Urban Development in Canada

BY LEROY O. STONE
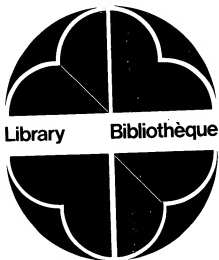
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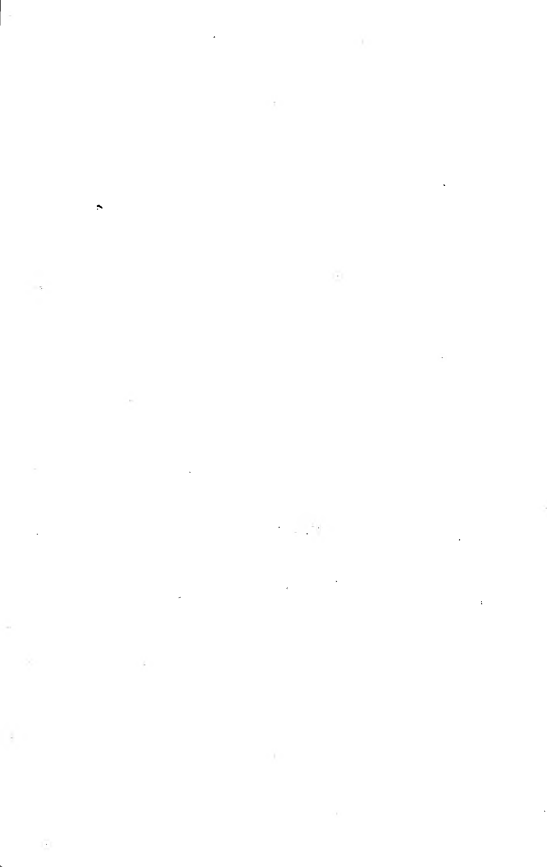
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Urban Development in Canada

An Introduction to the Demographic Aspects

by
Leroy O. Stone

ONE OF A SERIES OF 1961 CENSUS MONOGRAPHS

prepared for the

CENSUS DIVISION

DOMINION BUREAU OF STATISTICS

Foreword

The Canadian Censuses constitute a rich source of information about individuals and their families, extending over many years. The census data are used widely but it has proved to be worthwhile in Canada, as in some other countries, to supplement census statistical reports with analytical monographs on a number of selected topics. The 1931 Census was the basis of several valuable monographs but, for various reasons, it was impossible to follow this precedent with a similar programme until 1961. Moreover, the 1961 Census had two novel features. In the first place, it provided much new and more detailed data, particularly in such fields as income, internal migration and fertility, and secondly, the use of an electronic computer made possible a great variety of tabulations on which more penetrating analytical studies could be based.

The purpose of the 1961 Census Monograph Programme is to provide a broad analysis of social and economic phenomena in Canada. Although the monographs concentrate on the results of the 1961 Census, they are supplemented by data from previous censuses and by statistical material from other sources. In addition to *Urban Development in Canada* and a Series of Labour Force Studies, monographs will be published on marketing, agriculture, education, fertility, income, immigration, and internal migration.

I should like to express my appreciation to the universities that have made it possible for members of their staff to contribute to this Programme, to authors within the Dominion Bureau of Statistics who have put forth extra effort in preparing their studies, and to a number of other members of DBS staff who have given assistance. The Census Monograph Programme is considered desirable not only because the analysis by the authors throws light on particular topics but also because it provides insight into the adequacy of existing data and guidance in planning the content and tabulation programmes of future censuses. Valuable help in designing the Programme was received from a committee of Government officials and university professors. In addition, thanks are extended to the various readers, experts in their fields, whose comments were of considerable assistance to the authors.

Although the monographs have been prepared at the request of and published by the Dominion Bureau of Statistics, responsibility for the analyses and conclusions is that of the individual authors.

Walter E. Duffett.

DOMINION STATISTICIAN.

Preface

This monograph attempts to contribute to the analysis and interpreta-
tion of statistics of the Dominion Bureau of Statistics. It is designed to
help the well-read layman or public official, as well as the professional
social scientist, to gain a greater benefit from the volume of statistics
gathered from the Canadian population. Through analysis of some parts of
DBS data, the monograph should also point up avenues toward further im-
provement in the statistics and in this way it may help to make such parts
of the DBS product more valuable to the Canadian public.

This work lies within the field of urban studies. From a specialized
point of view, a small part of this field is covered. It is hoped that the
discussion will stimulate questions and research in areas extending far
beyond the monograph's limited scope. Some of these areas are mentioned
in the various Chapters.

The research underlying the monograph has been modest and small-
scale, and the scope of the resulting document must be described in similar
terms. The subject-matter coverage is further commented upon in the Intro-
duction and the reader will find a comprehensive key in the Table of Con-
tents, in Chapter One and in the final Chapter. The author has kept the
depth and sophistication in research design and analysis at modest levels
so as to interest a much wider audience than professional colleagues.

In the light of the existing pressure on social scientists to provide
reassuring answers and safe predictions on enormously complicated matters,
it is necessary to advise the reader about some things *not* in this monograph.
He will find no analysis aimed at demonstrating the complex of reasons *why*
Canadian urbanization has developed, or at prescribing the appropriate path
toward greater urbanization in any Canadian region. The objective lies,
instead, in providing fundamental background information to assist in the
development of causal interpretations. This objective is achieved through
an exposition on some of the major features, variations and mechanisms that
characterize the increasing concentration of the Canadian population into
cities. Thus, the analysis presented here deals with the *how* of Canadian
urban development rather than the *why* of it. The justification for this focus
rests largely upon the necessity for a document such as this when it has no
predecessor.

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SYMBOLS USED IN TABLES

— = nil or zero.
·· = figures not available.
··· = figures not appropriate or
    not applicable.

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INTRODUCTION

1.1 SCOPE OF THIS MONOGRAPH

Urban development in Canada has many important facets and ramifications on which at least a half dozen monographs could be written, each covering a somewhat unique area of subject matter. However, the present treatment of demographic aspects of urban development deals only with a relatively narrow theme and certain topics integral to that theme and therefore must be characterized as introductory. The aim is not to produce definitive analyses but to open further the doors to some of the information on urban development hidden away in DBS statistics, to contribute to synthesis and dissemination of this information, to stimulate further research in this field, and to point up some areas in which the statistical output of the Dominion Bureau of Statistics may be made more responsive to the growing demands being made upon it.

In focusing upon population, this monograph may be viewed as a contribution to an inventory of Canada's human resources. Because the size, characteristics, distribution and behaviour of population are known to be important factors in economic development, the materials presented have a significance that far exceeds the interests of the field of demography. A student of the economic and social history of Canada will observe apparent reflections of the major social and economic changes in the demographic variations among regions and over time (in the same region). Although the present study cannot be presented as a comprehensive work, it is nevertheless undeniably concerned with topics of very considerable importance to the future evolution of the Canadian economy and society. No responsible decision-maker for Canada or for any of its many communities should ignore the study of population.

Existing Canadian urban studies have left undone a great deal of basic 'spadework' in the compilation and synthesis of fundamental information. It is therefore appropriate that this work should concentrate upon such fundamentals as growth, demographic structure and areal distribution, the study of which requires analyses of the demographic processes of fertility, mortality and migration, and careful investigation of the relevant rates of these processes for sub-groups of population. Also included is information on rural-urban differentials in population change and the distribution of urban population among urban size groups and major regions,

partial analysis of the components and factors underlying selected patterns of urban population change, and partial analysis of population growth in Census Metropolitan Areas. The information concerning Census Metropolitan Areas is presented in recognition of a major recent development in the Canadian urban scene — the increasing emergence of massive agglomerations of population.

1.2 DATA SOURCES

Most of the data presented in this monograph are based on published tabulations of the 1961 Census of Canada. The main non-census data are the numbers of registered births and deaths and life tables published by the Health and Welfare Division of DBS, used herein in the preparation of estimates of net migration. Although discussion is focused on the more recent urban developments, continuing attention is given to the study of change and of historical patterns, requiring the use of data from censuses preceding 1961.

When one approaches a body of statistics with the aim of contributing to the knowledge and understanding of contemporary Canada, at least two perspectives are required. One is the perspective afforded by the study of differences between populations and regions at a fixed point in time — the cross-sectional perspective. The second is the perspective afforded by the study of patterns of change in the major dimensions of the Canadian economy and society—the longitudinal perspective. Each perspective provides some unique and valuable insights.

Most of the existing Canadian urban studies are confined to the cross-sectional perspective, there being comparatively little published work emphasizing the long historical view of Canadian urban development. This imbalance is unfortunate because it prompts the users of such information to draw possibly misleading inferences about the processes of urban development from the cross-sectional observations; cross-sectional observations sometimes provide a sound basis for inferences about the causes and consequences of change, but their use may also lead to quite erroneous inferences about the causes and consequences of change. There is no *a priori* basis for knowing when one may safely draw inferences about change and development from the differences between regions or populations at a fixed point in time (cf. Duncan, Cuzzort and Duncan, 1961, c.3). Generally, the adequate confirmation and testing of hypotheses about change require data on change. Thus, it is appropriate that this monograph should help to redress this imbalance in Canadian urban studies by placing some emphasis on the development of historical perspective.

A few general comments concerning data quality are in order. If the data are to be completely accurate, certain conditions must be fulfilled (unless one has the rare fortune of encountering errors that counteract each other fully): (1) an appropriate definition of the concept "urban area" must be used; (2) appropriate rules for applying this definition *in the field* are needed, and the rules must be applied accurately in practice; and (3) the census enumeration and classification of population must be substantially accurate. (Appendix A discusses some general issues involved in the delineation of urban areas.)

Even when an adequate operational definition of "urban" is used and accurate delineations of the boundaries of urban areas are obtained, there are other sources of defects in the census data. In all countries errors creep into census data due to miscounting of people, to misclassification of persons' characteristics (much of which arises from erroneous or inadequate replies made by respondents) and to mistakes in data processing. Knowledge of such errors in Canadian census statistics is limited primarily to general information about ways in which the errors may arise, because few of the analytical studies required for *measuring* the net errors in a wide range of census statistics at the provincial level or in any type of census statistics below the provincial level have been conducted. However, it is generally accepted that, with a few exceptions such as small figures and certain types of information such as income, the net errors are relatively negligible for most practical purposes (scientific research in particular); they are considered 'relatively negligible' in the sense that they comprise minor components of the observed values of the census figures.

Accepting the premise that net errors are relatively negligible, certain steps may be taken to maximize the probability of obtaining useful information from statistics that may be faulty. These steps may be formulated as a set of rules, which the reader should observe. We should (1) exercise considerable caution in the interpretation of small figures and small differences; (2) avoid emphasizing the *exact numerical value* of a figure and, instead, treat a figure as an *approximately* correct indication of the true value which the figure is intended to measure; and (3) avoid emphasizing the *exact values* of differences between numbers and, instead, concentrate upon the systematic and substantively meaningful patterns of differences among the numbers in the table. Typically, minor errors tend to behave in a random fashion and do not create systematic *patterns of differences* among the figures in a table. In short, the figures presented in this monograph should not be treated as figures whose accuracy has been verified. Instead, they should be treated as figures which probably give approximately accurate indications of the quantities being measured. The systematic variations of these figures

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over population sub-groups, areas and time periods (or dates) provide important information about the features and concomitants of Canadian urban development, even though each figure may be only approximately accurate.

1.3 SOME BASIC TERMS

To overcome the lack of uniformity in their usage throughout the literature, the basic terms "urbanization", "urban" and "metropolitan area" are commented upon at this point. Other special terms used in the text are defined when first used in each chapter.

Among the various definitions coined for the terms "urbanization" and "urban" none can be said to be inherently the best. As the purpose of the use of these terms is specificity, so may the identities of the most appropriate definitions. In recognition of the varied uses of "urbanization", it may be said that, in its broadest connotation, the process of urbanization involves the generation and spread of characteristic features of city life. City life, or urban living, has at least three major dimensions — demographic, economic and socio-cultural (cf. Hauser and Schnore, 1965, c. 1). The demographic dimension has two aspects — increase in the proportion of population residing in urban centres, and increase in the number of urban centres (cf. Eldridge, 1942). From the demographic viewpoint, an urban centre is a densely settled built-up area and the urban population consists of the residents of such areas.[1] The economic dimension involves the expansion of those economic activities that require or promote the concentration of productive establishments and working force into very small areas. Generally, such establishments do not involve the first-stage extraction of products from plants and animals (Schnore and Petersen, 1958). For example, manufacturing includes many production processes that are economically feasible only in locations having ready access to large labour pools and to the suppliers of the goods and services consumed in production. Such production processes require and promote the agglomeration of population. In its socio-cultural aspect, urbanization involves the spread of those cultural values, customs, behaviour patterns and styles of living that seem to be nurtured mainly in cities. The conditions of city life seem to engender social relations and cultural values differing markedly from those of the traditional rural community. Urban values and living patterns become more prevalent as the percentage of population in cities increases and are also diffused into rural areas through the communications media and inter-personal contacts.

The data presented below refer explicitly to the demographic dimension of urbanization. The level of demographic urbanization in a community is frequently measured by the percentage of population in urban centres

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(Davis, 1961) which fortunately tends to be highly correlated with the level of industrialization among large regions (cf. Davis and Golden, 1954; Schnore, 1964). As a result, variation in the index of demographic urbanization among broad regions tends to reflect variation in the level of industrialization among the regions (cf. Hauser, 1965, pp. 34-37).

In defining an urban area as a densely settled built-up area, only the general connotation of the term "urban" is being given. In order to measure and study the urban population, a set of rules must be devised for the identification of such areas comprising the operational (as distinct from the connotative) definition of urban, and in setting up these rules it is almost impossible to avoid a certain number of arbitrary decisions. In the 1961 Census, DBS treated as urban areas those falling into one of the following categories: (1) incorporated cities, towns and villages of at least 1,000 population, (2) unincorporated agglomerations (generally considered as towns or villages) of at least 1,000 population, and (3) built-up fringes of incorporated cities, towns and villages (of at least 5,000 population) with a population density of at least 1,000 persons per square mile.

In this monograph a "metropolitan area" is seen as the core of a larger metropolitan region, the latter being a collection of population centres having economic linkages among themselves and having economies oriented toward that of a large urban agglomeration (the central city or metropolis).[2] The metropolitan area is primarily a complex of closely related centres of population located within daily commuting distance to the central city (cf. Blumenfeld, 1961, p. 76) and thus has two main parts — the central city or metropolis, and the nearby centres whose economies are closely linked to that of the central city. Rules are needed also for the identification of metropolitan area, and certain arbitrary decisions must be made in the delineation of metropolitan area boundaries. In 1961, the Census Metropolitan Area[3] was comprised of an incorporated city of at least 50,000 persons and a surrounding area large enough for the whole Metropolitan Area to contain nearly 100,000 or more persons. The part of the Metropolitan Area surrounding the central city (incorporated) should have (1) at least 70 per cent of its labour force engaged in non-agricultural activities, and (2) a minimum population density of 1,000 persons per square mile in its built-up segments.

Direct evaluation of the definition and delineation of urban and metropolitan areas in the 1961 Census of Canada cannot be made without independent field investigations. Given the limits and purposes of this monograph, evaluation of the 1961 Census work in those areas must be confined to general comments. In the light of the connotative definition of "urban", the 1961 Census definition of this term seems generally adequate. The

1961 Census delineation of urban areas could be faulty in two areas mainly: (1) mistakes in the identification and mapping of the boundaries of densely settled built-up areas on the fringes of incorporated cities, and (2) mistakes in the classification and 'bounding' of unincorporated towns and villages. Only field investigations could reveal the extent of such mistakes. However, even if such mistakes were made, they may not have had significant net impact on the relevant census statistics. It is important to bear in mind that the correction of several minor mistakes in the field and in data processing may produce such a marginal improvement in the quality of the statistics as to be unjustifiable on economic grounds.

In delineating metropolitan areas in the 1961 Census, the census geographer explicitly accepted the proposition that the essence of the metropolitan area concept is the economic linkage and interdependence of a cluster of population centres (DBS 92-540, 1961, p. XI). Unfortunately, systematically collected statistics were not available for use as indicators of that linkage and it was necessary for the census geographer to conduct field observations and interviews with local area authorities on daily traffic flows to aid in the delineation of the metropolitan areas. How closely these areas approximate the metropolitan areas that would have been delineated with the aid of 'journey-to-work' statistics cannot be known without further field investigations.

Additional comments on the definitions of the terms "urban" and "metropolitan" are presented in the main text and in the Appendices (Chapter Two, Sections 2.2.1 and 2.2.2; Chapter Six, Section 6.1; and Appendices A and D).

1.4 CHAPTER CONTENTS

It may be of assistance here to indicate in synoptic fashion the topics covered in the monograph chapters. The reader who wishes to avoid the detail of the individual chapters may turn to Chapter Ten for a summary of the main findings of the study. Since this summary is selective and not exhaustive, it is also worth while to consult the detailed Table of Contents. The main text is presented in two parts.

Part I (Chapters Two to Five) deals mainly with the urban population, describing and partially analysing its growth, geographical distribution and sex-age composition. *Chapter Two* reviews the growth of urban population and the advance of urbanization in Canada. Historical patterns and differentials among five major regions of Canada are described and the historical pattern of the increase in urbanization is associated informally with the timing of major developments in the Canadian economy. *Chapter Three* describes features of the sex-age composition of Canada's urban

population and indicates some of the major differences among the urban, rural non-farm and rural farm populations in regard to sex-age structure. Urban size-group differentials in sex-age composition are also studied and there is a review of the historical pattern of changes in sex-age structure for cities of 30,000 and over. *Chapter Four* deals with the number and size distribution of Canada's urban agglomerations. The number and size distribution of urban agglomerations in a region are basic characteristics of population distribution in the region. *Chapter Five* presents estimates of the relative importance of selected components of urban population growth. The Chapter also reviews the historical pattern of net migration ratios for urban areas, as well as urban size-group differentials in the net migration ratio over the 1951-61 decade. Data are presented on the age profile of net migration ratios to selected urban areas over the four decades from 1921-31 to 1951-61, and on the relative contribution of net migration to changes in the sex-age composition of population in these areas.

Part II (Chapters Six to Nine) is mainly a discussion of some demographic aspects of metropolitan growth in Canada. It is understood that demographic patterns and trends *per se* are not the basic dimensions of metropolitan development. However, demographic patterns and trends are important aspects of metropolitan development and the great bulk of the existing data that provide indications of this development are demographic. *Chapter Six* describes the increasing concentration of the Canadian population in the principal areas of metropolitan development, reviewing indicators of major historical trends in metropolitan development and presenting data on the relative contribution of net migration to metropolitan population growth. *Chapter Seven* is an introductory study of the sex-age composition of the Canadian metropolitan population; it reviews trends in selected aspects of sex-age composition and features of the age profile of net migration ratios for Census Metropolitan Areas. *Chapter Eight* is a review of some intra-metropolitan differentials in population growth, sex-age composition, and sex-age specific net migration ratios. The focus of Chapter Eight is upon differences between central cities and other parts of the 1961 Census Metropolitan Areas in the 1951-61 decade, but some historical perspective is provided by data for selected counties containing the 1961 Census Metropolitan Areas. Unlike Chapters Six to Eight, which tend to group Census Metropolitan Areas in concentrating upon the differentials between metropolitan and non-metropolitan areas, *Chapter Nine* highlights the differences among the Census Metropolitan Areas. It is a series of sketches in which are described patterns of inter-metropolitan differentials on selected demographic, social and economic variables, and it makes extensive use of charts in an attempt to provide sharp visual images of the inter-metropolitan differentials.

The main text of the monograph is accompanied by a number of Appendices, most of which contain detailed definitions of concepts and technical notes describing various data processing and estimation procedures. The final Appendix presents some tables not available in other DBS publications; for the most part these tables contain estimates developed from already published data. Additional data used in preparing monograph data may be obtained on request, at the cost of reproducing the relevant worksheets.

FOOTNOTES TO CHAPTER ONE

[1] These comments are further developed later in this section and in Appendix A, Section A.1.

[2] In the professional literature there is much less uniformity in the usage of "metropolitan" than in the usage of "urban". The usage of "metropolitan" in this monograph follows a tradition stemming mainly from the work of N.S.B. Gras (1922). The concept of metropolitan region used here has been motivated largely by the work of Duncan *et al* (1960), according to which it is theoretically possible that a whole country forms the metropolitan region of its most important urban agglomeration.

In recent years there has been some criticism of the traditional concept of metropolitan area (Goheen and Berry, 1966). For example, there is a growing body of opinion that the delineation of metropolitan areas should concentrate not only on the main daily commuting range around the central city but also upon a range that includes journeys to weekend recreation and to occasional shopping. No attempt has been made to apply such a broad concept in this monograph because the requisite information (data on zones of work, recreation and shopping journeys around major cities) is not available. Also, efforts to make operational (a necessary step in practical statistical work) the emerging concepts, such as "urban field", are still in a state of infancy.

[3] It should be noted that the census metropolitan area is delineated by DBS with the aim of approximating roughly (particularly in view of the unavailability of systematically gathered data such as those mentioned in footnote [2]) the area that would have been delineated in a refined application of the metropolitan area concept. Since it has not been possible to make an independent field evaluation of the DBS efforts and since the census tabulations (particularly for dates preceding 1961) are not provided in equal detail for Census Metropolitan Areas and for municipalities surrounding those areas, Census Metropolitan Areas are used in this monograph. How much 'error' is entailed by the failure to evaluate independently these areas is not known but it is worth noting that a telling criticism of the DBS metropolitan areas concerns the establishment of two separate but related claims: (1) that certain DBS areas were inadequately delineated from the viewpoint of boundary location, and (2) that the inadequate delineation of these areas has produced a significant net error in relevant census statistics. Little of the existing criticism of DBS practices in boundary delineation relates to the second claim.

ONE HUNDRED AND TEN YEARS

OF CANADIAN URBAN POPULATION

INCREASE AND URBANIZATION

2.1 A PERSPECTIVE ON CANADIAN URBANIZATION

2.1.1 THE CONTEXT OF WORLD URBANIZATION — A brief review of the record of world urbanization provides a part of the background of basic information which is relevant to the study of urban development in Canada. The following comments should help to place Canadian urbanization in the broad context of the history of world urbanization.

The significant concentration of regional populations into urban ag-glomerations seems to be a recent phenomenon when seen in the perspective of the whole history of human life. The earliest trace of significant urbaniza-tion dates back to the fourth millennium B.C. in the "fertile crescent" of southwest Asia (Lampard, 1965, p. 525), part of what we now·call the Middle East. Urbanization also emerged in the Indus Valley and in the Huangho Basin between the second and third millennia B.C. Early traces of urbaniza-tion (mainly in the last two millennia B.C.) are also found in South America and in northern Europe. Although the fourth millennium B.C. is a very long time ago, the period since that time is less than 10 per cent of the total length of human history (Childe, 1951, c. 3).

From the fourth millennium B.C. to the nineteenth century A.D. world urbanization advanced at an exceedingly slow pace. As late as the turn of the nineteenth century, only England among the countries of the world seems to have had a considerable portion of its population concentrated in urban centres (Hoyt, 1963, p. 170). At that time less than five per cent of the world's population resided in cities of 20,000 and over (Davis, 1955, Table 1). The first world region to experience a major 'take-off' toward high levels of urbanization[1] was northwestern Europe (including England and

Wales) in the nineteenth century (Davis, 1955, pp. 432-433). Davis' summary of the important changes which this 'take-off' involved is worth quoting:—

> In western Europe, starting at the zero point, the development of cities not only reached the stage that the ancient world had achieved but kept going after that. It kept going on the basis of improvements in agriculture and transport, the opening of new lands and new trade routes, and, above all, the rise in productive activity, first in highly organized handicraft and eventually in a revolutionary new form of production — the factory run by machinery and fossil fuel. The transformation thus achieved in the nineteenth century was the true urban revolution, for it meant not only the rise of a few scattered towns and cities but the *appearance of genuine urbanization, in the sense that a substantial portion of the population lived in towns and cities.* (italics added)

By 1960 northwestern Europe had 54 per cent of its population in localities of 20,000 and over (UN, Economic and Social Council, 1965, Table 3) and was the most highly urbanized of six "more developed" world regions.[2] According to the UN estimates, about one fourth of the world's population in 1960 resided in localities of 20,000 and over. Thus, if the Davis estimates for 1800 and the UN estimates for 1960 are accepted as being sufficiently accurate for the purpose of obtaining a general impression of the advance of world urbanization, it appears that up to the turn of the nineteenth century the concentration of world population in urban centres reached no more than five per cent, whereas in the 160 years from 1800 to 1960 this concentration had risen to 25 per cent.

Even large cities, which may exist in areas having very low levels of urbanization, are recent phenomena in world history. Hauser (1965, pp. 6-7) observes that the evidence of the existence of cities of 100,000 and over appears in the Greek or Roman period, and that cities of 1,000,000 and over are mainly post-seventeenth century phenomena. Traces of cities of any size appear roughly 7,000 years ago (Lampard, 1965, p. 522). For most of this period, however, urban settlements were very small.

Dickinson in a review of the history of city growth in Europe (1959, p. 69), identifies the great periods of urban growth. The first period covers city growth incidental to the spread of Roman civilization throughout western Europe. The second extends over the years from 1000 A.D. to 1400 A.D., when there was marked growth in population. By 1400, towns and villages were spread throughout western and central Europe and the great majority of the present settlements in western, central and northern Europe were in existence by the end of the Middle Ages. Mumford (1961, p. 314) notes that the medieval town ranged in size mainly from a few thousand to 40,000,

which was the size of the city of London in the fifteenth century, although there were some exceptionally large cities of 100,000 and over (including Paris, Venice, Milan and Florence). The period from 1500 to 1800 was one of relative stagnation in European city growth (Dickinson 1959, p. 69) but the nineteenth century saw a great upsurge. From 1850 to 1900 city populations grew at very high rates and since 1900 the growth rates have declined markedly below their nineteenth century levels.

Thus, it may be concluded that the spread of urban living among the world's peoples is a quite recent development, whether this development is viewed as urbanization (the concentration of a population in urban centres) or as city growth. However, it should be noted that the twentieth century urban agglomeration in Europe and North America differs in important respects from those of the earlier centuries. Indeed the evolution of the structure of the urban agglomeration is a subject of major importance in its own right and municipal governments throughout North America are today struggling with the consequences of this evolution. As Fyfe (1961) writes, "urban communities were once compact, densely populated areas ... houses were close together and the transition on the fringe from urban to rural was fairly distinct.... . This old established pattern began to break down in the nineteenth century with the development of mass transportation." Technological advances in the field of transportation, a rising standard of living, and long-run changes in the distribution of income have combined to place enormous emphasis on open space. Thus, the area of urban settlement has expanded rapidly and the zone of transition from urban to rural has become very wide.

The ancient town was, by contemporary standards, a very small and highly compact settlement, which was generally centred upon a temple, a cathedral, a citadel or a castle. The areal size of such a town was extremely restricted by the necessity to walk in going from one place to another (Gras, 1922, pp. 106-121).

Even the medieval town was a small centre, its radius being about one half mile (Mumford, 1961, p. 313). However, these towns did grow in area as population increased. In flourishing medieval towns such as Rome and London, special marketplaces for commerce developed (Gras, 1922, p. 119). However, commerce and trade were confined mainly to luxury wares obtained from all parts of Europe and to the exchange of the products of local agriculture and handicrafts and the merchants and their retainers were greatly outnumbered by the artisans (Mumford, 1961, pp. 254-255).

The medieval town provided security for its small elite (usually clergy, princes or feudal landlords), housing their retainers and soldiers along with merchants and artisans who supplied needed goods and services. Religious

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precepts, kinship and duties governed human relations (Mumford, 1961, p. 256) and the social system was stratified and rigid (Hauser, 1965, p. 3). The town was divided into sections sealed off by such devices as walls and moats, with its centre containing the prominent government and religious structures and the principal market. The dwellings of the élite were situated close by and those of the poorer folk were farther from the centre, sometimes outside of the protection afforded by the town walls (Hauser and Schnore, 1965, p. 216). The structure and the social organization of the medieval city were dealt a mortal blow with the rise of commercial capitalism, which resulted in the transfer of power from protected producers to privileged wholesale merchants (Mumford, 1961, pp. 256-257).

The emergence of the industrial city out of the medieval town was a process requiring over two centuries and the rise of industrial capitalism. According to Hauser (1965, p. 4) the industrial city resulted partly from the acceleration in agricultural productivity and industrial technology during the eighteenth century, and was a principal outlet for capital accumulated in commercialized agricultural production. Coal and steam had emerged as major sources of motive power, and factories and population piled up in such cities as Manchester and Birmingham. The rise of the industrial city was an integral part of a whole matrix of important technological and social-organizational changes which mushroomed in Europe beginning in the latter half of the eighteenth century.

Steam was a great centripetal force because it had to be used close to its source. Thus, the economic activities employing steam as a motive power were highly concentrated in space. The cities and towns were advantageous locations for such concentrations and, as a result, the urban agglomerations burst free of their medieval bounds, in which travel was largely by foot and hoof and the city radius averaged about one half mile (Mumford, 1961, p. 313). Improvements in transportation reduced the attractiveness of residential location near the centre of the city (Hauser, 1965, p. 15) and the degree of specialization in land use increased markedly as residences tended to concentrate more and more away from the city centre.

The introduction and widespread use of the mass-produced internal combustion engine, rapid changes in the technology of production and communication, and continued economic growth have enabled the twentieth century city to relax the restrictive bonds of the centripetal forces of steam-motivated and rail-mediated production. At least three important changes, in regard to the structure of urban settlement in the twentieth century, are inter-related with these economic developments. Firstly, the areal expansion of cities has been accelerated enormously and the tendency for population to pile up in the core of the city has been reduced progressively in recent decades so that the so-called 'suburbs' are now ubiquitous. Secondly, the

economic ties between nearby urban centres have been tightened markedly and it is typical for the centres surrounding a major city to become satellites of that city, with interdependence (Gras, 1922) being developed and reinforced between cities and their satellite centres — patterns of commuting from place of residence to place of work are a major, although not the only, aspect of this interdependence. Thirdly, certain types of production and sales activities have been re-locating to an increasing degree in or near centres of population outside of the city-cores. As partial results of these three tendencies, agglomerations of population are now possible (and exist) which less than a century ago may not have been conceived of and such agglomerations have become major factors in the economic integration and development of large regions. According to Hawley (1956, p. 1):

> Few phenomena are more representative of the trend of modern society with its increasing emphasis on large-scale organization than is the emergence and rapid development of the metropolitan community during the last fifty odd years. Following quickly upon reduction of the time and cost involved in local movements, which resulted from the introduction of the motor vehicle and the hard-surfaced road, improvements in the transmission of electric power, the telephone, the radio and more recently television, the urban community burst its narrow bounds and expanded over the surrounding country. In contrast to the compact city of the nineteenth century the radial scope of which seldom exceeded ten miles, the expanded or metropolitan community embraces in a single organization the cities, villages and other minor civil divisions lying within a radial distance of thirty-five miles or more from the central or core city.

Hauser (1965, p. 4) points out that the metropolitan area "has become a basic economic and social unit not only in regional and national economies but also in world economy. It is a highly complex and interdependent unit binding centralization with decentralization and specialization and differentiation of function with integration and coordinating mechanisms."

The foregoing discussion should serve to indicate that the marked advance of urbanization in the histories of western Europe and North America is accompanied by a most important evolution in the organization and function of the urban agglomeration. A related topic, which is not touched upon here, is the evolution of the physical structure and function of the urban plant, which has also been a feature of advancing urbanization.

In sum, the level of world urbanization was still relatively low in 1960, when roughly one fourth of the world's population resided in localities of 20,000 and over. Rapid advances in the level of urbanization among the major regions of the world began mainly in the nineteenth century. Even large cities, which may develop in regions with very low levels of urbanization, are relatively recent phenomena in human history. Cities of 1,000,000 or more in population have existed mainly since the eighteenth century. Along with the advances in the level of urbanization and in city growth in Europe

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and North America, urban agglomerations have shown a tendency toward evolution from the compactness of the typical ancient and medieval town to the sprawl of the contemporary city.

2.1.2 CANADA IN THE WORLD SETTING — When significant European colonization of Canada began in the seventeenth century, town development in western Europe already had a long history. In 1666, the colony of New France had fewer than 5,000 settlers, while the city of London (England) contained over 400,000 residents (Cudmore and Caldwell, 1938, c. III). At that time, Montreal, Quebec and Trois-Rivières were tiny villages, each with a population of fewer than 1,000. By 1765, Montreal and Quebec had passed the 5,000 mark but no Canadian centre was as large as 20,000.

By the first quarter of the nineteenth century, Halifax, Montreal and Quebec had become major Canadian centres for trade, trans-shipment of goods and commerce. It is symptomatic of the functions of these centres that the Banks of Montreal and Quebec were founded in 1817 and 1818, respectively, for the purpose of financing trade between England and Canada. By 1818, Halifax was the most important of several shipping centres in the Maritimes (Cudmore and Caldwell, 1938, c. III). Thus, some significant urban development in Canada may be dated as early as the first quarter of the nineteenth century, if not earlier. It may be recalled (Section 2.1.1) that at the turn of the nineteenth century less than five per cent of the world's population resided in cities of 20,000 and over, although there were many cities considerably larger than 20,000, and the most highly urbanized country at that time (England and Wales) had already attained a marked degree of urbanization. By 1825, Montreal and Quebec had passed the 20,000 mark, having populations of 32,000 and 22,000, respectively. Trois-Rivières had about 3,000 persons and York, the capital of Upper Canada, 2,000. These four centres comprised nine per cent of the colonial population of Upper and Lower Canada. In the Maritimes, Saint John had about 11 per cent of New Brunswick's population (74,000) in 1824, and Halifax about 12 per cent of Nova Scotia's (124,000) in 1827. (Cudmore and Caldwell, 1938, c. III.) These data suggest that around 1825 roughly five per cent of the colonial population of Upper and Lower Canada and the Maritimes were concentrated in the two centres of 20,000 and over.

In 1851, seven per cent of the population which subsequently formed the Dominion were concentrated in centres of cities 20,000 and over. Montreal had passed the 50,000 mark, Quebec and Toronto had passed the 30,000 mark, and Halifax and Saint John were among the cities of 20,000 and over (Cudmore and Caldwell, 1938, c. III). According to Davis (1955, Table 1) the percentage of world population residing in cities of 20,000 and over was still below five per cent in 1850. Thus, if the Davis estimate

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may be accepted as being sufficiently accurate to provide a rough comparison of Canadian and world urbanization, it would appear that at least 20 years before Canada experienced a marked 'take-off' toward high levels of urbanization (between 1871 and 1885, as Section 2.2.3 shows) it already had a level of urbanization higher than the world average.

By 1961, Canada was placed firmly among the world's most highly urbanized countries. In a preliminary report to the Thirteenth Session of the United Nations Population Commission, the United Nations Secretary General (UN, Economic and Social Council, 1965, Table 4) ranks Australia and New Zealand, Northwestern Europe and North America (the United States and Canada) from first to third, respectively, in level of urbanization around 1960. The United Nations report (UN, Economic and Social Council, 1965, Table 5) ranks Canada in the top 20 of some 100 countries in this regard.

Within North America, the levels of urbanization shown by Canada and the United States around 1961 seem quite similar. In the 1960 Census of Population, 70 per cent of the population of the conterminous United States plus Alaska and Hawaii were classified as urban (U.S. Census 1961, pp. XIII-XIV), a percentage equal to that shown for Canada in its 1961 Census. A study of the definition of "urban" used in the United States Census of 1960 suggests that the definition is more restrictive than that used in the Canadian Census of 1961. To improve the comparability between the recent figures for the Canadian and United States levels of urbanization, it would seem necessary to adjust the United States figures upward. An initial step would consist of adding to the United States urban population total the figures for incorporated centres of 1,000–2,499 classified as rural, which alone would raise the indicated degree of United States urbanization in 1960 to 74 per cent. Of course, this addition might not be enough to make the Canadian and United States urban figures comparable. There are other sources of difference between the definitions of "urban" in the 1961 Census of Canada and the 1960 Census of the United States. Even if the two definitions were identical, there may be such differences between the patterns and density of urban settlement in these two countries that their urban population statistics would still not be comparable. These difficulties are somewhat reduced if one adopts the United States practice of restricting international comparisons of urban population statistics to localities of 20,000 and over in population (UN, Economic and Social Council, 1965). The figure of 20,000 is arbitrary but its use reduces the chances of distortion caused by differences in definition and in the pattern and density of urban settlement.

In terms of the percentage of population in urban agglomerations of 20,000 and over, the United States was probably ahead of Canada in 1961.

Chart 2.1 shows that in 1960 roughly 57 per cent of the United States population (conterminous U.S.) resided in urban agglomerations of 20,000 and over; the corresponding figure for Canada in 1961 was 52 per cent. However, the gap between Canada and the United States in this respect has been closing since 1921.

About 1961, the percentage of population in urban agglomerations of 100,000 and over was higher for Canada than for the United States (Chart 2.1), a differential that appeared for the first time (among census years) in 1951. In 1961 roughly one third of Canada's population resided in such agglomerations as against three tenths in 1951; in 1960 the United States figure had not yet reached three tenths. In comparison, the percentage of the United States population in urban agglomerations of 100,000 and over about 1870 was roughly 11 per cent versus three per cent for Canada. Canada's percentage has increased much more rapidly than that of the United States in this century.

CHART 2.1

PER CENT OF POPULATION IN URBAN AGGLOMERATIONS OF
20,000 AND OVER AND OF 100,000 AND OVER,
CANADA AND THE UNITED STATES[a], 1851–1961

[a] Before 1941 the Canadian and United States figures are for incorporated centres only. Since 1941 these figures include unincorporated urban centres and urbanized fringes of cities. The United States data refer to the conterminous United States, and to years ending in zero.

UNITED STATES P.C. URBAN 20,000+

CANADA P.C. URBAN 20,000+

UNITED STATES P.C. URBAN 100,000+

CANADA P.C. URBAN 100,000+

Sources: U.S., 1960 Census of Population, Table 8; D B S 99-512, 1961 Census, Table 3; DBS 92-535, 1961 Census, Tables 10 and 11; 1951 Census, Vol.1, Tables 12 and 12a; 1890-91 Census, Vol.1, p. 370; 1871 Census, Vol.1, pp. 30, 82, 428; 1851-52 Census, Vol.1, pp. xvii - xix. UN, Population Division, 1966, Tables 2 and 3.

Thus, from the earliest phases of the relatively short history of European settlement in Canada, a marked tendency was shown toward the concentration of the colonial population in centres. However, no centre of concentration was over 1,000 in population when the first census of New

France was taken in 1666. The colony had two cities of over 20,000 (Montreal and Quebec) by the first quarter of the nineteenth century, and the available data indicate that these centres contained more than five per cent of the colonial population of British North America in 1825, which suggests that Canada may be placed among the world's more highly urbanized regions by 1825. British North America was among the principal regions in regard to the level of urbanization in the decade after Confederation, when it began a 'take-off' toward high levels of urbanization. By 1961 Canada was firmly among the top one fifth of the world's most highly urbanized countries. Together with the United States, it formed one of the three most highly urbanized of the world regions. Around 1961 the levels of urbanization in Canada and the United States were very similar, at least 70 per cent in both countries.

2.1.3 SOME FACTORS IN CANADIAN URBANIZATION – Having reviewed the history of Canadian urbanization and its context of world urbanization, it is appropriate to consider informally (i.e., without statistical analysis) the factors responsible for the emergence of Canada as one of the world's most urbanized countries. Although the results of such informal consideration must, at best, be limited and unsatisfying, they may provide a framework of propositions and concepts within which to integrate and synthesize the historical record of Canadian urbanization. As a contribution toward the attainment of such a framework, this Section discusses the historical pattern of Canadian urbanization in the context of the timing of some major developments in the country's economic and social history.

Such discussion requires a set of basic considerations aimed at delimiting the field of factors relevant to an analysis of urbanization, considerations that are essential precisely because the available statistical data and tools seem quite inadequate for deep analysis of the historical course of a process as complex as is urbanization. This inadequacy necessitates heavy reliance on cogent substantive interpretation and analysis, and this requires a foundation of theoretical concepts and propositions. Clearly, such interpretation and analysis entail a fair amount of oversimplification.

As a first step in the development of a simplified framework for the analysis of urbanization, certain 'urbanizing forces' may be posited. These forces may be classified roughly as either economic, social or demographic. Each category is a complex of interrelated variables and between any two such complexes a myriad of interrelations exists. For the purposes of this discussion, the economic forces may be viewed as being comprised of a number of sub-complexes of interrelated variables, three of which may be identified and characterized as follows: (1) changes in the technology of

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production, including developments in division of labour and in systems of transportation, communication and exchange, as well as advances in the techniques and machinery of production methods; (2) changes in the composition of the supply and demand for economic goods and services; and (3) economic growth.

The demographic determinants of urbanization include the growth and regional distribution of population and the related demographic processes (such as migration). Viewed as a demographic phenomenon, urbanization itself may sometimes be a factor in its own advance. This is so because the advance of urbanization is conducive to the precipitation of a number of social and economic developments which, in turn, have a feedback effect upon the level of urbanization. The social forces in the advance of urbanization include political organization and the system for maintaining social order, the legal and ethical system governing economic relations among individuals and business entities, and the sets of customs, behaviour patterns and values commonly called "styles of living".

Clearly, the preceding classification of urbanizing forces, which has been synthesized from some of the major works in the field of urban studies (Weber, 1899; Gras, 1922; Mumford, 1961; Davis and Golden, 1954; Hauser and Schnore, 1965; and Hatt and Reiss, 1957), gives no information about the mechanisms by which urbanization is generated and advanced. This is the area in which the relevant fundamental knowledge suffers from its most crucial deficiencies. This knowledge seems to be most precise, though still quite inadequate, in the field of demographic variation, where it is known that as the population increases so does the number of centres reaching the critical mass and density required for classification as urban (in the purely demographic sense). Furthermore, the change in the proportion of population classified as urban, which is the most commonly accepted measure of change in the degree of urbanization, may be represented as a simple function of the initial level of urbanization and of the difference between the rates of increase in urban and rural populations (where the rates reflect changes in the areal extent of urban settlement). But as soon as one goes beyond such simple necessary relations among demographic changes with the aim of determining how such changes may be interrelated with economic and social factors, the existing knowledge becomes a network of plausible (but very imprecise) substantive interpretations. In the light of the limitations in the existing basic and relevant knowledge, as well as of the deficiencies in the available data and mathematical-statistical tools, one must seek satisfaction in the modest objective of informally interpreting the historical pattern of Canadian urbanization in terms of some major developments in the economic and social history of Canada. This is the objective of the following comments.

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In broad generalization, it may be said that Canadian urbanization has partially resulted from and determined the concentration of economic advances at a relatively few specific points in geographical space.[3] This concentration has been brought about partly by forces external to Canada (such as shifts in the commodity structure of demand on the world market, technological changes outside of Canada that affect the comparative advantage of certain types of productive activity in Canada, international migration, and major wars) and partly by internal forces (such as technological changes, shifts in the structure of demand, and decisions by political authorities which influence the structures of the demand and supply of economic goods and services). Important among the factors that have influenced the spatial concentration of economic changes and opportunities are: (a) a sequence of technological developments in the fields of transportation and communication, (b) the intensification of division of labour and of the interdependence of units in production processes, and (c) shifts toward more complex and sophisticated production systems. Particular developments in the geographical concentration of economic changes and opportunities tend, in turn, to produce ramifications that have had a powerful cumulative effect upon the advance of urbanization. These ramifications include the mobility of both people and factors of production, which, in turn, influence (a) regional and rural-urban differentials in the natural increase of population and (b) the attainment of large labour pools and consumer markets in very small geographical areas. The latter is a feature of urban agglomerations that tends to facilitate further advances in the technology of production (and hence further urbanization, up to the upper limits of urbanization).[4] These complexes of factors seem to be evidenced, if only partially so, by the recorded history of Canada.

Canadian urban development probably had its 'take-off' toward high levels of urbanization in the 10-15 years following Confederation in 1867 (Section 2.2.3). Upper Canada, Lower Canada and the Maritimes (together) were about eight to 10 per cent urbanized around 1825.[5] (Cudmore and Caldwell 1938, c. 111.) These regions were about 13 per cent urbanized in 1851, which suggests an average decade increase of about two percentage points in the level of urbanization between 1825 and 1851. The decennial advance in the level of urbanization for these regions increased markedly from 1861-71 to 1871-81. This advance remained near its 1871-81 level in the remaining two decades of the nineteenth century. For Canada as a whole there was a similar upsurge in the decade increase of urbanization in 1871-81 (which is to be expected, since settlement was heavily concentrated in the Maritimes, Quebec and Ontario).[6]

A number of important developments may be associated with the upsurge of Canadian urbanization following Confederation. The 20-year

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period preceding Confederation had seen the occupation of virtually all of the easily arable land in Eastern Canada (Lower, 1946, p. 182) and the first phase of marked expansion in railways and telegraph networks (Spelt, 1955, pp. 136-137; Cudmore and Caldwell, 1938, p. 33). In addition, there were some major shifts in the conditions of world trade which were partly responsible for the formation of a Confederation designed to promote, among other things, the development of domestic markets and interregional trade within Canada (Buckley, 1955, p. 45; Mackintosh, 1939, pp. 15-19). These developments imparted a shock to the pre-1850s complex of economic relations, which was characterized by almost exclusive orientation to primary-product extraction in the economy, by transportation dominated by wooden sailing vessels and water routes, and by considerable isolation of the individual British North American communities (Cudmore and Caldwell, 1938, c. III; Camu, Weeks, and Sametz, 1964, p. 44; Mackintosh, 1939, pp. 17-19). The shock provided by the above-mentioned developments in the fields of agricultural activity, of transportation, of world trade, and of political organization (Confederation) produced an expanded scope for the growth of those economic activities which require (or are facilitated by) the agglomeration of population into very small geographical areas.

Later in the nineteenth century there was a sharp expansion of tariffs from 1879 to 1887 (Mackintosh, 1939, pp. 33, 50; Buckley, 1955, p. 46), and technological changes spurred the development of manufacturing (Bertram, 1963, p. 171; Spelt, 1955, pp. 138, 171; Buck and Elver, 1964, p. 5; Corbett, 1957, p. 122). These post-Confederation developments combined with those occurring in the 1850s and 1860s to generate a surge of industrialization during the last third of the nineteenth century. Important among the ramifications of such developments was a marked step toward the economic integration of Canadian regions (Camu, Weeks, and Sametz, 1964, pp. 48-49), which has been a major influence on the size of the internal market for domestic non-primary production. This whole complex of forces must have generated a great push to the agglomeration of population into urban centres, where the new economic structural changes and opportunities were being concentrated, while the urban centres further facilitated the march of industrialization. Thus, the historical record suggests a whole matrix of major economic and social changes associated with the upsurge of Canadian urbanization following Confederation and with the continued rapid pace of this urbanization in the last third of the nineteenth century.

Beginning around the latter portion of the 1890s the 'urbanizing forces' in Canada sustained a new and powerful augmentation. A tremendous immigration wave (about 1896-1914), extensive western settlement, and the emergence of wheat as a major staple in the Canadian economy

formed a three-pronged development which was probably interrelated with the marked upsurge in the decade advance of Canadian urbanization from 1891-1901 to 1901-11. The expansion of wheat production for export became a major force in promoting the integration and interdependence of Canadian regions (with a particularly notable impulse to manufacturing in Central Canada), and this expansion had an important multiplier effect upon employment opportunities in the centres where non-primary activities were concentrated – that is, in the urban areas. Thus, the rapid growth of population and the generation of urban employment opportunities (derived ultimately from the expansion of wheat production for export) enhanced the advance of urbanization around the turn of the twentieth century (Mackintosh, 1939, pp. 39, 50; Buckley, 1955, pp. 4, 45).

The First World War brought heavy demands for manufactured products and exerted a marked impulse upon the concentration of economic opportunities in urban areas (Corbett, 1957, p. 143; Buckley, 1955, p. 45). The economic transformations of the war period promoted technological changes in agriculture, particularly in Western Canada, and these changes mushroomed in the 1920s (Mackintosh, 1939, p. 87). The expanded use of mechanized farm implements was making heavy inroads into the demand for farm labour. In Central Canada, urbanization maintained its record pace of advance from 1901-11 to 1911-21, while the increase of urbanization decelerated markedly in the highly agricultural Prairies.

The Great Depression which began generally in 1929, but was evident in Saskatchewan as early as 1928 (Mackintosh, 1939, c. 6), was marked by an enormous dampening of the factors promoting urbanization. Immigration and population growth decelerated markedly, the demand for the products of non-primary activities fell off considerably, and the rate of investments technological changes declined greatly. Accompanying this matrix of economic contraction (Hood and Scott, 1957, p. 15) was a marked downturn in the pace of Canadian urbanization. The events of the period surrounding and including the Great Depression comprise an impressive commentary on the integral part played by urbanization in the development of the Canadian economy.

With the advent of the Second World War, Canada entered upon a period of unprecedented industrialization. This War was an important motive force behind some impressive technological changes and mobilization of resources. As stated by Wilson, Gordon, and Judek (1965, pp. 44-45), "Not only had industrial research begun on a large scale but many entirely new industries had been established (e.g., synthetic rubber, roller bearings, diesel engines, antibiotics, high octane gasoline, aircraft manufacturing, and shipbuilding). Further processing of some manufactured

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goods hitherto imported likewise gave the Canadian economy a taste of new manufacturing capabilities .... In many industries (e.g., steel) basic capacity was permanently enlarged." And accompanying the transformations of the 1940s was a heavy decline in the agricultural working force (1951 Census, Vol. X, p. 47; Slater, 1960a, pp. 57-58). These changes no doubt were interrelated with a marked upsurge in the level of urbanization, which was further accentuated in the postwar period of unprecedented prosperity.

To the forces let loose by the Second World War must be added in the postwar period the development of new sources of economic opportunity (through an employment-multiplier process) in the rapid growth of the oil, natural gas, pulp and paper, and automobile industries, and the great revolution in transportation and communication facilities which spurted after the turn of the century (Bertram, 1963, p. 175) and mushroomed after the Second World War (Blumenfeld, 1961). This revolution and the continued economic growth' have been key factors in the suburban sprawl and metropolitan growth of the 1950s and 1960s. The recent rapid urbanization has been further enhanced by a postwar immigration wave which has been concentrated upon urban areas (Camu, Weeks, and Sametz, 1964, p. 72).

Chart 2.2 shows patterns that are consistent with the foregoing comments. For Canada as a whole, a measure of relative decennial change in the level of urbanization is graphed. Also graphed is the same measure applied to the per cent of the male working force *outside* of agriculture, hunting, fishing and trapping (logging is excluded from this complex of primary activities because the historical data in this category sometimes include pulp and paper manufacturing). This latter figure may be termed the per cent of the male labour force mainly in the non-primary economic activities. Marked similarity is shown by the patterns of historical fluctuation for the relative changes in the level of Canadian urbanization and in the per cent of the male labour force mainly among non-primary activities. Both variables show distinct upsurges in 1901-11, 1941-51 and 1951-61, as well as downturns in the generally depressed 1931-41 decade.

Chart 2.2 does not demonstrate that the historical advances in Canadian urbanization result from industrialization because the economic series in the chart probably reflect both determinants and consequences of the advances in the level of urbanization. However, the chart strongly suggests that by studying the advances in Canadian urbanization we are focusing upon a reflection of major structural changes in the Canadian economy.

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CHART 2.2

DECENNIAL RELATIVE CHANGE^a IN THE LEVEL OF URBANIZATION
AND IN THE PERCENTAGE OF THE MALE WORKING FORCE^b
OUTSIDE OF AGRICULTURE, HUNTING, FISHING AND TRAPPING
CANADA, 1891 - 1961

PER CENT   PER CENT

^{a} Let "p" be the relevant figure, and "p_1" and "p_2" mean two consecutive censuses. The relative change is defined as $100(p_2-p_1)/(1-p_1)$.

^{b} Before 1951 these figures refer to gainfully occupied males aged 10 and over. In 1951 and 1961 the figures refer to the labour force aged 14 and over. The 1891 and 1901 figures pertain to the 1931 occupational classification. The 1941, 1951 and 1961 figures pertain to the 1951 occupational classification. The 1911, 1921 and 1931 figures are averages of those given by the 1931 and 1951 occupational classifications, and the difference between the two sets of figures for these years never exceeds one half of one percentage point.

RELATIVE CHANGE IN THE P. C. OF
MALE WORKING FORCE OUTSIDE OF
AGR., HUN., FISH.,& TRAPPING

RELATIVE CHANGE IN
THE LEVEL OF
URBANIZATION

1891-1901 1901-1911 1911-1921 1921-1931 1931-1941 1941-1951 1951-1961

Sources: DBS 94-501, 1961 Census, Table 3; DBS, 1939, Table 5; and Table 2.2 below.

Since Chart 2.2 covers the period from 1891 to 1961 only, it is appropriate to mention some relevant work by Angers and Allen (1954), which presents census-based estimates of the distribution of the Canadian working force among selected activity groups from 1851 to 1891. The percentage and the total shown for the agricultural group increases in each decade from 1851 to 1881; but the increase is at a markedly decreasing rate from the first to the third of these decades, and between 1881 and 1891 the percentage declines. This pattern of changes seems roughly consistent with that of advances in the level of urbanization over the same period.

It may be noted here that the demographic process of migration has been important in the immediate mechanism of Canadian urbanization (Anderson, 1966). One of the important indirect effects of the migration process has been a recent shift in the concentration of the most fertile segments of the population from the farm to the urban and suburban areas (Chapter Three).

If the foregoing interpretations are plausible (see footnote ^{3}), the hypothesis is suggested that the advance of Canadian urbanization is a symptom of and a factor in a far-reaching evolution in the structures of the Canadian economy and society. A major claim of Chapter One is thus

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substantiated — a monograph focusing on the demographic aspects of urbanization provides significant reflections of the social and economic evolution of Canada. Only a mild exercise of imagination is required to bring the realization that the demographic trends are by themselves suggestive of insights, hypotheses and questions about the causes and consequences of this evolution. The present Section reviews briefly the history of and factors in Canadian urbanization, considering the Canadian case in the general context of world urbanization; with this review in the background, the following Sections provide more details on the subject.

2.2 SOME HIGHLIGHTS OF CANADIAN URBAN DEVELOPMENT

2.2.1 CANADIAN URBANIZATION IN 1961 — The urban influence in Canadian communities in 1961 is indicated only partially by the 70 per cent level of urbanization mentioned in Section 2.1.2. This figure is based upon the demographic conception of the term "urban" — the urban population residing in densely settled built-up areas, each having a given minimum population.[8] A portion of the population classified as rural non-farm in the 1961 Census consisted of persons who commuted to work-places located within the recognized urban centres. Still more people classified as rural in 1961 had occupations and styles of living far removed from those typical of traditional rural society.

CHART 2.3

PER CENT OF POPULATION URBAN, RURAL NON-FARM, RURAL FARM, CANADA AND PROVINCES, 1961

Source: DBS 99-512, 1961 Census, Table II.

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CHART 2.4

NORTHWEST   TERRITORIES

BRITISH COLUMBIA

ALBERTA

SASKATCHEWAN

MANITOBA

ONTARIO

QUEBEC

NEWFOUNDLAND

NEW BRUNSWICK

PRINCE EDWARD ISLAND

NOVA SCOTIA

DISTRIBUTION OF URBAN CENTRES OF 5,000 AND OVER,
CANADA, 1871 TO 1961

LEGEND

● Centres of 5,000 and over in 1871
◉ Centres of 5,000 and over in 1901,
  but not in 1871
◒ Centres of 5,000 and over in 1941,
  but not in 1901
● Centres of 5,000 and over in 1961
  but not in 1941

The high degree of Canadian urbanization in 1961 was accompanied by a marked variation in the level of urbanization among regions of Canada. Urban centres are by no means evenly spread throughout the settled part of the Canadian territory. These generally known facts are worth being recalled and documented in some detail because of their important implications regarding regional differentials in economic structure and development.

At the provincial level the degree of urbanization in 1961 (as measured by the per cent of population classified as urban) ranged from 77 per cent in Ontario to 32 per cent in Prince Edward Island (Chart 2.1). Although Canada as a whole was more than two thirds urbanized in 1961, just three of the ten provinces were at least two thirds urbanized in 1961 — Ontario (77 per cent), Quebec (74 per cent) and British Columbia (73 per cent).[9] Of the seven remaining provinces four were over 50 per cent urbanized — Newfoundland, Nova Scotia, Manitoba and Alberta. Thus, the central and far western provinces accounted principally for the high degree of Canadian urbanization in 1961.

Within the provinces, urbanization is regionally concentrated, partly because the larger urban centres tend to be clustered near each other. Chart 2.4 shows that only in Saskatchewan and Alberta do the larger urban centres depart greatly from this clustering tendency. The regions containing major concentrations of urban centres are well known: the lower Great Lakes and the St. Lawrence Valley in Ontario and Quebec, the lower Fraser Valley in British Columbia, the Assiniboine and Red River Valleys in southern Manitoba, and the Atlantic coastlines and St. Lawrence Gulf coastlines in the Atlantic Provinces. In Quebec 85 per cent of the 1961 urban population were located in 54 counties which may be said to comprise roughly the Montreal and Eastern Townships region. In contrast, this region contains only 54 per cent of the provincial rural non-farm population and 64 per cent of the provincial rural farm population (DBS 92-536, 1961, Table 13). In Ontario 63 per cent of the 1961 provincial urban population were contained in the 22 counties adjacent to Lakes Erie and Ontario, although only 39 per cent of the rural non-farm and 40 per cent of the rural farm populations were contained in these counties. The most southerly census divisions of British Columbia contained 91 per cent of the province's urban population in 1961, but only 72 per cent of the rural non-farm and 73 per cent of the rural farm populations. In the remaining provinces, a notable difference between the regional distributions of the urban and the rural populations is also observed, the differential being weakest in Saskatchewan and Alberta.

2.2.2 HISTORICAL PATTERN OF RATES OF URBAN POPULATION IN-CREASE – The past century has experienced high rates of urban population increase,[10] accompanied by much lower rates of change in rural population. Between 1851 and 1961 the urban population in the area of the three oldest major regions[11] (the Maritimes, Quebec and Ontario) has increased at least 28-fold, while the rural population has increased, at most, twofold (Tables 2.2 and L.1). It is notable that the population classified as rural in these three major regions was about 2,000,000 in 1851 and only about 3,500,000 in 1961. Between 1901 and 1961 the urban population in Canada (excluding Newfoundland, Yukon Territory and the Northwest Territories)[12] has increased at least sixfold, while the rural population has increased at most threefold.

