REGIONAL GROWTH AND NORTHEASTERN ONTARIO DEVELOPMENT: AN ANALYSIS OF FACTOR COSTS IN MANUFACTURING ACTIVITY

by
CHRISTIAN G. SAARE

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AUTHOR: CHRISTIAN G. SAARE, B.A. (Wilfrid Laurier University)

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ABSTRACT

Regional growth literature indicates that the relations between the core and the peripheral regions, and the process by which growth is transmitted between regions are of prime importance in discussing growth disparities.

Northeastern Ontario is a peripheral region, economically subordinate to the Ontario core region, and exhibits adverse growth conditions. Diversification of the region's resource dependent economy has been called for by many groups but has been hindered by the perception of higher manufacturing production costs. However, these costs have not been investigated.

In this thesis, Northeastern Ontario centers' factor costs in manufacturing are compared with core centers' costs by utilizing a cost accounting method. The results indicate that some Northeastern locations may be cost attractive locations. However, low costs derived for Toronto would indicate continued manufacturing concentration in the principle centers of the core region.

When costs are calculated for hypothetical firms, the importance of the factor requirement structure is indicated in determining location. Northeastern locations would be attractive to firms with large land, and low labour requirements. If future analyses verify these results, alternative explanations of the development problem of the Northeast should be explored.

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PREFACE

This thesis deals with a single aspect of the complex regional development problem which exists in the Northeastern Ontario planning region. The problem as a whole has often been studied by the Ontario provincial government, the Ontario Economic Council and the Canadian government. Basically, the performance of the region's economy has been below provincial average, and its growth and development has been hampered by the structure of core-periphery relations. For example, there exists a basically colonial industrial system oriented towards resource extraction which functions with a dissatisfied workforce in an alienated society.

The inhabitants of the region are not satisfied with government policy and attempts aimed at alleviating the problems that result from the continuation of the historic natural resource-dependent economy of the region. This dissatisfaction on the part of the inhabitants is firmly based on the political nature of the problem. As early as 1891, resentment against the provincial government's support of mining companies' exploitation of the region, without just taxation to support the region's development, led to calls for separation from the rest of the province.[1] A current manifestation of provincial disregard for the region centers on development policy. The

provincial government has long promised to foster industrialization and resource processing in the Northeast but it also promised the Toronto-Centered Region, which does not require government development assistance, that it could probably increase its role in processing resources from northern Ontario.[2] Subsequently, there is a widespread belief that the provincial government's programs for development are piece-meal and often based on thin analysis.[3] As a result, as a recent Financial Post article noted:

> Impatience more than anger fuels Northern Ontarians' rekindled sense of self-reliance. In town after town, people are growing skeptical after years of big government and talking more of taking economic development into their own hands -- a natural reaction to the long, largely fruitless wait for Queen's Park to conjure up some splendid regional development plan launched on a river of tax dollars.[4]

It is self evident that the economic growth process produces definite and serious anomalies in the spatial distribution of its beneficial and negative effects. Subsequently, this results in serious social development anomalies such as alienation, lack of opportunities and out-migration. Northeastern Ontario's economy and social development, being adjuncts to the development of the core region of Ontario, suffers from these anomalies. If economic growth is defined as the expansion of the economic system in such a manner that opportunity, employment, capital accumulation and standards of living increase as population increases, Northeastern

Ontario's economy is not growing in proportion with the rest of the province. This has serious consequences for the social development of the region. The resulting alienation and frustration with the provincial government's handling of the problem has led to the establishment of a self-help philosophy in the Northeast. The inhabitants of the region are attempting to take the responsibility of economic development in their own hands in an attempt to solve their economic and social problems. This thesis may be regarded in this light.

THESIS SCOPE AND ORGANIZATION

The purpose of this thesis is two-fold. First, the complexity of the regional growth problem in both its theoretical and actual context will be examined in the first two chapters in order to provide an understanding of the constraints in correcting the regional imbalance. Secondly, a single tractable element of the problem will be analyzed and a methodology promoted in order to obtain answers for a specific and current condition. While both the element examined and methodology employed utilize actual information, they have theoretical implications.

Therefore, Chapter 1 deals with the theoretical aspects of the regional growth problem in general. Here, the basic concepts and explanations of the growth process, the general factors affecting the process, and the policy of growth

center strategy to intervene in the process will be discussed. In Chapter 2, the Northeastern Ontario development problem is discussed in terms of the north-south dichotomy, and the key characteristics of the economy, the development factors and organizations involved in attempting to develop the region are enlarged upon. In the third chapter, the element of factor costs in manufacturing production is isolated as an element of the problem which is both tractable and perceived as an important barrier to development. As Northeastern costs for production factors are considered significantly above the costs elsewhere, blame for lack of industry and attempts to attract industry hinge on the favourable comparison of these costs with costs in the core region of the province. Therefore, in this chapter, annual factor costs are derived in a relatively simple accounting method. This accounting methodology was selected for the factor cost analysis in an attempt to provide some insight into the problem as it exists at the present. However, it provides a basis for future theoretical analysis into the Northeastern Ontario development problem while also providing immediate, but tentative, results. In Chapter 4, it is shown how the derived factor cost functions may be utilized in calculating total annual production costs for varying types of firms. This may be used to indicate the least cost production locations for a firm given different factor requirements and characteristics. The data provided can therefore be used to identify whether or not a firm could operate profit-

ably in a Northeastern location and in public relation campaigns to attract new firms. In the final chapter, the tentative results of Chapters 3 and 4 are discussed in relation to the contextual material to indicate both implications for policy and further research.

As this thesis attempts to deal with the existing Northeastern problem, the following observation would be appropriate. Policy planning, especially in dealing with regional economic problems, often tends towards irrationality because society itself contains elements of irrationality. The apparent confusion and internal contradiction with regional planning in practice is the result of the ideological and political basis of decisions. Therefore, this lack of "value-free" decision-making may tend towards enforcing the anomalies of the economic system. In this manner, regional planning in practice aids in the reproduction of existing conditions. It is this trap of unconsciously enforcing the existing anomalies of the economic system that regional planners must avoid. As R. Peet observed, despite inequalities in society, there are few social stresses as long as all the environments of society are improving.[5] But if they are not, especially in an alienated segment of society, the reproduction of the conditions will create serious social stresses. "Value-free" and apolitical regional planning could lessen the probability of social stress manifestation. I hope this thesis may contribute to this viewpoint.

Footnotes

1. Sudbury Journal. June 15th, 1891. Quoted in G.A. Stetler. " Origins of a Company Town: Sudbury in the Nineteenth Century ". Laurentian University Review. Volume 3, Number 3, 1971.

2. D. Scott. " Northern Alienation ". in D.C. MacDonald, ed.. Government and Politics of Ontario. (Toronto: MacMillan, 1975), p. 238.

3. Ibid., p. 244.

4. R. Oram. " 2001: A Self-Help Odyssey ". Financial Post, November 18, 1978. p. 19.

5. R. Peet. " Inequalities and Poverty: A Marxist-Geographic Theory ". Annals of the Association of American Geographers. Volume 65, 1975. p. 569.

CHAPTER 1

THE THEORETICAL CONTEXT - REGIONAL DISPARITIES, ECONOMIC GROWTH AND GROWTH CENTER STRATEGY

The objective of this chapter is to discuss regional development problems in their theoretical context. Initially, the concept and need for regional economic development will be discussed in terms of the general approaches to regional planning. This will provide a rationale for interest in regional planning and definitions for various problem regions. As the state of development in a region may be regarded as a question of economic growth, the theoretical reasons for growth will be explored in the second section. In this section, the concept of comparative advantages, the endogenous and exogenous factors affecting economic growth, a concept of accumulating causes, and other explanatory concepts will be discussed. In the third section, the growth concept which has had greatest appeal to policy makers will be discussed. Here, the elements of growth center strategies will be summarized, with an emphasis on the policy appeal and implementation problems of the strategy.

INTRODUCTION TO REGIONAL ECONOMIC PLANNING

The generally high level of economic performance in the developed nations since the late 1940's and the wealth that was created has been characterized by the uneveness of

their distribution over space. These spatial imbalances, while varying in seriousness between nations, have resulted in pockets or regions of chronic unemployment, outmigration, limited economic bases and decaying social capital facilities. In Canada, there has been increasing recognition that any future development of the Canadian economy must allow for a more equitable participation by all the economic regions.[1]

A nation's unity can be threatened by a wide variance in the imbalances of social and economic wealth. In fact, Canadian Prime Minister Pierre Elliot Trudeau once stated that the failure to deal with these imbalances or disparities was as great a threat to the national unity of Canada as the French Canadian question.[2]

The action taken in order to improve the equity and efficiency of a national economy's spatial dimension, particularly in regards to disparities between regions, can be refered to as regional economic planning. Regional economic planning attempts to propose the format by which a region's economy can be developed. This development takes the form of trying to correct imbalances in the distribution of social and economic wealth and opportunity. A case for regional economic development can be built on a concern for a range of social equity philosophies. In Canada, regional economic development is desirable because, first, free market forces cannot be relied upon to satisfactorily consider public costs or benefits. Industrial location decisions, for example, are usually based

on an analysis of a firm's private costs and benefits. Secondly, economic growth requires a policy to ensure that a society's scarce resources are fully and effectively utilized. Such a concern generates questions of "place versus people prosperity" and the movement of "employment to people" versus the movement of "people to employment". Thirdly, Canadian federal government policy can be hindered by the existence of these disparities between regions. The effectiveness of policies intended to increase the sense of national unity or to combat inflation may be decreased as long as wide differences in regional unemployment rates exists. Therefore, in order to deal with regional disparities in Canada, regional economic planning has become a component of policy formulation at both the federal and provincial levels of government.

This policy concern for regional economic development has grown out of the interest by intellectuals in regional economic growth. This academic interest is relatively recent, evolving from a lengthy interest in national economic growth by economists. This traditional emphasis on economic growth of nations was characteristic of the writings of Adam Smith, Karl Marx and Max Schumpeter.[3] Interest in regional economic growth started to evolve in the late 1920's and 1930's but it was not until the late 1950's that direct interest in the research of regional economic growth became prominent.[4] It is possible that the early lack of interest in regional

economies was the result of a belief that regions had essentially the same characteristics as small nations. However, regions within a national state have a number of characteristics that make poor regions easier to develop than poor nations. First, since regions lack political boundaries that regulate or impede the flow of factors and goods of production, the inter-regional mobility of labour, capital and goods is higher than between nations. As a result, differences in living standards of the magnitude that exist between nations do not evolve. Secondly, regions are part of a political community that will provide a common scale of social services, form of currency and levels of taxation. In effect, the richer regions subsidize the poor. Thirdly, a region has access to the national market. In general, regions are more open to flows of commodity and factors of production and, therefore, some exogeneous influences affecting the region may be controlled by the central government. Underdeveloped nations, on the other hand, while having tariff and monetary control, may have difficulty in attracting capital because of political instability. Also, colonial trade patterns with an emphasis on the importation of consumption goods and dependence on a few export goods decrease the ability of poor nations to accumulate capital. As a result of these differences between regions and nations, regional economic planning has differed from economic planning for poor nations, and action taken to foster development in a region has a better chance for success

than programs to develop poor nations.

Because the analysis of regional economies is a relatively recent development in economic planning, it was not until the 1960's that a functional classification of regions suitable for planning purposes was developed.[5] Using Friedmann's categories, it is possible to establish a framework of problem regions as follows:

i. Core regions within a nation have great potential for economic growth and stability but possibly may become congested. Where the development scale has resulted in diseconomies of scale, for example in transportation systems, the industrial efficiency can be reduced.

ii. Downward transitional regions are areas of established settlement in economic decline as the result of resource depletion, declines in the market demand for the products of the region or political decisions.

iii. Special problem regions can be identified as areas where resource or location peculiarities result in an underdeveloped economy where their resources are underutilized and industrial development is hindered by a lack of capital. Due to the lack of investment, the infrastructures of these regions tend to be inadequate for growth.

iv. Resource frontier regions are zones of new settlement which are based on resource exploitation. Employment

in these areas may be unstable or temporary depending upon the life expectancy of the resource and market conditions for the resource.

Because regions are component parts of a national system, disparities that exist between well functioning regional economies and the problem regions classed above cannot be solved in isolation. Regions exist in relation to other regions. The spatial relationship between the core regions of the nation and the peripheral regions is an important factor for regional economic development. It is the core region and its local environs which usually have well functioning and growing economies while the peripheral areas include downward transitional, special problem and resource frontier regions.

A key question, then, concerns the factors which inhibit and promote economic growth.

FACTORS AFFECTING THE POTENTIAL OF ECONOMIC GROWTH IN A REGION

In this section, a collection of factors affecting economic growth in a region will be classified and discussed in an attempt to explain the variance in regional growth roles. While the collection is admittedly not complete, it should allow for an adequate background for later discussions.

Advantages and Endowments

Regional imbalances in economic growth are commonly explained as being the results of differences in "comparative advantages" or of "resource endowments".[6] These explanations are general statements and are sometimes confused with each other. Comparative advantage refers to the advantage a region has in some activity as opposed to all other activities in that region and compared to another region. A comparative advantage can be expressed in a general statement as existing for industry 1 in region A when:

$$\frac{O_{A1}}{O_{A2}} > \frac{O_{B1}}{O_{B2}} \qquad (1.1)$$

where O is the level of output of a region's industry. Thus, O_{A1} is the level of output of industry 1 in region A, O_{B1} is the level of output of the same industry in region B, O_{A2} is the level of output of industry 2 in region A, and O_{B2} is the level of output of industry 2 in region B.

The comparative advantages of a region depend upon its endowment of resources. The resources of a region may be natural, such as minerals, harbours or climate, and therefore their location and distribution cannot be predetermined by man. Or the resources may be the results of acts of man's activities. Such things as economic and social infrastructures fall in this category. While no one can control the initial distribution of natural resources, men make the decisions as

to the distribution of man-made resources. Given that the key economic resources of a region are the results of man's activities, any explanation of economic growth based upon the concept of comparative advantages tend to be simplistic, circular and, therefore, of little use for regional economic development. For example, a region may prosper because of its rich endowment in man-made resources. But this does not explain what initially attracted the man-made resources to that region. Any attempt to explain the endowment of man-made resources in a region requires a more detailed basis than the concept of comparative advantages or resource endowment.

It is possible to list some of the factors which appear to encourage or inhibit regional economic growth. An attempt will be made to give this list some cohesiveness but a complete theory of regional economic growth is beyond our present capabilities.

Factors Affecting Regional Economic Growth

According to basic economic theory, the only factor of production that is fixed in location is "land" which includes actual land, natural resources and other gifts of nature. The factor of production that is most mobile is capital, while labour's mobility is lessened by human spatial inertial. Therefore, attention should be paid to the characteristics of a region which affect the movement of capital

and labour. These characteristics may be either endogenous to the region or exogeneous.

Endogenous characteristics could be considered as being associated with a region's economic personality in that they are characteristics of the region alone and are not influenced by its relations with other regions. Endogenous characteristics include the following:

1. Availability of local inputs. The availability of land, water, air and labour as well as their quality will affect regional economic growth. While these are primarily natural resources, their use and quantity available for use is related to man's activities.
2. Industrial composition and the structure of the region's economy. A diversified regional economy is a healthy structural feature that may reduce a region's vulnerability to high unemployment rates that may result from cyclical changes in market demand for a product or from the loss of an industry or firm. Also, a diversified regional economy should result in the development of a variety of skills and experience in the labour force. If the economy includes so-called "growth industries" which have high recorded growth and the potential to expand, the service sector should also expand to meet the requirements of the industry.
3. The presence of economies external to the firm. These economies are related to the industrial structure of a

region. For example, localization economies are gained by all firms in a single industry which are located in close proximity to each other. As the total output of the industry at that point allows for the sharing of repair and power facilities, joint raw material purchases, and a common labour pool, other firms in that industry would be attracted to an established center. Agglomeration economies accrue to inter-related industries that exist in proximity to other related firms and the benefits are similar to those resulting from localization economies. A large inter-related complex allows for local support firms to supply the needs of the industries, promotes research and development facilities and allows for sharing of facilities. Urbanization economies result from the concentration of population, industrial output, and wealth at a location. This concentration allows for the availability of labour, technical services and specialized goods and services. Generally, these economies are related to the division of costs among a number of firms.

4. Economies of scale in the provision of public services. Good quality infrastructures, including transportation networks, sanitation services, public education facilities, parks and recreation facilities, tend to be associated with larger centers. These high quality

infrastructures promote economic growth as the services provided do not have to be provided by the private sector. Also associated with infrastructures are government departmental offices, financial institutions, community and health services, and social welfare frameworks.

5. The level of demand for the products of local industries. Demand for local products usually increase with population increases. Therefore, firms will be attracted to areas where this assured local demand is large and growing.

6. The quality of local entrepreneurship. An entrepreneur is someone who exercises control over some production process. An entrepreneur is not necessarily the owner of the means of production. The entrepreneur's role is that of innovation where control over the means of production also for new combinations of production. If a region's entrepreneurs are innovative, resulting in new products, new methods of production, successful marketing strategies and other changes, and efficient, growth will be stimulated. The quality of a region's entrepreneurial talent is a function of environmental influences including the need to achieve and educational facilities.

While growth is a function of the region's economic

personality, it is also affected by influences exogenous to the region. These influences include:

1. Demand for the region's products outside the region. This external demand will be strongly influenced by transportation costs. As a result, distance between the region and its major external markets is an important influence on the competitiveness of the region's firms. This distance also reduces the possibility that bulky products with low value such as ore will be shipped without processing. Perishability of the product and handling charges must also be considered. It is therefore conducive to a regional economy to be near a large external market.
2. Policy determined by governments external to the region. An example is two policy alternatives open to a government that is external but senior to a region. The first is that of non-interference in the economy. This would allow present trends, such as concentration in major metropolises, to continue indefinitely, leaving only a veneer of efficient agricultural and recreational areas in the hinterland. The second is that of complete dispersal of various forms of economic aid to all distressed areas, in an attempt to foster even development over the entire country. The policy of a competing region's government may adversely affect a region. This could

include attracting industries out of the region to another, political pressure at a senior governmental level for favours or some other form of intervention against the region. Thus, the actions of governments can affect the potential for growth in a region through their policies relating to that region.

3. Colonial policies resulting from external governmental and corporate decisions. This problem is dealt as a separate factor from policy because the use of regions as "colonies" involves both governmental and corporate policies. Colonies, in a regional context, are usually manifested in resource frontier areas as single-industry towns. The community is dependent on a single industry or a single firm to provide employment and the capital for investment in plants and facilities is controlled from outside the region. Characteristic of these areas are a lack of concern for the region by the absent owners, a withdrawal of the enterprise's profits from the local economy, and local inhabitants' resentment towards the major firm in operation. Growth is more likely to occur in areas that are not perceived as being "colonies" or private domains by investors and entrepreneurs.

4. Technological change. Innovations in production pro-

cesses, goods and services, and consumer attitudes result from changes in technology. However, technological changes are associated with economies of scale, agglomeration and urbanization, and are more likely to occur in large centers. How these changes affect a region outside the source of change will depend on the diffusion of innovative ideas.

At this point, it will be noted that many of the above factors would appear to be both causes and results of economic growth. It is fairly difficult to focus upon one characteristic of an economic system that will spontaneously generate economic growth. For example, a region's ability to provide an adequate infrastructure will depend on the availability to spend money on capital projects. Only growing regions will have the available money. Only a few of these factors can be partially disassociated from growth while the others would tend to stimulate while feeding upon existing growth.

The Concept of Accumulating Causes

As previously noted, the internal and external factors promoting growth are dependent upon the prior existence of economic growth in a region. The only internal factors which may be partially independent from the prior existence

of growth are the presence of inputs and the quality of entrepreneurship in the region while external features that exhibit the same quality of quasi-independence are governmental and corporate policies. Except for the presence of inputs, which are related to a region's natural resources, these factors' effects on regional economic growth can be the result of arbitrary human decisions. For example, the decision whether or not a government will intervene in a regional economy, degree of intervention, degree of corporate control over a regional economy or political system and the decision to innovate are decisions made by people who may have other criteria than the presence or lack of growth in a regional economy.

We may accept that some of the factors that can either stimulate or inhibit growth may be partially independent from the condition of growth in a region. However, we must also accept their overall inter-relationship with each other and with economic growth. The concept of accumulating causes attempts to deal with the problem of separating the factors into causes and effects of growth.[7] Growth is reinforced by the presence of factors which may have contributed to initial growth momentum or is further diminished as the factors conducive to growth are lost as the economy decays. While this is a circular argument, an accumulation of forces that either support or inhibit growth while being cumulatively reinforced by growth provides a plausible des-

cription of how growth is affected.

This may be refined slightly in view of the factors that affect economic growth in a region. Each factor affecting growth can have either negative or positive effects on growth. For example, the lack of various external economies would perhaps act to inhibit growth. However, the degree to which growth is promoted will be a function of the levels of benefits resulting from various levels of external economies. If a method of measurement could be established to indicate the degree to which each of these factors either promote or inhibit growth, these factors affecting growth could be described as growth vectors. By way of illustration, it could be said that there are n number of factors which normally affect growth. Then, $x_1, x_2, \ldots, x_n$ will be those factors' growth inducing effects while $y_1, y_2, \cdots, y_n$ are those factors' growth inhibiting effects. Let X denote the vector of growth inducing effects such that:

$$X = [x_1, x_2, \ldots, x_n]$$

and let Y denote the vector of growth inhibiting effects:

$$Y = [y_1, y_2, \ldots, y_n]$$

It would be expected that regions with large X values and small Y values would grow more rapidly than regions with small X values and large Y values. Next, by appending X to Y, vector W may be created, such that:

$$W = [Y|X] \tag{1.2}$$

defining the effects on growth. It might be possible to find a function f for a region i if the value of W at time t is designated W(t). Thus,

$$W(t)_i = f(W(t-1)_i) \tag{1.3}$$

The function f would then indicate how growth in period t is related to the effects of the factors that affect growth in time period t-1. If the supposition is made that one of the n factors affecting growth, x_1 for example, is a measure of the level of growth in the economy of a region, then the expectation would be that:

$$\frac{\partial x_1(t)}{\partial x_i(t-1)} > 0 \tag{1.4}$$

for all the growth inducing variables x_i, and that:

$$\frac{\partial x_1(t)}{\partial yi(t)} < 0 \tag{1.5}$$

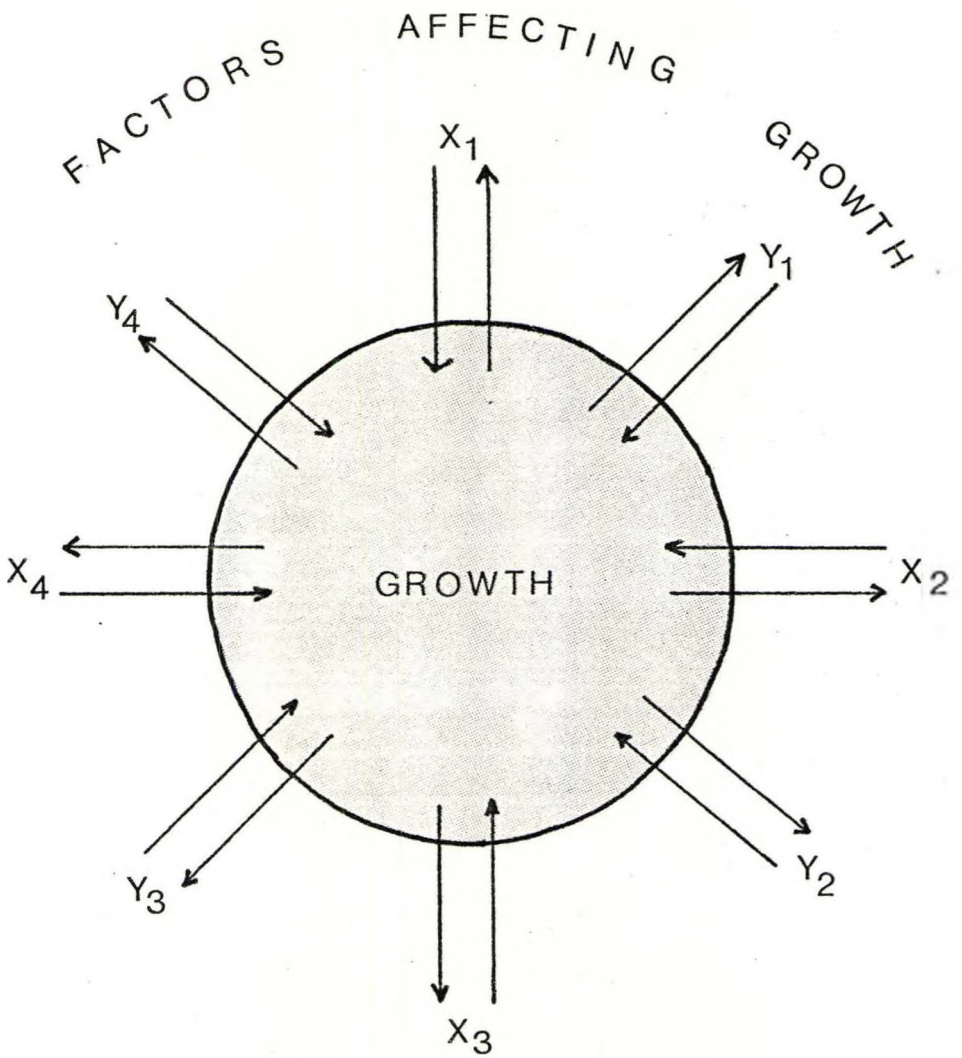
for all the growth inhibiting variables y_i.

The velocity of growth, V, then in time period t would be a function g where:

$$V(t) = g(f(W(t-1))). \tag{1.6}$$

Such a model is shown graphically in Figure 1.1, with the feedback loops indicating the relationship between growth

Figure 1.1



The Inter-relationship between Factors which affect Growth and Growth:

negative effects= Y_n

positive effects= X_n

and the factors affecting growth.

One model based on this accumulation of causes and effects is Myrdal's[8] cumulative causation. This model predicted that regional per capita incomes would diverge through time because market forces would tend to increase inequities. Market forces would cause self-sustaining growth in some centers, while lagging areas' limited advantages, such as low priced labour or land, would be insufficient to offset the agglomeration advantages of the growing centers. In the end, the favourable induced effects of growth in prosperous areas would be outweighed by the unfavourable effects on the lagging areas.

Kaldor[9] attempted to give cumulative causation a testable basis by stating that the rate of productivity growth was an increasing function of the rate of growth in the region's output. That is:

$$T_i = f_i^1(Y_i) \tag{1.7}$$

$$\text{and} \quad Y_i = f_i^2(w_i/t_i), \tag{1.8}$$

where T_i = rate of productivity growth in region i, Y_i = rate of growth of output, w_i = a money wage index for region i, t_i = productivity index, while f_i^1 and f_i^2 are increasing functions to allow for external economies. Kaldor acknowledged that the divergence between regions would be reduced by diseconomies such as traffic congestion

resulting from concentrated, rapid industrial growth; the inter-regional mobility of labour; and government policy.

It could be argued that government policy could arrest regional divergence, if effectively implemented, by stimulating growth in the areas that would normally be affected by the unfavourable effects of growth in prosperous areas.

Other Explanatory Concepts of Growth

Myrdal's concept of cumulative causation, based upon the relationship between the factors affecting growth and growth's effect upon these factors, is but one of a number of approaches to conceptualizing the economic growth process.

"neo-classical" models[10] have been widely used because they contain elements of factor mobility, and are easily adapted from aggregate growth theory to a regional scale. These models, unlike Myrdal's cumulative causation, predicts regional convergence of per capita incomes. In general, these models are in the form of:

$$Y_i = a_i k_i + T_i + (1-a_i)L_i, \qquad (1.9)$$

where Y_i, k_i, T_i and L_i are the growth rates of output, capital technology and labour in region i, while a_i is capital's share of income. Capital and labour growth rates are a function of changes in factor returns. It is unfortunate, but the restrictive assumptions of the models make

the neo-classical approach almost useless for regional planning. By assuming full employment of factors of production, constant returns to scale, fixed labour supply and technology, perfect competition and knowledge, and by ignoring the spatial element of economics, these models are simplistic compared to reality.

Export base models express regional growth rates as a function of the regions' export performance. That is:

$$Y_i = f(X_i) \quad , \tag{1.10}$$

where Y_i is the growth rate of output and X_i is the growth rate of export in region i. These are basically demand models, arguing that demand for a product create its own supply[11], and this orientation is the weakness of these models.

