross-correlation functions suggest that only monthly spikes and not damping or explosive ARIMA structures are readily identifiable. That is, there appears no evidence of 'damping' of the effects between months.

There also appear to be wide differences within the Maritime area with respect to the lead/lag performances of particular regions. Avalon seems to lag at four months while Newfoundland-Labrador and P.E.I. lead the nation. Variation is also evident in Quebec and Ontario. Two interesting cases stand out. The Montreal (13) and Toronto (17) regions

Table 6.5

Results of cross-correlation analysis

Region	Q Stat. d.f.=30	Significant Lags (k, r_{xy} value)
01	41.5	0 = 0.212, -4 = -0.292, 4 = 0.239
02	41.3	0 = 0.300, -9 = 0.251
03	27.7	-7 = 0.191
04	21.2	--
05	28.6	4 = 0.281
06	31.2	0 = 0.209
07	29.1	0 = 0.239, -10 = -0.289, 12 = -0.285
08	16.5	--
09	35.7	0 = 0.246, 1 = -0.212
10	36.4	-1 = -0.228, 1 = -0.189, 2 = 0.226
11	16.9	0 = 0.196
12	17.4	0 = 0.246
13	59.0	0 = 0.580, -10 = -0.200
14	35.0	0 = 0.263, 5 = -0.210, 7 = 0.218
15	20.4	0 = 0.268, 12 = 0.203
16	42.5	0 = 0.171, -3 = -0.304, -4 = 0.266, -14 = -0.212
17	38.8	0 = 0.371, -6 = -0.246, -13 = -0.307
18	30.1	0 = 0.356, -5 = 0.217
19	35.8	0 = 0.328, -10 = -0.215, -3 = -0.200
20	25.5	-3 = 0.251, 2 = 0.201
21	46.6	0 = 0.422, -1 = -0.227, -2 = 0.219
22	27.2	0 - 0.291
23	31.5	0 = 0.277, 10 = -0.267
24	30.7	0 = 0.218
25	26.0	-9 = 0.229
26	11.1	-15 = -0.201
27	23.7	-3 = 0.196, -15 = -0.238
28	15.1	--
29	53.0	-7 = -0.254, -8 = 0.251, 1 = 0.324
30	24.8	-13 = -0.188
31	45.9	0 = 0.381, 2 = 0.240
32	42.5	0 = 0.397, 10 = -0.266
33	21.4	0 = 0.184
CA	66.0	-1 = 0.234, -7 = -0.272, -8 = 0.274, 1 = 0.382, 4 = -0.225
ED	18.5	--
HM	33.4	-2 = 0.212, -17 = -0.234
HX	41.6	0 = 0.327, -5 = 0.291
MO	27.4	0 = 0.188
OH	20.1	0 = 0.225, -5 = -0.205
QL	18.5	--
TO	37.2	0 = 0.341, -6 = -0.246
VA	32.5	0 = 0.350, 10 = -0.251

-- no

or ags

show evidence of substantial leads and negative correlations. This would suggest that these two regions lead the nation and tend to move against the trends of the national economy for these months. The Prairie regions show significant leads but often at reverse signs. This should not appear surprising as the period under analysis saw rapid growth in Alberta, Saskatchewan and to a lesser extent Manitoba.

A final point is worth noting. Eight regions across all major divisions of Canada show no lags, but rather exhibit evidence of simultaneous response with the national series. Given these results the next step is to calibrate or estimate the transfer function models for each region (the results are shown in Table 6.6). The cross-correlation function enabled identification of the general term X_t^b as well as the structure of the ARIMA transfer function model. A brief discussion of the transfer function results is given in the next section.

6.1.4 The empirical relationship

From Table 6.6 it is clear that one noise model (type A) in particular is representative of the residual behaviour of many Canadian regions. Moreover, all models imply some degree of differencing, and most imply both month-to-month and seasonal (twelve month) differencing. The structure exhibited in the noise model of the residuals is quite significant in all Canadian regions and thus rejects the common supposition of assuming N_t to be random or 'white' noise. While in a few cases seasonal adjustment could account for such structure, in most there is at least a first order moving average term and also importantly, the noise model is not simply additive but rather multiplicative with respect to other terms in

TABLE 6.6

THE RELATIONSHIP BETWEEN NATIONAL (X_t) AND REGIONAL (Y_t) UNEMPLOYMENT: CANADA, 1966-1975*

REGION	Function Form $Y_t = \gamma(B)X_t^b + \ldots$	Error Model Form N_t	Parameter Estimates** 1	2	3	4	5	6	Q Stat.	$\hat{\sigma a}$
01 Avalon	$Y_t = b_1X_t + b_2X_{t-4} + b_3X_{t+4} + \ldots$	TYPE A†	1.33	0.59	-1.85	0.29	0.82	...	27.00	1.79
02 Newfoundland-Labrador	$Y_t = b_1X_t + b_2X_{t+9} + \ldots$	TYPE A	1.93	0.92	0.52	0.58	...	...	10.89	1.94
03 P.E.I.	$Y_t = b_1X_{t+7} + \ldots$	TYPE A	0.56	0.35	0.78	...	...	...	19.70	4.30
04 Cape Breton***										
05 Annapolis. South Shore	$Y_t = b_1X_{t-4} + \ldots$	TYPE A	0.03	0.51	0.68	...	...	...	20.96	1.20
06 Halifax North Shore	$Y_t = b_1X_t + \ldots$	$\frac{(1-\theta_aB)(1-\theta_bB^{12})}{(1-B)}a_t$	1.21	0.43	-0.19	...	...	...	21.26	0.53
07 Moncton	$Y_t = b_1X_t + b_2X_{t-12} + b_3X_{t+10} + \ldots$	TYPE A	1.32	-0.22	-1.00	0.52	0.57	...	49.14	2.00
08 St. John Valley***										
09 Upper St. John Valley	$Y_t = b_1X_t + b_2X_{t-1} + \ldots$	TYPE A	1.40	-0.19	0.49	0.60	...	...	22.96	1.22
10 North East New Brunswick	$Y_t = b_1X_{t-2} + b_2X_{t+1} + \ldots$	TYPE A	0.59	-2.01	0.47	0.53	...	...	20.21	0.83
11 Gaspé- North Quebec	$Y_t = b_1X_t + \ldots$	$\frac{(1-\theta_aB)(1-\theta_bB^{12})}{(1-B)}a_t$	3.20	0.03	-0.33	...	...	...	42.59	3.30
12 Laurentians	$Y_t = b_1X_t + \ldots$	$\frac{(1-\theta_aB-\theta_bB^3)}{(1-B)}a_t$	1.33	0.43	0.19	...	...	...	16.63	0.62
13 Montreal Region	$Y_t = b_1X_t + b_2X_{t+10} + \ldots$	TYPE A	1.07	0.003	0.56	0.72	...	...	38.25	0.13