The sharp urban-rural differential in rates of population increase, which has been indicated above for periods covering at least half a century, is also observed among the individual decades. In each of the 11 intercensal periods from 1851 to 1961 the urban population rate of increase in Canada was at least twice as high as the rural population rate of increase (Chart 2.5). The same pattern of urban-rural differentials is shown when one considers the group of major regions for which data on a relatively constant area exist (the Maritimes, Quebec and Ontario). In this group, the rural population increased by about 26 per cent from 1851 to 1861, but since that decade it has failed to increase by as much as 15 per cent in any intercensal period. Indeed the figures (computed from Tables 2.2 and L.1) show that the rural population in the Maritimes, Quebec and Ontario (taken together) declined absolutely in 1881-91, 1891-1901, 1911-21 and 1941-51.

Among two major categories of rural population (farm and non-farm) the farm segment has been primarily responsible for the urban-rural differentials in rates of population increase. The farm population has declined absolutely in each intercensal period since 1931 (Table 2.1), and other authors suggest that the intercensal rate of change for the rural farm population has been declining since the 1860s and 1870s, with short-lived reversals of the decline in 1901-11 and 1911-21 (Blanchard, 1953, pp. 81-88; Germain, 1962, p. 267).[13] The rural non-farm category shows positive rates of intercensal population growth since 1931.

Thus, it is clear that the rates of urban population change in Canada since 1851 are impressive when compared with the rates of rural population change. In 10 of the 11 decennial periods since 1851 the decade rate of urban population increase exceeded 25 per cent, and in five of these periods the rate of urban population increase was higher than 35 per cent (Table 2.1).

CHART 2.5

INTERCENSAL PERCENTAGE CHANGE IN POPULATION,
CANADA BY URBAN AND RURAL,
1851–61 TO 1951–61

Source: Table 2.1

27
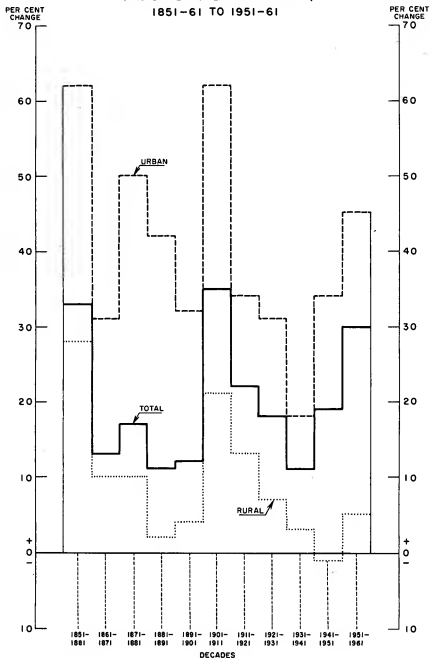
Table 2.1 – Intercensal Percentage Change in Population, by Urban and Rural, Canada,[a] 1851-61 to 1951-61

NOTE. — Let P_0 and P_1 mean the populations at the beginning and at the end, respectively, of a given intercensal period. The percentage change is defined as $100 (P_1-P_0)/P_0$. Rates are computed from unrounded figures.

Intercensal period	Total	Urban[b]	Rural	Rural non-farm[c]	Rural farm[c]
1851-61	33	62	28	..	..
1861-71	13	31	10	..	..
1871-81	17	50	10	..	..
1881-91	11	42	2	..	..
1891-1901	12	32	4	..	..
1901-11	35	62	21	..	..
1911-21	22	34	13	..	..
1921-31	18	31	7	..	..
1931-41	11	18	3	17	– 4
1941-51	19	34	–1	13	–10
1951-61	30	45	5	44	–27

[a]Excludes Newfoundland, Yukon Territory and Northwest Territories. Data for Newfoundland are available only since 1951. The Yukon and Northwest Territories had only 14,000 persons residing in incorporated cities, towns, and villages of 1,000 and over in 1961. Further details on these are given in DBS 99-511, 1961 Census, and in DBS 99-512, 1961 Census. Data for Manitoba, Alberta, and Saskatchewan in 1851 and 1861 and for Alberta and Saskatchewan in 1871, 1881 and 1891 are not available; totals for Canada are not affected significantly by this lack of data because settlement of these provinces was extremely sparse during the period (Camu, Weeks, and Sametz, 1964, Table 3.1).

[b]See Appendix A for a general discussion on the definition of "urban". The "urban area" is defined connotatively as a densely settled built-up locality containing at least 1,000 residents. The census definition of "urban" may be viewed as an operational specification of the connotative definition. In Canada the census definition of "urban" was changed in 1951, in 1956 and in 1961 (1961 Census, DBS 99-512, pp. 2.1-2.3). The rates of urban population increase in this column are substantially comparable from the viewpoint of the denotation of "urban" because the unincorporated areas excluded from the figures from 1851 to 1911 probably contained a very small percentage of the true urban population.

For 1851 and 1861 the figures refer to incorporated cities, towns and villages of 1,000 and over. The published census data for these years refer to all incorporated cities, towns and villages. The figures given here for 1851 and 1861 are based on a retrojection of the ratio of (1) the population in cities, towns and villages of 1,000 and over to (2) the population of all cities, towns and villages using published data for 1871 and 1881. It may be assumed that the population of unincorporated, densely settled, built-up localities in 1851 and 1861 is negligible in regard to its possible influence on the rate of urban population increase (Cudmore and Caldwell, 1938, p. 44). This assumption may be made for all of the census years up to 1931. Thus, the data for urban population upon which this column is based refer to the population of incorporated cities, towns and villages of 1,000 and over, from 1851 to 1911, and are believed to be substantially the same as those that would have been obtained had the 1961 Census definition of urban been used. It should be noted, however, that the source data for 1871, 1881 and 1891 refer to places containing at least 1,000 persons at the time of the 1921 Census, but it can be assumed that the places which declined from being 1,000 and over some time between 1851 and 1911 to being less than 1,000 in 1921 have a negligible influence on the rate of urban population increase.

Beginning in 1921 the published data for incorporated centres of 1,000 and over have been adjusted for the purposes of this monograph. From 1921 to 1961 the urban population figures are intended to refer to (1) all incorporated cities, towns and villages of 1,000 and over, (2) all unincorporated villages and towns of 1,000 and over, and (3) unincorporated urbanized fringes of cities of 5,000 and over. For 1961 these categories are represented in the published census data: for 1951 categories (1) and (2) are fully represented and category (3) only partially represented, for 1911 to 1941 category (1) only is shown in the published census data. The data for 1921 to 1951 are based on estimates of the proportions upon which would have been reported in the censuses had the 1961 Census definition of "urban" been used. The rates in this column for 1921-31 to 1951-61 are based on these proportions. However, in order to attenuate the impact of the change in definitions from 1911 to 1921 on the observed rate of urban population increase, the estimated urban population in 1911 (according to the 1961 Census definition) has been used in computing the rate shown for 1911-21. The rate shown for 1901-11 is based only on the data for incorporated cities, towns and villages of 1,000 and over (Appendix A).

[c]Census data for the rural non-farm population were first published for 1931. The rates shown for the rural non-farm population are those implied by the rates for the rural and rural farm populations. Estimates of the farm population in 1920 have been published by Firestone (1958, Table 7, p. 60).

SOURCES: 1921 Census, Vol. I, Table 12; 1931 Census, Vol. I, Tables 1a and 5; 1941 Census, Vol. I, Table 10; 1951 Census, Vol. I, Tables 12, 12a and 13; 1951 Census, Bul. SP-7; 1956 Census, Vol. I, Tables 8 and 9; 1961 Census, DBS 99-511, Table 1 – DBS 99-512, Tables 1 and 2 – DBS 92-535, Tables 10 and 11 – DBS 92-536, Table 12 – DBS 92-539 – DBS 92-528; DBS, "Component Parts...", 1963; Cudmore and Caldwell, 1938, pp. 36-38.

Table 2.2 – Per Cent of Population Urban,[a] Canada and Provinces, 1851-1961

NOTE.— Percentages computed from unrounded figures. Exclusive of the Yukon and Northwest Territories. See footnote[a], Table 2.1, for relevant information.

Canada or province	1851	1861	1871	1881	1891	1901
Canada (incl. Newfoundland)	...	...	...	...	...	...
Canada (excl. Newfoundland)	13.1	15.8	18.3	23.3	29.8	34.9
Newfoundland	...	...	...	...	...	...
Maritimes	9.0	9.9	11.9	15.3	18.8	24.5
Prince Edward Island................	−	9.3	9.4	10.5	13.1	14.5
Nova Scotia	7.5	7.6	8.3	14.7	19.4	27.7
New Brunswick	14.0	13.1	17.6	17.6	19.9	23.1
Quebec	14.9	16.6	19.9	23.8	28.6	36.1
Ontario	14.0	18.5	20.6	27.1	35.0	40.3
Prairies	...	...	...	...	...	19.3
Manitoba	...	...	−	14.9	23.3	24.9
Saskatchewan	...	...	...	...	...	6.1
Alberta	...	...	...	...	...	16.2
British Columbia..................	−	−	9.0	18.3	42.6	46.4

Canada or province	1911	1921	1931	1941	1951	1961
Canada (incl. Newfoundland)	...	...	...	...	62.4	69.7
Canada (excl. Newfoundland)	41.8	47.4	52.5	55.7	62.9	70.2
Newfoundland	...	...	...	...	43.3	50.7
Maritimes	30.9	38.8	39.7	44.1	47.4	49.5
Prince Edward Island................	16.0	18.8	19.5	22.1	25.1	32.4
Nova Scotia	36.7	44.8	46.6	52.0	54.5	54.3
New Brunswick	26.7	35.2	35.4	38.7	42.8	46.5
Quebec	44.5	51.8	59.5	61.2	66.8	74.3
Ontario	49.5	58.8	63.1	67.5	72.5	77.3
Prairies	27.9	28.7	31.3	32.4	44.5	57.6
Manitoba	39.3	41.5	45.2	45.7	56.0	63.9
Saskatchewan	16.1	16.8	20.3	21.3	30.4	43.0
Alberta	29.4	30.7	31.8	31.9	47.6	63.3
British Columbia..................	50.9	50.9	62.3	64.0	68.6	72.6

[a]From 1851 to 1911 the urban population figures refer to incorporated cities, towns and villages of 1,000 and over only; from 1921 to 1951 the percentages are estimates of the percentages which would have been reported in the respective censuses had the 1961 Census definition and procedures been used; for 1961 the figures are those published according to the 1961 Census definition of "urban". See footnote[b] to Table 2.1 for further details.

SOURCES: 1921 Census, Vol. I, Table 12; 1931 Census, Vol. I, Tables 1a and 5; 1941 Census, Vol. I, Table 10; 1951 Census, Vol. I, Tables 12, 12a and 13; 1951 Census, Bul. SP-7; 1956 Census, Vol. I, Tables 8 and 9; 1961 Census, DBS 99-511, Table 1–DBS 99-512, Tables 1 and 2–DBS 92-535, Tables 10 and 11–DBS 92-536, Table 12–DBS 92-539– DBS 92-528; DBS, "Component Parts...", 1963; Cudmore and Caldwell, 1938, pp. 36-38.

No marked trend (a sustained upward or downward drift) is observed in the decennial rates of urban population increase from 1851·61 to 1951·61 in Canada.[14] What Chart 2.3 shows predominantly is a pattern of marked upswings and downswings in the intercensal rates of urban population increase. There are very high peaks for 1851·61 and 1901·11, less prominent peaks for 1871·81 and 1951·61, and troughs in 1861·71, 1891·1901 and 1931·41. The 1851·61 and 1901·11 peaks are equal (62 per cent), they are nearly twice as high as the median decennial rate of increase (34 per cent) in urban population from 1851 to 1961, and are more than three times as high as the low point (18 per cent) of that rate, which was attained in 1931·41.

The dating of peaks and troughs in the decennial rate of increase for the Canadian urban population is quite similar to that for the intercensal rate of growth for the total population (Chart 2.5). This observation is not unexpected since (a) urban and rural areas have shared in gains from the immigration waves, (b) historical fluctuations in rates of natural increase have been manifested simultaneously by urban and rural areas, and (c) the proportion of the total population classified as urban has been increasing continually since 1851. The significance of the historical fluctuations in the decennial rate of urban population increase would be clarified markedly if the components of the urban population increase were isolated. Inadequacies in the available data make it extremely difficult to provide anything but a crude decomposition of this increase. Chapter Five presents fully the decomposition of the intercensal urban population increase from 1851·61 to 1951·61, which has been developed for this monograph.

One of the questions which a refined decomposition of the intercensal urban population increase should answer is the following: What has been the relative contribution of international migration to the rate of urban population growth in Canada? A precise answer to this question may not be available due to the large pieces of relevant information which are not contained in the available data. However, the works of Hurd (1943), of Slater (1960b), and of Camu, Weeks, and Sametz (1964, pp. 68-72) indicate that international migration, whose direct impact on population growth is the net external migration, has been a significant contributor to urban population increase in Canada. Chart 2.6 indicates the strong association between the historical patterns of the intercensal rates of net external migration and of urban population increase.

2.2.3 HISTORICAL PATTERN OF THE ADVANCE OF URBANIZATION –
The marked urban-rural differentials in intercensal rates of population increase, indicated in Section 2.2.2, imply continued advances in the percentage of population which is urban (Chart 2.7). Between 1851 and 1961 this percentage (which is being used here as a measure of the level of

CHART 2.6

INTERCENSAL RATES OF IMMIGRATION, NET EXTERNAL MIGRATION, AND URBAN POPULATION INCREASE,[a] CANADA,[b] 1851-61 TO 1951-61
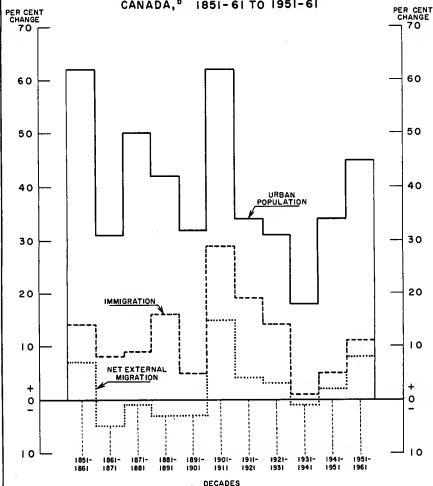
a The rates are formed by dividing the population of Canada at the beginning of the pertinent intercensal period into the respective totals (immigration, net external migration, or urban population increase). "Immigration" refers to the total number of immigrant arrivals between the censuses in question. "Net external migration" is the difference between immigration and emigration (defined as the number of persons departing Canada for residence elsewhere). The figures for immigrants and emigrants are estimates having varying degrees of accuracy (see Camu, Weeks, and Sametz, 1964, pp. 56-64 for detailed discussion).

b The data for immigrants and for net external migration include Newfoundland (after 1941) and the Yukon and Northwest Territories. These areas are excluded from the urban population data. The implied discrepancy in this chart has a negligible effect on the pattern which the chart is designed to show.

Source: Table 2.1., for the urban population data. The remaining data were obtained directly from Camu, Weeks, and Sametz, 1964, Table 3.1.

CHART 2.7

PER CENT OF POPULATION URBAN, CANADA AND MAJOR REGIONS,
1851 — 1961

Source: Table 2.2
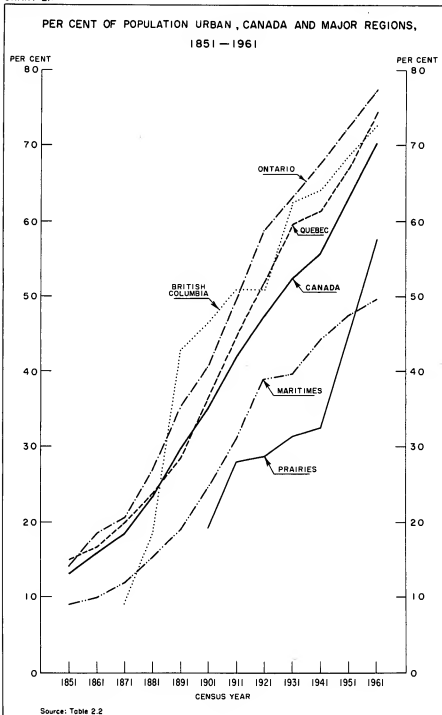
urbanization) increased at least fivefold[12] (Table 2.2). Between 1901 and 1961 the degree of urbanization in Canada doubled from 35 per cent to 70 per cent.

The degree of urbanization in Canada has advanced in every decade since 1851, as the foregoing comments on urban-rural differentials in rates of population increase suggest. In eight of the eleven decades from 1851 to 1961 the degree of urbanization in Canada increased by at least five percentage points (Chart 2.7).[12] The three decades in which the degree of urbanization has advanced by less than five percentage points were two periods preceding the 'take-off' of industrialization in Central Canada (1851-61 and 1861-71) and a period containing much of the Great Depression (1931-41).

In 1851 the level of urbanization in Canada was less than 15 per cent; it increased by about three percentage points in 1851-61 and in 1861-71, accelerated from 1861-71 to 1871-81, and the decennial increase remained very near five percentage points from 1871-81 to 1891-1901. By 1901 the degree of Canadian urbanization was about 35 per cent. The percentage point advance accelerated from 1891-1901 to 1901-11 and by 1931 the level of urbanization had passed 50 per cent. However, the percentage point increase decelerated sharply from 1921-31 to 1931-41 and in the generally depressed 1931-41 decade the level of urbanization increased by about three percentage points. From 1931-41 to 1941-51 the rate of advance increased and the periods 1941-51 and 1951-61 are outstanding in showing two of the three highest decade increases in the level of Canadian urbanization since 1851. An increase of seven percentage points is shown by Table 2.2 for 1901-11, 1941-51 and 1951-61. Obviously, a decade increase of seven percentage points could be maintained for at most four more decades because by 1961 the degree of Canadian urbanization had reached 70 per cent. The historical pattern of the advance of urbanization in the area of the Maritimes, Quebec and Ontario (for which there is an unbroken time series for a relatively constant area from 1851 to 1961) is very similar to that of Canada as a whole. Thus, within the period of a century, Canada has been transformed from an overwhelmingly rural country to a highly urbanized one.

Considering the decennial percentage point gain in urbanization and the decennial rate of increase in urban population, six historical phases may be identified in the pattern of Canadian urban development from 1851 to 1961. Three of these phases are marked by upturns and three by downturns in the pace of Canadian urban development.

CHART 2.8

PER CENT OF POPULATION URBAN , CANADA, 1871, 1901, 1931, AND 1961

1871

18%

1901

35%
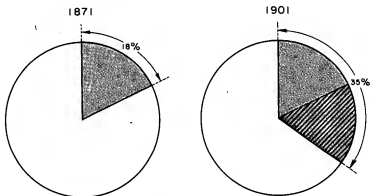
LEGEND

PER CENT URBAN

INCREASE IN PER CENT URBAN,
SINCE PREVIOUS DATE SHOWN

1931

52%

1961

70%
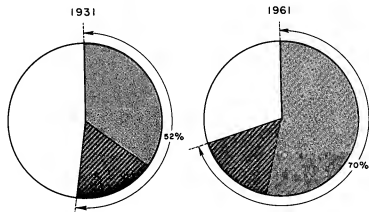
CHART 2.9

INTERCENSAL PERCENTAGE CHANGE IN URBAN POPULATION AND IN THE
POPULATION OF INCORPORATED CITIES, TOWNS, AND VILLAGES
OF 1,000 AND OVER, ONTARIO, 1851-61 TO 1951-61
(RATES FOR CTV'S^a ESTIMATED)
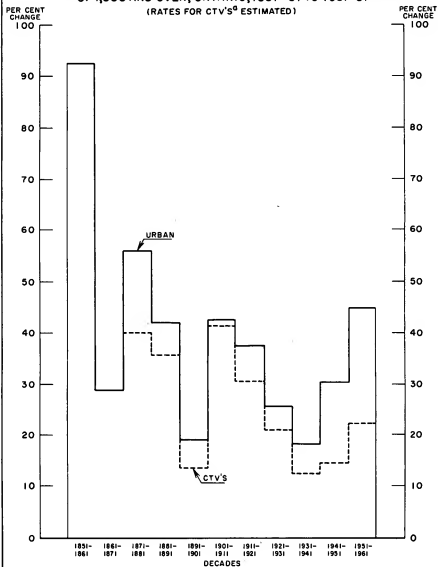
a "CTV'S" means incorporated cities, towns, and villages of 1,000 and over. The figures are estimates of
the growth rates of the CTV-population independently of annexations and of the rural-urban
reclassification of CTV'S. Due to the unavailability of the requisite data the CTV series
begins in 1871-81.

Sources: Tables 2.2 and 5.3

Historical phase	General direction of change in the rate of urban development	Number of decades in which the direction of change is sustained
1851 - 61 to 1861 - 71	very slight downturn	1
1861 - 71 to 1881 - 91	sharp upturn	2
1881 - 91 to 1891 - 1901	slight downturn	1
1891 - 1901 to 1901 - 11	moderate upturn	1
1901 - 11 to 1931 - 41	moderate downturn	3
1931 - 41 to 1951 - 61	very sharp upturn	2

The historical pattern of urban development in Canada is not merely a result of places 'graduating' from rural to urban status and cities enlarging their boundaries through annexation; it is a pattern which is shown by the intercensal growth rates for cities independently of boundary changes. In Chart 2.9, the curve of the rates for Ontario cities, with boundaries held constant, shows the same historical timing of marked upswings and downswings as that shown by the intercensal rate of urban population increase in Ontario.[15]

2.3 URBANIZATION AMONG FIVE MAJOR REGIONS — A LONG VIEW

It is important to supplement the preceding discussion with comments on the urbanization of Canadian regions, partly because urbanization tends to be highly concentrated in geographical space. In addition, there are very significant differences between Canadian regions (even among the major regions used in this Section) in regard to urbanization and to the associated factors. The description of these differences substantially supplements the picture of Canadian urbanization and casts some light on the motive forces underlying its advance. Therefore this Section undertakes to describe some principal features of the historical pattern of urbanization in the selected major regions of Canada[11], pointing out some systematic differences among these regions in regard to the rapidity and timing of advances in the level of urbanization. Space limitations prohibit a discussion of factors underlying regional differentials in Canadian urbanization but it may be noted that a cursory review of the data suggest that the regional patterns confirm the basic hypothesis advanced in Section 2.1.3 concerning some major forces underlying Canadian urbanization.

2.3.1 MAJOR-REGIONAL DIFFERENTIALS IN THE HISTORICAL PATTERN OF URBANIZATION — Each of the five major regions of Canada was at least 50 per cent urbanized in 1961 — 77 per cent in Ontario, 74 per cent in Quebec, 73 per cent in British Columbia, 58 per cent in the Prairies, and 50 per cent in the Maritimes (Table 2.2).[16] Ontario, Quebec and British Columbia have been the most highly urbanized of the regions in every

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census since 1881; before 1881 the Maritimes were more highly urbanized than British Columbia (Chart 2.7). Since 1881 the differential in level of urbanization between that of the group of Ontario, Quebec and British Columbia and that of the Maritimes has widened. The differential between the same group and the Prairie region widened from 1901 to 1941 but has narrowed markedly since then as a result of the sharp upturn in the advance of urbanization in the Prairies.

The differences between the levels of urbanization among the three most highly urbanized of the major regions have generally narrowed since 1881, the first year in which British Columbia had a level of urbanization similar to that of Central Canada (Table 2.2). Roughly 10 percentage points separated the extreme levels of urbanization among Quebec, Ontario and British Columbia between 1881 and 1901 but since 1901 the distance between these levels has been roughly of the order of five-to-seven percentage points. Although these differences indicate a general similarity between the three regions, in regard to levels of urbanization, the historical patterns of the advance of urbanization in Ontario and Quebec differ markedly from that in British Columbia. The curves for Quebec and Ontario (Chart 2.7) have generally followed parallel courses but that for British Columbia has cut across these curves at various points, reflecting the very much shorter history of extensive settlement in British Columbia than in Central Canada.

The pattern of urbanization in the three most highly urbanized regions since 1881 is markedly different from that of the other two regions. As one might expect, there are marked differences between the two less urbanized regions (the Maritimes and the Prairies). The Maritimes comprise one of the two oldest of the major regions of Canada (the other is Quebec), in regard to a history of considerable European settlement, and this region may have been the most highly urbanized of the major regions some time in the eighteenth century (Cudmore and Caldwell, 1938, c. 111). By 1851, however, this region was slightly less urbanized than Quebec and Ontario (Table 2.2), and has shown a very much lower level of urbanization than the two central provinces ever since. The curve of the per cent of population urban in the Maritimes (Chart 2.7) shows a pattern of undulations over time which is roughly similar to those of Ontario and Quebec, but upward surges have not been sustained in the Maritimes to the same extent as in Ontario and Quebec; as a result a general widening of the differential between the Maritime and the central provinces is evidenced between 1851 and 1961, becoming prominent mainly after 1921.

There was also a marked widening of the differential in level of urbanization between the Prairie region and Central Canada following the

great wave of western settlement (1896-1914). For the intercensal periods of 1911-21, 1921-31 and 1931-41 the level of urbanization in the Prairie region increased very slowly. Thus, while the central provinces were urbanizing rapidly from 1911 to 1941 (Ontario's level increased from 50 per cent to 68 per cent and Quebec's from 44 per cent to 61 per cent), advances of urbanization in the Prairies were relatively slow (from 28 per cent to 32 per cent). It was only up to 1931-41, however, that the rapidity of Prairie urbanization lagged behind that of the central provinces. Between the relatively depressed 1931-41 decade (a depression which was particularly severe in the Prairies) and the 1941-51 decade, the advance of Prairie urbanization accelerated very sharply and in the 1951-61 decade continued to climb rapidly. Over the whole 20-year period from 1941 to 1961 the level of Prairie urbanization jumped 26 percentage points (from 32 per cent to 58 per cent), in contrast with an increase of just four percentage points in the 30 years from 1911 to 1941 and has been urbanizing most rapidly among the major regions since 1941 (Chart 2.4). This unusually rapid advance in the recent decades may partly reflect the region's unusually short history of significant settlement, yet the historical pattern suggests strongly the influence of factors that extend beyond the mere 'youth' of this region. The highly profitable expansion of oil and natural gas production since the middle 1940s is probably an important cause of the recent upsurge in Prairie urbanization (Alberta, Royal Commission, 1956, c. 2). This expansion has accelerated Prairie industrialization and has probably been a most important multiplier of employment opportunities in Prairie cities. Urbanization in each Prairie Province increased by at least 18 percentage points between 1941 and 1961, Alberta leading with an increase of 31 points. In comparison, among the provinces outside the Prairie region, the most rapid advance of urbanization in this period was made by Quebec where the increase was 13-percentage points. Table 5.4 in Chapter Five suggests strongly that over three quarters of the urban population increase underlying this impressive upsurge in Prairie urbanization is accounted for by growth within Prairie cities (with boundaries held constant).

Thus it may be concluded that, among the five major regions of Canada, distinct and systematic differentials are shown in the historical pattern of urbanization. Only to a minor degree may these differentials be attributed to the varying lengths of the regions' histories of extensive settlement. The major regions may also be compared in regard to selected indicators of the rapidity of urbanization.

2.3.2 DIFFERENTIALS REGARDING THE RAPIDITY OF URBANIZATION –
The major regions may be compared in terms of the census dates at which they reached specific levels of urbanization. As Chart 2.7 shows, Ontario

was the first region to be 25 per cent urbanized and it reached this level near 1881. Ontario was joined by British Columbia in being the first to reach the 50 per cent level, attained in 1911. The two-third level of urbanization was first shown for Ontario for 1941 and by 1961 Ontario was the only region showing a level higher than three fourths, although Quebec and British Columbia had levels very close to 75 per cent. Table 2.3 shows these patterns in greater detail.

Only Ontario, Quebec and British Columbia had passed the 35 per cent level of urbanization by the turn of the present century and the Maritime and Prairie regions have yet (as of 1961) to reach the levels of urbanization attained by Quebec, Ontario and British Columbia in 1931. However, it should be noted that the Provinces of Nova Scotia and Manitoba had passed the 50 per cent level by 1951 and that Nova Scotia and Manitoba had passed the 35 per cent level by 1911.

The major regions may also be compared in terms of percentage-point gain in level of urbanization over specific periods. For the entire 1851-1961 period, British Columbia, Ontario and Quebec rank in that order from first to third in regard to percentage-point gain in urbanization. These provinces rank in the identical order from first to third in regard to the amount of advance in level of urbanization from 1851 to 1911, the latter year marking the end of an intercensal decade of unprecedented population growth and western settlement. However, the order changes for the 1911-1961 period when Quebec takes the lead in increase of urbanization, with Ontario and British Columbia following in that order. Since 1941, the Prairies have established a clear lead in increase of urbanization.

Table 2.3 — Census Years in Which Canada and the Major Regions Reached or Surpassed Selected Levels of Urbanization, 1851-1961

Canada and major regions	Levels of urbanization [a]				
	25 p.c.	35 p.c.	50 p.c.	67 p.c.	75 p.c.
Canada......................	1891	1901	1931	1961	[b]
Maritimes...................	1901	1921	1961	[b]	[b]
Quebec.....................	1891	1901	1921	1951	[b]
Ontario....................	1881	1891	1911	1941	1961
Prairies	1911	1951	1961	[b]	[b]
British Columbia	1891	1891	1911	1951	[b]

[a]The level of urbanization is measured by the percentage of population classified as urban.

[b]The area in question had not attained the pertinent level of urbanization as of 1961, according to the source data.

SOURCES: 1921 Census, Vol. 1, Table 12; 1931 Census, Vol. 1, Tables 1a and 5; 1941 Census, Vol. 1, Table 10; 1951 Census, Vol. 1, Tables 12, 12a and 13; 1951 Census, Bul. SP–7; 1956 Census, Vol. 1, Tables 8 and 9; 1961 Census, DBS 99-511, Table 1–DBS 99-512, Tables 1 and 2–DBS 92-535, Tables 10 and 11–DBS 92-536, Table 12–DBS 92-539–DBS 92-528; DBS, "Component Parts...", 1963; Cudmore and Caldwell, 1938, pp. 36-38.

Thus it is apparent that there are distinct and systematic differences between the five selected major regions of Canada in regard to the historical pattern of increase in urbanization and in the rapidity of this increase over specified periods and among selected levels of urbanization. The factors responsible for these differences are not discussed in detail but a number of general points may be noted. An explanatory analysis of the regional differentials should be constrained by the facts that (a) the regions differ markedly in regard to the history of considerable settlement, and (b) as the proximity of the upper limit of the level of urbanization is reached it may become more and more difficult to obtain a given increase in urbanization. Having taken these two factors into account, one should then turn to the demographic mechanisms accounting for the regional differentials, and follow this by an attempt to delineate the non-demographic factors underlying (and interacting with) the demographic mechanisms.

2.4 SUMMARY

When significant European colonization of Canada began in the seventeenth century, town development in western Europe and the British Isles already had a long history. However, from its earliest stages colonial settlement in Canada was marked by a tendency for population to be concentrated in very small areas, and the available data suggest that Canada may be placed among the more highly urbanized regions of the world around 1825. (It should be recalled, however, that the levels of world and Canadian urbanization were extremely low around 1825.) At the time of the 1851 Census, less than 15 per cent of the population of British North America resided in urban centres. By 1961, however, Canada was 70 per cent urbanized and was clearly among the most highly urbanized countries in the world. Within North America, the levels of urbanization in Canada and the United States were very similar around 1961.

In the past century Canada has had high rates of urban population increase accompanied by much lower rates of change in rural population. In each of the 11 decennial periods from 1851 to 1961, the percentage increase in Canadian urban population was twice as high as that in rural population. In 10 of the intercensal periods, the Canadian urban population increase exceeded 25 per cent and in five of these periods the rate of increase was higher than 35 per cent.

No marked and sustained upward or downward drift (general trend) is observed in the intercensal rates of urban population increase for Canada; what the data show prominently is a historical pattern of marked fluctuations in these rates. In the curve of intercensal rates of urban population increase, there are very high peaks for 1851-61 and 1901-11, less prominent peaks for 1871-81 and 1951-61, and troughs in 1861-71, 1891-1901 and 1931-41. The

historical pattern of the increase is not explained by waves of expansion in the area of urban settlement, and it reflects rates of population growth in urban centres independently of boundary changes.

The marked rural-urban differentials in the rate of population increase imply continued advances in the level of Canadian urbanization. In the decades preceding the period of 'take-off' in the industrialization of Central Canada (1851-61 and 1861-71) and in the generally depressed 1931-41 decade, the level of Canadian urbanization advanced about two-to-three percentage points. In all other decades, however, the level of urbanization advanced by at least five percentage points, and the increase reached a peak of seven percentage points in 1901-11, 1941-51 and 1951-61.

Among the five selected major regions of Canada, Ontario, Quebec and British Columbia showed levels of urbanization above 70 per cent in 1961, while in the Maritimes and the Prairies it was less than 60 per cent. Ontario, Quebec and British Columbia have been the most highly urbanized of the five major regions since 1881. Since 1881, the differential between the level of urbanization in this group of regions and that in the Maritimes appears to have widened markedly. The differential between the level of urbanization in the group of Ontario, Quebec and British Columbia and that in the Prairie region widened markedly from 1911 to 1941 but has since narrowed sharply, as the Prairies have led the way in the postwar advance of urbanization. Generally, Ontario has been in the vanguard of Canadian urbanization since Confederation, being among the first to reach the 25 per cent (in 1881), 50 per cent (in 1911) and 75 per cent (in 1961) levels of urbanization. However, for the 1851-1961 period, British Columbia, Ontario and Quebec rank in that order from first to third in regard to the amount of increase in urbanization, while for the 1911-61 period Quebec leads the rank order with Ontario and British Columbia following.

FOOTNOTES TO CHAPTER TWO

¹ The level of urbanization is measured by the percentage of population residing in urban areas. See Chapter One, Section 1.3, for relevant discussion.

² The United Nations report (UN, Economic and Social Council, 1965) classifies world regions as "more developed" or "less developed", listing the six more developed regions as North America, northwestern Europe, central Europe, southern Europe, Oceania and the Union of Soviet Socialist Republics.

³ This paragraph in general and this statement in particular cannot be considered as a complete general theory of Canadian urbanization. Its incompleteness and over-simplification are clear. The paragraph serves as an analytical 'peg' — a deliberately confined theoretical viewpoint adopted for the purpose of analysis. The analysis should then, depending on its thoroughness, indicate the light that the adopted viewpoint may cast on the process of urbanization.

[4] For comprehensive discussions of urbanization as a determinant of industrial growth, see UN Centre for Housing, 1966; Thompson, 1965; and Williamson and Swanson, 1966.

[5] See Chapter One, Section 1.3, for relevant comments on the definition of "urban".

[6] It should be noted that the coverage of the census data for the nineteenth century is known to be faulty. There were notable lapses in coverage of the western and aboriginal populations up to 1901 (1931 Census. Vol. I, p. 66, 99-101). Camu, Weeks, and Sametz (1964, Table 3.1) have published adjustments of the census data for the period 1851-1901. Attributing the whole of their adjustments to the rural category, one finds negligible changes in percentage of urban population for Canada.

[7] The role of income growth in urbanization, particularly of urban-rural income differentials, is recognized but is not emphasized in this presentation. It is difficult to separate the unique income-effect upon urbanization from the income-manifestations of the structural changes (which this presentation does emphasize). For discussion on aspects of income growth in urbanization, see Chinitz, 1964, c. 1; Sinclair, 1966, pp. 215-223, and c. V; Hood and Scott, 1957, pp. 64-65; and Daly, 1966.

[8] See Chapter One, Section 1.3, and Appendix A for relevant discussion.

[9] The differences between the figures for these three provinces should not be considered particularly significant without further investigation, partly because of possible marked interprovincial variation in the spatial pattern and density of settlement.

[10] These rates are appropriately affected by changes in the area of urban settlement; it is worth noting that such changes do not account for the historical pattern of upswings and downswings in the rate of urban population increase (Chart 2.9).

[11] See Appendix B for a relevant discussion of the selected "major regions" of Canada.

[12] Except where otherwise stated, all historical figures attributed to Canada exclude data for Newfoundland, Yukon Territory and the Northwest Territories.

[13] For more information on the decline of the rural farm population, see 1961 Census, DBS 99-512; 1956 Census, Vol. III, c. 2; and 1951 Census, Vol. X, c. 2. This matter will also be discussed in the 1961 Census Monograph on agriculture.

[14] See footnote [6]. This statement remains valid even when the adjustments of Camu, Weeks, and Sametz (1964, Table 3.1) are used.

[15] The corresponding data for Canada as a whole, presented in Chapter Five, indicate the same pattern of correspondence. Ontario has been singled out for Chart 2.9 because the Canadian series contain incomplete records for Western Canada before 1901 and Ontario has been in the vanguard of urbanization, among the major regions, since 1851.

[16] Small differences between the indicated levels of urbanization should not be considered substantively significant without further investigation. See footnote [9].

TRENDS IN CANADIAN URBAN
SEX-AGE COMPOSITION, 1901-1961

3.1 IMPORTANCE OF THE COMPOSITION OF
POPULATION BY SEX AND AGE

In an introduction to some demographic aspects of Canadian urban growth it is appropriate that a discussion on urban population increase be followed by one dealing with changes in the composition of this population. Some aspects of the distribution of the Canadian urban population among the sexes and age groups are considered in the present Chapter. The composition of a population by sex and age has ramifications in several important areas. Changes in sex-age composition are manifestations of differences among the sexes and age groups in rates of population change, and they also reflect historical shifts in the rates of the demographic processes of fertility, migration and, to a lesser extent, mortality. These changes in the rates of the demographic processes may in turn be related to social and economic factors. The sex-age distribution of a population may also limit or give scope to potential changes in such areas as the composition of municipal services, and the structures and volumes of consumer demand and labour supply. To some extent, the age composition also influences the potential population growth rate and a study of recent trends in the age distribution is an asset in forecasting population size. Finally, the age distribution is frequently an intervening variable in the analysis of the impact of social and economic changes on demographic trends, mainly because the socio-economic changes tend to have differential impacts among sub-groups of the population. Where the relevant sub-grouping of the population is markedly associated with age, the age distribution partly determines the net impact of social and economic changes. Thus, a knowledge of the age composition of the population in question and a study of its trends may be essential to an effective understanding of the interrelations of social, economic and demographic changes in the community. Clearly, the composition of a population by sex and age merits careful study.

In this monograph, detailed consideration and analysis of age distributions are not given but concentration is placed upon broad features and

differentials in sex-age composition, so as to present a description of the general 'character' of the Canadian urban population in this regard. The discussion is carried on in terms of a study of selected statistics of the composition of population by sex and age. Three descriptive Sections treat the general pattern of the sex-age composition of the Canadian urban population in 1961 and some major urban-rural and urban size-group differentials in sex-age composition; discuss regional differentials in urban sex-age composition; and discuss trends in the sex-age composition of the population in cities of 30,000 and over from 1901 to 1961. In the data assembled for the latter discussion, the disturbing effects of a changing list of cities of 30,000 and over are attenuated.[1] It should be noted that only in this portion (Section 3.4) of the Chapter do the urban population data refer to the administrative boundaries of cities; the other urban data in this Chapter reflect figures for unincorporated centres and urbanized fringes adjacent to incorporated centres. The fourth Section contains a few interpretive comments, indicating some ramifications of the main findings in the descriptive Sections. Chapter Five presents a brief analysis of the relative contribution of migration to changes in the sex-age structure of the population in four of Canada's largest cities.

3.2 URBAN SEX-AGE STRUCTURE IN 1961, AND SOME URBAN-RURAL AND URBAN SIZE-GROUP DIFFERENTIALS

In regard to the relative numbers of males and females, the urban population of Canada in 1961 may be characterized as 'female-dominant'.[2] Females outnumbered males in the whole urban population and in the segment of persons aged 20-34, as well as in the older age groups where females tend to be predominant because of their lower mortality. In 1961, the female predominance in the urban population was rather slight—98 males for every 100 females (Table 3.1). The statistics underlying Chart 3.1 show female predominance in all but five of the 18 age groups (five-year age groups up to age 84, and 85 and over as a single group). Three of the five exceptional age groups are those from age 0 to age 14, where the effects of the normal male predominance at birth (the masculinity ratio[2] at birth is usually between 102 and 106) are still evident; in the other two exceptional age groups—25-29 and 30-34—the masculinity ratio is insignificantly greater than 100.

In 1961 the urban age composition for Canada was that of a 'mature' population.[3] This statement is based on a classification scheme used by the United Nations (UN, Econ. Affairs Dept., 1956, p. 7) and derived from a study of the age distributions of 72 countries, which classified as 'young', 'mature', and 'aged' populations having percentages aged 65 and over of zero to three per cent, four to seven per cent, and at least eight per cent, respectively. The data for the 72 countries around 1950 indicate that in the 'aged' populations the number of persons 65 years and over is generally more than 12 per cent of the population aged 15-64, while the number of persons

CHART 3.1

AGE PYRAMIDS FOR URBAN, RURAL NON-FARM
AND RURAL FARM POPULATIONS, CANADA, 1961
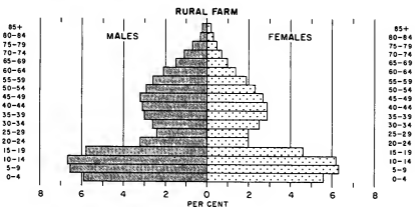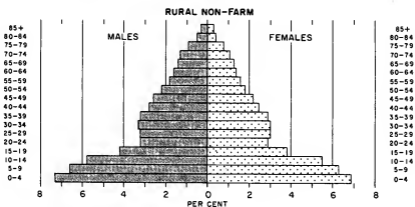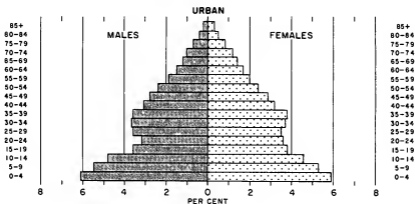
Source: DBS 92-542, 1961 Census, Table 21.

aged 0-14 is typically less than 40 per cent of the population aged 15-64. Table 3.1 shows that the 'old-age dependency' ratio in the Canadian urban population was 13 per cent in 1961 and that the 'youth dependency' ratio was 53 per cent.[4] Since the Canadian urban 'old-age dependency' ratio in 1961 falls within the values for aged populations and the youth dependency ratio is considerably higher than the values for aged populations, the age structure of this population is classified here as being 'mature'.[5]

Table 3.1 – Selected Statistics of the Sex-Age Composition, by Urban, Rural, Rural Non-farm, and Rural Farm, Canada, 1961

Item	Canada	Urban	Rural	Rural non-farm	Rural farm
Masculinity ratio, all ages[a]	102.2	98.2	112.2	109.0	117.6
Masculinity ratio, ages 20-34[b]	101.4	97.2	114.5	109.3	126.2
Median age males[c]	26.0	27.1	23.3	23.4	23.0
Median age females[c]	26.5	28.0	21.9	22.3	20.7
Youth dependency ratio[d]	58.1	53.4	70.0	72.2	66.4
Maturity ratio, males 20-64[e]	60.3	59.5	62.4	59.4	67.2
Old-age dependency ratio[f]	13.1	12.7	14.0	15.7	11.5

[a](Males/Females) 100.
[b](Males aged 20-34/Females aged 20-34) 100.
[c]Fifty per cent of the population lies below the median age; the median age is given in years and fractions of years.
[d](Persons aged 0-14/Persons aged 15-64) 100.
[e](Males aged 35-64/Males aged 20-64) 100.
[f](Persons aged 65 and over/Persons aged 15-64) 100.

SOURCE: 1961 Census, DBS 92-542, Table 21.

The percentage of the 1961 Canadian urban population aged 0-14 (32 per cent) is also characteristic of the group of 'mature' populations. The median ages of males and females in this population were 27 years and 28 years, respectively, and 41 per cent of the males in the prime labour force ages (20-64) were concentrated in the early years of working life (20-34).

Although the age composition of the urban population of Canada in 1961 may be considered characteristic of a 'mature' population, this population has not been ageing in the most recent decades. In an ageing population it is typical that the first few of the youngest five-year age groups would show declining percentages (of the total population) as one moves down the age pyramid toward age zero. Reflecting the postwar upswing in the crude birth rate, Chart 3.1 shows that the Canadian urban age composition in 1961 had just the opposite gradation of percentages (of the total population) for the four youngest age groups. Moving down the age structure from age 15-19 to age 0-4, the percentages tend to increase. In short, the urban age composition for Canada in 1961 shows a substantial 'rejuvenation' as a result of the postwar upswing in birth rates.[6]

Another notable feature of the 1961 urban age composition for Canada is the slight tendency toward a bulge in the age pyramid between the ages 25 and 39, reflecting the impact of net migration (including both external and internal migration) on the age structure. Chart 3.1 suggests that this impact of net migration is relatively slight when compared with the influence of the sharp postwar upturn in birth rates.'

3.2.1 URBAN-RURAL DIFFERENTIALS –

Urban-rural differentials in the sex-age composition of population are basic indicators of the major divergences between urban and rural communities. In Canada in 1961, the rural areas were markedly 'male-dominant' and the urban areas slightly 'female-dominant' in sex composition. Table 3.1 indicates that the masculinity ratio of 112 for the rural population was 14 percentage points higher than the masculinity ratio for the urban population. In the important 20-34 age group, where labour-force entry and family formation over the 1951-61 decade were concentrated, the rural population masculinity ratio (114 per cent) was 17 percentage points higher than that of the urban population in 1961. Clearly, the concentration of females was markedly higher in the urban than in the rural population of Canada in 1961.

The high masculinity ratios in the Canadian rural population are accounted for principally by the rural farm population (Table 3.1). In the total population and in the age group 20-34 the masculinity ratios for Canada's rural farm population in 1961 were 118 and 126, respectively; the corresponding masculinity ratios for the Canadian rural non-farm population were 109 in both cases. In the statistics underlying Chart 3.1, the Canadian rural farm population of 1961 shows 'male-dominance' in each of the 18 age groups. These data suggest that 'female-selective' rural-to-urban migration streams sustained over a period of several decades have been important determinants of the 'female-dominance' in the urban sex composition (Chapter Five).

In regard to the relative numbers of young, mature, and aged persons in 1961, the urban population was 'older' than the rural population in Canada. The median age of rural males (23 years) was four years lower than that of the urban males, and the median age of the rural females (22) was six years below that of the urban females. These differentials reflect a considerably higher 'youth dependency' ratio in the Canadian rural population (70 per cent) than in the corresponding urban population (53 per cent). The 'old-age dependency' ratio in the 1961 rural population of Canada (14 per cent) was one percentage point above that of the urban population, and the adult population 'maturity' ratio⁶ for males in this rural population (62 per cent) was three percentage points above that of the urban population.

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Between the Canadian rural farm and rural non-farm populations in 1961, distinctions regarding the general ageing of population are not clearly evident. The median age of the rural farm males (23 years) was less than one year below that of the rural non-farm males, while the median age of the rural farm females (21 years) was one year below that of the rural non-farm females. These differentials seem mainly due to the relatively high value of the rural non-farm 'old-age dependency' ratio (16 per cent, which was five percentage points above the rural farm ratio) in 1961. In that year the 'youth dependency' ratio and the percentage aged 20-34 among males aged 20-64 were slightly higher in the rural non-farm than in the rural farm population (Table 3.1).

There are several marked contrasts among the Canadian urban, rural non-farm, and rural farm age pyramids in 1961 (Chart 3.1). In regard to the differences between the urban and rural non-farm populations, the portion of the age pyramid containing the survivors of the postwar 'baby-boom' is considerably smaller in the urban age pyramid than in that of the rural non-farm population. The urban age pyramid shows a stronger tendency toward a bulge between ages 20 and 39 than does that of the rural non-farm population. For females in particular, the percentage aged 20-39 is markedly larger in the urban than in the rural non-farm population.

In regard to the differences between urban and rural farm areas, the ages 0 to 19 contain a much smaller portion of the urban age pyramid than of the rural farm age pyramid. Unlike the urban age pyramid, the rural farm age pyramid shows no tendency toward a bulge between ages 20 and 39; rather, there is a striking 'trough' in the female side of the rural farm age pyramid from ages 20 to 39. Generally, the rural farm age pyramid may be characterized as a relatively narrow (as compared with the urban age pyramid) column at and above age 20, resting on a broad base below age 20. These observations reflect the relatively high rates of age selective net migration losses from farms, which have been sustained for several decades. In regard to the masculinity ratio, to the median age, and to the general contour of the age pyramid, the rural non-farm population generally showed patterns intermediate to those of the urban and the rural farm populations.

The pattern of Canadian urban-rural differentials in age composition is roughly similar to those observed in most countries. In most countries the urban population tends to show a larger percentage of young adults and a lower proportion of children than the rural population (Hauser, 1961, p. 111; Breese, 1966, p. 76). The persistence of this differential over several countries indicates that a roughly similar pattern of urban-rural differences in the crude birth rate and in age-specific net migration may be observed.

Among the economically developed countries there is typically a larger proportion of females than males in urban areas (to which pattern Canada

conforms), but this female predominance in urban population does not occur in many countries. In many of the newly developing countries males are more abundant than females in the urban population (Breese, 1966, p. 77). This statement applies mainly to countries in Asia and Africa, rather than to those in Latin America where several countries show female predominance in the urban population (Breese, 1966, p. 77; Hauser, 1957, pp. 107-108). These international variations in the masculinity ratio among urban populations probably reflect long-standing differences in social customs, particularly those bearing on the demand and supply of female labour for the economic activities that tend to be concentrated in urban areas.

Canada and the United States are similar in regard to the general pattern of urban-rural differentials in sex-age composition. As in Canada, the United States urban population has shown a higher median age than its rural population (Bogue, 1959, p. 99). In both countries the youth dependency ratio is markedly lower in urban than in rural areas, and the urban age pyramid shows a larger bulge between ages 20-39 than the rural age pyramid (Bogue, 1959, p. 103; Duncan and Reiss, 1956, pp. 41-43). In both countries females are more abundant than males in the urban population, and males tend to be predominant in the rural population (Duncan and Reiss, 1956, p. 44).

The general pattern of Canadian urban-rural differentials in the sex-age composition of population, as observed in 1961, seems to be traditional in Canada. At least since 1921, the Canadian urban population has tended toward 'female-dominance' in sex composition while the rural population has tended toward 'male-dominance' in sex composition (Table 3.2). Since 1911, the urban age composition has been 'older' than the rural one, and the urban age pyramid has shown a more persistent tendency toward a bulge between the ages 20 and 39 than has the rural age pyramid (Chart 3.1 and 3.2, for example).

Table 3.2 suggests that in each census since 1921 the urban population had a slightly female-dominant sex composition and the rural population had a markedly male-dominant sex composition. As a result of the heavily 'male-selective' immigration of the 1901-11 decade, both urban and rural populations had male-dominant sex compositions in 1911. The considerably higher masculinity ratio in the rural population aged 20-34 than in the corresponding urban population at every census from 1911 to 1961 is another indication of sustained rural-to-urban migration streams which were highly selective of females. Table 3.2 also suggests that the urban-rural differential in the median age of population has shown a slight tendency toward widening over time, a tendency shown more strongly by the female than by the male population. Although the urban-rural differential in the median age of population may have widened somewhat over time, the urban-rural differential in the 'old-age dependency' ratio has narrowed markedly. This ratio shows

(Table 3.2) a steady upward trend since 1911 in both the urban and rural populations, although the trend has risen more rapidly in the former; the ratio for the urban population more than doubled from 1911 to 1961 while that for the rural population rose only 62 per cent.[9]

Table 3.2 – Selected Statistics of the Sex-Age Composition, by Urban and Rural,[a] Canada, 1911-61

NOTE. – Exclusive of Newfoundland, Yukon Territory and the Northwest Territories. See footnotes to Table 3.1 for the definitions of sex-age distributional statistics.

Item		1911	1921	1931	1941	1951	1961
Masculinity ratio, all ages	Urban	104.4	97.4	98.8	96.7	95.8	98.1
	Rural	118.5	115.9	118.2	116.0	114.1	112.1
Masculinity ratio, ages 20-34 ...	Urban	112.7	89.7	92.8	90.6	88.9	97.2
	Rural	137.3	121.4	128.3	120.3	113.0	114.0
Median age, males	Urban	25.6	26.2	27.0	28.9	29.3	27.2
	Rural	23.7	23.4	23.9	25.8	25.4	23.4
Median age, females	Urban	24.6	25.2	26.1	28.6	29.4	28.2
	Rural	21.2	20.6	21.3	23.6	23.8	22.1
Youth dependency ratio........	Urban	44.6	49.6	42.8	34.9	41.6	53.1
	Rural	60.0	64.4	59.1	51.8	61.3	69.4
Maturity ratio, males 20-64 ...	Urban	46.3	56.3	57.5	56.8	58.0	59.5
	Rural	50.4	56.0	56.3	56.5	58.9	62.6
Old-age dependency ratio	Urban	6.0	7.1	7.8	9.5	12.2	12.7
	Rural	8.7	8.7	9.7	10.7	13.2	14.1

[a]From the given data, the best available approximation to the urban population according to the definition accepted for this monograph (Appendix A) has been made. For 1911, 1931 and 1941 the urban population data refer to incorporated cities, towns and villages of 1,000 and over, and the rural population data are those according to the census definition in the respective year (1961 Census, DBS 99-512, pp. 2.1 – 2.3). These data seem useful mainly in showing rural-urban contrasts *at a given census date*, and should not be used as adequate measures of trends in urban or in rural sex-age composition.

SOURCES: 1911 Census, Bul. XVIII, Table III; 1921 Census, Vol. II, Tables 10 and 17; 1931 Census, Vol. III, Table 6; 1941 Census, Vol. III, Tables 3, 5 and 6; 1951 Census, Vol. I, Tables 21 and 24; 1961 Census, DBS 92-542, Tables 21 and 23; and unpublished Census Division Tables for 1911 and 1931.

3.2.2 URBAN SIZE-GROUP DIFFERENTIALS – The marked contrasts between the urban and rural populations in regard to the sex-age composition of population provide a perspective for interpreting urban size-group differentials in sex-age composition. Table 3.3 and Chart 3.3 indicate systematic changes in the selected sex-age distributional statistics as one moves down the ladder of urban size groups from the places of 100,000 and over to those of 1,000-4,999. As the size of place declines, the sex-age composition of the urban population approximates more and more closely the rural population.

CHART 3.2

AGE PYRAMIDS FOR URBAN° AND RURAL POPULATIONS,
CANADA°, 1911, 1941 AND 1961
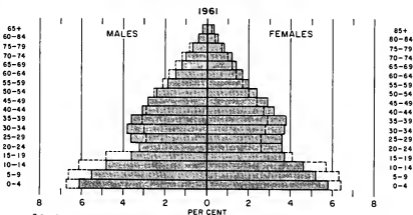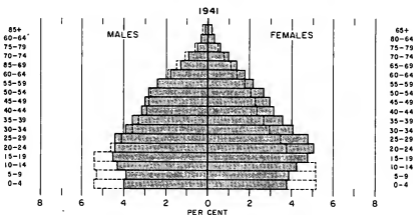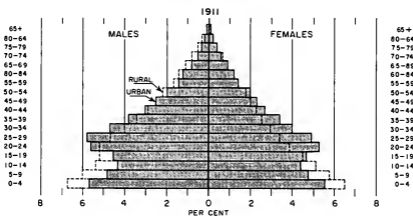
a See footnotes a and b to Table 3.2
Source: Same as Table 3.2

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CHART 3.3

CUMULATED PERCENTAGE DISTRIBUTION OF POPULATION BY SEX—AGE
GROUPS, FOR URBAN SIZE GROUPS, RURAL NON—FARM AND RURAL FARM,
CANADA, 1961
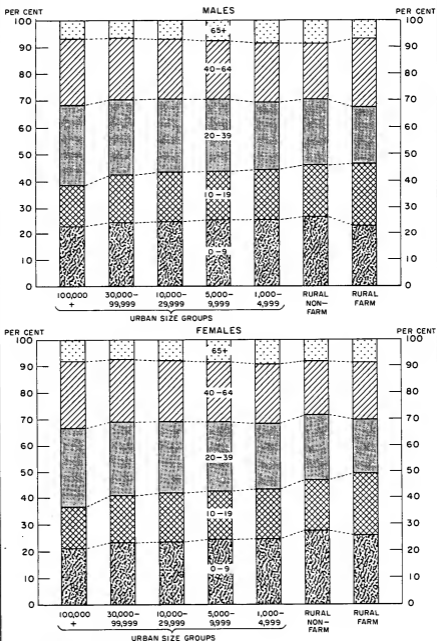
Source: DBS 92—542, 1961 Census, Table 21.

Table 3.3 – Selected Statistics of the Urban Sex-Age Composition,
by Urban Size Groups, Canada, 1961

NOTE. – See footnotes to Table 3.1 for definitions of age distributional statistics.

Item	All urban	100,000 and over	30,000-99,999	10,000-29,999	5,000-9,999	1,000-4,999
Masculinity ratio, all ages...	98.1	97.6	98.4	98.8	98.9	100.4
Masculinity ratio, ages 20-34	97.2	96.9	95.9	97.8	98.0	100.8
Median age, males..........	27.2	28.1	25.7	25.0	25.1	24.8
Median age, females........	28.2	29.2	26.4	25.8	25.5	25.3
Youth dependency ratio	53.1	49.8	56.8	59.0	61.3	63.6
Maturity ratio, males 20-64 ..	59.5	59.5	59.7	59.0	58.9	59.7
Old-age dependency ratio....	12.7	12.2	11.8	12.8	14.2	15.9

SOURCE: 1961 Census, DBS 92-542, Table 21.

'Female-dominance' is shown in the sex composition of all but one of
the urban size groups for Canada in 1961. The lowest, 1,000-4,999, shows a
very slightly 'male-dominant' sex composition, and as size of urban place
increases there is a slight tendency toward decline in the masculinity ratios
(Table 3.3). On the whole, however, the differentials in masculinity ratio
among the various urban size groups are very slight in 1961.

Very clear urban size-group differentials are shown in regard to the
ageing of population. At 29 years, the median age of the population in the
100,000-plus size range is four years higher than that in the 5,000-9,999 and
1,000-4,999 size groups. The median age tends to vary directly with the size
of place (Table 3.3), a tendency more attributable to the relative numbers
of young people in the various size groups than to the relative numbers of
old people in these groups. In the 1,000-4,999 group the 'youth dependency'
ratio in 1961 was 64 per cent, and this ratio declined regularly with each
step up the ladder of size groups to a value of 50 per cent in the 100,000
and over group. The 'old-age dependency' ratio also varies inversely with
size of urban place, a variation which would tend to increase the median age
of population in the smaller urban centres.

Thus, the urban population sex-age composition approaches that of the
rural population with the decline in the size of urban place from centres of
100,000-plus to those of 1,000-4,999 (Chart 3.3). There is marked resem-
blance between the age pyramid of the urban population of Canada in the
1,000-4,999 size group in 1961 and that of the rural non-farm population,
although the sex-age composition of the urban group of 1,000-4,999 is clearly
closer to that of the 100,000-plus group than is the sex-age composition of
the rural non-farm population. Data for other countries also indicate that the

urban-rural differences in sex-age composition tend to widen as one moves up the ladder of urban size groups (Hauser, 1957, p. 108; Hauser, 1961, p. 111-112; and Duncan and Reiss, 1956, pp. 42-43).