The third method that will be discussed is that related to econometric techniques. In this case, it is the availability of data that moulds the structure of these models. These models rely heavily upon export base models and the spatial element is not included. Also, there has been much experimentation but little comparison of the results. However, these models[12] hold promise for the future if the approach could be standardized to allow for comparison of results.

It would appear that the accumulation of effects and causes would lend itself to these econometric approaches.

The rate of economic growth, Y, in any time period, t, in region i could be attributed to various variables. For example:

$$Y_i(t) = a + b_1G(t-1) + b_2P(t-1) + b_3N(t-1) + b_4R(t-1) + b_5T(t-1) + b_6Y_i(t-1) \quad (1.11)$$

where G indicates level of total government spending on region i's infrastructure; P, N, R and T denote growth rates of the region's population, employment in "growth" industries, rate of profit and technology, while $Y_i(t-1)$ is the growth rate of the region's output in the previous time period. Obviously, other variables could be included in equation (1.11). Czamanski's model[13] of economic growth in Nova Scotia had 54 endogenous variables, 50 pre-determined variables and 54 identifying equations. This method would tend to produce elaborate equations with large numbers of functions.

However, it is highly improbable that such an exercise would be useful. There are a number of difficulties, other than "data problems" associated with approaching regional economic growth in this manner. The first major problem is the manner in which to determine the relations between growth inducing and inhibiting factors, and their relations with the level of economic activity. That is, the problem is to specify the functions f and g in equations

(1.3), (1.5), (1.7), (1.8) and (1.9). Clearly, some plausible function f and g can be mathematically specified which might have value as an insight into the question of how growth occurs. Unfortunately, once such functions have been specified, subsequent analysis is locked into an examination of the implications of the functions. It may prove to be more fruitful to keep the relation between the factors affecting growth and the growth rate variable. This is because far too little is known about the causes of growth at the present time. As a result, it may not be useful to explore in any mathematical detail the implications of any specific and, hence, arbitrary assumptions about such relations.

There is another major shortcoming with not only the econometric method but with the neo-classical, export-base and Myrdal's cumulative causation. These methods do not help to explain the initial stimulus or kick which begins the whole cumulative process. It cannot be forgotten that it is this theoretical kick that initially causes the clustering of activities in an area. It is not until later that this growth becomes self sustaining because of increasing internal and external economies.[14]

Summary

In this section, a discussion of various factors that affect economic growth in a region indicated that most of these

factors depend on the state of previous growth in the region. As a result, perhaps the most adequate method of explaining the growth process contains some notion of accumulating causes and effects. This attempts to account for some of the inter-dependence between the factors affecting growth and the actual growth. The current state of regional economic growth theory indicates an emphasis on abstraction, without allowing for the effects of distance and without addressing itself to the question of stimulating growth. It is obvious that the stimulation of growth in a region requires the marshalling of factors conducive to growth. Unless one accepts a theory of spontaneous generation of growth, the manner in which these factors conducive to growth combine to provide the initial stimulus must be related to the partially-independent factors. These were availability of inputs, quality of entrepreneurship, corporate decision making and government policy. This would allow us to set the basis for a development strategy, which will be discussed in the following section.

THE STIMULATION AND SPREAD EFFECTS OF GROWTH: GROWTH CENTERS

The concept of growth centers as a propulsive node in geographic space[15] evolved from the non-spatial concept of growth poles which were first noted by F. Perroux.[16] Much has been written about misinterpretating -- Perroux's

original concept[17] and the locational aspects of growth were the weakest in his treatment of growth. There is little need to review much of growth pole theory as a result. As a brief summary, Perroux was concerned with organizational and industrial "space" where innovating activities take place in the large economic units that are able to dominate their environment. These dominant economic units cause the initial spiral of growth, fueled by external economies, subsequent innovations resulting from research and development and the diffusion of new innovation.

Boudeville adapted growth pole concepts to a spatial context[18] which became suited to policies for lagging areas. In this section, the key points of the growth center concept will be discussed, followed by a segment explaining the appeal of the concept for policy recommendations. Thirdly, the technical aspects of the initial stimulus and growth center selection will be noted. In the fourth segment of this section, problems in using growth center strategies will be discussed.

Key Elements of Growth Center Strategy

Growth center strategy is based upon the selection of a few locations in a region, stimulating economic growth in those locations, and generating prosperity throughout the area surrounding the selected centers. This hinges on the relationship that exists between the growth center and region

around the center. Myrdal[19] identified two effects that growth in a center can have on the periphery. The first were backwash effects in which the factors of production, labour and capital, migrate to the center of growth, inhibiting growth in the periphery. The second effects were spread effects, where demand for the products of the periphery in the growth center, stimulating prosperity in periphery as growth in the core extended outward. Hirschmann[20] also identified effects similar to Myrdal's. Polarization effects were the negative effect on growth in the periphery while trickling-down effects correspond to the spread effects. Friedmann[21] conjectured that growth was transmitted from the core to the periphery through a hierarchical system of settlement while Richardson[22] indicated that growth centers were likely to be higher ranking central places.

Thus we have a spatial system where growth from selected, high ranking central places can either inhibit or promote growth in their periphery regions. If the backwash or polarization effects are somehow minimized, the spread or trickling-down effects could stimulate growth in the periphery by:

1. the need for resources and agricultural produce from the periphery for the growth center will stimulate the movement of some capital to profitable investment opportunities in the periphery.
2. the movement of labour to the center from the

periphery in response to increases in the demand for labour that would result from growth. This would decrease unemployment in the periphery.

3. the demand generated in the periphery area for goods and services available in the growth center would cause local capital and capital from the growth center to move to the periphery to provide these goods and services.

Because of the self-sustaining aspects of growth, if a growth center was to lose the initial stimulus, the stronger growth centers would continue to experience growth. The advantages derived from the earlier growth would act as internal economic momentum for new growth.

The Policy Appeal of the Growth Center Concept

The idea population centers could act as propulsive units in space, affecting their surrounding hinterlands had an intuitive appeal for policy makers. Even with the lack of empirical verification, the growth center concept suggested that the central place structure of a nation could be utilized when growth was initiated and its effects transmitted in space.

Disregarding theoretical difficulties with the concept, the argument for using the growth center concept for

regional development policies would seem fairly plausible. The growth center concept suggests that growth in lagging areas can be more effectively stimulated if government aid is concentrated in selected centers, because of economies of scale. These selected centers should be fairly large because of the availability of an existing infrastructure and because innovations are more readily adopted in the stimulating and competitive economic environments of larger centers. These larger centers can more readily provide services requiring high threshold quantities of support to the hinterland areas. Also, outmigration from these lagging areas would be reduced with the intervening opportunities offered by a growth center in those regions.

This notion of concentrating aid in centers with high potentials for growth in the hope that growth will be stimulated in the hinterland areas of the region is a reasonable compromise between complete dispersal of aid to all areas of a lagging region and promoting complete "economic efficiency" by allowing present trends to continue.

Governmental involvement in attempting to provide the initial kick or growth stimulus to these selected centers are based on assembling various production factors at a location. This involvement may take the following forms:

1. Improvements to the Infrastructure. External economies are increased with the provision of a high quality infrastructure. Transportation net-

works, communications, educational and public utilities investments increase the attractiveness of the center to firms and people. This rehabilitation can also include the promotion of favourable images of the region, the release of information to potential manufacturers and indications of the region's available amenities.

2. Inducement Instruments. These include various types of subsidies, tax inducements, and government investment in fixed capital projects such as industrial parks, in an attempt to draw firms to the growth center by reducing the firms' costs. Another form of inducement centers on the government's constitutional powers over labour conditions, wages, transport rates and utilities. Conditions such as cost levels could possibly be altered to make a region more attractive to new firms. The location of government services in a center could also make it more attractive.

3. Restrictive Policies. While the previous two forms of policy act to pull firms to a region, restrictive policies attempt to induce growth in a lagging region by making other regions look less attractive. These can include legal restrictions on land use through zoning restrictions, congestion taxes and control of prices and pricing policies. These actions are

applied in areas which are developed in attempt to draw off growth to lagging areas.

These three forms of policy intended to induce growth, coupled with the intuitive logic behind growth centers, has made the concept appealing for regional development programs. Unfortunately, some problems with the concept of growth centers has reduced its policy value.

Practical Problems with Growth Center Strategies

Growth center strategies have failed in the past because of the designation of large numbers of centers as growth centers and because of inadequate fundings for the strategies.[23] These faults of the strategies can be attributed to two difficulties in operationalizing the concept. First, the designation of large numbers and large areas as growth centers was the result of problems in deciding what the size of the growth center had to be in order to have all the required advantages. Estimates of population levels required for a growth center have ranged between 25,000 and 200,000,[29] reducing the number of potential centers available for selection. These centers should be large enough to act as the catalyst for regional development because of the provision of markets, specialized labour, business services and infrastructure are of a level that should accommo-

date growth. It is possible that political concessions were the reasons behind designating centers that did not meet this criteria. Thus funding was dispersed among centers rather than concentrated in centers with growth potential.

Secondly, the actual act of intervention by a government in a region may make that region unattractive to individuals involved in the firm location decision.[25] The presence of a government inducement mechanism indicates that the area is lagging and therefore it becomes unattractive to new firms because of the perceptions of the private decision makers.

However, given the political and conceptual problems related to growth center strategies, its appeal to intuition makes it a logical choice at the present time for governmental policies for regional economic growth.

SUMMARY AND CONCLUSIONS

This chapter indicates that regional economic disparities resulting from a spatial imbalance of growth is a Canadian policy concern. Unfortunately, the process of regional economic growth is complex. Various endogenous and exogenous factors affect growth to varying degrees and in varying ways. The result is that these factors have an accumulating effect on growth as growth in turn modifies these factors. The attempts to explain this process have been abstracted from reality in order to achieve some degree of understanding. The growth center concept has had an

intuitive appeal to policy makers wishing to correct regional imbalances. This concept has been developed into a strategy by which designated growth centers are supposed to spread growth into their hinterlands. A key element of growth center strategies is the provision of an initial growth stimulus.

Until such a time that growth center strategies may be replaced by a greater understanding of the growth process, regional economic development policies will probably be based upon it, regardless of the conceptual problems. Having provided a context for regional development problems, it is possible to examine a particular form of the problem. In the following chapter, the regional development problems of Northeastern Ontario will be discussed.

Footnotes

1. F.T. Walton. " The Formulation of Regional Economic Objectives ". in B.S. Keirstead, et. al. eds. Economics Canada: Selected Readings. (Toronto: MacMillan, 1974).

2. Interview with Peter Newman. Telegraph-Journal, St. John, April 27, 1968.

3. For a short summary of literature on the growth of national economies see H.W. Richardson. Regional Growth Theory. (London: John Wiley, 1973).

4. This early work in regional economic growth includes: D.C. North. " Location Theory and Regional Economic Growth ". Journal of Political Economy, Volume 63, 1955., and G. Myrdal. Economic Theory and Underdeveloped Regions. (London: Duckworth Press, 1957). See Richardson (1973), op. cit..

5. J. Friedmann. Regional Development Policy: A Case Study of Venezuela. (Cambridge: MIT Press, 1966). pp. 39 - 44.

6. N. Kaldor. " The Case for Regional Policies ". in B.S. Keirstead, et. al. eds. op. cit., p. 249.

7. The reason for the apparent divergence from the concept developed by Myrdal is due to his emphasis on core- periphery polarization.

8. Myrdal. op. cit..

9. Kaldor. op. cit..

10. F.W. Bell. " An Econometric Forecasting Model for a Region ". Journal of Regional Science, Volume 7, 1967. pp. 109 - 127. This provides a good example of the application of neo-classical approaches.

11. For example see R.E. Bolton. Defense Purchases and Regional Growth. (Washington: Brookings Institute, 1966).

12. Two examples of econometric models can be seen in S. Czamanski. An Econometric Model of Nova Scotia. (Nova Scotia: Dalhousie University, 1968). and E. Olsen. International Trade Theory and Regional Income Differences: United States 1880- 1950. (Amsterdam: North- Holland, 1971).

13. Czamanski. op. cit..

14. Myrdal. op. cit. and Kaldor. op. cit..

15. As defined in D.F. Derwent. " Growth Poles and Growth Centers in Regional Planning: A Review ". Environment and Planning, Volume 1, 1969. pp. 5 - 32.

16. F. Perroux. L'economie due XX^{me} siècle, 2. (Paris: Presses Universitaires du France, 1964). and " Economic Space, Theory and Applications ". Quarterly Journal of Economics, Volume 64, 1950. pp. 89-104.

17. Malcolm Moseley. Growth Centers in Spatial Planning. (Oxford: Pergammon Press, 1974).

18. J.R. Boudeville. Problems of Regional Economic Planning. (Edinburgh: University Press, 1966).

19. Myrdal. op. cit..

20. A.O. Hirschmann. The Strategy of Economic Development. (New Haven: Yale University Press, 1958).

21. Friedmann. op. cit..

22. H.W. Richardson. Elements of Regional Economics. (Harmondsworth: Penguin, 1969).

23. N. Hansen. " Criteria for Growth Center Policy". in A. Kuklinski, ed. Growth Pole and Growth Centers in Regional Planning. (The Hague: Mouton, 1972).

24. Hansen. ibid..

25. N. Hansen. Intermediate Cities as Growth Centers: Applications for Kentucky, the Piedmont Crescent, the Ozarks and Texas. (New York: Praegar, 1971).

CHAPTER 2

THE NORTHEASTERN ONTARIO DEVELOPMENT PROBLEM

Northeastern Ontario has been identified by both the Ontario provincial government[1] and the Canadian federal government as a lagging sub-provincial region.[2] Northeastern Ontario is one of the two provincial planning regions designated for northern Ontario. In this chapter, the background to this regional development problem will be presented. In order to provide a wider context for the Northeast's problems, reference will be made to a general dichotomy between northern Ontario and southern Ontario. This will provide a basis upon which to discuss three particular Northeastern characteristics which have development ramifications. The Northeast's settlement patterns, economic orientation and the effects of distance are characteristics which create the conditions for the region's lagging economy and also hinders the solution of its problems. In the third section, particular problems in the region will be discussed. In the following section, the features of the Northeast which could aid in alleviating these problems will be presented. In the final section, the political and administrative forces seeking to rectify these problems will be identified and their recommendations briefly discussed.

THE GENERAL BASIS OF THE NORTHEASTERN PROBLEM

The economic growth problem in Northeastern Ontario is rooted in the dichotomy between the northern and southern sections of the province. This dichotomy in the socio-economic character of Ontario, while having historical roots, was strengthened by a rush to exploit Canadian natural resources. The growth of Ontario's economy since the late 1940's, resulting from this "resource boom" which supported a rapid rate of national growth, led to the realization of a greater magnitude of regional disparities and unequal participation in the overall provincial economic growth.

This resource boom was the mechanism by which Canadian living standards were to be raised to American standards in the easiest possible manner. The policy of selling natural resources to the highest bidder was enshrined in the 1955 tax legislation.[3] This, in combination with the failure of Canadians to make economic decisions during the 1950's, meant that the major concerns of Canadians were how to meet the demand for raw materials and how to facilitate its movement.[4] This, in turn, implied a preoccupation with the primary sector of the economy and an unplanned exploitation of natural resources.

The southern regions of Ontario, with access to export markets and with established, higher quality infrastructures and entrepreneurship, were in a better position to gain in the

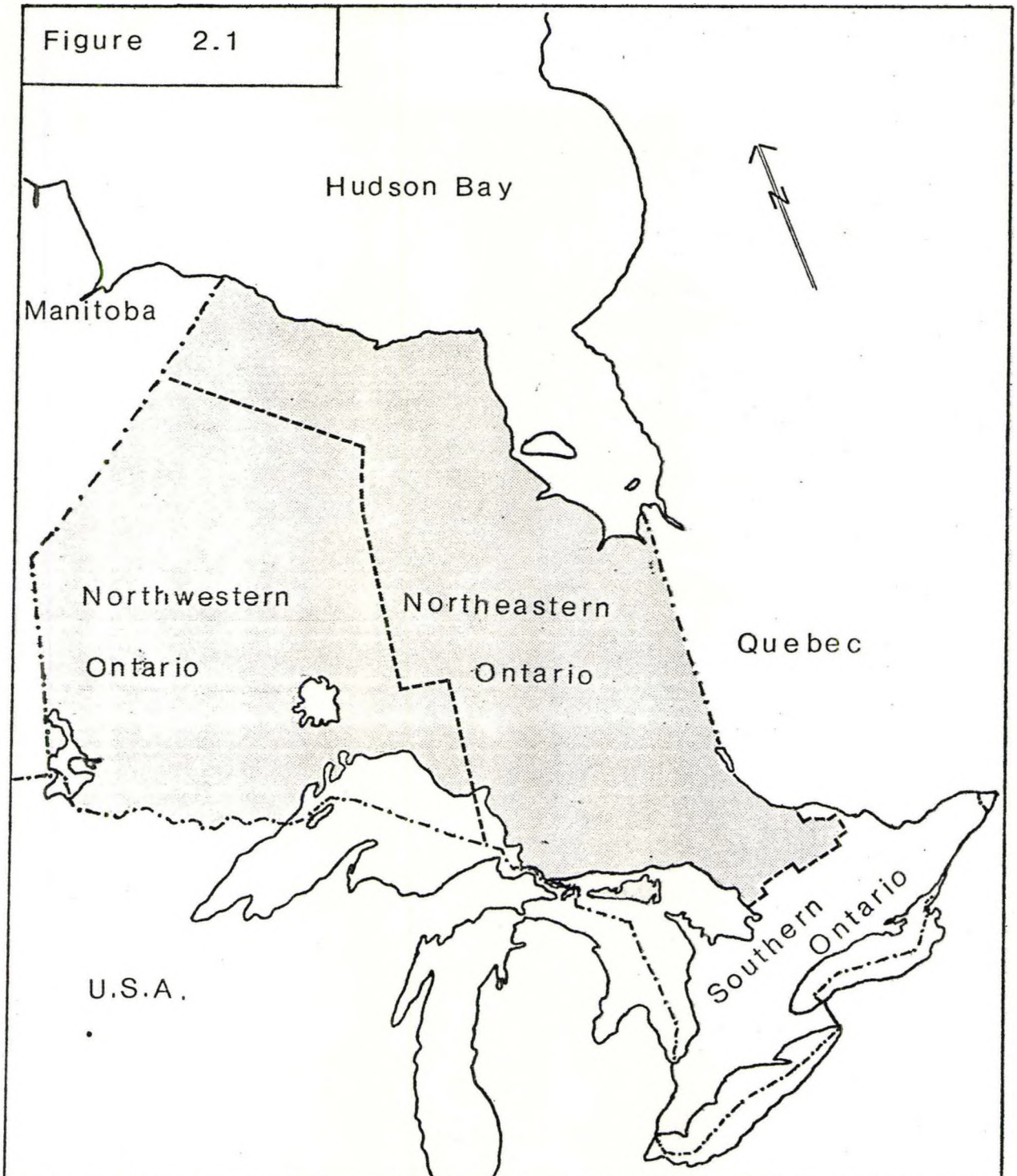
long run from the resource boom than the actual resource producing regions.

The subsequent consequences of the southern regions' ability to process natural resources into semi-finished manufactured goods and the development of subsidiaries of American firms in southern Ontario reinforced the historical dichotomy between southern Ontario and its northern hinterlands. The resource producing areas of Ontario, largely located in the north, were largely unaffected by the stimulus for economic growth.

The historical dichotomy is rooted in the concept of distinctive characters of regions, largely "natural regions". While this view has been largely discarded,[5] it provides an adequate point of reference for Ontario's north-south dichotomy. Figure 2.1 shows the division of Ontario into two northern sections and the southern region. Ontario has two distinct characters. There is the southern region which is characterized by intensive agriculture, advanced industrialization and large urban developments. It has approximately ten percent of the province's area and ninety percent of its population. On the other hand, there is the vast, sparsely inhabited, resource rich but economically dependent northern region.

The differences between the two major regions of Ontario are actually more complex than suggested above. These differences may be characterized as physical, historical, administrative, demographic and economic.

Figure 2.1



Northwestern, Northeastern and Southern Ontario

Shaded area indicates
Northern Ontario

Physical Differences

The southern section of the province can generally be characterized as an area of gentle relief with the elevation ranging from 1700 feet to 150 feet above sea level. The soils are generally grey-brown podzolic with sand plains north of Lake Erie and the eastern end of Lake Ontario. The rivers are generally short and the area is bounded by Lakes Huron, Erie and Ontario and by the St. Lawrence and Ottawa rivers. The original forest cover was mostly hardwood, with white and red pines in the lighter soils. However, much of this forest cover has been removed.

The northern region's character has been largely shaped by the presence of the Canadian Shield, a low plateau marked by many rivers and lakes, rocky terrain, and forest and mineral resources. The boreal forest includes black and white spruce, jack pine, tamarack, poplar, white birch and balsam. The soils are generally brown podzolic except for areas of peat and two major clay belts in north east corner. Whereas the southern region is generally suited to some forms of agriculture, agriculture is limited in the north by a range from 100 to 40 frost free days per year.

In terms of size, northern Ontario is nine times the size of the south, being bounded by the Provinces of Manitoba and Quebec, and by Lakes Huron and Superior, the French and Mattawa river system and by Hudson and James Bays.

The difficulties arising from the rugged terrain and

the size of the region has had a negative impact on the settlement and development of the northern region. The presence of the Canadian Shield has effectively limited agriculture while providing an economy based on resources, thereby dictating the location of urban settlements.

Historical and Administrative Differences

The area referred to as southern Ontario has had a longer history of settlement and development than the north. While the first major influx of settlers in southern Ontario occurred after the American Revolution, with fairly substantial settlement achieved by the War of 1812, it was not until the construction of the trans-continental railroad in the early 1880's that northern Ontario was effectively opened for settlement. To a large extent, the north's development has lagged the south by a century. Also, despite the early 20th century settlement programs for the Clay Belt area, it was the forest and mineral potential of the north which led to settlement, not its agricultural potential.

The political development of northern Ontario has also differed from that of the south. Prior to 1874, the Government of Canada advocated a northern boundary of Ontario that would follow the limit of the Great Lakes watershed, including, thereby, the areas around Thunder Bay, Sault Ste. Marie, Sudbury and North Bay. In 1874, however, the boundary was provisionally set considerably further north, just south

of James Bay, considerably increasing Ontario's potential hinterland. The Ontario-Manitoba boundary dispute was resolved in 1889 with Ontario gaining the disputed Rainy River-Kenora area and additional land north of the provisional 1874 boundary. In 1912, the northern boundaries of Ontario were set at their present state when the boundary was extended up to the western coast of Hudson Bay.

Northern Ontario was, as a result, a late addition to Ontario's jurisdiction while the south had been under some form of central government since the establishment of Upper Canada in 1791. Internally, the south had been divided into counties with set boundaries, while the north's division into districts, as opposed to counties, underwent numerous changes from 1858 until 1922 when the Cochrane District was created from the northern sections of Temiskaming and Algoma Districts.

Demographic Differences

The most striking demographic difference between the north and the south is that of population size. The total population of northern Ontario in 1971 was 805,000, only one-ninth that of the south. About 30 percent of this population is francophone, a much higher level than in the south, and has serious implications for the duplication of social services.

Most of Ontario's internal migration is in a southerly direction from the north. The Federal Government Department of

Regional Economic Expansion noted in 1976 that, although "the province is committed to the principle of decentralized growth, the large urban areas of the south continue to grow at the expense of the rural and northern areas (of Ontario)".[6] Population growth for northern Ontario for the period 1971 to 1974 was 2.4%, about one-half of the provincial average. The central region of Ontario, based upon Toronto, is projected to have a population of eight million by the year 2000, while northern Ontario will remain approximately steady at 900,000.[7]

Economic Differences

Northern Ontario has been called a "resource colony".[8] The dominant industries in terms of employment and income generation are based upon the extraction of the resources of the north and are thought, by the inhabitants, to be foreign-owned.[9] Because the economic bases of most northern communities are resource dependent, market conditions for the resources often result in "boom and bust" cycles in employment and income. Southern Ontario is seen as the primary recipient of wealth extracted from the north as these resources feed the diversified, stable industries of the south.

In conclusion, northern Ontario's character is shaped by the presence of the Canadian Shield, the later settlement and administration of the region, slow growth of population and the resource orientation of the economy.

With this background, the specific features of the

Northeastern region can be discussed.

NORTHEASTERN ONTARIO AND THE DICHOTOMY

Northern Ontario is divided for provincial planning purposes into a Northwestern and a Northeastern section. There is some justification for this division because, even though the general statements previously listed hold true both for the Northwest and the Northeast, there exists a certain degree of difference between the two.

The Northwest is more physically isolated from Southern Ontario by distance than the Northeast, and is consequently less developed than the Northeast. This region is dominated by the city of Thunder Bay. Its population of 109,966 in 1976 was 55 percent of the northwest's total population. The towns of Kenora, with a 1976 population of 10,102, and Fort Frances, with 8,928, were the second and third largest centers. In general, the Northwest is socially tied to Winnipeg, while the Northeast is tied to Toronto.[10]

The Northeast is composed of the Districts of Algoma, Cochrane, Manitoulin, Nippissing, Parry Sound, Sudbury and Timiskaming. This is a rather diverse planning unit of 108,995 square miles; an area almost one-third of Ontario's total size. The District of Manitoulin, an island in Georgian Bay, has an economy based mostly on tourism and agriculture. Geologically, it is similar to southern Ontario, especially to Bruce and Grey Counties. The District of Parry Sound would

appear to be more tied to the Muskoka region than to the rest of the Northeast. The Northeastern planning region also includes the James Bay Lowland section of the District of Kenora, which is part of the northwest. The size and diversity of the Northeast would appear to render it unwieldy as a planning unit.

The regional development problem in the Northeast finds its origins in the form that the settlement pattern has taken, the economic bases of these settlements, and the economic impact of distance.

Urban Settlements

The Northeast had a population of 543,896 in 1971; only 7.6 percent of the provincial total. Approximately seventy percent of this population live in the seven largest urban centers of the region and 30.7 percent live in the largest center, the Regional Municipality of Sudbury.

The Regional Municipality of Sudbury had a population of 167,306 in 1977. Located at the intersection of the Canadian National Railway and Canadian Pacific Railway lines and the junction of provincial highways 17, 69 and 144, the settlement pattern in the Sudbury area has been that of a central city surrounded by settlements on the transportation routes. The City of Sudbury is the dominant central place and this results in a cohesive Regional Municipality. The dominant feature of the Sudbury area is the Sudbury Basin,

an oval-shaped, flat and fertile valley which is surrounded by the nickel irruptive, a rocky rim that has been the basis of Sudbury's major economic activity, mining. Sudbury's reliance on nickel mining has resulted in an economy that is strongly influenced by the external environment. This reliance on a single resource industry has meant that employment has been determined by cycles of demand for nickel. Low participation rates of females in the labour force and the migration of the young, skilled and educated have resulted. Over time, Sudbury's economic growth has not been able to support natural population increases.

The City of Sault Ste. Marie, in the Algoma District, with a population of 80,630 in 1977 is the second largest center in the Northeast. Between Lakes Superior and Huron, it is a water transportation node as well as a border city. This location facilitated the emergence of Sault Ste. Marie as an iron and steel producing center.

East of Sudbury, in the District of Nippissing, is the City of North Bay with a 1977 population of 50,398. North Bay had its origins as a Canadian Pacific Railway's railyard in 1882. Still a major transportation node, it is the southern terminus and headquarters of the provincially owned Ontario Northland Railroad.

The City of Timmins, 130 miles north of Sudbury, had a population of 44,812 in 1977. Founded in 1911 to service the gold mines of the area, Timmins has remained primarily a

mining settlement.

These four centers are the major urban settlements and accounted for 63.09 percent of the Northeast's population in 1977. The remaining ten settlements with populations over three thousand are either economically dependent on a narrow resource base or exist as small service areas. The population distribution is basically distributed along two settlement corridors indicated in Figure 2.2. The East-West Corridor is based on Highway 17, and on the Canadian Pacific Railroad in the east and the Algoma Central Railroad in the west. This East-West Corridor contains the Cities of Sudbury, Sault Ste. Marie and North Bay, and the towns of Sturgeon Falls, Espanola, Blind River and Elliot Lake, making it the most populous and economically important corridor. The Northern Corridor follows the routes of Highway 11 and the Ontario Northland Railroad north from North Bay. The economies of the centers in this corridor are more dependent on one main resource activity than the centers of the East-West Corridor. The centers of the Northern Corridor include the City of Timmins and the towns of New Liskeard, Kirkland Lake, Iroquois Falls, Cochrane, Smooth Rock Falls and Kapuskasing.