TABLE 6.6 cont'd

REGION	Function Form $Y_t = \gamma(B)X_t^b + \ldots$	Error Model Form N_t	Parameter Estimates** 1	2	3	4	5	6	Q Stat.	$\hat{\sigma a}$
14 Eastern Townships	$Y_t = b_1X_t + b_2X_{t-5} + b_3X_{t-7} + \ldots$	$\frac{(1 - \theta_1 B^{12})}{(1 - B)(1 - B^{12})} a_t$	-0.02	0.01	0.004	0.92"	...	...	29.20	0.80
15 Western Quebec	$Y_t = b_1X_t + b_2X_{t-12} + \ldots$	TYPE A	1.51"	1.27"	0.38"	0.64"	...	...	28.16	1.88
16 Eastern Ontario	$Y_t = b_1X_t + b_2X_{t+3} + b_3X_{t+4} + b_4X_{t+14} + \ldots$	TYPE A	1.23"	-0.37"	0.15	-0.13	0.40"	0.80"	16.57	0.22
17 Toronto Region	$Y_t = b_1X_t + b_2X_{t+6} + b_3X_{t+13} + \ldots$	TYPE A	1.01"	-0.18	-0.06	0.58"	0.68"	...	42.02	0.10
18 Niagara	$Y_t = b_1X_t + b_2X_{t+5} + \ldots$	TYPE A	1.21"	0.38	0.54"	0.86"	...	...	39.63	0.56
19 Central Ontario	$Y_t = b_1X_t + b_2X_{t+10} + \ldots$	TYPE A	0.66"	-0.24	0.65"	0.81"	...	...	26.30	0.60
20 Southwest Ontario	$Y_t = b_1X_{t-2} + b_2X_{t+3} + \ldots$	TYPE A	0.88"	0.89"	0.23"	0.79"	...	...	29.80	1.23
21 Kitchener	$Y_t = b_1X_t + b_2X_{t+1} + b_3X_{t+2} + \ldots$	TYPE A	1.19"	-0.72"	0.56"	0.44"	0.75"	...	31.59	0.50
22 Northern Ontario	$Y_t = b_1X_t + b_2X_{t-1} + b_3X_{t-2} + \ldots$	TYPE A	0.36"	0.44	0.36	0.11"	0.13"	...	42.50	1.12
23 Winnipeg	$Y_t = b_1X_t + b_2X_{t-10} + \ldots$	TYPE A	0.88"	-0.16	0.56"	0.78"	...	...	40.83	0.46
24 South Manitoba	$Y_t = b_1X_t + \ldots$	TYPE A	0.61"	0.43"	0.83"	...	...	...	37.13	0.51
25 Regina	$Y_t = b_1X_{t+9} + \ldots$	TYPE A	0.68"	0.23"	0.69"	...	...	...	29.56	0.61
26 Saskatoon	$Y_t = b_1X_{t+15} + \ldots$	TYPE A	0.30	0.40"	0.53"	...	...	...	26.42	1.20
27 Medicine-Hat/ Lethbridge***										

TABLE 6.6 cont'd

REGION	Function Form $Y_t = \gamma(B)X_t^b + \ldots$	Error Model Form N_t	Parameter Estimates** 1	2	3	4	5	6	Q_w Stat.	$\sigma\hat{a}$
28 Calgary Region	$Y_t = b_1X_{t-1} + b_2X_{t+7} + b_3X_{t+8} + \ldots$	TYPE A	1.02	-0.68	0.52	0.08	0.88	...	25.15	0.47
29 Edmonton Region	$Y_t = b_1X_{t+13} + \ldots$	TYPE A	-0.34	0.50	0.85	...	...	...	33.31	0.37
30 Parklands	$Y_t = b_1X_{t+15} + \ldots$	TYPE A	-0.52	0.45	0.70	...	...	...	24.07	0.52
31 B.C. Interior	$Y_t = b_1X_t + b_2X_{t-2} + \ldots$	TYPE A	1.40	0.50	-0.07	0.42	0.70	...	32.70	0.65
32 Vancouver Region	$Y_t = b_1X_t + b_2X_{t-10} + \ldots$	TYPE A	1.09	-0.76	0.49	0.78	...	...	23.78	0.43
33 Vancouver Island	$Y_t = b_1X_t + \ldots$	$\frac{(1 - \theta_aB - \theta_bB^2)(1 - \theta_cB^{12})}{(1 - B)(1 - B^{12})} a_t$	1.34	0.33	0.39	0.73	...	...	14.86	1.37
CA Calgary***										
ED Edmonton***										
HM Hamilton	$Y_t = b_1X_t + b_2X_{t+5} + \ldots$	TYPE A	0.87	0.63	0.44	0.85	...	...	23.19	0.73
HX Halifax	$Y_t = b_1X_{t+2} + \ldots$	TYPE A	0.52	0.60	0.71	...	...	...	15.82	0.71
MO Montreal	$Y_t = b_1X_t + \ldots$	TYPE A	0.10	-0.36	0.05	...	...	...	43.73	1.21
OH Ottawa-Hull	$Y_t = b_1X_t + b_2X_{t+5} + \ldots$	TYPE A	0.49	-0.09	0.38	0.71	...	...	40.22	0.71
QL Quebec-Levis***										
TO Toronto	$Y_t = b_1X_t + b_2X_{t+6} + \ldots$	TYPE A	0.71	-0.02	-0.66	-0.48	-0.42	...	46.15	0.16
VA Vancouver	$Y_t = b_1X_t + b_2X_{t-10} + \ldots$	TYPE A	1.02	-0.72	0.48	0.78	...	...	23.57	0.47

TABLE 6.6 cont'd

* n = 120

** Parameter estimates (1, 2, ...) conform, in successive order to, first, the transfer function components, then to the error model parameters, again in order.