3.3 REGIONAL DIFFERENTIALS IN URBAN SEX-AGE STRUCTURE, 1961

The major features of the sex-age composition of the urban population of Canada in 1961, are generally shown by the urban populations of each of the five major regions. On the whole, the sex compositions of these populations were slightly 'female-dominant' and generally tended to have 'mature' age structures, with each major-regional age composition reflecting the 'rejuvenating' influence of the postwar upturn in birth rates. In each major region close to 40 per cent of the urban males in the principal ages of economic activity (20-64) were concentrated in the early years of working life (20-34). Chart 3.4 presents age pyramids for the urban populations of the five major regions of Canada in 1961.

Table 3.4 — Selected Statistics of the Urban Sex-Age Composition, Canada and Five Major Regions, 1961

NOTE. — See footnotes to Table 3.1 for definitions of age distributional statistics.

Item	Canada	Maritimes	Quebec	Ontario	Prairies	British Columbia
Masculinity ratio, all ages...	98.1	96.8	97.1	98.2	99.5	99.8
Masculinity ratio, ages 20-34	97.2	97.3	94.7	98.2	97.9	101.5
Median age, males..........	27.2	24.2	25.1	28.6	27.1	30.8
Median age, females	28.2	25.8	26.3	29.7	27.2	31.8
Youth dependency ratio	53.1	58.7	54.7	51.2	54.9	49.3
Maturity ratio, males 20-64 ..	59.5	59.6	57.6	60.9	57.3	63.2
Old-age dependency ratio....	12.7	13.4	9.5	13.3	14.2	18.6

SOURCE: 1961 Census, DBS 92-542, Table 21.

Despite the broad similarities in sex-age composition among the five major regions, there were some systematic differentials. Moving westward across Canada, the level of 'female-dominance' in the urban sex compositions tends to decrease (Table 3.4 and Chart 3.4), and it actually disappears in British Columbia's urban population (which is very slightly 'male-dominant'). Ontario and the western regions show generally 'older' age compositions than do the Maritimes and Quebec. The median ages of the urban populations of the major regions in 1961 ranged from low points of 25 and 26 in the Maritimes and Quebec, respectively, to high points of 29

and 31 in Ontario and British Columbia, respectively. The median age in the urban population of the Prairie region in 1961 was 27. The 'old-age dependency' ratio among the 1961 urban populations of the five major regions was highest in Western Canada (19 per cent in British Columbia and 14 per cent in the Prairies), and was lowest in Central Canada (10 per cent in Quebec and 13 per cent in Ontario).

CHART 3.4

AGE PYRAMIDS FOR URBAN POPULATIONS,
MAJOR REGIONS OF CANADA, 1961

Source: DBS 92-542, 1961 Census, Table 21.

CHART 3.4

ONTARIO

MALES | FEMALES

PER CENT

PRAIRIES

MALES | FEMALES

PER CENT

BRITISH COLUMBIA

MALES | FEMALES

PER CENT

Source: DBS 92-542, 1961 Census, Table 21.
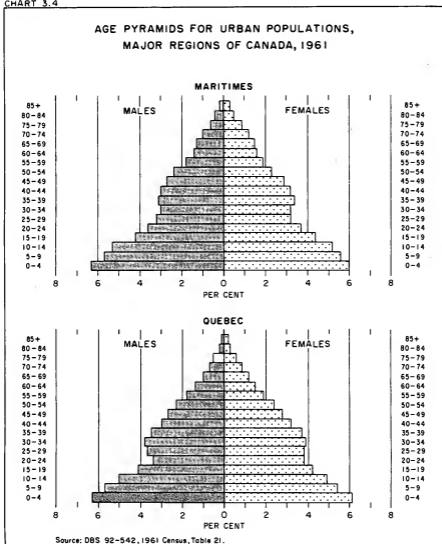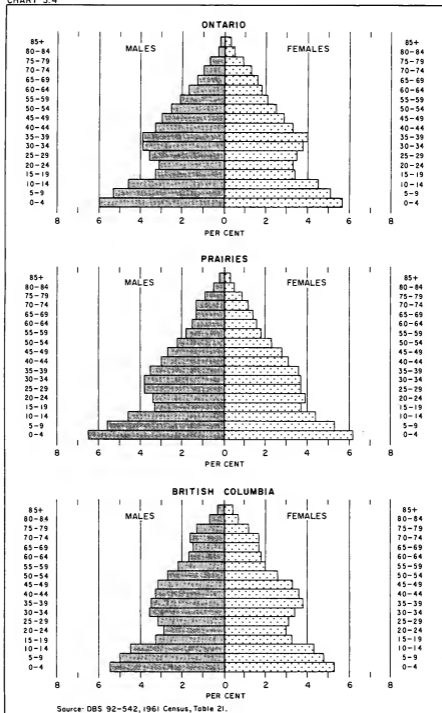
The 1961 urban population in the Maritime region had one of the highest levels of 'female-dominance' in sex composition and one of the 'youngest' age structures, among the major regions. The median age, at 25 years, was three years below that of urban Canada as a whole and six years below that of urban British Columbia; the 'youth dependency' ratio was six percentage points above that of urban Canada and nine percentage points above that of urban British Columbia. Among the age compositions of the five major regions, that of the Maritimes most closely approximates a 'normal' pyramid (Chart 3.4), which is characterized by declining percentages in the age groups as one moves up the pyramid from 0-4 to 85 and over. The main source of the marked divergence of the Maritime urban age composition from that of urban Canada in 1961 is the lack of a distinct tendency toward a bulge in the age pyramid for the Maritimes between ages 25 and 39 (Chart 3.4). As Chapter Five demonstrates, this peculiarity reflects the softer impact of age-selective net migration on the Maritime urban age composition (as of 1961) than on the age compositions of the other four regions.

Quebec joins the Maritimes in being the two major regions with the most 'female-dominant' sex compositions and the 'youngest' age compositions in regard to the urban population of 1961. The median age of the urban population in Quebec, at 26 years, was one year higher than that of the Maritime urban population. However, the 'old-age dependency' of Quebec's urban population, at 10 per cent, was four percentage points lower than that of the Maritimes and nine percentage points below that of British Columbia. Generally, the contour of the age pyramid for the urban population of Quebec in 1961 is quite similar to that of the Canadian urban population in the same year (Chart 3.4).

Ontario's urban age composition in 1961 was one of the most 'mature' among the major regions. The median age for the Ontario urban population, at 29 years, was one year above that of Canada as a whole and two years below that of British Columbia. This relatively high median age reflects Ontario's lower-than-average 'youth dependency' ratio (51 per cent) and percentage (39 per cent) aged 20-34 among males in the prime working ages (20-64). The 'old-age dependency' ratio in the urban population of Ontario, at 13.3 per cent, was generally similar to the value for urban Canada. Among the 1961 urban populations of the five major regions, the general contour of Ontario's age composition is most closely approximated by that of Quebec (Chart 3.4). There are two main dissimilarities between the age pyramids for these regions: (1) the portion of the age pyramid containing survivors of the postwar 'baby-boom' is somewhat larger in Quebec than in Ontario and (2) the portion of the age pyramid containing females

aged 15-39 is larger in Quebec than in Ontario. The latter difference reflects the higher levels of age-selective net migration of females to the urban areas in Quebec than to those of Ontario in the recent decades (Chapter Five).

The urban population of the Prairie region in 1961 had a somewhat 'younger' age composition than that of urban Canada in the same year. The median age in the Prairies, at 27 years, was one year below that of urban Canada as a whole and four years below that of urban British Columbia. This lower-than-average median age reflects mainly the relatively high Prairie values on the 'youth dependency' ratio (55 per cent) and on the percentage aged 20-34 (43 per cent) among males in the prime ages of economic activity (20-64). The 'old-age dependency' ratio in the Prairies was the second highest (14 per cent) among the 1961 urban populations of the five major regions, being four percentage points above that for Quebec and five below that of British Columbia. In general contour, the age pyramid for the 1961 urban population of the Prairies is similar to that of Canada, although the Prairie urban age composition does not show as clear a tendency to bulge between ages 25 and 39 as does the Canadian urban age composition.

In 1961, the sex-age composition of the urban population of British Columbia was distinctive in several notable respects. British Columbia alone among the five major regions showed a 'male-dominant' sex composition, although the level of that dominance was not marked (Table 3.4). The age composition of British Columbia's urban population was clearly the oldest among the five major regions, its median age, at 31 years, being three years higher than that of urban Canada as a whole and two years above that for the next highest median age (Ontario) among the urban populations of the major regions. The British Columbia urban population had both the lowest 'youth dependency' ratio (49 per cent) and the highest 'old-age dependency' ratio (19 per cent) among the five regional urban age compositions and, in addition, had the highest adult population maturity ratio for males (63 per cent) among the major regions. Among the 72 countries for which the United Nations (UN, Econ. Affairs Dept., 1956, Table 1) has published age distributional data (for years near to and including 1950), only France and Ireland showed age compositions as aged as that of British Columbia's urban population in 1961. The general contour of the age pyramid for British Columbia's urban population in 1961 was only rough but similar to that of the Canadian urban population. There are three notable dissimilarities between these two age compositions: (1) the portion of the age pyramid containing the survivors of the postwar baby-boom is markedly narrower in British Columbia than in Canada; (2) although the Canadian age pyramid shows a tendency toward a bulge among the females aged 20-39, in British Columbia's age pyramid such a tendency is shown only among the

females aged 39-49; and (3) the age groups above and including 65-69 show much higher concentrations of population in the British Columbia age pyramid than in that of Canada.

Thus in 1961, the urban sex-age compositions for the five major regions range from the relatively 'young' (when compared with urban Canada) and slightly 'female-dominant' sex-age structure of the Maritime region to the relatively 'old' and slightly 'male-dominant' sex-age composition of British Columbia. Between these two extremes lie the sex-age compositions of Quebec, Ontario and the Prairies which show a few marked divergencies amid general similarity.

3.4 EVOLUTION OF THE SEX-AGE COMPOSITION OF THE POPULATION IN CITIES OF AT LEAST 30,000, 1901-1961

In considering whether and in what ways the basic features of urban sex-age composition have changed since 1901, it is not appropriate to use the total urban population based on the definition of "urban" at each census. Between any two censuses the areal extent of urban settlement is increased. In order to attenuate the disturbing effects of such increases on the observed shifts in the sex-age composition of population it is necessary to use data for selected portions of the urban population, which means that only a partial (sample) view can be obtained of the 'true' trends in urban sex-age composition. However, if the data selected for study should cover appropriately a large and significant proportion of the urban population they may offer useful glimpses into the evolution of urban sex-age composition in Canada.

The data selected for use in this Section refer generally to incorporated cities and towns of 30,000 and over. More specifically, the data for the initial date of observation (1901) refer to incorporated cities and towns of 30,000 at that date. For each subsequent census a decision was made as to whether the cities which become 30,000 and over for the first time (according to census data) should be included in the data for the sex-age composition of population. Such cities were included in the data for sex-age composition if their inclusion had a negligible effect on the time series of sex-age distributional changes. The net result is that for each census date a large proportion of the urban population is included in the data of Table 3.5, while the disturbances of the time series of sex-age distribution by an enlarging list of cities of 30,000 and over have been kept within tolerable limits (Appendix C contains tables supporting this claim). It seems safe to say that Table 3.5 and Chart 3.5 are useful records of the historical pattern of changes in the sex-age composition of the Canadian populations residing in *incorporated* cities of 30,000 and over. These cities may be considered

the core areas of Canadian urban development and as such are of much interest to the student of the history of Canadian urban development, even though they may give a biased picture of recent age structural changes in the 'true' areas (which extend beyond incorporated limits) of the urban agglomerations of 30,000 and over.[10]

Table 3.5 – Selected Statistics of the Sex-Age Composition, for the Population in Selected Cities[a] and Over, 30,000 Canada, 1901-1961

NOTE. – See footnotes to Table 3.1 for definitions of age distributional statistics.

Item	1901	1911	1921	1931	1941	1951	1961
Masculinity ratio, all ages	91.2	99.5	95.7	98.0	95.6	93.7	96.4
Masculinity ratio, ages 20-34	83.3	103.0	87.1	90.8	88.2	88.2	98.0
Median age, males	23.8	25.2	26.9	28.0	30.0	30.7	29.2
Median age, females	24.4	24.8	26.0	27.0	29.7	31.1	30.5
Youth dependency ratio..........	47.5	43.5	45.0	38.8	31.5	35.2	45.0
Maturity ratio, males 20-64	50.6	45.5	55.4	57.7	58.0	58.3	59.4
Old-age dependency ratio	6.2	5.1	5.7	6.9	9.0	12.4	13.8

[a]The cities were selected in such a way as to attenuate the distortion of a changing list of cities upon the apparent changes in sex-age composition, at the same time permitting a large portion of Canada's urban population to be included in the data for each year. Appendix C explains the procedure used, presents the list of cities used each year and gives data supporting the choice of cities at each year. In 1901 and 1911 the figures refer to the incorporated cities and towns of 30,000 and over as of 1901; for 1921, 1931, 1941 and 1951 they refer to incorporated cities and towns of 30,000 and over according to the census in question; for 1961 they refer to incorporated cities and towns of 30,000 and over as of 1951. (A relevant comment on annexations is contained in footnote 1 to the text.)

SOURCES: 1901 Census, Vol. IV, Table 1; 1911 Census, Bul. XVIII, Table III; 1921 Census, Vol. II, Tables 10 and 17; 1931 Census, Vol. III, Table 6; 1941 Census, Vol. III, Tables 3, 5 and 6; 1951 Census, Vol. I, Tables 21 and 24; 1961 Census, DBS 92-542, Tables 21 and 23; and unpublished Census Division Tables for 1911 and 1931.

Since 1901 definite trends in the sex-age composition of the population in incorporated cities and towns of 30,000 and over are observed in median age, in 'old-age dependency' ratio and in adult population maturity ratio for males (Table 3.5), all of which have risen markedly over the period.

The median age of population in Canadian incorporated cities of 30,000 and over rose from 24 years in 1901 to 31 years in 1951 but between 1951 and 1961 it declined, largely as a result of the postwar upswing in birth rates. Generally, historical fluctuations in the crude birth rate have left their mark on the pattern of intercensal change in the median age of population in these cities. Between 1901 and 1921 the median age increased one year in each decade, as the Canadian crude birth rate changed gradually (Firestone, 1958, Table 1). In the 1920s the crude birth rate for Canada declined sharply (Firestone, 1958, Table 1) and maintained a relatively

CHART 3.5

CHANGES IN THE AGE COMPOSITION OF POPULATION, INCORPORATED CITIES, TOWNS AND VILLAGES OF 30,000 AND OVER,^a
CANADA, 1901 – 1961

MALES

FEMALES
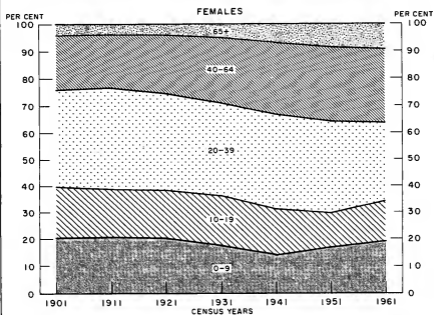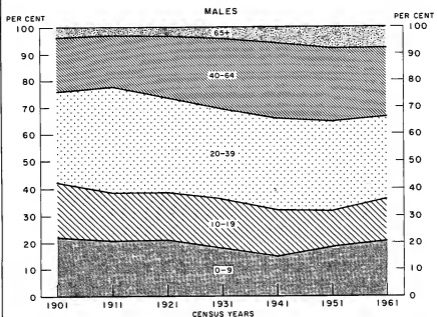
steep decline into the latter half of the 1930s; concomitantly, the median age of the population in incorporated cities of 30,000 and over increased by two years in each decade from 1921 to 1941. The crude birth rate had begun a gradual increase when the 1930s ended, and continued to increase at a slow pace up to the baby-boom which began about 1946. This alteration in the pattern of change of the crude birth rate was probably influential in slowing the increase of the median age of population in incorporated cities of 30,000 and over from two years in 1931-41 to one year in 1941-51. By 1961, the postwar baby-boom had greatly increased the number of children and teen-agers in the population, which was probably a major factor in the one-year decline in the median age of the population in Canadian incorporated cities of 30,000 and over in 1961. This emphasis on the importance of birth rate changes on the pattern of shifts in the median age of city population is confirmed by the data for the 'youth dependency' ratio (Table 3.4), which ratio tends to be strongly affected by the birth rate. In the population of Canadian incorporated cities of 30,000 and over, the 'youth dependency' ratio declined sharply in 1921-31 and in 1931-41, but increased in 1941-51 and 1951-61. The 1951-61 increase of ten percentage points was the highest decennial change in the 'youth dependency' ratio for this population since 1901.

The 'old-age dependency' ratio in the population of Canadian incorporated cities of 30,000 and over has also shown a marked upward trend from 1901 to 1961. From 1901 to 1911 this ratio declined slightly from six per cent to five per cent but since 1911 it has increased in every decade at an average of two percentage points per decade, reaching 14 per cent by 1961.

Unlike the general ageing of population, the sex composition of population in Canadian incorporated cities of 30,000 and over shows no distinct trend from 1901 to 1961 (Table 3.5). The highest level of 'female-dominance' in this population is observed in 1901, when the masculinity ratios for the total population and for persons aged 20-34 were 91 and 83, respectively. With the heavy male-selective immigration of 1901-11, the masculinity ratio increased sharply (8 percentage points in the total population and 20 percentage points among persons aged 20-34); from 1921 to 1961 it ranged between 96 and 98 in the total population, and between 87 and 98 among persons aged 20-34. Generally, this ratio has tended to rise in decades containing upswings of immigration (1901-11, 1921-31 and 1951-61).

Further details on the historical pattern of fluctuations in the sex-age composition of the population in incorporated cities of 30,000 and over are shown in Chart 3.5. Generally, these fluctuations are in conformity with the historical pattern of upswings and downswings in Canadian birth rates. At each census since 1901, there has been a tendency toward a bulge between

ages 20 and 39 in the age composition of the population in the incorporated cities. However, the prominence of this bulge has varied markedly, being most distinct in 1911 and in 1951 — census years that followed sharp up-swings in the level of urbanization. Despite the continued rapid advance in the level of urbanization in 1951-61 (Table 2.1), the prominence of the bulge declined markedly from 1951 to 1961 (Table 3.6). Although the decline shown in Table 3.6 is partly due to the postwar upswing in birth rates, it suggests a definite downturn in rates of net migration to the group of incor-porated cities of 30,000 and over (partial support for this suggestion is given in Chapter Five, Table 5.7). This downturn in net migration for these cities in a decade of upswing in net migration gains to the metropolitan areas (Chapter Six) is consistent with the hypothesis that the major parts of the larger incorporated cities have become increasingly saturated resi-dentially in recent years.

Table 3.6 — Index of a Bulge in the Age Distribution (by Sex) Between Ages 20 and 39, for Cities of 30,000 and Over,[a] Canada, 1901-1961

NOTE. — The index is defined as the proportion of the population of a given sex (males, for example) in the age group 20-39 divided by the proportion of the same population in the combined age groups of 10-19 and 40-49. The degree of bulge varies directly with the values of the index.

Sex	1901	1911	1921	1931	1941	1951	1961
Males.............	1.08	1.40	1.14	1.01	1.10	1.26	1.08
Females	1.19	1.33	1.23	1.10	1.19	1.34	1.07

[a]See footnote to Table 3.5.

SOURCES: 1901 Census, Vol. IV, Table 1; 1911 Census, Bul. XVIII, Table III; 1921 Census, Vol. II, Tables 10 and 17; 1931 Census, Vol. III, Table 6; 1941 Census, Vol. III, Tables 3, 5 and 6; 1951 Census, Vol. I, Tables 21 and 24; 1961 Census, DBS 92-542, Tables 21 and 23; and unpublished Census Division Tables for 1911 and 1931.

This Section has provided a glimpse into the evolution of urban sex-age composition in Canada since 1901. The data for incorporated cities and towns of 30,000 and over, in which the distortions of a changing list of such cities have been attenuated, suggest that the population in the core *areas* of Canadian urban development has shown a general trend toward ageing from 1901 to 1961. This trend is indicated most clearly by the median age of population and by the 'old-age dependency' ratio. The general contour of the age pyramid for the population of these core areas shows historical fluctuations associated with swings in the Canadian crude birth rate. A notable recent shift in the age composition of the population of the incorporated cities and towns of 30,000 and over is the sharp reduction of the bulge in the age pyramid between ages 20 and 39, particularly among

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females, from 1951 to 1961. This shift is interpreted as reflecting partly the residential saturation of the major parts of these urban centres, with consequent reductions in the impact of sex and age-selective net migration on these parts of Canadian urban settlement.

3.5 SOME INTERPRETIVE COMMENTS ON THE FINDINGS

A few interpretive comments may help to highlight the social and economic significance of the patterns and changes in the composition of population by sex and age indicated in the foregoing Sections.

The persistent 'female-dominance' in the sex composition of the Canadian urban population is another confirmation of the viewpoint that, in Canada, urban development is an aspect of the spatial concentration of economic opportunities and changes. As Cameron and Hurd (1935, p. 229) have suggested, a surplus of rural population in Canada has been particularly evident among females, for whom there are relatively few, as compared with males, opportunities in primary economic activities such as agriculture. With the advancing industrialization of Canada since Confederation more and more job openings have been available to females in service activities and, to a lesser extent, in light manufacturing. This long-standing rural-urban differential in the share of economic opportunities for females has probably been a major factor behind the sustained female-selectivity of the net migration gains to urban areas (Chapter Five). The data suggest that the 'female-dominance' in the sex composition of the Canadian urban population since 1911 would have been even higher had it not been for periodic waves of male-selective immigration to Canada.

The 'female-dominance' in the sex composition of the Canadian urban population and its likely relation to economic opportunities for females in industry is generally known. What may not be readily appreciated, however, is the likely impact of the long-standing net migrational flow of females upon urban birth rates. On the whole, urban age-specific fertility rates have been lower than rural age-specific fertility rates over the past half-century (Charles, 1941, c. VII). By continually adding to the size of female urban population in the most fertile ages, the sustained net migrational flows of females into urban areas have probably kept the urban natural increase rates above the levels which they would show in the absence of such flows. Thus, through its impact upon the age distribution of population, migration has contributed indirectly to urban natural increase rates.

In the light of the preceding observation, the recent downturn in the rate of growth for females aged 20-39 in the population of incorporated cities of 30,000 and over takes on added significance. Population growth rates in these traditionally core areas of urban development may be coming

under an increasingly dampening influence from an unfavourable age distribution.

It will be shown in Chapter Five that the decreasing weight of young adults in the age pyramid for the population of large incorporated cities is partly a result of the concentration of in-migrational flows upon the outer edges and fringes of these cities. In addition, much of the rural non-farm population is concentrated in and near counties and census divisions containing the larger cities (DBS 92-536, 1961, Table 13). These two points suggest that the populations with the highest concentrations of persons in the most fertile ages are increasingly being located on the outer edges of, and in the areas near to the largest cities. In decades gone by, the farm population contained the highest concentrations of persons in the most fertile ages (Charles, 1941, p. 147).

Thus, the areas of highest 'youth dependency' ratios are no longer the farms; but are instead the non-farm areas on the edges of, and near to the larger urban centres. No doubt during the present century there have been marked increases in the demand for educational, recreational and health facilities for youth in such areas and the location of such facilities will increasingly be oriented toward those fringe areas. Up to the point where the negative effect of congestion becomes a major constraint, the location of these facilities near the fringes of urban centres may act as an additional magnet drawing young families into such areas.

As the most fertile segments of the population tend to decrease their concentration in the major parts of the larger cities, the core areas of these cities may tend to contain increasing concentrations of aged, middle-aged and unmarried persons, with some effects on the structure and volume of demand for goods and services in local areas. The age distributional differentials and changes indicated in this Chapter may also have important ramifications in the areas of culture and behaviour patterns. To the extent that the relative prevalence of different styles of living depends on the composition of population (in a given society) by sex and age, the ageing of population in the core areas of Canadian urban development may influence social trends in these areas.

The comments in this Section and in Section 3.1 should show that the composition of population by sex and age is not a matter of purely demographic interest. It affects a wide variety of changes in society and careful study of its interrelation with such changes is needed. At the very least, attempts to influence social and economic trends in Canadian communities by deliberate planning should include considerations of the sex-age compositions of the populations in question and of the influences which desired social and economic changes may have on these sex-age compositions.

FOOTNOTES TO CHAPTER THREE

[1] Although the effects of annexations by the cities in question are not controlled, a careful study of the existing records of city boundary changes and of data for the total populations in annexed areas (conducted for Chapter Five) indicates clearly that between any two censuses since 1901 annexations would have a negligible effect on the age-distributional data for the whole Canadian population in cities of 30,000 and over.

[2] The sex composition may be said to be 'female-dominant' when females outnumber males, 'neutral' when males and females are equal in number, and 'male-dominant' when males outnumber females. The type and level of dominance is indicated by the 'masculinity ratio' which is (males/females) 100.

[3] The whole population consists of children, teen-agers, young adults, mature adults, and the aged. The relative numbers of these groups of persons may be used to characterize the population as being, on the whole, either young, mature or aged (for which the term 'older' is sometimes used). Generally, for example, the greater the relative weight of the population in the younger ages, the greater is the likelihood that the population will be classified as 'young'. Several different statistical measures may be used to reflect in varying ways the relative weights of young, mature and older persons in a population. For any one or any combination of these measures, the boundary line between values indicating a young population and those indicating a 'mature' population, for example, must be set somewhat arbitrarily. In this monograph, the precedent of a United Nations study (UN, Econ. Affairs Dept., 1956) in regard to the classification of age distributions has been followed to a large extent and, although the results are not entirely satisfactory, they will at least place the Canadian observations in an international perspective.

[4] The terms "old-age dependency ratio" and "youth dependency ratio" are merely shortened references to the percentages mentioned in the preceding sentence. See also footnotes d and f to Table 3.1.

[5] It is understood that data for the age structures of urban populations in various countries might be more useful in classifying the Canadian urban age composition than that for *whole* countries; however, the former data are not readily available.

[6] When a population has been 'ageing' for some time (i.e., roughly speaking, the relative weight of older persons in the population has been increasing to an extent sufficient to cause the median age of the population to increase) and then sustains a distinct increase in the relative numbers of young persons, the age composition may be said to have been 'rejuvenated'.

[7] See 1961 Census, DBS 99-514 for a general discussion on the over-all (urban plus rural) age distribution of Canada and the provinces.

[8] The percentage aged 35-64 among persons aged 20-64 is taken from the index of 'maturity' in the adult population. See Table 3.1, footnote f.

[9] Data for the United States also show persistence over several decades in the pattern of urban-rural differentials in sex-composition (Bogue, 1959, pp. 103-104).

[10] A comparison of the 1961 data in Table 3.5 with the figures for the size-groups above 30,000 in Table 3.3 suggests the nature of the bias mentioned in this sentence. In 1961 incorporated centres of 30,000 and over had a markedly older age composition than the whole urban population residing in agglomerations of 30,000 and over. This observation is due to the concentration of families with young children in the suburbs of such cities, a concentration which has probably been much increased in the past two decades. It should be noted that the bias that appears when the two populations are compared at one point in time may not be as significant when change in age structure is studied.

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CANADIAN URBAN COMPLEXES—
SOME ASPECTS OF THEIR
DISTRIBUTION BY SIZE

4.1 INTRODUCTION

The number, size distribution and regional concentration of urban centres are three variables that may be said to comprise the distributional aspect of urban development (Duncan and Reiss, 1956, p. 19; Eldridge, 1942, p. 338). This Chapter is an introductory discussion of the distributional aspect of urban development in Canada, in which are described some features of the historical pattern of increase in the number of Canadian urban agglomerations together with the major characteristics and historical changes in the size distribution of these urban agglomerations. The discussion includes patterns for Canada as a whole and differentials among the five major regions.

The concentration of population into urban agglomerations and the number of such agglomerations in a given region are basic characteristics of population distribution in the region (Bogue and Hauser, 1965). Because the size of an urban agglomeration limits its economic functions (Duncan and Reiss, 1956, Pt.I), the size distribution of the urban centres in a region influences the economy of the region. The size distribution of urban centres also influences the composition and volume of municipal services and the problems of municipal government organization. For example, in the fields of traffic flow, sewage disposal and sanitation, law enforcement and recreation, large cities tend to have different types of problems than small ones. Although the economic correlates of city-size distributions are not treated in this Chapter, the descriptions presented may be helpful in stimulating further research on economic aspects of the distribution of Canadian cities by size. Some materials related to this topic will appear in the 1961 Census Monograph on internal migration.

In this Chapter, each 1961 Census Metropolitan Area (MA) and Major Urban Area (MUA) (defined in Appendix D and in DBS 99-512, 1961, pp. 2.9-2.10) is treated as a single complex of closely related centres. Thus, the incorporated centres within any 1961 MA or MUA are not recognized as

separate units of observation. The practice of treating MAs and MUAs as single units in tabulating data for urban size groups has been followed by DBS since 1956 and this practice is frequently desirable when the data are being used in research. When the satellites of a major urban centre are well within the daily commuting distance to this centre, it is appropriate in many cases to view these satellites as extensions of the centre. It is true that as one goes backward in time, particularly into periods when transportation systems were much less efficient than they are today, the grouping of the incorporated centres within the 1961 MAs and MUAs becomes less and less justifiable. However, the methodological difficulties involved in the use of such a grouping seem more tolerable than those incurred in the treatment of each incorporated centre as a separate urban agglomeration, as in the more recent censuses. The term "urban complex" is used below to indicate (a) 1961 Census MAs and MUAs, each being treated as a single unit, or (b) incorporated or unincorporated urban centres (as recognized in DBS tabulations) outside of group (a). (Appendix E contains further discussion on the considerations and procedures underlying the data presented in this Chapter and also gives the reasons for limiting the discussion to the size range of 5,000 and over population.)

4.2 HISTORICAL INCREASE IN THE NUMBER OF CANADIAN URBAN COMPLEXES OF 5,000 AND OVER, 1871-1961

Canada had 190 urban complexes of 5,000 and over in 1961, representing a tenfold increase since the 1871 Census and a more than threefold increase since 1901. Since 1871 the number of Canadian urban complexes has increased in every intercensal period, the decennial increases tending to be larger after the major decade of western expansion (1901-11) than before. The largest intercensal increase since 1871 took place in 1951-61 when 53 units were added to the 1951 total; the smallest increase (eight) took place in 1931-41.

Like the rates of urban population increase (Chapter Two), the decennial percentage change in the number of Canadian urban complexes of 5,000 and over shows no definite trend from 1871 to 1961; both series show peaks in 1871-81, 1901-11 and 1951-61 and troughs in 1891-1901 and 1931-41. The historical pattern of upswings and downswings is the same for the numerical increase in the number of Canadian urban complexes as for the percentage change in this number (Table 4.1).

The similarity between the historical patterns of the rates of increase in urban population (Table 2.2) and in the number of urban complexes of 5,000 and over may be largely a statistical artifact. As the rate of urban population growth accelerates, there is an increase in the probability that

Table 4.1 – Number of Urban Complexes of 5,000 and Over, Canada and Major Regions, 1871-1961

NOTE. – Only incorporated centres of 5,000 and over (at each census) are included. Each 1961 Census MA and MUA is treated as a single unit and the data for all centres within each such area are aggregated; thus, the whole set of units is called "urban complexes of 5,000 and over".

Census year or decade	Canada[a]	Maritimes	Quebec	Ontario	Prairies	British Columbia
	Number of urban complexes					
1871.................	19	3	4	12	–	–
1881.................	35	6	8	19	1	1
1891.................	44	8	9	23	1	3
1901.................	53	9	10	28	2	4
1911.................	76	11	13	37	12	3
1921.................	88	13	17	41	12	5
1931.................	104	14	20	48	15	7
1941.................	112	15	25	49	14	9
1951.................	137	15	34	57	18	13
1961.................	190	20	53	73	25	19
	Numerical change					
1871-81	16	3	4	7	1	1
1881-91	9	2	1	4	–	2
1891-1901	9	1	1	5	1	1
1901-11	23	2	3	9	10	-1
1911-21	12	2	4	4	–	2
1921-31	16	1	3	7	3	2
1931-41	8	1	5	1	-1	2
1941-51	25	–	9	8	4	4
1951-61	53	5	19	16	7	6
	Percentage change					
1871-81	84	100	100	58	–	–
1881-91	26	33	12	21	–	200
1891-1901	20	12	11	22	100	33
1901-11	43	22	30	32	500	-25
1911-21	16	18	31	11	–	67
1921-31	18	8	18	17	25	40
1931-41	8	7	25	2	-7	29
1941-51	22	–	36	16	29	44
1951-61	39	33	56	28	39	46

[a]Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

SOURCES: 1871 Census, Vol. I, Table VI, p. 428; 1881 Census, Vol. I, Table VI, p. 406; 1891 Census, Vol. I, Table VII, p. 370; 1941 Census, Vol. I, Table 7; 1956 Census, Vol. III, Table 3; 1961 Census, DBS 92-535, Tables 10 and 11, and DBS 92-536, Table 2.

centres will cross the 5,000-population mark in the process of sharing the general level of urban population growth. Yet the multiplication of centres of population concentration in various Canadian regions is a significant factor determining the spatial structure of the Canadian economy, because such centres become nuclei of economic activity. As they grow in size, their potential as profitable locations for market-oriented industries and industrial complexes increases.

It should be noted that new incorporations account for small portions of the increases in the number of Canadian urban complexes of 5,000 and over in most of the intercensal periods. New incorporations accounted for 11 per cent, 11 per cent and 18 per cent of the numerical increases in 1881-91, 1891-1901 and 1931-41, respectively; in three of the remaining six decades, new incorporations accounted for five to eight per cent of the increases, and in the other three decades they made no contribution to the increases (Appendix L.2). It may also be noted that no urban complexes dropped out of the 5,000-plus size group as a result of population decline or of the dissolution of formerly incorporated centres from 1871 to 1961.

4.3 DISTRIBUTION OF CANADIAN URBAN COMPLEXES BY FOUR SIZE GROUPS, 1871-1961

The Canadian urban complexes of 5,000 and over are heavily concentrated in the lower range of population sizes (Appendix E discusses the selection of size groups). In 1961, 87 (46 per cent) of the 190 urban complexes had less than 10,000 population, 32 per cent had less than 30,000 and about 13 per cent were in the 30,000-99,999 group, leaving 10 p.c. in the 100,000 and over group (Chart 4.1).

The ranking of the four size groups in regard to the share of the total number of urban complexes of 5,000 and over has been virtually unchanged since 1871 (Chart 4.2). The 5,000-9,999 size group had the largest share of the total of such complexes since 1871 and its share exceeded one half of this total from 1871 to 1921. Urban complexes in the 10,000-29,999 group tended to contain roughly one third of the total in all censuses but one (1881); the percentage concentrated in the 30,000-99,999 group ranged from 10 per cent to 17 per cent; and that in the 100,000 and over group varied between five and 11 per cent.

Although this ranking of the size groups has been stable over the 1871-1961 period, the shares of certain of the groups show definite trends (Chart 4.2). The share of the 5,000-9,999 group shows a generally downward trend; the percentage concentrated in this group was slightly higher than 52 per cent from 1871 to 1911 and was somewhat lower than 50 per cent in most of the 1921-61 period. On the other hand, a distinct upward trend is

CHART 4.1

SIZE–GROUP DISTRIBUTION OF THE NUMBER OF URBAN COMPLEXES,
CANADA AND MAJOR REGIONS, 1961
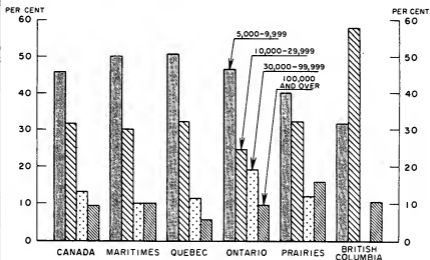
Source: DBS 92-535, 1961 Census, Tables 10 and 11; DBS 99-512, 1961 Census, Table 2.

CHART 4.2

CUMULATED SIZE–GROUP DISTRIBUTION OF THE NUMBER OF
URBAN COMPLEXES OF 5,000 AND OVER,
CANADA, 1871–1961
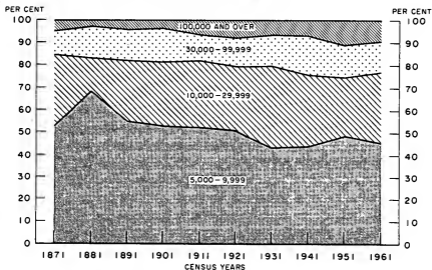
Source: Same as Table 4.1

shown for the share of the 100,000-plus group; generally, the share of this group increased from approximately four per cent in the latter third of the nineteenth century to about 10 per cent in the two latest decades. No distinct trends are shown in the shares for the 10,000-29,999 and 30,000-99,999 groups. These general patterns of change are mainly due to existing cities increasing in size and not to new incorporations (Appendix L.2). In each intercensal period the new incorporations among the urban complexes of 5,000 and over are nearly always less than 10,000 in population and, as already mentioned, the percentage share of the complexes in the 5,000-9,999 size group has been declining.

Table 4.2 — Number of Urban Complexes of 5,000 and Over, by Size Group, Canada, 1871-1961

NOTE. — See headnote to Table 4.1 for definition of "urban complex". Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

Census year	Total		100,000 and over		30,000-99,999		10,000-29,999		5,000-9,999	
	No.	p.c.	No.	p.c.	No.	p.c.	No.	p.c.	No.	p.c.
1871........	19	100	1	5.3	2	10.5	6	31.6	10	52.6
1881........	35	100	1	2.9	5	14.3	5	14.3	24	68.6
1891........	44	100	·2	4.5	6	13.6	12	27.3	24	54.5
1901........	53	100	·2	3.8	8	15.1	15	28.3	28	52.8
1911........	76	100	5	6.6	9	11.8	22	28.9	40	52.6
1921........	88	100	7	8.0	11	12.5	25	28.4	45	51.1
1931........	104	100	7	6.7	14	13.5	38	36.5	45	43.3
1941........	112	100	8	7.1	19	17.0	36	32.1	49	43.8
1951........	137	100	15	10.9	20	14.6	35	25.5	67	48.9
1961........	190	100	18	9.5	25	13.2	60	31.6	87	45.8

SOURCES: 1871 Census, Vol. I, Table VI, p. 428; 1881 Census, Vol. I, Table VI, p. 406; 1891 Census, Vol. I, Table VII, p. 370; 1941 Census, Vol. I, Table 7; 1956 Census, Vol. III, Table 3; 1961 Census, DBS 92-535, Tables 10 and 11, and DBS 92-536, Table 2.

4.4 REGIONAL DIFFERENTIALS IN NUMBER AND SIZE-GROUP DISTRIBUTION OF URBAN COMPLEXES, 1961

The number of Canadian urban complexes of 5,000 and over is unevenly distributed among the five major regions. In 1961 the 190 such complexes were heavily concentrated in Central Canada—Ontario had over one third, Quebec had slightly more than one fourth, and the shares for the Maritimes, the Prairies and British Columbia were 10 per cent, 13 per cent and 10 per cent, respectively. As one might expect, these regional shares are highly correlated with the regional shares in the urban population of Canada (Chart 4.3).

CHART 4.3

REGIONAL PERCENTAGE SHARES IN CANADA'S TOTALS OF URBAN POPULATION
AND OF URBAN COMPLEXES OF 5,000 AND OVER, 1961

PER CENT
50

PER CENT OF CANADA'S URBAN COMPLEXES
OF 5,000 AND OVER IN REGION

PER CENT OF CANADA'S
URBAN POPULATION IN REGION

PER CENT
50

MARITIMES   QUEBEC   ONTARIO   PRAIRIES   BRITISH
COLUMBIA

Source: Same as Table 4.3.
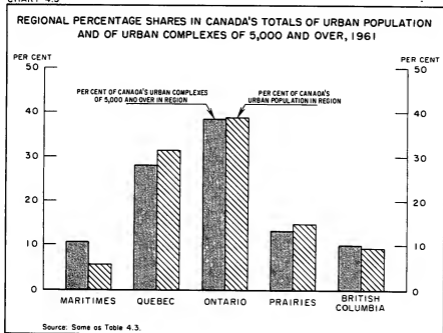
Within each of the four size groups, the regional distribution of the
urban complexes was quite uneven in 1961 (Chart 4.4). Ontario had the lar-
gest number in each of the size groups and contained at least 30 per cent
of the national total in each group. Among the urban complexes in the 30,000-
99,999 group, Ontario's share of the Canadian total exceeded one half; the
Prairies had the largest share in the 100,000-plus group and Quebec had the
largest share in the 5,000-9,999 and 10,000-29,999 groups.

At every census since 1871 Quebec and Ontario have contained at
least three fifths of the urban complexes of 5,000 and over (Chart 4.5). Al-
though Ontario has always had the largest share, that share has declined by
nearly one half since 1871; in 1871 it was 63 per cent and in 1961 it had
declined to 38 per cent. Among the other major regions, distinct trends in
the percentage shares are shown by the Maritimes and by British Columbia;
generally, the share for the Maritimes has declined and that for British
Columbia has increased. Quebec's percentage share remained near one fifth
from 1871 to 1941 and has increased in the following two decades. Since
the major decade of western settlement (1901-11), the Prairies' share in
Canadian urban complexes has fluctuated around 13 per cent.

CHART 4.4

REGIONAL PERCENTAGE SHARES IN THE NUMBER OF URBAN COMPLEXES
BY SIZE GROUP, MAJOR REGIONS OF CANADA, 1961

Source: Same as Chart 4.1.

CHART 4.5

REGIONAL PERCENTAGE SHARES IN THE NUMBER OF URBAN COMPLEXES
OF 5,000 AND OVER, MAJOR REGIONS OF CANADA,
1871–1961

Source: Table 4.1.
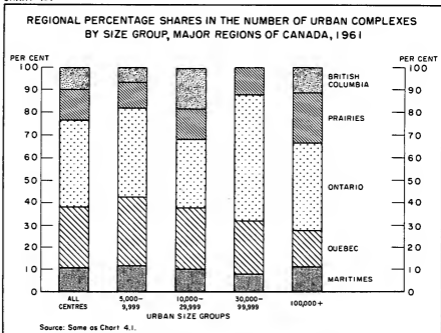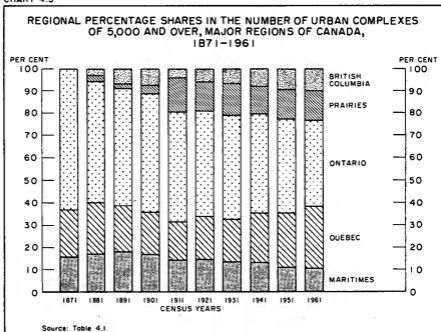
The regions have also differed markedly in the size-group distribution of their urban complexes of 5,000 and over. In 1961 the 5,000-9,999 group did not contain the largest percentage of the urban complexes in every region; the exception was British Columbia (Chart 4.1), where 11 of the 19 urban complexes were in the 10,000-29,999 group. The heaviest concentrations of urban complexes in the 5,000-9,999 group were shown by the Maritimes and by Quebec; in both of these regions about 50 per cent were in that group — a markedly higher percentage than the corresponding 32 per cent for British Columbia.

Among the five major regions of Canada, the concentration of urban complexes in the larger size groups (30,000-99,999 and 100,000-plus) was highest for Ontario and the Prairies in 1961; in Ontario 29 per cent were in the 30,000-plus range and in the Prairies 28 per cent. The Prairies actually had more urban complexes in the 100,000-plus group than in the 30,000-99,999 group. In Ontario, the number of urban complexes of 30,000-99,999 (14) was twice as large as that in the 100,000-plus group and, among the regions, Ontario had the heaviest concentration of urban complexes in the 30,000-99,999 group (19 per cent).

4.5 SIZE-GROUP DISTRIBUTION OF THE TOTAL POPULATION IN URBAN COMPLEXES, 1961

Additional perspective on the character of Canadian urban development is provided by a review of the distribution of the urban population by size of urban centre. This Section treats the size-group distribution of the total population in Canadian urban complexes of 5,000 and over. It will be seen that the high proportion of the urban complexes among centres of less than 30,000 does not markedly counteract the necessary tendency for the above-mentioned total population to be concentrated among the larger urban complexes. In 1961, for example, Canadian urban complexes of 5,000-9,999 out-numbered those of 100,000 and over by five to one, while population in the latter size group outnumbered that in the complexes of 5,000-9,999 by 13 to one (Table 4.3).

For Canada as a whole in 1961, the 100,000 and over group contained four times as many people as did the next largest group (30,000-99,999). There were 7,900,000 persons in the urban complexes of 100,000 and over and the percentage share of this group in the population of the urban complexes exceeded its percentage share in the total number of such complexes sevenfold. Table 4.3 shows that 71 per cent of the Canadian population in urban complexes of 5,000 and over resided in those within the 100,000-plus group. Another 15 per cent were in the 30,000-99,999 group, leaving nine per cent and five per cent for the 10,000-29,999 and 5,000-9,999 groups, respectively.

Table 4.3 – Population in Urban Complexes of 5,000 and Over, by Size Group, Canada and Major Regions, 1961

NOTE. — See headnote to Table 4.1 for definition of "urban complex".

Size group	Canada[a]	Maritimes	Quebec	Ontario	Prairies	British Columbia
	Urban population[b] ('000)					
5,000 and over	11,132	588	3,477	4,439	1,565	1,062
100,000-plus	7,924	276	2,638	2,959	1,183	868
30,000-99,999	1,620	136	385	935	164	–
10,000-29,999	1,001	129	278	298	143	153
5,000-9,999	587	47	177	247	74	42
	Percentage distribution of the urban population					
5,000 and over	100	100	100	100	100	100
100,000-plus	71.2	47.0	75.9	66.7	75.6	81.7
30,000-99,999	14.6	23.1	11.1	21.1	10.5	–
10,000-29,999	9.0	22.0	8.0	6.7	9.2	14.4
5,000-9,999	5.3	8.0	5.1	5.6	4.7	3.9
	Mean population of urban complexes ('000)					
5,000 and over	586	29	66	61	63	56
100,000-plus	440	138	879	423	296	434
30,000-99,999	65	68	64	67	55	–
10,000-29,999	17	22	16	17	18	14
5,000-9,999	7	5	7	7	7	7
	Ratio of percentage of urban population to percentage of urban complexes[c]					
100,000-plus	7.5	4.7	13.3	6.9	4.7	7.8
30,000-99,999	1.1	2.3	1.0	1.1	0.9	–
10,000-29,999	0.3	0.7	0.2	0.3	0.3	0.2
5,000-9,999	0.1	0.2	0.1	0.1	0.1	0.1

[a]Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

[b]Population totals refer to the *whole* urban populations within the 1961 Census MAs and MUAs plus the populations of urban centres of 5,000 and over outside of the 1961 Census MAs and MUAs. Figures for size groups may not add to the totals due to rounding error.

[c]Each figure is the percentage of the urban population in the relevant area and size group *divided by* the percentage of the number of urban complexes (of 5,000 and over) in the same area and size group.

SOURCES: 1961 Census, DBS 92-535, Tables 10 and 11; DBS 92-536, Tables 10 and 11; and DBS 99-512, Table 2.

Among the five major regions, the ranking of the four size groups in respect of population is the same as that for Canada as a whole. However, there is marked regional variation in the percentage of the urban complex

of 5,000 and over population concentrated in a specific size group (Table 4.3). In 1961, the percentage share of the 100,000-plus group ranged from 47 per cent in the Maritimes to 82 per cent in British Columbia. In that year both Quebec and the Prairies had 76 per cent of their total populations in urban complexes concentrated in the 100,000-plus group and the corresponding percentage for Ontario was 67 per cent. All major regions except the Maritimes had over 80 per cent of their urban complex populations concentrated in the size range of 30,000 and over; Quebec, Ontario and the Prairies had 86 to 87 per cent concentration in such complexes, British Columbia followed with 82 per cent and the Maritimes had 70 per cent.

There was also marked regional variation in the mean population of the urban complexes in a given size group in 1961. For the 100,000-plus group, the mean population of 900,000 in Quebec was twice as large as the next highest mean − 400,000 in British Columbia and in Ontario. The corresponding figure for the Prairies was 300,000 and that for the Maritimes was 100,000. The high value for Quebec is mainly due to the very large size of the Montreal Metropolitan Area and to the relatively small number (two) of urban complexes of 100,000 and over in this province. Although the Toronto Metropolitan Area was also very large in 1961, there were seven census MAs of at least 100,000 urban population in Ontario.

4.6 URBAN SIZE-GROUP DIFFERENTIALS IN RATES OF POPULATION GROWTH, 1911-61

The concentration of population in the largest urban size groups has been increasing in Canada, as a recent study (1961 Census, DBS 99-512, p. 2.11) shows. This trend is partly due to the 'movement' of individual urban centres into the largest size groups. Although this movement is discussed implicitly in Section 4.3, the present Section provides an additional perspective on the subject by attempting to measure the association between urban size group at the beginning of a given decade and the rate of population growth over the decade. The classification of each urban complex by size at the beginning of a given decade is held constant in the computation of size-group population growth rates for that decade. The rates of population growth obtained through this procedure cast some light on the proposition that very large urban agglomerations exert a stronger force of attraction upon population movements than small urban agglomerations. Over the 1951-61 decade, the two larger size groups had higher rates of population growth than the smaller size groups. For Canada as a whole, the 1951-61 decennial rates of population growth were 28 per cent, 33 per cent, 25 per cent and 25 per cent for the 100,000-plus, the 30,000-99,999, the 10,000-29,999 and the 5,000-9,999 groups, respectively (column E, Table 4.4). (These rates are not influenced significantly by annexations.)

Table 4.4 — Decennial Percentage Change in Population, by Size Group of Urban Complexes, Canada and Major Regions, 1911-21[a] to 1951-61

NOTE. — For each intercensal period, the areas of the urban centres have been held practically constant. In all but a few of these centres which had annexations, the populations of the annexed areas were obtained (from the notes appended to the source tables) or were estimated so that the figures refer to their areas at the end of the decade in question. Such adjustments (where necessary) were made for all centres of 10,000 and over and for most of the centres of 5,000-9,999 at the beginning of the decade. In no case was an adjustment neglected where the centre had an annexation and showed an unusually large increase in population over the decade in question. It may be assumed that more refined adjustments would yield figures differing in negligible degrees from those shown.

Size group	1911-21[a]	1921-31	1931-41	1941-51	1951-61	
	CTVs[b]				CTVs	CTVs plus MA fringes[c]
	A	B	C	D	E	F
Canada[d]						
5,000 and over	31.8	27.4	12.0	18.7	28.5	40.9
100,000 and over ...	32.2	31.1	9.8	14.2	28.2	45.4
30,000-99,999	27.0	22.9	12.2	33.2	33.3	37.4
10,000-29,999	47.2	21.8	19.8	14.4	25.2	26.4
5,000-9,999	19.5	20.0	14.5	22.4	25.2	25.3
Maritimes						
5,000 and over	20.0	4.4	15.2	13.0	16.8	21.9
100,000 and over ...	–	–	–	–	28.0	37.3
30,000-99,999	18.8	4.5	16.1	11.4	13.1	17.7
10,000-29,999	54.2	16.8	13.7	17.8	14.5	14.5
5,000-9,999	14.4	-2.4	13.3	13.7	9.7	9.7
Quebec						
5,000 and over	31.9	36.6	13.3	18.9	30.7	37.8
100,000 and over ...	34.0	37.4	10.7	14.4	32.3	41.1
30,000-99,999	23.5	–	22.1	30.7	27.4	31.0
10,000-29,999	52.4	32.6	27.2	39.8	26.6	26.8
5,000-9,999	16.2	32.8	23.6	30.5	24.6	24.6
Ontario						
5,000 and over	33.3	23.0	12.3	14.3	22.2	41.5
100,000 and over ...	34.2	22.8	9.8	11.8	16.5	45.7
30,000-99,999	36.5	32.1	10.6	35.5	38.1	42.3
10,000-29,999	35.2	15.8	20.5	-0.7	21.8	24.6
5,000-9,999	22.8	25.6	12.9	18.6	25.3	25.5
Prairies						
5,000 and over	44.2	28.8	6.0	30.7	53.6	57.5
100,000 and over ...	33.7	22.5	2.0	8.5	55.9	61.2
30,000-99,999	32.2	38.1	9.5	49.9	62.7	62.7
10,000-29,999	84.7	33.1	1.8	33.7	41.0	41.0
5,000-9,999	35.0	10.1	16.4	23.0	36.4	36.4

Table 4.4 – Decennial Percentage Change in Population, by Size Group of Urban Complexes, Canada and Major Regions, 1911-21[a] to 1951-61 – concl.

Size group	1911-21[a]	1921-31	1931-41	1941-51	1951-61	
	CTVs[b]				CTVs	CTVs plus MA fringes[c]
	A	B	C	D	E	F
	British Columbia					
5,000 and over	33.3	36.7	11.7	26.2	14.8	38.0
100,000 and over ..	14.4	47.1	12.3	27.1	13.5	40.6
30,000-29,999	22.3	0.9	12.8	16.5	7.0	36.2
10,000-29,999	–	–	–	–	15.7	15.7
5,000-9,999	24.1	6.5	5.4	29.9	27.3	27.3

[a]Figures were not prepared for earlier decades due to the extremely high rates of urban population growth associated with the settlement of Western Canada on a large scale.

[b]''CTVs'' means figures based on data for incorporated urban centres of 5,000 and over (at the beginning of the decade). (See headnote to Table 4.1 for definition of ''urban complex''.)

[c]''CTVs plus MA fringes'' means that for the 1961 Census MAs and MUAs the whole populations of these areas were used.

[d]Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

SOURCES: 1931 Census, Vol. II, Table 8; 1951 Census, Vol. I, Table 12; 1961 Census, DBS 92-535, Tables 10 and 11, and DBS 92-539.

The somewhat lower 1951-61 growth rate shown for the 100,000-plus group than for the 30,000-99,999 group probably reflects the greater degree of residential saturation in the former set of cities. The influence exerted by the residentially saturated cities upon population movements may be reflected markedly by the growth rates for the areas adjacent to these cities. Perhaps information on the growth rates in the latter areas is required for the purpose of obtaining a valid measure of that influence. The foregoing comments are supported by column F of Table 4.4, where the whole populations of the 1961 MAs and MUAs are taken into account in computing the growth rates; in this column the growth rate for the 100,000-plus group (45 per cent) is eight percentage points higher than that for the 30,000-99,999 group. Among the five major regions there is general confirmation of the pattern of increases in 1951-61 growth rates as one moves up the ladder of size groups (column F, Table 4.4).

Table 4.4 fails to show any consistent tendency in the ranking of the four size groups (of incorporated urban centres) in regard to the decennial rate of population growth from 1911-21 to 1951-61. In only one of these decades (1921-31) does the rate of population growth vary directly with the size of urban complex. In 1911-21 and 1931-41 the highest rate of intercensal population growth is shown by the 10,000-29,999 group in Canada as a whole; in 1941-51 the highest rate is shown for the 30,000-99,999 group and the next highest rate for the 5,000-9,999 group. The population sizes in

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the individual size groups do not seem to account for much of this pattern of differentials over the decades. These generalizations are not significantly altered when note is taken of the growth rates for individual urban complexes in relation to their sizes.

No systematic attempt is made in this monograph to account for the pattern of differentials. Initial steps in such an attempt would be a study of the distribution of growth rates for the cities within each size group and an analysis of the regional and temporal differentials shown in Table 4.4. As a passing comment, it should be noted that the lack of a systematic association between urban size groups and population growth rate may be due to offsetting influences by net migration and natural increase. A study of urban size-group differentials in age composition (Chapter Three, Section 3.2.2) suggests that birth rates, and hence natural increase rates, vary inversely with city size (Charles, 1941, c.VII). This inverse correlation would tend to counteract any tendency toward a positive association between net migration rates and city size.

In summary, the data for incorporated urban centres of 5,000 and over fail to show a consistent tendency toward direct association between the decennial population growth rate and urban size group (as defined at the beginning of each decade). Thus, there was no consistent indication of an increasing concentration of population in the larger size groups, *independently* of the shift of urban centres into the larger size groups, according to the data in Table 4.4. However, the data for 1951-61 suggest that the failure to take into account the population in the urbanized fringes of incorporated cities may seriously bias the observation of urban size-group differentials in population growth rates, at least in the more recent decades. This qualification seems to have an important implication for the analysis of the growth rates of large cities. If the urban population growth associated with changes in the economy of a city is reflected largely by growth in the areas adjacent to the city (particularly its suburbs), the demographic data for the city alone may seriously bias the observed association between economic changes and urban growth.

FIRST STEPS IN A DEMOGRAPHIC ANALYSIS OF URBAN POPULATION INCREASE IN CANADA, 1871-81 TO 1951-61

5.1 PURPOSE AND SCOPE OF THIS ANALYSIS

The preceding Chapters have presented general reviews of selected features of the growth, sex-age composition and spatial distribution of urban population in Canada. In this Chapter, a first step is taken in the direction of a study of the factors responsible for urban population increase and urbanization in Canada. The main discussion begins in Section 5.2, where the intercensal increases of urban population are decomposed into selected sources of such increases. These data provide rough indications of the relative contribution to the urban population increase from changes in the area of urban settlement and may also be used in setting limits on the contribution of demographic growth (net migration plus natural increase) to the urban population increase.

Given the perspective thus afforded, a discussion on the relative importance of net migration to urban population growth follows in Section 5.3. The information on the relative contribution of net migration to urban growth is based on estimates of net migration ratios which are important and interesting in their own right. These estimates are used in presenting, in Sections 5.4 and 5.5, a review of the net migration ratios for urban areas, with some attention to regional differentials. Some data on urban-rural and urban size-group differentials in net migration ratios are also discussed briefly.

Having considered the sources of urban population increase, the relative importance of net migration among these sources and the levels and patterns of net migration ratios for the total population, it is appropriate to turn to a study of the rates of the demographic processes for selected sub-groups in the urban population. The present monograph deals only with

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a small portion of this large field — the estimation and analysis ̥ ͨ demographic rates for specific sub-groups of population. Section 5.6 presents estimates of the sex-age profiles of net migration ratios for a sample of the largest Canadian cities from 1921-31 to 1951-61. More detailed information concerning demographic rates for sub-groups of the urban population in the 1956-61 period is being assembled for the 1961 Census Monographs on internal migration and on fertility.

The net migration is an important (though not the major) determinant of the sex-age structure of the urban population. In Section 5.6 an attempt is made to demonstrate empirically the contribution which net migration has made to the character of the sex-age structure of the population in six of Canada's largest cities over the 1901-1961 period. The estimates prepared for this discussion suggest that in the absence of migration over the sixty years from 1901 to 1961 the population of these cities would have 'aged' at a much faster rate than it actually did.