Very little urban settlement or economic development has occurred away from these two corridors. The exceptions are Chapleau and White River, both on the Canadian Pacific Railway line, Hornepayne, on the Canadian National line, and

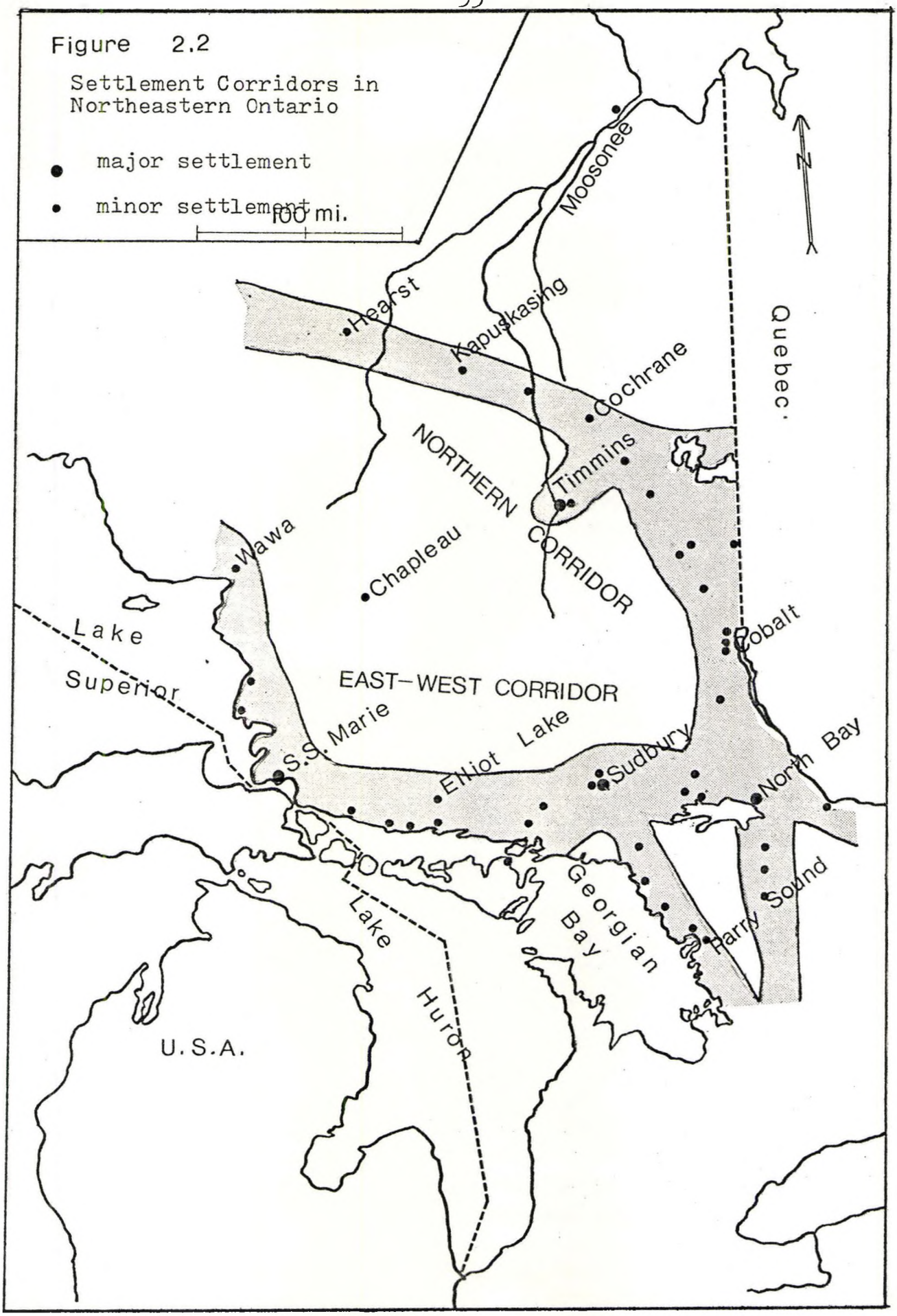


Figure 2.2
Settlement Corridors in Northeastern Ontario
major settlement
minor settlement
100 mi.
N
Moosonee
Hearst
Kapuskasing
Cochrane
Quebec
NORTHERN CORRIDOR
Timmins
Wawa
Chapleau
Lake Superior
EAST-WEST CORRIDOR
Cobalt
S.S. Marie
Elliot Lake
Sudbury
North Bay
Georgian Bay
Lake Huron
Parry Sound
U.S.A.

Wawa, on Highway 17. The settlement pattern along the corridors is characterized by the large distances separating the major centers and by the lack of continuity of settlement between towns. As a result, the major settlements of Timmins, North Bay, Sudbury and Sault Ste. Marie have large hinterlands, but no one center has achieved domination over the whole region. Secondly, because this settlement pattern has fragmented both the regional market and the labour pool over a large area, local industries and services do not serve the entire region but remain small and low volume.

As previously noted, Northeastern Ontario had a population growth of only 2.4 percent between 1971 and 1974, about half of the provincial average. Only the Sudbury District showed any substantial population growth, with an increase of 4.0 percent, but the total populations of the Districts of Algoma and Timiskaming declined during that period. There is a tendency to migrate from the hinterland areas to the major Northeastern centers as well as a tendency to migrate from these centers to South Central Ontario.[11]

Characteristics of the Regional Economy

Both the existing settlement pattern and the economic base of the region operate as self-reinforcing factors that have enforced the north-south dichotomy in Northeastern Ontario. Superficially, it would appear that the prime factor determining settlement locations was transportation. However,

the precise locations of the majority of the settlements were determined by either the discovery of resources or the ability to exploit those resources. Mineral resources were often discovered as transportation routes, especially railways, were constructed. This was the case with the discovery of nickel-copper ore near Sudbury, silver at Cobalt, gold at Porcupine and Kirkland Lake, and copper at Noranda, Quebec. Federal Government embargoes on the export of logs in 1898 and later on pulpwood caused the construction of lumber mills along the north shore of Georgian Bay and paper mills at Sturgeon Falls, Espanola and Sault Ste. Marie.

Northeastern Ontario has long been dependent upon resource orientated activities such as extraction and processing. There has been little diversification from this initial base because manufacturing, other than resource processing, was not drawn to the region. This resulted in an economy based on the export of resources to other regions. In 1971, 27.6 percent of the region's employment was in forestry, fishing and trapping, mining and natural resource allied manufacturing, while the provincial average was 10.2 percent. On the other hand, manufacturing employment outside of resource processing accounted for only 2.7 percent of Northeastern employment but accounted for 17.8 percent of provincial employment in 1971.[12]

Tourism is an important sector in the Northeastern economy, especially in the areas along the shorelines of

Lakes Superior, Huron and Nippissing, employing an estimated[13] 10.0 percent of the Northeast's labour force. Tourism in the Northeast is another resource-orientated activity, dependent upon the quality of the physical environment and availability of wild life. Tourism, however, is limited by the distances separating the Northeast from major North American cities and competition from intervening recreation areas around southern Georgian Bay, the Muskokas and the Haliburton Highlands. The tourist industry in the Northeast is seasonal, peaking in prime outdoor recreational seasons, indicating a limited overall appeal to tourists.

This overall dependence on resource related activities for employment and, thereby, income generation has implied a number of resulting characteristics for the economy of the Northeast. First, it has resulted in a narrow, relatively slow growing economic base. The little growth and diversification that has occurred has been limited to the major centers. As a result of this lack of diversification away from a resource base, many centers, including Sudbury, Timmins and Sault Ste. Marie, have only one major employer and one major product. This has two major implications. The first implication is that the failure of the company or the depletion of the resource will result in a "ghost town" syndrome. The second is that cyclical fluctuations in the demand and price for resources will determine the rate of employment in a "boom or bust" syndrome. The second result of resource depen-

dence is the lower rates of female participation in the labour force due to the lack of employment alternatives and the tradition of not employing females in resource extraction and processing industries. As a result, female participation in the labour force in 1971 was 35.6 percent in the Northeast while the provincial average was 44.3 percent.[14]

Figure 2.3 indicates these results of employment cycles and female unemployment rates. Unemployment rates for the Northeast vary more and are usually higher than unemployment rates for the province at large and for the Toronto centered region.

Employment growth rates are below provincial averages. As noted in Table 2.1, annual employment growth roles in the Northeastern Ontario districts for the period 1961 to 1971 ranged from -.12 percent in Timiskaming to 3.84 percent in Sudbury. During this period, the average annual growth rate for the province was 4.02 percent. The three districts with the largest average annual growth rates, Algoma, Nippissing and Sudbury, were also the most industrialized. Timiskaming and Cochrane were dependent upon mining and forestry activities. Parry Sound and Manitoulin both lacked either mining or industrial bases. The degree of industrialization in the Northeast, even if it is only resource processing, would appear to be associated with employment growth.

A contemporary example of the effects of resource dependence upon employment is that of the massive layoff of

Figure 2.3 Average Unemployment Rates for January and June (1971-1976)

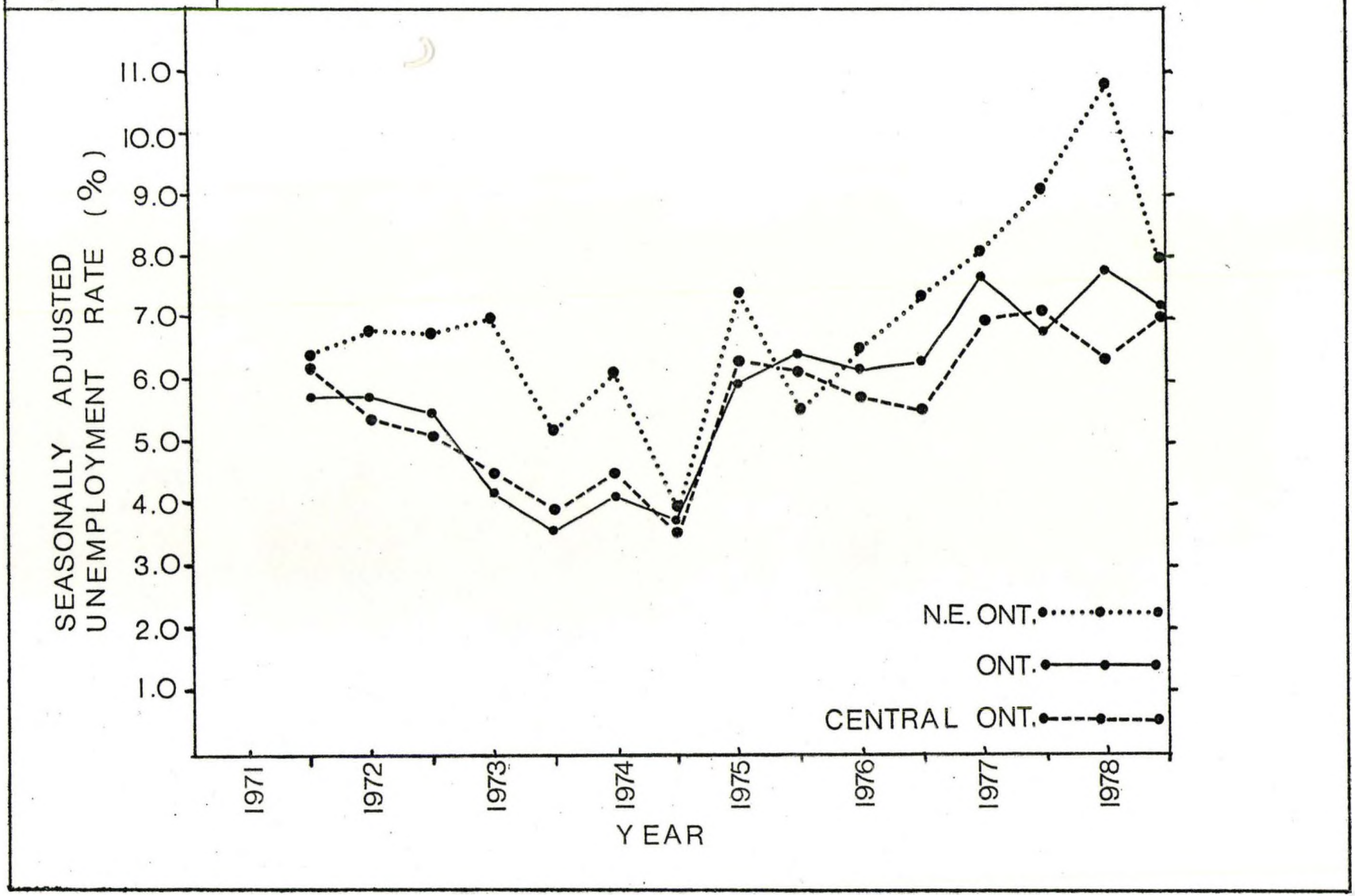


Table 2.1

Employment Growth Rates
for 1961-1971

District	Average Annual Rate of Employment Growth
Algoma	2.17 %
Cochrane	0.53 %
Manitoulin	1.36 %
Nippissing	2.76 %
Parry Sound	1.69 %
Sudbury	3.84 %
Timiskaming	-0.12 %
Average, Northeastern Ontario	2.22 %
Average, Province of Ontario	4.02 %

Source: Ontario Ministry of Treasury. Design for Development: Northeastern Ontario Regional Strategy Statistical Appendix, 1976.

miners in Sudbury during the Spring of 1978. Inco Limited, whose Sudbury area operations made it the world's largest nickel producer, had seen its share of the non-Eastern Bloc nickel market fall from 90 percent in the mid-1950's to 35 percent by 1977. Inco's trading position had been weakened as a result of being frozen out of the Japanese market when it had developed and as a result of predatory pricing by competitors which used Inco's published prices as the target price for under pricing their products. At the same time, demand for high quality nickel had declined causing nickel inventories to build. This led Inco to announce on October 20th, 1977 that 2,200 workers in Sudbury were to be laid off while another 600 jobs were to be lost through attrition. It was anticipated that this would result in the loss of $42 million in annual wages for the regional economy if alternate employment could not be found and it was feared that the service sector would have to contract in size.[15] These fears of multiplier effects would appear to have not been realized. Historically, mining employment has fluctuated in Sudbury. From 1971 to 1978, Sudbury had lost 6,400 mining jobs, and the service sector would appear to have developed some resilience to deal with mining business cycles.

The Economic Impacts of Distances

The development of Northeastern Ontario, besides being adversely affected by the existing settlement pattern

and the economic base, is constrained by the actual distance and the resulting transportation rates.

While a glance at Figure 2.4 would appear to indicate that the Northeastern Ontario region is well serviced by the existing transport network of highway, railway and air linkages, three facts must be considered. First, the volume of traffic on the highways does not warrant the expenditure to upgrade them past their present usual two lanes. Secondly, the distance to the markets in southern Ontario is large. Sudbury and North Bay, in the south of the region, are both roughly 250 miles from Toronto while Sault Ste. Marie and Timmins are both over 400 miles from Toronto. On the other hand, Kitchener-Waterloo, Hamilton and Oshawa are respectively 60, 50 and 35 miles from Toronto. The result of these greater distances is higher transportation costs for manufacturers in the Northeast.

The existence of higher transportation costs is a major disincentive to firms that might potentially locate in the Northeast.[16] While it may be true, because of the importance of transportation in Canadian economic history, that any regional economic failures have tended to be attributed to transportation,[17] there is evidence that unfavourable conditions could be rectified in the Northeastern region. N. C. Bonsor, in an Ontario Economic Council research study, analyzed the freight rate structure of rail, highway and water transportation in regards to northern Ontario. Using

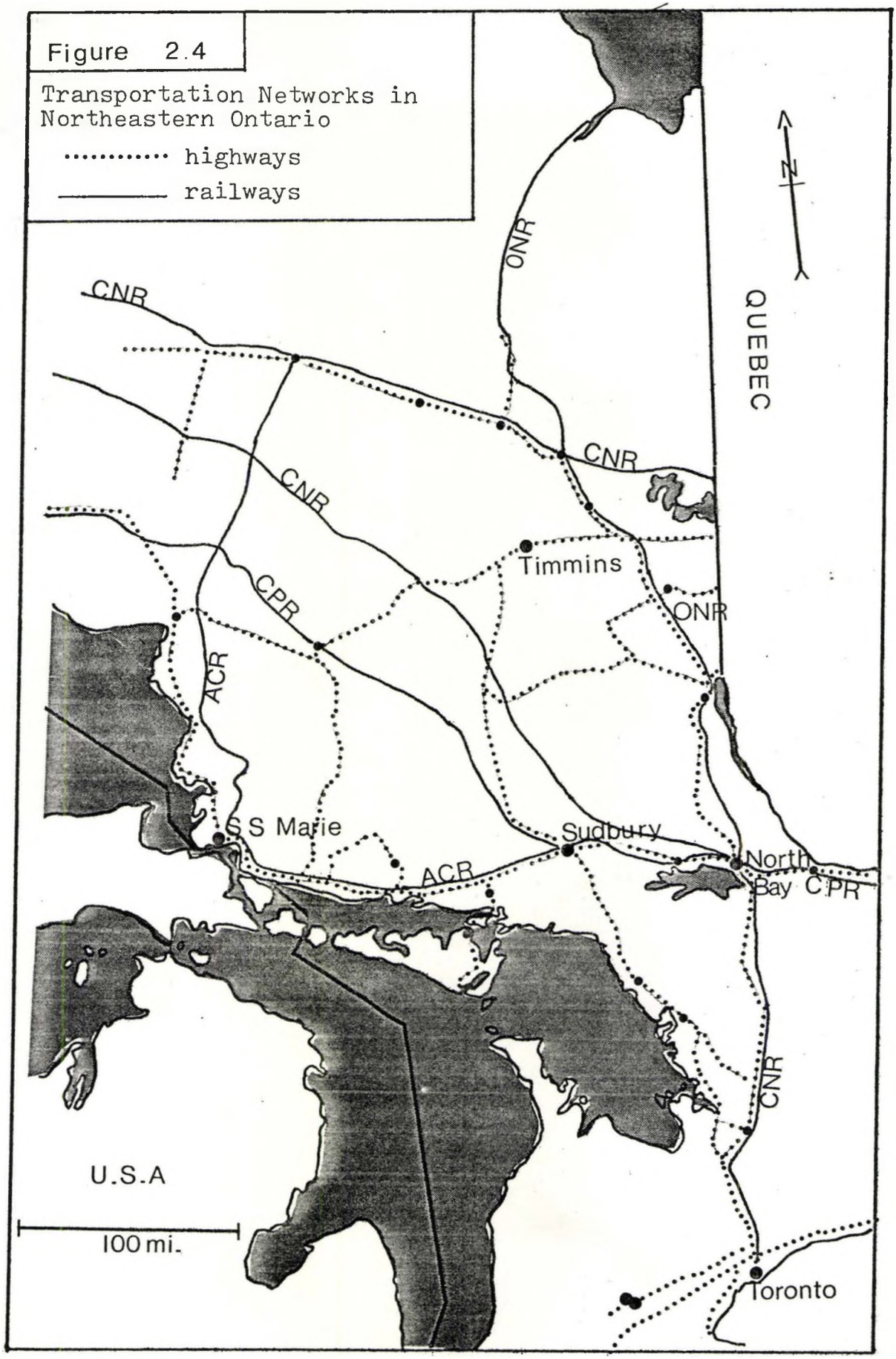


Figure 2.4
Transportation Networks in Northeastern Ontario
..... highways
_____ railways
N
ONR
CNR
CNR
CNR
CNR
CPR
ACR
ACR
QUEBEC
Timmins
ONR
S S Marie
Sudbury
North Bay
CPR
CNR
U.S.A
100 mi.
Toronto

data from the period of May to September, 1975, collected from the Canadian Freight Association, Canadian National Railway, Canadian Pacific Railway, highway tariff bureaus and individual carriers, Bonsor attempted to explain freight rates as a function of distance, commodity weight, commodity value and agreed charges.[18] His analysis indicated that shipments to and from northern Ontario tended to be low volume, with the exception of raw material shipments. As a result, lower rates, such as agreed charges and competitive rates, which are available to large volume shippers are generally not available to shippers in the region. These rates are self reinforcing. In order for rates for manufacturing inputs to fall, the volume of shipment of these inputs must rise. But volume will only rise if the economy of the region grows; and growth is initially inhibited by the existing rate structure on low volume shipments. Related to this, there appears to be a lack of competition in the trucking industry in northern Ontario.[19] There are two significant results. First, trucking freight rates tend to be high in northern Ontario, and, secondly, freight rates will be high for railways in the absence of competition with trucking firms, reinforcing high rail freight rates. Freight rates on shipments out of northern Ontario are not excessively higher than rates elsewhere. This is related to the low value and high volume of resource shipments. It is semi-finished and manufactured inputs and outputs of low volume that cause the higher overall

rates in northern Ontario. Bonsor concluded that improved competition in the transport industry would, in the long run, make northern Ontario more attractive to manufacturers than it is at present. Therefore policy should be oriented towards increasing competition rather than subsidizing the industry.

Claims that the Northeastern region is being subjected to a non-competitive, oligopolistic transport system have been made often[20] but are difficult to substantiate. The Federal Government has some control over rail freight rates through the Canadian Transport Commission and the National Transportation Act (1967), but the provincial government has little control. On the other hand, entry into the Ontario trucking industry is controlled by the Ontario Highway Trucking Board which can issue licenses to a trucking form if its application is accepted at a hearing. While there is no formal control over rates, the provincial government can regulate the amount of competition in the industry by controlling the number of firms in it.

This entire situation is complicated by the participation of the Ontario provincial government in the transportation sector. The Ontario Northland Transportation Commission, operating tourist facilities, a telecommunication network, ferries, norOntair, and a bus line in Northeastern Ontario, also provides rail service from North Bay to Kirkland Lake, Cochrane and Moosonee and operates Star Transfer, a trucking

firm. The Ontario Northland Railway had 745 miles of track in 1976, excluding the Nippissing Central Railway, which Ontario Northland also owned. The Ontario Northland Railway, originally the Temiskaming and Northern Ontario Railway, has served as a method to colonize and to remove timber and mineral resources from the Temiskaming and Cochrane Districts since the early part of this century. It has a near monopoly on rail service in the northern corridor of settlement as only North Bay and Cochrane receive alternative rail service. This alternative service to North Bay and Cochrane is, however, part of the east to west trans-continental system, while the Ontario Northland railway runs northward. The Ontario Northland Railway then has a monopoly on north and south bound freight in this settlement corridor. It is possible that monopolies provide lower output of service at a higher price than competitive firms.[21] This is because the monopolist's price exceeds marginal cost while competitive firms' prices equal their marginal costs. Monopoly generally implies inefficient allocation or resources as consumer wants are not satisfied with maximum effectiveness.[22] The Ontario Northland Railway is a subsidized monopoly, receiving financial support from the provincial government. It does not have to minimize its costs in its operation and therefore tends to be inefficient. Examples of the lack of efficiency in the Ontario Northland Railway can be extracted from operating data. Data for the two national railways, Canadian National

and Canadian Pacific, as well as the smaller companies Algoma Central and Northern Alberta can be compared to the Ontario Northland's 1976 operating data.[23] In order to standardize the data in an attempt to remove the effects of company size, the average freight revenue and the average total expenses per ton of freight transported for each company were calculated, then expressed as a percent of Canadian National's value. Average freight revenue per ton transported for Algoma Central and Ontario Northland, both operating in Northeastern Ontario, are approximately 35 percent and 31 percent respectively of Canadian National's. These lower revenues and expenses per ton transported are not a function of differences in freight content. For the five railways, the percentage of the total freight that is low-revenue crude materials ranges only from 28.28 for Algoma Central to 31.93 percent for Canadian National. If a ratio of indexed revenues to expenses is calculated, with the base being Canadian National, expenses in terms of revenue are second highest for Ontario Northland, after the Canadian National.

The Ontario Northland Railway, however, receives substantial provincial government subsidies. In 1976, these subsidies amounted to $4,284,996 while in 1977, $7,980,391 was received. For 1978, approximately $8 million has been budgeted. These subsidies do not include Canadian Federal government subsidies, amounting to $3,032,168 during the period 1976 and 1977.[24] In fact, these provincial and federal

government subsidies are roughly 25 percent of the Ontario Northland Railway's total revenue.

There would appear to be problems with the managing of the Ontario Northland Railway. During the last general provincial election campaign, two passenger trains were put into service without bargaining with the Canadian National Railway for the use of Canadian National's tracks. As a result, the Ontario Northland had to pay $13 a mile for use of the tracks. Also, the Commission failed to apply for Canadian federal government subsidy of the service. As a result, in order to meet the high operating costs, the trains would have had to carry 211 passengers per trip. But the trains' passenger capacity was only 114 passengers and average passenger use was only about 25 percent of this capacity. The difference had to be made up with provincial subsidies. Besides provincial subsidies, the Ontario Northland Transportation Commission has the revenues of Star Transfer to bolster the railway. Star Transfer was acquired in July 1960 and, with the exception of a few years, it has consistently realized a profit. As Table 2.2 indicates, during the period December 31, 1970 to December 31, 1976, Star Transfer had an average annual profit of $234,894. The railway's average annual profit over the same period was $1,119,756, much greater than Star Transfer. However, approximately one half of this profit was the result of the communications sector of the railway.[25] During the period 1973 to 1976, the rail service

Table 2.2

Ontario Northland Transportation Commission
Expenditure and Profit for 1970 to 1976

Year	Thousands of Dollars Gross Expenditures		Thousands of Dollars Net Profit or Loss	
	Railway	Star Transfer	Railway	Star Transfer
1970	22,769	3,603	4,644	133
1971	24,479	4,067	3,991	202
1972	26,099	4,639	3,877	352
1973	28,955	5,245	- 482	488
1974	33,710	7,229	450	371
1975	26,572	7,203	- 3,739	-180
1976	27,996	7,365	- 344	277
Average Annual	27,226	5,622	1,120	235
Average Annual for 1973-1976			- 1,029	239

Source: Ontario Northland Annual Report, 1970-1976.

showed an average annual loss of $1,028,661 while Star Transfer remained fairly consistent with $239,303 in profit. Star Transfer, while not fully compensating for losses incurred by the rail service, does improve the recent financial condition of the Ontario Northland operations and could possibly be more profitable if its service was expanded. It is, therefore, possible that the Ontario Northland Transportation Commission would move to protect Star Transfer from any increase of competition with private companies. As Star Transfer serves the four major Northeastern centers and carries freight between the Northeast and Toronto and Hamilton, any move to protect this trucking firm by barring new firms would result in high freight rates for the region.

While a detailed study of the effects of government participation in the transport industry of the Northeast is beyond the scope and intent of this paper, it is possible that there are detrimental effects on the Northeast's economy. Two points emerge. First, there is an apparent lack of competition in the trucking industry that results in subsequently high freight rates.[26] And secondly, government involvement in transportation, and its consequences, is perceived by the people of the Northeast as being a barrier to development.

The form of the settlement pattern in the Northeast, its economic base and the transport costs that result from being located in the region are characteristics of the Northeastern Ontario region that hinder economic development of

that region. But, what is meant by the term "economic development"? We shall use it to mean orderly industrial growth and diversification, resulting in economic stability, employment opportunity growth and stability. For the Northeast, "economic development" implies a decreasing emphasis on resource industries and, hence, the resolution or partial resolution of the economic-related problems of the region which are due to the lack of economic development.

SUMMARY OF THE NORTHEASTERN ONTARIO ECONOMIC CONDITIONS AND RESULTING PROBLEMS FOR DEVELOPMENT

The Sudbury and District Chamber of Commerce has identified the following problems as existing in the Northeast.[27]

Industrial/Employment Related Problems

In general, there is a lack of variety in employment opportunities. The majority of the existing jobs are resource related and therefore insecure, and employment growth is slow. Growth of employment in the Northeast for the years 1961-1971 was 20 percent while the provincial average was 38 percent. Employment opportunities are concentrated in the main urban centers. As a result of the lack of variety of employment opportunities, there is a corresponding shortage of some types of labour. For example, the lack of local employment acts as a disencentive to receive skills training. Also, the existing

industries of the Northeast experience high turnover rates in their labour forces and relatively high wage and salary levels. These industries have to meet high transport costs for the movement of freight and do not have access to a full range of transportation services. There is a hesitancy by companies to invest in the region and local entrepreneurs have difficulty in obtaining capital for investment because of a lack of well developed sources of capital in the Northeast. Because of this difficulty in attracting capital to the region and the subsequent reliance on resource industries, market fluctuations in demand for the limited products of the Northeast result in reduced production, plant slowdowns and cyclical variations in employment. Resource industries are export oriented and, thus, have little control over market prices or demand for their products.