† TYPE A. Error Model: $N_t = \frac{(1 - \theta_a B)(1 - \theta_b B^{12})}{(1 - B)(1 - B^{12})} a_t$

" b parameter values significant at the 95% level.

*** Regions for which no statistically significant relationship between national and regional unemployment could be determined.

the transfer function model.

Overall, we can characterize many Maritime and Quebec regions as having high sensitivity to national fluctuations (i.e. parameter values > 1.00) with a mixture in Ontario between greater and lesser sensitivity to national fluctions ($\gtrless$ 1.00). The Prairies exhibit less sensitivity and interestingly the B.C. regions exhibiting greater sensitivity. A number of regions however, show characteristics that would seem to suggest that the postulated relationship $Y_t = f(X_t)$ maybe inadequate. It was noted earlier in the discussion of the cross-correlation function results that Toronto, Calgary and Edmonton showed quite unusual results. This has been further reinforced by the transfer function modelling where the first two metropolitan regions in particular were very difficult to model adequately. A more detailed discussion of the results is given below through the interpretation of alternative macro-policies and their implications for regional unemployment disparities.

6.2 Macro-policy and the Future of Regional Unemployment Disparities

The results of the statistical modelling of national and regional unemployment discussed in Section 6.1 are interpreted now in the light of the general policy analysis developed in Part II and applied in Chapters Four and Five. The Liberal and NDP scenarios were chosen because of the former's significance in the actual direction of Canadian government policy for the years 1976-1981, while the NDP scenario was chosen because it represents a clearly defined alternative. It could be argued that the Conservative policy platform might also have been included, however at the time of writing there was not a clear enough articulation of the

macro-policy options promoted by that party that would facilitate analysis.

The Liberal and NDP options have the objective of reducing the level of unemployment. What they differ on are the appropriate policy instruments and how they perceive the relative costs (in terms of different levels of unemployment and inflation) involved in achieving their goal. The Liberal option could be characterized as a 'deflation-type' policy whereas the NDP has promoted a set of policies designed, in part, to immediately stimulate the economy. In this section the theoretical or practical usefulness of these competing policies are not questioned, rather we ask the question: if the Liberal and NDP policies are implemented (and they work) what would be their likely implications for regional unemployment disparities in the short-run?

6.2.1 The Liberal scenario

> "The primary means of reducing unemployment due to periods of slow growth lies in the maintenance of adequate overall demand, however, the experience of many countries in recent years underlines the danger of setting targets for unemployment too low or trying to reach them too quickly."
> Minister of Finance, Budget Speech, May 1976

> "Excessive tightness in job markets, as in any market, can be an inflationary force. The unemployment problems we may experience through the remainder of this decade may slowly transform themselves into problems of shortages of workers and workers with particular skills in the early 1980's, particularly in certain regions."
> 'The Way Ahead', Canadian Government, October 1976

These two quotations emphasize a number of assumptions inherent in the Liberal government's approach both over the 1974-1976 period and for the period 1976-1981. The Liberal scenario emphasizes four particular issues: (i) That a longer period is necessary for resolving the twin problems of high unemployment and inflation (at least until early 1980) than has traditionally been the case with macroeconomic stabilization problems. (ii) That there is a trade-off between the two policy objectives, (the primary goal being lower inflation) despite the time element. (iii) That a

fundamental problem is the structural nature of the current employment crisis: in particular, problems of technological change and regional misallocation of human resources imply very poor labour market efficiency. (iv) Finally that the structural problems are the most important barriers to the resolution of macroeconomic aggregate policies: the poor 'efficiency' (in terms of labour market adjustment) of the regional system itself contributes to stagflation.

The implication of these assumptions is that both aggregate unemployment and regional unemployment levels will remain the same or even increase in the foreseeable future. Recent confidential forecasts by the Department of Manpower and Immigration, based on the assumption of continued Liberal macro-policy, is for even higher levels of unemployment to 1980 (E. Broadbent, June 1977). Thus, while the federal government has recognized the problems of slow growth and reduced demand, emphasis has been placed more on the long-run *structural* resolution of the national stabilization problem, rather than direct intervention to boost demand. The theoretical foundations for such a policy are to be found in Holt *et al.*, (1973) and Phelps *et al.*, (1970).

The Liberals have argued that it is structural long-term policies such as are embodied in DREE that hold the key to lower inflation and the opportunity to stimulate aggregate demand. Hence, there is an implicit assumption in the scenario that a trade-off still exists and that lower inflation can only be bought at the expense of higher unemployment.

There are a further set of issues to be noted. First, in Chapter Three it was hypothesized that for Maritime regions regional adjustment and unemployment are positively related to the rate of money wage change and the evidence and results accumulated in Chapter Four supported this contention. Clearly any attempt, such as is implicit in the Liberal scenario to decrease the rate of money wage-rate change, also creates conditions for the Maritime regions to slow the rate of increase in unemployment.

Consequently, a necessary condition for recovery in the Maritimes and to a lesser extent Quebec regions, is a moderation in the rate of money wage inflation. It is important to emphasize however, that the results in Chapter Four imply a reduced rate of increase in unemployment, not a decrease in absolute levels. Also significant is the fact that many Ontario and western regions have a negative relationship between MW_t^N and U_t^R and thus the Liberal scenario would imply that lowering the rate of inflation may also cut the rate of growth in employment opportunities for these regions.