Section 5.7 is an exploration of the association between levels of urbanization and net migration ratios. The analysis is conducted for Canadian counties and census divisions from 1921-31 to 1951-61. The data presented in this Section may cast some light on the general hypothesis that regions containing the largest urban agglomerations possess much greater than average retentive power as poles of attraction in the field of migrational flows.

Despite their limitations, the analyses presented in this Chapter seem worth while. Although it is possible to give some statistical explanation of urban growth and urbanization without breaking them down into their components, the results would be severely limited and largely unsatisfactory. A component analysis of urban growth is essential to adequate understanding of the ways in which economic and social factors are interrelated with this growth. Despite their apparently pedestrian nature, the breakdown of urban growth into its components and the description of the 'operating characteristics' of the components form an essential part of the fundamental knowledge concerning Canadian urban development.

5.2 SOME SOURCES OF URBAN POPULATION INCREASE, 1871-81 to 1951-61

5.2.1 DECOMPOSITION OF URBAN POPULATION INCREASE — The increase of the Canadian urban population between any two censuses is partly the result of changes in the area of urban settlement. Localities are reclassified from rural to urban, and *vice versa*, and city boundaries are changed. Thus the urban population increase may initially be allocated to (1) demographic growth (net migration plus natural increase) in a constant

geographical area, and (2) areal expansion. This Section presents an approximate allocation of Canadian urban population increases from 1871-81 to 1951-61 among selected sources, so as to provide a rough indication of the relative importance of demographic growth and areal expansion.

The available data do not permit a neat separation of demographic growth (in a constant urban area) from areal expansion in the statistical decomposition of the Canadian urban population increase. Demographic growth in a constant urban area may be estimated with useful results for incorporated centres. In addition the relevant population totals for incorporated localities which are reclassified from rural to urban, and *vice versa*,[1] may also be approximated adequately. These two sources of increase in the Canadian urban population are identified separately in Table 5.1. When the urban population increase due to the above-mentioned two sources is subtracted from the whole urban population increase, the remainder is the net effect of (a) urban population increase in unincorporated areas, (b) annexations by incorporated urban centres, and (c) a net residual error. The notes to Table 5.1 provide detailed explanations of the various estimations which have been made.

It should be observed that the partitioning of the intercensal urban population change shown by Table 5.1 is partly arbitrary, as are all exercises in statistical accounting. A different decomposition of the urban population increase may bring out features of this increase which Table 5.1 masks. In Section 5.3, for example, another partitioning of the 1951-61 urban population growth is used to estimate the relative contribution of net migration and natural increase to this growth.

5.2.2 FINDINGS FOR 1951-61 — Since the vast majority of Canada's urban population resides in the incorporated urban centres, these centres may be expected to have the largest share of the intercensal urban population increase. The data confirm this expectation, but they show that this share has been unexpectedly small in recent decades. Table 5.1 indicates that most of the urban population increase in Canada from 1951 to 1961 is concentrated in the incorporated centres (with constant boundaries) which were urban in both 1951 and 1961. The percentage of the urban population increase accounted for by these centres (55 per cent) may be said to be unexpectedly low in the sense that it is markedly smaller than the share of such centres in the 1951 urban population. In 1951, 86 per cent of the Canadian urban population resided in incorporated cities, towns and villages. The discrepancy between the two percentages does not reflect an unusually high level of rural-urban reclassification of incorporated centres. Since that reclassification accounted for only seven per cent of the 1951-61 urban population increase (Table 5.1), well over 30 per cent must be allocated to the residual component (Table 5.1, column D).

The pattern of the increase in this component since 1901 suggests that it reflects primarily the urban population increase in areas outside of incorporated centres, including the urbanized fringes of the larger incorporated cities. The relatively high value of the well-known 'residual' component in 1951-61 may be a reflection of the 'explosion' of population growth in areas within the commuting distances to the larger cities. This interpretation is supported by the data presented in Section 5.4 (Table 5.6), which indicate high rates of 1951-61 population growth and net migration to the parts (geographical areas held constant) of Canadian urban complexes outside of incorporated centres. These rates were markedly higher than those for the incorporated urban centres included in the data on urban complexes.

Table 5.1 – Relative Importance of Selected Sources of Urban Population Increase in Canada, 1871-81 to 1951-61

Note: — Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

Period	Decennial Percentage change in urban population[a]	Percentage change due to growth in incorporated urban centres[b]	Percentage change due to rural-urban reclassification of localities[c]	Residual change[d]	Percentage of urban population in incorporated centres at first census
	A	B	C	D	E
1871-81 ...	49.6	31.9	17.8	d	100.0
1881-91 ...	41.5	33.3	8.2	d	100.0
1891-1901..	31.8	18.2	13.6	d	100.0
1901-11 ...	61.7	51.9	10.5	-0.7	100.0
1911-21 ...	34.1	27.0	4.7	2.4	96.8
1921-31 ...	30.8	23.7	2.4	4.6	95.5
1931-41 ...	17.6	11.2	1.5	4.9	91.8
1941-51 ...	33.8	18.4	4.3	11.1	91.4
1951-61 ...	45.3	24.6	3.3	17.4	86.5
	Relative importance of each source[e]				
1871-81 ...	100	64.3	35.9	d	
1881-91 ...	100	80.2	19.8	d	
1891-1901..	100	57.2	42.8	d	
1901-11 ...	100	82.0	16.6	1.2	
1911-21 ...	100	79.4	13.7	6.9	
1921-31 ...	100	77.0	7.9	15.1	
1931-41 ...	100	63.5	8.5	28.0	
1941-61 ...	100	54.4	12.7	32.8	
1951-61 ...	100	54.6	7.2	38.3	

Footnotes and Sources on following page.

[a]See Table 2.1, footnote [b]. It should be noted that A=B+C+D, barring rounding error.

[b]The figures in this column refer to incorporated cities, towns and villages classified as urban in both censuses of the relevant decade. Essentially, the population growth rate for a sample of such centres is computed from the available census data, after making adjustments designed to attenuate markedly the influence of boundary changes on the data. This growth rate is then applied to the population (at the first of the two censuses marking the decade) of all the incorporated centres classified as urban at the both ends of the decade. The resulting estimated population growth is taken as the direct contribution of growth in such centres to the total urban population change. The ratio of estimated growth to the total urban population B at the beginning of the relevant decade is the figure in column B.

The sources of data used to obtain the estimates of population growth are varied. For the period 1871-1931 use has been made of a table (1931 Census, Vol. 1, Table 8) giving population totals for incorporated centres (of 1,000 and over in 1931) according to their areas in 1931. For the decades 1871-81 to 1921-31, decennial population growth rates,have been computed from this table, using (for the most part) the following numbers of urban centres in each major region: Maritimes, 24 centres; Quebec, 33; Ontario, 79; Prairies, eight; and British Columbia, six. In each major region the largest cities and towns were included in the sample of centres (Table 5.3 indicates the proportion of the population of all incorporated urban centres included in the sample).

There are two exceptions to the foregoing list of number centres in the sample from each major region. The estimated growth rates for incorporated urban centres (with boundaries held constant) were compared with the whole urban population rate of increase within each region. In British Columbia and in the Prairies, the former growth rates were sufficiently higher than the urban population rate of increase (in certain decades) to indicate a need for adjustments of the estimates. For the population totals of Vancouver in 1901, 1911 and 1921 (used in calculating growth rates for 1901-11 and 1911-21), the area of Vancouver in 1931 was used. For the estimation of the growth rate for the Prairies in 1901-11, the sample of centres was increased from six to 17.

From 1871-81 to 1891-1901, figures are not available for the centres that were reclassified from urban to rural in each decade. It is assumed that these figures would comprise a negligible percentage of the population of incorporated urban centres at the beginning of each decade. Since the urban area from 1871 to 1901 consists of incorporated centres only (Table 2.1, footnote[b]), the figures in column B for 1871-81 to 1891-1901 are the estimated rates of population growth for incorporated centres with boundaries held constant.

From 1931-41 to 1951-61, the decennial rates of population growth for incorporated centres (with constant boundaries) were estimated from data according to the areas of samples of such centres at the end of each decade. Data for all incorporated centres of 5,000 and over (at the beginning of the pertinent decade) were used. Adjustments for boundary changes were made in the manner indicated in the headnote to Table 4.4.

[c]In each intercensal period some centres are reclassified from rural to urban, and vice versa (the bases for such reclassification are indicated in footnote[b]). The urban population change due to reclassification of centres over any decade is the "end-of-decade" population of the centres reclassified from rural to urban minus the "start-of-decade" population of the centres reclassified from urban to rural. For the incorporated centres, the necessary data may be extracted directly from 1961 Census, DBS 92-539, for the periods 1901-11 to 1951-61. Such data have not been located for the periods 1871-81 to 1891-1901.

For the decades 1871-81 to 1891-1901, the figures in column C are the differences between those in columns A and B. These figures are actually net results of changes in the boundaries of incorporated urban centres, of errors in the basic data and in the estimation of column B, and of rural-urban reclassification of centres. Estimates from available figures for periods after 1891-1901 indicate that the boundary changes comprise a negligible portion of the whole intercensal urban population change in each region. Errors in the basic data affect all estimates presented here, and no basis has been found for assessing the sizes of the net errors in the estimation of column B. By setting C = A - B for 1871-81 to 1891-1901 we are essentially assuming that urban-rural reclassification is the dominant factor in this residual.

[d]As footnote[c] indicates, the residual from 1871-81 to 1891-1901 is allocated to column C. From 1901-11 to 1951-61 D = A-B-C. This residual is the net result of (a) urban population growth (in constant geographical areas) outside the incorporated urban centres, (b) boundary changes by urban centres and rural-urban reclassification of unincorporated urban areas, and (c) a net residual error due to defects in the basic data and in the estimation for columns A and B. When the figure in column D is negative there is probably an over-estimation in column B.

[e]Relative importance is measured from the data in the top panel of this table. For example, the relative importance of the figures in column B is measured, using the above-mentioned data, by $|B / \{ |B| + |C| + |D| \}$; where $|x|$ means the absolute value of x. It can be shown that the rank order of any two fixed components of A, in regard to their arithmetical influence upon A, is independent of the way in which the remaining part (A minus the two fixed components) is decomposed. However, the total number of components and the identities of these components influence the measured relative importance of each component. This limitation is not unusual, because it also appears in regression analysis. In interpreting the figures given in the bottom panel of this Table, it is sufficient to bear in mind that they refer specifically to the particular decomposition of urban population increase used in the table.

SOURCES: 1911 Census, Vol. 1, Table 1; 1921 Census, Vol. 1, Tables 10 and 12; 1931 Census, Vol. 1, Tables 1e and 5; 1931 Census, Vol. 1, Table 8; 1941 Census, Vol. 1, Table 10; 1951 Census, Vol. 1, Tables 12, 13 and 13; 1951 Census, Bul. SP-7; 1956 Census, Vol. 1, Tables 8 and 9; 1961 Census. DBS 99-512, Table 1—DBS 99-512. Table 1 and 2—DBS 92-535, Tables 10 and 11—DBS 92-528, Table 12—DBS 92-539; DBS, "Component Parts..." 1963; Cudmore and Caldwell, 1938, pp. 36—38.

Among the five major regions there is wide variation in the relative importance of the selected sources of urban population increase for 1951-61 (Table 5.2). The relative importance of population growth within the 1951 incorporated urban centres (which remained urban in 1961) is highest in the Prairies, in the Maritimes and in Quebec. In the Prairies, unlike the other Canadian regions, the larger incorporated centres tended to contain much land available for residential development as late as 1951 (1961 Census DBS 99-512, p. 2-16). In the Maritimes, there were markedly lower-than-average rates of urban population growth and urbanization over the past two decades (Table 2.2), which suggests that the tendency for population to spill over (or concentrate outside of) the boundaries of the larger incorporated centres may be less marked there than in the other regions having similarly long histories of urban development. This interpretation is supported by data in Section 5.4 (Table 5.6) which indicate that the 1951-61 crude net migration ratio for urban areas outside of incorporated centres is by far the lowest in the Maritimes.

As Table 5.2 shows, the relative importance of population growth within the 1951 incorporated urban centres (which remained urban in 1961) to the total urban population increase was almost the same in Quebec as in the Maritimes. However it should be observed that 96 per cent of Quebec's 1951 urban population was located within incorporated centres in 1951. The corresponding percentage for the Maritimes was 82 per cent, just one percentage point above the figure for Ontario. Thus the concentration of the 1951-61 urban population increase within incorporated centres is considerably more significant in the Maritimes than in Quebec.

Among the regions, Ontario and British Columbia have shown the most rapid rates of urbanization since 1851 (Chapter Two, Section 2.3). These are the regions with the lowest values for the proportion of the 1951-61 urban population increase attributable to population growth within incorporated centres (those that were urban in both 1951 and 1961). In each of these regions the proportion was less than one half, even though much more than two thirds of their 1951 urban populations resided in incorporated centres. The most striking divergence is that for British Columbia, where 74 per cent of the 1951 urban population resided in incorporated centres while such centres accounted for 23 per cent of the 1951-61 urban population increase. In Ontario the corresponding figures are 81 per cent and 40 per cent, respectively. In short, there was disproportionate concentration of the 1951-61 urban population increase outside of the 1951 incorporated urban centres in these two regions.

The rural-urban reclassification of localities accounts for less than 10 per cent of the 1951-61 urban population increase in three of the five

regions. The two exceptions are the Maritimes and Quebec, in both of which reclassification accounted for 13 per cent. Since the rural-urban reclassification of localities is relatively unimportant in accounting for the intercensal urban population increase among these regions, the 'residual' component (Table 5.2, column D) tends to be relatively large, particularly in Quebec. Ontario and British Columbia. In Quebec 21 per cent of the 1951-61 urban population increase is allocated to this residual category and in Ontario and British Columbia more than 50 per cent each. That Ontario and British Columbia should have the highest values on these percentages partly reflects the fact that in these regions the proportions of the 1951 urban population residing outside of incorporated urban centres were atypically high (Table 5.2). Data presented in Section 5.4 (Table 5.6) suggest. however, that in the urban areas outside of incorporated urban centres population growth and net migration ratios were very much higher in Ontario, British Columbia and Quebec than in the Maritimes and the Prairies.

Table 5.2 — Relative Importance of Selected Sources of Urban Population Increase in Major Regions of Canada, 1951-61

NOTE. — Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

Canada and major region	Decennial percentage change in urban population[a]	Percentage change due to growth in incorporated urban centres[a]	Percentage change due to rural-urban reclassification of localities[a]	Residual change[a]	Percentage of urban population in incorporated centres at first census
	A	B	C	D	E
Canada...........	45.3	24.6	3.3	17.4	86.5
Maritimes.......	19.6	13.7	2.6	3.3	81.9
Quebec..........	44.2	29.2	5.6	9.4	96.1
Ontario.........	44.8	17.9	1.2	25.7	80.7
Prairies........	61.4	49.0	3.8	8.6	91.7
British Columbia	47.9	11.0	4.0	32.9	74.3
	Relative importance of each source[a]				
Canada	100	54.6	7.2	38.3	
Maritimes.......	100	67.0	13.2	16.8	
Quebec..........	100	66.0	12.7	21.2	
Ontario.........	100	40.0	2.6	57.4	
Prairies........	100	79.8	6.1	14.0	
British Columbia	100	22.9	8.4	68.7	

[a]See footnote on corresponding item of Table 5.1.

SOURCES: 1951 Census, Vol. I, Tables 12, 12a and 13; 1951 Census, Bul. SP—7; 1956, Census, Vol. I, Tables 8 and 9; 1961 Census, DBS 99-511, Table 1–DBS 99-512, Tables 1 and 2–DBS 92-535, Tables 10 and 11–DBS 92-536, Table 12—DBS 92-539–DBS 92.528.

5.2.3 HISTORICAL TRENDS – Since the concentration of the Canadian urban population in incorporated urban centres is traditional, it may be expected that such centres would have the largest share of the urban population increase from 1871-81 to 1951-61. This expectation is supported by Chart 5.1, which shows that at least one half of the Canadian urban population increase in each decade from 1871-81 to 1951-61 may be attributed to the incorporated centres that remained urban in classification throughout the period. This proportion is largely independent of boundary changes by such centres (Table 5.1). In four of the nine intercensal periods from 1871-81 to 1951-61 at least 75 per cent of the Canadian urban population increase may be attributed to the above-mentioned source. In 1871-81 and 1891-1901 the proportion was less than two thirds, due to the strong influence of the rural-urban reclassification of centres and it was also unusually low in 1941-51 and 1951-61. In the latter decades, however, rural-urban reclassification of urban centres is unimportant, and the 'residual' component accounts for a relatively large portion of the urban population increase. The large size of the 'residual' component in recent decades probably reflects the generally known upswing in population growth for the areas within the commuting distances to the larger incorporated urban centres.

CHART 5.1

RELATIVE IMPORTANCE OF SELECTED COMPONENTS OF THE INTERCENSAL URBAN POPULATION INCREASE, CANADA, 1871-81 TO 1951-61

B: Growth in incorporated urban centres
C: Rural-urban reclassification of centres
D: Residual urban population change, which is total change —B-C.

DECADES
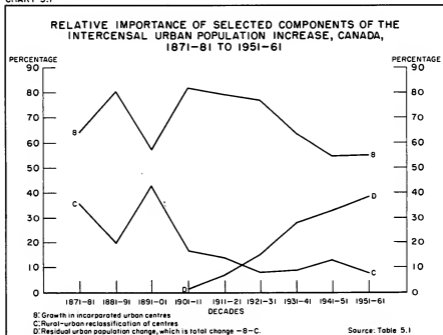
Source: Table 5.1

The data in Table 5.1 (column B) provide appropriate measures of the relative contribution of demographic growth (net migration *plus* natural increase) in incorporated centres to urban population increase for the respective decades. They show that the contribution has not been stable over the decades and has been markedly lower than average near the beginning and the end of the 1871-1961 period. The figure of colunm B may also be used to estimate the relative importance of net migration in the intercensal growth of the population in incorporated centres; because these data are not disturbed significantly by changes in city boundaries. First, however, it is necessary to transform them so that they show rates of growth for the population in the incorporated centres. The results of this transformation are given in Table 5.3.

Table 5.3 – Estimated Decennial Rates of Population Growth for Incorporated Urban Areas, Canada and Major Regions, 1871-81 to 1951-61

NOTE. — Explanation of estimation procedures is given in footnote[b], Table 5.1. Effects of boundary changes in these percentages are negligible.

Period	Canada[a]	Maritimes	Quebec	Ontario	Prairies	British Columbia
	Rates of growth					
1871-81	31.9	14.6	27.1	40.0	[b]	31.1
1881-91	33.3	9.0	28.9	35.7	221.1	216.8
1891-1901	18.2	11.2	22.8	13.3	58.3	52.7
1901-11	51.9	17.1	38.9	41.3	297.3	118.0
1911-21	28.0	17.7	25.6	30.5	40.5	16.1
1921-31	23.7	1.0	31.6	20.8	31.0	40.1
1931-41	12.5	15.2	14.5	12.9	6.0	11.7
1941-51	20.1	12.9	18.9	17.9	30.7	26.2
1951-61	29.2	16.8	27.6	24.6	57.8	17.6
	Population in the centres used to compute the rates as a percentage of the population in all incorporated urban centres					
1871[c]	109	138	112	101	[b]	[d]
1881[c]	98	108	104	90	[e]	100
1891	95	95	102	86	[e]	100
1901	85	80	90	82	96	88
1911	81	71	83	82	78	80
1921	79	68	77	82	75	95
1931	84	74	81	87	84	89
1941	87	77	81	93	86	92
1951	89	82	83	96	88	90

[a]Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

[b]1871 figure was zero for sample cities.

(Footnotes continued on following page)

5.3 RELATIVE IMPORTANCE OF THE DEMOGRAPHIC COMPONENTS OF URBAN POPULATION INCREASE, 1951-61

The components of demographic growth, net migration and natural increase, were not treated separately in the preceding Section. The present Section will help to fill this gap in the information for the 1951-61 decade by attempting to estimate the relative contributions to Canadian urban population increase from the direct impact of net migration and from natural increase (which includes the interaction of net migration with natural increase).[2] Because of the numerous adjustments of data and estimations used in obtaining Table 5.4, some preliminary methodological notes are required.

5.3.1 PRELIMINARY METHODOLOGICAL NOTES – In this Section the total contribution of areal change to urban population increase is broken down into a direct contribution and an indirect one. The direct impact of areal change is defined as the 1951 population of the areas added to the urban territory (between 1951 and 1961) *minus* the 1951 population of areas subtracted from this territory for the decade.[3] The indirect contribution is the interaction of areal change with demographic growth, defined as the 1951-61 population growth in the area added to urban territory over the same period.[4] Thus the total contribution of demographic growth to the 1951-61 urban population increase may be defined as the population growth in the centres (with constant boundaries) that were urban in 1951 and 1961 *plus* the interaction of areal change and demographic growth.

It is important to separate these direct and indirect impacts of areal change on urban population increase, where feasible. In these days of lengthening daily commuting distances, the influence of large cities on population movements may be reflected markedly in the growth of population in areas near to these cities. For important analytical purposes, it may be assumed safely that the bulk of the migration to these outlying areas is as much an 'urbanward' migration (including urban-to-urban as well as rural-to-urban migration) as is the migration into the incorporated parts of the cities. Thus, when assessing the contribution of migration to urban growth, account should be taken of the contribution of migration to demographic growth in the areas added to urban territory over the period in question.

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Several limitations in the coverage and detail of the relevant basic data have placed constraints upon the component analysis of urban population change. Total population figures for the areas annexed to cities are available (or are fairly estimable) mainly for the incorporated cities of 5,000 and over. Total 1951 and 1961 populations for constant areas are not available for the unincorporated urban centres outside the boundaries of the 1961 Metropolitan Areas (MAs) and Major Urban Areas (MUAs). Vital statistics for urban centres are readily available only for the incorporated areas, and are not given separately for recently annexed parts so that vital statistics for cities having significant annexations may not be taken as based on constant geographical areas. Because of these properties of the basic data, it was necessary to restrict the denotation of "urban" in this analysis, and a number of estimations were required (indicated in Appendix F and in the footnotes to Table 5.4).

The data in Table 5.4 refer to the urban complexes, as defined in Chapter Four, Section 4.1. The urban population in this case includes (a) the urban population (as designated in the census statistics) residing within the boundaries of the 1961 MAs, MUAs and Urbanized Areas (UAs), and (b) the population of incorporated urban centres of 5,000 and over outside the boundaries of the 1961 MAs, MUAs and UAs. The urban population figures in (a) refer to both incorporated and unincorporated areas. In the remainder of this Section, the urban population in (a) and (b) are referred to as the "urban-complex population".

Over the 1951-61 decade the Canadian population residing in urban complexes increased by 52 per cent (Table 5.4), an increase that may be divided into (a) population growth in the area which was urban in both 1951 and 1961; (b) increase directly due to change in the area of urban settlement; and (c) the interaction of areal change and demographic growth. Each part has been estimated independently of the increase in the whole urban-complex population. Thus when added they may not equal this increase, and for each region there is a residual error (Table 5.4, column G). This residual error, which is the net effect of deficiencies in the basic data as well as in the estimation techniques and assumptions, varies from two per cent of the urban-complex population growth in the Maritimes and in the Prairies to 14 per cent in British Columbia. Because the available data do not permit an assessment of the relative importance of errors in the basic data and those in the chosen estimation techniques, no basis was found for modifying the figures so as to reduce the apparent residual error. Despite their limitations, fair estimates of the relative contribution of net migration to urban population growth are considerably useful. Attempts to find significant correlations between urban growth and economic changes should take into account the relative importance of net migration (as a component of the urban growth).

This is so because economic changes do not influence net migration and natural increase in the same ways (except possibly where the interaction of net migration and natural increase dominates the total natural increase).

5.3.2 FINDINGS – As one might expect, the growth of population in the area classified as urban in both 1951 and 1961 was easily the most important of the three major components (mentioned in the preceding paragraph) of the 1951-61 increase of the urban-complex population in Canada. This component accounted for over 60 per cent of the increase, approximately 25 per cent being attributed to the direct and indirect effects [components (b) and (c)] of areal change.

In each of the five major regions, population growth in the area classified as urban in both 1951 and 1961 has the largest share of the total population increase in the urban complexes, varying from about 56 per cent in Ontario to about 87 per cent in the Prairies. This regional variation is not correlated significantly with regional variation in the 'residual error' term. Instead it reflects mainly the marked regional variation in the areal change component of the increase in the urban-complex population. The total (direct and indirect) contribution of areal change to the increase in the urban-complex population varied from 11 per cent in the Prairies to 34 per cent in Ontario. Roughly one half of this 34 per cent figure for Ontario is due to annexations (Appendix F, Table 9) and another half is mainly due to DBS change in the boundaries of the unincorporated urbanized fringes of the larger cities (particularly Toronto).

Over the 1951-61 decade, the population in the Canadian urban complexes was increased by 52 per cent (Table 5.4). More than 75 per cent of this increase may be attributed to the total demographic growth, which consists of population growth in the area that was urban in both 1951 and 1961 *plus* population growth in the area that was added to urban territory over the decade. The latter factor, the interaction of areal change and demographic growth, accounted for about 12 per cent of the population increase for the Canadian urban complexes. In none of the five regions did the total demographic growth account for less than 70 per cent of the above-mentioned population increase.

Net migration and natural increase rates have been estimated for the constant geographical areas involving the territory that was urban in both 1951 and 1961 *plus* the area added to urban territory over the 1951-61 decade. By means of legitimate operations upon the relevant formulas (Appendix F), it is possible to derive a set of weights for the estimated net migration rates so as to measure the relative importance of net migration in both the total demographic growth and (hence) the over-all urban population increase.

Table 5.4 — Components of Population Increase in Urban Complexes of 5,000 and Over, Canada and Major Regions, 1951-61

NOTE. — In 1951, the urban complex population consists of the urban population of the 1951 Census Metropolitan Areas (MAs) *plus the* population in incorporated urban centres of 5,000 and over outside of the 1951 MAs; where the definition of "urban" is that of the 1951 Census. In 1961, the urban complex population consists of the urban population of the 1961 MAs, Major Urban Areas (MUAs) and Urbanized Areas (UAs) *plus* the population in incorporated urban centres of 5,000 and over outside of the 1961 MAs, MUAs and UAs; and the definition of "urban" is that of the 1961 Census. For details of the census definition in 1951 and 1961, see 1961 Census, DBS 99-512, pp. 2.1 – 2.3, and Table 2.1, footnote[c].

Canada[a] and major region	Percentage change in population[b]	Percentage change due to natural Increase in the 1951 and 1961 urban area[c]	Percentage change due to net migration to the 1951 and 1961 urban area[c]	Percentage change B+C	Percentage change due to natural increase in areas added to urban territory[d]	Percentage change due to net migration to urban areas added to urban territory[d]	Percentage change due to total demographic growth[e] B+C+D+E	Percentage change due to areal change directly to area[f]	Residual error[g] A-B-C-D-E-F
	A	B	C	B+C	D	E	B+C+D+E	F	G
Canada	51.6	20.2	13.2	33.4	2.2	3.9	39.5	7.3	4.8
Maritimes	27.9	20.2	– 1.6	18.6	2.6	1.2	22.4	6.0	-0.5
Quebec	48.7	21.7	9.7	31.4	2.3	3.3	37.0	6.1	5.6
Ontario	56.3	18.4	13.0	31.4	3.1	6.3	40.8	10.0	5.5
Prairies	63.1	26.1	28.8	54.9	1.3	1.1	57.3	4.6	1.2
British Columbia.	42.2	15.6	13.1	27.7	1.3	2.5	31.5	4.6	6.1
				Relative importance of the components[h]					
Canada	100	39.1	25.5	64.6	4.3	7.6	76.5	14.1	9.4
Maritimes	100	62.9	5.0	67.9	7.9	3.8	79.6	18.7	1.7
Quebec	100	44.6	19.9	64.5	4.6	6.8	75.9	12.6	11.5
Ontario	100	32.7	23.2	55.9	5.5	11.2	72.6	17.7	9.7
Prairies	100	41.4	45.6	87.0	2.0	1.7	90.7	7.3	2.0
British Columbia.	100	34.6	31.0	65.6	3.1	6.0	74.7	10.9	14.4

Footnotes and Sources on following page.

^a Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

^b As the headnote indicates, this percentage is influenced by changes in the area of urban settlement.

^c Based on estimate of the intercensal net migration and natural increase ratios for a constant geographical area (comprised of both incorporated and unincorporated centres) which was part of the urban-complex (of 5,000 and over) territory in *both* 1951 and 1961. Appendix F indicates the relevant formulas and procedures underlying the estimated rates.

^d Appendix F indicates the relevant formulas and procedures underlying the estimated net migration and natural increase rates upon which these percentages are based.

^e Total demographic growth is equal to population growth in constant area which was urban in both 1951 and 1961 *plus* population growth in the territory added to the urban area between 1951 and 1961.

^f The urban population increase directly due to areal change is the 1951 population in areas added to the urban territory over the 1951-61 decade *minus* the 1951 population in the areas subtracted from the urban territory over the decade. Footnote^f to the text indicates how such subtraction may take place.

^g This column exists because column A was *not* used in obtaining any of the columns B, C, D, E and F, and therefore may serve as a rough check on the quality of the decomposition of the population growth shown by columns B, C, D, E and F. For further discussion see Appendix F.

^h See footnote^e, Table 5.1.

SOURCES: *Vital Statistics* (annual), 1921 to 1961 (1951, Table 26; 1952 to 1960, Table 7; 1961, Table S7); 1951 Census, Vol. I, Tables 12 and 13; 1961 Census, DBS 92-536, Table 12—DBS 92-539—DBS 99-511, Table 2; DBS, ''Component Parts ...'', 1963.

Forty-three per cent of the total demographic growth for the Canadian urban complexes may be attributed to the direct influence of net migration. This contribution was 33 per cent of the whole population increase for these urban complexes. The remaining 57 per cent of the total demographic growth is the net result of (a) the natural increase which was independent of net migration and (b) the interaction of net migration and natural increase. About three fourths of the net migrational contribution represents net migration to the area that was urban in both 1951 and 1961.

Among the five major regions, the relative importance of the direct impact of net migration on the total demographic growth for the urban complexes varies widely (Table 5.4). In the Maritimes it was 11 per cent, in Quebec 35 per cent, in Ontario 47 per cent, in British Columbia 50 per cent and in the Prairies 52 per cent. Due to limitations of time and space, a systematic explanation of this wide variation is not attempted in this monograph but it may be noted in passing that the rank ordering of the regions on this variable is markedly correlated with their rank orderings on several economic indicators shown in the *Second Annual Review* of the Economic Council (1965, c.5).

5.3.3 URBAN SIZE-GROUP DIFFERENTIALS – In addition to the regional differentials in the relative importance of net migration in urban population increase from 1951 to 1961, there are also systematic differences among urban size groups in respect of this influence of net migration. It may be recalled that Chapter Four, Section 4.6, indicated a definite positive association between size of urban complex in 1951 and the 1951-61 rate of population growth. Table 5.5 shows a similar association between size of urban complex in 1951 and the 1951-61 net migration ratio.

In Canada as a whole and in each major region the larger size groups of urban complexes (30,000-99,999 and 100,000-plus) show considerably higher net migration ratios than do the two smaller size groups, (10,000-29,999 and 5,000-9,999) over the 1951-61 decade (Table 5.5). For Canada, the net migration in the 100,000 and over group was 22 per cent of the 1951 population and in the 30,000-99,999 group, 17 per cent. In the two lower groups, the net migration did not exceed four per cent of the 1951 population. No such pattern of differentials is shown for the natural increase which ranges from 20 per cent of the 1951 population (100,000-plus group) to 24 per cent (10,000-29,999 group). Thus, the size-group differentials in the 1951-61 growth rate of the population in urban complexes of 5,000 and over are mainly due to the net migration factor.

Table 5.5 — Components of Population Increase in Urban Complexes, by Size Group, Canada and Major Regions, 1951-61

NOTE. — The urban-complex population is comprised of (a) the whole population within the boundaries of the 1951 MAs and MUAs *plus* (b) the population in incorporated centres of 5,000 and over (as of 1951) which were outside the 1961 MAs and MUAs. For the 1961 MAs and MUAs, the published data give 1951 and 1961 population totals according to the 1961 areas. For the centres in category (b) that had annexations, adjustments (described in the headnote to Table 4.4) were made so that the data refer to geographical areas as of 1961. Thus the figures in this table are not significantly affected by boundary changes.

Size group (as of 1951)	Decennial percentage change in population	Contributions of the components			Relative importance of the components[a]		
		Estimated natural increase ratio[b]	Estimated net migration ratio[b]	Residual error A-B-C[c]	Natural increase ratio	Net migration ratio	Residual error
	A	B	C	D	E	F	G
	Canada[d]						
5,000 and over..................	40.9	20.8	18.6	1.5	50.9	45.4	3.7
100,000 and over..............	45.4	19.8	22.5	3.0	43.6	49.6	6.7
30,000-99,999	37.4	23.0	16.6	− 2.1	55.2	39.7	5.1
10,000-29,999	26.4	24.2	3.2	− 1.0	85.3	11.3	3.4
5,000- 9,999	25.3	22.9	3.7	− 1.3	82.1	13.2	4.7
	Maritimes						
5,000 and over..................	21.9	21.3	− 1.2	1.8	87.6	4.9	7.5
100,000 and over..............	37.3	21.4	8.7	7.3	57.2	23.2	19.6
30,000-99,999	17.7	21.4	− 3.3	− 0.4	85.3	13.2	1.6
10,000-29,999	14.5	20.5	− 5.2	− 0.8	77.3	19.7	3.0
5,000- 9,999	9.7	20.1	− 10.4	−	65.8	34.2	−
	Quebec						
5,000 and over..................	37.8	22.5	22.1	− 6.8	43.7	43.0	13.3
100,000 and over..............	41.1	21.1	28.2	− 8.2	36.6	49.1	14.2
30,000-99,999	31.0	24.8	10.7	− 4.5	62.1	26.7	11.2
10,000-29,999	26.8	28.4	0.8	− 2.4	89.8	2.6	7.6
5,000- 9,999	24.6	27.9	1.9	− 5.2	79.7	5.4	14.9

	Ontario						
5,000 and over	41.5	19.4	19.1	3.0	46.7	46.0	7.3
100,000 and over	45.7	18.6	19.9	7.1	40.8	43.6	15.6
30,000-99,999	42.3	23.8	19.1	− 0.6	54.7	43.9	1.4
10,000-29,999	24.6	22.3	4.6	− 2.4	76.2	15.8	8.1
5,000-9,999	25.6	20.3	8.5	− 3.3	63.2	26.6	10.2
	Prairies						
5,000 and over	57.5	26.0	31.5	0.1	45.1	54.7	0.2
100,000 and over	61.2	26.1	34.2	0.9	42.7	55.8	1.5
30,000-99,999	62.7	23.8	38.4	− 3.5	39.8	55.2	5.0
10,000-29,999	41.0	21.5	19.6	− 0.1	52.2	47.5	0.2
5,000-9,999	36.4	25.6	15.0	− 4.2	57.1	33.5	9.4
	British Columbia						
5,000 and over	38.0	15.2	17.4	5.4	39.9	45.8	14.3
100,000 and over	40.6	14.0	18.0	8.6	34.6	44.3	21.1
30,000-99,999	36.2	15.7	23.3	− 2.8	37.6	55.7	6.7
10,000-29,999	15.8	17.7	− 1.9	—	90.2	9.8	—
5,000-9,999	27.4	24.2	6.4	− 3.4	71.0	18.9	10.1

a See footnote[b], Table 5.1.

b Appendix F indicates the procedures and formulas underlying the estimation of these ratios. The denominator of each ratio is the 1951 population.

c This column exists because column A was *not* used in obtaining either columns B or C. See footnote[g], Table 5.4.

d Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

SOURCES: *Vital Statistics* (annual), 1921 to 1961 (1951, Table 26; 1952 to 1960, Table 7; 1961, Table S7); 1951 Census, Vol. I, Tables 12 and 13; 1961 Census, DBS 92-546, Table 12 — DBS 92-539 — DBS 99-511, Table 2; DBS, "Component Parts . . .", 1963.

Although the total natural increase (which includes the interaction of the net migration and natural increase processes) is less important than net migration in accounting for size-group *differentials* in 1951-61 growth rates, it is usually the more important component in *each* growth rate. Table 5.5 shows that it was more important in all but seven of the 24 growth rates computed (excluding those for the whole group of 5,000 and over), and five of the seven exceptions were in the 100,000 and over size group. In the Prairies and in British Columbia net migration was the more important component in accounting for the population growth rate both for the 100,000-plus and the 30,000-99,999 groups. These data suggest that the largest size groups did exert an atypically strong force of attraction upon the migrational flows, and that only in these size groups did the direct influence of net migration tend to be more important than natural increase in accounting for the decennial rate of population change.

Summarizing this Section, the 1951-61 population increase for the Canadian urban complexes has been decomposed into (a) net migration as a component of total demographic growth, (b) natural increase (including its interaction with net migration) as a component of total demographic growth, and (c) areal change independent of demographic growth. The total demographic growth is the population growth in the area that was urban in both 1951 and 1961 *plus* population growth in the area added to urban territory over the 1951-61 decade. For Canada as a whole, for the Maritimes and for Quebec, natural increase was by far the most important component, in the Prairies and in British Columbia net migration was the larger component, and in Ontario the direct impact of net migration was only slightly less important than the natural increase component. The direct contribution of areal change to the population increase in the urban complexes was 14 per cent of this increase for Canada, and among the major regions the contribution ranged from 7 per cent in the Prairies to 19 per cent in the Maritimes (Table 5.4).

5.4 LEVELS AND PATTERNS OF NET MIGRATION RATIOS FOR URBAN AREAS, 1951-61

This Section focuses on the levels and patterns of net migration ratios estimated for urban areas in Canada. Such ratios are not only indispensable in the analysis of the growth rate and the areal redistribution of population, but are appropriate variables for measuring the influences being exerted by migratory flows on the composition of population in a given area. Although net migration is a poor indicator of population turnover (in-migration *plus* out-migration), it is an appropriate measure of the retentive power of a given locality in a field of migrational flows. The propensity of an area to retain its natural increase and its in-migrants is a matter of considerable practical

significance, and the net migration ratio is one of the appropriate indicators of this propensity. The following paragraphs describe selected features of net migration ratios for the 1951-61 decade, reviewing differentials among the major regions of Canada, incorporated centres, other urban areas[1] and urban size groups. Data reflecting rural-urban differentials are also presented and discussed briefly.

For Canada the 1951-61 net migration to urban complexes (with geographical areas held constant) was 16 per cent of the 1951 population in these complexes[6] (Table 5.6). Among the five major regions, the net migration ratio ranged from zero in the Maritimes to 28 per cent in the Prairies. The ratios for British Columbia and Quebec were slightly below the national average and that for Ontario was slightly above. However, the range of the ratios among Quebec, Ontario and British Columbia (12 per cent to 18 per cent) was very short. A systematic explanation of this pattern of regional differentials is not attempted in this monograph.

Table 5.6 shows that the net migration ratios for the incorporated centres were markedly below those for the remaining parts of the urban complexes. In Canada as a whole, net migration for the incorporated centres within the urban complexes was roughly 10 per cent of the 1951 population of these centres while the corresponding ratio for other areas within the urban complexes was about five times as large. In all regions except the Prairies, the net migration ratio for these "other parts" of the urban complexes was at least five times as large as that for the incorporated centres. Only in the Prairies is the value of the ratio for such incorporated centres (30 per cent) clearly in excess of values that may be easily dominated by errors in the estimates (Stone, 1966, p. 4); this atypical result reflects the fact that many of the larger Prairie incorporated cities had extensive tracts of land available for development as late as 1951 (1961 Census, DBS 99-512, p. 2-16) and that an unusually high proportion of the heavy 1951-61 in-migration to the Prairies settled within the boundaries of these larger centres. The pattern of regional variation in the net migration ratio for the parts of urban complexes outside of incorporated centres (ratios of over 40 per cent in Quebec, Ontario and British Columbia, and values of less than 25 per cent in the Maritimes and the Prairies) suggests that this variable reflects the well-known and recent 'suburban explosion' of population.

Despite their low values, the 1951-61 net migration ratios for the incorporated centres within the urban complexes tend to be higher than those for the areas outside of the urban complexes for Canada as a whole, and in the Maritimes, Quebec and the Prairies. In the Prairies, particularly, the ratio for the area outside of the urban complexes was minus 15 per cent, a value 45 percentage points below that for the incorporated centres within the Prairie urban complexes. Generally, the areas outside the urban complexes

Table 5.6 — Estimated Net Migration and Natural Increase Ratios for Urban Complexes of
5,000 and Over, Canada and Major Regions, 1951-61

NOTE. — See headnote to Table 5.4 for definition of "urban complexes". Effects of boundary changes are negligible.

Canada[b] and major region	Estimated natural increase ratio[a]			Estimated net migration ratio[a]			
	All urban complexes	Incorporated centres[c]	Other parts[d]	All urban complexes	Incorporated centres	Other parts	Region outside of urban complexes[e]
	A	B	C	D	E	F	G
Canada	20.7	19.6	27.1	15.8	9.2	47.9	− 2.4
Maritimes	20.7	20.3	26.2	−0.3	−3.6	12.6	−10.0
Quebec	22.5	21.7	33.6	12.2	9.2	49.8	− 5.1
Ontario	19.4	16.7	29.1	17.5	. 5.2	59.7	7.4
Prairies....................	26.0	26.4	24.8	28.4	29.7	21.2	−15.3
British Columbia	15.1	12.2	22.6	14.7	3.4	42.9	29.1

[a] See footnote [b] , Table 5.5.

[b] Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

[c] These data refer to incorporated centres of 5,000 and over within the urban complexes; details of the estimation technique are given in Appendix F.

[d] These data refer to the parts of the urban complexes outside of incorporated centres of 5,000 and over; see Appendix F for details of the estimation.

[e] These data refer to the area within each region which is outside of the urban complexes; see Appendix F for details of the estimation techniques.

SOURCES: *Vital Statistics* (annual), 1921 to 1961 (1951, Table 26; 1952 to 1960, Table 7; 1961, Table 87); 1951 Census, Vol. I, Tables 12 and 13; 1961 Census, DBS 92-536, Table 12 — DBS 92-539 — DBS 99-511, Table 2; DBS, "Component Parts...", 1963.

sustained (when taken as a whole) net losses of population through migration, and the losses were greatest in the most agricultural of the five regions (the Prairies and the Maritimes). In Ontario and British Columbia the area outside of the urban complexes had net migration gains, although only the British Columbia gain is substantial. In British Columbia the net migration ratio for this area was 29 per cent, a figure almost ten times as large as the ratio for the incorporated centres in the British Columbia urban complexes.

Although Tables 5.5 and 5.6 are not based on identical sets of data, they show similar patterns of regional variation in net migration ratios. The breakdown of net migration ratios by size group of urban complex in Table 5.5 usefully supplements the information in Table 5.6. The Prairies show the highest net migration ratio in each of the four size groups. Quebec (Montreal MA plus Quebec MA) has the second highest ratio in the 100,000 and over group and Ontario the second highest ratio in the 30,000-99,999 group. In each of the four size groups the lowest net migration ratios are shown for the Maritime region.

Summarizing, the 1951-61 net migration ratios for the urban complexes varied markedly by major regions, a variation considerably greater than that of the natural increase ratios. The regional net migration ratios for the urban complexes were highest in the Prairies (28 per cent) and lowest in the Maritimes (zero per cent), and in the other three major regions they clustered near the national average of 16 per cent. Within the regions, the net migration ratios tended to be higher for the parts of urban complexes outside of incorporated centres than for these incorporated centres, and the ratios for the incorporated centres tended to be higher than those for the areas outside of the urban complexes. Generally, the latter areas tended to have net migration losses (when taken as wholes), the losses being greatest in the more agricultural regions. There were marked exceptions to these within-region tendencies in the Prairies and British Columbia; in the Prairies the net migration ratio was highest for the incorporated centres within the urban complexes and in British Columbia a high positive ratio is shown for the areas outside of the urban complexes.

5.5 GLIMPSES INTO THE HISTORICAL PATTERN OF NET MIGRATION RATIOS FOR URBAN AREAS

The preceding sections have indicated that over the 1951-61 decade net migration accounted directly for 33 per cent of the population increase for Canadian urban complexes, and that the net migration ratio for these complexes was roughly 16 per cent. In attempting to determine the significance of these findings, it is appropriate to view them in the perspective of the historical pattern of net migration ratios for urban areas. As a small

contribution to the completion of this perspective, the present Section indicates estimates of net migration ratios from 1921-31 to 1951-61 for a group of the larger incorporated Canadian cities. The possibly disturbing effects of boundary changes upon the relevant statistics are not present in the data assembled for the group of cities in question. Although the ratios for this group may not be adequately representative of the whole urban population throughout the 1921-1961 period, they should usefully reflect the historical pattern of net migration ratios for the traditionally core areas of Canadian urban development.

Net migration ratios in the group of larger incorporated Canadian cities have generally declined since 1921-31 (Table 5.7). These ratios, which refer only to persons alive at the beginning of the intercensal period in question, dipped sharply from 15 per cent in 1921-31 to four per cent in 1931-41. In the 1941-51 and 1951-61 decades the ratios were five per cent and eight per cent, respectively. This moderate post-Depression upswing is probably *not* representative of the pattern of change in the net migration ratio for the

Table 5.7 — Net Migration Ratios for a Group of Larger Canadian Cities, by Major Region, 1921-31 to 1951-61

NOTE. — Net migration estimates for persons alive at the beginning of each decade.[a] The group of larger Canadian cities includes: Halifax, Saint John, Montreal, Quebec, Kitchener, London, Ottawa, Sudbury, Toronto, Windsor, Calgary, Edmonton, Regina, Saskatoon, Winnipeg, Vancouver and Victoria. See headnote to Table 4.4.

Period	All cities	Maritime cities	Quebec cities	Ontario cities	Prairie cities	British Columbia cities
	Net migration ratios[b]					
1921-31	14.9	− 8.8	15.0	12.9	17.4	30.6
1931-41	3.7	5.1	1.2	6.7	− 1.2	9.5
1941-51	4.6	− 1.9	0.1	2.4	13.3	16.1
1951-61	7.9	− 5.0	1.8	4.6	28.9	5.7
	Percentage of the population of all incorporated centres of 1,000 and over in these cities					
1921	53.7	29.5	59.0	46.5	66.3	83.4
1931	53.8	29.1	56.4	47.4	67.4	73.9
1941	52.5	28.8	53.0	47.3	68.3	74.1
1951	47.9	28.0	45.6	43.9	62.4	66.7

[a] Net migration ratios for the intercensal births have been computed for the periods beginning in 1931-41 only.

[b] Each ratio is the estimated net intercensal migration divided by the population at the beginning of the decade. The net migration estimates have been computed by means of the life table survival ratio technique (Appendix G).

SOURCES: DBS 84-510, 1947; DBS 84-512, 1960; DBS 84-517, 1964; Keyfitz 1931, Table 9; Keyfitz 1950, Table 2; 1931 Census, Vol. II, Table 25; 1941 Census, Vol. II, Table 24; 1951 Census, Vol. I, Table 24; 1961 Census, DBS 92-542, Table 24; unpublished 1921 census tabulations.

whole urban population, an observation suggested by the 16 per cent value of the 1951-61 net migration ratio shown in Table 5.6 for the urban complexes of 5,000 and over. When the 1951-61 ratio of eight per cent (Table 5.7) for the group of larger cities is adjusted to take into account the net migration of persons born between 1951 and 1961, it becomes less than one per cent. That is, when the 1951-61 net migration ratio for the group of larger cities (Table 5.7) is adjusted to cover the same age range as the corresponding ratio for the urban complexes (Table 5.6), the differential between the two ratios almost doubles. Thus, the moderate post-Depression upswing in the net migration ratio shown in Table 5.7 for the group of larger cities may be a reflection of the increasing residential saturation of the traditionally core areas of Canadian urban development.

Anderson (1966, Table 16) and Slater (1960b, Table B.3) have computed estimates of the net migration to urban areas in Canada, providing a useful indication of the general pattern of decade fluctuations. The estimates of these authors agree with Table 5.7 in showing a sharp drop in the level of the net migration ratio from 1921-31 to 1931-41 and a moderate rise in this level from 1931-41 to 1941-51. Economic Council estimates (1965, Table 5.5) concerning the 1941-51 to 1951-61 upswing indicate an 85 per cent increase from 1941-51 to 1951-61. Table 5.7 shows a 71 per cent increase in the level of the net migration ratio for the group of larger Canadian cities from 1941-51 to 1951-61. Although these ratios for the group of larger cities exclude intercensal births in each decade and are thus not really comparable with Anderson's (1966, Table 16) data, they are markedly closer to Anderson's estimates in 1921-31 than in 1951-61. These observations support the view that there was a marked post-Depression upswing in decade rates of net migration to urban areas in Canada which has not been reflected strongly by the largest *incorporated* cities. Among the five major regions, the Prairies provide the principal exception to the preceding generalization. In the Prairies the net migration ratio for the large-city group did drop very sharply from 1921-31 (17 per cent) to 1931-41 (*minus* one per cent); but by 1941-51 the ratio has returned to a level (13 per cent) near to that of 1921-31. Between 1941-51 and 1951-61 the ratio for the Prairie group of cities more than doubled (from 13 per cent to 29 per cent).

In summary, it may be concluded that net migration ratios for the whole urban area in Canada have fluctuated markedly over time, in rough association with the general economic conditions of the individual decades. The data presented for a group of the largest Canadian cities (Table 5.7) suggest that the incorporated limits of these cities have had a declining trend in the net migration ratio. While these cities reflect the post-Depression upswing in net migration to urban areas, the reflection is not as sharp as that estimated (Anderson, 1966, Table 16) for all urban areas. It should be

noted, however, that this observation does not apply to the data shown (Table 5.7) for the Prairies. As late as 1951-61 the incorporated parts of the largest Prairie cities were able to absorb much of the high level of postwar 'urbanward' migration in this region (Alberta Royal Commission, 1956, Table 6).

5.6 SEX-AGE PROFILES OF NET MIGRATION RATIOS FOR A GROUP OF THE LARGEST CITIES, 1921-31 to 1951-61

Having reviewed some estimates concerning the levels of net migration to Canadian urban areas and considered their relative contribution to urban population increase, we may now look at the sex-age composition of this net migration. Certain features of the sex-age composition of the urban population are covered in Chapter Three and the present Section concentrates on some highlights of the sex-age composition of net migration to selected urban areas, commenting upon the relative importance of net migration to changes in urban age distribution.

The analytical difficulties raised by changes in the census definition of "urban," by the rural-urban reclassification of localities between censuses, and by city boundary changes are particularly severe when an attempt is made to estimate the sex-age composition of net migration to urban areas. Information concerning the sex-age composition of the population in areas added to urban territory, over a given decade, is not available. Data for the sex-age composition of rural census subdivisions have been published for 1951 and 1961 but are not detailed enough to permit the computation of net migration estimates by sex and five-year age groups for a constant geographical area closely approximating the whole urban area of Canada. In the light of these difficulties, net migration estimates have been prepared for a group of the largest incorporated centres (Table 5.8) in which the effects of boundary changes have been controlled statistically to the extent that they are negligible. For the population in these cities net migration estimates by sex and age have been computed from 1921-31 to 1951-61. (A useful set of net migration estimates by sex and age is obtainable from the data on counties and census divisions and these are presented in the Chapters on metropolitan development.)

The group of larger cities is representative of the traditionally core areas of Canadian urban development, and the data given in this Section should provide a fair picture of the sex-age composition of the net migration of these areas. The following description concentrates on a discussion of broad features of the sex composition of net migration, of the variation in net migration ratios by five-year age groups, and of the changes over time in the net migration ratios for specific age groups.

5.6.1 SEX DIFFERENTIALS IN LEVELS OF NET MIGRATION – There has been distinct variation over time regarding the male-female differential in the net migration ratios for the selected group of large cities. Generally, the net migration ratios for males were higher than those for females in 1921-31 and 1951-61, while the reverse was true in 1931-41 and 1941-51. This pattern of temporal variation may reflect the impact of the generally 'male-selective' immigration' upon these cities in 1921-31 and 1951-61.

Over the four decades from 1921-31 to 1951-61, 'female dominance' in age-specific net migration ratios for the selected group of large cities tends to be concentrated in the same age groups, while 'male-dominance' tends to be concentrated in other age groups. As Table 5.8 shows, females have tended to show higher net migration ratios than males between ages 10 and 24 and above age 60*, while males tended to have higher net migration ratios than females between ages 25 and 59. Within these age groups, 'female-dominance' tends to be highest in ages 15-19 and 20-24, while 'male-dominance' tends to be highest in ages 30-34 and 35-39.

In 1921-31 the net migration ratio for the males aged 10 and over* was 16 per cent and that for the females aged 14 per cent. In six of the 14 age groups, and particularly in those showing the highest age-specific net migration ratios, the net migration ratio for males was higher than that for females (Table 5.8). This pattern may have reflected the impact of immigrants (among whom males were in clear predominance, as DBS, 1931c, Table 39 shows) upon the net migration ratios for the sample of cities. In 1931-41, the net migration ratios for females tended to be higher than those for males, although most of the ratios for this decade are too low to be considered significant. For example, the net migration ratio for persons aged 10 and over was five per cent for females and two per cent for males, figures that may easily be dominated by defects in the estimates (Stone, 1966, Table 5). In 1941-51, females continued to have the higher net migration ratios for the sample of cities, dominating in ten of the 14 age groups. In 1951-61, the males again showed the higher ratios; the ratio for persons aged 10 and over was nine per cent for males and six per cent for females, and the ratios for males exceeded those for females in seven of the 14 age groups.

In general, the data for the sample of large cities over the four decades show few consistent sex differentials in the net migration ratios by age. The females consistently show the higher net migration ratios in the age groups between ages 10 and 24 and in ages 60 and over. Although the tendency is not uniform over the four decades, the male ratios are generally higher in the age groups between ages 25 and 59.

Table 5.8 – Net Migration Ratios[a] for a Group of Larger Canadian Cities,
by Sex and Age Group, 1921-31 to 1951-61

NOTE. — The cities included in the group are given in the headnote to Table 5.7.

Age group (at end of decade)	1921-31	1931-41	1941-51	1951-61
	Males			
10-14	15.7	7.0	− 0.6	2.1
15-19	13.4	6.9	3.7	10.2
20-24	27.3	10.2	17.4	48.2
25-29	40.6	9.7	16.4	50.0
30-34	33.0	3.1	3.1	17.4
35-39	20.8	− 0.8	− 0.5	3.5
40-44	14.6	− 2.3	1.3	2.6
45-49	6.5	− 3.9	− 1.7	1.1
50-54	6.8	− 3.6	1.7	1.7
55-59	− 2.5	− 6.6	− 4.4	− 0.5
60-64	− 4.5	− 5.4	− 3.9	− 4.0
65-69	3.6	0.7	2.0	− 1.8
70-74	− 0.6	− 0.1	1.9	−
75 and over	6.4	4.8	5.0	3.4
10 and over	15.7	2.0	3.4	9.4
	Females			
10-14	17.1	8.1	0.6	2.1
15-19	25.9	15.0	16.4	21.3
20-24	50.5	30.1	37.7	66.5
25-29	29.4	11.8	23.3	29.3
30-34	6.8	− 5.7	− 2.8	− 2.9
35-39	4.8	− 2.8	− 4.1	− 3.6
40-44	5.8	−	− 1.5	− 2.3
45-49	1.5	− 3.4	− 2.2	− 2.4
50-54	4.5	− 0.6	1.2	− 0.8
55-59	− 2.3	− 3.7	− 3.3	− 2.3
60-64	− 1.9	− 2.3	− 3.3	− 6.2
65-69	7.1	6.7	3.4	− 2.6
70-74	5.2	7.5	6.8	2.4
75 and over	9.6	9.2	6.4	4.5
10 and over	14.2	5.3	5.8	6.4

[a] Each ratio is the estimated net intercensal migration divided by the population at the beginning of the decade. The net migration estimates have been computed by means of the life table survival ratio technique (Appendix G).

SOURCES: DBS 84-510, 1947, DBS 84-512, 1960; DBS 84-517, 1964; Keyfitz 1931, Table 9; Keyfitz 1950, Table 2; 1931 Census, Vol. II, Table 25; 1941 Census, Vol. II, Table 24; 1951 Census, Vol. I, Table 24; 1961 Census, DBS 92-542, Table 24; unpublished 1921 census tabulations.

5.6.2 AGE PROFILE BY SEX – From 1921-31 to 1951-61 the age profile
of net migration ratios for the selected group of large Canadian cities shows

a characteristic shape, in which it rises gradually from age group 10-14 to age group 15-19[a] and then very steeply from 15-19 to a peak at either 20-24 or 25-29. Once the peak age group is reached, the trend is rapidly downward and by age group 35-39 the ratio has returned to levels at or below that attained in the age group 15-19. From age group 35-39 to the age group 60-64 the ratios fluctuate near the value of zero and show a slight rising trend from the age group 60-64 to the group 75 and over. Generally, only the ratios from age group 15-19 to the group 35-39 are clearly above levels that could easily be dominated by defects in the estimates (Stone, 1966, Table 5).

There are notable differences between the age profiles for males and those for females (Chart 5.3). Firstly, in the decades for which males were predominant in the volume of net migration (1921-31 and 1951-61), the peak age group for net migration ratios among males is 25-29, while in the other two decades (1931-41 and 1941-51) the peak group is 20-24. Among females, the peak age group is 20-24 in each decade. Secondly, the peak ratios for females are higher than those for males in each decade, and on either side of the peak the net migration ratios decline much more rapidly for the females than for the males. Thus, the relative net migrational gains among females are much more highly concentrated in a single five-year age group (20-24) than they are among males (where the ratios for ages 20-24 and 25-29 are typically quite similar).

The four decades vary markedly in their age profiles of the net migration ratio for the sample of large Canadian cities. The area between the age curve of net migration ratios in Chart 5.2 and the horizontal line marking the zero level of the net migration ratio is largest in 1921-31. In regard to the size of this area, 1951-61, 1941-51 and 1931-41 rank in that order from second to fourth. The peak age-specific ratio in 1951-61 is much higher than that in 1921-31; but the decline of the ratios to the right of this peak is much more gradual in 1921-31.