Social Related Problems

Despite the high wages paid in some industries, average incomes per capita after income tax are below the provincial average. In 1973, the average per capita income of the four largest centers in the Northeast was $6009 while the provincial average was $6530. This lower income level has ramifications when cost of food is considered. Cost of food in the Northeast ranges between 5 and 10 percent higher than Toronto on average. The further away a community is from Toronto, the higher the food costs, while available

income is lower.

The slower population growth of the region, resulting from the outmigration of the young and educated, implies that the regional market for local industry and services is stunted in comparison to southern Ontario markets. Outmigration from the region occurs because of the lack of employment opportunities in the region for the young, skilled or educated.

At the same time, a sense of alienation from southern Ontario, the seat of power, and the mainstream of Ontario wealth exists. This alienation is based on the physical distance from the south, the existence of larger French and native minorities that are more visible than in the south, the concern of the inhabitants for environmental quality and the belief that provincial government programs are designed for the south.

In general, it can be seen that many of the problems of the Northeast could be solved with a diversification from its resource orientation. Diversification would lead to a greater variety of employment, reducing the need for migration and the effects of world market prices for resources on employment stability. It is possible that diversification would increase participation in the labour force, thereby increasing per capita incomes and therefore offsetting the higher costs of living. While diversification of the economic base of the Northeast is hindered by shortages and high wages for some types of labour, transport costs and the hesitancy of companies

to invest in the region, there are positive factors which would appear to make the region attractive to industry and, therefore, aid diversification.

THE POTENTIALLY ADVANTAGEOUS FEATURES OF NORTHEASTERN ONTARIO

While there are features of the Northeastern Ontario region which quite clearly create regional disparities and hinder the solution of the resulting problems, there are also a number of features which could potentially aid in the alleviation of these problems. The argument for the attractiveness of Northeastern Ontario to some industries is based on the following observations.

1) Growth in southern Ontario may be approaching levels that result in diseconomies for industry and the general public. The urbanized belt centered around Toronto suffers from rising land prices, urban and transportation congestion, and competition with agricultural and environmental concerns. Continuation of this trend would eventually force industrial concerns to locate outside this region, possibly in the Northeast.[28]

2) The location of the Northeastern region is more central within Canada. It is nearer to the western provinces, has linkages through Sault Ste. Marie to the American mid-west, is within the Mid-Canada Corridor and is closer to southern Ontario markets than the maritime provinces.

Its location on Lake Huron would suggest the use of the Great Lakes shipping routes.

3) Besides the availability of wood and mineral raw materials for industry, the region has resources of plentiful land for building, water for industrial processes and hydro power and lignite deposits south of Moosonee for fuel.

4) The region has an existing infrastructure of urban settlement and transportation routes. Many of the infrastructure amenities, such as governmental offices, educational facilities, available and trainable labour pool, municipal government services, and recreation and leisure facilities, exist in the larger centers.

5) The provincial government appears to be interested in aiding the north.[29] While the sincerity of this desire is difficult to measure, the provincial government has been flexible with resource companies.[30] It must be obvious to the Ontario and Canadian governments that development of the Northeast would decrease the need for special grants to the region'a municipalities, and decrease unemployment and welfare payments to the population of the region. Simultaneously, the region's municipalities desire development and would conceivably aid new industries that desired to locate in the Northeast.

6) Because of the trend of mechanization in mining and the subsequent decrease in manpower requirements and because of the availability of females for participation in the

labour force, an adequate labour supply should exist in the Northeast.

These factors should make the Northeast attractive to at least a few new industries. However, southern Ontario retains an advantage in attracting new industries because of an apparent preference by manufacturers to locate there. In an attempt to promote Northeastern Ontario, and diversify and stabilize its economy, a number of political groups have offered input for regional planning. These groups and their suggestions will be discussed in the following section.

RECENT THOUGHTS ON NORTHEASTERN ONTARIO DEVELOPMENT

In this section, the roles and policies of the Canadian Federal government's Department of Regional Economic Expansion, the Ontario provincial government, the Sudbury and District Chamber of Commerce, the Northern Ontario Heritage Party and the Sudbury 2001 Committee for Economic Development will be discussed. This will indicate both the government and the critical thoughts on the development problem in the Northeast.

Federal Government

The Canadian Department of Regional Economic Expansion has designated a large portion of the Northeast as a region eligible for federal government aid for new or expanding industries. Regardless of the development restraints on the North-

east, this department believes that the region can support more extensive secondary industry because of the size of the regional market, the existing Northeastern infrastructure and constraints on future development in southern Ontario. The changes in the Regional Development Incentives Act in April, 1974 appear, however, not to have altered the emphasis on subsidies for capital requirements. While the stated prime objective of the Department of Regional Economic expansion is the creation of employment, the subsidy incentives favour capital investment rather than employment creation.[31] That is, capital subsidies tend to be larger than labour subsidies. In the long run, capital investment will increase plant output. The capital thus raised would tend to be invested in more production equipment, resulting in spiralling decreases in the demand for labour. It is quite likely that the federal government expenditure on subsidies could be used more effectively to provide an income subsidy for depressed areas rather than to influence industrial location decisions.[32]

Provincial Government

It is the provincial government of Ontario which has the greatest potential to influence regional economic expansion in the Northeast. Regional planning is the responsibility of the Ministry of Treasury, Economics and Inter-Governmental Affairs and the regional planning program in Ontario in its present form initiated with the Toronto Centered Region Concept.

First annunciated in the 1962 Metropolitan Toronto and Region Transportation Study and refined in the Design for Development: Toronto Centered Region report released in May, 1970, the Budget Speech of 1971 and the Status Report on the Toronto Centered Region of August 1971, it was the initial step towards comprehensive regional planning in Ontario. Previously, provincial economic development policy was concerned with industrial promotion and expansion. While apparently aware of regional imbalances within Ontario, the policy makers only promoted decentralization. The creation of the Municipality of Metropolitan Toronto in 1954 solved the component municipalities' water, sewage, housing and transportation problems. This inadvertently made the south central core area of Ontario more attractive to industry and resulted in continued concentration of economic growth in this area. The Toronto Centered Region was an attempt to control and set limits to this economic growth. The main principle of this concept was that growth would be limited to an arc centered on Toronto and extending eastward to Oshawa and southward to Hamilton. The area north of this arc would remain largely rural or recreational land. In order to ease growth pressures on the lakeshore arc, the area beyond an easy commuting range of Toronto would receive some unspecified aid in encouraging growth. This apparently included Northeastern Ontario. The proponents felt that growth in the northern zone of the Toronto Centered region, including the Cities of Barrie, Orillia, Midland and

Collingwood, would transmit growth into the Parry Sound District. Because of the potential benefits to the Northeast, the proponents of the concept felt that competitive economies should be discouraged.

The Toronto Centered Region concept subsequently led to regional plans for the Northeast. In 1971, Design for Development: Northeastern Onatio, Phase 1 was released by the Ministry of Treasury, Economics and Inter-governmental Affairs. The information and data on the problems, needs and goals of the region contained in this report formed the basis for the March 1976 Design for Development: Northeastern Ontario Regional Strategy. It was stated in the preface of this report that "it should be emphasized that this document is not confirmed provincial government policy...(it is only) a draft proposal for action in Northeastern Ontario." The Northeastern Ontario Regional Strategy contained serious flaws. The recommendations for economic development were very general in nature and lacked specific details on timetables, financing arrangements, actual projects to undertake, and terms of reference. The lack of substance in these recommendations can be demonstrated with a few examples. It was recommended as part of the economic strategy that the tourist industry in the Northeast should be upgraded and encouraged to become a year-round industry. As for other enterprises, the recommendation was that venture capital be made available by the private sector. These recommendations were made with-

out details as to how the tourist industry was to be encouraged or how the private sector was to be enticed into providing venture capital for Northeastern enterprises. The only recommendation for the transportation sector suggested that rail and trucking rates for the Northeast should be reviewed, while the cyclical instability of employment in the resource sector should be reduced.[33] The Strategy failed to mention any improvement of transportation linkages, the role of the Ontario Northland Transportation Commission or any provincial measures to provide alternative employment. Few of the fourteen recommendations for the economic strategies contained any specific proposals of any kind. Even so, the overall emphasis of these recommendations was not on diversification but on improving the resource sector. Eleven of the economic strategy recommendations were related to mining, forestry and tourism while two dealt with manufacturing and other businesses. Only one recommendation was made concerning transportation. The spatial strategy for the urban system consisted of the selection of growth centers for the Northeast. Three levels of growth centers were identified. Sub-regional centers included Timmins, North Bay, Sudbury and Sault Ste. Marie while lower priority area service centers included Kapuskasing, Kirkland Lake, Moosonee, Parry Sound and New Liskeard. The third priority local service centers were identified as being Blind River, Wawa, Hearst, Cochrane, Espanola, Chapleau, Little Current, Sturgeon Falls and

Iroquois Falls, and were to remain small centers serving activities in the primary sector. Assistance was to be geared to the sub-regional and area service centers but the nature of the assistance was not discussed.

To date, the Ontario government has not prepared a status report on the Northeastern Ontario Regional Strategy and little visible evidence is apparent of action taken on the recommendations of this strategy. This apparent lack of action by the provincial government in moving to prepare a more detailed, comprehensive strategy or to act on recommendations made in the Northeastern Ontario Regional Strategy resulted in vociferous criticism of the provincial government's policy on Northeastern Ontario development.

The Sudbury and District Chamber of Commerce

The Sudbury and District Chamber of Commerce was extremely critical of the Northeastern Ontario Regional Strategy and responded with the report Profile in Failure. The provincial strategy, the Sudbury group contended, did not contain any strategy, analysis or programs for development of the region but contained a secret strategy based on the colonial exploitation of the region's natural resources for the benefit of southern Ontario's economy as witnessed by the emphasis on the existing mining, forestry and tourist sectors. The Sudbury and District Chamber of Commerce also disagreed with the proposal to include Sudbury with the other

sub-regional growth centers because this categorization seemed to be based on population size. The use of central place functions would have resulted in Sudbury being designated the "metroplex" of the Northeast.

Profile in Failure also contained a number of concrete recommendations for a Northeastern Ontario Development Strategy which was based on concentrating aid in the areas of promise in the Northeast and relocating employment away from the Toronto Centered region to the Northeast. These included the designation of Sudbury as the Northeast's regional center, the construction of a four lane highway and a high speed rail link between Toronto and Sudbury, identification of industries whose cost structure would make the Northeast a favoured location and establishing a mining techniques institute, Northern Ontario Studies program, and a graduate school of mining and metallurgical engineering at Laurential University in Sudbury. In order to partially finance these projects, it was suggested that the business tax applied to mining companies' properties should be increased.[34]

While the proposals of the Sudbury and District Chamber of Commerce were more substantive than the Design for Development recommendations and included a method of financing, they admittedly lacked a careful analysis of their feasibility. For example, the effects of raising local taxes on the profitability of mining companies was not analyzed.

Northern Ontario Heritage Party

Discontent with government action in dealing with the problems of the Northeast has also led to the formation of a regional political party named the Northern Ontario Heritage Party. Official approval by the Ontario Commission on Election Contributions and Expenses was given on October 19, 1977 allowing the Northern Ontario Heritage Party to register as a recognized provincial political party. The platform is based on the threat of the northern Ontario secession from Ontario if the electorate believes that a new province would improve present conditions. This party's regional emphasis is unique to Ontario provincial politics. While hardly a mass movement, the Northern Ontario Heritage Party's origin and emphasis is reminiscent of Quebec's separatist movement. Two specific proposals by the party are that at least fifty percent of the resources extracted from northern Ontario should be required to be processed to a finished product in the north and that a Ministry of Northern Ontario Development, responsible for transportation policy, regional taxation, development of industrial parks and resource management of northern Ontario, should be created.

While support for the Northern Ontario Heritage Party has yet to be tested in a provincial election and probably will never become a major political force, it provides an alternative forum for the expression of feelings of neglect and discontent with southern Ontario political establishments.

Sudbury 2001 Development Committee

In an attempt to solve the problems of the region, the principle of "boot-strap" or "self-help" has been employed. An example of this principle is the Sudbury 2001 Development Committee, formed in October of 1977. Representing local government, business interests, labour groups and interested citizens of the Sudbury area, this group attempted to present a unified front to press for a new industrial strategy for the Sudbury area. A conference on economic development held in April, 1978 drew eight hundred participants from labour and business groups, local government, professionals and consumers. The organization which resulted from the conference had the aim of aiding the creation of new permanent employment in order to make Sudbury a self-sustaining metropolis by the year 2001. The committee believed that the economic climate of the Sudbury area could be improved by supporting local industry and business to maintain or expand levels of employment and by attracting and aiding new industries in Sudbury. By identifying products that could be manufactured in and marketed from Sudbury, firms that manufactured those products might be induced to locate in Sudbury. Another proposal called for the dissemination of information on available industrial facilities, labour force qualifications and availability, and markets for new products. Other suggestions included the creation of a fund through local subscription to use as seed funding for new projects, using

public land for industrial parks, training programs for small business and entrepreneural skills, opening of the partially completed deep water harbour on Georgian Bay, municipal tax incentives, and a pro-Sudbury media package emphasizing Sudbury's positive features.

To date, few of these recommendations have been acted upon with the exception of a "Buy Sudburian" campaign. The present United Steelworkers of America strike against the Sudbury operations of Inco Limited seems to have decreased public awareness of and interest in the organization.

Observations

Given the relative urgency for the correction of the Northeast's problems which result from a lagging economy, it is unfortunate and surprising that very few concrete proposals have been made or action taken to rectify the problems. The Canadian federal government and the Ontario government have conducted extensive studies on the Northeast. Their best solutions have consisted of incentive loans and grants to new or expanding firms located in the region. While much of the blame for the lack of action lies with the Ontario government, the unwillingness of the Northeasterners to take the initiative is disconcerting. While the Sudbury 2001 Development Committee had a hopeful start, it has not accomplished a great deal. Given the current government spending restraint at both federal and provincial levels, the philosophy of self-help should become

more prevalent. The Northeast must aid itself as much as possible, if senior levels of government continue to vacillate.

CONCLUSIONS AND A SPECIFIC PROBLEM FOR INVESTIGATION

Northeastern Ontario is economically limited by the general north-south dichotomy which exists in Ontario. Any action taken to deal with the various listed problems must be regarded in this light. The region could be classified as a special case, a frontier region, a depressed region or a colony, as discussed in the first chapter. While the label is not important, what emerges is the importance of the core-periphery relations in Ontario, and the effects these relations have on the Northeast. Economic growth has been concentrated in southern Ontario but the spread effects of growth have not stimulated the hinterland's economy. Backwash effects have prompted the movement of factors of production to the core but the demand for the products of the hinterland has not resulted in a growing economy in the periphery.

The various groups which have indicated a concern for the Northeastern Ontario problem would appear to have studied every aspect, whether stated or unstated, of the results of core-periphery relations in Ontario. In order to deal with the problems, these groups usually identify noncontentious and politically expedient objectives in an abundance of studies, papers, media releases, and policy statements. However, they

generally fail to explain the method by which these objectives may be achieved. One obvious failure is the lack of detail on the financing of the various projects suggested. With the exception of the proposal to increase mining land taxation in the Sudbury area, the question of how the required money is to be raised and distributed is not usually dealt with.

Other failures with the various proposals are more tractable than the question of financing. For example, all groups involved have stated that the Northeast should have more industry than it presently has. The Sudbury and District Chamber of Commerce and the Sudbury 2001 Development Committee both suggested that industries which can operate successfully in the Northeast should be identified, without indicating how this should be done. Once a method has been established to compare factor of production costs in the Northeast with other manufacturing centers, it would be possible for the Northeastern centers to disseminate this information to the feasible industries. Specific measures, such as municipal taxation rate manipulation, grants, and the provision of industrial lands, could then be taken to attract these industries which could operate successfully in the Northeastern centers. Possibly, this procedure would provide the designated growth centers with the propulsive units required for the initial stimulation of growth. This hinges on the identification and comparison of factor of production costs. In the following chapter, an attempt will be made to identify and

compare the production factor costs for manufacturing activity in Northeastern and southcentral Ontario centers.

Footnotes

1. Ontario. Design for Development: Northeastern Ontario Regional Strategy, 1976.

2. Canada. Department of Regional Economic Expansion. Climate for Regional Development: Ontario Region, 1976.

3. E.W. Kierans. " Towards a New National Policy ". in Keirstead et. al. eds. op. cit.. p. 7.

4. Walton. op. cit. p. 263.

5. J. Glasson. Introduction to Regional Planning: Concepts, Theory and Practice. (Oxford: University Press, 1974). p. 19.

6. Climate for Regional Development: Ontario Region, op. cit. p. 10.

7. Ontario. Population Trends: A Review of Implications, December 1976.

8. J. Deverell. Falconbridge: A Portrait of a Canadian Mining Multinational. (Toronto: Lorimer, 1974). p. 90, 113.

9. D. Scott. " Northern Alienation ". in D.C. MacDonald. op. cit. p. 238.

10. Scott. ibid. p. 241.

11. Climate for Regional Development: Ontario Region, op. cit. p. 10.

12. Ontario. Design for Development: Statistical Appendix to the Northeastern Ontario Regional Strategy, 1976.

13. Ontario. Design for Development: Northeastern Ontario Regional Strategy, op. cit..

14. Ontario. Design for Development: Statistical Appendix, op. cit..

15. Globe and Mail, Toronto, October 22, 1977. and Toronto Star, Toronto, October 26, 1977.

16. N.C. Bonsor. Transportation Rates and Economic Development in Northern Ontario. (Toronto: Ontario Economic Council, 1977). p. 30.

17. H.J. Darling. The Structure of Railroad Subsidies in Canada. (Toronto: York University Press, 1974). p. 1.

18. The equation was in the form of:

$$\frac{R_i}{D_i} = a_i + b_1 (d_i) + b_2 (w_i) + b_3 V_i + b_4 AC$$

where R is the rate for the commodity, D is the distance transported, w is the weight of the commodity transported, V is its value and AC is a dummy variable to include agreed charges and effects of volume. Bonsor, op. cit. p. 16.

19. Ontario. Ministry of Transportation and Communications. An Investigation of Freight Rates and Related Problems: Northern Ontario. 1976. and J. Palmer. " A Further Analysis of Provincial Trucking Regulation ". Bell Journal of Economics and Management Science. Volume 4, 1973. pp. 655- 664.

20. See statements by E.L. Hollingsorth in Sudbury Star, May 6, 1977. and Alan Pope in Toronto Star, December 21, 1977.

21. Profit- maximizing monopolists, faced with a downward sloping demand curve and a marginal revenue curve which has twice the slope of the demand curve, will operate at the output level where marginal cost equals marginal revenue, determining the price in relation to the demand curve. However, this explanation is relatively abstract and must be regarded in this light.

22. F.M. Scherer. Industrial Market Structure and Economic Performance. (Chicago: Rand McNally, 1970).

23. See Table A.a.

24. Ontario. Public Accounts 1977- 1978. Volume 2. and Expenditure Estimates 1978- 1979, Volume 1, 1978.

25. Ontario Northland Transport Commission. Annual Reports, 1970 - 1976.

26. Ontario. Ministry of Transportation and Communications, op. cit..

27. Sudbury and District Chamber of Commerce. Profile in Failure. (Sudbury: Acme, 1977). pp. 5- 26.

28. Climate for Regional Development: Ontario Region, op. cit. p. 25.

29. Design for Development: Northeastern Ontario Regional Strategy, op. cit..

30. Especially in pollution control and abatement requirements.

31. R.S. Woodward. " Effectiveness of DREE Subsidies ". Canadian Public Policy, Volume 2, 1975.

32. L. Usher. " Some Questions about RDIA ". Canadian Public Policy, Volume 4, 1975.

33. Design for Development: Northeastern Ontario Regional Strategy, op. cit. pp. XIV-XV, 39.

34. Sudbury and District Chamber of Commerce, op. cit. pp. 15-16.

CHAPTER 3

DERIVING COMPARATIVE PRODUCTION COST FUNCTIONS FOR ONTARIO CENTERS

In the initial chapter of this thesis, it was indicated that the growth process in a regional economy was a complex mechanism. This process could be influenced by many factors which could be either endogenous or exogenous to the regional system. Attempts have been made to explain the growth process, but the existence of unequal growth rates in various regions has resulted in policy makers applying the growth center concept to regional planning. One of the features of growth center policy is the initial stimulation or "kick" of growth in a designated growth center in the hopes that this growth will become self sustaining and stimulate further growth. That is, centers designated as growth centers require a propulsive unit or propulsive units. In the second chapter, the Northeastern Ontario region was discussed as an example of a lagging region. While the Northeastern Ontario Regional Strategy designated North Bay, Sudbury, Sault Ste. Marie and Timmins as regional growth centers, the initial stimulation of growth by propulsive units in these centers was not specified. A general problem with the Northeastern Ontario regional economy is the lack of industry other than resource related activities. This is partially

due to the perception of the Northeast as a high production cost area. It was suggested by the Sudbury 2001 Committee that firms, which could operate profitably in the Northeast, be identified and induced to locate in the Northeast. This possibly could provide the designated growth centers with the required propulsive units.

In this chapter, an attempt will be made to compare the costs associated with manufacturing production in these Northeastern centers with selected centers in southcentral Ontario. The basis for this type of production cost analysis can be found in Roy E. George's comparative study of manufacturing in Nova Scotia and central Canada.[1] In the first section of this chapter, the methodology issues will be discussed and the production cost function identified. In the following section, the various factor cost subfunctions will be derived for selected years for the Northeastern and southcentral centers. In the final section, conclusions will be drawn regarding manufacturing production costs.

METHODOLIGAL QUESTIONS AND THE SELECTED APPROACH

Three major points will be covered in this section. Initially, George's study will be quickly reviewed, followed by a discussion of the selected production cost function. Lastly, elements of the structure of manufacturing activity in Ontario will be discussed in order to provide a basis for

the examination of the production cost function.

The Background

George's method of comparing the costs of manufacturing in Nova Scotia with those of central Canada is the basis for the approach later utilized in this chapter. George was interested in the circumstances that Nova Scotia found itself in the late 1960's and attempted to explain the general lack of economic growth in Nova Scotia on the premise that Nova Scotia was not a least-cost location for manufacturing firms. After standardizing Nova Scotia's production costs in labour, materials, fuels, electricity, transportation and capital to central Canada's manufacturing structure, he found that Nova Scotia's costs were comparable to central Canada's. That is, the cost of producing manufactured goods and distributing them to markets in Nova Scotia and central Canada was virtually the same whether the producing plant was located in Nova Scotia or in central Canada.[2] The crucial issue seemed to be the supply of entrepreneurship which could not be readily attracted to Nova Scotia. Because the rate of monetary returns to entrepreneurship were the same in either location, the intangible returns such as social contacts and amenities must have been important in deciding location.

While this study was published in 1970, his attention was confined to the period 1945 to 1962. To provide information that was not readily available, two surveys were under-

taken; one in 1962 and the other in 1965.

If a classification is required for the method, it could be referred to as a cost-accounting approach in which the production requirements of factories in a number of locations are assumed to be comparable while production costs may vary. In this manner, these locations' production costs may be compared.

The Cost Accounting Method

George's cost-accounting approach, in a form modified for the requirements of this study, was the method selected. This approach has the following strengths in relation to what has been stated about Northeastern Ontario in previous chapters.

i) If the northeast is found to be a high production cost area, then the retardation of its economic growth with its lack of diversification may be explained as a function of these high production costs.

ii) By identifying the types of costs which are high, government policy can be directed to these costs in an attempt to lower them. By identifying costs which are low, firms that are intensive in that factor can be made aware of the cost advantage of that factor in the Northeast.

iii) If it is found that production costs in the North-

east do not differ significantly from the area of manufacturing concentration in Ontario, then reasonable alternative explanations of the lack of manufacturing in the Northeast can be sought.

The area of Ontario that includes the cities of Oshawa, Toronto, St. Catherines and Kitchener-Waterloo will be referred to as south-central Ontario. These centers are within the manufacturing belt of southern Ontario and, with the exception of Toronto, approximate the sizes of the Northeastern Ontario centers. All of these centers have a large manufacturing sector, accounting for between one-third and one-quarter of total employment. The Northeastern centers that will be compared to these south-central centers include Sudbury, Sault Ste. Marie, North Bay and Timmins. The rationale behind this selection is simple. These are the four major urban centers in the Northeast and as such have the greatest potential for growth, the greatest attraction for manufacturing firms and are the largest sources of employment in the Northeast.

If these Northeastern centers have a disadvantage in attracting manufacturing firms in the form of higher production costs, the relative lack of economic growth in the Northeast may be attributed to this relative disadvantage. This premise is based on the highly likely assumption that manufacturing firms which are not spatially constrained will locate in the vicinity of the least cost production areas.

It would be realistic to accept that a firm would locate in south-central Ontario if production costs were significantly lower there than in the Northeast.

The assumptions that will have to be made in order to define the production cost function are as realistic as possible. The two assumptions about the firms' behaviours are:

1) Entrepreneural skills do not differ significantly between the Northeast and south-central Ontario. This is reasonable given the common system of provincially-directed education, common access to higher education and equal access to business and consumer information;
2) All manufacturing firms will be managed in an attempt to be profitable;

while the three assumptions related to the market conditions are:

3) Entry into the industry is relatively easy for most firms and is without spatial restrictions. There is no difference in the freedom of entry between the Northeast and south-central Ontario.
4) The only market for goods produced in both areas is found in south-central Ontario because of the greater size of population in this area.
5) The amount of goods of Northeastern manufacture that is sold in the market is too small to have any real

effect on the level of prices for these goods. The effects of distance upon the cost of the producing will be incorporated into the production cost function. This will be achieved by applying freight rates for materials to the cost of materials required for the production process. Manufacturing machinery will be dealt with in the same manner.

Given these conditions, the total annual cost, designated TC, of producing a firm's output is a function of various required costs such that:

$$TC = C_L + C_N + C_B + C_M + C_V + C_E \tag{3.1}$$

where C_L, C_N, C_B, C_M, C_V and C_E are the annual costs of labour, land, buildings, materials, machinery and energy required to produce the output. The use of these factors are such that TC in center i with an output level of (Q) may be defined with the following subfunctions:

$$C_{Li} = e_i W_i \lambda(Q) \tag{3.2}$$

$$C_{Ni} = (T_{Ni} + I) P_{Ni} \gamma(Q) \tag{3.3}$$

$$C_{Bi} = (T_{Bi} + I) P_{Bi} \beta(Q) \tag{3.4}$$

$$C_{Mi} = (P_M + R_i) \mu(Q) \tag{3.5}$$

$$C_{Vi} = (P_V + R_i) \partial(Q) \tag{3.6}$$

$$C_{Ei} = P_{Gi} \rho(q) + P_{Fi} \phi(Q) + P_{Ei} \eta(Q) \tag{3.7}$$

where:

e_i = measure of labour efficiency in i

W_i = manufacturing wage rate in i, in dollars per manyear

T_{Ni} = annual municipal taxation on land, in dollars per square foot

T_{Bi} = annual municipal taxation on buildings, in dollars per square foot

I = annual bank interest rate on loans

P_{Ni} = price of land in i, in dollars per square foot

P_{Bi} = price of buildings in i, in dollars per square foot

P_{M} = price of manufacturing materials, FOB Toronto, in dollars per 100 pounds

P_{V} = price of manufacturing machinery, FOB Toronto, in dollars per 100 pounds

R_{i} = freight cost to each location i from Toronto, in dollars per 100 pounds

P_{Gi} = price of natural gas, in dollars per MCF

P_{Fi} = price of fuel oil, in dollars per gallon

P_{Ei} = price of electricity, in dollars per kilowatt hours

These variables will be used to identify what will be referred to as the factor cost identities for each factor subfunction. The following variables are used to define each subfunction's factor requirements and these factor requirements are the amounts of the factors necessary to produce 100 pounds of output per year:

(Q) = annual output in hundreds of pounds

λ = man years required

γ = square feet of land required

β = square feet of building required

μ = hundreds of pounds of materials required

∂ = hundreds of pounds of machinery required

ρ = million cubic feet of natural gas required

ϕ = gallons of fuel oil required

η = kilowatt hours of electricity required

The factor cost identities for each factor subfunction may be defined as:

$$c_{Li} = \frac{C_{Li}}{\lambda(Q)} \tag{3.8}$$

$$c_{Ni} = \frac{C_{Ni}}{\gamma(Q)} \tag{3.9}$$

$$c_{Bi} = \frac{C_{Bi}}{\beta(Q)} \tag{3.10}$$

$$c_{Mi} = \frac{C_{Mi}}{\mu(Q)} \tag{3.11}$$

$$c_{Vi} = \frac{C_{Vi}}{\partial(Q)} \tag{3.12}$$

$$c_{Ei} = \frac{C_{Ei}}{(\rho+\phi+\eta)Q} \tag{3.13}$$

If it is initially stipulated that the output is unknown and the factor requirements are also unknown, the factor cost identities c_L, c_N, c_B, c_M, c_V, and c_E can be derived from available manufacturing data for various Ontario centers. This will allow for a comparison of these factor cost identities for various centers.