Second, the Liberal scenario of inducing higher aggregate unemployment may have significant equity and political consequences. Given the discussion in Chapter Five concerning the 1974(6) - 1975(12) phase and the results of the empirical, predictive, model developed in this chapter, then two issues can be highlighted.

(i) Existing inequalities, which have been traditionally identified with respect to the Maritimes, must inevitably become worse on all three equity criteria. The discussion of the last phase 1974(6) - 1975(12) and the analysis in Chapter Four have demonstrated the differential impact of government macro-policy that would occur from concentrating success in the west. The greatest impact would be higher unemployment in the Maritimes. In general, the statistical model of national and regional unemployment also confirms this observation. Significant parameter values are greater for Maritime and Quebec regions than for most Ontario and Prairie regions. In fact, most values of the parameters for the depressed regions are larger than 1.00 and this implies that cyclical sensitivity is higher than the national average. Unfortunately, the model does not allow for estimation within a given business-cycle. At the same time,

many Ontario regions (for example, Central Ontario) have parameter values less than 1.00 implying cyclical sensitivity less than the national norm.

In many western regions (for example, the Calgary region), parameter values are insignificant or less than 1.00. Also, in a number of these regions, no empirical relationship was established between national and regional unemployment (in particular, for the major cities of Edmonton and Calgary). This implies that local Prairie economies may be relatively poorly integrated with the mainstream of national economy. Thus, continued spatial polarization in unemployment and further inequities in distributive justice are the implications of the Liberal scenario.

(ii) An immediate welfare concern must be the ability of the UIC to adjust to continuing high levels of unemployment. It was noted in Chapter Four that over the period 1969(7) - 1975(12) very high levels of unemployment in Maritime regions with even less work opportunities brings into question the relevance of eligability conditions for UIC benefits. It would seem that UIC regulations may work best in regions with medium unemployment (6.0-8.0%) and characterized by relatively high rates of job turnover and a long-term (up to five years) recession. The Liberal scenario implies a worsening of this dilemma as unemployment continues to increase in these regions and many more loose their benefit eligibility. Two further implications follow, both are more general and controversial.

(iii) In Chapter Three regional development policy objectives and the equity issues inherent in regional development were discussed. The results noted in this section suggest that the more perverse impacts of macro-policy have been in regions which have been subject to most federal

regional development assistance. The Liberal scenario implies an even greater impact in the future on those regions despite regional development policies. In this context, serious questioning of the role and possible effectiveness of DREE could be noted. In particular, it is without question that macro-policy impact must severely limit the effectiveness of DREE. Why such contradiction in policy objectives and implementation exists is difficult to say, however the contradiction has been well recorded by Hatfield (1973) amongst others.

(iv) Related to this issue is an even more current and contentious topic - Quebec separation. Frechette (1977) recently has claimed that a prime justification for separation is the mis-matching of Federal macro-policy with the Quebec regional system. In Chapters Four, Five and Six we have in fact documented the impact and extent of policy mis-match with respect to the spatial economic structure of Quebec. Frechette (1977) has also argued that the Liberal scenario implies that Quebec, as well as the Maritimes, must share, under the guise of *national efficiency*, in the costs of stabilization policy while other regions benefit. National efficiency or national unity may then be simply a phrase justifying the continued 'exploitation' of Quebec. The Liberal scenario of macro-policy for the early 1980's reinforces such criticisms and Quebec separation under these conditions, according to E. Broadbent (1977), may become inevitable. While Chapter Four documented a number of structural reasons for differential adjustment to macro-policy, it remains a political reality that the Liberal scenario creates differential impacts and exacerbates existing inequalities. In summary, the Liberal scenario has important costs, both in terms of higher absolute levels of unemployment and as well in terms of regional

equity whether interregional or with respect to existing disparities.

6.2.2 The New Democratic Party scenario

This program is based upon a number of principles or prescriptions:

(i) The importance of coordinated manpower and demand policies aimed at achieving full employment within three years.

(ii) The simultaneous resolution of inflation and unemployment, where, if both branches of policy work, the target for full employment would be 3.0% unemployment.

(iii) The use of the government as employer of last resort and as the legislative force to maintain national employment levels.

(iv) The vital importance of an incomes policy, not simple wage-price control, but rather a policy recognizing the socio-political aspects of wage negotiation, in what could be termed a social contract.

Unlike the Liberal scenario, this policy would involve stimulating demand over the 1976-1981 period to the point where a target of 3.0-4.0% unemployment at most is achieved. While structural factors in the spatio-economic labour market are obviously important, the NDP scenario argues that demand expansion is a necessary condition for regional equity and justice as well as the growth of the aggregate economy. The theoretical foundations and an application to Canada are to be found in Weintraub (1976). The NDP scenario combines objectives of decreasing inflation and unemployment through a group of structural and demand orientated policies. Thus comments in part (i) with respect to money wage rate inflation related to the Liberal scenario are also relevant in this section. Assuming

that the NDP scenario is plausible and that part (i) of section 6.2.1 can be accomodated within the structure of the NDP scenario, a number of implications follow.

(i) Given an expansion in aggregate demand, and hence lower aggregate unemployment, an important issue is the timing of regional response. With respect to the transfer function models in Table 6.6, a number of generalizations can be made. First, regions one (Avalon) to three (P.E.I.) lag significantly in response, in the case of region one by four months, region two by nine and region three by seven months. Both Avalon and Newfoundland/Labrador however, do react simultaneously with the national series as well. Regions in the rest of the Maritimes react either simultaneously or after a lag (such as in the case of North East New Brunswick which lags by one month). Second, of the five Quebec regions, four move simultaneously with the national series, one of these (Western Quebec) actually leads as well by twelve months, while the Eastern Townships exhibit no significant relationship except for the twelve month seasonal term.