The profile for 1921-31 is unique among the four profiles in showing net migration ratios higher than 10 per cent for the age groups 35-39 and 40-44.[9] These unusually high ratios do not reflect the impact of immigration. The immigration for that decade was heavily 'male-dominant' and was concentrated mainly among persons aged 20-34 in 1931 (DBS, 1931c, Table 39). Chart 5.2 indicates higher ratios at ages 35-39 and 40-44 among the females than among the males. Thus, unless these ratios are simply the results of substantial defects in the basic data, they suggest a marked difference between the character of the net migration to the sample of cities in 1921-31 and that in 1951-61. They suggest that the ages in which persons are most likely to have two or more children were much more

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CHART 5.2

AGE PROFILES OF NET MIGRATION RATIOS BY SEX, FOR A SAMPLE OF
THE LARGEST CANADIAN CITIES BY MAJOR REGION,
1921−31 TO 1951−61
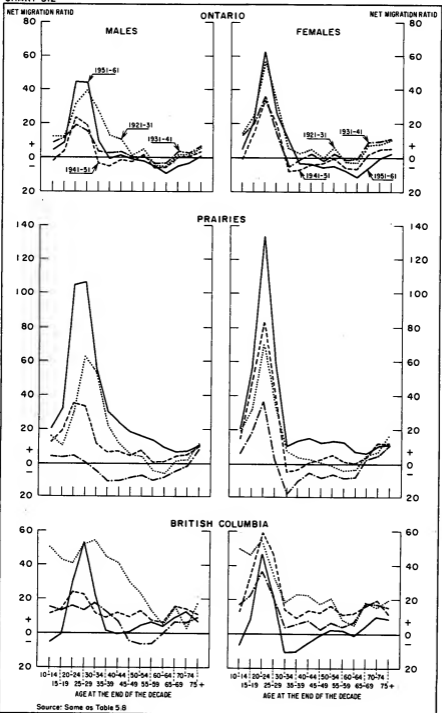
NET MIGRATION RATIO   NET MIGRATION RATIO

ALL CITIES

MALES   FEMALES

MARITIMES

QUEBEC

AGE AT THE END OF THE DECADE   AGE AT THE END OF THE DECADE

CHART 5.2

NET MIGRATION RATIO   ONTARIO   NET MIGRATION RATIO

MALES   FEMALES

PRAIRIES

BRITISH COLUMBIA

AGE AT THE END OF THE DECADE

Source: Same as Table 5.8

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heavily represented in the net migration to the cities in 1921-31 than in 1951-61, an interpretation which seems plausible in the light of the well known 'suburban explosion' of the 1950s.

The areas between the age curves of net migration ratios in Chart 5.3 and the zero level for these ratios are markedly less in 1941-51 and in 1931-41 than in the 1921-31 and 1951-61 decades. The curves for the females in 1941-51 and 1931-41 continue to show quite prominent 'humps' between ages 15-19 and 30-34, and the peak ratios for these decades (30 per cent in 1931-41 and 38 per cent in 1941-51 are quite high (Stone, 1966, Table 5). The 'hump' in the curves for 1941-51 and 1931-41 is markedly smaller among the males than among the females and none of the peak ratios for males exceeds 20 per cent. In 1931-41, in particular, it would seem that the age profile of net migration ratios deviates far from the characteristic shape (suggested in the opening paragraph of this Section) for profiles showing marked net in-migration.

The large and systematic inter-decade variation in the age profile of net migration to the sample of large Canadian cities shows clearly how population movements may reflect the general economic conditions of the decades. The 'hump' in the age profile of the net migration ratios is widest and most prominent in the relatively prosperous decades of 1921-31 and 1951-61 and it is almost dissipated in the depressed 1931-41 decade.

5.6.3. AGE DIFFERENTIALS IN TEMPORAL FLUCTUATIONS OF THE NET MIGRATION RATIOS — Chart 5.3 shows marked differentials among the age groups in regard to the historical pattern of the net migration ratio from 1921-31 to 1951-61. For the selected group of large Canadian cities the age groups 20-24 and 25-29 show the most marked fluctuations over time. In both of these age groups, the net migration ratio drops sharply from 1921-31 to 1931-41, rises moderately from 1931-41 to 1941-51, and rises sharply from 1941-51 to 1951-61. By 1951-61 they attain or exceed their 1921-31 levels. The immediately adjacent age groups, 15-19 and 30-34, show the same pattern of fluctuations but in a less prominent degree. The pattern is still less marked among the age groups 35-39 and 40-44. Among females there is a definite downward trend in the net migration ratios for the ages 35-39 and 40-44, perhaps reflecting a declining proportion of women with two or more children in the net migration to the incorporated parts of the largest Canadian cities. These data suggest that the net migration ratios for persons in the peak ages of labour force entry and family formation over a given decade (ages 10-19 at the beginning of the decade) may be sensitive barometers of economic conditions in the large Canadian cities. In this connection it may be noted that the age groups 20-24 and 25-29 show the most marked fluctuations in net migration ratios for the selected cities within each of the major regions.

CHART 5.3

DECENNIAL CHANGES IN THE NET MIGRATION RATIOS FOR
SELECTED FIVE–YEAR AGE GROUPS BY SEX,
FOR A SAMPLE OF THE LARGEST CANADIAN CITIES,
1921–31 TO 1951–61
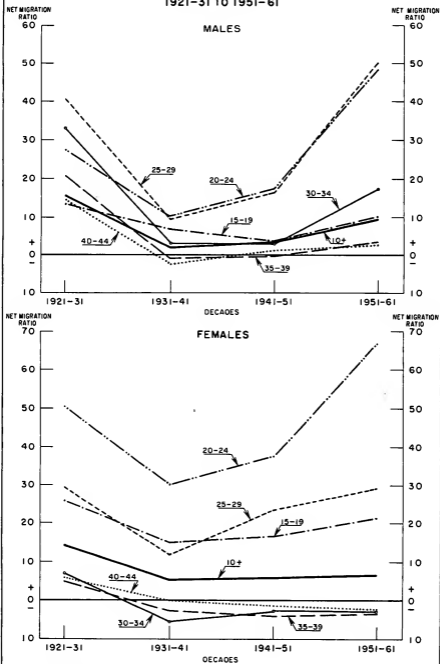
5.6.4 REGIONAL DIFFERENTIALS — There are some marked differentials among the age profiles of net migration for the regional groupings of the selected cities. These differentials are so large that they are not likely to be accounted for by defects in the net migration estimates (Chart 5.2).

In the group of Maritime cities (Halifax and Saint John) the 'humps' in the age profiles of net migration ratios tend to be much less prominent than in the entire group of cities. They show an atypically high proportion of net migration ratios of minus 10 per cent or less (Chart 5.2). The lowest net migration ratios are shown for 1921-31 and the age profiles for males in this decade lie entirely within negative values of the net migration ratio. Although the 'hump' in the profile for males in the entire sample of cities almost disappears for 1931-41, it remains quite distinct in the Maritime group of cities.

The groups of cities in Quebec and Ontario show age profiles of net migration ratios roughly similar to those for the entire set of sample cities. The main difference between the Quebec group and the Ontario group is that the 'hump' in the profiles tends to be markedly larger for the latter. Among the males, there is no marked 'hump' in the Quebec age profiles for 1931-41 and 1941-51.

Generally, the Prairie age profiles of net migration ratios show exceedingly prominent 'humps'; the only exception is the 1931-41 period when the profile for males has no 'hump' and never exceeds the five per cent level on the net migration ratio. Chart 5.2 shows that through net migration alone the males aged 20-24 and 25-29 in 1961 and the females aged 20-24 in 1961 doubled in size over the 1951-61 decade.

The curves for the group of British Columbia cities (Vancouver and Victoria) in the ages above 35-39 show the highest levels (among the regions) of net migration ratios. In the other regional groups, with the sole exception of the Prairie group, the profiles tend to be concentrated in negative values between ages 35 and 64. In contrast, the British Columbia profiles are concentrated among positive values within this age range, and the British Columbia profiles are the only ones that tend to show net migration ratios higher than 10 per cent in the age groups 65-69, 70-74 and 75 and over. These two cities (Victoria in particular) are popularly known as well-favoured locations for older migrants.

A systematic explanation of the regional differentials is not attempted in this monograph. It may be noted that the general pattern of the differentials regarding the prominence of the 'hump' in the age profile of net migration ratios is similar to those observed (Section 5.4) regarding rates of urban population increase and of net migration to urban areas. It seems quite likely that these similarities are interrelated with a basic set of

factors involving regional differentials in recent economic growth, structural change and levels of living (Economic Council, 1965, c.5; Wilson, Gordon, and Judek, 1965, c.3).

5.6.5 **IMPACT OF NET MIGRATION ON AGE DISTRIBUTION** – The contribution of net migration to the demographic aspects of urban development has been examined mainly in regard to the growth of the total population. The contribution of migration to trends in the sex-age composition of population is also deserving of attention. In order to see the justification of this statement one needs only to pause and reflect upon the array of social and economic variables and problems affecting the sex-age structure of population. Using the age data for six Canadian cities (Montreal, Quebec, Hamilton, London, Ottawa and Toronto)[9] and ten-year survival ratios estimated from life tables for Canadian regions, this Subsection attempts to measure the impact of net migration on age distributional change.

Chart 5.4 shows that the age profiles of net migration ratios for the above cities from 1901-11 to 1951-61 are generally typical of those shown by a population sustaining net in-migration. These profiles show the usual 'hump' in age groups covering the peak ages of labour force entry and the early years of working life. For both males and females the 'hump' reflects the heavy volume of net in-migration for the 1901-11 decade, and the relatively low level of net in-migration in the generally depressed 1931-41 decade. Thus the net intercensal migration to the chosen cities has been heavily selective of persons in the peak ages of labour force entry and in the early years of working life. The main purpose of this Subsection is to measure the impact of this selectivity upon the age distribution of the population in these cities. Details of the measurement technique are given in Appendix G, Section G.2.

Suppose there had been neither in-migration nor out-migration for the selected city population from 1901 to 1961. What would the age distribution have been at each census from 1911 to 1961, and how much would this distribution have differed from the one actually observed? If we may assume that the true age variation in ten-year survival ratios is adequately reflected by the ratios used in this paper and that the observed child-woman ratios are independent of migration, then a tentative answer may be given to the preceding question. This answer is obtained from hypothetical age distributions based upon the foregoing assumptions (the technique for computing these age distributions is described in the Appendix G, Section G.2). Table 5.10 presents information comparing the observed and the hypothetical age distributions.

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Table 5.9 – Net Migration Ratios[a] for Six Incorporated Canadian Cities, by Sex and Age Group, 1901-11 to 1951-61

NOTE. — The six cities are Montreal, Quebec, Hamilton, London, Ottawa and Toronto.

Age at the end of the decade	1901-11	1911-21	1921-31	1931-41	1941-51	1951-61
	Males					
10-14	27.8	10.5	13.0	5.7	− 4.3	− 2.7
15-19	35.9	16.0	11.0	5.8	− 0.6	3.7
20-24	77.0	26.6	26.0	8.4	11.6	34.2
25-29	80.5	25.7	36.3	7.7	11.8	37.1
30-34	46.8	2.6	30.0	0.4	0.2	10.1
35-39	40.4	1.4	19.1	− 1.9	− 2.7	− 2.5
40-44	32.0	1.2	11.9	− 2.8	− 0.8	− 3.0
45-49	25.7	2.8	2.6	− 3.8	− 4.2	− 4.0
50-54	23.4	5.1	5.1	− 2.9	− 1.5	− 3.5
55-59	15.5	− 5.3	− 4.7	− 6.1	− 7.5	− 6.1
60-64	20.3	0.2	− 5.0	− 6.3	− 7.3	− 9.3
65-69	20.2	1.5	2.4	0.8	− 2.0	− 7.0
70-74	16.3	− 4.9	− 0.6	− 1.2	− 2.5	− 6.5
75 and over	4.2	2.0	5.0	3.3	1.7	− 1.4
10 and over	39.5	8.1	13.7	1.1	− 0.0	3.0
	Females					
10-14	31.1	13.0	14.4	6.6	− 3.5	− 2.8
15-19	45.6	30.0	22.1	11.4	7.9	11.7
20-24	83.1	56.9	46.4	24.5	26.0	52.6
25-29	57.8	37.4	29.6	10.7	17.4	24.1
30-34	13.8	4.1	7.9	− 5.0	− 3.5	− 4.7
35-39	12.4	3.1	4.2	− 3.0	− 6.0	− 7.3
40-44	18.0	5.0	5.1	− 0.8	− 3.7	− 7.4
45-49	15.9	5.2	0.2	− 3.9	− 5.2	− 7.6
50-54	19.5	8.6	4.3	− 1.1	− 2.0	− 5.8
55-59	11.9	0.9	− 2.9	− 4.2	− 6.7	− 7.5
60-64	17.2	4.4	− 1.6	− 3.0	− 7.3	−11.1
65-69	21.5	6.6	6.6	5.7	0.1	− 7.7
70/74	21.0	0.0	5.1	6.2	2.4	− 2.6
75 and over	8.8	6.2	8.4	8.0	3.9	0.9
10 and over	30.5·	15.4	12.9	3.9	1.8	1.0

[a] Each ratio is the estimated net intercensal migration divided by the population at the beginning of the decade. The net migration estimates have been computed by means of the life table survival ratio technique (Appendix G).

SOURCES: 1901 Census, Vol. IV, Table 1; 1911 Census, Bul. XVIII, Table III; 1921 Census, Vol. II, Tables 10 and 17; 1931 Census, Vol. II, Table 25, and Vol. III, Table 6; 1941 Census, Vol. II, Table 24 and Vol. III, Table 3, 5 and 6; 1951 Census, Vol. I, Tables 21 and 24; 1961 Census, DBS 92-542, Tables 21, 23 and 24; Keyfitz, 1931, Table 9; Keyfitz, 1950, Table 2; unpublished 1911, 1921 and 1931 census tabulations.

CHART 5.4

ESTIMATED NET MIGRATION RATIOS BY SEX BY FIVE-YEAR AGE GROUP
FOR THE POPULATION IN SIX OF CANADA'S LARGEST INCORPORATED CITIES,
1901-11 TO 1951-61

Source: Table 5.9

AGE AT THE END OF THE DECADE

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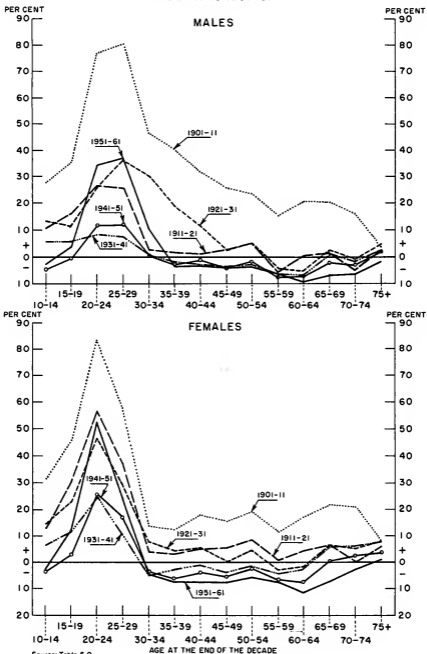
Table 5.10 — Selected Statistics of the Sex-Age Composition for Observed and Hypothetical Populations in Six Incorporated Canadian Cities, 1901-1961

NOTE.— These data are computed from age distributions generated in the manner indicated by Appendix G, Section G.2. The distributions are intended to reflect the results that would have been observed had the population been closed to immigration over the 1901-1961 period. The six cities are Montreal, Quebec, Hamilton, London, Ottawa and Toronto.

Item[a]		1901	1911	1921	1931	1941	1951	1961
Masculinity ratio, all ages ..	OP[b]	90.1	97.6	93.0	95.2	93.5	92.9	95.0
	EP[b]	90.1	91.8	93.7	95.0	95.8	96.6	96.9
Masculinity ratio, ages								
20–34	OP	81.8	99.6	85.2	90.2	87.6	90.3	97.5
	EP	81.8	87.7	99.4	99.2	100.1	100.6	100.5
Median age, males	OP	23.8	25.2	26.1	27.2	29.6	30.6	29.7
	EP	23.8	25.0	26.8	28.8	31.8	24.0	34.5
Median age, females........	OP	24.6	25.0	26.1	27.2	30.1	31.8	31.3
	EP	24.6	27.2	28.9	30.7	33.4	35.7	36.5
Youth dependency ratio	OP	46.8	43.3	45.6	39.7	32.2	33.5	41.6
	EP	46.8	45.6	44.5	36.2	29.6	31.8	38.4
Old-age dependency								
ratio	OP	6.2	5.4	6.1	7.2	9.0	11.7	13.0
	EP	6.2	5.8	7.6	10.2	13.2	17.0	18.7
Index of dissimilar-								
ity[c] ....Males		–	5.1	4.7	5.8	4.7	5.5	8.4
	Females	–	6.1	7.8	8.8	7.2	6.4	8.3

[a] The age distributional statistics are defined in Table 3.1.

[b] 'OP' refers to the observed population. "EP" refers to the hypothetical population mentioned in the headnote and the data in the "EP" rows are obtained from the age distributions also mentioned in the headnote.

[c] The index is a summary measure of the differences between the age distributions (in five-year age-groups up to age 65) of the observed (OP) and the hypothetical (EP) populations. The distributions are expressed on a percentage basis and the difference between the OP and EP percentages is computed for each age-group. The index is the sum of the positive differences (which is equal in value to the sum of the negative differences) and it ranges from zero to 100.0.

SOURCES: 1901 Census, Vol. IV, Table 1; 1911 Census, Bul. XVIII, Table III; 1921 Census, Vol. II, Tables 10 and 17; 1931 Census, Vol. II, Table 25, and Vol. III, Table 6; 1941 Census, Vol. II, Table 24, and Vol. III, Tables 3, 5 and 6; 1951 Census, Vol. I, Tables 21 and 24; 1961 Census, DBS 92-542, Tables 21, 23 and 24; Keyfitz, 1931, Table 9; Keyfitz, 1950, Table 2; unpublished 1911, 1921 and 1931 census tabulations.

The first four rows of Table 5.10 show how migration has contributed significantly to the masculinity ratio of the city population. The observed masculinity ratio for the whole population and for the important 20-34 age group shows no definite trend from 1901 to 1961, tending to rise in decades of heavy immigration to Canada and to fall in others. The masculinity ratio for the city population which has been 'closed' hypothetically since 1901 shows a definite upward trend. In 1901 the masculinity ratio for the whole population was 90 per cent. 'Closing' the population to migration causes the ratio drift upward to a value of 97 per cent in 1961, apparently

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approaching the typical range for the masculinity ratio in a closed popula-
tion where age specific mortality differentials are not very sharp.

As Table 5.10 shows, the selected city population would have aged
at a considerably faster rate than it actually did had it been closed to
migration since 1901. Following the method used to generate the data, the
1901 age distribution is the same for the observed and the hypothetical
populations. Largely due to the heavy 'male-selective' immigration wave of
the 1901-11 decade, the 1911 median age for males was slightly lower in the
hypothetical than in the observed population. At no other census is such a
differential shown, however. By 1931 the male hypothetical population had
a median age more than one year above that of the observed male
population and by 1961 this differential had increased to at least four
years. Among females, the 1961 differential was even greater − at least
five years of age. The highest median age in the observed population is
the 31 years in 1951. The hypothetically 'closed' population had passed
this level of the median age between 1931 and 1941. Thus, were it not for
migration, the highest median age actually observed would have been reach-
ed at least ten years earlier, and the 1961 city population would have been
at least four years of age 'older' (in median age) than that actually ob-
served.

Striking differences are also shown by the 'old-age dependency'
ratio. By 1931 the hypothetically 'closed' population had a ratio which
was three percentage points higher than that of the actual population. This
differential was almost doubled by 1961. In 1961 there were 13 persons
aged 65 and over per 100 persons aged 15-64, while the 'closed' population
had 19 persons aged 65 and over per 100 persons aged 15-64.

The last two rows of Table 5.10 summarize the differentials between
the actual and the hypothetically 'closed' populations. These rows of
Table 5.10 provide scores on the index of dissimilarity between the age
distribution for the actual and the hypothetically 'closed' populations.
The value of this index may be interpreted as the percentage of the actual
population which would need to be redistributed in order that its age distri-
bution may be the same as that of the 'closed' population. Generally the
index shows no definite trend. Among males, the index attains its maximum
of 8.4 per cent in 1961; among females the index reaches its maximum of
8.8 per cent in 1931, just slightly above the 8.3 per cent value for 1961.

In summary, migration has exerted a retarding effect upon the 'ageing'
of the selected city population. This effect is the result of two processes.
One is the direct contribution made by migration to the size of the young
adult population. The other is the indirect contribution of migration in
exerting an upward push on the urban crude birth rate, which it does by
increasing the population in the fertile ages.

5.7 URBANIZATION AS A FACTOR IN LEVELS OF
NET MIGRATION, 1921-31 to 1951-61

In view of the unavailability of precise estimates of the levels of net migration to urban areas and of the difficulties facing any attempt to obtain such estimates, it is desirable to make some use of the data for counties and census divisions, in which problems of boundary change are usually controlled with relative ease. These data may be used in studying the degree and pattern of association between levels of urbanization and of net migration ratios. Since urban centres (particularly large ones) are dense concentrations of economic activities and opportunities, there should be a positive association between the level of urbanization in a region and the region's net migration ratio. This Section will explore this hypothesis, using county and census division data for Canada. The results of this exploration cannot be considered definitive, partly because the counties and census divisions are arbitrary areal units which may fail (in varying degrees from case to case) to delineate the most appropriate boundaries of the relevant socio-economic regions below the provincial level. The general question to be dealt with in this Section is whether the most highly urbanized counties and census divisions have consistently shown the highest net migration ratios from 1921-31 to 1951-61. For the first examination of the data, the initial year of each decade is used as the base year for determining the levels of urbanization. The grouping of the counties and census divisions by levels of urbanization in that year is then held constant throughout the decade in question.

Chart 5.5 shows that the level of urbanization in 1951 is positively associated with the net migration ratio for 1951-61, among the Canadian counties and census divisions although the degree of association is only moderate. The chart does show clearly that the counties and census divisions which were less than 50 per cent urbanized in 1951 are heavily concentrated among the group showing 1951-61 net migration losses.

Twelve counties or census divisions show unusually high levels of the 1951-61 net migration ratio, in the light of their low levels of urbanization in 1951. Shortage of time does not permit any detailed discussion and investigation of these cases but some possibly relevant factors may be noted in passing. Six of the deviant counties are in Quebec and these are mostly within the commuting distances to Montreal Island. Four of the deviant areas are British Columbia census divisions, four census divisions that have shown rather high levels of income per capita, despite their low levels of urbanization. In 1961 they formed major parts of the top 35 per cent of the 68 Canadian regions established by Camu, Weeks, and Sametz (1964, p. 363) in regard to the level of disposable income per capita. The deviant county (Halton) in Ontario is partly in the Toronto MA, and that in

CHART 5.5

SCATTER DIAGRAMS SHOWING THE PATTERN OF ASSOCIATION BETWEEN LEVELS OF URBANIZATION[o] AND NET INTERCENSAL MIGRATION RATIOS,[b] COUNTIES OR CENSUS DIVISIONS, CANADA, 1921-31 TO 1951-61

PER CENT URBAN AT THE BEGINNING OF THE DECADE
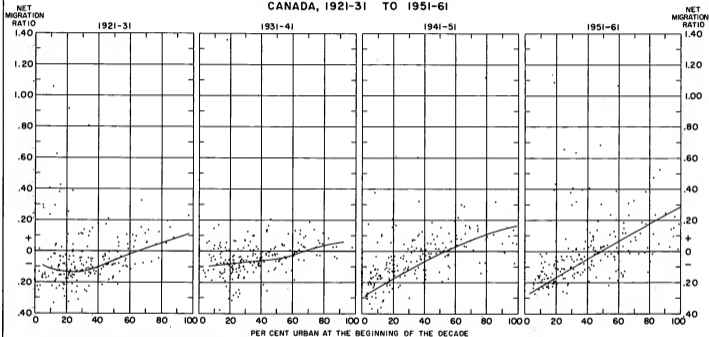
[o] For each decade the definition of "Urban" is that used by the census at the beginning of the decade.

[b] Estimated net migration divided by the population at the beginning of the decade in question.

Source: DBS,1921-61 (1921, Tables 2and 12; 1922-28, Table 1; 1929, Table 17; 1931, Table 19; 1944, Tables 29-31; 1946, Tables 30 and 31; 1948, Tables 30 and 31; 1941 Table 27); 1931 Census, Vol. I, Tables 1 and 5; DBS, 1934, Tables II and III; DBS, 1935, Tables 1 and 2; DBS, 1939 Part I Table I and Part II Table IX; 1941 Census Vol. 1, Table 6; 1951 Census, Vol. 1, Table 14; 1951 Census, Vol. X, Table 3; DBS 92-539, 1961 Census; DBS 99-511, 1961 Census Table 2. Quebec 1922-1927 (1923, p.44; 1924, p.85, 1925, p.110; 1926, pp.83-84; 1927, p.68).

the Maritimes (Sunbury county in New Brunswick) contained a military establishment which markedly affected its 1951-61 growth rate. The deviant cases in Quebec and Ontario, at least, reflect the influence of nearby large urban agglomerations.

In each diagram for the decades 1921-31, 1931-41 and 1941-51 there is a general tendency toward an upward drift (in the direction of higher levels of the net migration ratio) in the cluster of points as the level of urbanization at the beginning of the decade rises. The strength of this tendency does vary over time, however. Generally, the tendency seems strongest for the 1921-31 decade, ignoring the two markedly deviant points where quite low levels of urbanization (in 1921) are associated with high net migration ratios.

The points are more tightly clustered about the plotted trend line in 1921-31 than in the other decades. The deviant points are mostly Prairie census divisions which probably were undergoing rapid agricultural expansion (Mackintosh, 1939, pp. 87-90) up to 1929. Following the 1921-31 and 1951-61 patterns, that of 1941-51 shows the clearest indication of a positive association between the level of urbanization in 1941 and the net migration ratio for 1941-51. However, the spread of the cluster of points about the plotted 'trend line' is markedly greater than in 1921-31. In 1931-41 the above-mentioned association is markedly weak. There are tendencies for the counties and census divisions with the lower levels of urbanization to be concentrated among those having net migration losses, and for the counties and census divisions in the upper half of the urbanization scale to be clustered in the positive half of the net migration ratio scale. Apart from these tendencies the vast majority of the points are clustered among net migration ratio values ranging from −20 per cent to 11 per cent showing no definite upward trend as the level of urbanization (in 1931) increases.

In constructing Chart 5.5 it was necessary to use the definition of "urban" which obtained at each of the respective censuses. This practice means that the computed levels of urbanization for a given county or census division may not be comparable over time, and that variations in the census definitions may have distorted some of the inter-decade comparisons made above. A further analysis of the data was, therefore, undertaken. Each county or census division was classified into one of three groups according to the size of its largest incorporated city in 1921. The first group contained counties or census divisions having cities of 30,000 and over in 1921, the second was comprised by the counties or census divisions which had cities of 10,000-29,999 in 1921, and the third group consisted of the counties or census divisions in which there were no cities of 10,000 or over in 1921. These may be termed the "Group I", "Group II" and "Group III"

areas, respectively. Within each group the counties or census divisions were allocated into six intervals along the scale of net migration ratios (Chart 5.6).

Chart 5.6 shows that in each decade from 1921-31 to 1951-61 the weight of the distribution of counties or census divisions tends to shift toward the lower end of the net migration ratio scale as one moves from the Group I areas to the Group III areas. Generally, in each decade the Group I units cluster mostly in the three highest net migration ratio intervals, the Group II units cluster in the middle three intervals and the Group III units are concentrated mostly in the lowest three net migration ratio intervals. These observations suggest that the counties or census divisions with the largest urban agglomerations have tended to exert an unusually strong 'pull' upon migrational flows. The counties or census divisions with cities of 30,000 or over in 1921 have continued to have the largest urban agglomerations in Canada. Thus the consistency of the results in Chart 5.6 from 1921-31 to 1951-61 indicates that the above-mentioned tendency has been persistent in Canada since 1921-31.

CHART 5.6

CUMULATED DISTRIBUTIONS OF COUNTIES OR CENSUS DIVISIONS AMONG LEVELS OF THE NET INTERCENSAL MIGRATION RATIO,[a] CANADA, 1921–31 TO 1951–61
(COUNTIES OR CENSUS DIVISIONS GROUPED ACCORDING TO THE SIZES OF THEIR LARGEST CITIES IN 1921)

PERCENTAGE OF COUNTIES OR CENSUS DIVISIONS

[a] Estimated net migration divided by the population at the beginning of the intercensal period.
[b] These are ranges of the net migration ratio.
Source: Same as chart 5.5

The findings from Chart 5.6 have been based upon a classification of counties according to the sizes of their cities in 1921, and upon fixed intervals of net migration ratios. Further analysis was undertaken in order to

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look at the data from another perspective. In Chart 5.7 the three groups of counties or census divisions are the same as in Chart 5.6, but for each decade the counties are classified according to the sizes of their largest cities at the beginning of the decade. For Chart 5.7 the distribution of county net migration ratios in each decade was split at the 33rd and 67th percentiles, thus yielding three intervals of net migration ratios.

The Chart shows that in each decade the Group I counties and census divisions were heavily concentrated in the highest third of the distribution of the net migration ratios; only in 1931-41 did this concentration fall below 75 per cent. Neither Group II nor Group III were even close to Group I in regard to the degree of concentration of counties or census divisions above the 67th percentile for net migration ratios. Generally, the middle and top thirds of the distribution of net migration ratios tended to have quite similar shares (each being over 30 per cent) of the number of Group II counties or census divisions. The two net migration ratio intervals up to the 67th percentile tended to share roughly similar shares (each over 30 per cent) of the number of Group III counties or census divisions.

CHART 5.7

CUMULATED DISTRIBUTIONS OF COUNTIES OR CENSUS DIVISIONS
AMONG LEVELS OF THE NET INTERCENSAL MIGRATION RATIO,[a]
CANADA, 1921-31 TO 1951-61
(COUNTIES OR CENSUS DIVISIONS GROUPED ACCORDING TO THE
SIZES OF THEIR LARGEST CITIES AT THE BEGINNING OF EACH DECADE)

a See footnote a to chart 5.6
b These are percentiles of the distribution of all counties or census divisions in the range of net migration ratios. One-third of these areas have net migration ratios below the 33rd percentile value, for example.

Source: Some as chart 5.5

The data presented in this Section suggest that the level of urbanization in a Canadian region is positively associated with the level of net

migration to the region. The marked deviations from this tendency seem to fall into three types of cases. In the first type, economic opportunities in a county or census division may increase rapidly in economic activities that are not necessarily facilitated by high concentrations of population, as in the case of the deviant Prairie census divisions in 1921-31. The second type refers to periods in which there is marked slackening in the economic forces that tend to concentrate economic opportunities in urban agglomerations, as was true in the depressed 1931-41 decade. The third type of deviant case refers to areas near to large urban agglomerations, which may suddenly have a 'take-off' in the growth rate of population due to settlement by persons who commute to the urban agglomeration. This third deviant type may be considered as being mainly a statistical anomaly, arising from the failure of the county boundaries to include these urban-fringe areas in the same county with the influential urban agglomeration.

The marked dissipation of the association between levels of urbanization and net migration ratios in 1931-41 suggests that in an industrializing economy there are certain 'urbanizing forces' generated in part by the spatial concentration of technological and economic structural changes. The temporal fluctuations in these forces are accompanied by variations in the retentive power of the major poles of attraction in migrational fields. To the extent that these poles of attraction are urban agglomerations, temporal variations in economic structural changes may produce temporal variations in the rate of urbanization. Thus, migration plays a key role in the mechanisms linking economic structural changes with urbanization. This conclusion is familiar but it is by no means trivial in its implications concerning regional disparities in levels of living.

As an area in an economy of interdependent regions becomes more highly urbanized, the advances in urbanization contribute to the attractiveness of the area for a wide range of decision makers concerning the location of economic establishments. This is particularly true of those locators in the highly market-oriented industries. Thus through its influence upon the location of productive resources and establishments the urbanization in a region may be seen as a self-reinforcing phenomenon.

Of course, both urbanization and industrialization have upper limits. As these limits are approached in a given area, the rate of urbanization must eventually slow down markedly. One factor that may hasten this slow-down is the congestion of traffic, people and facilities. As this congestion increases, areas away from (but still within convenient reach of) the congested territory become more and more attractive to residential and industrial locators. The occupancy of these outlying areas depends markedly on the efficiency and availability of transportation and communication facilities. Given that these facilities are adequate, many types of residential and industrial

locators will tend to converge more and more in locations just outside of the congested area. The rate of population growth in the congested area will slow down markedly, but the economic influence of this area over its surrounding hinterland may increase. In analysing the demographic aspects of urban development in such regions, it becomes more and more appropriate to supplement those data which reflect only population changes in the congested core areas of the urban development. A first step in this direction is the review, and analysis of data for Census Metropolitan Areas.

FOOTNOTES TO CHAPTER FIVE

[1] By reaching the 1,000-population mark during an intercensal period, a locality may 'graduate' from the rural to the urban categories in the census statistics. A locality may also be reclassified from the urban to the rural categories if it declines below the 1,000-population mark during the intercensal period in question.

[2] Through its direct impact upon the number of persons (more precisely, the total number of person-years spent) in the child-bearing ages over a given decade, the net migration indirectly influences the number of births and may also indirectly affect the number of deaths over the decade in question. These indirect influences may be termed the "interaction of net migration with natural increase".

[3] In addition to the reclassification mentioned in footnote[1], the area of urban settlement is changed in the census statistics when (a) DBS alters the boundaries of the unincorporated urban area so as to take into account the lateral expansion of the urbanized fringes of the larger cities, and (b) the incorporated limits of cities, towns and villages of 1,000 and over are changed.

[4] See Appendix F for the basis of this definition.

[5] "Incorporated centres" refers to incorporated cities, towns or villages of 1,000 and over. "Other urban areas" include municipalities that are not incorporated as cities, towns or villages, and incorporated cities, towns and villages of less than 1,000.

[6] The net migration divided by the population at the beginning of the migration period is defined as the "net migration ratio" in this monograph. When the net migration includes persons of all ages, the net migration ratio is termed the "crude net migration ratio".

Various linear combinations of the end-of-period and the beginning-of-period populations have been used as the denominators for net migration ratios. It can be shown that the denominator most appropriate for net in-migration is not the same as the one most appropriate for net out-migration. When comparing the net migration ratios for several areas, however, it is desirable to use a uniform definition of the base for the ratios, and the main differentials among the areas (in regard to net migration) are not markedly affected by the particular uniform base chosen. The use of the beginning-of-period population as the uniform base for net migration ratios in this monograph is convenient because the sum of the net migration and natural increase ratios is equal to the percentage change in population, so that the net migration ratio may be used directly in measuring the relative importance of the net migration component in the population growth rate.

[7] In describing types of migration, this monograph uses the terminology that is now conventional among experts in migration research. In this terminology, "immigration" and "emigration" refer to international (called "external") migration. Immigrants are the external migrants moving into a given country and emigrants are the external migrants moving out of the country. Unless otherwise specified, net migration to a given city is the result of both internal and external (immigration and emigration) migration.

[8] All ages of migrants specified in this Section refer to age at the *end* of the pertinent migration period (always a decade in this study).

[9] For these cities the age data are adjusted so that in each decade they refer to the areas of the cities at the *end* of the decade. Through this adjustment the effect of annexations upon the age distributional changes and net migration estimates may be considered negligible.

SOME FEATURES AND COMPONENTS OF THE SHIFT OF POPULATION INTO THE PRINCIPAL REGIONS OF METROPOLITAN DEVELOPMENT, 1901-1961

6.1 INTRODUCTION

The expansion of the area of urban settlement in Canada has accele-rated markedly since the Second World War. Generally, population has mush-roomed in areas within commuting distances to the larger urban centres. This development represents a forward surge in the pace of a phenomenon charac-teristic of urbanization – the lateral growth of cities – and is also a mani-festation of acceleration in the development of metropolitan areas.

Metropolitan development is largely a twentieth-century phenomenon. As mentioned in Chapter Two (Section 2.1), rapid changes in the technology of production, transportation and communication, and continued economic growth have permitted a relaxation of the centripetal forces that constrained urban development in the nineteenth century. This relaxation has resulted in the well-known 'suburban explosion' and the tightening of economic link-ages among urban centres, particularly those in close proximity to each other. Although the interdependence between cities and their immediate hin-terlands (including towns, villages and agricultural land) is not a peculiarly twentieth-century phenomenon, the economic linkages manifesting this inter-dependence have been strengthened considerably in the twentieth century. These linkages form an essential aspect of metropolitan development.

Metropolitan relations are essentially a system of economic relations among urban centres. Although these relations (manifested mainly by the pattern of inter-urban flows of people, goods and communication) entail interdependence among the participating centres, the co-ordination and control of economic activity and of location decisions tend to be concentrated in the largest and most accessible of them (Duncan et al., 1960, cc. 3 and 4). Also concentrated in the largest centre are the major establishments in the network of facilities that mediate the distribution of commodities throughout

the metropolitan area. Thus, the largest centre — known as the "central city" — may be said to dominate the several centres. These related centres may be said to comprise a *metropolitan region* organized about the central city (Gras, 1922, pp. 184-186, and McKenzie, 1933, p. 70).

At the core of each metropolitan region lies the *metropolitan area* of the central city. This area (comprised of the central city and much of its immediate hinterland) does not extend beyond the maximum feasible distance for daily commutation to the central city, a distance that depends on the available transportation and communication facilities (cf. Blumenfeld, 1961). What is essential for the existence of a metropolitan area is a complex of closely related centres of population concentration within daily commuting distance to the central city.

The foregoing indicates the usage of the terms "metropolitan region" and "metropolitan area" which will be made in the following chapters and also suggests two important principles that have guided the assembly and processing of data for the discussion in this Chapter. Firstly, the distinction between rural area and urban area is not crucial in the delineation of metropolitan areas. Secondly, territorial specialization may develop among the parts of a metropolitan area through the economic linkages which are the basic manifestations of metropolitan organization. In the process of this specialization, particular parts of the metropolitan area may contain unusually high concentrations of certain types of people and of economic establishments. For many problems in the analysis of the determinants and consequences of metropolitan development, such specialized parts of the metropolitan area would provide quite misleading reflections of characteristics of the metropolitan area, and it is thus necessary to treat the metropolitan area as a whole.

For the purposes of this study, a new effort to delineate metropolitan areas is prohibitively expensive. It is assumed that the Census Metropolitan Areas delineated by DBS provide an adequate picture of the main features of the selected aspects of metropolitan development in Canada. For the most part, the 1961 Census Metropolitan Areas (Appendix D) are used, but approximations of these areas are necessary when the data pertain to decades preceding 1951-61.

This Chapter presents some features of the historical growth of population in the Census Metropolitan Areas. It is realized that historical account of the growth of metropolitan areas in Canada should concentrate primarily upon the development of economic linkages between large cities and their immediate hinterlands. Changes in the volume, composition and geographical extension of these linkages should be traced over several decades, since these changes are at the core of metropolitan area development. Having described the essential features of metropolitan area develop-

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ment, some of its major concomitants should be discussed, among them the increase of the metropolitan area population. However, the economic data required for such an account are not readily available and the vast majority of the relevant and available data are demographic. Because of these circumstances, this Chapter is focused upon certain aspects of population growth in metropolitan areas. Section 6.2 describes some major features of the 1951-61 growth of population in the 1961 Census Metropolitan Areas, and of the increasing shift of population into the Principal Regions of Metropolitan Development (areas closely approximating 1961 Census Metropolitan Areas) in Canada. Section 6.3 draws on the evidence provided by population growth rates for large cities and their surrounding census and municipal subdivisions in an introductory discussion of major historical phases in Canadian metropolitan development since 1871. Section 6.4 provides a view of the demographic components of the growth rate trends discussed in Section 6.2.

The data in this Chapter indicate that the 1961 Census Metropolitan Areas (MAs) increased their share of the Canadian population by five percentage points from 1951 to 1961, an increase much larger than those shown for the 1961 Census Major Urban Areas (MUAs) and for other categories of areas. With the exception of the 1931-41 decade, the areas closely approximating the 1961 MAs (which may be viewed as the Principal Regions of Metropolitan Development in Canada) have increased their share of the Canadian population by roughly four percentage points in each decade since 1901-11.

The estimates prepared for the components of population growth in the Principal Regions of Metropolitan Development indicate that the direct influence of net migration was more important than natural increase in 1921-31 and 1951-61; only in 1931-41 was it markedly less important. In 1951-61 the crude net migration ratio for the 1961 MAs was markedly higher than that for the 1961 MUAs. Since the 1921-31 period, the Principal Regions of Metropolitan Development consistently have had much higher crude net migration ratios than other areas (taken as a whole). The findings on areal net migration ratio differentials since 1921-31, for the five major regions as well as for Canada, suggest a relatively new focus for migration studies in Canada — the gravitation of population into metropolitan areas.

6.2 HISTORICAL TREND OF POPULATION CONCENTRATION IN THE PRINCIPAL REGIONS OF METROPOLITAN DEVELOPMENT, 1901-1961

The 17 Census Metropolitan Areas (MAs) contained 45 per cent of the roughly 18 million residents of Canada in 1961 (Table 6.1). Of these areas, seven were in Ontario, three in the Atlantic Provinces, two in

Quebec, three in the Prairies, and two in British Columbia. Among the five major regions, Ontario, British Columbia and Quebec had the highest concentrations of population in the MAs in 1961. In Ontario and British Columbia the percentages were 52 per cent and 58 per cent, respectively; the figure for British Columbia seems particularly high since it refers to the Vancouver and Victoria MAs only. Some 48 per cent of the population of Quebec Province were concentrated in the Montreal and Quebec MAs in 1961. Considerably smaller percentages of the total 1961 population were concentrated in MAs in the Atlantic region (20 per cent) and in the Prairies (34 per cent).

The national population markedly increased its concentration within the boundaries of the 1961 MAs from 1951 to 1961. The increase from 40 per cent to 45 per cent in the concentration of the national population in these MAs is the largest increase among the three categories of area identified in Table 6.1. The 1961 MUAs hardly increased their share of the national population and the percentage outside the 1961 MAs and MUAs declined by five percentage points. A similar pattern of increases is observed in four of the five major regions. Each region except British Columbia increased its concentration within the 1961 MAs by at least two percentage points over the 1951-61 decade. In British Columbia the concentration was the same in 1951 as in 1961.

Table 6.1 – Population in Census Metropolitan and Major Urban Areas, Canada and Major Regions, 1961

Canada[a] and major regions	Total	MAs[b]	MUAs[b]	Remainder[b]
	A	B	C	D
	Population ('000)[c]			
Canada	18,201	8,164	1,284	8,753
Atlantic.	1,897	370	162	1,365
Quebec[d]...................	5,130	2,467	426	2,237
Ontario[d]	6,365	3,290	696	2,379
Prairies..................	3,179	1,093	–	2,086
British Columbia...........	1,629	944	–	685
	Percentage of population by region			
Canada	100.0	100.0	100.0	100.0
Atlantic...................	10.4	4.5	12.6	15.6
Quebec[d]..................	28.2	30.2	33.2	25.6
Ontario[d].................	35.0	40.3	54.2	27.2
Prairies...................	17.5	13.4	...	23.8
British Columbia...........	8.9	11.6	...	7.8

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Table 6.1 – Population in Census Metropolitan and Major Urban Areas, Canada and Major Regions, 1961 — concl.

Canada[a] and major regions	Total	MAs[b]	MUAs[b]	Remainder[b]
	A	B	C	D
	Percentage of population by type of area			
Canada	100.0	44.9	7.0	48.1
Atlantic.....................	100.0	19.5	8.5	72.0
Quebec[c]	100.0	48.1	8.3	43.6
Ontario[d]	100.0	51.7	10.9	37.4
Prairies.....................	100.0	34.4	...	65.6
British Columbia	100.0	57.9	...	42.1
	Change in percentage by type of area, 1951-61			
Canada	...	4.6	0.0	−4.6
Atlantic.....................	...	2.2	−0.2	−2.0
Quebec[c]	...	4.0	0.0	−4.0
Ontario[d]	...	3.6	0.2	−3.7
Prairies.....................	...	7.9	...	−7.9
British Columbia	...	0.0	...	−0.0

[a] Exclusive of Yukon Territory and Northwest Territories.

[b] See Appendix D for definition of MAs and MUAs. "Remainder" means areas outside MAs and MUAs.

[c] Figures in columns B, C and D may not add to the total due to rounding error.

[d] Because Ottawa MA is partly in Ontario and partly in Quebec, Hull County in Quebec has been allocated to the Ontario total.

SOURCES: 1961 Census, DBS 92-535, Tables 10 and 11—DBS 92-536, Table 13—DBS 99-511, Table 1.

Chart 6.1 indicates the historical trend of population concentration in an area which closely approximates that of the 1961 MAs. This trend may not·be treated as being equivalent to the trend in the growth of metropolitan population in Canada, because fewer and fewer areas satisfy the criteria of metropolitan status as one goes backward in time. The data presented by Table 6.2 and Chart 6.1 indicate the historical trends in the shift of the Canadian population into the regions where metropolitan development has been concentrated. The substantive significance of these shifts stems partly from the enormous importance of metropolitan regions in the spatial structure of the Canadian economy. In order to obtain historical data for an area where boundary changes are negligible, it was necessary to depart slightly from the 1961 MA boundaries. The areas actually used for Table 6.2 and Chart 6.1 are called, for the sake of convenience, the Principal Regions of Metropolitan Development. The

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Table 6.2 – Population in the Principal Regions of Metropolitan Development (PRMDs), Canada and Major Regions, 1901-1961

NOTE. — The boundaries of some of the 1961 MAs cut through census or municipal subdivisions. As a result, data are not available for each MA for the whole period 1901-1961. In order to provide the information in this table, the above-mentioned boundaries have been extended slightly so as to conform to those of census or municipal subdivisions and to provide data for a constant geographical area. The areas covered by these data closely approximate those of the 1961 MAs and are called the "Principal Regions of Metropolitan Development" (Section 6.2). Appendix I provides a detailed list of the parts of these Regions.

Canada[a] and major regions	1901	1911	1921	1931	1941	1951	1961
	Population in the PRMDs ('000)[b]						
Canada	1,338	2,076	3,103	4,098	4,615	5,904	8,575
Maritimes	102	111	138	141	170	212	280
Quebec[c]	532	750	954	1,292	1,457	1,800	2,539
Ontario[c]	629	908	1,266	1,640	1,851	2,354	3,452
Prairies	76	307	459	616	657	853	1,352
British Columbia	–	–	287	408	480	684	953
	Percentage of the total population in PRMDs						
Canada	26.0	30.5	35.4	39.5	40.2	43.3	48.3
Maritimes	11.4	11.9	13.7	14.0	15.0	16.9	19.4
Quebec[c]	33.1	38.3	41.4	46.0	44.7	45.4	49.5
Ontario[c]	28.2	35.3	42.4	46.9	48.0	50.2	54.2
Prairies	18.0	23.1	23.5	26.2	27.1	33.5	42.5
British Columbia	–	–	54.8	58.8	58.7	58.7	58.5

    [a] Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

    [b] Regional figures may not add to Canada total due to rounding error.

    [c] Because Ottawa MA is partly in Ontario and partly in Quebec, Hull County in Quebec has been allocated to the Ontario total.

    SOURCES: 1961 Census, DBS 92-535, Tables 9, 10 and 11–DBS 92-539.

In 1901 about one fourth of the national population were concentrated in the Principal Regions of Metropolitan Development (PRMDs). By 1961 almost one half (48 per cent) of this population resided in PRMDs. With the exception of the 1931-41 period, when the percentage hardly changed, the decade increase in this concentration was quite stable near four percentage points (Chart 6.1). Thus, the five percentage-point advance from 1951 to 1961 in the concentration of Canada's population in the PRMDs is near to the typical decade increase of this concentration since 1901. Obviously this conclusion does not mean that metropolitan development has proceeded at an even pace over the decades since 1901, excepting 1931-41, because this development is also manifested by the rate at which areas gain metropolitan status. In order to establish the latter rate, valid criteria of metropolitan

status must be developed for research on historical data and the appropriate data must be processed. The development and application of such criteria are beyond the scope of this monograph.

CHART 6.1

PER CENT OF POPULATION IN THE PRINCIPAL REGIONS OF
METROPOLITAN DEVELOPMENT, CANADA AND MAJOR REGIONS,
1901-1961

Source: Table 6.2.
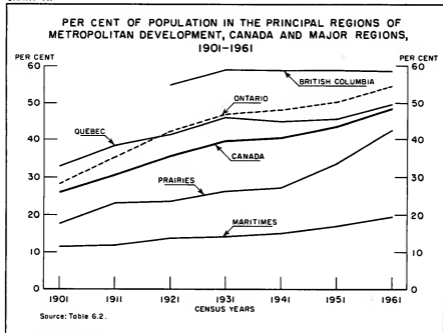
6.3 SOME DEMOGRAPHIC REFLECTIONS OF THE HISTORICAL TIMING OF METROPOLITAN DEVELOPMENT IN CANADA

It is quite difficult to find sound statistical documentation of the historical pattern of metropolitan development in Canada. Such documentation requires data which directly indicate the economic linkages between large cities and their surrounding urban centres at each census and even the 1961 Census contains no such data. A long historical perspective on metropolitan development in Canada is obtainable mainly through somewhat inappropriate data on population growth. The use of such data in this Section may be rationalized by the following sketch of an ideal situation.

It seems reasonable to suppose that in the history of a typical metro-politan area there was a pre-metropolitan era in which the hinterland of the central city grew at a slower rate than the central city. During this era persons migrating into the subsequently metropolitan area almost always chose locations within the central city. As the central city grew and its core areas became residentially saturated, there was an increasing tendency for residential movers to choose locations in the hinterland of the central

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city, thus imparting an increasingly strong impulse to population growth in the hinterland. As the residential density of the central city advanced, it became more likely that its population growth rate would be exceeded by that in the hinterland. The date at which the hinterland growth rate appeared to exceed that of the central city may be an approximate earliest possible date for the emergence of metropolitan development in the area, assuming that a sizable population and rapid population growth in the immediate hinterland of the central city are necessary (but not sufficient) conditions of the emergence of a metropolitan area. This assumption is supported by the observation that the significance of the hinterland as a labour pool and a market for the central city industries depends partly on the population size and growth rate of the hinterland. These suppositions suggest that the differential between the central city and the hinterland in the growth rate of population may serve as an indicator of the historical pattern of the advance of metropolitan development.

The application of the preceding suggestion is impeded by at least three 'stumbling blocks'. Firstly, there is the theoretical objection that the observed rates of population growth for the hinterland are influenced by the normally higher natural increase rates shown in the hinterland than in the central city. Secondly, the central city is not a fixed geographical area and its recurrent boundary changes may distort the observed central city — hinterland differentials in population growth rates. Thirdly, the boundary of the hinterland area must be delineated somewhat arbitrarily. In using the census data, for example, one is confined largely to information for municipal or census subdivisions (incorporated cities, towns, villages and rural municipalities), which are essentially administrative units. (In using these data it is advisable to substitute the term "metropolitan ring" for hinterland, and to accept the fact that as an approximation to the true hinterland area the accuracy of the metropolitan ring is not known precisely.) Despite these difficulties, the present Section uses data that reflect central city — hinterland differentials in population growth rates. These data comprise the only readily available series that may throw light on the historical pattern of Canadian metropolitan area development.

It is assumed that if metropolitan area development is reflected in central city — ring differentials in population growth rates, this reflection will be most evident in the data pertaining to the largest cities (cf. Duncan et al., 1960, c. 3). Chart 6.2 presents data on the decennial population growth rates for cities of 30,000 and over at the beginning of each decade and for the census subdivisions surrounding these cities. In each decade adjustments of the data are made so as to minimize the effects of boundary changes on the computed growth rates (headnote to Chart 4.4).

Chart 6.2 indicates that the decennial rate of population growth in the subdivisions surrounding Canada's largest incorporated cities overtook the growth rate for these cities in 1911-21; from 1871-81 to 1901-11 the largest incorporated cities grew faster than their surrounding census subdivisions. This suggests that considerable metropolitan development in Canada may not be dated before 1921 (Schnore and Petersen, 1958, Table 3) although a few areas may have had metropolitan development before that date.

CHART 6.2

PERCENTAGE CHANGE IN POPULATION FOR INCORPORATED CITIES
OF 30,000 AND OVER AND FOR THEIR ADJACENT CENSUS
SUBDIVISIONS, CANADA, 1871-81 TO 1951-61
(CITY-SIZE DETERMINED AT THE BEGINNING OF EACH DECADE)

Source: 1931 Census Vol.II, Table 12; DBS 92-535, 1961 Census, Table 9;
DBS 92-539, 1961 Census.
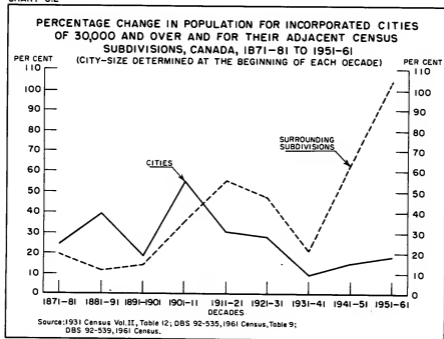
Since 1911-21 the rate of population growth in the census subdivisions surrounding the largest cities has remained higher than that in the cities themselves and the differential between the two rates has widened greatly since 1931-41. Chart 6.2 shows that the differential was less than 25 percentage points up to and including 1931-41, jumped to 48 percentage points in 1941-51 and reached 86 percentage points in 1951-61. As Chapter Two (Section 2.2) indicates, the 1941-51 decade was one of tremendous acceleration in the pace of industrialization in Canada and of absolute decline in the size of the rural population. The period immediately following the Second World War was one of 'explosion' in urban building (Daly, 1964,

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Chart 2; Buckley, 1955, p. 45). Taking these considerations into account, it would seem reasonable to assume that the dating of the emergence of significant metropolitan development in Canada may be set no later than 1951. Thus, a considerable emergence of metropolitan development in Canada should be dated some time between 1921 and 1951.

It should be noted that a conclusion pertaining to the dating of considerable metropolitan development in Canada as a whole does not necessarily apply to particular regions or to individual metropolitan areas. If the data concerning central city — adjacent area differentials in rates of population growth are taken as fair indicators of the emergence of metropolitan areas, then it is worth noting that the population in the census subdivisions surrounding Montreal was growing faster than that of Montreal city in all but one of the intercensal periods since 1871 (Chart 6.3); the exception is 1881-91. However, this observation should be interpreted cautiously because the legal city limits may have understated the 'real' Montreal urban agglomeration as early as 1871 (cf. Blanchard, 1953, pp. 252-268). Despite this precautionary note, it may be accepted that metropolitan growth, involving particularly the Montreal and Toronto areas (Chart 6.3), may have been evident long before it was prevalent enough to warrant the statement that 'Canada has fully entered upon the age of widespread metropolitan development'. Although the data do not indicate the precise date at which such a statement may be verified, they strongly suggest that it was not later than 1951. Today, metropolitan development is prominent in Canada and metropolitan regions and markets are playing an increasingly influential role in the Canadian economy.

6.4 COMPONENTS OF POPULATION GROWTH IN THE PRINCIPAL REGIONS OF METROPOLITAN DEVELOPMENT, 1921-31 TO 1951-61

Having reviewed briefly the marked 1951-61 shift of the Canadian population into the 1961 Census Metropolitan Areas (MAs) and the increasing concentration of this population into the Principal Regions of Metropolitan Development (PRMDs) from 1901 to 1961, it is appropriate to go behind these trends and measure their demographic components. This Section reviews the results of the relevant measurements that have been made for the present study and for related DBS publications. Subsection 6.4.1 discusses the relative contribution of net migration to the 1951-61 population growth rate of the MAs and to the growth rate differentials among MAs, MUAs (Major Urban Areas) and other areas in the five major regions. Subsection 6.4.2 presents and reviews some highlights of the estimates of net migration ratios for the PRMDs from 1921-31 to 1951-61.

CHART 6.3

PERCENTAGE CHANGE IN POPULATION FOR THE INCORPORATED CITIES
OF MONTREAL AND TORONTO AND FOR THEIR ADJACENT
CENSUS SUBDIVISIONS, 1871-81 TO 1951-61
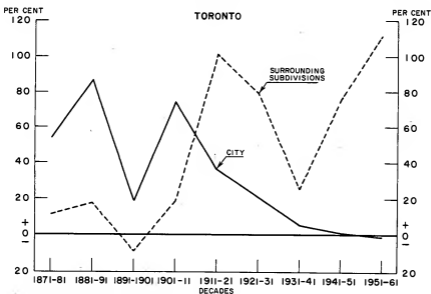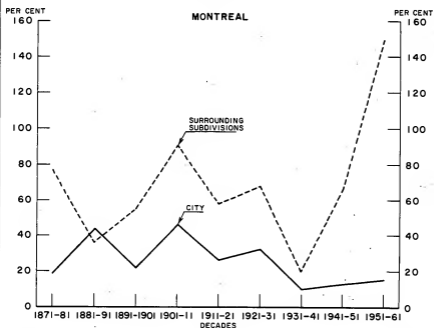
Source: Same as Chart 6.2.

6.4.1 FINDINGS FOR THE 1951-61 DECADE — Net migration was more important than natural increase in accounting for the 1951-61 rate of population growth in the area of the 1961 MAs. In Canada as a whole, the direct impact of net migration was 54 per cent of the decennial rate of population growth (45 per cent) (Table 6.3). The indirect impact of net migration (the influence of net migration upon the total numbers of intercensal births and deaths) is included in the remaining 46 per cent of the decennial rate of population growth. In four of the five major regions the direct impact of net migration accounted for at least one half of the 1951-61 rate of population growth in the area of the 1961 MAs; in the Maritimes the percentage was about 30 per cent. Thus, the five percentage-point increase from 1951 to 1961 in the concentration of Canada's population in the 1961 MAs may be attributed largely to net migration.

The 1951-61 net migration to the 1961 MAs exceeded one fifth of the 1951 population of these MAs for Canada as a whole and for four of the five major regions (Table 6.3). The Prairie ratio of 34 per cent was the highest and was nine percentage points above the second highest ratio of 25 per cent, observed for both British Columbia and Ontario. The ratios for Quebec and the Maritimes were 21 per cent and nine per cent, respectively.