Manufacturing Activity in the Selected Centers

Before the accounting method is used to derive the factor cost identities for each center, it would be fruitful to discuss manufacturing concentration and subsector diversity in the eight centers. This will provide a basis for comparison of results when the factor cost identities are derived.

Manufacturing employment in Oshawa accounted for 39.22 percent of total employment in 1971. For Kitchener-Waterloo, it accounted for 39.03 percent; 34.42 percent in Sault Ste. Marie; 31.91 in St. Catherines; 25.35 percent in Toronto; 12.94 percent in Sudbury; 9.28 percent in North Bay; and 6.13 percent in Timmins. The actual numbers employed in manufacturing ranged from 315,565 manufacturing employees in Toronto to 925 employees in Timmins.[3]

In terms of manufacturing diversity, Oshawa, St. Catherines, Sudbury, Sault Ste. Marie and Timmins all had a dominating subsector which accounted for more than thirty-five percent of total manufacturing employment. For Oshawa and St. Catherines, this dominating subsector was Transportation Equipment Manufacturing and was obviously associated with the automobile assembly plants in these centers. Sudbury's and Sault Ste. Marie's manufacturing sectors were dominated by the Primary Metals Processing Subsector, while Timmins' dominating subsector was the Wood Industry. The manufacturing employment of the eight centers can be compared

with each other by means of a manufacturing location quotient, indicating the relative concentration of manufacturing employment among the eight centers. This quotient may be expressed as:

$$MC = \frac{X_i * 100}{\sum X_i} \times \frac{\sum Y_i}{Y_i * 100} \qquad (3.14)$$

where X_i is the manufacturing employment in center i, and Y_i is i's population. This expresses manufacturing employment in each center as a percentage of the sum for all centers in terms of the population of each center expressed as a percentage of the sum of the population of all the centers. A value for this ratio which exceeds 1.00 indicates that the center had a concentration of manufacturing employment above which its share of population warranted. Values below 1.00 imply that the center had less than its share of manufacturing employment. The calculated value[4] for Kitchener-Waterloo, in 1971, was 1.524; 1.377 for Oshawa; 1.185 for Sault Ste. Marie; 1.085 for St. Catherines; 0.980 for Toronto; 0.446 for Sudbury; 0.206 for North Bay, and 0.205 for Timmins. Both Kitchener-Waterloo and Oshawa had manufacturing employment levels that exceed what was expected while Sudbury, North Bay and Timmins had only one half of the expected employment.

While it was previously indicated that some centers had dominating industrial subsectors, a more useful index of subsector dominance will indicate whether or not some centers were more dominated by a subsector than others. By initially

ranking the highest ten values for subsector employment percentages and then cumulatively adding these subsectors, the sum of the cumulative totals indicates the degree of subsector domination. This index may be expressed as D_i for center i, when:

$$D_i = \sum_{j=1}^{10} (10-j+1)\ X_j\ , \qquad (3.15)$$

where X_j is the percent of all employment in the sector which ranks in position j. The D_i term acts as a weighted sum of employment in the top ten sectors with higher ranking sectors given higher weights. Values for D_i potentially range between 1000, for a center whose manufacturing employment existed in only one subsector, to 275 for a center whose manufacturing employment was equally distributed between all existing twenty subsectors. The calculation of the D_i values for 1971[5] indicate that Toronto and Kitchener-Waterloo, with D_i values of 469 and 581 respectively, were fairly diversified manufacturing centers. On the other hand, Sudbury, with a D_i value of 885, and Sault Ste. Marie, with 935, had manufacturing sectors which were dominated by a subsector. North Bay's value was 645; Oshawa's was 765; Timmins' was 778; while St. Catherines' was 790.

The twin cities of Kitchener and Waterloo are normally considered a single urban center because they are contiguous. Henceforth, Kitchener-Waterloo will be referred to as Kitchener, for the sake of brevity. The previous discussion has indicated

that Kitchener is a center in which manufacturing activity is concentrated and that it has a diversified subsector mix of manufacturing activities. It also has a persistently high population growth rate.[6] Because of these favourable manufacturing conditions, Kitchener will be used as the reference center against which the production cost functions for the other centers will be compared.

MANUFACTURING PRODUCTION COSTS IN THE SELECTED CENTERS

In this section, each factor cost subfunction specified for the total production cost function in equation (3.1) will be derived for each of the eight selected centers and compared to the values for Kitchener.

Labour Cost Subfunction

The labour cost identity, c_{Li}, was defined in equation (3.8) as being:

$$c_{Li} = e_i W_i$$

The data for factor cost identity c_{Li} was based on many sources but primarily upon the Canadian census material contained in Manufacturing Industries of Canada for the years 1965, 1970, 1971, 1972 and 1974.

Initially, the term W_i, average annual manufacturing wages per employee in each center i, was calculated by dividing the total manufacturing wages paid in each center by the

number of employees employed in manufacturing in that center. These W_i values are expressed as a percentage of wages paid per employee in Kitchener in Table 3.1. Data for 1965 for Oshawa, Sault Ste. Marie and Sudbury were not available in any potentially useful form. The average values for the percentage values of W_i each center i for the period 1970 to 1974, range in value from Toronto's 100.38 percent of Kitchener's average annual wage per manufacturing employee to Oshawa's 146.29 percent. This average value for W_i in Oshawa, St. Catherines and Sault Ste. Marie were all more than 40 percent higher than Kitchener's. These centers had earlier been found to have had dominating manufacturing subsectors. But, Sudbury and Timmins also had dominating subsectors, and their associated W_i averages were 110.35 and 107.35 respectively. Clearly, the effects of the manufacturing subsector mix upon the average annual manufacturing wage should be identified. The calculated W_i values do not allow for the effects of distortion by the subsector mix. Therefore, a correction factor, designated as DW_i, for the effects of subsector mix should be calculated. Unfortunately, the available data does not allow a calculation of the term DW_i in the manner that George employed.[7] George's method for calculating a correction factor involved subtracting a standardized average annual wage from the actual average annual wage. The standardized average wage level was calculated by multiplying the average annual wage paid in each

Table 3.1

Average Annual Wages as Percents of Kitchener's Average Annual Wage for selected years

Center	W_i Values as Percents of Kitchener's W value for selected years			
	1970	1971	1972	1974
Kitchener Actual Wages	$5939.22	$6729.07	$7194.40	$8305.09
	%	%	%	%
NBY	109.35	111.47	102.56	96.79
OSH	137.81	156.82	141.55	148.98
STC	125.02	151.43	137.43	146.36
SOO	136.65	141.01	140.06	155.69
SUD	106.16	110.81	97.24	126.79
TIM	95.75	90.46	121.35	121.85
TOR	100.25	102.14	96.37	102.77

Source: Statistics Canada. Manufacturing Industries of Canada: Geographical Distribution, 1970, 1971, 1972, 1974. Cat. 31-209.

industrial group in the first region by the number of employees in each industrial group in the second region. The sum of these values was then divided by the total wages paid in the second region and expressed as a percentage. That is:

$$WS_i = ((w_{i1}n_1 + w_{i2}n_2 + \ldots + w_{im}n_m)/W)100 \qquad (3.16)$$

where WS_i is the standardized wage in i, w_{im} is the wage level in each sector m, n_m is the employment in each sector in the other region, and W is the total manufacturing wages paid in the other region. While George calculated these values for industrial sectors, of which manufacturing was only one sector, and for two regions, the term DW_i here must be calculated for manufacturing subsectors and seven centers. While employment data are available for each subsector of manufacturing for each center, wage data are not. Thus, an alternative to the George method was devised such that:

$$DW_i = WS_i - W_i$$

where:

$$WS_i = \frac{((wd_i n_d + wn_i n_n)100)}{W_K} \qquad (3.17)$$

where, wd_i is the average annual wage of employees in durable goods manufacturing in center i, n_d is the number of employees in durable goods manufacturing in Kitchener, wn_i is the wage in nondurable goods manufacturing in i, n_n is the number of

employees in nondurable manufacturing, and W_K is the total wage bill in Kitchener. Durable goods includes wood products, furniture and fixtures, processed primary metals, machinery, transportation equipment, electrical products, and non-metallic mineral products. Nondurable goods manufacturing includes all other manufacturing subsectors. This method will not capture all the effects of manufacturing subsector mix; however, it will have to suffice. The correction factor values are contained in Table 3.2 and were derived from Table A.5. It would also be possible to correct the wage rate for male-female composition of each centers' labour force, which potentially could lower average wage rates for a center if there is a high female participation rate in that center. For example, in 1972, females comprised 20.3 percent of Kitchener's durable goods labour force and 35.5 percent of its nondurable goods labour force. Toronto, with 19.2 percent and 36.5, almost mirrored Kitchener's values. But, St. Catherines' durable goods labour force was only 9.1 percent female and its nondurable goods labour force was only 17.7 percent female. Sudbury had the lowest female participation rate in durable goods manufacture and overall participation in manufacturing, with respective values of 3.3 and 14.5 percent.[8] While high female participation rates in the manufacturing labour force will lower the total manufacturing wages paid and thereby average annual wages per employee, the data available for the eight centers does not

Table 3.2

Correction Factors for Average Annual Wages as Percentages of Kitchener's Average Annual Wage

Center	DW_i Values			
	1970	1971	1972	1974
KWL	0.00	0.00	0.00	0.00
NBY	9.56	-0.65	24.23	18.16
OSH	-4.75	-1.98	3.43	-7.85
STC	-1.65	3.78	3.31	-20.45
SUD	18.75	18.14	39.34	-2.73
SOO	2.84	-0.74	-4.36	-24.25
TIM	8.18	10.74	-11.63	-14.77
TOR	15.73	11.68	27.09	10.42

Source: Statistics Canada. Employment Earnings and Hours, 1970, 1971, 1972, 1974. Cat. 72-002. And Tables 3.1 and A.5.

allow for the calculation of a correction factor as was calculated for durable-nondurable mix. While data are available for office occupations for both sexes for the centers,[9] these values are not appropriate surrogates. Most manufacturing labour is unionized and therefore equal rates would prevail for both sexes, whereas office work may not be as unionized. Therefore, because the calculation of DW_i involved a durable-nondurable classification, and the available values for Kitchener, Toronto, St. Catherines and Sudbury indicate a fairly constant ratio of approximately .55 of female employment in durable goods manufacture to nondurable goods, and because unionization of manufacturing workers should be uniform, no attempt to calculate a correction factor should be made.[10] The term DW_i will be used later to correct the labour sub-function and will be assumed to account for sub-sector mix and male-female mix for each center. The W_i values must also be corrected for the length of man-years in various centers. This is accomplished by calculating the term t_i, the average number of hours worked by each employee, by dividing the total number of paid manhours in a year by the total number of manufacturing employees for each center. These values may help to explain high W_i values. That is, average annual wages per employee may be high if the employees worked for more hours during the year. With the exception of a few cases,[11] particularly Sudbury in 1971 and 1972, most centers consistently over the years had larger average annual

hours worked per employee. In Oshawa, employees worked between 6.29 and 14.45 percent more hours annually than in Kitchener. In actual terms, in 1970 Oshawa manufacturing employees worked on the average 129 more hours annually than Kitchener employees and, in 1971 on the average, worked 303 more hours. Toronto manufacturing employees, on the other hand, worked similar annual average hours as Kitchener manufacturing employees. For the Northeastern Ontario centers, Sault Ste. Marie's manufacturing employees worked the longest average annual hours. The only possible explanation of Sudbury's low average annual hours worked per employee for 1972 is labour-management disputes and the resulting strike against Inco Limited by the workers. A mean value for t_i, designated as $\overline{t_i}$ may be derived for the period 1970 to 1974.[12] For this period, Toronto and North Bay varied only very slightly from Kitchener's average annual hours worked per employee. All other centers' employees, on the average, worked more than 90 hours more than Kitchener employees; approximately two hours more a week.

By dividing W_i by t_i, obtaining an average hourly wage results in a corrected annual average wage by multiplying the hourly wage by 2080 hours, the standard numbers of hours worked annually with a 40 hour work week.

Any attempt to realistically determine a comparative value for labour efficiency is hindered by the same lack of usable data that plagued the calculation of DW_i. The term

e_i should be based on the average annual value added per employee. The dilemma in calculating e_i is due to different levels of value added per employee in different manufacturing subsectors and the resulting distortion caused by subsector concentration in different centers. For example, value added per employee is higher in electrical products manufacturing than in food and beverages production. Variations in actual output per worker may be due to the amount of capital invested in the production process per worker, the nature of technology being applied, scale of production, managerial efficiency and the education and training of the labour force. The Economic Council of Canada found that efficiency of the labour force was primarily due to the amount of education that the labour force received.[13] Given the initial assumption relating to common system of education available to all centers, the value for e_i for all centers should be equal if there is no significant variance in educational attainment between the eight centers. This may be seen in the percentage values of the labour force in seven census agglomerations for which the data are available that have secondary school education.[14]

It is assumed that manufacturing employees would be required to have some form of secondary school education. The results indicate little variation in the levels of male and females employed with at least three years of secondary education. Approximately one-third of the active labour force in each of the census agglomerations have an educational level

of Grade Nine, Ten and Eleven. Approximately one-quarter of the active male labour force attained either Grades Twelve or Thirteen, with a range in values of 8.61 percent. The lowest percentage for Grades Twelve and Thirteen achievement was 20.54 percent in Sudbury while London, with 29.15 percent of the labour force achieving Grades Twelve and Thirteen, had the highest value for this level. More than one-third of the female work force attained these levels, with a range of 10.09 from minimum to maximum values. Because female participation in manufacturing was approximately one-third of the total manufacturing labour force, these variations in educational achievement and their effects on the efficiency of labour may be discounted. And because these values are for the entire labour force for each center, they do not really indicate variations in the efficiency of manufacturing labour in these centers. As a result, the value for e_i will be assigned equal values of 1.00 for the eight centers in the analysis.

For purposes of deriving c_{Li}, the factor cost identity for each center, may be redefined as:

$$c_{Li} = e_i \left(\frac{W_i}{t_i} - Dw_i \right) \qquad (3.12)$$

Table 3.3 contains the c_{Li} values for each center expressed as a percentage of Kitchener's c_{Li} value for 1970, 1971, 1972 and 1974. The average values for c_L will be taken to be indicative of comparable wage rates as they minimize the

Table 3.3

Labour Cost Identities for Centers for Selected Years

Center	c_{Li} Values as percentages of Kitchener's c_{Li} Value			
	1970	1971	1972	1974
c_{Li} KWL	$6000.67	$6690.15	$7165.80	$8513.42
	%	%	%	%
NBY	98.43	109.26	78.82	76.41
OSH	134.40	139.00	127.48	144.15
STC	120.68	137.70	126.84	156.08
SOO	128.86	137.49	133.40	162.64
SUD	81.20	84.93	59.82	121.94
TIM	82.11	76.34	130.91	127.22
TOR	83.64	91.21	75.10	90.02

Source:

$$c_{Li} = e_i \left(\frac{w_i}{t_i} - DW_i \right)$$

effects of new labour contract occurrences, labour strikes and fluctuations in the economy. On the average then, North Bay and Toronto are lower labour cost locations than Kitchener, while Oshawa, St. Catherines and Sault Ste. Marie have man-year labour costs which exceed Kitchener's by more than one-third. Sudbury and Timmins are both near 5 percent within Kitchener's cost of labour per man-year. As both these centers are basically mining towns, this difference may be the result of manufacturers having to compete with mining wages. As two of the Northeast centers were only slightly higher than Kitchener during this period, and one was almost 10 percent below Kitchener, this would seem to indicate that most of the Northeastern centers are not particularly high labour cost locations. It is possible that economies of scale within the manufacturing firms may account for variations in the values for c_{Li}. Firms in North Bay, Timmins and Sudbury had, on the average, less than thirty workers.[15] These were relatively low-labour cost locations. With an average of 180 workers, Sault Ste. Marie had the largest average number of employees per manufacturing plant. Internal economies of scale in larger plants would mean that wages could be higher than in smaller plants.

Generally one would assume that wage rates for centers within a province would be approximately equal due to minimum wage limits and union representation at wage negotiations. The higher labour costs which have been observed, then, must be related to the following factors:

1. Difficulty in attracting manufacturing labour to certain locations due to isolation, attractiveness and imperfect information.
2. Higher labour productivity and efficiency.
3. Competition for labour with other sectors.
4. High level of labour unionization, which would result in higher wage demands.

Land Cost Subfunction

The land cost subfunction was designated in equation (3.9) as:

$$c_{Ni} = (T_{Ni} + I)P_{Li}$$

The derivation of the factor cost identity for land costs involved the calculation of average industrial land prices in each center, the local taxation rate and the interest rate cost. Table 3.4 contains data on the average price per square foot of industrial land in the eight centers for the years 1970 to 1974, with an average price for the five year period. In terms of land prices, Toronto was the highest cost location, followed in descending order by Oshawa, Kitchener, Sault Ste. Marie, St. Catherines, Sudbury, North Bay and Timmins. The Northeastern centers were generally low land cost locations, and, with exception of Sault Ste. Marie, cost of land in the Northeast appears to decline with population size. Generally, supply of serviced industrial

Table 3.4

Average Cost of Land in Study Centers for Selected Years

Center	P_{Li} Values in Dollars per Square Foot			
	1970	1971	1972	1974
KWL	0.204	0.219	0.260	0.524
NBY	0.046	0.133	0.124	0.228
OSH	0.115	0.177	0.616	1.131
STC	0.117	0.213	0.260	0.419
SOO	0.225	0.225	0.217	0.516
SUD	0.092	0.091	0.251	0.390
TIM	0.054	0.069	0.080	0.100
TOR	1.033	1.034	1.148	1.456

Source: Ministry of Industry and Tourism. Profiles of Ontario Municipalities, Volumes 1 and 2, 1971, 1972, 1973, 1975.

land was greater in the Northeastern centers than in the south-central centers.

Municipal taxation costs are usually calculated for land and buildings together. However, for the purposes of this analysis, the amount of taxation on land will be separated from the buildings' taxes. Classed under municipal taxes will be both realty taxes and manufacturing business taxes. The Ontario Ministry of Industry and Tourism annual publication Profiles of Ontario Municipalities guideline for municipal taxes indicates that realty taxes may be approximated with the following equation:

$$T_{Ri} = MV \times \frac{PI_i}{100} \times \frac{m_i}{1000} , \qquad (3.18)$$

where T_R is the realty tax paid, MV is the market value of the property, PI_i is a provincial equalization factor which is calculated for all centers, and m is the set municipal mill rate for industrial land. As Manufacturing Business taxes are set at sixty percent of realty taxes, T_{Ni}, the municipal taxation rates are 160 percent of realty taxes. That is:

$$T_{Ni} = 1.6 \left(\frac{PI_i}{100} \times \frac{m_i}{1000} \right) \times MV \qquad (3.19)$$

Municipal taxation policies may influence plant location. Oshawa was the center with the highest average taxation rate over the period 1970 to 1974, followed in descending order by Timmins, Kitchener, Sault Ste. Marie, Toronto, North Bay

Sudbury and St. Catherines.[16] After 1970, Kitchener, St. Catherines and Sault Ste. Marie exhibited steady declines in the municipal taxation rate for industrial land, perhaps in an attempt to attract industrial development.

In order to indicate the effects of land costs, an assumption will be made that once a firm moves to a location, it will retain the land indefinitely, in order to minimize the annual cost of land. The firm will borrow the required capital to purchase the land at prevailing lending interest rates but will take an infinite period of time to repay the loan. If the interest rate is I, and P_{Ni} is the purchase price of the land, the annual payments on land costs will be IP_{Ni}. This annual payment is, of course, a lower bound on the actual annual charges. The precise amount paid annually will depend on the individually negotiated terms of the loan such as payment duration. The upper bound of the annual charges is $(1+I)P_{Ni}$, if the loan is to be re-paid over one year. With annual payments of the amount of IP_{Ni}, the firm will minimize annual land costs. Thus, if the capital required to purchase the land was borrowed at prevailing interest rates, the annual cost of repayment will be such that if equal payments are made over an infinite time period, the annual payments will be:

$$X_i = IP_{Li} \tag{3.20}$$

where X_i is annual payments, I is the interest rate and P_{Li}

is the cost of land. Loans may be obtained through the Northern Ontario Development Corporation to build plants that will be located in Northern Ontario may be negotiated at an interest rate below prevailing rates. However, the degree to which these rates are below prevailing rates varies with individual applications. It is possible to use the minimum interest rates set by the Bank of Canada as an indication of the cost of borrowing money to purchase land. As these values may fluctuate in a year, the interest rates used were the interest rates by the Bank of Canada at the end of the year. These values were used as the I values.[17]

It is possible, then, to calculate annual land costs in the manner designated in equation (3.9). The c_{Ni} values, expressed as a percentage of Kitchener's annual land costs, are noted in Table 3.5. It is interesting to note the steady decrease in the gap between Kitchener's annual land costs per square foot and Toronto's. Toronto's land costs decreased from 525.96 percent of Kitchener's in 1970 to 288.94 percent. During the same period, Oshawa's increased from 58.65 percent of Kitchener's to 230.26 percent. St. Catherines' land costs were either slightly above or below Kitchener's. With only a few exceptions, annual land costs in the Northeastern centers were below Kitchener's. North Bay and Timmins had the lowest annual land costs relative to Kitchener, while Sault Ste. Marie's land cost varied from 120.67 percent to 69.04 percent of Kitchener's in different years. Sudbury was generally a

Table 3.5

Land Cost Identities for Study Centers in Selected Years

Center	c_{Ni} Values as percentages of c_N for Kitchener in dollars per square foot			
	1970	1971	1972	1974
c_N KWL	$.0208	$.0196	$.0222	$.0669
	%	%	%	%
NBY	23.08	62.24	51.80	44.09
OSH	58.65	87.24	263.96	230.26
STC	56.73	102.55	106.75	79.52
SOO	120.67	113.77	88.29	94.17
SUD	45.19	41.32	102.25	75.63
TIM	28.36	33.67	34.23	20.63
TOR	525.96	476.53	477.92	288.94

Source: Derived from Table A.11

low land cost center.

Building Cost Subfunction

The subfunction defining the cost of constructing a factory was defined in equation (3.10) as:

$$c_{Bi} = (T_{Bi} + I)P_{Bi}$$

The taxation rate for building area is the same as the rate on land as $T_{Bi} = T_{Ni}$. Furthermore, the value for I, calculated in the previous section, is also applicable for c_{Bi}. Hence, for a given fixed output (Q), the only new data required is for the term P_{Bi}, the price of buildings, in dollars per square feet. Table 3.6 contains construction costs per square feet for the eight centers for the period 1970 to 1974. As would be expected, construction costs for the Northeastern centers were slightly above the cost for south-central centers, as the result of higher prices paid for building materials shipped to these centers, the shorter construction periods, the need to winterize the building more thoroughly and, possibly, higher construction wages paid. If we again assume that the plant owner wants to minimize the annual payments for the building, the annual cost of borrowing the capital to build the plant is simply the amount of interest accrued on the loan. The values for c_{Bi}, as a percentage of Kitchener's annual cost of the building per square foot are contained in Table 3.7. With the exception of 1974

Table 3.6

Construction Costs in
Study Centers

Centers	P_{Bi} Values in dollars per square foot for selected years			
	1970	1971	1972	1974
KWL	14.42	15.04	15.75	26.60
NBY	17.43	18.23	18.95	24.93
OSH	14.27	14.07	15.89	22.96
STC	16.13	16.44	17.77	24.81
SOO	16.74	16.94	18.73	23.72
SUD	17.43	17.88	19.51	22.88
TIM	17.85	17.97	18.85	22.10
TOR	14.29	14.79	15.29	22.97

Source: Canadian Housing and Mortgage Corporation.
Canadian Housing Statistics, 1971, 1972, 1974.

Table 3.7

Building Cost Identities for
Study Centers in Selected Years

Center	c_{Bi} Values in dollars per square foot as percentages of Kitchener's c_B value			
	1970	1971	1972	1974
c_B KWL	$1.4399	$1.3469	$1.3988	$3.3958
	%	%	%	%
NBY	126.16	124.14	126.39	95.12
OSH	105.73	101.18	108.15	95.32
STC	107.05	115.01	115.98	92.74
SOO	129.92	124.83	121.09	85.24
SUD	123.97	118.35	126.37	87.46
TIM	135.79	127.05	128.01	90.17
TOR	105.18	99.20	101.08	89.57

Source: Derived from Table A.12

when building costs per square foot in Kitchener rose relative to the building costs in other centers, the building costs in the Northeastern centers were higher relative to Kitchener. On the average, Timmins' cost was 19.54 percent per square foot higher than Kitchener, followed in order by North Bay being 17.74 percent higher, Sudbury at 16.05 percent higher, and Sault Ste. Marie at 15.19 percent. Building taxes and interest costs in Toronto and Oshawa were within 2 percent of Kitchener's while St. Catherines' was 9 percent higher on the average. In relation to both building and land costs, George found, in his surveys of manufacturers in Nova Scotia and central Canada, that the perceived level of local taxation was a relatively important consideration. Local taxation rates could be used by municipalities to attract firms. However, industrial promotion advertising sponsored by Ontario municipalities rarely mention local taxation rates. It seems probable at this point that the Northeastern centers have been perceived as having high taxation rates by firms. Firms would point to the lack of other sources of revenue in Northeastern centers as the reason for believing that the industries that are located in the Northeast must therefore be taxed excessively.

Materials Cost Subfunction

The cost of materials used in the manufacturing was defined in equation (3.11) as being:

$$c_{Mi} = P_M + R$$

The cost of the input of materials is equal to the price of materials plus the cost of shipping materials to the production site, multiplied by the amount of materials required for a given output. Different centers will exhibit varying requirements for input materials as the result of different manufacturing subsector concentrations and size of operation. As the types of materials required and the scale of shipment of the materials varies with centers, the average price of the materials required will vary between centers. For example, the cost of materials purchased by the manufacturing firms, expressed as a percentage of the selling value of factory shipments in 1974, was[18]:

56.88 percent in Kitchener,

50.33 percent in North Bay,

69.45 percent in Oshawa,

48.30 percent in St. Catherines,

43.73 percent in Sault Ste. Marie,

23.01 percent in Sudbury

32.59 percent in Timmins, and

58.42 percent in Toronto.

The range of these values was 46.44 percent from Oshawa's values to Sudbury's. This is a direct result of the prices of the materials used. The automobile parts used in Oshawa's primary manufacturing activity have higher value than the

materials required in primary processing. In the diversified manufacturing centers of Kitchener and Toronto, the cost of materials used in manufacturing, was relatively consistent at 56.88 percent and 58.42 respectively.

Due to the wide variance in values for prices of materials and, therefore, an insufficient basis for determining the weight of materials used, the term P_M will not be calculated at the present time. However, it will be assigned a value in a following section when the actual costs for a hypothetical firm in various locations are calculated.

The term R_i, the freight costs, in dollars per 100 pounds, of transporting materials to each center from Toronto, is derived from the Canadian Transport Tariff Bureau Association's Class Tariff 1-C, for truck load shipments. Higher rates are set for less-than-truckload shipments. Most possible combinations of destinations and origins are classed on the basis of the distance and these classifications have set charges per 100 pounds of material transported for a minimum of 24,000 pounds. Thus, the freight charges, R_i, have a distance component. If these values for freight charges per 100 pounds transported to each center from Toronto[19] are divided by the distance that each center is from Toronto, the result is a decreasing cost per mile for longer distances, with the exception of Timmins. Timmins is only four miles more distant from Toronto than Sault Ste. Marie's distance of 426 miles. However, the cost of trans-

porting 100 pounds of materials to Timmins from Toronto is approximately 30 percent higher than to Sault Ste. Marie. This may be due to discriminatory freight rates as discussed in Chapter Two or because of the poorer quality of the highway and possible lack of return shipments. The alternative explanation is that Sault Ste. Marie may have been set rates more favourable than its distance from Toronto dictated. This could have been due to larger volumes of shipments. The result, in any case, is that manufacturers in Timmins would have to pay higher freight costs than in Sault Ste. Marie, on the same amount of materials transported the same distance.