Third, Ontario regions in general move simultaneously with the national series although with some qualifications. Eastern Ontario for example, lags as well by three months and at the same-time moves in the opposite direction to the national series. Southwest Ontario both leads by two months and lags by three months but with consistent signs with the national series. In the prairie regions however, it is difficult to generalize due to the often insignificant relationship between national and regional unemployment. Winnipeg and South Manitoba move simultaneously with the national series, Regina lags by nine months, while the Calgary

region leads by one month and lags at seven months, although the sign at seven months is at odds with the direction of the national series. The Edmonton region is similar in that it lags fifteen months with a negative sign, implying movement opposite to the national trend.

The British Columbian regions (including B.C. Interior, Vancouver region and Vancouver Island) move simultaneously with the nation although the Vancouver metropolitan area and region leads the nation by ten months. Finally, the metropolitan regions exhibit behaviour consistent with their provincial significance, Hamilton, Toronto and Vancouver moving simultaneously with the nation and Hamilton and Halifax also lagging at five and two months respectively. For an expansion policy it could be expected, on the average, that the Maritimes would then lag in response, Quebec would react almost simultaneously, and Ontario would show variable behaviour consistent with Chapters Four and Five.

(ii) The impact of an expansionary policy on actual levels of unemployment would clearly favour the Maritimes, Quebec and British Columbia, despite their lags in response. The highest significant parameters are found in Newfoundland/Labrador, Moncton, Upper St. John Valley, North Quebec and Western Quebec. On the average, Ontario regions have parameters less than 1.00 and the prairies similarly have coefficients less than 1.00 but they are often not significant. The larger metropolitan regions such as Montreal (region thirteen), Toronto (region seventeen) and Vancouver (thirty-two) have coefficients very close to 1.00 reflecting almost exactly the trends in national unemployment. This is afterall, consistent with their size and significance for the national economy.

The NDP scenario is essentially quite simple. Given a decrease in

money wage rate inflation, an expansion over 1976-1981 would tend to induce greater employment growth in more depressed regions and a convergence in the level of interregional disparities. Although there would be some lags in behaviour, once recovery was initiated many Maritime and Quebec regions would on the average respond greater than the Ontario and Prairie regions. It must also be noted however, that for a number of eastern regions such a recovery might not reduce unemployment below 10% although in Ontario the rate might fall close to the level of 4.0-5.0%. As Frechette (1977) has noted, the dominance of Ontario in the national economy may mask the appropriate full employment level for Quebec and the Maritimes as in fact national macro-policy simply directed to a national full employment level will mean that expansion may be halted prematurely for those regions. In any event, it should be emphasized that the NDP scenario depends, in the Maritime case at least, on a significant reduction in national money wage inflation.

CHAPTER 7

CONCLUSIONS

7.1 Summary

The analysis of policy developed in Part II and subsequently applied in Part III focussed upon a number of particular issues: understanding why differential regional adjustment may occur in response to macro-policy induced fluctuations; developing a means of evaluating the equity consequences of macro-policy impact, and; finally considering the future of regional unemployment. With respect to the first element in the analysis, the model of regional adjustment tested in Chapter Four met with considerable success (see section 4.3 for more specific details) despite its relative simplicity. A clear spatial dichotomy was evident in that many eastern regions responded positively to a change in national money wages while many western regions responded negatively: One section of Canada is growing rapidly in conditions that are disasterous for another section.

At the same time, testing for a theoretical link between national demand conditions and regional unemployment highlighted the vulnerability of most Ontario and Quebec regions. Thus, stagflation impacted all regions in Canada and a partial theoretical understanding of this result can be found in our neo-Keynesian model of regional adjustment. This model, developed in a time-series framework, has important implications for

appropriate fiscal and monetary policies. In Chapter Six some mention was made of an important condition for Maritime economic recovery in the short-run; that of decreasing money wage rate inflation. At the same time, demand expansion policies also were seen as vital in inducing overall regional growth. With such a set of policies however, this does not mean that many regions would necessarily attain full employment in concert with the spatio-economic core of Canada. Rather, there are clearly different degrees of response and different absolute levels of unemployment. In this sense a growing and stable economy is a necessary condition for regional development, which may be supplemented through specifically directed regional economic policies, although these latter policies may not be effective if substituted for broad macroeconomic expansion and growth.

The second step in our policy analysis was to evaluate the actual impact of macro-policy through a simple estimation procedure and equity criteria. The NBER procedure was used in estimation and a set of equity criteria, based on ethical and policy concepts, was applied to the 1969-1976 period. Our findings were that the impact of macro-policy was variable over time and space. The first phase 1969(7) - 1974(10) saw impact concentrated in regions considered prosperous; in the second phase 1972(10) - 1974(6), the impact was concentrated in depressed areas, and finally, in 1974(6) - 1975(12) recession again dominated the depressed regions while expansion continued in the Prairies.

Consideration of the efficacy of UIC policy prompted the conclusion that such policies were not adequate for high unemployment regions, although they were effective for Central Canadian regions. This was so for two reasons: the large degree of intra-regional variation in the UIC regions

and second, the relatively longer term duration of the current recession for many Maritime regions which made the maximum fifty weeks of benefits far too inadequate.

In summary, the equity effects of policy have been more often spatially perverse. This would seem to be particularly the case in terms of interregional and comparative equity although with some variation over each phase of the 'business-cycle'. It is difficult to avoid the conclusion that those regions historically worse off in terms of their levels of unemployment have borne disproportionally the costs of higher unemployment. Thus, these results lend some support to Hatfield's (1973) contention that the Maritime regions, in particular, have been grossly disadvantaged in the federal government's fight against inflation.

The final step of analysis was to combine the findings of Chapters Four and Five with a statistical model of national and regional unemployment for predicting the possible future of regional unemployment disparities in Canada given a set of macro-policy alternatives. The conclusion was that under a Liberal policy scenario it is likely that regional unemployment disparities will widen and the impact may well continue to be greatest in those regions already depressed. The future for those regions is rather bleak unless some version of the NDP scenario is considered seriously. Some questions could be raised as to appropriate policy adjustments within the Liberal scenario that could mitigate against the worst impacts of such policy. However, without a comprehensive program of full employment and price stability it is difficult to see what could be done in the short-run. In this regard, it is felt that further consideration of policy and theoretical options for regional-national stabilization policy is

warranted although at this stage little research has been conducted in this area (cf. L'Esperance, 1977 and Tomczak, 1978). Suffice to say, the NDP macro-policy option implies a far better prospect for narrowing, in the short-run, regional unemployment disparities than does the Liberal scenario.