Table 6.3 — Components of Population Growth for Census
Metropoliton Areas, Major Urban Areas and Other Areas,
Conada and Major Regions, 1951-61

Canada[a] and major regions	MAs[b]	MUAs[b]	Other urban 5,000+ in 1951[c]	Selected mainly rural farm counties[d]	Remainder[e]
	A	B	C	D	E
	Population growth rates[f]				
Canada	44.9	31.5	30.1	2.2	19.1
Maritimes	31.7	15.3	12.0	0.8	10.6
Quebec[g]	41.1	29.1	26.8	4.8	19.3
Ontario[g]	45.8	37.5	24.4	9.5	24.5
Prairies.........	61.6	—	50.0	—	6.9
British Columbia.	39.9	—	24.6	h	43.4
	Natural increase ratios				
Canada	20.8	23.8	21.5	19.1	24.4
Maritimes	22.4	22.4	20.2	13.7	21.0
Quebec[g]	20.5	27.4	26.5	22.3	28.7
Ontario[g]	20.8	21.8	17.9	14.2	22.4
Prairies.........	27.1	...	23.2	19.3	22.7
British Columbia.	14.7	...	19.7	h	26.8

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Table 6.3 — Components of Population Growth for Census
Metropolitan Areas, Major Urban Areas and Other Areas,
Canada and Major Regions, 1951-61 — concluded

Canada[a] and major regions	MAs[b]	MUAs[b]	Other urban 5,000+ in 1951[c]	Selected mainly rural farm conuties[d]	Remainder[e]
	A	B	C	D	E
			Net migration ratios[i]		
Canada	24.1	7.7	8.6	−16.9	− 5.3
Maritimes	9.3	− 7.1	− 8.2	−12.9	−10.4
Quebec[g]	20.6	1.7	0.4	−17.4	− 9.4
Ontario[g]	24.9	15.7	6.4	− 4.7	2.1
Prairies.........	34.5	...	26.8	−19.3	−15.8
British Columbia.	25.2	...	4.9	h	16.6
			Relative importance of net migration in population growth rate[j]		
Canada	53.7	24.4	28.6	47.0	18.0
Maritimes	29.3	24.0	29.0	48.6	33.1
Quebec[g]	50.2	5.8	1.4	43.9	24.7
Ontario[g]	54.4	41.9	26.3	25.0	8.6
Prairies.........	56.0	...	53.7	50.0	41.0
British Columbia.	63.2	...	20.0	h	38.2

[a] Exclusive of Newfoundland, Yukon Territory and Northwest Territories.
[b] See Appendix D for definition of MAs and MUAs.
[c] Incorporated centres only. The data are not significantly affected by annexations (headnote to Table 4.4).
[d] Pertains to a group of counties or census divisions that had no urban centres of 10,000 or over in 1951 and whose rural populations in 1951 were heavily concentrated in the rural farm category. The selected counties or census divisions are listed in Appendix J.
[e] Refers to all areas not covered by columns A, B, C or D.
[f] Let P_0 and P_1 be the 1951 and 1961 populations, respectively. The population growth rate is defined as $100(P_1 − P_0)/P_0$, which is the 1951-61 percentage change in population.
[g] Because Ottawa MA is partly in Ontario and partly in Quebec, Hull County in Quebec has been allocated to the Ontario total.
[h]No census divisions were drawn (for this column) from British Columbia; see footnote d.
[i] See Appendix J for description of the estimation of these ratios.
[j] Let M and I mean net migration and natural increase ratios, respectively (see Appendix F for definition of these ratios). The relative importance of net migration ratio is $100 |M| / (|M| + |I|)$, where $|X|$ means the absolute value of X. This index varies from zero to 100 (Table 5.1, footnote e).

SOURCES: *Vital Statistics* (annual), 1951 to 1961 (1951, Table 26; 1952 to 1960, Table 7; 1961, Table S7); 1951 Census, Vol. I, Tables 12, 13 and 15; 1961 Census, DBS 92-535, Tables 9, 10 and 11—DBS 92-536, Table 12—DBS 92-539—DBS 99-511, Table 2; DBS, "Component Parts...", 1963.

Among the five regions, the association between the 1951-61 crude net migration and natural increase ratios, for the 1961 MAs, was quite low. The Prairies do show the highest natural increase ratio (27 per cent) in Table 6.3, which is doubtless a partial result of the estimated 34 per cent population growth rate which net migration *alone* would have produced in this region. But at the lower end of the range of natural increase ratios lie the 1961 MAs of British Columbia, which had the second highest net migration

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ratios. The relatively low natural increase ratio of 15 per cent for the Vancouver and Victoria MAs (six percentage points below the ratio for all the 1961 MAs) is probably a partial result of the highly unfavourable age composition of these MAs in 1951, as Chapter Seven shows. Among the 1961 MAs in the remaining major regions, the 1951-61 natural increase ratios do not vary significantly, ranging from 20 per cent in Quebec to 22 per cent in the Maritimes. The area of the 1961 MAs in the Maritimes had the lowest 1951-61 net migration ratios and the second highest natural increase ratios for the same period.

Among the five categories of areas identified in Table 6.3, the 1961 MAs had by far the highest 1951-61 crude net migration ratios, being, at 24 per cent, three times as high as that for the 1961 MUAs. Both the 1961 MUAs and the urban areas of 5,000 and over (as of 1951) outside of MAs or MUAs sustained net migration gains over the 1951-61 decade, but in each case the ratios were somewhat less than 10 per cent. Not surprisingly, the selected group of predominantly rural farm counties or census divisions sustained a heavy net migration loss over the 1951-61 decade, with a net migration ratio of *minus* 17 per cent. This means that the net migration loss to the population of these counties or census divisions was 17 per cent (near to one fifth) of the 1951 population in these areas. The residual category (Table 6.3, column E), also sustained a net migration loss (*minus* five per cent of the 1951 population). This category contains mainly the urban areas of less than 5,000 in population (as of 1951) which were not in the 1961 MAs or MUAs, and rural population also outside of the 1961 MAs and MUAs.

The MA-MUA differentials in Table 6.3 suggest that the 'suburban explosion' of the 1950s was heavily concentrated within the boundaries of the 1961 MAs. Among the three regions having 1961 MUAs (Maritimes, Quebec and Ontario) only the Ontario MUA area had a crude net migration ratio which was either greater than 10 per cent or as much as one half the net migration ratio for the 1961 MAs. In the 1961 MUAs for Ontario the 1951-61 migration ratio was 16 per cent, a figure eight times as high as that for the 1961 MUAs in Quebec. Thus, in Quebec the 1961 MAs (Montreal MA and Quebec MA) dominated the within-region population redistribution resulting from migration to a much greater extent than was the case in Ontario.

6.4.2 HISTORICAL TRENDS SINCE 1921 – Table 6.4 presents estimates of net migration and natural increase to the Principal Regions of Metropolitan Development (PRMDs) for the decades 1921-31 to 1951-61, thus providing a view of the demographic components of the steady increase in the concentration of Canada's population in these regions (indicated in Section 6.2). The Table shows that for Canada since 1921-31 the PRMDs have had net migration gains, while the other areas taken as a whole have had net migration losses. In both 1921-31 and 1951-61 net migration contributed

directly over one half of the population growth in these Regions, for Canada as a whole, in 1941-51 that contribution was very nearly one half (47 per cent), and the corresponding value for 1931-41 was 31 per cent. With the marked exception of the Maritimes, a similar pattern is shown by the major regions in regard to decade fluctuations in the relative contribution of net migration to population growth in the PRMDs.

As the preceding paragraph may suggest, the crude net migration ratio for the PRMDs has fluctuated markedly over time. In Canada as a whole, it fell from 16 per cent in 1921-31 to four per cent in 1931-41, rose to 13 per cent in 1941-51, and increased again to 23 per cent in 1951-61.Thus, it may be said that a marked upward trend in net migration ratios to these Regions has been established over the 1931-61 period and that the major regions generally conform to the pattern established for Canada as a whole. The natural increase ratio shows a pattern of decade fluctuations quite similar to that of the crude net migration ratio. It also fell sharply from 1921-31 to 1931-41, and increased in both 1941-51 and 1951-61. This pattern reflects the decadal swings in the Canadian crude birth rate, and is also shown by the area *outside* of the PRMDs; the crude net migration ratio for the area *outside* of the PRMDs did not fluctuate markedly from 1921-31 to 1951-61 but ranged between *minus* seven per cent (1941-51) and *minus* four per cent (1951-61) in Canada as a whole. In none of the five major regions does the net migration ratio for the area *outside* the PRMDs show a pattern of decennial fluctuations similar to that of the natural increase ratio for the same area.

The discussion in this Chapter suggests a relatively new focus for migration studies in Canada — the gravitation of population into metropolitan areas. The data show a marked and relatively steady decadal shift of the Canadian population into an area which closely approximates that of 1961 MAs. Even without its secondary influence upon the crude birth rate, net migration has been a major factor in this population shift. The importance of these findings derives partly from the assumptions that (a) the MAs include the most prominent 'growth poles' in the Canadian economy, and (b) metropolitan regions and markets are assuming major and increasing functions in the Canadian economy (Economic Council, 1965, c. 3). Data on the educational and occupational composition of migration streams involving the 1961 MAs (to be presented in the Census Monograph on internal migration) provide partial support for these assumptions, as do data on economic production in these urban complexes.

Table 6.4 – Components of Population Growth for the Principal Regions of Metropolitan Development (PRMDs) and for Other Areas, Canada and Major Regions, 1921-31 to 1951-61

Canada[a] and major regions	1921-31		1931-41		1941-51		1951-61	
	MA region[b]	Remainder[c]	MA region	Remainder	MA region	Remainder	MA region	Remainder
	A	B	C	D	E	F	G	H
	Population growth rates[d]							
Canada..........	31.1	10.0	12.6	9.7	27.9	12.3	45.2	18.8
Maritimes.......	3.4	(PRMDs)	20.0	10.7	25.2	8.7	31.7	11.1
Quebec[e]........	35.4	12.4	12.8	18.7	23.5	19.9	41.0	19.8
Ontario[e].......	29.6	7.7	12.9	8.2	27.2	16.4	46.6	24.7
Prairies........	34.2	16.0	6.5	1.6	29.9	- 4.0	58.5	7.8
British Columbia	..	..	17.6	18.0	42.4	42.5	39.3	40.5
	Natural increase ratios[f]							
Canada..........	14.7	16.4	8.6	14.3	14.8	19.1	22.1	22.4
Maritimes.......	9.1	12.0	10.4	13.2	20.6	19.1	25.1	20.2
Quebec[e]........	16.5	24.4	10.4	20.8	16.3	27.2	21.8	27.0
Ontario[e].......	13.0	10.8	7.8	8.9	13.4	13.8	22.2	19.4
Prairies........	17.0	17.9	10.0	15.3	16.0	16.4	26.6	21.0
British Columbia	..	..	4.3	10.5	12.8	18.4	16.7	26.5
	Net migration ratios[f]							
Canada..........	16.4	- 6.4	4.0	- 4.6	13.1	- 6.8	23.2	- 3.6
Maritimes.......	- 5.7	-16.5	9.6	- 2.4	4.6	-10.4	6.6	- 9.1
Quebec[e]........	18.9	-12.0	2.4	- 2.0	7.3	- 0.7	19.2	- 7.1
Ontario[e].......	16.6	- 3.1	5.0	- 0.6	13.8	2.5	24.5	5.3
Prairies........	17.3	- 1.9	- 3.5	-13.7	13.9	-20.4	31.9	-13.2
British Columbia	..	..	13.4	7.5	29.6	24.1	22.7	14.0
	Relative importance of net migration in population growth rate[g]							
Canada..........	52.7	28.0	31.5	24.3	46.9	26.3	51.2	13.9
Maritimes.......	35.5	49.0	47.9	15.6	18.3	55.8	20.9	31.1
Quebec[e]........	53.4	33.0	18.8	8.9	30.8	42.9	46.9	20.9
Ontario[e].......	56.0	22.1	39.3	6.8	50.9	15.4	52.5	21.4
Prairies........	50.4	9.4	25.8	47.2	46.5	30.6	54.6	38.6
British Columbia	..	..	75.8	41.7	69.7	36.2	57.6	34.6

a Exclusive of Newfoundland, Yukon Territory and Northwest Territories.
b See headnote to Table 6.2 for the definition of these regions.
c Areas not within MA regions; see headnote to Table 6.2.
d See Table 6.3, footnote[f].
e Because Ottawa MA is partly in Ontario and partly in Quebec, Hull County in Quebec has been allocated to the Ontario total.
f See Appendix K for description of the estimation of these ratios.
g See Table 6.3, footnote[j].
SOURCES: Vital Statistics (annual), 1921 to 1961 (1951, Table 26; 1952 to 1960, Table 7; 1961, Table S7); 1961 Census, Vol. I, Tables 12, 13 and 15; 1961 Census, DBS 92-535, Tables 9, 10 and 11-DBS 92-536, Table 12-DBS 92-539-DBS 99-511, Table 2; DBS, "Component Parts...", 1963.

AGE COMPOSITION AND AGE PROFILES OF NET MIGRATION FOR THE MAJOR AREAS OF METROPOLITAN GROWTH IN CANADA, 1921-1961

7.1 INTRODUCTION

Among the demographic characteristics of a population, few are more fundamental or have more far-reaching ramifications than its sex and age composition. What are the principal features of the sex-age composition of metropolitan area populations in Canada? To what extent do these features differ from those of non-metropolitan populations, and what trends are observed in such differentials over the past decades? What have been the major features of the age profiles of net migration to the principal areas of metropolitan development in Canada, and how have these features differed from those of net migration to the remainder of Canada? Using the available data, the present Chapter provides partial answers to these questions. Section 7.2 discusses some features of the sex-age composition of the population in the 1961 Metropolitan Areas (MAs) and of 1951-61 changes in this sex-age composition. Section 7.3 reviews historical trends in the sex-age composition of population in the counties containing the 1961 MAs in Eastern and Central Canada. Section 7.4 discusses differentials between metropolitan and non-metropolitan areas in the sex-age profile of net migration ratios from 1921-31 to 1951-61.

7.2 SEX-AGE COMPOSITION OF CENSUS METROPOLITAN AREAS IN 1961 AND ITS 1951-61 CHANGES

Since the 1961 MAs comprise a highly urbanized area (only four per cent of the 1961 MA population was classified as rural), the 1961 MA population sex-age structure shows features quite similar to those indicated in Chapter Three for the urban population. The similarity is particularly marked when the 1961 MA population sex-age structure (Table 7.1) is compared with that of the urban size group of 100,000 and over (Table 3.3).

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There is considerable overlap between these two categories of areas. For example, only one city of 100,000 and over in 1961 (Regina) is not included in the figures for MAs. It was shown in Section 3.2 of Chapter Three that the contrast between urban and rural sex-age structures is sharpest when the 100,000-plus urban size group is considered. Thus the sex-age structure of the 1961 MA population is very similar to that of the urban size group which least resembles the rural population in sex-age structure, among the categories of areas considered.

There are a few notable differences between the sex-age composition of the 1961 MA population and that of the urban size group of 100,000 and over. Due to its rural component, which was heavily weighted with persons obtaining their livelihood from non-farm activities (1961 Census, DBS 94-504, Table 7A), the 1961 MA population is slightly 'younger' than that of the 100,000-plus urban size group. Table 3.3 shows, for example, that the median age of the male population in this urban size group was 28 years in 1961, while the corresponding figure for the MA population was 27 years (Table 7.1).

Table 7.1 – Selected Statistics of the Sex-Age Composition for Census Metropolitan Areas, Canada and Major Regions, 1961

NOTE.—See footnotes to Table 3.1 for definitions of age distributional statistics.

Item	Canada	Mari-times	Quebec	Ontario	Prairies	British Columbia
	Metropolitan areas					
Masculinity ratio, all ages..	97.9	99.5	96.2	98.2	99.6	98.8
Masculinity ratio, ages 20-34	97.2	104.4	94.8	97.7	97.8	99.6
Median age, males	26.5	24.8	26.0	26.8	26.1	28.2
Median age, females	27.1	25.7	26.7	27.4	26.2	28.8
Youth dependency ratio.....	50.0	54.9	49.1	49.6	54.2	47.9
Maturity ratio, males 20-64..	59.6	56.4	58.3	60.5	57.1	63.9
Old-age dependency ratio...	12.3	11.2	9.7	12.2	12.5	20.0
	Remainder of major region[a]					
Masculinity ratio, all ages..	105.7	103.7	103.8	104.4	109.9	110.8
Masculinity ratio, ages 20-34	105.4	101.7	101.4	105.5	110.2	113.8
Median age, males	24.3	23.1	20.4	25.8	25.7	25.9
Median age, females	24.2	23.6	20.6	26.2	25.0	25.2
Youth dependency ratio.....	64.5	68.3	71.6	59.3	62.0	61.2
Maturity ratio, males 20-64..	61.1	62.9	57.5	62.5	62.5	61.3
Old-age dependency ratio...	13.9	16.3	10.2	15.4	15.3	13.6

[a] Portion of major region outside of MAs.

SOURCE: 1961 Census, DBS 92-542, Tables 20 and 24.

The major-regional variation in the median age of the 1961 MA population was slight. Only British Columbia's MA population had a markedly different median age (29 years) than that of all the MAs (27 years); in the Maritimes and the Prairies it was one year below the all-MA average and in both Quebec and Ontario it was practically the same as the all-MA average.

The pattern of regional variation in the 'youth dependency' ratio for the 1961 MA population is quite similar to that observed in the median age of population. For all the 1961 MAs the number of children aged 0-14 was 50 per cent of the number of persons aged 15-64 (this is the 'youth dependency' ratio). The children aged 0-14 comprised 31 per cent of the whole 1961 MA population. The 'youth dependency' ratio is highest in the Maritime MAs (55 per cent) and in the Prairie MAs (54 per cent). The ratios for the other three regional groupings of 1961 MAs range between 48 and 50 per cent.

The range of the 'old-age dependency' ratio was somewhat wider than that of the 'youth dependency' ratio among the regional groupings of 1961 MA populations in 1961. It was lowest in Quebec (10 per cent), ranged between 10 and 12 per cent among the four regions to the east of British Columbia, and in British Columbia was 20 per cent. The latter figure indicates that in the 1961 Vancouver and Victoria MAs the population aged 65 and over was as large as one fifth of the population aged 15-64. For all the 1961 MAs, the 'old-age dependency' ratio was only 12 per cent.

In summary, the sex-age composition of the 1961 MA population closely resembles that of the urban size group of 100,000 and over, mainly due to the heavy concentration of the members of this size group among MAs. Among the major-regional groupings of 1961 MA populations, the 'youngest' populations are those in the Maritimes and the Prairies while the 'oldest' populations are those in British Columbia and Ontario.

Table 7.2 presents data concerning 1951-61 changes in the values of selected features of the age distribution for the 1961 areas of the MAs. The sources of these data do not give information for males and females separately but this deficiency will be largely rectified in Section 7.3.

In Canada as a whole the median age of the population in an area closely approximating the 1961 MAs declined by one year from 1951 to 1961, largely due to a large increase in the relative numbers of young children in this area. The median age of the population in the area closely approximating the 1961 MAs declined from 28 years to 27 years for Canada as a whole over the 1951-61 decade. The 'youth dependency' ratio for this population jumped 11 percentage points in the same period, from 39 per cent to 50 per cent, but the 'old-age dependency' ratio remained at 12 per cent

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in 1951 and 1961. Among the major regions the pattern of changes in the above-mentioned features of the age distribution is roughly the same as that indicated previously for Canada as a whole (Table 7.2).

Table 7.2 — Selected Statistics of the Age Composition for Areas Approximating the 1961 Census Metropolitan Areas, Canada and Major Regions, 1951 and 1961

NOTE.—See footnotes to Table 3.1 for definitions of age distributional statistics.

Item		Canada	Mari-times	Quebec	Ontario	Prairies	British Columbia
		Areas approximating 1961 MAs[a]					
Median age	1951	27.8	26.4	26.9	28.0	28.0	29.4
	1961	26.8	25.3	26.3	27.0	26.6	28.3
Youth dependency ratio.	1951	38.6	44.9	41.1	37.0	36.7	37.2
	1961	50.1	54.6	49.6	50.3	50.5	48.8
Old-age dependency ratio	1951	12.1	10.6	9.3	12.1	13.2	19.3
	1961	12.5	11.2	9.7	12.3	14.4	19.6
		Remainder of major region[b]					
Median age	1951	25.4	25.0	21.3	27.2	26.0	26.8
	1961	24.3	23.4	20.4	26.1	25.4	25.4
Youth dependency ratio.	1951	56.2	61.9	69.4	47.5	51.3	49.4
	1961	64.3	68.3	71.7	58.8	61.7	61.7
Old-age dependency ratio	1951	12.9	15.1	9.6	15.2	12.5	13.3
	1961	13.7	16.3	10.1	15.5.	14.3	13.2

[a] These are the Principal Regions of Metropolitan Development (PRMDs) defined in the headnote to Table 6.2.

[b] Portion of major regions outside of the PRMDs in the top panel of this Table.

SOURCES: 1951 Census, Vol. I, Table 2.3; 1961 Census, DBS 92-542, Tables 22 and 24 — DBS 92-525.

A similar pattern of changes in age composition is shown for the population residing outside of the area closely approximating the 1961 MAs (Table 7.2). Thus, given this observation and the marked differences between the two categories of areas (that closely approximating the 1961 MAs, and other areas) in regard to the 1951-61 net migration ratios (Table 6.4), the recent shifts in the age composition of the 1961 MAs may be attributed mainly to the postwar baby boom.

7.3 HISTORICAL TRENDS IN THE SEX-AGE COMPOSITION FOR SELECTED COUNTIES CONTAINING THE 1961 MAs

A historical review of changes in the sex-age composition of the Canadian metropolitan area population is impeded by the normal expansion

over time in the list of areas satisfying the criteria of metropolitan status. The age distributional data for such an expanding list of metropolitan areas would seriously confound the effects of areal change with those of the demographic processes (fertility, migration and mortality). In order to focus upon the effects of the demographic processes, this Section presents historical age distributional data for an area that has had negligible boundary changes — the counties containing the 1961 MAs in Eastern and Central Canada (Maritimes, Quebec and Ontario). Because considerable changes were made in the boundaries of the Manitoba and Alberta census subdivisions in 1956 and 1961 and because the requisite data for British Columbia were not available before 1931, information for Western Canada is excluded from the following discussion.

Table 7.3 — Selected Statistics of the Sex-Age Composition for Counties Containing the 1961 Census Metropolitan Areas, Eastern and Central Canada, 1911-1961

NOTE.—See footnotes to Table 3.1 for definitions of age distributional statistics.

Item	1911	1921	1931	1941	1951	1961
	1961 MA counties[a]					
Masculinity ratio, all ages	100.8	96.4	98.2	97.0	96.7	98.3
Masculinity ratio, ages 20-34	101.8	89.5	93.5	92.3	92.4	97.6
Median age, males	24.6	25.6	26.6	28.9	29.3	27.6
Median age, females	24.4	25.4	26.4	29.2	30.0	28.7
Youth dependency ratio	48.2	49.0	43.5	35.5	39.9	51.1
Maturity ratio, males 20-64	49.2	55.1	56.1	57.5	57.9	59.4
Old-age dependency ratio	6.9	7.1	7.9	9.2	11.1	11.3
	Remainder of major region[b]					
Masculinity ratio, all ages	100.6	105.2	107.4	107.1	104.4	103.8
Masculinity ratio, ages 20-34	110.0	104.6	111.8	110.3	100.2	102.9
Median age, males	23.1	23.1	23.6	25.3	25.0	23.3
Median age, females	22.5	22.4	22.8	24.4	24.8	23.7
Youth dependency ratio	59.6	61.3	58.2	51.1	59.2	65.7
Maturity ratio, males 20-64	53.3	56.3	55.7	54.1	57.2	60.7
Old-age dependency ratio	10.4	10.9	11.8	11.8	12.9	13.5

[a] See Appendix I for a list of these counties.
[b] The area outside of the MA counties.

SOURCES: 1931 Census, Vol. II, Table 24; 1941 Census, Vol. II, Table 22; 1951 Census, Vol. I, Table 22; 1961 Census, DBS 92-542, Table 21; unpublished data from the 1911 and 1921 Censuses.

In 1961 the sex composition of the Eastern and Central Canada counties containing 1961 MAs was slightly 'female-dominant', with a masculinity ratio of 98. The masculinity ratio for persons in the early years of

working life (20-34) in these counties was also 98. Largely attributable to the tremendous wave of 'male-selective' immigration in the 1901-11 decade, the masculinity ratio for the total population in these counties was 101 in 1911 but has been less than 100 since 1921. With the exception of 1911 and 1961, the masculinity ratio for persons aged 20-34 has been markedly lower than that for the whole population, ranging from 90 to 94 for the census years 1921 to 1951. Generally, the masculinity ratios for the Eastern and Central Canada counties containing 1961 MAs show no definite trend from 1911 to 1961, the highest values for these ratios being observed for the census years following relatively heavy waves of immigration — 1911, 1931 and 1961.

The median age of population for the same counties shows a generally upward trend from 1911 to 1961. This median increased from 25 years in 1911 to 30 years in 1951 and declined to 29 years in 1961. The historical pattern of fluctuations in the median age is quite similar to that indicated in Chapter Three, Section 3.4, for the cities of 30,000 and over. These fluctuations are highly associated with that in the 'youth-dependency' ratio, which is very sensitive to temporal fluctuations in the crude birth rate.

A general trend toward 'ageing' is also indicated by the 'old-age dependency' ratio which increased from seven per cent in 1911 to 11 per cent in 1961 for the population in the Eastern and Central Canada counties containing 1961 MAs. As Table 7.3 shows, this increase is much larger than that for the population outside of those counties; the 'old-age dependency' ratio in the latter population was 11 per cent as early as 1921.

7.4 DIFFERENTIALS BETWEEN METROPOLITAN AND NON-METROPOLITAN AREAS REGARDING SEX-AGE PROFILES OF NET MIGRATION RATIOS, 1921-31 TO 1951-61

This Section provides the first of two glimpses (the second in Section 7.5) into the differentials between metropolitan and non-metropolitan areas regarding the pattern of net migration by age over the 1951-61 decade. The source data for this table do not permit separate treatment of males and females, this deficiency is largely rectified in Table 7.5. Table 7.4 presents 1951-61 net migration ratios by age for areas closely approximating the 1961 MAs (excluding Calgary, Edmonton and St. John's), and for other areas in each major region (excluding Alberta Province). It shows a pattern of high net migration gains by age for the areas approximating the 1961 MAs, and a pattern of net migration losses by age for the remaining non-metropolitan areas. In six of the eight age groups the net migration ratios for the areas approximating the 1961 MAs exceed 10 per cent, and this ratio reaches 49 per cent in the age group 20-24. The latter figure means

that from net migration alone the number of persons aged 10-14 in 1951 would have increased by over one half over the 1951-61 decade in the area of the 1961 MAs. In sharp contrast, five of the eight age groups show net migration losses in the remaining non-metropolitan parts of the major regions. These losses are most severe among those aged 10-14 in 1951, for which the net migration ratio was *minus* 15 per cent in Canada as a whole.

Table 7.4 – Net Migration Ratios by Age Group for Areas Approximating the 1961 Census Metropolitan Areas, Canada and Major Regions, 1951-61

NOTE.—The estimation of net migration ratios is described in Appendix G, Section G.1.

Age group in 1961[a]	Canada[b]	Mari-times	Quebec	Ontario	Prairies	British Columbia
	Area approximating 1961 MAs[c]					
10-14	18.6[d]	2.7	17.2	21.3	15.3	21.0
15-19	20.0	15.5	19.4	19.6	31.2	17.4
20-24	49.3	50.8	44.5	51.3	80.9	35.6
25-34	45.2	15.6	39.1	53.9	35.8	50.4
35-44	21.3	2.8	17.8	25.9	14.1	25.6
45-54	10.8	− 0.0	8.7	12.4	8.4	14.4
55-64	4.2	− 2.6	2.4	3.8	4.5	11.4
65 and over...........	9.4	5.6	7.2	8.7	10.1	14.4
10 and over...........	20.8	9.0	18.7	23.2	20.2	22.5
	Remainder of major region[e]					
10-14	3.3	− 3.1	− 0.7	10.7	1.4	19.7
15-19	− 5.4	−12.0	− 8.4	1.5	− 7.1	7.6
20-24	−15.3	−30.1	−19.0	− 6.4	−14.8	5.1
25-34	− 2.5	−18.5	−12.1	10.7	1.6	34.6
35-44	4.2	− 3.5	− 2.0	10.4	3.7	22.5
45-54	− 0.3	− 5.4	− 2.8	3.4	− 1.8	10.2
55-64	− 0.7	− 2.9	0.0	1.1	− 3.4	3.1
65 and over...........	12.5	4.7	7.1	6.4	5.0	8.8
10 and over...........	− 0.4	− 8.2	− 5.1	5.7	− 0.8	15.0

    [a] These age groups are required by the age groupings in the source data.
    [b] Exclusive of Newfoundland, Yukon Territory and Northwest Territories.
    [c] These are the Principal Regions of Metropolitan Development (PRMDs) defined in headnote to Table 6.2.
    [d] Let NM be the estimated net migration and P_0 be the population at the beginning of the decade. The net migration ratio is defined as $100 (NM/P_0)$. See Chapter Five, footnote 6 for a relevant comment.
    [e] Portion of major regions outside of the PRMDs in the top panel of this table.

    SOURCES: 1951 Census, Vol. I, Table 2.3; 1961 Census, DBS 92-542, Tables 22 and 24 – DBS 92-525; Keyfitz, 1931, Table 9; Keyfitz, 1950, Table 2.

    Table 7.5 presents estimates of net migration by sex and age for the counties containing the 1961 MAs in Eastern and Central Canada and for the remaining parts of these regions. For the 1951-61 decade, Table 7.5

Table 7.5 – Net Migration Ratios by Sex and Age Group for Counties Containing the 1961 Census Metropolitan Areas, Eastern and Central Canada, 1921-31 to 1951-61

NOTE.–The estimation of net migration ratios is described in Appendix G, Section G.1. See footnotes to Table 3.1 for definitions of age distributional statistics.

Age at end of decade	1961 MA counties[a]				Remainder of major region[b]			
	1921-31	1931-41	1941-51	1951-61	1921-31	1931-41	1941-51	1951-61
Males								
10-14	15.2c	7.4	10.4	19.0	- 0.7	5.8	4.1	2.0
15-19	11.3	4.5	6.8	16.1	- 4.6	- 0.4	- 5.3	- 5.5
20-24	19.1	5.7	14.6	36.7	-11.8	- 5.1	-15.4	-17.7
25-29	26.2	6.7	19.4	55.9	-19.0	- 7.4	-15.3	-12.3
30-34	27.2	4.3	14.7	43.2	-11.6	- 5.5	-10.5	0.1
35-39	21.3	3.9	13.3	28.8	- 5.4	3.2	- 4.3	3.0
40-44	15.2	1.5	11.5	21.2	- 2.0	1.1	- 1.8	2.2
45-49	5.6	- 0.9	5.4	13.5	- 5.8	1.1	- 4.2	- 1.2
50-54	6.6	- 0.4	6.5	11.0	- 2.9	0.9	- 0.1	0.0
55-59	- 2.3	- 4.0	- 0.9	6.0	- 7.6	- 0.8	- 4.6	0.3
60-64	- 2.9	- 3.7	- 1.7	1.3	- 4.7	- 0.6	- 1.3	0.5
65-69	4.1	2.9	3.5	2.7	2.7	6.2	5.5	6.0
70-74	1.7	1.0	2.8	2.8	2.5	5.6	6.3	7.7
75 and over	4.5	3.6	4.1	3.9	1.9	2.9	3.0	4.1
10 and over	13.3	2.9	9.0	20.5	- 6.0	- 0.3	4.5	- 1.9
Females								
10-14	15.1c	7.3	10.2	18.8	- 1.8	5.1	2.9	1.4
15-19	16.8	7.5	12.1	21.1	- 9.1	- 2.6	- 6.6	- 7.8
20-24	32.9	16.2	25.2	52.5	-19.5	- 9.4	-14.8	-18.5
25-29	23.6	9.7	27.7	51.0	-24.0	-11.1	-11.5	-12.8
30-34	11.0	- 0.4	12.6	31.2	-16.5	- 5.2	- 4.5	- 1.1
35-39	9.0	1.2	9.1	21.6	- 7.5	1.4	- 1.5	1.8
40-44	8.2	1.6	7.1	13.7	- 5.1	1.4	- 0.5	- 0.1
45-49	2.5	- 2.3	3.2	8.6	- 8.2	- 1.5	- 2.8	- 2.1
50-54	5.4	- 0.1	4.4	7.3	- 5.5	- 0.3	- 0.8	- 1.5
55-59	- 1.3	- 2.9	- 0.6	4.6	- 8.3	- 2.2	- 3.5	0.6
60-64	- 0.5	- 1.4	- 1.8	0.4	- 6.1	- 1.8	- 3.1	- 2.3
65-69	7.5	6.1	4.8	3.6	1.5	4.2	3.0	2.6
70-74	5.0	5.9	6.7	7.8	2.6	3.4	1.7	5.8
75 and over	7.3	7.5	6.2	7.0	1.4	3.8	4.3	3.7
10 and over	12.4	4.4	10.3	18.9	- 9.3	- 1.9	3.7	- 3.2

a See Appendix I for a list of these counties.

b Area outside the MA counties.

c Let *NM* be the estimated net migration and P_0 be the population at the beginning of the decade. The net migration ratio is defined as $100 (NM/P_0)$. See Chapter Five, footnote 6 for a relevant comment.

SOURCES: 1951 Census, Vol. I, Table 2.3; 1961 Census, DBS 92-542, Tables 22 and 24 – DBS 92-525; Keyfitz, 1931, Table 9; Keyfitz, 1950, Table 2.

confirms the findings in Table 7.4 in showing high ratios of net migration between ages 10 and 44 in the Eastern and Central Canada counties containing the 1961 MAs. In sharp contrast, the same age range shows a marked concentration of negative net migration ratios among both males and females (the latter particularly) in the area outside of the above-mentioned counties within Eastern and Central Canada. However, the values of the MA-county net migration ratios for corresponding age groups are higher in Table 7.4 than in Table 7.5, indicating that the net migration to the counties containing 1961 MAs was markedly concentrated within the Metropolitan Areas themselves. Generally, the age-specific net migration ratios for the counties containing 1961 MAs are highest in the same age groups where the net migration losses for the other counties are greatest.

The basic pattern of differentials in sex-age specific net migration ratios between the counties containing 1961 MAs, on one hand, and the remaining counties within Eastern and Central Canada, on the other, has been stable in the four decades from 1921-31 to 1951-61 (Chart 7.1). Generally, the age profile of net migration ratios for the counties containing 1961 MAs shows a 'hump' among positive ratios between ages 15 and 44. In roughly the same age range, but mainly in the age group 15-39, the net migration ratios for the remaining parts of Eastern and Central Canada show a 'trough' among negative ratios. The differential between the two sets of age profiles of net migration ratios (one for counties containing 1961 MAs and the other for the remaining parts of Eastern and Central Canada) is greatest in 1951-61 and smallest in 1931-41. These observations suggest that much of the high net migration ratios between ages 15 and 39 for the counties containing 1961 MAs have reflected intra-regional population redistribution favouring these counties. In addition, the pace of this redistribution has fluctuated markedly over time, slackening sharply in the relatively depressed 1931-41 decade and reaching a peak in the very prosperous 1951-61 decade.

When the data are broken down by major region (Chart 7.1) some marked variations are observed between the Maritimes, Quebec and Ontario in regard to the areal differentials in profiles of net migration ratios by age. In the Maritimes, the differentials between the age-specific net migration ratios for the counties containing 1961 MAs and the remaining counties are not as sharp as in the whole group of three major regions. This is mainly due to the relatively low 'humps' in the age profiles for the Maritime counties containing 1961 MAs. In the remainder of the Maritime counties the 'troughs' in the profiles are quite prominent.

In Quebec, the 'troughs' in the age profiles for the area outside the counties containing the 1961 MAs are also quite distinct, although not as

CHART 7.1

AGE PROFILES OF NET MIGRATION RATIOS FOR COUNTIES CONTAINING
THE 1961 MA'S AND FOR THE OTHER PARTS OF THE MAJOR REGIONS,
CENTRAL AND EASTERN CANADA, 1921–31 TO 1951–61
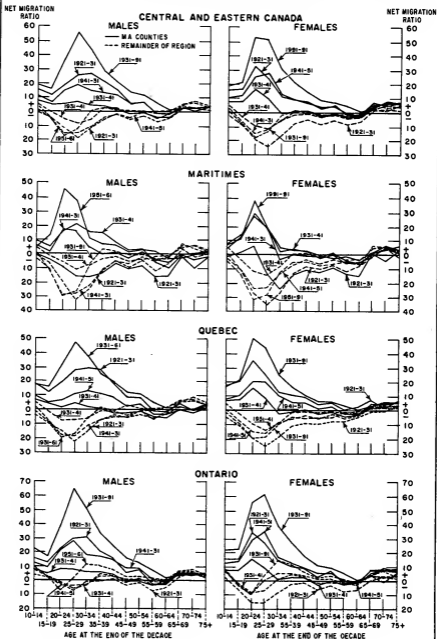
Source: Same as Table 7.5.

prominent as those of the Maritimes, and the 'humps' for the counties containing the 1961 MAs are markedly more prominent than in the Maritimes. As a result, the differentials between the two sets of profiles (one for counties containing 1961 MAs and one for the remaining areas) are somewhat larger in Quebec than in the Maritimes. Marked exceptions to this generalization are the age profiles for 1931-41.

Generally, the patterns for Ontario differ from those for Quebec in two broad respects (Chart 7.1). Firstly, the 'troughs' in the age profiles for areas outside of the counties containing 1961 MAs are less prominent in Ontario than in Quebec. Secondly, the 'humps' in the age profiles for the counties containing 1961 MAs are generally more prominent in Ontario than in Quebec. On the whole, the differentials between the two sets of age profiles seem slightly less prominent in Ontario than in Quebec.

The data presented in this Chapter provide an additional perspective on the decennial shifts of the Canadian population into the Principal Regions of Metropolitan Development, which were indicated in Chapter Six. In each decade, the net migration gains to the counties containing these Regions have been heavily concentrated among persons in the early years of working life (roughly, ages 20-34 at the end of each decade). These gains probably reflect migration *within* the major regions (Chart 7.1) because the parts of the major regions outside of the above-mentioned counties have had net migration losses concentrated in roughly the same age range (20-34). That much of the net migrational gains by metropolitan areas result from migration within the major regions is also strongly suggested by the five-year migration data presented in the 1961 Census Monograph on internal migration. These data, which permit the separation of in-migration from out-migration, show clearly that intra-provincial migration is very much larger in volume than inter-provincial migration.

SOME DEMOGRAPHIC DIFFERENTIALS
BETWEEN THE CENTRAL CITIES
AND OTHER PARTS OF CENSUS
METROPOLITAN AREAS

8.1 INTRODUCTION

A basic study of metropolitan development has at least three major phases. The first phase concentrates upon the essential and distinctive features of metropolitan organization, describing and analysing the variation of these features over time and space. The second phase treats the internal structures of metropolitan areas and regions, reviewing and explaining the systematic social, economic and demographic differences between the metropolitan sub-areas and sub-regions; also studied are the intra-metropolitan flows of people, goods and communication, which are so essential to the maintenance of metropolitan organization (Section 6.1 for related comment). The third major phase is concerned with the system of metropolitan regions viewed as an important aspect of the spatial structure of an advanced economy, in which phase one studies the economic linkages and interdependencies between metropolitan regions, and examines the features and correlates of the hierarchy of metropolitan areas in regard to such dimensions as size and economic functions. Chapters Six and Seven may be viewed as brief and selective introductions to the first phase of a basic study of Canadian metropolitan development. The present Chapter is a brief and selective introduction to the second phase of such a study. Chapter Nine (Section 9.7) presents a few materials concerning the third phase. However, these materials are largely inadequate, and a much more thorough treatment of the system of metropolitan regions in Canada will be the subject of research by the author in the near future.

This Chapter presents a review of differentials between the central cities and the remaining parts[1] of the 1961 MAs in regard to population size, to growth and sex-age composition, and to the levels and age profiles of net

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migration ratios.[2] The discussion is focused mainly upon data for the 1951-61 decade,[3] but some longer historical perspective will be provided through the use of data for counties, census divisions and census subdivisions.

8.2 BROAD FEATURES OF INTRA-METROPOLITAN POPULATION DISTRIBUTION AND REDISTRIBUTION, 1911-21 to 1951-61

In 1961, the population of the 1961 Census Metropolitan Areas (MAs) was heavily concentrated within the incorporated areas of the central cities (Table 8.1). In Canada as a whole, 62 per cent of the 1961 MA population were contained within the incorporated limits of the central cities, which ranged in size from 51,000 (Saint John and Victoria) to 1,283,000 (Montreal). Among the five major regions, the highest concentrations of the 1961 MA populations within the incorporated central cities were found in Quebec (75 per cent) and the Prairies (73 per cent); in the remaining three regions concentration was much lower, being 57 per cent in the Atlantic, 53 per cent in Ontario and 47 per cent in British Columbia.

Aside from the central city, incorporated urban centres of 10,000 and over comprised just six per cent of the 1961 MA population in Canada. Only in the Atlantic and the Prairies was the proportion higher than six per cent; in the Atlantic it was 16 per cent and in the Prairies 11 per cent.

Thus, as Table 8.1 shows, 32 per cent of the 1961 MA population in Canada was concentrated in areas outside of incorporated centres of 10,000 and over (including the central city). Among the five major regions this percentage was highest in British Columbia (47 per cent) and Ontario (42 per cent), and was lowest in the Prairies (16 per cent); in the Atlantic it was 26 per cent and in Quebec 21 per cent.

In Canada as a whole there were marked intra-metropolitan differentials in the growth rate of population over the 1951-61 decade. Generally, the lowest growth rate was attained in the central cities (24 per cent). Among the incorporated centres of 10,000 and over, the growth rate was 57 per cent (Table 8.1) but this figure, which is a very rapid decennial rate of population growth, is barely larger than one half of the growth rate in the parts of the 1961 MAs outside of incorporated centres of 10,000 and over. In the latter areas the population more than doubled between 1951 and 1961, growing at a decennial rate of 111 per cent. This extremely high growth rate is yet another reflection of the well-known 'suburban explosion' of the 1950s.

The foregoing rank ordering of three selected subdivisions of the 1961 MAs in regard to the 1951-61 population growth rate is generally observed in the five regions.[4] Only in the Prairies did the central cities grow

Table 8.1 – Percentage Change in Population for the Central Cities and Remaining Parts of the 1961 Census Metropolitan Areas, Canada, 1951-61

Census metropolitan area	Percentage changes in population[a]				Percentages of 1961 MA population			
	MA	Central city[b]	Other centres of 10,000+[c]	Remainder of MA[d]	MA	Central city	Other centres of 10,000+	Remainder of MA
All MAs	44.8	23.8	57.0	110.7	100	61.9	5.8	32.3
Atlantic	31.9	11.7	78.6	70.6	100	57.1	16.4	26.5
St. John's	32.4	20.4	—	72.8	100	70.0	—	30.0
Halifax	37.3	8.1	101.1	78.0	100	50.3	25.5	24.2
Saint John..................	22.0	8.6	29.5	57.5	100	57.7	14.5	27.8
Quebec	41.1	27.9	53.6	117.7	100	75.0	3.8	21.2
Montreal	43.3	30.9	71.9	141.9	100	79.6	3.1	17.3
Quebec	29.4	4.9	24.1	76.3	100	48.1	8.2	43.7
Ontario	45.8	15.5	54.5	116.3	100	53.4	4.4	42.2
Hamilton	41.0	21.8	148.5	103.7	100	69.3	11.9	18.8
Kitchener	44.1	53.5	31.2	31.0	100	61.9	18.0	20.1
London	40.6	40.9	—	35.9	100	93.5	—	6.5
Ottawa.....................	46.9	34.2	—	150.6	100	81.4	—	18.6
Sudbury	49.9	40.8	—	80.7	100	72.4	—	27.6
Toronto	50.7	- 0.5	30.7	125.0	100	36.8	3.9	59.3
Windsor	18.2	- 4.7	—	81.3	100	59.2	—	40.8
Prairies.....................	61.6	50.2	70.4	133.0	100	72.9	10.9	16.2
Winnipeg	33.4	12.6	70.4	78.6	100	55.8	25.0	19.2
Calgary	96.1	87.0	—	233.5	100	89.5	—	10.5
Edmonton	91.0	74.9	—	251.4	100	83.2	—	16.8
British Columbia	39.9	10.9	29.3	90.7	100	46.5	6.1	47.4
Vancouver..................	40.6	11.5	29.3	101.6	100	48.7	7.2	44.1
Victoria....................	36.2	7.0	—	60.3	100	35.6	—	64.4

a The 1961 areas of the MAs are held constant.

b Groups of incorporated centres are used in some cases: Montreal—all cities of 10,000 and over (in 1961) on Montreal Island; Kitchener—Kitchener and Waterloo; Ottawa—Ottawa, Hull and Eastview.

c As of 1951.

d Portion of MA outside of cities of 10,000 and over in 1951.

SOURCE: 1961 Census, DBS 92-535, Table 10.

at decennial rates exceeding 30 per cent. In sharp contrast, the parts of the 1961 MAs outside of incorporated centres of 10,000 and over grew by at least 60 per cent in each major region over the 1951-61 decade. In Quebec, Ontario and the Prairies the population in these areas more than doubled from 1951 to 1961, and it almost doubled in British Columbia (91 per cent growth). In the Atlantic region there was a 71 per cent increase in the MA population outside of incorporated centres of 10,000 and over (as of 1951). These observations indicate a very sharp intra-metropolitan redistribution of population over the 1951-61 decade in which the share of the central cities in the MA population declined by ten percentage points.

Intra-metropolitan redistribution of population at the expense of the central cities is by no means a peculiarity of the 1951-61 decade. A DBS report (DBS, 1956b, Table VII, pp. 2-14) indicates that the population in 15 1951 Census MAs grew by 15 per cent over the 1941-51 decade. The central cities of these 15 MAs grew by 15 per cent and the remaining parts grew by 64 per cent. However, these DBS (1956b, Table VII, pp. 2-14) data (Table 8.1 and Chart 6.1) suggest that the population redistribution took place at a faster rate in 1951-61 than in 1941-51.

Although the data in Charts 6.1 and 6.2 do not refer to metropolitan areas only, they do suggest that the intra-metropolitan redistribution of population may have accelerated sharply from 1931-41 to 1941-51. Between 1931 and 1941 the population in incorporated cities of 30,000 and over (as of 1931) grew by 10 per cent and the population in the census subdivisions adjacent to these cities grew by 21 per cent. In sharp contrast, the corresponding rates of growth from 1941 to 1951 were 15 per cent and 63 per cent, respectively. These observations suggest that while marked intra-metropolitan population redistribution at the expense of the central city may have predated the 1941-51 decade, this redistribution accelerated greatly in 1941-51 and increased again in 1951-61.

8.3 DEMOGRAPHIC COMPONENTS OF THE BROAD INTRA-METROPOLITAN DIFFERENTIALS IN THE POPULATION GROWTH RATE, 1951-61

Net migration is considerably more important than natural increase in accounting for the marked rate of intra-metropolitan population redistribution over the 1951-61 decade. Estimates prepared by DBS (1961 Census, DBS 99-512, Table X) for the 1961 MAs indicate that the central cities sustained a net migration loss which was one per cent of their 1951 population, while the remaining parts of the 1961 MAs had a net migration gain which was 69 per cent of their 1951 population. Such a high net migration ratio (69 per cent) would markedly affect the natural increase ratio for population in the parts of MAs outside of the central cities. Thus it is not surprising that the natural increase in these parts of MAs (28 per cent of the

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1951 population) was 11 percentage points higher than that in the central cities, as the DBS data show (Table 8.2). However, the differential in net migration ratios between the central cities and the remainder of the 1961 MAs was very much larger than that in the natural increase ratios. The above-mentioned DBS data indicate that 86 per cent of the differential in population growth between the central cities and the remainder of the 1961 MAs may be attributed to the direct impact of net migration.

Table 8.2 – Estimated Net Intercensal Migration and Natural Increase Ratios for the Central Cities and Remaining Parts of the 1961 Census Metropolitan Areas, Canada, 1951-61

NOTE.—DBS estimates (see source).

Metropolitan area[a]	Central city			Remainder of MA		
	1951 population[a] ('000)	1951-61 natural increase ratio[b]	1951-61 net migration ratio[b]	1951 population ('000)	1951-61 natural increase ratio	1951-61 net migration ratio
All MAs[c]	3,610	17.2	− 1.2	1,653	28.0	69.0
Atlantic	189	21.6	− 9.9	90	29.2	44.8
St. John's ...	53	27.2	− 6.9	14	36.7	39.1
Halifax......	86	20.0	− 11.9	48	32.7	56.4
Saint John ...	51	18.3	− 9.7	28	19.2	27.5
Quebec	1,186	18.0	− 3.0	485	26.7	58.6
Montreal.....	1,022	18.2	− 1.6	374	26.7	64.3
Quebec.....	164	16.6	− 11.8	111	26.5	39.4
Ontario[c]	1,313	14.3	− 6.1	661	31.0	78.4
Hamilton ...	220	18.3	0.6	53	35.4	95.1
London	96	15.4	− 6.3	33	29.9	102.4
Ottawa	202	17.7	15.0	90	34.7	43.9
Toronto	676	11.7	− 12.2	442	29.5	84.7
Windsor	120	15.0	− 19.8	44	34.1	47.2
Prairies	526	26.4	16.7	143	29.7	97.6
Winnipeg	236	14.7	− 2.1	118	23.2	51.3
Calgary	130	33.2	33.0	11	50.4	427.7
Edmonton....	160	38.2	31.1	14	69.1	240.4
British Columbia	396	9.9	1.0	274	21.6	57.9
Vancouver ...	345	10.2	1.3	217	23.8	63.0
Victoria	51	7.4	− 0.4	57	13.4	38.2

a Areas are based on the 1956 Census delineation of MAs (see source). Population figures may not add to totals due to rounding error.
b See Appendix F, Section F.4, for definition of these ratios.
c Parts of the requisite data for Kitchener and Sudbury MAs are unavailable.

SOURCE: 1961 Census, DBS 99-512, Table X.

Table 8.2 shows that the net intercensal migration ratio for 1951-61 was lower for the central city than for the remaining part of each 1961 MA,

and that, generally, the ratios for the latter areas were more than five times as high as those for the central cities. Six of the 15 incorporated central cities sustained net migration losses over the 1951-61 decade. The central cities of the Calgary and Edmonton MAs each sustained high net migration ratios of over 30 per cent and Ottawa had a ratio of 15 per cent. For each MA, the portion outside of the central city had a crude 1951-61 net migration ratio of over 25 per cent. This means that, through net migration alone, each of these 'non-central city' parts would have grown by one fourth over the 1951-61 decade. The crude net migration ratio exceeded 50 per cent in the 'non-central city' parts of nine of the 15 MAs; in Hamilton, Calgary, Edmonton and London it exceeded 90 per cent. These phenomenal ratios of net migration for a decade have probably produced rapid changes in the economic and social conditions of the respective areas and have led to serious problems in the provision and co-ordination of municipal services.

The observations made in this Section suggest that the 1951-61 migrational flows into the metropolitan areas were concentrated heavily on locations outside of the central cities, while an increasing proportion of former central city residents may have relocated to the suburbs of the central city. Common observation suggests that an atypically high proportion of these relocators consisted of families with two or more children, for whom the increasingly congested central city was undesirable.

8.4 SEX-AGE COMPOSITIONAL DIFFERENTIALS BETWEEN CENTRAL CITIES AND OTHER PARTS OF MAs, 1951-61

It is well known that there are marked differences in the socioeconomic and demographic composition of population among the various districts and neighbourhoods of cities and metropolitan areas. The socioeconomic characteristics of families partly determine their ability to compete for scarce residential space. In addition, the volume of residential space demanded by a given family depends partly on its size and age composition, and the various 'types' of residential space are unevenly distributed in a metropolitan area. It is well known, for example, that suitable space for a family with three young children is more likely to be found in the outskirts of the central city and in the adjacent suburban area than in the downtown section of the central city. As a result of the dependence of the ability to compete for residential space upon socioeconomic status and of the uneven areal distribution of the various 'types' of residential space, marked areal differentials in the composition of population may be expected. This expectation is borne out by common observation and by a number of studies (Schnore, 1965, as an example) dealing with intra-metropolitan differentials in population composition. The present Section reviews some of the available data concerning sex-age compositional differentials within the 1961 Census MAs.

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Table 8.3 supports the common observation that the parts of the 1961 MAs outside of the central cities contain considerably larger concentrations of families with young children than do the central cities themselves. For the whole group of MAs, the 'youth dependency' ratio for central cities was 45 per cent in 1961; the ratio in the other incorporated centres of 10,000 and over within the 1961 MAs was ten percentage points higher than that in the central cities. In the parts of the 1961 MAs outside of incorporated

Table 8.3 — Selected Statistics of the Sex-Age Composition for the Central Cities and Other Parts of the 1961 Census Metropolitan Areas, Canada and Major Regions, 1961

NOTE.—See footnotes to Table 3.1 for definitions of age distributional statistics.

Item	Canada	Atlantic	Quebec	Ontario	Prairies	British Columbia
			Central city[a]			
Masculinity ratio, all ages.	96.2	95.7	94.7	96.6	98.8	96.1
Masculinity ratio, 20-34 ...	97.7	102.9	94.7	99.7	98.7	99.9
Median age, males........	27.0	24.9	26.6	27.4	26.6	35.1
Median age, females	27.7	26.2	27.4	28.1	26.6	35.9
Youth dependency ratio....	44.9	48.7	44.2	44.8	49.8	37.8
Maturity ratio, 20-64	59.3	57.4	58.6	60.0	56.9	64.9
Old-age dependency ratio..	13.5	12.6	10.3	14.6	13.5	23.8
		Other incorporated centres of 10,000 and over				
Masculinity ratio, all ages.	98.1	100.9	97.0	· 97.6	97.8	98.7
Masculinity ratio, 20-34 ...	97.3	99.9	95.0	99.2	92.2	103.4
Median age, males........	25.9	24.4	22.2	27.3	25.7	27.7
Median age, females	26.3	24.3	23.5	27.8	26.2	28.6
Youth dependency ratio....	54.5	64.4	63.6	46.0	57.9	44.0
Maturity ratio, 20-64	60.0	55.1	57.8	61.4	61.3	62.9
Old-age dependency ratio..	11.4	9.0	8.2	11.8	11.9	16.9
		Remainder of MA[b]				
Masculinity ratio, all ages.	101.0	103.1	101.7	99.9	104.0	101.5
Masculinity ratio, 20-34 ...	95.9	99.5	95.2	95.0	96.6	98.8
Median age, males........	25.6	21.9	23.2	26.1	23.2	26.5
Median age, females	25.9	22.2	24.1	26.5	23.5	26.9
Youth dependency ratio....	60.1	70.4	66.1	56.1	71.6	59.3
Maturity ratio, 20-64	60.2	56.6	57.5	61.0	56.2	63.0
Old-age dependency ratio..	10.0	8.8	7.6	9.3	8.2	16.3

[a] Groups of incorporated centres are used in some cases: Montreal—all cities of 10,000 and over (in 1961) on Montreal Island; Kitchener—Kitchener and Waterloo; Ottawa—Ottawa, Hull and Eastview.
[b] Portion of MA outside of cities of 10,000 and over in 1951.

SOURCE: 1961 Census, DBS 92-542, Table 24.

centres of 10,000 and over, the 'youth dependency' ratio was 60 per cent, a full 15 percentage points higher than that in the central cities. This 60 per cent figure means that for every 10 persons aged 15-64 there were six persons aged 0-14 in the parts of the 1961 MAs outside of incorporated cities and towns of 10,000 and over.

In 1961 the 'old-age dependency' ratio was highest in the central cities (14 per cent) among the three categories of areas described above. This ratio for the central cities was three percentage points higher than that for the other incorporated centres of 10,000 and over, which, in turn, was one percentage point higher than that of the 1961 MA population outside of the incorporated centres of 10,000 and over.

With the highest 'old-age dependency' ratio and the lowest 'youth dependency' ratio, among the three categories of areas within the 1961 MAs, it is not surprising that the median age of population is highest in the central cities. At 28 years, the median age of the population in the central cities was two years higher than that in the remainder of the 1961 MAs.

As a result of the 'male-dominance' among children (mainly due to the strong tendency for the masculinity ratio at birth to range between 102 and 106) and of the high 'youth-dependency' ratio in the 'non-central city' parts of the MAs, one might expect the highest masculinity ratios in these parts of the 1961 Census MAs. This expectation is confirmed by Table 8.3. For the whole group of central cities in the 1961 MAs, the masculinity ratio for the total population was 96; for the other incorporated cities of 10,000 and over it was 98; and in the remaining parts of the 1961 MAs it was 101. This rank ordering of the three parts of the 1961 MAs in total-population masculinity ratio is observed in each of the major regions (Table 8.3).

In both the central cities and the remaining parts of the 1961 MAs, the age structure of population was 'younger' in 1961 than in 1951 (Table 8.4). For both areas, the median age of population declined slightly and the 'youth dependency' ratio increased sharply over the 1951-61 decade. However, this 'youthening' of population was somewhat more marked in the parts of the MAs outside of central cities than in the latter areas. In the central cities the median age of population declined by six tenths of a year (from 28.2 years to 27.6 years) and in the 'non-central city' parts of the MAs it declined by more than one full year (from 26.9 years to 25.8 years). The change in the 'old-age dependency' ratio was probably an important factor in this differential. In the central cities the 'old-age dependency' ratio increased from 12 per cent to 14 per cent over the 1951-61 decade but in other parts of the 1961 MAs it declined from 12 per cent to 11 per cent. In general, the marked intra-metropolitan redistribution of population over the 1951-61 decade resulted in a definite increase in the proportions of

older persons in the central-city populations and of younger persons in the populations of areas outside the central cities.

Table 8.4—Selected Statistics of the Age Composition for the Central Cities and Other Parts of Areas Approximating the 1961 Census Metropolitan Areas, Canada and Major Regions, 1951 and 1961

NOTE.—See footnotes to Table 3.1 for definitions of age distributional statistics.

Item		Canada[a]	Mari-times	Quebec	Ontario	Prairies	British Columbia
		Central city[b]					
Median age	1951	28.2	26.8	27.4	28.5	29.0	35.3
	1961	27.6	26.1	27.0	27.6	28.2	35.5
Youth dependency ratio..	1951	34.8	40.1	37.6	33.3	30.9	31.6
	1961	43.8	45.3	43.8	45.6	41.3	37.8
Old-age dependency ratio...............	1951	12.4	11.0	9.3	12.9	14.5	20.5
	1961	13.8	13.0	10.3	14.4	17.6	23.8
		Remainder of area					
Median age	1951	26.9	25.7	25.1	27.2	26.9	28.4
	1961	25.8	23.7	23.3	26.3	25.7	26.8
Youth dependency ratio..	1951	47.6	54.1	56.5	44.8	47.6	43.8
	1961	59.1	66.1	66.3	55.9	60.6	57.5
Old-age dependency ratio...............	1951	11.6	9.7	9.0	10.4	11.0	17.8
	1961	10.6	9.0	7.9	9.8	11.1	16.3

[a] Exclusive of St. John's, Nfld.
[b] Groups of incorporated centres are used in some cases: Montreal—all cities of 10,000 and over (in 1961) on Montreal Island; Kitchener—Kitchener and Waterloo; Ottawa—Ottawa, Hull and Eastview.

SOURCES: 1951 Census, Vol. I, Table 2.3; 1961 Census, DBS 92-542, Tables 22 and 24— DBS 92-525.