Table 3.8 contains the values for c_{Mi} for all eight centers. These values have not been expressed as a percentage of Kitchener's c_M value because P_M was not determined for the present. If the materials required for manufacturing are only available from Toronto, the Northeastern centers will have to pay between $1.06 and $2.88 more per 100 pounds of materials. Obviously, Sudbury and North Bay, with their smaller distances to Toronto, are better located than the other two Northeastern centers. However, Oshawa, St. Catherines and Kitchener are only 40.63 and 69 miles respectively from Toronto.

In the long run, the factors that will determine the total cost of materials required by a manufacturer in any center will be the amount and type of materials transported, the distance from the supplier, and the proportion of the

Table 3.8

Cost of Materials and Transportation for period 1970-1974 for Study Centers

Center	c_M Values for Period in Dollars per 100 pounds of materials
KWL	$P_M + 1.16$
NBY	$P_M + 2.22$
OSH	$P_M + 1.00$
STC	$P_M + 1.16$
SOO	$P_M + 3.07$
SUD	$P_M + 2.47$
TIM	$P_M + 4.04$
TOR	$P_M + 0.00$

Source: Derived form Table A.14

materials that may be obtained locally. The calculation of c_{Mi} in Table 3.8 does not allow for materials that could be locally produced and used as manufacturing inputs. This proportion will vary from firm to firm and subsector to subsector. Therefore, allowance for locally manufactured material cannot be included at this stage.

Machinery Cost Subfunction

The machinery cost subfunction was specified in equation (3.12) as:

$$c_{vi} = (P_V + R_i)$$

The price per 100 pounds of machinery, P_V, will quite obviously vary with different subsectors. Types of machinery required for production processes range too greatly in price and weight to determine an annual P_V value at this time.

It is possible to indicate the average amount expended annually on machinery in Ontario. By obtaining the total expenditure on manufacturing machinery in Ontario, and dividing this by the total number of manufacturing firms, average annual new machinery expenditure per firm for 1970 to 1974 was derived.[20] As these values are for all of Ontario and include freight costs, and are not corrected for establishment size variations, they only serve as indicators of new machinery expenditures for this period. These expen-

ditures ranged from 80.920 dollars per firm in 1971 to 132,886 dollars in 1974. Machinery repair expenditures during this period was between 50 and 60 percent of new machinery.

In calculating the freight rate, the Canadian Transport Tariff Bureau Association's guidelines indicate that machinery, whether or not it is crated, assembled or disassembled, should be charged at 250 percent of its actual weight. Using the freight rates which were derived for materials costs in Table 3.8, the c_{vi} values for the period 1970 to 1974 are indicated in Table 3.9.

The inability of a firm to obtain new machinery or machinery repairs in its local area will become a more important factor when considering costs for larger firms. These larger firms, with larger requirements for machinery, will prefer not to locate in areas of relatively high machinery transport costs. Similarly, very small firms which have limited capital, would try to locate in order to minimize added costs to machinery and machinery repair that result from transport costs.

Energy Cost Subfunction

The cost of energy required in the production process was defined in equation (3.7) as:

$$c_{Ei} = P_{Gi} + P_{Fi} + P_{Ei}$$

Table 3.9

Cost of Machinery and Transportation
for period 1970-1974 for Study Centers

Center	c_V Values for Period in dollars per 100 pounds of machinery
KWL	P_V + 2.900
NBY	P_V + 5.550
OSH	P_V + 2.500
STC	P_V + 2.900
SOO	P_V + 7.675
SUD	P_V + 6.175
TIM	P_V +10.100
TOR	P_V + 0.000

Source: Derived from Table A.14

The amounts of energy required will vary with the quantity produced and the type of activity. It is possible to obtain the P_{Fi} values, the price of fuel per gallon for center i, and P_{Ei}, the price of electricity per kilowatt-hour for center i, as well as the P_{Gi} values, for the price of natural gas per MCF.

The energy cost identity has three components. These are the price of natural gas per MCF, price of fuel oil per gallon and electricity price in KWH. These costs are usually thought of as being rather unimportant costs in the long run, accounting for only small percentages of the total value of shipments.[21] In 1971, the total fuel and electricity expenditures were 1.736 percent of total value of manufacturing shipments in Ontario.[22] However, certain manufacturing activities require differing energy inputs. For these energy intensive firms, the cost of supplied energy may become a locational consideration.

Table 3.10 contains the computed values for c_{Ei} for the period 1971 to 1974. The south-central Ontario centers were generally lower energy cost locations than the Northeast. This is perhaps understandable for fossil fuel prices as the petroleum refineries are located in the southern region of Ontario. However, the higher electricity costs in the Northeastern regions are at first difficult to explain. There are a number of hydro-electric generating stations throughout the region which could be used to supply the

Table 3.10

Energy Cost Identities for Study Centers for Selected Years

Center	P_{Gi} Values in Dollars per MCF for Natural Gas			P_{Fi} Values in Dollars per gallon of Fuel Oil			P_{Ei} Values in Dollars per KWH of electricity		
	1971	1972	1974	1971	1972	1974	1971	1972	1974
KWL	.56	.57	.69	.11	.12	.53	.0103	.0107	.0149
NBY	.61	.62	.76	.12	.13	.58	.0111	.0129	.0145
OSH	.56	.57	.69	.11	.12	.53	.0109	.0111	.0145
STC	.56	.57	.69	.11	.12	.53	.0105	.0109	.0148
SOO	.61	.62	.76	.12	.13	.58	.0118	.0127	.0158
SUD	.61	.62	.76	.12	.13	.58	.0118	.0127	.0159
TIM	.62	.63	.76	.12	.13	.58	.0181	.0176	.0185
TOR	.56	.57	.69	.11	.12	.53	.0103	.0104	.0144

Source: Derived from Tables A.16 and A.17.

electricity to the region at a lower price. It is not the supply of electricity which causes the higher prices for it, but the demand for it. The lower demand for electricity, due to the small size of manufacturing activity in general and the smaller population of the Northeast, requires higher capital costs in hydro-electric infrastructures such as transmission lines and maintenance. It is interesting to note that St. Catherines, which is located only a short distance from the hydroelectric generating stations at Niagara Falls, Ontario, did not have the lowest cost of electricity per kilowatt hour. On this basis, it would not appear that the cost of electricity in a center is not strongly related to distance from the electrical generation site.

Summary of Production Cost Subfunctions

Table 3.13 contains the calculated values for the factor cost identities of c_{Li}, c_{Ni}, c_{Bi}, c_{Mi}, c_{Vi} and c_{Ei} for two selected years. The production cost function presented in this form allows a quick review of the various usbfunctions for each center.

Labour cost per man-years required to product output (Q) in 1971 were highest in Oshawa at $9299.31, followed by St. Catherines and Sault Ste. Marie with c_{Li} values of $9212.33 and $9198.29 respectively. The lowest man-year costs were those in Timmins at $5107.26, and in Sudbury at $5681.94. In 1974, the high labour cost locations were, in

Table 3.11

Factor Cost Identities for Study Centers for 1971 and 1974

Center	c_{Li}		c_{Ni}		c_{Bi}	c_{Mi}		c_{Vi}		c_{Ei}
					(in dollars)					
1971										
KWL	6690.15	+	.0196	+	1.3469	+ P_M+1.16	+	P_V+2.90	+	(.56+.11+.0103)
NBY	7309.65	+	.0122	+	1.6720	+ P_M+2.22	+	P_V+5.55	+	(.61+.12+.0111)
OSH	9299.31	+	.0171	+	1.3628	+ P_M+1.00	+	P_V+2.50	+	(.56+.11+.0109)
STC	9212.33	+	.0201	+	1.5490	+ P_M+1.16	+	P_V+2.90	+	(.56+.11+.0105)
SOO	9198.29	+	.0223	+	1.6813	+ P_M+3.07	+	P_V+7.67	+	(.61+.12+.0118)
SUD	5681.94	+	.0081	+	1.6813	+ P_M+2.47	+	P_V+6.17	+	(.61+.12+.0118)
TIM	5107.26	+	.0066	+	1.7112	+ P_M+4.04	+	P_V+10.10	+	(.62+.12+.0181)
TOR	6102.08	+	.0934	+	1.3361	+ P_M+0.00	+	P_V+0.00	+	(.56+.11+.0144)
1974										
KWL	8513.42	+	.0669	+	3.3958	+ P_M+1.16	+	P_V+2.90	+	(.69+.53+.0149)
NBY	6505.10	+	.0295	+	3.2301	+ P_M+2.22	+	P_V+5.55	+	(.76+.58+.0145)
OSH	12272.09	+	.1540	+	3.2369	+ P_M+1.00	+	P_V+2.50	+	(.69+.53+.0145)
STC	13287.74	+	.0532	+	3.1492	+ P_M+1.16	+	P_V+2.90	+	(.69+.53+.0148)
SOO	13846.22	+	.0630	+	2.8946	+ P_M+3.07	+	P_V+7.67	+	(.76+.58+.0158)
SUD	10381.26	+	.0506	+	2.9700	+ P_M+2.47	+	P_V+6.17	+	(.76+.58+.0159)
TIM	10830.77	+	.0138	+	3.0620	+ P_M+4.04	+	P_V+10.10	+	(.76+.58+.0185)
TOR	7663.78	+	.1933	+	3.0416	+ P_M+0.00	+	P_V+0.00	+	(.69+.53+.0144)

order, Sault Ste. Marie, St. Catherines and Oshawa, while North Bay and Toronto became the low labour cost locations. In terms of land costs, the south-central centers generally had higher values. This was particularly true of Toronto. The opposite was true for building costs, as the Northeastern centers had higher construction costs in 1971. However, Kitchener's high construction costs in 1974 made the construction costs in the Northeastern centers look relatively low. The costs of materials and machinery, weighted against distant centers by the freight rates, were highest in Timmins and Sault Ste. Marie. In terms of electrical energy costs, the Northeastern centers were relatively high cost locations in both 1971 and 1974.

If each of these production costs were equally important to a firm that was considering to locate in one of these eight centers, an overall consideration of all the rankings would be made. Thus, it is possible to devise an index of cumulative cost attractiveness, designated as A_i. This index will be defined as:

$$A_i = \sum_{j=1}^{6} (6 - j + 1) a_j \ , \qquad (3.21)$$

where a_j is the value of the rank for a factor cost which ranks in position j. Here the ranks between centers for factor inputs are ranked for each center, then are cumulatively added. The sum of these cumulative additions will

be large for low cost locations and small for high cost locations. The maximum value is 168 for a center which was ranked the low cost location for all six factor inputs and the minimum value for A_i is 21 for a center which was ranked the highest cost location for all six factor inputs. In this manner, the cost attractiveness of the location is weighted such that the higher cost rankings are assigned higher weights. This operates as a reinforcing mechanism by which the cost ranking attractiveness of a location to a firm is strengthened if the center is a low factor cost for more than one factor. The A_i values for the eight centers for the years 1971 were:

Toronto	157.0
Kitchener	129.5
Oshawa	127.0
Sudbury	110.5
St. Catherines	108.5
Timmins	98.0
North Bay	95.0
Sault Ste. Marie	50.5

These values for 1974 were:

Toronto	152.0
North Bay	131.0
Oshawa	118.0
Sudbury	109.5
St. Catherines	105.5

Kitchener	104.5
Timmins	100.0
Sault Ste. Marie	89.0

Comparing the results for the two years indicates a number of consistencies. If the A_i value approximates the cost attractiveness of a location to a firm which equally considers all the factor inputs, Toronto, Oshawa and Sudbury would be relatively attractive in both 1971 and 1974. Timmins and Sault Ste. Marie would be relatively unattractive in both years.

It is possible to carry this proposal further. If location decisions for firms are based on these rankings, it would be possible to weight the original a_j values for variance in the importance of various factor costs. For example, if the firm wishing to select a location is labour intensive and requires a large amount of land for storage, the ranks for the c_{Li} values and c_{Ni} values could be weighted by a factor of two. These factor cost ranks would then be double-counted and a center offering low cost labour and land would become more attractive. The effectiveness of this type of manipulation rests on the premise that what is normally considered in determining factor cost attractiveness is the relative costs in the location and not the absolute costs. Therefore, ranking factor costs by centers approximates what the firm would do when considering factor cost attractiveness in the location decision.

Observations on the Data Quality

A number of observations on the quality of the data were presented in this chapter. The values which were derived have been subjected to as rigorous control as possible. The data used were either for the end of each year or as near to December 31st as possible. Unfortunately the data, which were provided by the Ontario and Canadian governments on manufacturing, are either not available at sub-provincial scales or not complete. The reasons for this incompleteness include re-classification of data categories from one year to the next, confidentiality protection in categories with only a few operating firms, the total absence of some form of data, re-classification of urban center boundaries, and conflicting data originating from different government branches. For example, Statistics Canada's publication Manufacturing Industries of Canada: Sub-Provincial Areas was a constant source of irritation. For some years, neither Sault Ste. Marie nor Oshawa were listed in the tables for specified municipalities. The data for these years had to be derived from the tables for sub-provincial zones. Also, manufacturing subsector data were provided for all subsectors in Kitchener, Toronto and St. Catherines, but not for the other centers. The data provided for Sudbury prior to 1974 did not include values for Copper Cliff but did so after 1974. As a result, the data used in deriving the factor cost identities had to be verified against other sources, such as provincial government data or personal

interview, wherever possible.

CONCLUSION

In this chapter, the factor cost identities were derived for a given output (Q) for the various production cost subfunctions in the eight centers. On the basis of this information, it would appear that, of the Northeastern Ontario centers, Sudbury and North Bay had factor costs which were comparable to the south-central centers during the early 1970's. Oshawa and St. Catherines had higher labour and land costs. The only center which had consistently low factor costs was Toronto. Did the firms that located during this period follow the pattern of locating in low factor cost locations? During the period 1973 to 1976, 618 firms were recorded by the Ontario Ministry of Industry, Trade and Tourism as having located in Ontario.[23] Of these 618 firms, 129 located in the Toronto-Mississauga area, 30 located in Oshawa, and 25 located in Kitchener. Only 5 located in St. Catherines. Of the Northeastern centers, North Bay received the largest number; 13 firms. Sudbury received 7, Sault Ste. Marie received 5 and only 2 located in Timmins. While the factor costs in St. Catherines were basically the same as in Oshawa, Oshawa received more than four times the number of new firms. It would appear that Oshawa's nearness to Toronto is the determining factor, as 54 of the Toronto area new firms located in Mississauga, on

the western side of Toronto. The Northeastern centers, while receiving very few new firms, received the firms in proportion to the levels of factor costs in them.

As the factor cost identities were derived in this chapter, it is now possible to establish the factor requirements for hypothetical firms. In the following chapter, two hypothetical firms will be identified and their respective factor requirements established. Using the factor cost identities that have been established, the various production cost subfunctions can be solved and a value for total annual cost for each firm in different locations established. This will illustrate how the accounting method may be applied.

Footnotes

1. Roy E. George. A Leader and a Laggard: Manufacturing Industries in Nova Scotia, Quebec and Ontario. (Toronto: University of Toronto Press, 1970).

2. George. ibid., pp. 103- 105.

3. See Table A.1.

4. See Table A.2.

5. See Table A.3.

6. J. Pasternak. The Kitchener Market Fight. (Toronto: Stewart, 1975).

7. George. op. cit. p. 38.

8. Statistics Canada. Employment, Earnings and Hours, 1971. Catalogue 72-002.

9. Canada. Labour Canada, Economics and Research Branch. Wage Rates, Salaries and Hours of Labour: Community Rates.

10. If the data were available, the calculation of the correction factor would be relatively simple in the form suggested by George, op. cit..

11. See Table A.6.

12. See Table A.6.

13. Economic Council of Canada. Living Together: A Study in Regional Disparities - Highlights. Ottawa, 1977.

14. See Table A.7.

15. See Table A.8.

16. See Table A.9.

17. See Table A.10.

18. See Table A.13.

19. See Table A.14.

20. See Table A.15.

21. George. op. cit. p. 59.

22. Ontario Economic Papers. Energy Consumption by Ontario Manufacturing Industries, 1971. Toronto: 1976.

23. See Table A.18.

CHAPTER 4

CALCULATING PRODUCTION COSTS FOR HYPOTHETICAL FIRMS

Implicit in the previous chapter, as summarized in Table 3.13, is the assumption that all firms have the same factor requirements and output levels. Presumably, these implied factor requirements and output levels are the average of all factor requirements and output levels for firms of a given type in Ontario. For example, (Q) is the average man-years of labour required in Ontario to produce 100 pounds of output.

In this chapter, the annual production costs of two hypothetical firms will be calculated for each of the eight centers examined in the previous chapter. As the factor cost identities c_L, c_N, c_B, c_M, c_V and c_E have been calculated for selected years, the calculation of the total annual production costs of each firm requires only the specification of the factor requirements $\lambda, \gamma, \beta, \mu, \partial, \rho, \phi$ and η and the output level (Q). While the factor cost identities vary for the centers in question, the factor requirements do not vary. That is, the cost of the output varies over space but not the quantities of inputs required to produce that output. The calculation of the total annual cost of production of the two hypothetical firms will allow a more specific comparison between centers than that achieved for an unknown

firm with an unspecified output.

The two firms will be referred to as Standard Firm A or SFA, and Standard Firm B or SFB. These firms were selected for specific reasons for this analysis and their characteristics were manipulated with intention. First of all, SFA should be less compatible with the general Northeastern Ontario factor cost structure in that it requires skilled labour, a material that is produced mostly in southern Ontario which would incur higher transport costs as it is shipped north, and requires a higher level of energy inputs than SFB. Generally, SFA reflects the characteristics of small manufacturing firms of south-central Ontario. On the other hand, SFB is associated with Northeastern Ontario's recreation and tourist potential, uses low cost material, and uses generally unskilled labour. It, therefore, should be more compatible with the Northeastern factor cost structure. Also, SFB is the type of firm that the Sudbury 2001 Development Committee wishes to attract to Northeastern Ontario. The Sudbury 2001 Development Committee favoured the philosophy of "appropriate" or "alternative" technology in industrial development.[1] This approach, as developed by E. F. Schumacher[2], emphasizes small scale firms, with a high labour input, low capital requirement, and utilizes easily obtained, simple technology. This differs from the characteristics of the "typical" firm in south-central Ontario, as represented by SFA.

In calculating the total cost levels for the two hypothetical firms, the assumptions made in Chapter Three in regard to deriving the factor cost identities will hold. The manner in which the total cost levels will be calculated will imply that Standard Firm A exists identically and simultaneously in all centers for the given years and Standard Firm B exists in all centers. That is, Standard Firm A in Kitchener is identical in all respects to Standard Firm A in all other centers. In this manner, the total cost levels that are calculated will be for identical firms in various locations. The cost of transporting the output of the two firms to the market will not be included as the firms' relative size of output indicate that they are providing for the local market and the freight costs on sales outside the local markets are paid by the customer.

The factor cost requirements for both SFA and SFB were determined by three methods. Data from Statistics Canada on the manufacturing industries of Ontario allowed for the calculation of average firm size, output, material and labour requirements, and energy inputs for firms of SFA's and SFB's type. These values were then collaborated by Ontario government statistics on average energy requirements by firms of SFA's and SFB's type. In these terms, SFA and SFB were designated to have factor requirements that reflected the average of firms of their type in Ontario.

This information was then checked and elaborated by

second method used. This consisted of both telephone and personal conversations with managers or supervisors of firms of SFA's and SFB's type, conducted in the autumn of 1978 in the Toronto-Hamilton region, and in the Sudbury area.

As a final check on the information, financial information on firms available in various reports and yearbooks[3] was compared with the factor requirements established. Thus, SFA and SFB represent the average or typical firm of their type.

The two hypothetical firms will be dealt with in separate sections. After the total annual costs of production have been derived for both firms, in all eight centers, for the two selected years, observations will be made.

STANDARD FIRM A

Standard Firm A, referred to as SFA, is a metal fabricating firm with the three digit Standard Industrial Classification number 306. It produces metal tools and hardware from steel. The type of steel used is produced by the hot rolling method,[4] and is purchased from a Toronto firm. Its output in 1971 had a value of $500,000 and in 1974 of $650,000, roughly the average value of shipments for similar firms in Ontario for those years. The weight of these outputs for both years was 200,000 pounds. This value was obtained by deriving the value of materials used in order to

produce the output value of $500,000 from the industry total.[5] Its man-year requirements, material requirements, and energy requirements for annual operation were derived in similar fashion. The values for land, building and machinery requirements were obtained by personal interviews with firms in the Hamilton region.

The factor requirements for SFA are:

Q = 2000 hundreds of pounds of output

λ = 25 man-years

γ = 20,000 square feet of land

β = 10,000 square feet of building

μ = 2100 hundreds of pounds of materials[6]

∂_1 = 10.0 hundred pounds of new machinery in 1971

∂_2 = 12.5 hundred pounds of new machinery in 1974

ρ_1 = 1500 MCF of natural gas in 1971

ρ_2 = 1000 MCF of natural gas in 1974

ϕ_1 = 3500 gallons of fuel oil in 1971

ϕ_2 = 1500 gallons of fuel oil in 1974

η_1 = 129500 Kwh of electricity in 1971

η_2 = 144000 Kwh of electricity in 1974

Unless the factor requirement is subscripted, the value of the factor requirement holds for both 1971 and 1974. The term λ is assigned the value of 25 man-years but SFA has only 20 employees. However, ten of these employees are skilled workers and are paid for 1.5 man-years annually.

The ten skilled employees thus contribute 15 man-years to the value of output. The values for machinery were derived from information garnered with operating firms. The values for energy inputs were derived from the Ontario Ministry of Treasury, Economics and Intergovernmental Affairs' publications.[7]

In the previous chapter, the factor cost identities for cost of materials and cost of machinery were not stipulated in a general form. This was due to the problems of variance in manufacturing subsector variance. These factor cost identities may be derived for SFA now. The price of hot rolled steel was $7.300 per hundred pounds in 1971. The price in 1974 was $8.475 for the same amount.[8] The average price of machinery for SFA was $500 per 100 pounds in 1971 and $750 per 100 pounds in 1974.[9] Table 4.1 contains the factor cost identities for c_{Mi} and c_{Vi} for 1971 and 1974.

As both the factor cost identities and the factor requirements for each subfunction have been stated, it is possible to solve for the total cost of producing SFA's output of 200,000 pounds with a value of $500,000 in 1971 and $650,000 in 1974.

In Table 4.2, the various factor costs and total cost of production for SFA in 1971 are presented in hundreds of dollars. The total cost of producing 200,000 pounds of metal tools and utensils for SFA ranged from a low of $373640 in Toronto to $477185 in St. Catherines. If SFA was

Table 4.1

Cost of Materials for Standard Firm A

Center	Cost of Steel Plate in dollars per 100 pounds (c_{Mi} factor cost identities)		Cost of Machinery in dollars per 100 ounds (c_{Vi} factor cost identities)	
	1971	1974	1971	1974
KWL	8.460	9.635	502.90	752.90
NBY	9.520	10.695	505.55	755.55
OSH	8.300	9.475	502.50	752.50
STC	8.460	9.635	502.90	752.90
SOO *	7.300	8.475	507.67	757.67
SUD	9.770	10.945	506.17	756.17
TIM	11.340	12.515	510.10	760.10
TOR	7.300	8.475	500.00	750.00

* Note: As Sault Ste. Marie is a steel producing center, it will be assumed that Standard Firm A in Sault Ste. Marie will purchase steel plate locally.

Source: Derived from Table A.14 and Canada. Steel Profits Inquiry, October 1974.

Table 4.2
Factor and Total Costs for Standard Firm A
1971

Center	Factor Costs in Hundreds of Dollars for 1971						Total Cost in Hundreds of Dollars
	C_L	C_N	C_B	C_M	C_V	C_E	
KWL	1672.54	3.92	134.69	1776.6	502.90	25.59	4116.24
NBY	1827.41	2.44	167.20	1999.2	505.55	27.72	4529.52
OSH	2324.83	3.42	136.28	1743.0	502.50	26.36	4736.39
STC	2303.08	4.02	159.40	1776.6	502.90	25.85	4771.85
SOO	2299.57	4.46	168.13	1533.0	507.67	28.63	4481.46
SUD	1420.48	1.62	159.40	2051.7	506.17	28.63	4168.00
TIM	1276.81	1.32	171.12	2381.4	510.10	36.94	4377.69
TOR	1525.52	18.68	133.61	1533.0	500.00	25.59	3736.40

located in Toronto, total costs in 1971 would have been 90.77 percent of the total cost if SFA was located in Kitchener. In St. Catherines and Oshawa, SFA's total costs would have been more than 15 percent higher than in Kitchener. SFA's total costs, if it had been located in the Northeastern centers, would have ranged from 10.04 percent higher in North Bay to 1.26 percent higher in Sudbury. Overall, Sudbury was the third lowest total cost location, followed surprisingly by Timmins. These results are due to relatively low labour costs in these two centers.

Table 4.3 contains the various factor costs and total cost for 1974. Higher labour costs in Oshawa, St. Catherines, Sault Ste. Marie, Sudbury and Timmins resulted in higher total costs relative to Kitchener than existed in 1971. However, both Toronto and North Bay had total costs that were 7.20 percent and 4.60 percent lower than if SFA had been located in Kitchener. In 1974, Sudbury was the fourth lowest production cost location.

Overall, SFA's lowest costs would occur if it was located, respectively, in Toronto, Kitchener, Sudbury or North Bay. It would appear that, even though Sault Ste. Marie and Oshawa would have very low freight costs on materials, higher labour costs offset this transportation advantage. The generally high level of factor prices for all inputs to SFA's production in Timmins implies that any firms that are similar to SFA would not find Timmins to be an

Table 4.3
Factor and Total Costs for Standard Firm A
1974

Center	Factor Costs in Hundreds of Dollars for 1974						Total Cost in Hundreds of Dollars
	C_L	C_N	C_B	C_M	C_V	C_E	
KWL	2078.85	13.38	339.58	2023.3	941.12	36.29	5432.57
NBY	1626.27	5.90	323.01	2245.9	944.44	37.18	5182.75
OSH	3055.22	30.80	323.69	1989.7	940.62	35.73	6375.81
STC	3321.93	10.64	314.92	2023.3	941.12	36.16	6648.12
SOO	3461.55	12.60	289.46	1779.7	947.09	39.19	6529.64
SUD	2595.31	10.12	297.00	2298.4	945.21	39.19	6185.28
TIM	2707.69	2.76	306.20	2628.1	950.12	42.94	6637.85
TOR	1915.94	38.66	304.16	1779.7	937.50	35.58	5041.59

attractive factor cost location. It is interesting that total costs in Sudbury and North Bay would make these centers a relatively low total cost location for SFA, as firms of SFA's type are not traditionally attracted to Sudbury or North Bay.

In the following section, the total costs for a firm that has been suggested as being more fitting for Northeastern Ontario centers than firms of SFA's type will be discussed.

STANDARD FIRM B

Standard Firm B will be henceforth referred to as SFB and is classed as 328 according to the Standard Industrial Classification three digit classes for transportation equipment industries. It is a small boat building firm whose value of output in 1971 was $200,000 and $250,000 in 1974. In both years, SFB produced 100,000 pounds of output. The boats that SFB produce are 50 percent fibreglass, which is purchased from a Toronto supplier, and 50 percent wood. The wood is obtained by the firm locally from a furniture manufacturer who considers the wood as waste. Therefore, the wood is supplied free of charge to SFB.

The factor requirements for SFB were derived from Statistics Canada's Manufacturing Industries of Canada series and from Ontario's Consumption of Fuel and Electricity by Ontario Manufacturing Industries for 1971 and 1974. Further details were provided by correspondence with real boat building

firms.