7.2 Methodological Issues and Directions for Future Research

The dissertation is not without its shortcomings and these have been noted, when appropriate, in the body of the study. In this section some selected issues are highlighted. The problems of time-series analysis noted to be endemic to many previous studies on spatial labour markets generally were avoided through the use of the Cochrane-Orcutt (1949) method and the Box-Jenkins (1976) procedures. However, the study was limited in that little attention was paid to more complex space-time patterns that may be inherent in regional unemployment relationships. For example, interrelationships between regions and their possible influence on patterns of unemployment adjustment were ignored. More research in this area is warranted (see Martin and Oeppen, 1975 and Bennett, 1975) although it should be noted that many problems of a theoretical statistical nature may have to be surmounted before more generalized multivariate space-time auto-correlation methods become available to the general user (Anderson, 1976b).

With respect to the theoretical model developed and tested in this dissertation two issues stand out as important limitations to our understanding of the process of regional economic adjustment. First, little attention was paid to developing a more rigorous analysis of the spatial and sectoral effects of money wages rate determination in the modern economy. Again, while our approach was certainly a step forward

from previous studies in treating the problem of money wage determination explicitly and its relation to regional and national economic change, in some respect it was a relatively simplistic one in terms of its notions of the process of money wage rate determination in a spatial context. Consequently, more work is warranted and the recent paper by Hart and McKay (1977) on the British scene may be an appropriate start.

The second point about the model of regional adjustment is its treatment of effective demand and its measurement. Many researchers are now beginning to question whether or not the unemployment rate (as officially measured) is an appropriate proxy for deficient demand. By convention, virtually all spatial labour market models use national and regional unemployment in this manner despite evidence, noted for example in the Worswick (1976) volume, that recent changes in such welfare policies as unemployment insurance may have induced a large degree of voluntary unemployment. While this is certainly a contentious issue, and the evidence is by no means irrefutable, more research is needed in Canada and elsewhere on the efficacy of using officially measured unemployment rates as a proxy for involuntary unemployment.

As important as the technical issues of time series parameter estimation and theoretical modelling are the problems of developing appropriate and consistent means of policy analysis. The three stage welfare criteria and policy analysis developed in this study may not be appropriate for all problems of spatial policy analysis although the general framework could be applied more widely. For purposes of generalization and knowledge building however, Geography desperately needs a paradigm of policy analysis. Moreover, more attention could be paid in future to the

instrument of policy application, the State itself (Harvey, 1976). In Chapter Two it was argued that much of orthodox spatial labour market research and economic geography in general is conducted in a policy and institutional vaccuum. In this study, it was argued that the government and its policy is an important endogenous factor in the space-economy, influencing and determining aggregate and regional conditions. But, this view does not help in understanding why and how the State may, through macro-policy, create conditions of regional inequality and at the same time attempt to encourage regional growth through regional policy. An important avenue for future research is to develop more critical models of the State and its relationship to the spatio-economic structure of capitalism (cf. Dear and Clark, 1978).

Finally, a problem at the heart of all social science research is that many economic events in time and space tend to be unique and although related to the past, they do not replicate previous events or conditions. It was argued that such is the case in the current recession. Consequently, the focus of this study has been to extend our ideas and understanding of regional unemployment in conditions characterized as an economic crisis where little is known of why or how the spatial economic system may perform. Unfortunately, many of our models perform best as historical accounts of past events and often seem incapable of adjusting to or even helping to understand current problems. Thus, more work is needed in understanding adjustment in disequilibrium conditions rather than in what seems to be a fruitless search for the optimal or equilibrium conditions for regional growth (Pissaridies, 1976).

More broadly, current conditions tend to question certain general

practices of economic geography research. If geographers are to be concerned with identifying spatio-economic relationships in spatial labour markets, we should also be aware of two conditioning elements. First, the evolution and change in spatio-economic conditions and circumstances may mean the theoretical generalizations of behaviour in one time period may have little relevance for subsequent events. Second, the role that institutions may play in affecting the economic environment may change as the economy itself evolves. This study attempted to analyse both contemporary macroeconomic conditions and the role of government policy in developing an understanding of the patterns, mode of adjustment and future of regional unemployment in Canada.

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APPENDIX A

A PROFILE OF THE CANADIAN REGIONAL EMPLOYMENT STRUCTURE

Section three and the interpretation of regional adjustment is in part based upon the extent of regional differentiation in the manufacturing structure of Canadian employment. In this appendix each region is described on the basis of its employment distribution and in particular according to the distribution between high growth and low growth industries. The regional units are those noted in maps 1a. and 1b. which form the basis for our analysis. Description of each region's employment structure is derived from the 1970 Statistics Canada (1974) survey.

A.1 The definition of high and low growth industries

Following the theoretical discussion in Chapter Three concerning the role and function of high growth industries and low growth industries in regional adjustment, a set of Canadian industrial sectors were defined accordingly. Table A.1 lists those sectors defined as high and low growth industries on the basis of their rates of growth over the 1961-1970 period (Statistics Canada 1973); their degree of market concentration as of 1970 (Statistics Canada 1975b) and labour productivity (Department of Industry, Trade and Commerce, 1972). While some question was raised, in Chapter Four, of the relative crudeness of these divisions, this set of data remains the best available.

Table A.1 The definition of High and Low Growth Industries

Canada, 1970

Industry Group***	Rate of Empl. Growth 1960-1970 (%)	Market Concentration*	Productivity** Level
1. Transport Equipment	47.0	HIGH	HIGH
2. Electrical Products	35.2	MEDIUM	HIGH
3. Chemical	22.0	MEDIUM	MEDIUM
4. Textiles	12.8	MEDIUM	HIGH
5. Machinery	54.6	LOW	HIGH
6. Food and Beverage	1.9	LOW	LOW
7. Printing and Publishing	10.6	LOW	MEDIUM
8. Clothing	3.7	LOW	LOW
9. Petrol and Coal	-17.2	HIGH	LOW
10. Non-Metallic	13.4	MEDIUM	MEDIUM
11. Wood	4.6	LOW	LOW

* where concentration is defined as the share of total value added by the four largest firms. High: 75-100%; Medium: 50-74.9%; Low: <50%.