8.5 INTRA-METROPOLITAN DIFFERENTIALS IN THE AGE PROFILE OF NET MIGRATION RATIOS

8.5.1 FINDINGS FOR THE 1951-61 DECADE — Table 8.5 presents estimates of age-specific net migration ratios for the central cities and for the other parts of areas closely approximating the 1961 MAs. These data show a clear differential between the two categories, a differential which is sharpest among the ages in which families with two or more children are concentrated and is narrowest in the peak ages of labour force entry. In the age group 10-14 (in 1961) the ratio for the 'non-central city' parts of the areas closely approximating the 1961 MAs is 47 percentage points higher than that for the central cities, a differential that narrows to 21 and six

Table 8.5 – Net Migration Ratios by Age Group for the Central Cities and Other Parts of Areas Approximating the 1961 Census Metropoliton Areas, Canada and Major Regions, 1951-61

NOTE.—The estimation of net migration ratios is described in Appendix G, Section G.1.

Age at end of decade[a]	Canada[b]	Maritimes	Quebec	Ontario	Prairies	British Columbia
			Central city[c]			
10-14........	1.2	− 12.7	5.3	0.8	− 2.3	− 6.0
15-19........	11.4	16.1	14.7	7.8	20.4	3.9
20-24........	45.5	50.3	45.4	43.0	72.3	38.0
25-34........	18.1	− 17.8	25.6	17.0	1.8	17.4
35-44........	− 0.7	− 17.3	4.8	− 2.4	− 9.4	− 4.0
45-54........	− 1.2	− 8.8	2.9	− 4.7	− 4.8	1.5
55-64........	− 4.4	− 7.7	− 1.6	− 8.3	− 5.0	3.0
65 and over ..	3.6	1.3	4.3	1.5	2.4	9.3
10 and over ..	6.3	− 4.4	10.7	3.9	2.9	6.0
			Remainder of area			
10-14........	47.9	24.5	51.7	52.4	30.7	45.0
15-19........	32.4	14.7	32.6	37.2	23.1	28.8
20-24........	51.3	51.5	41.7	64.7	46.5	34.0
25-34........	110.7	86.6	93.7	133.4	95.4	87.2
35-44........	70.8	38.7	72.2	81.2	47.0	60.1
45-54........	36.2	15.8	33.4	43.5	22.5	30.7
55-64........	25.1	7.8	22.1	30.2	15.3	22.0
65 and over ..	23.2	15.0	21.0	26.5	18.6	21.3
10 and over ..	51.4	33.1	49.7	60.4	38.0	41.1

[a] These age groups are required by the age groupings in the source data.
[b] Exclusive of St. John's, Nfld.
[c] Groups of incorporated centres are used in some cases: Montreal — all cities of 10,000 and over (in 1961) on Montreal Island; Kitchener — Kitchener and Waterloo; Ottawa — Ottawa, Hull and Eastview.

SOURCES: 1951 Census, Vol. I, Table 2.3; 1961 Census, DBS 92-542, Tables 22 and 24; DBS 92-525; Keyfitz, 1931, Table 9; Keyfitz, 1950, Table 2.

percentage points in the age groups 15-19 and 20-24, respectively. The 20-24 age group has a high concentration of labour force entrants and young families with infants (Kasahara, 1965), and the net migration ratio for this age group was well over 40 per cent in *both* the central cities and the other parts of the areas approximating the 1961 MAs. In the age group 25-34, the areal differential jumps to its maximum value of 93 percentage points. Although the net migration ratio for persons aged 25-34 (in 1961) was 18 per cent in the central cities, it was 111 per cent in the 'non-central city' parts of the above-mentioned areas. This 111 per cent figure means that, from net migration alone, the population aged 25-34 (in 1961) doubled in the 'non-central city' parts of the areas closely approximating the 1961 MAs. In the next three age groups (35-44, 45-54 and 55-64) the central cities sustained

small net migration losses and the remainder of the areas approximating the 1961 MAs had net migration ratios in excess of 25 per cent. These data support the hypothesis that over the 1951-61 decade the net migration gains to the central cities of the 1961 MAs were highest among the age groups in which are concentrated persons who are either single or recently married, while the net migration gains to the remainder of the 1961 MAs were mainly concentrated among the age groups heavily weighted with families having young children. This hypothesis is supported by common observation and by data on the characteristics of migrants in the 1956-61 period (Kasahara, 1965). Table 8.5 shows that the relevant data for each of the five major regions support these findings for Canada as a whole. Additional materials on intra-metropolitan differentials are being prepared for the 1961 Census Monograph on internal migration.

8.5.2 HISTORICAL PERSPECTIVE FROM DATA FOR COUNTIES OR CENSUS DIVISIONS — From the foregoing discussion it seems clear that migration was much more important than natural increase in accounting for the intra-metropolitan population redistribution from 1951 to 1961, and that the age profile of the net migration for the central cities was markedly different from that for the other parts of the 1961 MAs. Table 8.6 and Charts 8.1 and 8.2 provide some of the historical perspective needed for interpreting the significance of these findings. Net migration estimates by sex and by five-year age group were prepared for (a) the counties containing selected 1961 MAs (Table 8.6) and (b) the central cities of these MAs. Then estimates of net migration by sex and age to the county areas *outside* of the central cities were obtained by simple subtraction involving the data in groups (a) and (b).

Chart 8.1 shows that the net migration ratios to the county areas outside of the central cities were considerably higher than those from the central cities only in 1941-51 and in 1951-61. It is abundantly clear that the differential between these two subdivisions of the selected counties attains an outstanding maximum in 1951-61. Equally interesting is the fact that the second highest sex-age specific levels of net migration for the county area outside of the central cities is in 1941-51 and not in 1921-31 as is the case with the central cities. The sex-age specific net migration ratios in 1921-31 were lower for the central cities than for the county areas outside of these cities. In 1931-41 there were no significant differences between the levels of sex-age specific net migration ratios for these two categories of areas.

Table 8.6 – Net Migration Ratios by Sex and Age Group for Selected Large Canadian Cities and for the Remaining Parts of their Surrounding Counties, 1921-31 to 1951-61

NOTE. – Net migration ratio is defined in Table 7.4, footnote c. The counties in parentheses are those containing the selected cities. In the following list of the relevant areal units, the name of each city is followed by the name of the surrounding county in parentheses. Halifax (Halifax), Saint John (Saint John), Montreal (Montreal and Jesus Islands), Quebec (Quebec), Kitchener (Waterloo), London (Middlesex), Ottawa (Carleton), Sudbury (Sudbury), Toronto (Halton, Ontario, Peel and York), Windsor (Essex).

Age at end of decade	1921-31		1931-41		1941-51		1951-61	
	Cities	Remainder of counties	Cities	Remainder of counties	Cities	Remainder of counties	Cities	Remainder of counties
	Males							
10-14....	12.0	26.6	6.9	8.1	− 4.5	31.2	− 2.2	44.3
15-19....	10.8	19.4	6.9	0.9	− 0.4	18.3	6.2	31.8
20-24....	25.1	19.6	10.9	− 1.2	13.1	21.3	37.3	46.5
25-29....	35.1	23.0	11.4	1.5	12.2	36.8	36.3	95.0
30-34....	26.9	39.0	3.0	9.9	− 0.1	46.8	8.0	107.4
35-39....	17.5	38.6	0.0	13.7	− 3.5	47.9	− 3.0	82.3
40-44....	11.1	30.3	− 1.6	8.6	− 1.4	36.3	− 2.6	56.2
45-49....	2.4	17.5	− 2.7	3.2	− 4.5	23.5	− 3.2	37.5
50-54....	4.2	15.5	− 1.9	3.1	− 1.0	20.3	− 2.3	30.9
55-59....	− 5.0	5.7	− 5.6	− 1.2	− 7.4	11.0	− 4.9	23.0
60-64....	− 6.0	4.5	− 5.9	0.6	− 7.2	7.7	− 8.2	16.0
65-69....	2.0	10.3	0.6	5.9	− 1.9	12.4	− 5.9	14.9
70-74....	− 1.5	7.4	− 1.3	3.4	− 2.3	10.4	− 5.2	14.8
75 and over	4.3	5.3	3.3	4.4	2.1	7.1	− 0.4	10.4
10 and over	12.8	21.0	2.6	4.4	0.1	25.7	3.7	46.8
	Females							
10-14....	13.5	25.4	7.6	7.8	− 3.7	30.1	− 2.0	44.0
15-19....	22.0	15.4	13.4	0.0	8.6	17.9	14.3	34.4
20-24....	45.8	22.6	27.7	0.9	26.4	25.8	52.9	64.8
25-29....	27.9	29.6	13.2	8.7	17.2	52.3	21.7	108.5
30-34....	5.4	35.4	− 3.6	10.1	− 4.4	51.7	− 5.7	104.0
35-39....	3.0	31.6	− 2.1	9.4	− 6.2	41.9	− 7.1	69.4
40-44....	4.4	22.6	0.2	5.3	− 3.9	29.5	− 6.4	44.7
45-49....	− 0.6	14.1	− 3.1	− 0.5	− 4.9	19.4	− 6.5	32.2
50-54....	3.5	14.3	− 0.4	0.8	− 1.6	16.3	− 4.6	27.5
55-59....	− 3.4	6.3	− 3.9	− 0.7	− 6.4	11.2	− 6.3	23.3
60-64....	− 2.6	6.4	− 2.6	1.5	− 6.8	8.2	− 9.8	18.1
65-69....	6.2	13.5	5.6	7.2	0.6	13.0	− 6.0	20.2
70-74....	3.8	8.7	6.6	4.9	3.1	13.3	− 1.3	24.4
75 and over	7.8	7.8	8.2	7.4	4.5	9.9	1.9	16.7
10 and over	12.0	20.3	5.2	4.6	1.9	26.8	1.8	47.6

SOURCES: DBS 84-510, 1947; DBS 84-512,1960; DBS 84-517, 1964: Keyfitz, 1931, Table 9; Keyfitz, 1950, Table 2; 1931 Census, Vol. II, Table 25; 1941 Census, Vol. II, Table 24; 1951 Census, Vol. I, Table 24; 1961 Census, DBS 92-542, Table 24; unpublished 1921 Census tabulations.

CHART 8.1

AGE PROFILES OF NET MIGRATION RATIOS FOR SELECTED LARGE CANADIAN CITIES[a] AND FOR THE OTHER PARTS OF THEIR SURROUNDING COUNTIES[b], 1921-31 TO 1951-61

CITIES

MALES

FEMALES

REMAINDER OF SURROUNDING COUNTIES

MALES

FEMALES

[a]See footnote b to Table 8.6   [b]See footnote a to Table 8.6   Source: Table 8.6

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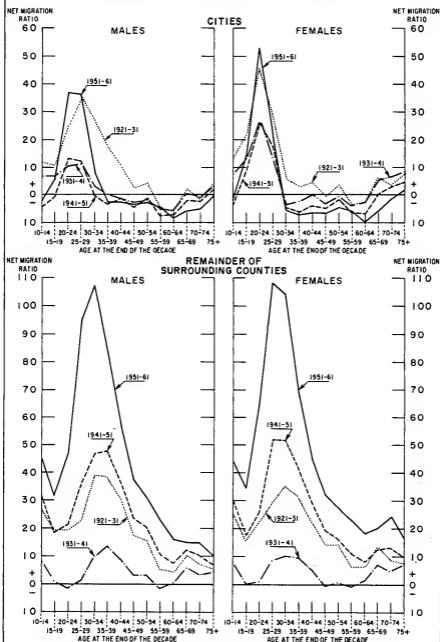
CHART 8.2

AGE PROFILES OF NET MIGRATION RATIOS FOR MONTREAL
AND TORONTO CITIES AND FOR OTHER PARTS OF
THEIR SURROUNDING COUNTIES[a], 1921-31 TO 1951-61
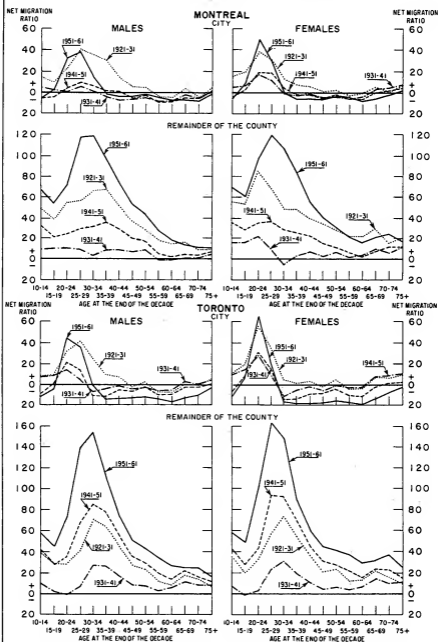
There is an additional notable differential between the central cities and the remaining county areas in regard to the age profile of net migration ratios. The peak value in the age profile of net migration ratios is observed at a later age in the parts of the counties outside of MA central cities than in the central cities themselves. The differential tends to be either five or ten years of age. Secondly, the net migration ratios to the right of the peak ratio do not decline (from the level of the peak ratio) as rapidly in the profiles for the county areas outside the MA central cities as in the profiles for the central cities themselves. This is particularly true of the females, and it reflects a persistent tendency for families with young children to be more heavily represented in the net migration to the county areas outside of the MA central cities than to the central cities themselves. This interpretation is borne out by the fact that the net migration ratios for persons aged 10-14 are considerably higher in the former areas than in the central cities for each decade since 1921-31.

Chart 8.3 indicates the pattern of temporal fluctuations in migration ratios for the county areas outside of central cities. Generally, the patterns are similar to those shown for the central cities in showing a sharp dip from 1921-31 to 1931-41 and marked increases in 1941-51 and in 1951-61. However, there are three notable differences between the two sets of patterns. Firstly, the 1941-51 and 1951-61 upswings in the sex-age specific net migration ratios for the county areas outside of the central cities are much sharper than those for the central cities themselves. Secondly, the ratios for the age groups 35-39 and 40-44 show generally downward trends from 1921-31 to 1951-61 in the central cities, while corresponding ratios in the outlying county areas share in the sharp 1941-51 and 1951-61 upswings in net migration ratios. Thirdly, the two age groups showing the sharpest decadal fluctuations in net migration ratios are 20-24 and 25-29 in the central cities, while they are 25-29 and 30-34 in the outlying county areas. These differentials are further suggestions of a historical shift in the intrametropolitan concentration of migrants above the age of 24 (at the end of each decade). Increasingly these migrants are choosing locations outside of the central cities.

Despite a relatively crude subdivision of the MA, or of an area approximating the MA, the data presented in this Chapter indicate marked and systematic intra-metropolitan differentials in population redistribution and in demographic composition. The areas outside of the central cities have markedly increased their share of the MA population. This increase is heavily concentrated among persons in the middle and younger ages. The age composition of the population outside of the central cities of the MAs contains a considerably larger proportion of young children than does the age composition of the central cities.

CHART 8.3

DECENNIAL CHANGES IN NET MIGRATION RATIOS FOR SELECTED
SEX-AGE GROUPS IN CERTAIN LARGE CANADIAN CITIES[a]
AND IN THE OTHER PARTS OF THEIR SURROUNDING COUNTIES,
1921-31 TO 1951-61
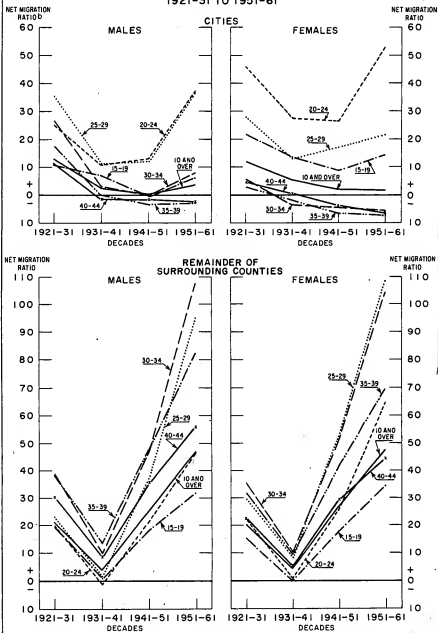
[a] See footnote b to Table 8.6   [b] See footnote a to Table 8.6   Source: Table 8.6

The intra-metropolitan population redistribution is mainly due to net migration. The net migration ratios for central cities are highest among persons in the peak ages of labour force entry, while the corresponding ratios for the MAs outside of the central cities are highest among the age groups where one is most likely to find the parents of two or more young children. On the whole, the central cities have had slight net migration losses over the 1951-61 decade, while the other parts of the 1961 MAs have had very high net migration gains. Among the 1961 MA central cities, only Calgary, Edmonton and Ottawa had moderate or high net migration gains, and nine of the 14 central cities (for which estimates have been presented) had net migration losses.

FOOTNOTES TO CHAPTER EIGHT

[1] It is desirable to examine intra-metropolitan differentials in greater detail than that which is provided by the traditional central city-metropolitan ring dichotomy. Due to limited time and space the more detailed examination may not be made in this monograph.

In this Chapter the author has followed, for the most part, the DBS designations of central cities. These are the incorporated areas of the largest centres in the MAs, and in some cases the author has amalgamated two or more adjacent incorporated centres under the heading of "central city". Shortage of time has prohibited a careful inspection of each case with a view to criticizing and modifying the DBS designations for the purposes of this monograph. So distinct and systematic are the differentials shown in this Chapter that there seems little doubt that they strongly reflect the more exact differentials that would have been shown through a more careful delineation of central city boundaries. It is questionable whether the increase in information yielded by the more exact differentials would have justified the cost of obtaining them.

[2] The net migration ratio is defined as the estimated net migration divided by the population at the beginning of the migration period. See Appendix F, Section F.4, for further details.

[3] The data required for a more extended historical study of intra-metropolitan differentials are not readily available. Within the 1951-61 decade there are relevant data available for census tracts and census subdivisions which are not used in this monograph. This omission is due to shortage of time and space.

[4] Because each MA is delineated somewhat arbitrarily (Appendix D), these regional comparisons must be made and accepted cautiously. For the same reason, comparisons of individual MAs is hazardous.
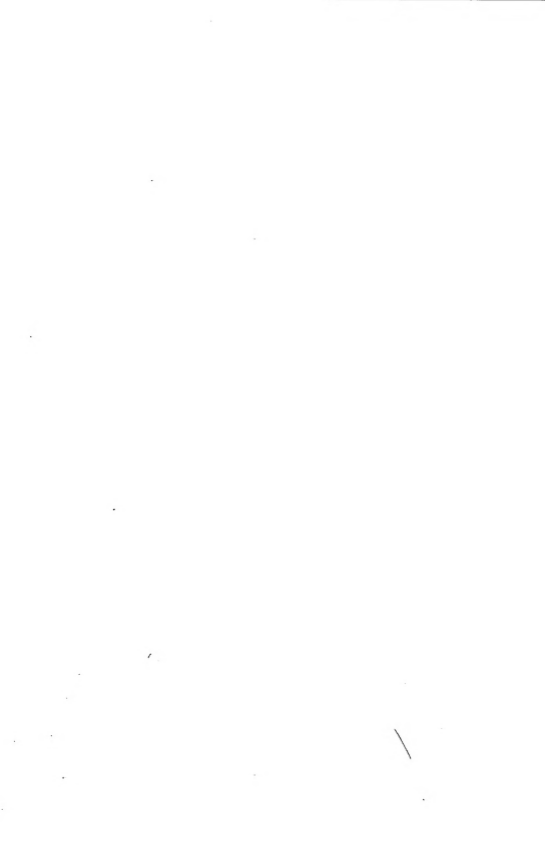
SKETCHES ON SOME DEMOGRAPHIC, SOCIAL AND ECONOMIC DIFFERENTIALS AMONG THE 1961 CENSUS METROPOLITAN AREAS

9.1 INTRODUCTION

In Chapters Six to Eight some emphasis has been placed on the treatment of metropolitan areas as a group, and on the contrasts between these and non-metropolitan areas. Despite the sharp and systematic nature of many of these contrasts they do not imply that the group of metropolitan areas consists of homogeneous units. The metropolitan areas are really quite heterogeneous and it is therefore appropriate to devote some attention to the differences among the 1961 MAs. This Chapter presents illustrations of such differences, in regard to selected demographic, economic and social variables. The MAs differ markedly and they are not easily classified into neat categories. They may fall neatly into meaningful groups on a given variable but when one moves to a quite different variable the grouping tends to shift markedly. This suggests that the inter-correlations among the selected variables are rather low for the 1961 MAs.[1]

This Chapter is divided into three broad parts. The first part preserves the focus upon demographic variables which has characterised the preceding chapters, while the second and third diverge somewhat from the concentration upon demographic patterns. The first part treats differentials among MAs, in regard to the historical pattern of population growth, to the relative importance of the components of the 1951-61 population growth rate, and to the sex-age structure of population.

For the second part of this Chapter, variables in the fields of ethnic origin, nativity, education and occupation are chosen as indicators of the socio-economic profile of an MA, and the major similarities and differences among the MAs in regard to these indicators are described.

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For the third major part of this Chapter, use has been made of the concept of *metropolitan function*. A city may be called a metropolis only if it is known (or assumed) to perform certain economic functions for other urban centres (cf. Gras, 1922, pp. 184-186). For example, the latter centres look to the metropolis for business services, as their primary source of wholesale goods, as the location for the head offices of many of their establishments, and as their main source of specialty goods and services which have relatively small and widely dispersed markets (e.g., scientific books). In providing such goods and services, the metropolis performs metropolitan functions (cf. Duncan et al., 1960, c.11).

In some cases it is possible to apply the concept of *metropolitan functions* to whole metropolitan areas. Indeed, as the concentration of business establishments outside of centre city (but still within the MA) increases, it becomes more and more necessary to look at the performance of metropolitan functions among metropolitan areas. Establishments located within Toronto MA but outside of Toronto city may perform important business services for establishments located in the Winnipeg MA, for example.

The third part of this Chapter is based on the assumption that each of the MAs performs metropolitan functions. Important among these functions are commercial and business service activities that develop by virtue of the economic linkages among Canadian urban agglomerations. The performance of metropolitan functions is partly reflected by such variables as wholesale sales per capita and business service receipts per capita (cf., Duncan et al., 1960, c. 11). It is assumed that if area A ranks higher than area B on such variables this rank ordering is *a partial* indication that area A is more highly specialized than area B in the performance of metropolitan functions. Given this assumption, the scores for MAs on the selected variables may be used as rough indicators for suggesting the hierarchy of MAs regarding specialization in the performance of metropolitan functions. Thus, in the third part of the present Chapter, the 1961 MAs are located among designated levels in a hierarchy pertaining to the performance of metropolitan functions. This Chapter also considers differentials among the 1961 MAs in regard to certain features of the industry-group distribution of the 1961 labour force, associating these differentials with those appearing in the data on wholesale sales and business service receipts per capita.

9.2 POPULATION SIZE AND GROWTH, 1901-1961

The 1961 MAs ranged in population size from an agglomeration of somewhat less than 100,000 (Saint John MA) to one of more than 2,000,000 (Montreal MA); the average size of the 17 MAs was 480,000 (Table 9.1).

Table 9.1—Population in Census Metropolitan Areas, Canada, 1961

NOTE.—See Appendix D for the 1961 Census definition of "metropolitan area".

Metropolitan area	1961 population[a]
	'000
Calgary	279
Edmonton	338
Halifax	184
Hamilton	395
Kitchener	155
London	181
Montreal	2,110
Ottawa	430
Quebec	358
Saint John	96
St. John's	91
Sudbury	111
Toronto	1,824
Vancouver	790
Victoria	154
Windsor	193
Winnipeg	476
All MAs	8,164
Average population	480

[a] Figures do not add to the total due to rounding error.

SOURCE: 1961 Census, DBS 99-512, Table VII.

In terms of their population sizes in 1961 the 17 MAs form five clusters of areal units (Chart 9.1). At the upper end are Montreal and Toronto, the only MAs with at least 1,000,000 persons (Table 9.1). Among the remaining MAs, Vancouver was the only one that exceeded 500,000. Lower down the size range is a cluster of six MAs with populations in the 250,000-500,000 size group (Winnipeg, Ottawa, Quebec, Edmonton, Hamilton and Calgary) and another cluster of six MAs with populations in the 150,000-200,000 size group (Windsor, Halifax, London, Victoria, Kitchener and Sudbury). Finally, standing by themselves with populations just below 100,000 are the Saint John (New Brunswick) and St. John's (Newfoundland).

Regional groupings emerge when one compares the curves of decennial population growth rates for areas that closely approximate the 1961 Census MAs. These areas are the Principal Regions of Metropolitan Development (PRMDs) defined in Chapter Six, Table 6.2. Four groupings of PRMDs are shown in Chart 9.2—the first group located in the Prairies, the second containing the Central Canada giants of Montreal, Toronto, Ottawa and Hamilton, the third containing three additional Central Canada Regions (London,

Kitchener-Waterloo and Windsor) and the fourth group formed by Quebec, Halifax and Saint John.[2]

CHART 9.1

RELATIVE POPULATION SIZES OF THE CENSUS METROPOLITAN
AREAS IN CANADA, 1961

ST. JOHN'S   SAINT JOHN

Source: Table 9.1
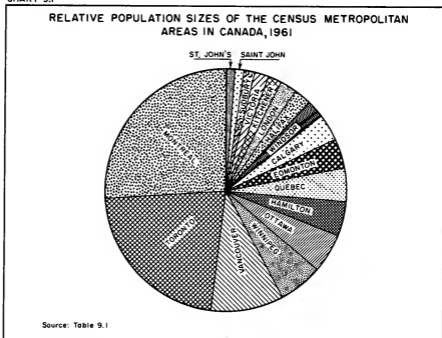
Striking similarities are shown by the Prairie Regions of Metropolitan Development (RMDs) in the pattern of the decennial growth rate of population from 1901-11 to 1951-61 (Chart 9.2). These Regions had by far the highest rates of population growth over the 1901-11 decade—an observation which is consistent with the rapid settlement of the Prairies in this decade—the lowest rates of population growth in the depressed 1931-41 decade, and the sharpest upturn in these rates since 1931-41. Thus, among all the RMDs, the Prairie group showed the most marked fluctuations in population growth rates since 1901-11, which is perhaps a reflection of the relatively short history of Prairie settlement.

The areas closely approximating the 1961 MAs of Montreal, Toronto, Ottawa and Hamilton were approximately similar in the pattern of the decennial rate of population growth from 1901-11 to 1951-61. Generally, these areas shared in the unusually high rates of population growth in 1901-11, although their growth rates in that decade were considerably lower than those of the Prairie Regions. The above-mentioned Central Canada Regions showed mainly downward trends from 1901-11 to 1931-41 and then marked upturns from 1931-41 to 1951-61. Again, these trends are not as striking as those shown by the Prairie Regions (Chart 9.2).

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CHART 9.2

DECENNIAL POPULATION GROWTH RATES FOR THE PRINCIPAL REGIONS OF METROPOLITAN DEVELOPMENT°, CANADA, 1901-11 TO 1951-61

PER CENT
40

QUEBEC   HALIFAX

20

SAINT JOHN

0

1901-11   1921-31   1941-51
    1911-21   1931-41   1951-61
          DECADES

120

100

80

WINDSOR

60

40

LONDON

KITCHENER

20

0

1901-11   1921-31   1941-51
    1911-21   1931-41   1951-61
          DECADES

60

TORONTO

40

MONTREAL

OTTAWA

20

HAMILTON

0

1901-11   1921-31   1941-51
    1911-21   1931-41   1951-61
          DECADES

PER CENT
580

560

540

CALGARY

520

240

220

200

180

100

EDMONTON   80

60

40

WINNIPEG   20

0

1901-11   1921-31   1941-51
    1911-21   1931-41   1951-61
          DECADES

° These Regions are defined in footnote o to Table 6.2   Source: Same as Table 6.2

Among the three remaining Central Canada RMDs (London, Kitchener-Waterloo and Windsor), London and Kitchener-Waterloo Regions show generally similar curves for the decennial rate of population growth from 1901-11 to 1951-61. Neither shared in the unusually high rates of population growth of the 1901-11 decade and the downward trend from 1901-11 to 1931-41 was much more moderate here than in the Regions of the largest Central Canada MAs (Montreal, Toronto, Ottawa and Hamilton). Between the 1941-51 and 1951-61 decades the Kitchener-Waterloo RMD had a markedly sharper upturn in the decennial rate of population growth than the London Region. The Windsor RMD is highly atypical among the areas for which data are shown in Chart 9.2; unlike the other areas it had its highest decennial rate of population growth in 1921-31, and recorded a decline from 1941-51 to 1951-61.

Similar historical patterns in the decennial rate of population growth are shown by the areas approximating the 1961 MAs of Quebec, Halifax and Saint John. None of these areas showed anything more than a moderate rate of population growth over the climactic 1901-11 decade. The Halifax and Saint John Regions had unusual upturns in the decennial rate of population growth from 1921-31 to 1931-41 but not one of the Three Regions had a sharp upturn between 1941-51 and 1951-61.

Thus, the areas closely approximating the 1961 MAs show marked regional groupings in regard to the historical pattern of the decennial growth rate of population, probably reflecting the differing economic histories of Canada's major regions. No doubt these areas have had large roles in the economic histories of Canada's major regions (cf. Wilson, Gordon and Judek, 1965, c. 5; Economic Council, 1965, c. 5).

9.3 COMPONENTS OF POPULATION GROWTH, 1951-61

Four groups of census MAs may be identified in discussing percentage of the 1951-61 population growth attributable to net migration (Table 9.2). In three of the four far-western MAs (Calgary, Vancouver and Victoria) over 60 per cent of the 1951-61 population growth may be attributed to net migration; the fourth of the far-western MAs (Edmonton) joins Toronto, Ottawa and London in forming the group with 50 to 60 per cent. Those for which the percentage lies between 34 and 50 cover an area stretching from the East Coast to the mid-West (Halifax, Montreal, Hamilton and Winnipeg); and of the four showing less than 34 per cent of the 1951-61 population growth due to net migration, three are located in the eastern half of Canada (St. John's, Saint John and Quebec), the fourth being Windsor.

The inter-metropolitan variation in the rate of population growth over the 1951-61 decade is primarily due to the inter-metropolitan variation in net

Table 9.2—Components of Population Growth for the 1961 Census
Metropolitan Areas, Canada, 1951-61

Metropolitan area[a]	Percentage change in population 1951-61	Natural increase ratio[b] 1951-61	Net migration ratio[b] 1951-61	Relative importance of net[c] migration
	A	B	C	D
Calgary	97.3	34.5	62.8	64.5
Edmonton	88.4	40.7	47.7	54.0
Halifax...............	37.3	24.6	12.7	34.1
Hamilton	40.6	21.6	19.0	46.8
London...............	40.6	19.1	21.4	52.8
Montreal..............	36.5	20.5	16.1	44.0
Ottawa...............	46.9	23.0	23.9	51.0
Quebec...............	29.4	20.6	8.8	30.0
Saint John............	22.0	18.6	3.4	15.5
St. John's	32.2	29.2	3.0	9.3
Toronto	44.9	18.8	26.1	58.1
Vancouver............	40.6	15.5	25.1	61.8
Victoria..............	30.4	10.6	19.9	65.3
Windsor	18.2	20.1	- 1.9	8.6
Winnipeg	33.3	17.6	15.7	47.2
All MAs	41.4	20.6	20.9	50.4

a Parts of the requisite data are not available for the Kitchener and Sudbury MAs.
b See Appendix F for the definition of these ratios. B + C = A, barring rounding error.
c See Table 5.1, footnote[6].

SOURCE: 1961 Census, DBS 99-512, Table x.

migration. Chart 9.3 shows only moderate differentials among the metropolitan areas in regard to the 1951-61 natural increase ratio, and marked intermetropolitan differentials in the net migration ratio. Generally, the 1951-61 natural increase ratio for the MAs ranges between 15 per cent and 25 per cent, the major exceptions being the higher ratios for Calgary MA and Edmonton MA and a lower ratio for Victoria MA. The figures in excess of 30 per cent for Calgary and Edmonton are probably due to the very high net in-migration ratios shown by these MAs' and the unusually low natural increase ratio of under 15 per cent shown by Victoria reflects its relatively high percentage of persons at least 45 years of age (who are mostly beyond the child-bearing ages). In 1961, 35 per cent of the Victoria MA population were at least 45 years old, compared with 26 per cent for all the census MAs. The figure for Victoria is the highest among the MAs '(1961 Census, DBS 92-542, Table 24).

The 1951-61 net migration ratio ranges from very high values of over 60 per cent in Calgary MA and 48 per cent in Edmonton to very low figures for Quebec MA, Saint John MA, St. John's MA, and Windsor MA (Chart 9.3).

CHART 9.3

COMPONENTS OF THE POPULATION GROWTH RATE, 1961 CENSUS METROPOLITAN AREAS, IN CANADA, 1951-61

Source: Table 9.2

180
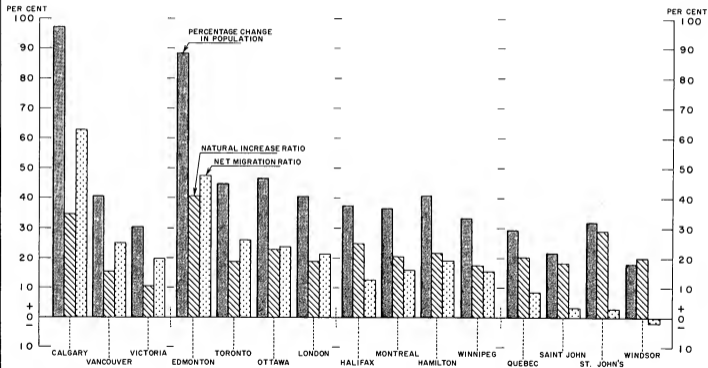
9.4 SEX-AGE COMPOSITION OF POPULATION, 1961

There are marked differences in the sex-age composition of population among the 1961 MAs. The inter-metropolitan variation is much sharper in the age distribution (by sex) than in the masculinity ratios by age.

Generally, the masculinity ratios for the 1961 MAs fail to show marked tendencies either toward 'male dominance' or 'female dominance'.[4] For the total population, the masculinity ratios range from 93 in Quebec MA to 107 in Sudbury MA. Along with Sudbury MA, only Halifax MA, Edmonton MA and Calgary MA had masculinity ratios in excess of 100 (Table 9.3) in 1961. Generally, the MAs located to the east of Toronto had lower masculinity ratios than those located to the west of Toronto.

Table 9.3 — Selected Statistics of the Sex-Age Composition of Population, Census Metropolitan Areas, Canada, 1961

NOTE.—See footnotes to Table 3.1 for the definitions of age distributional statistics.

Metropolitan area	Masculinity ratio		Median age		Dependency ratio	
	All ages	Persons aged 20-34	Males	Females	Youth	Old age
Calgary	101	99	26.8	26.7	57	12
Edmonton	102	97	25.8	25.2	59	10
Halifax	101	108	24.3	25.4	54	9
Hamilton	99	96	28.5	29.4	53	13
Kitchener	98	100	27.5	28.8	53	13
London	96	94	28.4	29.6	50	14
Montreal	97	96	27.3	28.5	49	10
Ottawa	96	99	25.3	27.3	56	11
Quebec	93	89	24.8	27.1	51	10
Saint John	97	95	26.3	28.4	56	15
St. John's	95	92	22.2	22.8	63	11
Sudbury	107	106	24.1	22.4	63	6
Toronto	98	98	29.8	30.8	46	12
Vancouver	99	98	31.4	32.2	48	18
Victoria	97	109	31.4	35.6	49	28
Windsor............	99	94	28.1	28.9	56	14
Winnipeg..........	97	97	28.7	29.6	49	15

SOURCE: 1961 Census, DBS 92-542, Table 24.

The inter-metropolitan variation in masculinity ratios increases when one focuses upon the population in the early years of working life and in the peak ages of family formation (ages 20-34). In the latter age group the 1961 masculinity ratio was as low as 89 in Quebec MA, which means that in the 1961 MA of Quebec there were 89 men per 100 women among persons aged 20-34. Relatively low masculinity ratios (94 or 95) were also shown for the

20-34 age group by London MA, Windsor MA and Saint John MA in 1961. At the opposite end of the range of masculinity ratios for persons aged 20-34 is the figure of 109 shown by Victoria MA (Table 9.3).

Among the 1961 MAs, the median age of population was lowest in Sudbury and highest in Victoria. Seven years of age separate the 1961 median age of males in Sudbury MA (24 years) from that in Victoria MA (31 years). The differential in the median age of females between Sudbury MA (22 years) and Victoria MA (36 years) is twice as large. Table 9.3 shows clearly that the age structures of the 1961 MAs range from relatively 'young' to relatively 'old' structures.⁵ Those with the 'oldest' sex-age structures are Vancouver, Victoria and Toronto. In 1961 each of these populations had a median age of at least 30 years, and in none of these populations did the number of persons aged 0-14 amount to one half of the number of persons aged 15-64. Vancouver and Victoria had by far the highest 'old age dependency' ratio; in Victoria MA persons aged 65 and over exceeded in number one fourth of the persons aged 15-64 (Table 9.3). The 'youngest' age structures are shown by St. John's, Sudbury and Halifax; in none of which was the 1961 median age above 25 years. These areas also had lower-than-average 'old age dependency' ratios and higher-than-average 'youth dependency' ratios.

CHART 9.4

'YOUTH DEPENDENCY' RATIO⁰ FOR THE CENSUS METROPOLITAN AREAS IN CANADA, 1961

⁰ 100 (Persons aged 0-14 / Persons aged 15-64)
Source: DBS 92-542, 1961 Census, Table 3.
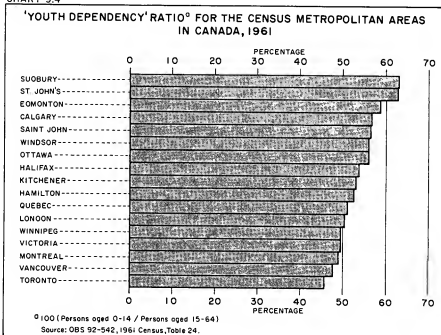
Between the two groups of relatively 'old' and relatively 'young' sex-age structures for 1961 MAs, one may identify one group of 'older' populations and another of 'younger' populations (Table 9.3 and Chart 9.4). The group of 'older' populations is comprised by Hamilton, Winnipeg, London, Windsor and Montreal; in this group the 1961 median age was about 28 years and the 'youth dependency' ratio varied mainly between 50 per cent and 56 per cent. The group of 'younger' populations is comprised by Calgary, Edmonton, Ottawa, Quebec and Saint John; in this group the median age was about 26 years and the 'youth dependency' ratio lies mainly between 56 per cent and 59 per cent.

9.5 DIFFERENTIALS IN ETHNIC GROUP AND NATIVITY COMPOSITION, 1961

The 1961 MAs include populations reporting very heavy concentrations of persons of British Isles origin, populations overwhelmingly of French origin, and populations with quite heterogeneous ethnic origin composition. Some of the MAs have populations with very small proportions of foreign born outside Canada while others contain substantial percentages of foreign-born persons.

In regard to the distribution of population among the four ethnic origin categories indicated in Chart 9.5, four groups of MAs may be identified. In the MAs of St. John's, Halifax, Saint John, London and Victoria at least 70 per cent of the 1961 population was reported as being of British Isles origin. As expected, Montreal and Quebec MAs had heavy concentrations of persons of French origin in 1961 — 60 per cent and 80 per cent, respectively. In Ottawa and Sudbury high proportions were either of British Isles or of French ethnic origin but there was no overwhelming predominance of either one of these groups. The remaining MAs showed substantial concentrations of persons who were neither British Isles nor French in ethnic origin. Kitchener is outstanding in this respect, having more than one half of its 1961 population comprised of persons reported as neither British Isles nor French in ethnic origin. Edmonton and Winnipeg follow with over 40 per cent of their populations outside the British Isles or French categories. The corresponding percentage was over 30 per cent in the MAs of Hamilton, Toronto, Windsor and Vancouver.

The ethnic group composition of a population may be said to be heterogeneous to the extent that no single ethnic group is predominant. In terms of the four categories (Chart 9.5), it would appear that the most ethnically heterogeneous of Canada's MAs in 1961 were Windsor, Kitchener, Edmonton and Winnipeg. The most ethnically homogeneous were St. John's, Quebec, Victoria, Saint John and Halifax.

CHART 9.5

DISTRIBUTION OF POPULATION AMONG FOUR ETHNIC ORIGIN CATEGORIES,
CENSUS METROPOLITAN AREAS IN CANADA, 1961

PER CENT

OTHER ORIGINS

ITALIAN, POLISH,
UKRAINIAN, RUSSIAN
FRENCH ORIGIN

BRITISH ISLES ORIGIN

ST. JOHN'S   VICTORIA   HALIFAX   QUEBEC   SUDBURY   EDMONTON   HAMILTON   WINDSOR   CALGARY
   SAINT JOHN   LONDON   MONTREAL   OTTAWA   KITCHENER   WINNIPEG   TORONTO   VANCOUVER
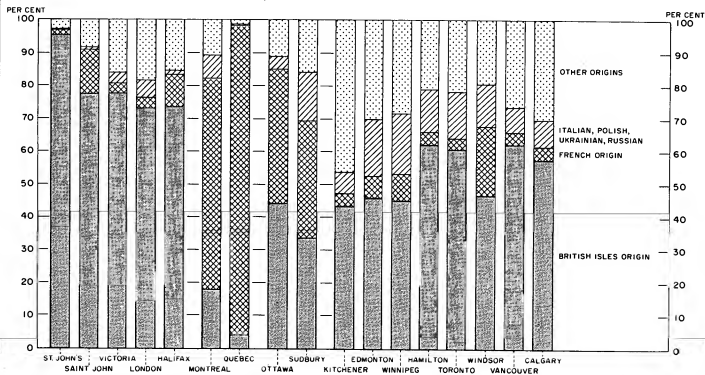
Source: DBS 92-545, 1961 Census, Table 39.

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The 1961 MAs also vary widely in nativity composition (Chart 9.6). Less than two per cent of the 1961 population of Quebec MA and less than 10 per cent of the populations of the St. John's, Halifax and Saint John MAs were comprised of foreign-born persons. At the opposite extreme, one third of the 1961 Toronto MA population and at least one fourth of the population of the MAs of Hamilton, Calgary, Vancouver and Victoria were persons born outside of Canada.

CHART 9.6

PER CENT OF POPULATION BORN OUTSIDE CANADA, CENSUS METROPOLITAN AREAS IN CANADA, 1961

PERCENTAGE

	0	5	10	15	20	25	30	35
TORONTO								
VICTORIA								
VANCOUVER								
HAMILTON								
CALGARY								
WINNIPEG								
EDMONTON								
WINDSOR								
LONDON								
KITCHENER								
SUDBURY								
MONTREAL								
OTTAWA								
HALIFAX								
SAINT JOHN								
ST. JOHN'S								
QUEBEC								

PERCENTAGE

Source: DBS 92-547, 1961 Census, Table 55
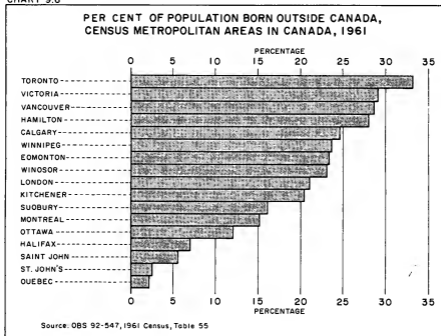
9.6 EDUCATIONAL ATTAINMENT AND THE CONCENTRATION OF THE MALE LABOUR FORCE IN PROFESSIONAL AND TECHNICAL OCCUPATIONS, 1961

Among persons aged 25-44 (who were not attending school), the percentage with some university training in 1961 ranged from seven in Sudbury MA to 19 in Ottawa MA. In addition to Ottawa MA, both Vancouver and Calgary MAs had at least 15 per cent of their populations aged 25-44 (and not attending school) with some university training. As Chart 9.7 shows, the proportion was less than 10 per cent in the MAs of St. John's, Halifax, Kitchener, Hamilton and Sudbury.

CHART 9.7

PERCENTAGE WITH SOME UNIVERSITY TRAINING AMONG MALES AGED 25-44 WHO ARE NOT ATTENDING SCHOOL, CENSUS METROPOLITAN AREAS IN CANADA, 1961

PERCENTAGE

OTTAWA
CALGARY
VANCOUVER
VICTORIA
WINNIPEG
HALIFAX
EDMONTON
TORONTO
MONTREAL
QUEBEC
LONDON
WINDSOR
HAMILTON
ST. JOHN'S
SAINT JOHN
KITCHENER
SUDBURY
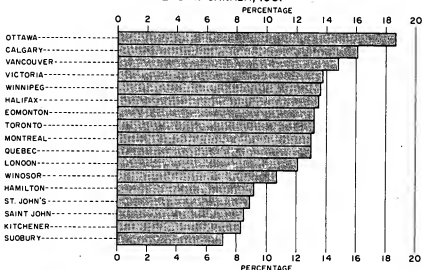
PERCENTAGE

Source: DBS 92-550,1961 Census, Table 76.

CHART 9.8

PERCENTAGE OF THE MALE LABOUR FORCE IN PROFESSIONAL AND TECHNICAL OCCUPATIONS, CENSUS METROPOLITAN AREAS IN CANADA, 1961

PERCENTAGE

OTTAWA
CALGARY
QUEBEC
TORONTO
EDMONTON
MONTREAL
LONDON
VICTORIA
VANCOUVER
WINNIPEG
WINDSOR
ST. JOHN'S
HAMILTON
HALIFAX
SAINT JOHN
KITCHENER
SUDBURY

PERCENTAGE
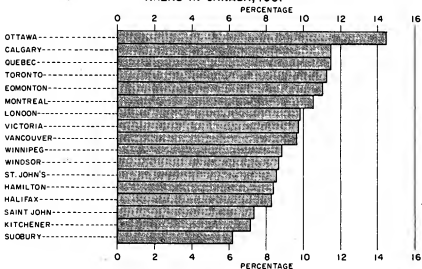
Source: DBS 94-504,1961 Census, Tables 7 and 8.

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Generally, the level of educational attainment in the 1961 MAs is positively associated with the concentration of the male working force in professional and technical occupations. Chart 9.8 shows that in 1961 this concentration was highest (among the census MAs) in Ottawa, Toronto, Calgary, Edmonton, Montreal and Quebec. In these MAs, 11 to 14 per cent of the male labour force consisted of persons classified in professional and technical occupations. The proportion was, at most, eight per cent in the MAs of Halifax, Saint John, Hamilton, Kitchener and Sudbury.

9.7 LOCATION OF MAs IN A HIERARCHY IN REGARD TO THE PERFORMANCE OF METROPOLITAN FUNCTIONS, 1961

Population centres provide goods and services for each other. Thus they may be said to perform economic functions for each other. Among these functions are the metropolitan functions, which involve essentially the performance of commercial and business services by one centre on behalf of another (cf., Gras, 1922, Duncan et al., 1960, c. 11). It would seem that the most sensitive indicators of the performance of metropolitan functions among a set of urban agglomerations would be provided by the data on flows of commodities and services among the centres. Unfortunately the existing census data do not provide this type of information.

However, it has been indicated (cf., Duncan et al., 1960, c. 11) that certain features of the economy of an urban agglomeration partly reflect specialization in the performance of metropolitan functions. Particularly useful in this connection are data on the performance of business services and on wholesale trade. Using such data, it is possible to develop *partial* indices of specialization in performance of metropolitan functions, and to rank metropolitan areas according to their values on such indices. This rank ordering *suggests* the hierarchy of the areas regarding specialization in the performance of metropolitan functions.

Chart 9.9 shows the value of business service receipts per person aged 15 and over in the 1961 business year for 17 census MAs. Chart 9.10 shows the value of wholesale sales per capita in the same period for the *counties or census divisions* containing the 1961 MAs.[6] Both charts show a similar pattern of areal differentials. Toronto, Montreal, Vancouver and Calgary regions (MA in the case of Chart 9.9 and county in the case of Chart 9.10) are at the top of the hierarchy in both charts. The census division comprising Winnipeg MA,[7] shows the highest value on wholesale sales per capita but Winnipeg MA is not at the top of the hierarchy on the business services receipts index. Other MAs showing relatively high values are Saint

John, Edmonton, London, Quebec and Windsor. At the bottom of the hierarchy of MAs are Kitchener, Victoria and Sudbury, these areas having the lowest values on the business services receipts and wholesale sales indexes. Just above these areas in the hierarchy of MAs are Halifax, Hamilton, Ottawa and St. John's.

Thus, Charts 9.9 and 9.10 *suggest* that 17 census MAs may be placed on at least four levels in the hierarchy of MAs regarding specialization in the performance of metropolitan functions in 1961. (There is probably a hierarchy of MAs *within* each of these levels but more data and study are needed in order to identify this hierarchy with adequate assurance.) The four levels are: *First (top) level*—Toronto, Montreal, Vancouver, Calgary, Winnipeg; *Second level*—Edmonton, Saint John, London, Quebec, Windsor; *Third level*—Hamilton, Halifax, Ottawa, St. John's; and *Fourth level*—Kitchener, Victoria, Sudbury.

CHART 9.9

BUSINESS SERVICE RECEIPTS PER 100 PERSONS AGED 15 AND OVER, CENSUS METROPOLITAN AREAS IN CANADA, 1961
(RECEIPTS OVER THE 1961 BUSINESS YEAR)

DOLLARS PER PERSON

Source: DBS 97-517, 1961 Census, Table 29.
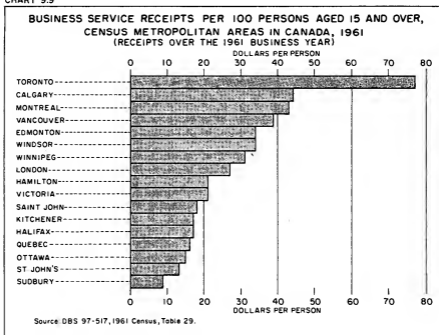
The grouping is markedly associated with the grouping observed when one studies inter-metropolitan differentials in the distribution of the labour force by industry group. In viewing these differentials we shall first look at the industry groups in which the performance of metropolitan functions is likely to be concentrated. As mentioned above, it is assumed that metropolitan functions essentially involve the exchange of goods and services among

urban agglomerations (cf., Gras, 1922, pp. 184-186). The work of Duncan et al., (1960, c. 11) for the United States strongly suggests that the principal industrial activities which reflect metropolitan functions are in the fields of finance, wholesale trade and business services and of somewhat lesser importance is the sub-group of fabricating industries within the group of manufacturing.

CHART 9.10

WHOLESALE SALES PER CAPITA FOR COUNTIES AND CENSUS DIVISIONS CONTAINING THE CENSUS METROPOLITAN AREAS IN CANADA, 1961
(SALES OVER THE 1961 BUSINESS YEAR)

THOUSANDS OF DOLLARS PER PERSON

	0	0.4	0.8	1.2	1.6	2.0	6.8	7.0	7.2

DIVISION NO. 20 (MAN)	WINNIPEG
YORK	TORONTO
DIVISION NO. 4 (B.C.)	VANCOUVER
DIVISION NO. 6 (ALTA)	CALGARY
MONTREAL AND JESUS ISLAND	MONTREAL
QUEBEC	QUEBEC
DIVISION NO. 11 (ALTA)	EDMONTON
ST JOHN CO.	SAINT JOHN
MIDDLESEX	LONDON
HALIFAX CO.	HALIFAX
WENTWORTH	HAMILTON
CARLETON	OTTAWA
DIVISION NO. 1 (NFLD)	ST. JOHN'S
WATERLOO	KITCHENER-WATERLOO
ESSEX	WINDSOR
SUDBURY	SUDBURY
DIVISION NO. 5 (B.C.)	VICTORIA

	0	0.4	0.8	1.2	1.6	2.0	6.8	7.0	7.2

THOUSANDS OF DOLLARS PER PERSON

Source: DBS 97-512, 1961 Census, Table 8.1.

In the following discussion, the industry groups of (a) wholesale trade, (b) finance, insurance and real estate, (c) business services and (d) fabricating industries (listed in Table 9.4) will be considered the principal indicators of the concentration of the labour force in industries that are sensitive to the performance of metropolitan functions. The proportion of the labour force in these industry groups is a convenient measure of such concentration. In order to sharpen the inter-metropolitan differentials, this proportion may be related to that for Canada as a whole. The proportion for a particular MA is divided by that for all of Canada and the resulting ratio indicates the extent to which the labour force concentration (in the selected industry group) for the MA departs from that for Canada. This ratio is called the "location quotient", and it usefully reflects regional variations in industry structure (of the labour force in this case).

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Table 9.4 – Selected Location Quotients[a] Regarding the Industry-Group Distribution of the Labour Force, Census Metropolitan Areas, Canada, 1961

Metropolitan area	Industry groups[b] showing the four highest location quotients			
	Highest	2nd highest	3rd highest	4th highest
Calgary	Mines, quarries, oil wells (3.4)	Storage (2.7)	Wholesale trade (2.0)	Finance, insurance and real estate (1.4)
Edmonton	Wholesale trade (1.8)	Public administration and defence (1.5)	Services to business management (1.4)	Construction industry (1.4)
Halifax	Public administration and defence (4.0)	Health and welfare services (1.4)	Communication (1.4)	Wholesale trade (1.2)
Hamilton	Fabricating industries in manufacturing (1.9)	Other manufacturing (1.8)	Health and welfare services (1.1)	Retail trade (1.1)
Kitchener	Other manufacturing (2.3)	Fabricating industries in manufacturing (1.8)	Finance, insurance and real estate (1.4)	Retail trade (1.1)
London	Health and welfare services (1.9)	Finance, insurance and real estate (1.7)	Fabricating industries in manufacturing (1.3)	Wholesale trade (1.2)
Montreal	Fabricating industries in manufacturing (1.9)	Services to business management (1.5)	Finance, insurance and real estate (1.5)	Transportation (1.3)
Ottawa	Public administration and defence (4.5)	Communication (1.3)	Finance, insurance and real estate (1.3)	Services to business management (1.1)
Quebec	Public administration and defence (1.9)	Health and welfare services (1.5)	Other services (1.3)	Education and related services (1.2)
Saint John	Wholesale trade (1.9)	Health and welfare services (1.8)	Transportation (1.7)	Communication (1.5)
St. John's........	Health and welfare services (2.0)	Public administration and defence (2.0)	Transportation (1.7)	Wholesale trade (1.7)
Sudbury	Mines, quarries, oil wells (17.0)	Health and welfare services (1.1)	Retail trade (1.0)	Education and related services (0.9)

Toronto	Services to business management (2.2)	Finance, insurance and real estate (1.9)	Fabricating industries in manufacturing (1.8)	Wholesale trade (1.4)
Vancouver	Storage (2.2)	Services to business management (1.8)	Finance, insurance and real estate (1.5)	Health and welfare services (1.4)
Victoria	Public administration and defence (3.5)	Health and welfare services (1.6)	Education and related services (1.3)	Retail trade (1.2)
Windsor	Fabricating industries in manufacturing (3.0)	Services to business management (1.3)	Education and related services (1.2)	Other services (1.2)
Winnipeg	Storage (3.3)	Wholesale trade (1.8)	Transportation (1.5)	Finance, insurance and real estate (1.5)

[a] Let "L_{ij}" mean the proportion of the labour force in the ith industry group for the jth Metropolitan Area, and "L_i" be the corresponding figure for Canada as a whole. The location quotient is defined as L_{ij}/L_i. The location quotients are shown in parentheses. It is important to bear in mind that the value of the location quotient depends on the number and the identities of the industrial categories. See footnote b/.

[b] Location quotients were computed for an industry-grouping containing 19 categories. These are: Agriculture; Forestry; Fishing and trapping; Mines, quarries and oil wells; Fabricating industries in manufacturing (Clothing industries, Printing, publishing and allied industries, Metal fabricating industries, Machinery industries, Transportation equipment industries, Electrical products industries, Chemical and chemical products industries); Other manufacturing (all manufacturing minus fabricating industries); Construction industries; Transportation; Storage; Communication; Electrical power, gas and water utilities; Wholesale trade; Retail trade; Finance, insurance and real estate; Education and related services; Health and welfare services; Services to business management; Other services; Public administration and defence. The figures for the industry unspecified category (generally less than two per cent of the labour force) were removed from the data before computation of the proportions which produce the location quotient. A more detailed industry-grouping is available in the source.

SOURCE: 1961 Census, DBS 94-519, Tables 2 and 3.

Using 19 industry groups (listed in Table 9.4), location quotients were computed for the labour force in 1961. For each 1961 MA, Table 9.4 lists the industry groups in which the four highest location quotients are observed. It should be noted that when the proportion of the labour force in a given industry group is the same for an MA as for Canada the location quotient is equal to one; when the proportion for the MA exceeds that for Canada the location quotient is greater than one.

The MAs may be ranked according to the number of 'principal industry groups for metropolitan functions' a [(a) wholesale trade, (b) services to business management, (c) finance, insurance and real estate, and (d) fabricating industries] listed in Table 9.4. Table 9.4 shows the industry groups having the four highest location quotients for each MA. It is assumed that the higher the number of 'principal industry groups' the greater is the concentration of the labour force in the performance of metropolitan functions. The data also support the idea that the rank of an urban complex in regard to size is a good predictor of its rank regarding the performance of metropolitan functions (cf. Duncan, et al., 1960, cc. 4 and 11).

Ranking the MAs in this manner, it is found that Toronto heads the list. The four highest location quotients for Toronto MA are exactly those for the designated 'principal industry groups for metropolitan functions'. In the Toronto MA the concentration of the 1961 labour force in services to business management, finance, insurance, real estate and fabricating industries was roughly twice that for Canada as a whole. At the bottom of the ranking are the MAs of Quebec, Sudbury and Victoria, each of which fails to have any of the designated 'principal industry groups' among those showing the four highest location quotients. The detailed ranking is as follows:

MAs in which the four highest location quotients occur in the designated 'four principal industries' for metropolitan functions	Toronto
MAs in which three of the four highest location quotients occur among the designated 'four principal industries'	London Montreal
MAs in which two of the four highest location quotients occur among the designated 'four principal industries'	Vancouver Windsor Winnipeg Kitchener Calgary Edmonton Ottawa
MAs in which one of the four highest location quotients occur among the designated 'four principal industries'	St. John's Halifax Saint John Hamilton

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Other MAs .... Quebec
Sudbury
Victoria.

Table 9.5 shows for each MA the location quotients for the four desig-
nated 'principal industry groups for metropolitan functions'. The MAs may
be ranked according to the number of these industry groups (maximum of
four) in which the location quotient is at least 1.20.[9] The ranking is as
follows:

MAs with four location quotients of at least 1.20................. Montreal
Toronto

MAs with three location quotients of at least 1.20................ London
Winnipeg
Calgary
Vancouver

MAs with two location quotients of at least 1.20 .... Edmonton
Kitchener
Windsor

MAs with one location quotient of at least 1.20 .... Halifax
Ottawa
Saint John
St. John's

Other MAs .... Quebec
Sudbury
Victoria.

The differentials among Census Metropolitan Areas in regard to the
industrial distribution of the labour force may also be studied through the
use of an index of dissimilarity between two comparable distributions. In
Table 9.6, scores on the index of dissimilarity for selected pairs of MAs
are shown for the 1961 distribution of the labour force among 19 industry
groups. The selected measure of dissimilarity between two comparable dis-
tributions varies between zero and 100, and its actual value depends on the
number and identities of the categories of each distribution. When the index
has the value X, it may be interpreted by the statement that X per cent of
the working force in one would need to be redistributed (among the selected
categories) in order that the two distributions might be the same.