SFB's factor requirements for an output of 100,000 pounds are:

λ = 6 man-years

γ = 20,000 square feet of land

β = 5,000 square feet of building

μ = 525 hundred pounds of fibreglass annually

∂ = 5 hundred pounds of machinery annually

ρ_1 = 600 MCF natural gas in 1971

ρ_2 = 600 MCF natural gas in 1974

ϕ_1 = 1200 gallons fuel oil in 1971

ϕ_2 = 400 gallons fuel oil in 1974

η_1 = 46000 kwh electricity in 1971

η_2 = 37200 kwh electricity in 1974

SFB has three permanent workers contributing one man-year apiece annually. There are 6 workers contributing only one-half a man-year apiece as they work for only 6 months. Only 5 percent of the fibreglass materials are wasted. The factor requirements with a subscript of 1 is the value for 1971; 1974 requirements have a subscript of 2.

As with SFA, the factor cost identities for C_{Mi} and C_{Vi} can be estimated for SFB. In 1971, fibreglass materials cost approximately \$47.60 and \$45.00 in 1974 per 100 pounds of material.[10] The machinery used cost roughly \$400 per hundred pounds in 1971 and \$575 per hundred pounds

in 1974.[11]

The factor costs for SFB for the eight centers in 1971 are contained in Table 4.4. Total cost of production of 100,000 pounds of output in 1971 were lowest in Timmins, due to relatively lower factor costs. Total cost of production in Timmins was 7.89 percent lower than if SFB was located in Kitchener. The second lowest total cost location was Sudbury where SFB's total costs would have been 5.58 percent lower than in Kitchener. The third lowest cost location was Toronto, at 3.35 percent below Kitchener's total cost level. Sault Ste. Marie exhibited a total cost level for SFB that was 23.62 percent higher than in Kitchener. St. Catherines and Oshawa followed, with total cost levels 21.61 and 20.61 percent respectively above Kitchener's level. SFB, with a lower emphasis on materials and machinery than SFA, did not suffer the same level of freight costs that SFA had. In this manner, Timmins and Sudbury, with lower labour costs, would have been the lowest total cost locations for SFB.

In 1974, higher labour costs in Timmins and Sudbury increased their total costs of production. Table 4.5 contains the factor costs and total costs for the eight centers. In 1974, the lowest total costs for SFB would have been realized in North Bay, 12.25 percent less than Kitchener's level of total costs. Toronto had the second lowest level of total costs. Total costs in Toronto were 3.93 percent

Table 4.4

Factor and Total Costs for Standard Firm B
1971

Center	Factor Costs in Hundreds of Dollars for 1971						Total Cost in Hundreds of Dollars
	C_L	C_N	C_B	C_M	C_V	C_E	
KWL	401.41	3.92	67.34	255.99	20.14	9.42	758.22
NBY	438.58	2.44	83.60	261.55	20.28	10.20	816.65
OSH	557.96	3.42	68.14	255.15	20.12	9.69	914.48
STC	552.74	4.02	79.70	255.99	20.14	9.53	922.12
SOO	551.90	4.46	84.06	266.02	20.38	10.53	937.35
SUD	340.91	1.62	79.70	262.87	20.31	10.53	715.94
TIM	306.43	1.32	85.56	271.11	20.50	13.48	698.40
TOR	366.12	18.68	68.80	249.90	20.00	9.42	732.80

Table 4.5

Factor and Total Costs for Standard Firm B
1974

Center	Factor Costs in Hundreds of Dollars for 1974						Total Cost in Hundreds of Dollars
	C_L	C_N	C_B	C_M	C_V	C_E	
KWL	498.80	13.38	169.79	242.34	28.99	11.80	965.10
NBY	390.30	5.90	161.50	247.90	29.03	12.27	846.90
OSH	736.32	30.80	161.84	241.50	28.87	11.65	1210.98
STC	797.26	10.64	157.46	242.34	28.99	11.76	1248.45
SOO	830.77	12.60	144.73	252.37	29.13	12.79	1282.39
SUD	622.87	10.12	148.50	249.22	29.06	12.79	1072.56
TIM	649.84	2.76	153.10	257.46	29.25	13.76	1106.17
TOR	459.82	38.66	152.08	236.25	28.75	11.61	927.17

below Kitchener's level. Kitchener had the third lowest level, followed by Sudbury where total costs were 11.13 percent higher than in Kitchener. The highest level of total costs occurred again in Sault Ste. Marie. In Sault Ste. Marie, SFB would have had total costs that were 32.87 percent higher than in Kitchener. St. Catherine's total cost level for SFB in 1974 was 29.36 percent above Kitchener's total cost level. In Oshawa, it was 25.48 percent higher.

It would appear that SFB would not have been compatible with Sault Ste. Marie's, St. Catherines' or Oshawa's factor cost structure. Total costs for SFB in 1971 would have been more than 20 percent higher than in Kitchener and 25 percent higher in 1974. Toronto and North Bay locations would have been total cost attractive, followed by Kitchener. Sudbury and Timmin's total costs would have made these centers only slightly less cost attractive than Kitchener. SFB is the type of firm which the Sudbury 2001 Committee has suggested as finding Northeastern Ontario locations feasible. While SFB could have had relatively low total costs in 1971 and 1974 in Sudbury, North Bay and Timmins, it could have had similar total cost levels in Toronto or Kitchener.

IMPLICATIONS

In this section, the implications of the preceding analysis of the two hypothetical firms will be discussed initially in a general manner and secondly in terms of North-

eastern Ontario's development problem.

Factor Requirement Structure

In the analysis of SFA and SFB, the determinant of total cost, given sets of factor cost identities, was the level of factor requirements. For example, given the relative size of the two firms' outputs, SFB was more land intensive than SFA, SFB also required less machinery than SFA. These differences in factor requirement levels will be referred to as the structure of a firm's factor requirements. The factor requirement structure of a firm, which depends on the relative importance of a factor to all other factors, should pull factor cost minimizing firms to the location with lowest cost levels for the factor that is most important to the firm.

For example, SFB in 1974 required 6 man-years, 20,000 square feet of land and 525 hundred pounds of fibreglass material. When the factor costs c_L, c_N and c_M were calculated, it was found that c_L was the largest single factor cost, followed by c_M or material costs. The ranking of C_{Li} paralleled the ranking of TC_i. With the exception of Oshawa and Sault Ste. Marie, this also held for 1971. Clearly, the identification of firms that would have a factor cost advantage in locating in a Northeastern Ontario center would allow local governments in the Northeast to pursue such firms. This is particularly important given

Toronto's favourable conditions for both SFA and SFB in both years, implying that Toronto offers both cost and location advantages. However, these advantages may be bounded by advantages elsewhere.

For example, from Table 3.13, production cost in Toronto for 1974 may be summarized as:

$$TC_T = 7663.78\lambda + .1933\gamma + 3.0416\beta + P_M\mu + P_V\delta + .69\rho + .53\phi + .0144\eta, \quad (4.1)$$

for respectively, labour, land, building materials, machinery, natural gas, fuel oil and electricity costs.[12] For Sudbury, it was:

$$TC_S = 10381.26\lambda + .0506\gamma + 2.9700\beta + (PM + 2.47)\mu + (P_V + 6.17)\delta + .76\rho + .58\phi + .0159\eta \quad (4.2)$$

The difference between the costs of production in Toronto and Sudbury would then be:

$$(TC_T - TC_S) = -2717.48\lambda + .1427\gamma + .0716\beta - 2.47\mu - 6.17\delta - .23\rho - .05\phi - .0015\eta \quad (4.3)$$

In equation (4.3), a positive sign indicates a factor cost advantage in Sudbury over Toronto while a negative sign indicates that Toronto had the advantage of lower factor costs in 1974. Thus, Sudbury had factor costs for land and buildings per square foot that were below the cost in Toronto. However, costs for labour per man-year, materials and machinery per 100 pounds, MCF of natural gas, gallon of fuel oil and kilowatt-hour of electricity were lower in Toronto.

For Sudbury's advantages to outweigh Toronto's ad-

vantages in 1974, after dividing both sides by 0.1427:

$$\tau + .502\beta > 19043.307\lambda + 17.309\mu + 43.237\partial + 1.600\rho + .350\phi + .011\eta \quad (4.4)$$

If there is a relationship between amount of square feet of land and amount of square feet of building required such that every square foot of building implies the use of three square feet of land[13], then the following conditions are necessary but not sufficient for Sudbury to have been the preferred location in 1974:

$$1.167\tau > 19043.307\lambda \quad (4.4)$$

$$1.167\tau > 17.309\mu + 43.237\partial \quad (4.5)$$

$$1.167\tau > 1.600\rho + .350\phi + .011\eta \quad (4.6)$$

Then, it was necessary, but not sufficient, that the amount of land used for a firm to have preferred a Sudbury location over a Toronto location would have been more than:

16138.172 square feet per worker per year
14.832 square feet per 100 pounds of material per year
37.050 square feet per 100 pounds of machinery per year
1.371 square feet per MCF natural gas used per year
0.299 square feet per gallon of fuel oil used per year
0.009 square feet per kwh of electricity used.

For example, the size of the industrial lot the firm would need in order to have land costs outweigh labour costs in 1974 would have to be more than 127.74 feet by 127.74 feet per worker. That is, it would be necessary but not sufficient that the firm would be so land intensive that it would use

2.67 workers per acre of land, given that the data initially used was correct for 1974 factor costs.

In equation (4.3), the average cost in Sudbury per man-year was calculated as $2717.48 more than Toronto. This large difference indicates that possibly the term c_L did not totally eliminate the effects of subsector, sex, skilled or union mix. As indicated in Chapter 3, it was not possible to totally standardize the cost of labour per man-year because of the aggregation of the available data. It is possible and probably likely that the land requirement per worker would be much less for Sudbury to be more attractive to firms.

As indicated, the factor requirement structure of firms would be an important consideration in determining the factor cost attractiveness of a location. This may be approached in another manner than specified above. The following relationships are necessary, but not sufficient, conditions for Sudbury to have been a favoured location in 1974, in comparison to Toronto:

Condition I $\gamma + .502\beta > 19043.307\lambda$ (4.7)

Condition II $\gamma + .502\beta > 17.309\mu + 43.237\partial$ (4.8)

Condition III $\gamma + .502\beta > 1.600\rho + .350\phi + .011\eta$ (4.9)

In the case of equation (4.7), the implication is that either the cost of the amount of land consumed or the cost of the building consumed must exceed the cost per man-year. On one extreme then, the amount of land consumed per man so that the

cost of land in Toronto exceeds the cost of labour would be 19043.307 square feet of land per worker. If buildings are substitutable for land, the other extreme would be no land consumed and 37934.874 square feet of building per employee. In Figure 4.1, this example is presented in graphical form, providing a production possibility curve of land and building requirements per worker where factor costs would favour a Sudbury location. The difference in cost for any combination of land and buildings in the shaded area exceeds the difference between Sudbury's and Toronto's labour costs.

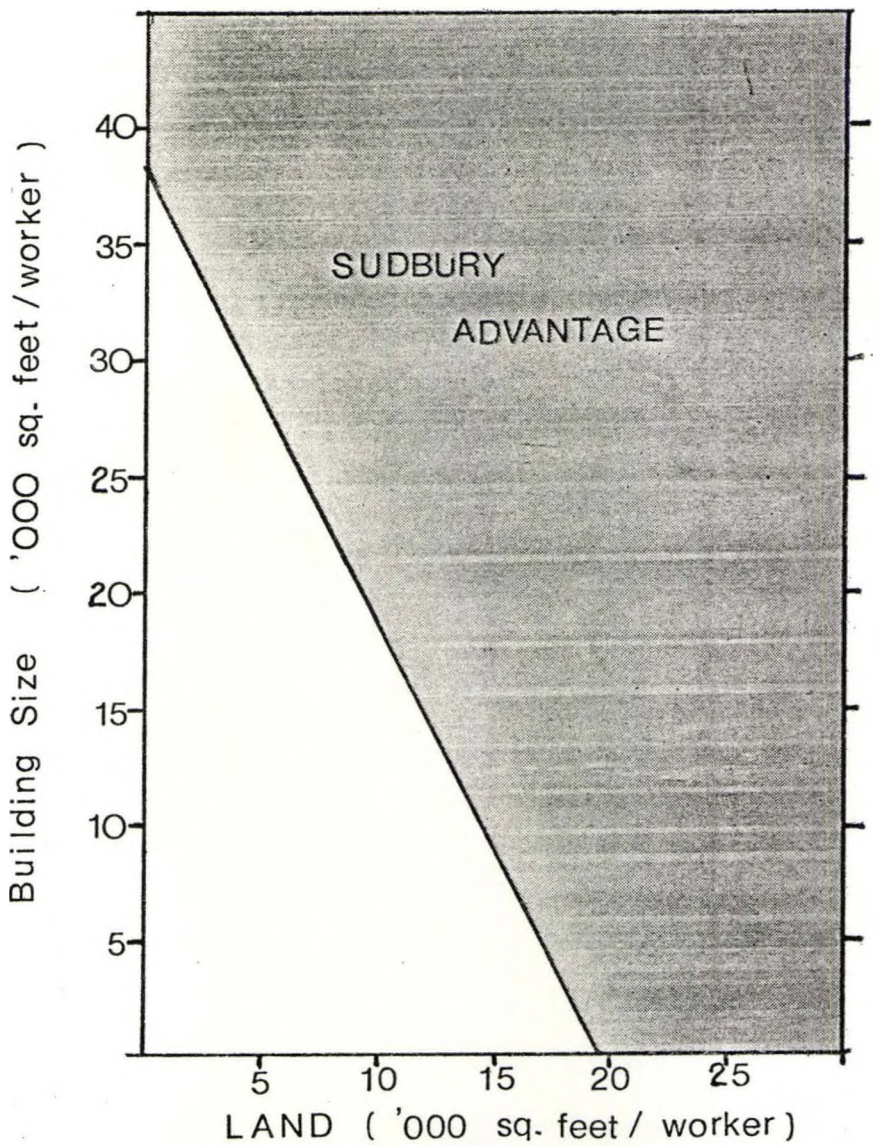
Due to Toronto's inherent advantages in combination with its factor cost advantages, it is an attractive location for industry. Northeastern centers should identify the types of firms, then, that could be as profitable in Northeastern location as in south-central locations like Toronto.

Implications for Northeastern Ontario

Tables 3.13 and 4.2 to 4.5 indicate that the Northeastern Ontario centers which would appear to be fairly reasonable locations for industrial firms are Sudbury and North Bay. Their relative nearness to Toronto and subsequent lower transport costs, availability and cost of land, labour and energy, and their taxation rates on industrial property are features in their favour, in comparison to Sault Ste. Marie and Timmins.

However, only particular types of firms would find

Figure 4.1 Firm Factor Trade-offs - Sudbury and Toronto
(Combinations and Amounts of Land and Building required to offset difference in Labour Cost)



Sudbury and North Bay to be attractive locations in terms of factor costs. These firms would have to have the following characteristics:

1. Low Labour Requirements. While the number of workers would have to be low, the firm could utilize the underutilized unskilled and female workers available.
2. Land Intensivity. As land costs are low in Sudbury and North Bay, firms requiring large amounts of land for security, storage or production reasons could find these locations attractive.
3. Building Intensive. While construction costs are high, municipal taxation is generally low.
4. Local Materials. Firms which have to utilize as much local materials as possible, due to transport costs on materials imported into the region. However, this is not a stringent condition as freight costs to Sudbury and North Bay from south-central Ontario are low compared to other Northeastern centers.
5. Machinery Requirements. Due to the higher freight costs on machinery, the firm would have to either have low machinery requirements, government subsidization, or be able to purchase machinery within the region.
6. Low Energy Requirements. The final characteristic is that the firms would need to have relatively low energy requirements, particularly petroleum energy. Because of the abundance of potential hydroelectric power, firms

that are willing to generate their own hydro energy would find Sudbury and North Bay attractive.

However, these characteristics may not be sufficient for firms to locate in these locations. The matter of intangible costs and benefits of locations, indicated by George[14] as being important, have not been considered. It would appear that entrepreneurial perception of cost is important. A survey of sixteen firms that operated in Sudbury in 1978, accounting for employment of 500 workers, indicates what these firms believed to be problems resulting from operation in Sudbury. Of all firms, 50 percent believed that high transport costs added substantially to their production costs but that this situation could be corrected with the de-regulation of the trucking industry. Seven firms believed that competition with firms from outside the region for the local market was a problem and indicated that local inhabitants should increase their support of local firms. Nine firms believed that high production costs were the result of local market size and could decrease with population increases or increased mining activity. Four firms indicated that environmental conditions such as weather increased costs because of increased maintenance, insulation and energy requirements. Three firms found that a problem was a lack of some local materials for the production process such as machinery, metals and ingredients. Most firms indicated that production costs were 5 to 10 percent higher in Sudbury than in Toronto. While

this observation is confirmed by the data presented in the previous chapter, it was an unsubstantiated estimate that could be less.

Thus, perception by the business committee of the economic health is a consideration that should be examined, as well as the amenity factor in industrial location decisions.

CONCLUSIONS

In this chapter, the total production costs for two hypothetical firms were calculated for 1971 and 1974. The ranking of lowest total costs to highest total costs, as summarized in Figure 4.2, indicates that on the basis of total costs, Toronto is a low cost location for both hypothetical firms. Next lowest is Kitchener, followed by Sudbury, North Bay, Timmins, Oshawa, Sault Ste. Marie and lastly, St. Catherines.

In general, Toronto locations appear to be low cost, due to labour cost differences. However, as mentioned previously, this large difference in labour costs are probably due to the impossibility of complete standardization of the wage data to remove various mix effects. Given the system of education which exists in Ontario, labour union representation of labour, and different sex composition in various centers, it would be expected that cost per similar man-year in all centers would be approximately the same. This is

Figure 4.2

Rankings of Total Cost for Standard Firm A and Standard Firm B (Annual Production)

SFA		TOTAL COST RANKING	SFB	
1971	1974		1971	1974
		LOW COST		
Toronto	Toronto		Timmins	North Bay
Kitchener	North Bay		Sudbury	Toronto
Sudbury	Kitchener		Toronto	Kitchener
Timmins	Sudbury		Kitchener	Sudbury
Sault Ste. Marie	Oshawa		North Bay	Timmins
North Bay	Sault Ste. Marie		Oshawa	Oshawa
Oshawa	Timmins		St. Catherines	St. Catherines
St. Catherines	St. Catherines		Sault Ste. Marie	Sault Ste. Marie
		HIGH COST		

(not to scale)

aided by the process of labour migration, particularly in the centers with low supplies of skilled labour. For example, the low supply of labour in Northeastern centers is probably due to a low, consistent demand for skilled labour in those centers.

While the sensitivity of the calculated values for labour costs may be low, the remaining values should be as accurate as possible. Thus, future correction of the labour cost values would refine the accuracy of the overall impression of the total cost values. Generally, the accounting method used in Chapters 3 and 4 allows for an appraisal of the manufacturing potential of Northeastern centers with real data, that indicates that particular types of firm would incur total costs in the Northeast that were not much different from south-central locations.

Therefore, it could be stated that it would be worthwhile for the Northeastern centers to sponsor a more sophisticated attempt to obtain more refined final values, in particular labour cost figures. The results of the factor cost accounting method utilized in the previous chapter indicate the general areas that Northeastern centers should concentrate in attempting to attract firms. A further attempt, unhampered by the restrictions and difficulties encountered here, would provide data that would increase the accuracy of the effort, and would be of greater assistance to firms considering Northeastern locations.

However, it has become increasingly apparent that the development problem existing in Northeastern centers is not due so much to higher total production costs in those centers. Particular types of firms should find Northeastern locations cost attractive. The possible reasons why they do not and the implications of this observation for policy and research will be discussed in the final chapter.

Footnotes

1. Sudbury 2001 Conference. April, 1978.

2. E.F. Schumacher. Small is Beautiful: Economics as if People Mattered. (New York: Harper and Row, 1973).

3. Financial Post Corporation Service. (Toronto, 1977).

4. The hot rolling method of producing steel at the steel mill precedes the cold rolling stage usually.

5. Statistics Canada. Manufacturing Industry of Canada: Geographical Distribution, 1971 and 1974.

6. This will allow for five percent wastage of materials in the production process.

7. Ontario. Consumption of Fuel and Electricity by Ontario Manufacturing Industries, 1971 and 1974. Toronto: May, 1975.

8. Canada. Steel Profits Inquiry, October 1974.

9. This was calculated on the basis of personal interviews in October, 1978.

10. Standards and Poors. Industrial Surveys. (New York: McGraw Hill, 1978).

11. Derived from interviews in October, 1978.

12. See equations 3.1 to 3.13 for definitions of terms.

13. Implied from interviews undertaken October, 1978.

14. George, op. cit..

CHAPTER 5

REFLECTIONS ON THE IMPLICATIONS OF THE RESULTS

As is common to regional economic studies, implications of the results of this research has both implications for policy in the Northeastern region and for future research. In this chapter, some of the implications for policy will be discussed in terms of conditions for the initial stimulus for growth and of core-periphery relations. This will be followed by a short discussion of immediate research implications.

IMPLICATIONS FOR POLICY

Northeastern Ontario is a region whose economy is lagging in development. Its economic growth is below the Ontario average and continues in unstable primary production. Economic growth, as indicated earlier, is a complex process where various factors promote, hinder and, in turn, are affected by growth. Because this process of growth is not understood beyond its basic theoretical principles, the effectiveness of government policy in correcting regional growth disequilibriums is greatly hampered. It would appear that the stimulation of economic growth in a lagging regional economy requires a positive exogenous shock that is large enough to initiate changes in the economy. The situation may be considered analogous to the snowball effect. A snowball,

representing a stagnant economy, will not gather mass or momentum until it is pushed down a hill. Once its inertia is overcome by the stimulus, it will roll down the slope of the hill, gathering mass which gives it new momentum. Of course, this is an oversimplification of the growth process. Other factors can affect growth within an economy, just as the snowball's movement down the slope is affected by the snow conditions, the angle of the slope, direction of movement and frictional forces.

Two of these considerations which will constrain government policy directed towards effecting changes in Northeastern Ontario's economy should be discussed further at this point. The first consideration has to do with the conditions necessary for the establishment of firms to act as propulsive units in the regional economy while the second consideration deals with the constraints imposed by core-periphery relations.

The Initial Kick Conditions

If it is initially assumed that economic changes are not only necessary but also possible and desirable in the Northeast, growth center strategies would appear to be the only present available policy tool. This requires the provision of a positive shock to the economy, in some form or another, in order to stimulate growth in the designated center and eventually stimulating growth in the surrounding

area. In equation (1.6) it was postulated the velocity, which includes rate of change and direction, of growth in time period t, designated as V(t), was a function of g, the effect of growth in the previous time periods on growth conditions, such that:

$$V(t)_i = g\ [f(W(t-1))]_i$$

The velocity of growth of a new firm locating in the Northeast will be affected by the general velocity of growth within the regional economy, as well as the firm's inherent characteristics. It would seem impossible then for single firms in the designated growth centers to offset the increasingly precarious conditions of the Northeastern economy. For example, the survival of the firm in a center would be unlikely if the firms depended on the local or regional market, given present poor economic conditions.

From the analysis in earlier chapters, it is possible that actual production costs are not unattractive in some of the major Northeastern centers, and may become more attractive in the future for certain firms. It would appear that economic reasons do not really hinder the establishment of new firms in these centers, and other factors may be more important. Policies to attract firms, to act as propulsive units in the growth process, must consider this contention. Of course, certain costs related to production could be lowered such as transport costs on imported materials and

machinery by increasing the entry into the transport field or gradually through increasing volume transported. However, if the velocity of the declining economy of the Northeast is to be changed by new firms locating in the Northeast, more than just economic factors must be considered, as the impetus to alter the present economy's momentum must be strong. This requires the creation of a "development environment" in the centers designated as growth centers. A development environment will be defined as a socio-economic climate in a region that is, or appears to be, conducive to economic growth. Simply, the possibility of an expanding, diversified economy will make investment for the future an attractive proposition. This implies that measures must be taken in the Northeast to change the present socio-economic climate of the region to one in which the perceived risk of establishing firms, which could act as propulsive units, is minimized. This could be achieved through entrepreneurial education, short term tax incentives and infrastructure investment in land, transportation, communications, and research. The creation of a development environment in Northeastern Ontario, is a necessary condition before entrepreneurs will consider a location in the region. Much of the expense in monetary and physical terms, would have to be met by the region's inhabitants. This will not only ensure rapid and efficient completion, but will also ensure that local sensitivities and knowledge will not be overlooked.

While preliminary results of the research contained here indicates that production costs for certain industries are comparable to those in the south-central region, there are limitations in which firms may act as propulsive units. Even with the creation of a development climate in the Northeast, the shock required to change the present economic trends in the Northeast will have to be of a magnitude great enough to overcome the inertia of the system. This will require some combination of small numbers of large firms, large numbers of small firms, and fundamental changes in the ideological and consumption natures of Canadian society. In regards to the firms, they must be compatible with the region's supply and price of factors of production such as land, labour and resources by utilizing the factors which the Northeast can provide advantageously. Larger firms would probably have to be export oriented due to the size of local markets, and produce in sufficient volume to gain cost reductions through economies of scale. Smaller firms could be oriented towards replacing imported goods or producing high quality, specialized products for export to other regions. It is the linkage effects of these firms to the service, supply and final demand sectors which will determine if these firms will act as propulsive units. Also, the success of these firms will reduce the perception of risk, contributing to the development environment and thereby attracting other firms to the region.

The strategy of initially attracting the firms which will act as propulsive units should not be based on a policy of government subsidies. First, the firm attracted by subsidies may become dependent upon this aid and, secondly, the knowledge that subsidies are available for firms locating in a particular region could result in a stigma of depression that will make entrepreneurs hesitant to invest in that region. Instead, information and education programs, combined with the creation of a development environment and the willingness of local entrepreneurs to invest in their own region, should be sufficient conditions to foster appropriate firms.

Indeed, the inhabitants of Northeastern Ontario should take much of the initiative into their own hands by investing their own resources into development, buying local products and promoting local entrepreneurs. The argument is that Northeasterners cannot expect outsiders to risk what they are not willing to risk themselves.

Also, it would appear that the problem of intangibles contributes to the overall Northeastern development problem. The perception of Northeastern centers as high cost locations, with little of the amenities of south-central section of Ontario, is difficult to measure as an additional growth inhibitor, and is difficult to dispel its resulting effects.

In summary, care must be taken in attracting firms which have the potential to act as propulsive units to stimu-

late growth, and whose factor requirements and factor costs will allow for a healthy firm within the Northeastern constructs. These firms are required in order to create a development environment in the Northeast, but so are changes in entrepreneurial perceptions of conditions in the Northeast which may be obtained by increased information, communication and education.

Core-Periphery Relations

The success of a growth center strategy for the Northeast will depend on the constraints imposed by core-periphery relations. The south-central region of Ontario will be considered the core, and the Northeast as the periphery. This division results in a number of problems for development, arising from the reproduction of the relationship through time.

The south-central core is an area of established growth, while the periphery's growth potential has been continuously diminished by the core's success. This situation creates economic barriers to the stimulation and success of growth in the Northeast. Northeastern centers, quite obviously, have not developed industrial economies of agglomeration to the extent that the core centers have. This is due in part, to the single industry orientation of most Northeastern centers, and the subsequent lack of development of easily exchangeable factors of production. The economic

system of the Northeast evolved through time as a specialized, resource-oriented economy, and has developed inertia in its socio-economic relationships. No substantial changes have occurred, other than shifts in settlement due to resource depletion. These shifts have merely resulted in changes in the location of economic activity, but not changes in the economy's character. In short, reproduction of the production conditions of the Northeastern economy has resulted through time, while the production conditions of the core have also been reproduced and reinforced. As the core has been the source of political, industrial and financial power, the Northeastern periphery has been relegated through the "natural order" of economic relationships to a subordinate position. This subordinate position also has inertia to change. As the continuation of the core-periphery relations requires the reproduction of the productive forces of society, and the relations of production,[1] which are secured for the most part by the political, legal and ideological superstructure of society,[2] the Northeast has remained subordinate to the core. The demands of the core's economic structure has required a supply of raw materials to sustain its industrial growth, a concentration of industrial activity in order to promote agglomeration economies, and ensured markets for goods produced in the core region. These, and other requirements, have led to an unconscious process of social, economic and political favouritism in dealing with the core region and

detrimental attitudes in dealing with the peripheral areas. This is manifested in explicit or implicit policies, and actions directed towards the concentration of Ontario's resources in the core region. A good example of policies by provincial governments in Ontario which resulted in further concentration of factors of production in the core region, was the establishment of Metropolitan Toronto in the 1950's. This act resulted in making Toronto more attractive for growth. Infrastructure investments in surrounding settlements' opened land for development, created a uniformity in municipal services such as water and sewage, and ensured good transportation linkages. Furthermore, as noted in an earlier chapter, much of the Ontario regional planning effort has been directed towards the Toronto centered region.