** See, Department of Industry, Trade and Commerce, 1972.

*** Those industry groups 1-5, are defined as high growth, and those groups 6-11, defined low growth.

A.2 Regional Employment Structure

A.2.1 Newfoundland regions

The two Labour Force Survey regions that comprise Newfoundland (see Map 3.1a.) are very small in terms of their population and work force. This creates a problem of many industrial and manufacturing sectors being unrepresented (see table A.2) or excluded from the official surveys. Much of Newfoundland is dependent upon mixed farming and the fishing industry. The smaller region, Avalon (01) is dominated by St. John's which is a commercial and administrative centre for the entire province. As well, there are a number of major fish processing plants, while in the rest of the region there is a limited amount of mineral extraction.

The largest region, Newfoundland-Labrador (02) is dominated by fishing on the coastal fringes as well as a small amount of forestry. The major centres, Grand Falls and Corner Brook are similar to St. John's through their fish processing function as well as having a small number of pulp and paper mills. According to virtually all indicators of economic welfare, these two regions are very depressed (Schramm, 1976) and have perhaps the lowest real income levels in all of Canada (see Economic Council of Canada, 1977). These regions have also been the recipients of a number of regional development programs initiated through the Department of Regional Economic Expansion (DREE).

A.2.2 Prince Edward Island and Nova Scotian regions

The region that represents P.E.I. (03) is dominated by agricultural processing (see Table A.3), in particular potato and mixed farming produce.

Table A.2 Employment structure: Newfoundland regions, 1970

Industry Group*	Labour Force Survey Regions (% empl. of total) Avalon	Newfoundland/ Labrador
1.	--	--
2.	--	--
3.	--	--
4.	--	--
5.	--	--
6.	--	27
7.	--	--
8.	--	--
9.	--	--
10.	--	--
11.	--	--
Total w.f. (Manuf.)	2510	10145

* see table A.1

Table A.3 Employment structure: P.E.I. and Nova Scotian regions, 1970

Industry Group	Labour Force Survey Regions (% empl. of total) P.E.I.	Cape Breton	Annapolis N. Shore	Halifax S. Shore	Halifax
1.	--	--	16	19	--
2.	--	--	--	--	--
3.	--	--	--	--	--
4.	--	--	--	--	--
5.	--	--	--	--	--
6.	77	24	41	27	40
7.	--	--	--	2	11
8.	--	--	--	--	--
9.	--	--	--	--	--
10.	--	--	--	--	--
11.	--	--	7	9	--
Total w.f. (Manuf.)	2698	6370	13913	10742	6687

Again the manufacturing labour force is relatively small and the island itself is functionally dominated by Charlottetown, the administrative and commercial centre.

Regions in Nova Scotia however, tend to be more diversified than the previous ones mentioned. Cape Breton Island (04) has food processing (mixed agricultural produce) as well iron and steel based upon local coal mining; Sydney is the predominant centre. The Annapolis-N. Shore region (05) is again a mix of agriculture, food processing (fish, local produce) and manufacturing (steel, engineering and textiles) with the dominant centre being New Glasgow. Almost half the manufacturing component is in low growth industries while a small percentage is in the high growth group of transport engineering. Halifax-S. Shore (region 06), which includes the metropolitan area of Halifax (see table A.3) is the major centre of Nova Scotia and reflects a more diversified administrative, commercial and manufacturing employment structure. For example in the latter group, automobile assembly and ship building are important with, as well, a large component concerned with fish processing.

A.2.3 New Brunswick regions

In a number of these regions some of the highest unemployment levels in Canada are recorded. These regions are generally less developed in an industrial sense and rely upon extractive industries such as forestry and mining. The Moncton region (07) including the Moncton metropolitan area as well the south east section of the Province, has an employment structure based upon the commercial activities of the city, while a large section of the employment structure is concentrated in low growth sectors (see

Table A.4 Employment structure: New Brunswick regions, 1970

Industry Group	Labour Force Survey Regions (% empl. of total) Moncton	Saint John Valley	Upper St. John Valley	N.W. New Brunswick
1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	2
4.	--	--	--	--
5.	--	--	--	--
6.	49	34	24	23
7.	6	4	6	--
8.	--	--	--	1
9.	--	--	--	--
10.	9	--	--	--
11.	11	3	29	10
Total w.f. (Manuf.)	4909	8931	6970	6801

Table A.4), for example, food packing (including sea-food products and local produce) as well as forestry and mining activities. The Saint John Valley region (08) however, is rather more diversified, particularly with respect to the metropolitan area of Saint John. Manufacturing (including ship building and light engineering) with food and forestry processing predominate. In contrast, Upper Saint John Valley (09) is more orientated towards administrative and service functions, particularly in the city of Fredericton, although it should be noted that forestry products processing has a major role in the region as a whole. Finally, North-east New Brunswick (region 10), perhaps the most economically depressed in New Brunswick, is dominated by agriculture and extractive industries such as logging and mining.

A.2.4 Quebec regions

In contrast to New Brunswick regions, the regions of Quebec tend to reflect a more 'developed' manufacturing structure. The exceptions to this are the North-Quebec (11) and Western Quebec (15) regions which are dominated by forestry, agricultural and mining activities. The former region in particular is relatively isolated from the spatio-economic structure of Quebec, while the latter region is dominated by the city of Hull. The Laurentian region (12), including the cities of Quebec and Levis has a stronger component of high growth industries, including transportation, electrical products and textiles. There is however, evidence (from Table A.5) of a large low growth component which is dominated by food processing and pulp and paper milling. Region 13, Montreal reflects a diversity of industry and structure to be expected of one of the largest Canadian cities,

Table A.5 Employment structure: Quebec regions, 1970

Industry Group	Labour Force Survey Regions (% empl. of total)							
	N. Quebec	Laurentians	Montreal region	Eastern Townships	Western Quebec	Montreal	Quebec-Levis	Ottawa-Hull
1.	--	6	7	--	--	8	--	--
2.	--	--	7	--	--	7	3	15
3.	--	3	5	--	--	5	3	--
4.	--	--	7	21	--	6	4	--
5.	--	--	3	--	--	2	--	--
6.	21	12	11	10	9	11	17	13
7.	--	3	5	2	--	5	8	19
8.	--	6	14	10	--	15	9	--
9.	--	--	--	--	--	--	--	--
10.	--	--	2	3	2	2	--	3
11.	15	9	18	6	26	--	3	--
Total w.f. (Manuf.)	8681	59884	382117	20521	14561	339246	21176	17950

Table A.6 Employment structure: Ontario regions, 1970

Industry Group	Labour Force Survey REgions (% empl. of total)								
	Eastern Ontario	Toronto Region	Niagara	Central Ontario	South-west Ontario	Kitchener	Northern Ontario	Toronto	Hamilton
1.	--	12	10	18	38	7	2	9	2
2.	17	10	7	11	--	13	3	10	9
3.	6	5	4	2	12	--	--	6	3
4.	10	2	4	2	--	7	--	2	3
5.	6	6	8	9	2	6	3	7	8
6.	12	9	7	14	13	13	7	10	7
7.	6	8	2	5	2	2	3	9	2
8.	2	--	--	--	--	3	--	5	2
9.	--	--	--	--	2	--	--	--	--
10.	4	3	5	3	4	--	2	2	4
11.	3	--	--	4	--	2	9	2	--
Total w.f. (Manuf.)	76483	338425	120532	41658	58187	66191	68627	294140	66807

although compared to the Toronto region (17, in Table A.6) with more employment concentrated in the low growth sectors. Finally, the Eastern Townships region (14) has a strong textile and clothing component as well as food and pulp processing sectors in proportions similar to these of the Laurentians region (12).

A.2.5 Ontario regions

It is expected that Ontario regions will be generally the most developed and diversified in Canada since Ontario itself has been the predominant manufacturing core of Canada. With reference to Table A.6 it is clear that this is in fact the case. Regions sixteen (Eastern Ontario), including Ottawa, seventeen (Toronto) including the Toronto metropolitan area, eighteen (Niagara) including Hamilton, nineteen (Central Ontario) including London, twenty (south-west Ontario) including Windsor and Sarnia and twenty-one (Kitchener) have employment structures dominated by high growth industries. There are however, varying degrees of specialization. For example, Ottawa has a strong civil service component, Hamilton the steel and heavy engineering, London the white collar administrative sectors, and Windsor-Sarnia the motor car assembly and petroleum refining. Only in region 22, Northern Ontario, is there any similarity to many of the Quebec regions with a strong wood and food processing component. In general, the Ontario regions are primarly urban and strongly developed with an emphasis on technological and specialized manufacturing.

A.2.6 Manitoba and Saskatchewan regions

The regions represented in Table A.7 are predominately rural,

Table A.7 Employment structure: Manitoba and Saskatchewan regions, 1970

Industry Group	Labour Force Survey Regions (% empl. of total)				
	Winnipeg	South Manitoba	Regina	Saskatoon	Parklands
1.	10	--	--	--	--
2.	3	--	--	--	--
3.	--	--	--	--	--
4.	--	--	--	--	--
5.	6	--	--	--	--
6.	21	38	28	53	31
7.	9	6	11	14	4
8.	15	--	--	--	--
9.	--	--	--	--	--
10.	--	--	6	--	--
11.	--	6	--	--	16
Total w.f. (Manuf.)	39305	6093	5007	4311	4420

dominated by the agricultural and food processing industries. Moreover, there is a distinct difference between the range-type farming (wheat, a small proportion of beef and other grain crops) dominating the Prairies, and the small-lot, intensive farming of the Maritimes. Regions twenty-three and twenty-five are dominated respectively by the cities of Winnipeg and Regina, although in both the food processing component is particularly important.

A.2.7 Alberta and British Columbian regions

A similar pattern is evidenced in the Alberta regions although the cities of Calgary and Edmonton have a rather more diversified structure (see Table A.8). Even in 1970 there is evidence of the energy based component becoming significant in those cities, although the agricultural base was most important. Both Interior B.C. (31) and Vancouver Island (33) reflect a very strong wood processing component, more in keeping with a number of New Brunswick regions than the immediately adjacent Prairie regions. Vancouver city, which dominates region 32, is also influenced by the wood sector although it is more diversified and has many of the functions of a major urban area.

The labour force survey regions, used as the basis for analysing regional performance in Canada, range from rural agricultural and fishing regions to urban ones, to forestry and prairie farming regions. There are a wide variety of industry and employment structures coupled with a significant degree of spatial differentiation between those regions.

Table A.8 Employment structure: Alberta and British Columbia regions, 1970

Industry Group	Labour Force Survey Regions (% empl. of total)								
	Medicine Hat	Calgary region	Edmonton region	B.C. Interior	Vancouver region	Vancouver Island	Calgary	Edmonton	Vancouver
1.	--	--	--	--	6	--	6	--	6
2.	--	--	--	--	--	--	--	--	3
3.	--	--	--	--	--	--	5	5	--
4.	--	--	--	--	--	--	--	--	--
5.	--	--	--	--	4	--	16	--	4
6.	28	--	50	14	18	7	23	28	17
7.	7	--	13	--	6	--	11	--	6
8.	--	--	--	--	--	--	--	8	--
9.	--	--	--	--	--	--	--	--	--
10.	6	17	--	2	--	--	--	6	--
11.	6	--	--	44	22	79	6	--	21
Total w.f. (Manuf.)	45731	1375	1070	34063	68017	16992	14838	20118	62356