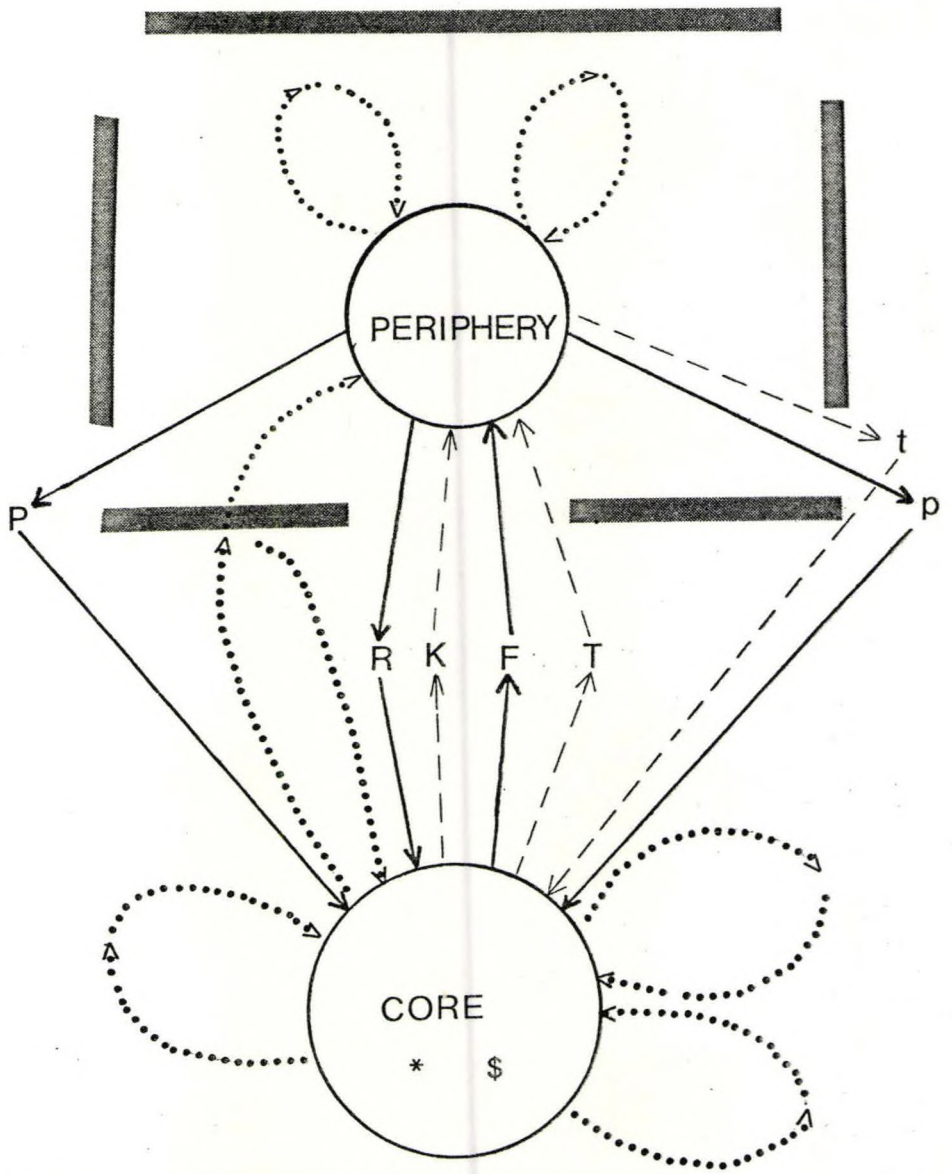
Myrdal has indicated,[3] that market forces, unaided by government policy, normally tend to increase rather than decrease inequalities between regions, as increasing returns activities are clustered in certain areas of the economy. Also, unfavourable backwash effects of growth from the core areas, outweigh favourable spread effects in the periphery. Labour, capital, goods and services flow unequally between core and peripheral areas. Therefore, free trade between such regions operates in such a manner that the periphery becomes export-oriented, its industrialization is inhibited and its pattern of production is distorted.[4] When government

policy acts in favour of the core regions, the negative effects of growth on the peripheral areas are increased. This partially explains the concentration of new firms in Oshawa, which was indicated to be a high factor cost location, and the lack of new firms in the Northeastern locations, as government expenditures on the Lake Ontario urban complex produces greater economies for agglomeration than in the Northeast.

Unfortunately, policies in the United States of America for resource, particularly mining, regions cannot be examined in order to provide ideas for Canadian policies for a simple reason. None of the American mining towns approach those in the Northeast in size or dependence on mining for employment. For example, in metallic mining towns in the United States, the largest number of employees was 2400 in Ontonagon, Michigan for 1972, while in Sudbury, mining employment was 14750. Thus, the development problem of the Northeast is a particularly Canadian problem in its magnitude.

It must be noted, however, that even if a provincial government decided to alter the existing character of the problem, its policies would be constrained by the strength of forces between the core and the periphery and the natural reproduction of these forces. In Figure 5.1, the major relations between the core and periphery in Ontario are presented in a simple diagram. From the periphery, population, resource products, profits from the resource companies and

Figure 5.1 Simplification of Core- Periphery Relations in Ontario



Legend :

- forces of reproduction *
- growth impetus
- secondary flows
- primary flows
- $ - center of monetary power
- * - political power

Flows –

- P - population, labour
- R - primary goods
- K - capital
- F - finished products
- T - transfer payments
- p - profits
- t - taxes

* includes growth barriers

taxes levied on the companies' income, flow to the core. Capital investment in resource companies, government transfer payments, and high value finished products flow from the core to the periphery. The core region is the center of both political and economic power and the periphery is subject to physical barriers to development and reproduction forces. Thus, growth impetus in the core is greater than in the periphery.

This may be enlarged upon. Figure 5.2 is a simple representation of the Northeastern economy. It shows the flows between major segments of the regional economy, leakages from the system and inputs from the core region. The most important segments are resource companies and labour involved in resource extraction, and much of the region's wealth is generated here. However, there are serious leakages to the system such as taxation, purchases from other regions, and loss of profits to the region. Thus, even given a condition of a lack of factor cost disadvantage, the region's economy will not grow if present relationships and leakages continue to exist. Therefore, the present feeble attempts by senior levels of government will do little to affect change in the region. And if the preliminary indications of favourable factor costs hold with further research, government policy would have to pay considerable attention to the effects of "psychic costs" which are perceived by new firms to be additional production costs attached to Northeastern locations.

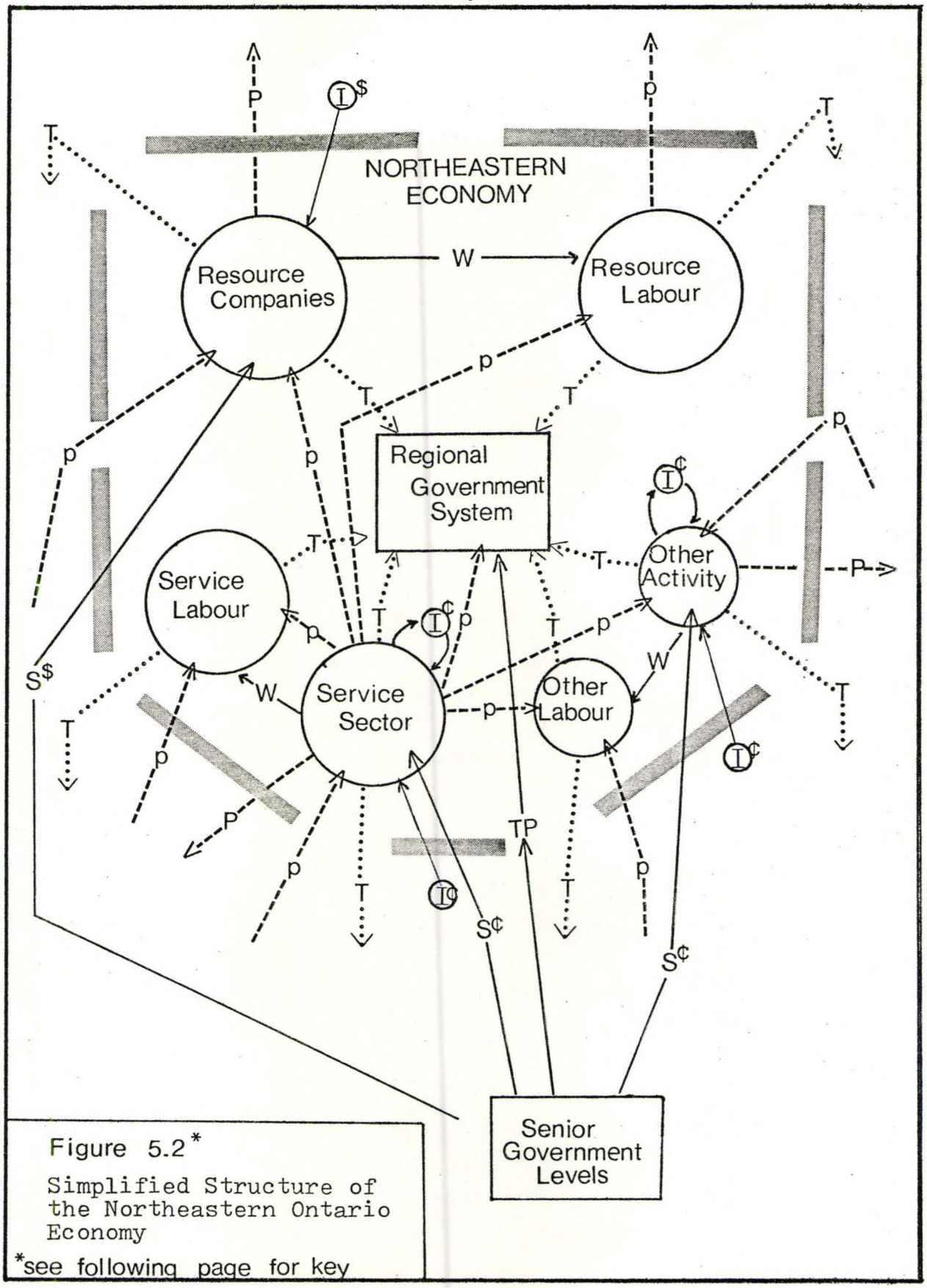


Figure 5.2*

Simplified Structure of the Northeastern Ontario Economy

*see following page for key

KEY (Figure 5.2)

Flows:

·····T·····>	- Taxes (provincial and federal government)
----P--->	- profits
----p--->	- purchases (all types)
——$S^{\$}$——>	- large subsidies
——$S^{¢}$——>	- small subsidies
——Ⓘ$^{\$}$——>	- large investments
——Ⓘ$^{¢}$——>	- small investments
——TP——>	- transfer payments
——W——>	- wages to labour
	- forces of reproduction, barriers to growth and effects of distance

The existing core-periphery relations in Ontario hinder Northeastern development and promote continued growth of the south-central urban-industrial complex. While it may be undesirable for this to continue, there would appear to be little effort to alter the existing conditions.

Conclusion

The policy implications of the Northeastern Ontario development problem, given preliminary indications of factor costs which are not restrictive, rests then on two major observations.

First, the initial kick required to stimulate growth is hampered by the perception of the Northeast as a high production cost location, the historical slow growth, resource orientation of the regional economy, and the lack of promotion of Northeastern locations for industrial growth.

Second, any attempt to stimulate growth in the Northeast will be constrained by the existing core-periphery relations, as evidenced by the historical North-South dichotomy of Ontario.

Thus, provincial governments in the future will continue to be timorous in promoting development in the Northeast because of the constraints imposed on the development problem. As policy will continue to be favourably directed towards the core region of Ontario, development in the Northeast will depend on native Northeastern initiative. Basically, self-help

should become the prime force if changes in the negative conditions of the Northeast are to occur. The effectiveness and motivations of senior levels of government are suspect.

The complexity of the situation, and the forces against change may require fundamental and radical changes in the existing relationship between the peripheral Northeastern Ontario, and the south-central core region. The degree and type of change will depend on the level of co-operation between the provincial government and the inhabitants of the Northeast.

IMPLICATIONS FOR RESEARCH

The research contained in this thesis is directed towards a single aspect of the complex and inter-related development problem existing in Northeastern Ontario. It is the complexity of the situation which results in interesting implications for future research. In general, these can be characterized into two broad topics -- the Northeast problem itself and the general issues related to core-periphery relations.

Two major specific issues related to the Northeastern development problem itself are the following:

1) Refinement of the factor costs identified in this thesis, in particular wage and efficiency elements of labour costs. Given more accurate data obtained through extensive surveys

and wider access to government data, the calculation errors could be decreased. Would such a calculation provide the same results encountered in this study? Also, can psychic costs be calculated for Northeastern locations and how could these be offset?

2) Effectiveness of self-help efforts. If the major impetus for development rests with local initiative, what will its success in the Northeast involve and at what cost? How can this self-help effort be aided? What type of propulsive units should be promoted?

In terms of core-periphery relations, the following issues arise:

1) Growth transmission. As the growth process is not fully understood, further work must be done in explaining how growth occurs and how it affects various regions. Econometric models for regional growth would appear to have potential for investigating the growth process, but are limited by data availability and the general inadequate state of regional growth theory.[5] Czamanski's model of the Nova Scotian regional study[6] and Richardson's model[7] are examples of work in this field.

2) The social, political and economic processes between core and periphery. The implications of core-periphery relations have not been developed fully in its social, political and economic aspects, nor have they been fully examined. Given the role of the Northeast as an area

peripheral to the south-central core area of Ontario, the effects on social conditions should be examined in both theoretical and practical terms. Also, questions to the role of politics and policy in the relations between core and peripheral areas should be examined, particularly in terms of intervention and of motivation.

Summary

It is possible to list many more implications of the research contained within this thesis, and to improve on the various aspects of this research. Constraints include only time, effort and finances.

REFLECTIONS

Out of the complexity of the development problem of the Northeast, one tractable aspect, factor costs, was isolated and examined in a relatively simple method of accounting. This method of research allows factor costs in the Northeastern region to be derived and compared to factor costs in Ontario core centers. This derivation and calculation indicates that some Northeastern centers are lower factor cost locations than some of the core centers. This leads to the following questions. If costs of production are not unfavourable to Northeastern Ontario development, what factor or factors are inhibiting region growth in a region so near to the core region? If Northeastern

Ontario development is desirable, can these impediments be removed? If so, who will pay for the necessary measures? Why have these impediments persisted through time? Unfortunately, these are among many presently unresolved questions. But answers must be found.

Continued alienation of the Northeast within existing core-periphery relations will be socially and politically dangerous as the following quotation from Pablo Neruda indicates:

> I met Bolivar on a long morning... "Father," I said, "Are you or are you not, or who are you?" And he said: "I rise up every hundred years when the people wake up."

Footnotes

1. L. Althusser. Lenin and Philosphy, and Other Essays. (London: New Left Books, 1971). p. 128.
2. Althusser. ibid. p. 148.
3. Myrdal. op. cit. p. 26.
4. Richardson (1973). op. cit. p. 29.
5. Richardson (1973). ibid. p. 36.
6. Czamanski. op. cit..
7. Richardson (1973). op. cit. pp. 209- 225.

APPENDIX TABLES

In the tables that follow, the abbreviations listed below will be used to promote clarity of presentation:

ONR	- Ontario Northland Railway
CPR	- Canadian Pacific Railway
CNR	- Canadian National Railway
ACR	- Algoma Central Railway
NAR	- Northern Alberta Railway
KWL	- Kitchener- Waterloo
NBY	- North Bay
OSH	- Oshawa
STC	- St. Catherines
SOO	- Sault Ste. Marie
TIM	- Timmins
TOR	- Toronto

Table A.a

Selected Railway Transport Operating Data (1976)

Railroad Company	A. Average Freight Revenue per ton	B. Average Freight Expense per ton	B. as % of CNR expense per ton divided by A. as % of CNR revenue per ton
CNR	$12.80	$15.84	100.00
CPR	$12.24	$12.82	83.53
ACR	$ 4.60	$ 4.70	82.55
NAR	$ 7.20	$ 7.80	87.53
ONR	$ 4.50	$ 5.20	93.39

Source: Statistics Canada. Railway Transport, Part II, IV, 1976. Cat. 52-209

Table A.1

Manufacturing Employment in Study Centers - Selected Subsectors (1971)

Center		Manufacturing Employment	Food and Beverage Subsector	Primary Metals Subsector	Transport Equipment Subsector
KWL	(#)	41,325	5,645	790	3,215
	(%)	39.03 [1]	13.66 [2]	1.91	7.78
NBY	(#)	1,775	265	90	50
	(%)	9.28	14.93	5.07	2.81
OSH	(#)	19,385	510	1,515	10,725
	(%)	39.22	2.63	7.81	55.32
STC	(#)	14,350	980	420	7,065
	(%)	31.91	6.83	2.92	49.44
SOO	(#)	11,235	345	9,070	10
	(%)	34.42	3.07	80.73	.09
SUD	(#)	8,045	680	5,675	45
	(%)	12.94	8.45	70.54	.55
TIM	(#)	925	155	130	5
	(%)	6.13	16.75	14.05	.54
TOR	(#)	315,560	32,800	8,540	26,505
	(%)	25.35	10.39	2.70	8.40

Note: 1 manufacturing employment as percent of total employment
2 subsector employment as percent of total manufacturing employment

source: Statistics Canada. Manufacturing Industries, 1971. Cat. 94-742,743,744.

Table A.2

Manufacturing Employment Concentration Ratios (1971)

Center	Manufacturing Employment Ratio (MC)
KWL	1.524
NBY	0.206
OSH	1.377
STC	1.085
SOO	1.185
SUD	0.446
TIM	0.205
TOR	0.980

Where:

$$MC = \frac{x_i\ (100)}{\Sigma x_i} \times \frac{\Sigma y_i}{y_i\ (100)}$$

and;

x_i = total population over 16 in center i.

y_i = total manufacturing employment in center i.

Source: Statistics Canada. Manufacturing Industries, 1971. Cat. 94-742, 743,744.

Table A.3

Index of Manufacturing Subsector Diversity
(1971)

Center	Index of Subsector Diversity*
KWL	581
NBY	645
OSH	765
STC	790
SOO	935
SUD	885
TIM	778
TOR	469

*Note: See text for explanation.

Small numbers indicate a diversified manufacturing sector while larger numbers indicate concentration of employment within a subsector.

Source: Statistics Canada. Manufacturing Industries, 1971. Cat. 94-742,743,744.

Table A.4

Total Annual Wage Bill, Standardized to Kitchener's Durable- Nondurable Manufacturing Employment Mix

Center	Standardized Total Wage Bill in Thousands of Dollars			
	1970	1971	1972	1974
KWL	4790.3	4983.2	4154.0	7573.8
NBY	5696.9	5522.5	5267.1	8705.9
OSH	6374.3	7715.9	6022.3	10689.4
STC	5910.1	7734.4	5846.3	9536.0
SOO	6682.1	6990.2	5636.4	9955.5
SUD	6462.9	6426.0	5673.5	9396.3
TIM	4978.4	5043.1	4557.8	8110.2
TOR	5555.7	5672.1	5128.8	8573.3

Source: Statistics Canada. Employment and Earnings, 1970, 1971,1972,1974. Cat. 72-002.

Table A.5

WS_i Values as a percent of Kitchener's WS Values

Centers	Study Centers Wage Bill as Percentages of Kitchener's Wage Bill (Standardized to Kitchener's Durable-Non-durable Manufacturing Employment Mix)			
	1970	1971	1972	1974
KWL	100.00	100.00	100.00	100.00
NBY	118.91	110.82	126.79	114.95
OSH	133.06	154.84	144.98	141.13
STC	123.37	155.21	140.74	125.91
SOO	139.49	140.27	135.68	131.44
SUD	134.91	128.95	136.58	124.06
TIM	103.93	101.20	109.72	107.08
TOR	115.98	113.82	123.46	113.19

Source: Derived from Table A.4

Table A.6

Hours of Annual Labour (t_i values as percents of Kitchener's t value)

Centers	Average Annual hours of Labour as a Percent of Average Annual Hours of Labour in Kitchener (t_i values as % of Kitchener's)			
	1970	1971	1972	1974
KWL*	100.00	100.00	100.00	100.00
NBY	101.26	102.63	99.42	102.34
OSH	106.29	114.45	108.13	109.30
STC	105.03	107.03	105.59	107.91
SOO	103.76	103.11	108.54	112.50
SUD	106.21	107.51	98.06	106.36
TIM	106.04	103.88	101.73	108.36
TOR	100.88	99.27	99.43	102.32

* Note: The average annual hours of labour per worker in Kitchener were:
2058.7 hours in 1970
2092.1 hours in 1971
2088.3 hours in 1972
2029.1 hours in 1974.

Source: Statistics Canada. Canadian Manufacturing Industries: Geographical Distribution, 1970, 1971, 1972, 1974. Cat. 31-209.

Table A.7

Secondary School Educational Attainment for Employed Labour Force (Selected Centers, 1971)

Center	Percentages of Total Employeed Labour Force with Secondary School Education			
	Males		Females	
	Grades 9-11	Grades 12-13	Grades 9-11	Grades 12-13
Hamilton	33.41	25.63	33.12	36.49
Kitchener	33.59	23.58	34.34	31.13
London	33.07	29.15	31.80	41.22
St. Catherines	34.78	23.95	33.34	36.09
Sudbury	33.50	20.54	33.54	34.50
Windsor	32.93	25.03	30.72	35.65

Source: Statistics Canada. Labour Force 1971.

Table A.8

Average Number of Employees per Manufacturing Firm

Center	Average Number of Employees			
	1970	1971	1972	1974
KWL	71.79	70.53	77.72	76.41
NBY	24.08	24.53	24.94	30.34
OSH	90.83	118.25	120.83	136.79
STC	71.14	80.70	80.23	84.19
SOO	179.44	177.48	176.83	186.26
SUD	13.34	13.12	12.74	20.66
TIM	14.55	15.04	16.03	32.35
TOR	30.19	29.66	31.05	31.45

Source: Statistics Canada: Manufacturing Industries of Canada: Geographical Distribution, 1970, 1971, 1972, 1974. Cat. 31-209.

Table A.9

Municipal Realty and Manufacturing Business Taxes (Mill Rates for Selected Years)

Centers	Annual Rates of Taxation on Land and Buildings * (T_i Values)			
	1970	1971	1974	Average 1970-1974
KWL	.041979	.042056	.040161	.045651
NBY	.044224	.044224	.042062	.043721
OSH	.046689	.049358	.053478	.048990
STC	.035560	.046731	.039441	.041521
SOO	.051757	.051757	.034542	.044769
SUD	.042417	.041656	.042317	.042121
TIM	.049537	.047729	.051051	.047872
TOR	.045987	.042838	.045264	.044621

* Standardized due to different methods of assessment by:

$$1.6 \times \frac{\text{provincial equalization factor}}{\text{municipal mill rate}}$$

Source: Ontario Ministry of Industry and Tourism. Profiles of Ontario Municipalities, Volumes 1 and 2, 1971, 1972, 1973, 1974, 1975.

Table A.10

Bank of Canada Interest Rates
1970 - 1976

Year	Interest Rate At End of Year
1970	6.00 %
1971	4.75 %
1972	4.75 %
1973	7.25 %
1974	8.75 %
1975	9.00 %
1976	9.50 %

Source: Statistics Canada. Canada Yearbook 1976-1977. (derived from Banking and Financial Analysis Department, Bank of Canada).

Table A.11

Annual Cost of Land per Square Foot

Center	Cost of Land per Square Foot (C_{Ni} Values) In Dollars per Square Foot*			
	1970	1971	1974	Average 1970-1974
KWL	.0208	.0196	.0669	.0374
NBY	.0048	.0122	.0295	.0156
OSH	.0122	.0171	.1594	.0643
STC	.0118	.0201	.0532	.0314
SOO	.0251	.0223	.0630	.0339
SUD	.0094	.0081	.0506	.0223
TIM	.0059	.0066	.0138	.0090
TOR	.1094	.0934	.1933	.1352

* Note: Includes interest, property and manufacturing tax costs.

Source: Derived from Tables A.9, A.10, and 3.4.

Table A.12

Annual Cost of Buildings per Square Foot

Centers	Cost of Buildings per Square Foot (C_{Bi} values in dollars per square foot)*		
	1970	1971	1974
KWL	1.4399	1.3469	3.3958
NBY	1.8166	1.6721	3.2300
OSH	1.5224	1.3628	3.2368
STC	1.5414	1.5491	3.1494
SOO	1.8708	1.6814	2.8948
SUD	1.7851	1.5941	2.9702
TIM	1.9552	1.7112	3.0620
TOR	1.5145	1.3361	3.0416

Source: Derived from Tables A.9, A.10, and 3.6.

Table A.13

Cost of Manufacturing Materials as Percentages of Value of Goods Shipped (1971, 1974)

Centers	Materials Cost as percents of Value of Goods Shipped	
	1971	1974
KWL	50.66	56.88
NBY	45.53	50.33
OSH	66.32	69.45
STC	44.85	48.30
SOO	46.08	43.73
SUD	25.93	23.01
TIM	54.71	32.59
TOR	54.35	58.42

Source: Statistic Canada. Manufacturing Industries of Canada: Geographical Distribution, 1971 and 1974. Cat. 31-209.

Table A.14

Selected Highway Freight Charges
(From Toronto to Destinations)

From Toronto to:	Shipment Charges in Cents per 100 Pounds (minimum of 24,000 pounds per shipment)	
	Class 100	Class 85
KWL	116	99
NBY	222	189
OSH	100	85
STC	116	99
SOO	307	261
SUD	247	210
TIM	404	343
TOR	0	0

Source: Canadian Transport Tariff Bureau Association. Class Tariff 1-C

Table A.15

Average Expenditure by Ontario Manufacturers on Machinery *

Years	Average Expenditure for new machinery per firm in dollars	Average Expenditure for machinery repairs per firm in dollars
1970	93,051	48,720
1971	80,920	50,765
1972	81,571	57,876
1973	96,265	63,023
1974	132,886	75,722

* Note: These values were obtained by dividing the total expenditure reported by all Ontario firms by the number of firms operating for each year.

Source: Statistics Canada. Private and Public Investment in Canada: Outlook and Regional Estimates, 1971, 1974, 1976. Cat. 61-205.

Table A.16

Cost of Electricity for Industry
(1971-1974)

Center	Average Cost per Kilowatt-Hour (in cents)			
	1971	1972	1973	1974
KWL	1.03	1.07	1.04	1.49
NBY	1.11	1.29	1.40	1.45
OSH	1.09	1.11	1.05	1.45
STC	1.05	1.09	1.05	1.48
SOO	1.18	1.27	1.48	1.59
SUD	1.18	1.27	1.48	1.59
TIM	1.81	1.76	1.72	1.85
TOR	1.03	1.04	1.07	1.44

Source: Ontario Hydro. Ontario Hydro Statistical Yearbook, 1971, 1972, 1973, 1974.

Table A.17

Energy Costs for Ontario Industries

Year	Price per Unit of Energy	
	Fuel Oil (dollars per gallon)	Natural Gas (dollars per MCF)
1971	0.11	0.56
1972	0.12	0.57
1973	0.13	0.60
1974	0.20	0.69

Source: Ontario Ministry of Treasury. Consumption of Fuel and Electricity by Ontario Manufacturing Industries, 1972, 1973, 1974.

Table A.18

Location of New Manufacturing Firms in Ontario (1973-1976)

Center	Number of New Firms* in Selected Centers				
	1973	1974	1975	1976	Total
Kitchener	8	4	7	6	25
North Bay	-	4	6	3	13
Oshawa	9	8	5	8	30
St. Catherines	-	1	2	2	5
Sault Ste. Marie	2	1	1	1	5
Sudbury	1	3	2	2	7
Timmins	-	1	-	1	2
Toronto	24	21	11	19	75
Hamilton	4	5	-	1	10
Mississauga	9	13	13	19	54
London	4	2	6	5	17
Cornwall	4	-	5	7	16
Ottawa	5	6	5	5	21
Thunder Bay	5	1	1	4	11
ONTARIO, total	161	145	147	165	618

*Note: With employment of over 10 or sales of $100,000.

Source: Ontario Ministry of Industry and Tourism. Ministry of Industry, Trade and Tourism Review, 1973, 1974-1975, 1975-1976, 1976-1977.

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