Among the scores computed for Table 9.6, the index of dissimilarity
ranges from six per cent (the difference between the industrial distributions
for Toronto and Montreal) and 41 per cent (the difference between distribu-
tions for Kitchener and Halifax MAs). Table 9.6 suggests that Toronto MA
and Montreal MA are very similar in regard to the 19 industry-group structure
of the labour force in 1961. Of all the indexes of dissimilarity involving
Toronto none but that for the Toronto-Montreal pair is less than 10 per cent.

Of all the indexes of dissimilarity involving Montreal none but that for the Toronto-Montreal pair is less than 10 per cent.

Table 9.5 – Location Quotients[a] for Selected Industry Groups Regarding the Labour Force, Census Metropolitan Areas, Canada, 1961

Metropolitan area	Fabricating industries in manufacturing[b]	Wholesale trade	Finance, insurance and real estate	Services to business management
Calgary	0.5	2.0	1.4	1.8
Edmonton	0.6	1.8	1.2	1.4
Halifax	0.6	1.8	1.2	0.9
Hamilton	1.9	0.9	0.9	1.0
Kitchener	1.8	0.8	1.4	0.7
London	1.4	1.3	1.7	1.1
Montreal	1.9	1.2	1.5	1.5
Ottawa	0.4	0.8	1.3	1.1
Quebec	0.8	1.2	1.2	1.0
Saint John	0.9	1.9	1.2	0.9
St. John's (Nfld.)	0.3	1.7	0.8	1.0
Sudbury	0.2	0.7	0.7	0.7
Toronto	1.8	1.4	1.9	2.2
Vancouver	0.7	1.7	1.5	1.8
Victoria	0.5	0.8	1.2	1.0
Windsor	3.0	0.8	1.1	1.3
Winnipeg	1.2	1.8	1.5	1.2

[a] See footnote [a] , Table 9.4 for definition of location quotients. The location quotients are computed with respect to a 19-industry-group classification; see footnote [b] Table 9.4.
[b] The industry groups included in "fabricating industries" are listed in footnote [b] , Table 9.4.
SOURCE: 1961 Census, DBS 94-519, Tables 2 and 3.

If the pairs of MAs that share indexes of dissimilarity of less than 10 per cent (Table 9.4) are placed in a single group, the following groups are observed: (a) Toronto, Montreal; (b) Vancouver, Winnipeg, Saint John; (c) Calgary, Edmonton; (d) Halifax, Victoria; (e) Hamilton, Kitchener. Each of the remaining five MAs in Table 9.4 fails to share an index of dissimilarity of less than 10 per cent with any other MA. Table 9.6 shows that in regard to the index of dissimilarity scores, the London and Windsor MAs are associated most closely with the MAs of Toronto and Montreal. Quebec MA most closely resembles the MAs of London and Edmonton, in regard to the distribution of the 1961 labour force among the selected industry groups, while Ottawa MA most closely resembles the MAs of Halifax and Victoria. Sudbury MA is not markedly similar to any other of the MAs. The lowest index of dissimilarity involving the Sudbury MA is 32 per cent (shown for the Sudbury-Vancouver pair). This means that at least 30 per cent of the Sudbury MA labour force would need to be redistributed (among the selected industry groups) in order that the Sudbury MA might have the same distribution as that of any other MA.

Table 9.6 — Indexes of Dissimilarity[a] Among Selected Census Metropolitan Areas in Regard to the Industrial Distribution[b] of the Labour Force, Canada, 1961

Metropolitan area	The six most similar MAs					
	1st	2nd	3rd	4th	5th	6th
Montreal.....	Toronto (6%)	Hamilton (12%)	London (13%)	Vancouver (13%)	Winnipeg (13%)	Saint John (15%)
Toronto	Montreal (6%)	London (10%)	Vancouver (13%)	Winnipeg (13%)	Hamilton (14%)	Windsor (14%)
London	Toronto (10%)	Winnipeg (11%)	Saint John (12%)	Vancouver (13%)	Montreal (13%)	Quebec (13%)
Quebec	Edmonton (12%)	London (13%)	Saint John (13%)	Vancouver (13%)	Winnipeg (14%)	St. John's (16%)
Saint John ...	Winnipeg (7%)	Vancouver (9%)	London (12%)	Edmonton (12%)	Quebec (13%)	Montreal (15%)
Vancouver ...	Winnipeg (9%)	Saint John (9%)	Edmonton (12%)	Toronto (13%)	Montreal (13%)	London (13%)
Windsor	Toronto (14%)	Montreal (15%)	Hamilton (18%)	London (18%)	Winnipeg (20%)	Quebec (22%)
Winnipeg	Saint John (7%)	Vancouver (9%)	London (11%)	Edmonton (11%)	Calgary (13%)	Toronto (13%)
Calgary	Edmonton (8%)	Winnipeg (13%)	Vancouver (14%)	Saint John (17%)	Toronto (20%)	St. John's (20%)
Edmonton	Calgary (8%)	Winnipeg (12%)	Vancouver (12%)	Quebec (13%)	Saint John (13%)	St. John's (14%)
Halifax......	Victoria (9%)	Ottawa (11%)	Quebec (18%)	St. John's (19%)	Edmonton (20%)	Winnipeg (23%)
Ottawa	Halifax (11%)	Victoria (13%)	Quebec (21%)	Edmonton (23%)	St. John's (24%)	Calgary (26%)
Victoria	Halifax (9%)	Ottawa (13%)	Quebec (16%)	St. John's (20%)	Edmonton (20%)	Winnipeg (23%)
Hamilton	Kitchener (8%)	Montreal (12%)	Toronto (14%)	London (17%)	Windsor (18%)	Vancouver (22%)
Kitchener	Hamilton (8%)	Toronto (17%)	Montreal (17%)	London (21%)	Windsor (22%)	Vancouver (27%)
Sudbury	Vancouver (32%)	Calgary (32%)	Quebec (33%)	Saint John (33%)	London (33%)	Edmonton (34%)
St. John's ...	Edmonton (14%)	Saint John (16%)	Quebec (16%)	Winnipeg (17%)	Vancouver (19%)	Calgary (20%)

[a] Consider L_{ij}, defined in footnote [a] to Table 9.4. Let L_{ik} be the corresponding proportion for the Kth Metropolitan Area. The "index of dissimilarity" is defined as $100 \sum_i (L_{ik} - L_{ij})$, where only values of $L_{ik} - L_{ij} \geq 0$ are included in the computation.

[b] The index of dissimilarity is computed for a 19-industry-grouping. A detailed list of the 19 categories is given in footnote [b] to Table 9.4.

SOURCE: 1961 Census, DBS 94-519, Tables 2 and 3.

Taking all the foregoing rankings together, it would seem that Toronto MA and Montreal MA are clearly at the top of the hierarchy of MAs in regard to concentration of economic activity in the performance of metropolitan functions in 1961. In the second level (though not necessarily 'equal' to each other) are Vancouver MA, Calgary MA, Winnipeg MA and London MA. In the third level of the hierarchy are Edmonton MA, Saint John MA and Windsor MA. A 'summary ranking' of the other eight MAs requires the study of data which more clearly reflect the hierarchy in regard to the performance of metropolitan functions. However, the data presented above do suggest that Sudbury and Victoria are probably near the bottom level of the hierarchy of Canadian census MAs in regard to specialization in the performance of metropolitan functions.

9.8 SUMMARY AND DISCUSSION

In summary, the 1961 MAs differ markedly among each other on a variety of demographic, social and economic variables. The differentials are such that one does not observe marked clustering of the MAs into groups when all the variables are inspected simultaneously. Instead, the apparent grouping of MAs tends to shift as one moves from one given variable to another. However, there is some tendency toward grouping, according to location in Canada's major regions, for a number of the variables considered.

The fact that the metropolitan areas differ among each other in important respects does not mean that they should not be treated as a class apart from other types of small regions in Canada. The case for the recognition of such a class is not invalidated by the consideration that the members of the class differ from each other in certain respects. In fact, the study of a number of important issues touching upon Canada's economic and social future is facilitated by the treatment of the metropolitan areas as a class apart from other types of small regions in Canada. It is appropriate to mention some of these issues at this point.

In its historical context, the emergence of metropolitan areas represents the growth of a relatively new pattern of organization among population centres in the performance of economic functions. In this organization the economies of a number of centres are oriented toward that of a 'dominant' central city and, through the linkages among the centres, some areal specialization tends to develop and persist. As the number of these metropolitan regions increases in a country, and as the linkages among these regions become strengthened, there is an increase in the complexity of the patterns of flows of people, goods and communication within the country. This means that the 'spatial structure' of the country's economy becomes more advanced. In this process the country's regions become more interdependent. The

prospects and the risks of decision-making and planning for a given region increasingly affect (or involve) developments in other regions.

In such an advanced national economy the metropolitan areas become the principal nodes mediating the flows of people, goods and communication among large regions, and are the prominent 'poles of attraction' for these flows. As such, they markedly influence patterns of industrial location (cf. Pred, 1965; Thompson, 1965; Williamson and Swanson, 1966; and UN, Centre for Housing, 1966) the course and nature of future evolution in the spatial structure of the national economy (cf. Friedmann, 1956; Meyer, Kain and Wohl, 1965; and Duncan et al, 1960) differentials in growth among the nation's regions (cf. Thompson, 1965; Ray, 1966; Perloff, et al., 1960), the spatial pattern of internal migration streams and its implications for specific regions (cf. Thomas, 1957; Kuznets, 1964), and the over-all growth potential of the national economy (cf. Perloff et al., 1960; Economic Council, 1965), among other matters.

The study of some important social and economic problems is also facilitated by the treatment of Canadian metropolitan areas as a class apart from other types of small regions. Some problems in municipal government organization, in the co-ordination of municipal services and in municipal financing appear peculiar to the large multi-centred metropolitan area. In the light of these problems regional planners cannot afford to think of their individual municipalities in isolation from the others with which it is actually interdependent. The concept of a class of metropolitan areas having distinctive features helps to facilitate the breakdown of the out-dated assumptions which justify the treatment of municipalities as largely isolated units. In addition, this concept helps us to anticipate and consider the diseconomies of very large city size, particularly those associated with such matters as traffic congestion, air and water pollution, and protection.

In the light of the foregoing comments it would seem worthwhile to devote some resources to the study of the system of Canadian metropolitan areas and of the individual members of this system. This study should consider such matters as their economies, their impact on the national and regional economies, their economic and demographic growth, their demographic composition, and their problems. In an analysis of demographic growth among metropolitan areas, for example, it is useful to estimate and study the relative importance of the components of this growth (net migration and natural increase). Then hypotheses about relations between the individual components and economic and social factors should be considered and evaluated. In evaluating these hypotheses it will be useful to estimate and analyse demographic rates for important population sub-groups.

In an exploratory and unpublished empirical analysis, for example, the data suggest that, in Canada, linkages between migration and economic changes were primarily responsible for the association between these changes and 1951-61 population growth rates among 37 MAs and MUAs. The areal variation in 1951-61 natural increase ratios was not associated with any of a number of economic indicators chosen for study. This and similar analyses (Bogue 1957, for example) point clearly to the need for different explanatory models of metropolitan population growth depending on the relative importance of net migration in this growth.

FOOTNOTES TO CHAPTER NINE

[1] Given the low inter-correlations one may ask whether there is a small number of underlying factors in terms of which the MAs may be categorized. This question seems more interesting if it is formulated in a different way as follows. Is there a basic set of dimensions underlying the variations among MAs which may be taken as representative of the fundamental characteristics of the Canadian metropolitan areas? Unfortunately, the writer sees no adequate justification for applying the available techniques of multivariate analysis to an inter-correlation (or co-variance, as the case may be) matrix estimated from less than 20 observations. It therefore seems necessary to seek some satisfaction in the somewhat pedestrian type of review of inter-MA differentials that is presented here.

Generally, the relevant multivariate analysis techniques fall into the class of methods for factor and principal component analyses (Harmon, 1960). In order to understand the rationale for these techniques, it is helpful to view each MA as a point in a multi-dimensional variable space, where each dimension is a characteristic of the MA. The techniques are usually intended to transform the point to another variable space having a much smaller number of dimensions, and these dimensions have certain definite properties according to the technique used. The empirical meaning of a dimension is induced through an informal process (notably without stated rules of procedure) of inspection of the figures that produce the required transformation. Unfortunately, for the purpose of answering the question raised, the investigator is virtually free to select the kinds of dimensions needed (so he cannot claim to have discovered them). More importantly, the transformation is not unique for a given set of dimensions. Thus it is difficult to validate the empirical interpretation given to a specific transformation. These problems are severely compounded in this case because the transformation is subject to random variability in the estimates of the matrix of inter-correlations obtained from the existing observations. With less than 20 MAs, this last consideration becomes critical. A correlation matrix based on less than 20 observations will seldom, exceptions being mostly unusual and trivial conditions, be sufficiently reliable (from the viewpoint of sampling variability) to permit one to have significant confidence that the derived 'underlying dimensions' of the correlation matrix are stable enough to justify substantive interpretation.

[2] The requisite historical data from 1901 are not available for the census subdivisions surrounding Vancouver, Victoria and St. John's.

[3] The net in-migration is heavily concentrated among persons aged 20-34 in 1961. When the net in-migration ratio becomes very high it may have an appreciably positive effect on the number of intercensal births taking place within the area in question.

[4] The sex composition may be said to be 'male dominant' when males exceed females in number, and 'female dominant' when females exceed males in number.

[5] See Chapter Three, Section 3.2, for explanation of the concepts of 'young' and 'old' populations.

[6] Census data on wholesale sales for Metropolitan Areas are not available.

[7] Census Division No. 20, and it is conterminous with the Winnipeg census MA.

[8] A location quotient of 1.20 means that the proportion for the relevant industry group in the particular MA exceeds that for the same industry group in Canada by 20 per cent.
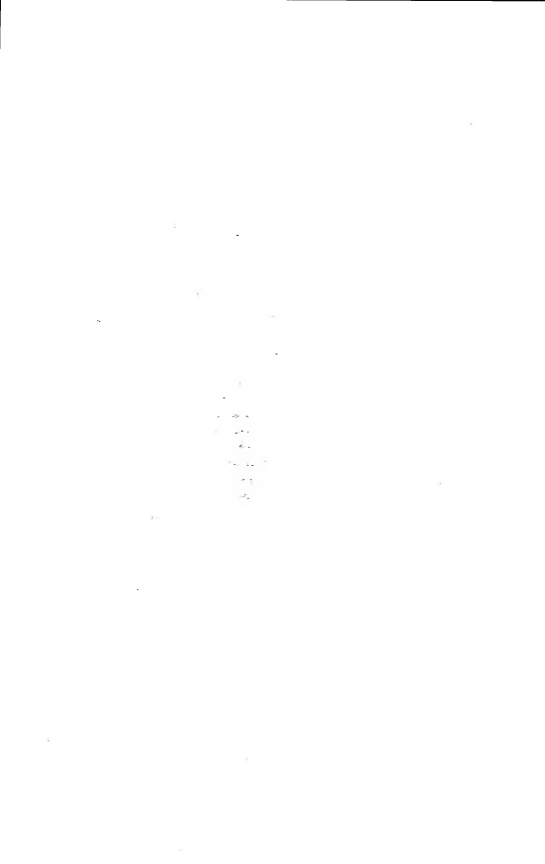
SUMMARY OF THE MAIN FINDINGS
AND INTERPRETATIONS

10.1 INTRODUCTION

Since this study was not focused upon a single well-defined hypothesis, it is not appropriate to seek any general conclusions which could quickly represent the thrust of the monograph. Such general conclusions would leave too much unsaid in terms of necessary qualifications and refinements of the thoughts expressed. Further, because no part of this monograph is a definitive treatise on some aspect of Canadian urbanization, it is inappropriate to attempt to point to major new directions for research which emerge from this monograph. Therefore, this Chapter will be a summary of the main findings and interpretations presented in Chapters Two through Nine.

10.2 CHAPTER TWO

10.2.1 CANADA AT THE FOREFRONT OF WORLD URBANIZATION SINCE THE EARLY 1800s – A cursory review of the relevant historical data suggests that from the earliest phases of the relatively short history of European settlement in Canada, a marked tendency was shown toward the concentration of the colonial population in centres. However, no centre of population concentration was over 1,000 in population when the first census of New France was taken in 1666. The colony had two cities of over 2,000 in population (Montreal and Quebec) by the first quarter of the nineteenth century, and the available data indicate that these two centres contained more than five per cent of the colonial population of British North America in 1825, which suggests that Canada may be placed among the world's more highly urbanized regions by 1825. British North America was among the principal world regions in regard to the level of urbanization in the decade after Confederation, when it began a 'take-off' toward high levels of urbanization. By 1961, Canada was firmly among the top one fifth of the world's most highly urbanized countries. Together with the United States, it formed one of the three most highly urbanized of the world regions. Around 1961, the levels of urbanization in Canada and the United States were very similar – at least 70 per cent in both countries.

In 1851, 16 years before Confederation, the population of British North America was approximately one and one half million (Camu, Weeks and Sametz, 1964, Table 3.1). Roughly 13 per cent of these persons resided in urban centres. Since 1851 the urban population has grown much more rapidly than the rural population.

Between 1851 and 1961 the urban population occupying the area of the three oldest major regions of Canada (the Maritime provinces, Quebec and Ontario) has increased at least 28-fold, while the rural population has been increased by at most twofold. It is notable that the population classified as rural in the area of these three major regions was about two million in 1851 and was only about three and one half million in 1961. Between 1901 and 1961 the urban population in Canada (excluding Newfoundland, Yukon Territory and Northwest Territories) has increased at least sixfold, while the rural population has been increased by at most threefold.

No marked trend is observed in the decennial rates of urban population increase from 1851-61 to 1951-61 in Canada. What Table 2.1 shows predominantly is a pattern of prominent 'upswings' and 'downswings' in the intercensal rates of urban population increase. There are very high peaks for 1851-61 and 1901-11, less prominent peaks for 1871-81 and 1951-61, and troughs in 1861-71, 1891-1901 and 1931-41. The 1851-61 and 1901-11 peaks are equal (62 per cent). These peaks are nearly twice as high as the median decennial rate of increase (34 per cent) in urban population from 1851 to 1961, and they are more than three times as high as the low point (18 per cent) of the above-mentioned rate, which was attained in 1931-41.

10.2.2 DOUBLING THE LEVEL OF URBANIZATION SINCE THE TURN OF THE CENTURY – The marked urban-rural differentials observed in intercensal rates of population increase imply continued advances in the percentage of population that is urban. Between 1851 and 1961 that percentage (used here as a measure of the level of urbanization) increased at least fivefold in Canada, according to Table 2.2. Between 1901 and 1961 the degree of urbanization in Canada doubled from 35 per cent to 70 per cent.

The level of urbanization in Canada has advanced in every decade since 1851. In eight of the eleven decades from 1851 to 1961, the degree of urbanization increased by at least five percentage points. The three exceptional decades include two periods preceding the 'take-off' of industrialization in Central Canada (1851-61 and 1861-71) and a period containing much of the Great Depression (1931-41). In 1851 the level of urbanization in Canada was less than 15 per cent; it increased by about three percentage points in 1851-61 and in 1861-71, accelerated by the intervening decade and recorded an intercensal percentage point increase very near five percentage points from 1871-81 to 1891-1901. By 1901 the degree of Canadian urbanization was about 35 per cent and by 1931 it had passed 50 per cent. Although

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the increase in urbanization decelerated sharply in the generally depressed 1931-41 decade, urbanization markedly increased its rate of advance from 1931-41 to 1941-51, and in the periods 1941-51 and 1951-61 showed two of the three highest decade increases since 1851; an increase of seven percentage points is shown for 1901-11, 1941-51 and 1951-61. Obviously, since the 1961 degree of urbanization had reached 70 per cent, a decade increase of seven percentage points could be maintained for at most four more decades.

10.2.3 IDENTITY OF MOST HIGHLY URBANIZED REGIONS UNCHANGED SINCE THE 1880s – There are very significant differences between Canadian regions in regard to the level and historical pattern of urbanization. These differences reflect the regional concentration of industrial activity and regional disparities in economic development. Five major regions of Canada (based on provincial boundaries) are widely recognized: (1) Maritimes (Nova Scotia, New Brunswick and Prince Edward Island—Newfoundland being excluded here because of the lack of appropriate historical data for this province), (2) Quebec, (3) Ontario, (4) Prairies (Manitoba, Saskatchewan and Alberta), and (5) British Columbia. Each of the five major regions of Canada was at least 50 per cent urbanized in 1961—Ontario 77 per cent, Quebec 74 per cent, British Columbia 73 per cent, the Prairies 58 per cent, and the Maritimes 50 per cent.

Ontario, Quebec and British Columbia have been the most highly urbanized of the five major regions in every census since 1881. Before 1881 the Maritimes were more highly urbanized than British Columbia. Since 1881 the differential in level of urbanization between that of the group of Ontario, Quebec and British Columbia and that of the Maritimes has widened. The differential in the level of urbanization between the Ontario-Quebec-British Columbia group and the Prairie region widened from 1901 to 1941 but has narrowed markedly since 1941 as a result of the sharp upturn in the advance of urbanization in the Prairies since the 1941 Census.

10.3 CHAPTER THREE

10.3.1 URBAN SEX-AGE STRUCTURE IS 'FEMALE-DOMINANT' AND 'MATURE' – In regard to the relative numbers of males and females, the urban population of Canada in 1961 may be characterized as 'female-dominant'. Females outnumbered males in the whole urban population and in the segment of persons aged 20-34, as well as in the older age groups where females tend to be predominant because of their lower mortality. In 1961 the urban age composition for Canada was that of a 'mature' population. The urban age composition had been 'rejuvenated' markedly by the postwar upswing in birth rates and this 'rejuvenation' overshadowed the impact of net migration upon the age composition of the Canadian urban population.

Urban-rural differentials in the sex-age composition of population are basic indicators of the major divergences between urban and rural communities. In Canada, one finds that the rural areas were markedly 'male-dominant', while urban areas were slightly 'female-dominant' in sex composition in 1961. The urban population was clearly an 'older' population than the rural population, mainly due to the high 'youth dependency' ratio in the rural population.

There are marked contrasts between the Canadian urban, rural non-farm and rural farm age pyramids in 1961. The portion of the age pyramid containing the survivors of the postwar baby-boom is considerably larger in the rural non-farm age pyramid than in that of the urban population. In regard to the urban-rural farm differentials, the ages zero to 19 contain a much larger portion of the rural farm age pyramid than of the urban age pyramid. The rural farm age pyramid shows a striking 'trough' in the female side of its age pyramid from ages 20 to 39. This observation reflects the relatively high rates of age selective net migration losses from farms, which have been sustained for several decades. In regard to the masculinity ratio, to the median age, and to the general contour of the age pyramid, the rural non-farm population showed patterns intermediate to those of the urban and the rural farm populations.

The general pattern of urban-rural differentials in the sex-age composition of population as observed in 1961 seems to be traditional in Canada. At least since 1911, the urban population has tended toward 'female-dominance' in sex composition while the rural population has tended toward 'male-dominance'. Since 1911 the urban age composition has been 'older' than the rural, and the urban age pyramid has shown a more persistent tendency toward a bulge between the ages 20 and 39 than has the rural age pyramid.

10.3.2 SYSTEMATIC URBAN SIZE-GROUP DIFFERENTIALS IN SEX-AGE STRUCTURE – There are systematic changes in the features of the age distribution as one moves down the ladder of urban size groups from the places of 100,000 and over to those of 1,000-4,999. As the size of urban place declines the sex-age composition of the urban population approximates more and more closely that of the rural population. Very clear urban size-group differentials are shown in regard to the 'ageing' of population. At 29 years the median age of the population in the 100,000+ size range is four years higher than that in the 5,000-9,000 and 1,000-4,999 size groups. The median age of population tends to vary directly with the size of urban place, while the masculinity ratio tends to vary inversely with size of urban place.

Since 1901 definite trends in the age composition of the population in incorporated cities and towns of 30,000 and over are observed in the

median age, in the 'old-age dependency' ratio, and in the adult population maturity ratio for males (Table 3.5). Generally, all three have risen markedly since 1901. Among the Canadian incorporated cities of 30,000 and over, the median age of population has risen from 24 years in 1901 to 31 years in 1951 and has declined one year in the 1951-61 decade. The downturn from 1951 to 1961 is largely an effect of the postwar upswing in birth rates.

10.3.3 'IMPLICATIONS' OF THE AGE DISTRIBUTION PATTERNS – The persistent 'female-dominance' in the sex composition of the Canadian urban population is another confirmation of the viewpoint that, in Canada, urban development is an aspect of the spatial concentration of economic opportunities and changes. As Cameron and Hurd (1935, p. 229) have suggested, a surplus of rural population in Canada has been particularly evident among females, for whom there are relatively few, as compared with males, opportunities in primary economic activities such as agriculture. With the advancing industrialization of Canada since Confederation, more and more job openings have been available to females in service activities and, to a lesser extent, in light manufacturing. This long-standing urban-rural differential in the share of economic opportunities for females has probably been a major factor behind the sustained female-selectivity of the net migration gains to urban areas (Chapter Five). The data suggest that the 'female-dominance' in the urban population since 1911 would have been even higher had it not been for periodic waves of male-selective immigration to Canada.

The 'female-dominance' in the urban population and its likely relation with economic opportunities for females in industry is generally known. What may not be readily appreciated, however, is the likely impact of the long-standing net migrational flow of females on urban birth rates. On the whole, urban age-specific fertility rates have been lower than rural age-specific fertility rates over the past half-century at least (Charles, 1941, c. VII). By continually adding to the size of female urban population in the most fertile ages, the sustained net migrational flows of females into urban areas have probably kept the urban natural increase rates above the levels they would show in the absence of such flows. Thus, through its impact upon the age distribution of population, migration has contributed indirectly to urban natural increase rates.

In the light of the preceding observation, the recent downturn in the rate of growth for females aged 20-39 in the population of incorporated cities of 30,000 and over takes on added significance. Population growth rates in the traditionally core areas of Canadian urban development may be coming under an increasingly dampening influence from an unfavourable age distribution.

The decreasing weight of young adults in the age pyramid for the population of large incorporated cities is partly a result of the concentration of in-migrational flows upon the outer edges and fringes of these cities. In addition, much of the rural non-farm population is concentrated in and near counties and census divisions containing the larger cities. These two points suggest that the populations with the highest concentrations of persons in the most fertile ages are increasingly being located on the outer edges of, and in the areas near to the largest cities. In decades gone by, the farm populations contained the highest concentrations of persons in the most fertile ages (Charles, 1941, p. 147).

Thus, the areas of highest 'youth dependency' are no longer the farms but are instead the non-farm areas on the edges of, and near to the larger urban centres. No doubt this century has seen marked increases in the demand for educational, recreational and health facilities for youth in such areas. While the financial burden of a high 'youth dependency' load in these fringe areas may not be borne to any great extent by the income from economic activity within those areas, the location of educational, recreational and health facilities will increasingly be oriented toward obtaining close proximity with those fringe areas. The location of such facilities near the fringes of urban centres may act as an additional magnet drawing young families into those areas.

As the most fertile segments of the population tend to decrease their concentration in the core parts of the larger cities, the 'old-age dependency' ratios in these areas tend to increase. More and more the core areas of these cities may tend to contain increasing concentrations of aged, middle-aged and unmarried persons, with some effects on the structure and volume of demand for goods and services in local areas.

10.4 CHAPTER FOUR

10.4.1 INCREASING NUMBER OF 'URBAN COMPLEXES' — In Chapter Four each 1961 Metropolitan Area (MA) and Major Urban Area (MUA) is treated as a single complex of closely related centres. Thus the incorporated centres within any 1961 MA or MUA are not recognized as separate units of observation.

Canada had 190 urban complexes of 5,000 in 1961 (Table 4.1). This figure represents a tenfold increase in the number of such complexes since the 1871 Census, and a more than threefold increase since 1901. Since 1871 the number of urban complexes has increased in every intercensal period, with the decennial increases tending to be larger after the major decade of western expansion (1901-11) than before this decade. The largest intercensal increase in the number of these complexes since 1871 took place

in 1951-61, when 53 units were added to the total of 1951; the smallest increase (nine) took place in 1891-1901.

10.4.2 STABILITY OF THE SIZE DISTRIBUTION – The Canadian urban complexes of 5,000 and over are heavily concentrated in the lower end of this range of population sizes. In 1961, 87 (46 per cent) of the 190 Canadian urban complexes of 5,000 and over were less than 10,000 in population, 32 per cent had populations less than 30,000, about 13 per cent were in 30,000-99,999 size group, and 10 per cent in the group of 100,000 and over. Although this rank ordering of the four size groups in regard to their shares of the total number of Canadian urban complexes (of 5,000 and over) has been virtually unchanged since 1871, the shares of certain size groups show definite trends. The share of the 5,000-9,999 size group shows a generally downward trend over the period from 1871 to 1961. Generally, the percentage concentrated in urban complexes of 5,000-9,999, among those of 5,000 and over, was slightly higher than 52 per cent from 1871 to 1911 and was somewhat lower than 50 per cent in most of the 1921-61 period. A distinct upward trend is shown for the share of the 100,000-plus size group in the total number of urban complexes of 5,000 and over. Generally, the share of this group has increased from approximately four per cent in the latter third of the nineteenth century to about 10 per cent in the past two decades. No distinct trends are shown in the corresponding shares for the size groups 10,000-29,999 and 30,000-99,999.

The data for incorporated urban centres of 5,000 and over fail to show a consistent tendency toward direct association between the decennial population growth rate and urban size group (as defined at the beginning of each decade). Thus there was no consistent indication of an increasing concentration of population in the larger cities independently of the shift of urban centres into the larger size groups. However, the data for 1951-61 suggest that the failure to take into account the population in the urbanized fringes of incorporated cities may seriously bias the observation of urban size-group differentials in population growth rates at least in the more recent decades. This qualification seems to have an important implication for the analysis of the growth rates of large cities. If the urban population growth associated with changes in the economy of a city is reflected largely by growth in the areas adjacent to the city (particularly its suburbs), the demographic data for the city alone may seriously bias the observed association between economic changes and urban growth.

10.5 CHAPTER FIVE

10.5.1 INCREASING CONCENTRATION OF URBAN GROWTH OUTSIDE OF INCORPORATED CENTRES – Although 86 per cent of Canada's 1951

urban population resided in incorporated cities, towns and villages, these areas accounted for just 55 per cent of the urban population increase over the 1951-61 decade. A large portion of the 1951-61 urban growth must be attributed to the 'explosion' of population in areas which are within daily commuting distances of the larger cities, this statement applying particularly to Ontario and British Columbia.

In every decade since 1871, population growth within incorporated urban centres (as defined at the beginning of each decade) has accounted for more than one half of the urban population increase in Canada. Generally, at least two thirds of the decennial urban population increase is attributable to population growth within the incorporated centres. The principal exceptions to this generalization are found near the end-points of the 1871-1961 period. In 1871-81 and 1891-1901 more than one third of the urban population increase took place outside of the incorporated centres (those existing and classified as urban at the beginning of each decade), largely due to the number of localities reclassified from the rural to the urban categories over each of these decades. Again in 1941-51 and 1951-61, less than two thirds of the urban population increase took place within the incorporated centres (existing and classified as urban at the beginning of each decade), largely due to the mushrooming of urban population in unincorporated areas (particularly those within daily commuting distances to the larger cities).

10.5.2 NET MIGRATION IS ONE THIRD OF THE 1951-61 GROWTH OF 'URBAN COMPLEXES' – The component analysis of urban growth involves the consideration of demographic processes as well as the attribution of growth to different types of area. Mainly attributable to the fact that urban growth involves expansion in the territory of urban settlement (through urban-rural reclassification of localities and annexation of rural territory by cities), the demographic analysis of urban growth is beset with knotty data processing problems. The data needed for routine resolution of these problems are scarce. Because of these difficulties, the writer has prepared an analysis for the 1951-61 decade only, confining the coverage of the data to the urban complexes of 5,000 and over.

Over the 1951-61 decade the population in the Canadian urban complexes of 5,000 and over increased by 52 per cent. Some six tenths of this increase may be attributed to demographic growth in the area classified as urban in both 1951 *and* 1961 and an additional one tenth to demographic growth in the area *added* to urban territory between 1951 and 1961. Together these two sources comprise the *total* demographic growth. Some 43 per cent of this total demographic growth may be attributed to net migration (the remainder being attributed to natural increase), and three fourths of this contribution of net migration pertains to the area classified as urban in

both 1951 *and* 1961. Some 33 per cent of the whole 1951-61 urban population increase may be attributed to net migration.

Among the five major regions, the relative importance of the direct impact of net migration on the total demographic growth for the urban complexes varies widely, it ranged from 11 per cent in the Maritimes to 52 per cent in the Prairies; in British Columbia it was 50 per cent, in Ontario 47 per cent, and in Quebec 35 per cent.

10.5.3 URBAN SIZE GROUP POSITIVELY ASSOCIATED WITH 1951-61 NET MIGRATION RATIO

In addition to the regional differentials in the relative importance of net migration in urban population increase from 1951 to 1961, there are also systematic differences among urban size groups in respect of this influence of net migration. There is a definite positive association between size of urban complex in 1951 and the 1951-61 net migration ratio. In Canada and in each major region, the larger size groups of urban complexes (30,000-99,999 and 100,000-plus) show considerably higher net migration ratios than do the two smaller size groups over the 1951-61 decade. For Canada, the net migration to the urban complexes in the size group of 100,000 and over was 22 per cent of the 1951 population, and the corresponding figure for the 30,000-99,999 size group was 17 per cent. In the two lower size groups (10,000-29,999 and 5,000-9,999) the net migration did not exceed four per cent of the 1951 population. No such pattern of differentials is shown for the natural increase, which ranges from 20 per cent of the 1951 population (100,000-plus size group) to 24 per cent of the 1951 population (10,000-29,999 size group). Thus the size-group differentials in the 1951-61 growth rate of the population in urban complexes of 5,000 and over are mainly attributable to the net migration factor.

10.5.4 PRAIRIES LEAD IN THE 1951-61 NET MIGRATION RATIO FOR 'URBAN COMPLEXES'

For Canada, the 1951-61 net migration to urban complexes (with geographical areas held constant) was 16 per cent of the 1951 population in these complexes. Among the five major regions, this net migration ratio ranges from zero in the Maritimes to 28 per cent in the Prairies. The ratios for British Columbia and Quebec were slightly below and that for Ontario slightly above the national average. However, the range of the ratios among Quebec, Ontario and British Columbia is quite short.

10.5.5 THE 'SUBURBAN EXPLOSION' REFLECTED

The net migration ratios for the incorporated centres were markedly below those for the re-maining parts of the urban complexes. In Canada as a whole, net migration for the incorporated centres within the urban complexes was 10 per cent of the 1951 population of these centres while the corresponding ratio for other areas within the urban complexes was about five times as large. In all

regions except the Prairies, the net migration ratio for these 'other parts' of the urban complexes was at least five times as large as that for the incorporated centres. In the Prairies the ratio for the incorporated centres was larger than that for the other parts of the urban complexes, and only in this region is the value of the ratio for such incorporated centres (30 per cent) clearly in excess of values which may be easily dominated by errors in the estimates (Stone, 1966, p. 4). The pattern of regional variation in the net migration ratio for the parts of urban complexes outside of incorporated centres (ratios of over 40 per cent in Quebec, Ontario and British Columbia, and values of less than 25 per cent in the Maritimes and the Prairies) suggests that this variable reflects the well-known and recent 'suburban explosion' of population.

10.5.6 HISTORICAL DECLINE OF NET MIGRATION RATIOS FOR THE LARGER INCORPORATED CANADIAN CITIES – Net migration ratios in the group of larger incorporated Canadian cities have generally declined since 1921-31. These ratios, which refer only to persons alive at the beginning of the intercensal period in question, dipped sharply from 15 per cent in 1921-31 to four per cent in 1931-41. In 1941-51 and 1951-61 the ratios were five per cent and eight per cent, respectively. Thus the post-Depression upswing has left the ratio (as of 1951-61) markedly below its 1921-31 level. The moderate post-Depression upswing in the net migration ratio for the group of larger Canadian cities is probably not representative of the pattern of change in the net migration ratio for the whole urban population. This observation is suggested by the 16 per cent value of the 1951-61 net migration ratio shown for the urban complexes of 5,000 and over. The moderate post-Depression upswing in the net migration ratio shown in Table 5.7 for the group of larger cities is a reflection of the increasing residential saturation of the traditionally core areas of Canadian urban development.

10.5.7 HISTORICAL PATTERN OF THE AGE PROFILE OF NET MIGRATION RATIOS FOR THE LARGER CITIES – From 1921-31 to 1951-61 the age profile of net migration ratios for a selected group of large Canadian cities generally shows a characteristic shape. In its characteristic shape, this age profile shows a gradual rise in the net migration ratio from the age group 10-14 to age group 15-19 (age being measured at the end of each decade). The ratio then rises very steeply from 15-19 to a peak at either 20-24 or 25-29. Once the peak age group is reached the net migration ratio falls rapidly, and by the age group 35-39 the ratios have returned to levels at or below that attained in the age group 15-19. From the age group 35-39 to the age group 60-64 the ratios fluctuate near the value of zero, and they show a slight rising trend from the age group 60-64 to the age group of 75 and over. Generally, only the ratios from the age group 15-19 to the age group 35-39 are clearly above levels which could easily be dominated by defects in the estimates (Stone, 1966, Table 5).

There are notable differences between the age profiles for males and those for females. Firstly, in the decades for which males were predominant in the volume of net migration (1921-31 and 1951-61), the peak age group for net migration ratios among males is 25-29, while in the other two decades (1931-41 and 1941-51) the peak age group is 20-24. Among the females the peak age group is 20-24 in each decade. Secondly, the peak ratios for the females are higher than those for the males in each decade, and on either side of the peak the net migration ratios decline much more rapidly for the females than for the males. Thus the relative net migrational gains among females are much more highly concentrated in a single five-year age group (20-24) than they are among males (where the ratios for ages 20-24 and 25-29 are typically quite similar).

The four decades vary markedly in their age profiles of the net migration ratio for the sample of large Canadian cities. The area between the age curve of net migration ratios and the horizontal line marking the zero level of the net migration ratio is largest in 1921-31. In regard to the size of this area, 1951-61, 1941-51 and 1931-41 rank in that order from second to fourth. The peak age-specific ratio in 1951-61 is much higher than that in 1921-31 but the decline of the ratios to the right of this peak is much more gradual in 1921-31. The data suggest a marked difference between the character of the net migration to the sample of cities in 1921-31 and that in 1951-61. These ratios suggest that persons old enough to have two or more children were much more evident in the net migration to the cities in 1921-31 than in 1951-61, an interpretation that seems plausible in the light of the well-known 'suburban explosion' of the 1950s.

The large and systematic inter-decade variation in the age profile of net migration to the sample of large Canadian cities shows clearly how population movements may reflect the general economic conditions of the decades. The 'hump' in the age profile of the net migration ratios is widest and most prominent in the relatively prosperous decades of 1921-31 and 1951-61, and it is almost dissipated in the depressed 1931-41 decade.

10.5.8 MIGRATION RETARDS 'AGEING' OF POPULATION IN CITIES – Estimates prepared for six of Canada's largest incorporated cities suggest that in the absence of migration between 1901 and 1961 the population of these cities would have 'aged' at a much faster rate than it actually did. These estimates also show clearly that the persistent 'female-dominance' in the urban sex-age structure may be attributed largely to the influence of migration.

10.5.9 LEVEL OF URBANIZATION IN A REGION POSITIVELY ASSO-CIATED WITH ITS NET MIGRATION RATIO – In view of the unavailability of precise estimates of the levels of net migration to urban areas and of

the difficulties facing any attempt to obtain such estimates, it is desirable to make some use of the data for counties and census divisions, in which problems of boundary change are usually controlled with relative ease. These data may be used in studying the degree and pattern of association between levels of urbanization and of net migration ratios. Since urban centres (particularly large ones) are dense concentrations of economic activities and opportunities, there should be a positive association between the level of urbanization in a region and the region's net migration ratio. The general question dealt with is whether the most highly urbanized counties and census divisions have consistently shown the highest net migration ratios from 1921-31 to 1951-61. The data of the initial year of each decade is used as the base year for determining the levels of urbanization. The grouping of the counties and census divisions by levels of urbanization in that year is then held constant throughout the decade in question. The data suggest that the level of urbanization in a Canadian region is positively associated with the level of net migration to the region.

The marked dissipation of the association between levels of urbanization and net migration ratios in 1931-41 suggests that in an industrializing economy there are certain 'urbanizing forces' generated in part by the spatial concentration of technological and economic structural changes. The temporal fluctuations in these forces are accompanied by variations in the retentive power of the major poles of attraction in migrational fields. To the extent that these poles of attraction are urban agglomerations, the temporal variations in economic structural changes may produce temporal variations in the rate of urbanization. Thus migration plays a key role in the mechanisms linking economic structural changes with urbanization. This conclusion is familiar but it is by no means trivial in its implications concerning regional disparities in levels of living.

As an area in an economy of interdependent regions becomes more highly urbanized, the advances in urbanization contribute to the attractiveness of the area for a wide range of decision-makers concerning the location of economic establishments. This is particularly true of those locators in the highly market-oriented industries. Thus, through its influence upon the location of productive resources and establishments, the urbanization in a region may be seen as a self-reinforcing phenomenon.

Of course, both urbanization and industrialization have upper limits. As these limits are approached in a given area, the rate of urbanization must eventually slow down markedly. One factor that may hasten this slowdown is the congestion of traffic, people and facilities. As this congestion increases, areas away from (but still within convenient reach of the) congested territory become more and more attractive to residential and industrial locators. The occupancy of these outlying areas depends markedly on

the efficiency and availability of transportation and communication facilities. Given that these facilities are adequate, many types of residential and industrial locators will tend to converge more and more in locations just outside of the congested area. The rate of population growth in the congested area will slow down markedly; but the economic influence of this area over its surrounding hinterland may increase. In analysing the demographic aspects of urban development in such regions it becomes more and more appropriate to supplement those data which reflect only population changes in the congested core areas of the urban development. A first step in this direction is the review and analysis of data on Census Metropolitan Areas.

10.6 CHAPTER SIX: METROPOLITAN GROWTH, A NEW FOCUS FOR MIGRATION STUDIES

The data presented in Chapter Six indicate that the 1961 Census Metropolitan Areas (MAs) increased their share of the Canadian population by five percentage points from 1951 to 1961. This increase was much larger than those shown for the 1961 Census Major Urban Areas (MUAs) and for other selected categories of areas. With the exception of the 1931-41 decade, the areas closely approximating the 1961 MAs (which may be viewed as the principal regions of metropolitan development in Canada) have increased their share of the Canadian population by roughly four percentage points in each decade since 1901-11.

In regard to the components of population growth in the Principal Regions of Metropolitan Development (PRMDs), the estimates indicate that the direct influence of net migration was more important than natural increase in 1921-31 and 1951-61. Only in 1931-41 was the direct impact of net migration markedly less important than natural increase in the population growth rate for the PRMDs. Since the 1921-31 period the PRMDs have consistently had much higher crude net migration ratios than other areas (taken as a whole). The findings on areal net migration ratio differentials since 1921-31, which are presented for the five major regions as well as for Canada, suggest a relatively new focus for migration studies in Canada— the gravitation of population into metropolitan areas.

10.7 CHAPTER SEVEN: SIMILARITIES BETWEEN THE METROPOLITAN GAINS AND NON-METROPOLITAN LOSSES REGARDING THE AGE PROFILE OF NET MIGRATION

Chapter Seven presents 1951-61 net migration ratios by age group for areas closely approximating the 1961 MAs (excluding Calgary, Edmonton and St. John's), and for other areas in each major region (excluding Alberta

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province). There were high net migration gains by age for the areas approximating the 1961 MAs, and a pattern of net migration losses by age for the remaining non-metropolitan areas. In six of eight age groups the 1951-61 net migration for the areas approximating the 1961 MAs exceed 10 per cent of the 1951 population and this net migration reached 49 per cent in the age group 20-24. This latter figure means that from net migration alone the number of persons aged 25-34 in 1961 would have increased by nearly 50 per cent over the 1951-61 decade in the 1961 MAs. In sharp contrast, five of the eight age groups show net migration losses in the remaining non-metropolitan parts of the major regions. These losses are most severe among those aged 20-24 in 1961, for which the net migration ratio was *minus* 15 per cent in the non-metropolitan part of Canada.

Estimates of net migration by sex and age were prepared for the counties containing the 1961 MAs in Eastern and Central Canada (Maritimes, Quebec and Ontario) and for the remaining parts of these regions. The basic pattern of differentials in sex-age specific net migration ratios between the counties containing 1961 MAs, on one hand, and the remaining counties within Eastern and Central Canada, on the other hand, has been stable in the four decades from 1921-31 to 1951-61. Generally, the age profile of net migration ratios for the counties containing 1961 MAs shows a 'hump' among positive ratios between ages 15 and 44. In roughly the same age range, but mainly in the age-group 15-39, the net migration ratios for the remaining parts of Eastern and Central Canada show a 'trough' among negative ratios. The differential between the two sets of age profiles of net migration ratios (one for counties containing 1961 MAs, and the other for the remaining parts of Eastern and Central Canada) is greatest in 1951-61 and is smallest in 1931-41. These observations suggest that much of the high net migration ratios between ages 15 and 39 for the counties containing 1961 MAs have reflected intra-regional population redistribution favouring these counties. In addition, the pace of this redistribution has fluctuated markedly over time, slackening sharply in the relatively depressed 1931-41 decade and reaching a peak in the very prosperous 1951-61 decade.

10.8 CHAPTER EIGHT

10.8.1 RECENT ACCELERATION OF POPULATION REDISTRIBUTION WITHIN METROPOLITAN AREAS — Chapter Eight indicates that in Canada as a whole there were marked intra-metropolitan differentials in the growth rate of population over the 1951-61 decade. Generally, the lowest growth rate was attained in the central cities (24 per cent). Among the other incorporated centres of 10,000 and over the 1951-61 population growth rate was 36 per cent. In sharp contrast, the population in the parts of the 1961 MAs outside incorporated centres of 10,000 and over more than doubled between 1951 and 1961, growing at a decennial rate of 118 per cent.

Intra-metropolitan redistribution of population at the expense of the central cities is by no means a peculiarity of the 1951-61 decade. A DBS report (DBS, 1956b, Table VII, p. 2-14) indicates that the population in 15 1951 Census MAs grew by 27 per cent over the 1941-51 decade. The central cities of these 15 MAs grew by 15 per cent, while the remaining parts of the MAs grew by 64 per cent. However, the intra-metropolitan redistribution of population took place at a faster rate in 1951-61 than in 1941-51 and the data also suggest that it may have accelerated sharply from 1931-41 to 1941-51.

10.8.2 VERY LARGE AREAL DIFFERENTIALS IN NET MIGRATION BY AGE WITHIN METROPOLITAN AREAS – Net migration is considerably more important than natural increase in accounting for the marked rate of intra-metropolitan population redistribution over the 1951-61 decade. The central cities sustained a net migration loss which was one per cent of their 1951 population, while the remaining parts of the 1961 MAs had a net migration gain which was 69 per cent of their 1951 population. The differential in net migration ratios between the central cities and the remainder of the 1961 MAs was very much larger than their natural increase ratio differential. Some 86 per cent of the differential in population growth between the central cities and the remainder of the 1961 MAs may be attributed to the direct impact of net migration.

For each MA, the portion outside of the central city had a crude 1951-61 net migration ratio of over 25 per cent. This means that through net migration alone each of these 'non-central city' parts of the MAs would have grown by one fourth over the 1951-61 decade. The crude net migration ratio exceeded 50 per cent in nine of the 14 MAs. In the 'non-central city' parts of the Calgary, Edmonton, London and Hamilton MAs the crude net migration ratio exceeded 90 per cent. These are phenomenal ratios of net migration for a decade, and they probably produced rapid changes in the economic and social conditions of the respective areas and have led to serious problems in the provision and co-ordination of municipal services.

The foregoing observations suggest that the 1951-61 migrational flows into the metropolitan areas were concentrated heavily upon locations outside of the central cities, while an increasing proportion of former central city residents may have relocated to the 'suburbs' of the central city. Common observation suggests that an atypically high proportion of these relocators consisted of families with two or more children for whom the increasingly congested central city was undesirable.

10.8.3 PEAK NET MIGRATION RATIOS OBSERVED AT EARLIER AGES IN CENTRAL CITY THAN IN METROPOLITAN 'RING' – Estimates of age-specific net migration ratios have been prepared for the central cities

and other parts of areas closely approximating the 1961 MAs. These data show a clear differential between the central cities and the remainders of the areas approximating the 1961 MAs in regard to the age-specific of net migration ratios. This differential is sharpest among the ages in which families with two or more children are concentrated and it is narrowest in the peak ages of labour force entry. In the age group 10-14 (in 1961) the net migration ratio for the 'non-central city' parts of the above-mentioned areas is 47 percentage points higher than that for the central cities. This areal differential in net migration ratios narrows to 21 and six percentage points in the age groups 15-19 and 20-24, respectively. The 20-24 age group has a high concentration of labour force entrants and young families with infants and the net migration ratio for this age group was well over 40 per cent in *both* the central cities and the other parts of the areas approximating the 1961 MAs. In the age group 25-34, the above-mentioned areal differential jumps to its maximum value of 93 percentage points. While the net migration ratio for persons aged 25-34 (in 1961) was 18 per cent in the central cities, it was 111 per cent in the 'non-central city' parts of the above-mentioned areas. In the next three age groups (35-44, 45-54 and 55-64), the central cities sustained small net migration losses, while the remainder of the above-mentioned areas had net migration ratios in excess of 25 per cent.

In Eastern and Central Canada the net migration ratios to the county areas outside of the central cities of MAs have been considerably higher than those for the central cities only in 1941-51 and in 1951-61. Among the four decades from 1921-31 to 1951-61 the differential between these two subdivisions of selected counties attains an outstanding maximum in 1951-61. The second highest sex-age specific levels of net migration for the county area outside of the central cities is in 1941-51 and not in 1921-31 as is the case with the central cities. The sex-age specific net migration ratios in 1921-31 were lower for the central cities than for the county areas outside of these cities. In 1931-41 there were no significant differences between the levels of sex-age specific net migration ratios for these two categories of areas.

10.9 CHAPTER NINE

10.9.1 LACK OF MARKED CLUSTERING OF MAs INTO GROUPS ON A BATTERY OF DEMOGRAPHIC, SOCIAL AND ECONOMIC VARIABLES –

Referring briefly to selected data on population growth, sex-age composition, ethnic and nativity status, education, occupation and industry, Chapter Nine shows that each Census Metropolitan Area has a profile of scores on all the variables which differs in substantial respects from the profile of any other MA. There is no marked tendency for the MAs to cluster into groups when all the variables are considered, and the grouping of MAs tends to shift markedly from one variable to another. However, for a number of

variables there is some tendency toward grouping of the MAs according to location among Canada's major regions.

10.9.2 THE HIERARCHY OF CENSUS MAs REGARDING SPECIALIZATION IN METROPOLITAN FUNCTIONS

— The nature of the system of metropolitan areas is best investigated by the use of data on inter-metropolitan flows of goods, services communication and people. Since such data are not available from the census tabulations, use has been made of 'stock' data which are believed to be sensitive to specialization in the performance of metropolitan junctions — mainly economic functions performed by one urban agglomeration for another. Data for 1961 have been presented in regard to business service receipts and wholesale sales per capita, as well as to the distribution of the labour force among 19 industry groups. In reviewing the industry group distributions, emphasis was placed upon the general degrees of dissimilarity among the MAs and on inter-MA differentials for four selected industry groups. These specific industry groups were considered to be the ones most likely to reflect concentration by MAs in the performance of metropolitan functions. The selected industry groups are (a) services to business management, (b) wholesale sales, (c) finance, insurance and real estate, and (d) fabricating industries in manufacturing. Various rankings of the MAs were developed as rough indicators of their hierarchy in regard to specialization in the performance of metropolitan functions.

Taking all the rankings together, it would seem that Toronto MA and Montreal MA are clearly at the top of the above-mentioned hierarchy. In the second level of the hierarchy (though not necessarily 'equal' to each other) are Vancouver MA, Calgary MA, Winnipeg MA and London MA. The third level of the hierarchy includes Edmonton MA, Windsor MA and Saint John MA. The ranking of the remaining eight 1961 MAs cannot be indicated with significant assurance until more suitable data (than those presented in Chapter Nine) are analysed. The data used here do support the idea that the rank of a metropolitan area in regard to size is a good predictor of its rank in regard to the performance of metropolitan functions.

Appendices A-L

Appendix A

ESTIMATING THE URBAN POPULATION ACCORDING TO THE 1961 CENSUS DEFINITION, 1921-1951

A.1 THE PROBLEM AND THE METHOD USED – The term "urban" has been defined connotatively in various ways. Among the internally consistent definitions, none is inherently better than the others since a definition is a convention. Thus, for a specified purpose one of the alternative definitions may be selected and for the purposes of this monograph the demographic concept of *urban* seems most appropriate. This concept is also the one most widely used or implied in urban research (Hatt and Reiss, 1957, pp. 17-21; Davis, 1961, pp. xvi-xix; and Hauser and Schnore, 1965, p. 9). Furthermore, it seems safe to assume that in Canada urban areas delineated according to the demographic concept would be highly correlated with urban areas delineated according to an economic concept.

Eldridge's (1942, p. 338) classic definition of the process of urbanization serves as a convenient 'peg' for an exposition of the demographic concept of urbanization. The process of urbanization is the multiplication and growth of centres of population concentration. In North America, the urban area – a centre of population concentration – is a densely settled built-up area with a selected minimum population. In each country the minimum size is chosen with the object of ensuring that the census statistics reflect clearly the important differences between urban and rural economies, cultures and styles of living. In Canadian censuses since 1951 the minimum has been set at 1,000 (recommended in census publications as early as 1931) and this figure is accepted in this monograph (cf. Davis, 1961, p. xvii for a relevant discussion).

The connotative definition of "urban" indicated above may not be applied before operational definitions are given for its key terms. Terms such as "built-up" and "densely settled" need operational specification.

This monograph is confined to census data and it is therefore necessary to accept the operational specifications embodied in the census definition of "urban". However, there are several census definitions, since DBS has changed its procedures for delineating urban areas in 1951, 1956 and 1961 (1961 Census, DBS 99-512, pp. 2.1-2.3). In terms of consistency with

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the connotative definition of "urban", the 1961 census procedures are the most adequate of the alternatives among the census procedures developed for delineating urban areas. In that census, urban areas are comprised by (a) incorporated cities, towns and villages of 1,000 and over (CTVs), (b) unincorporated towns and villages of 1,000 and over, (c) unincorporated suburbs adjacent to CTVs of 5,000 and over and which had a population density of at least 1,000 persons per square mile. The areas designated as urban under category (c) are found in either of three types of statistical areas: (1) Metropolitan Areas (MAs), (2) Major Urban Areas (MUAs), and (3) Urbanized Areas (UAs). The delineation of category (c) areas was carried out through field observations by the staff of the Geography Section of DBS, and may be evaluated directly only through a field check of the boundaries assigned for these areas. The 1961 census definition of urban has been the basis of the provincial and national level data on total urban population presented in this monograph.

The adoption of the 1961 census definition of urban poses a practical problem since the census figures based on this definition pertain to 1961 only. It is necessary to make estimates of the urban population in the censuses before 1961 according to the 1961 census definition. Such estimates have been prepared for the census years from 1921 to 1951. For the period before 1921 it is assumed that the part of the urban population residing outside of CTVs was a negligible proportion of the whole urban population (Table 2.1, footnote b), at least for Canada and the larger provinces. In obtaining the estimates for 1921 to 1951, the first step taken was to approximate the least upper bound of the population that would have been reported as urban according to the 1961 census definition. Generally, the estimate for a given year is the average of the least upper bound and the population residing in CTVs. This procedure may be indicated somewhat more precisely as follows.

> Let B represent the approximate least upper bound of the population which would have been reported as urban according to the 1961 census definition,
>
> C represent the population residing in CTVs,
>
> T represent the correct size of the urban population according to the 1961 census definition, and
>
> eT be the estimate of T.

It is assumed that

$$C \leq T \leq B \tag{1}$$

and eT is *defined* as

$$eT = \tfrac{1}{2}[B+C] \tag{2}.$$

Definition [2] is used for 1921, 1931 and 1951. It is modified slightly for

1941. A concise statement of this modification is facilitated by the presentation of the formula for B.

The formula for B is

$B = C$

$+ \begin{bmatrix} (a) & \text{the approximate least upper bound of the urban popula-} \\ & \text{tion residing outside of CTVs but within the 1961 MAs,} \\ & \text{MUAs, and UAs; } minus \text{ (b) the population in area (a)} \\ & \text{which is already classified as urban by the census of} \\ & \text{the year in question.} \end{bmatrix}$

$+ \begin{bmatrix} (c) & \text{the approximate least upper bound of the population in} \\ & \text{urban unincorporated villages and towns outside of the} \\ & \text{1961 MAs, MUAs and UAs; } minus \text{ (d) the population in} \\ & \text{area (c) which is already classified as urban by the} \\ & \text{census of the year in question.} \end{bmatrix}$ [3]

For the sake of convenience, it may be said that the second term of equation [3] refers to the 'unincorporated urbanized fringe population', and that the third term of [3] refers to the 'other unincorporated area population'. The estimation of these terms of [3] is discussed in A.2 and A.3.

Given the formula for B, the modification of the definition [2] which was made for 1941 may be indicated briefly. The estimates of B indicate that the proportion of T which was missed by the pre-1961 censuses was probably at a maximum in 1941. In addition, for this year an available census tabulation (1951 Census, Bul. SP-7) makes the estimation of the third term of [3] unnecessary, because this tabulation indicates the population sizes of unincorporated hamlets, villages and towns in 1941. In the light of these considerations eT was defined as follows for 1941 only:

$eT_{1941} = \quad C$

$+ \quad \frac{1}{4} \begin{bmatrix} \text{of the approximate least upper bound for the 'unincorpo-} \\ \text{rated urbanized fringe population'.} \end{bmatrix}$

$+ \quad \begin{bmatrix} \text{the published figures (1951 Census, Bul. SP-7) for the} \\ \text{'other unincorporated area population'.} \end{bmatrix}$ [2a]

A.2 ESTIMATION FOR THE 'UNINCORPORATED URBANIZED FRINGE POPULATION' — The estimation of the second term in equation [3] is based upon data available for (a) the 1961 *urban* population residing outside of CTVs but within the 1961 MAs, MUAs and UAs, and (b) the *total* population (urban plus rural) within the census MAs, MUAs, UAs or 'Greater Cities' from 1931 to 1961. The data in category (a) are used without adjustment and are projected backwards by means of population growth rates

computed from the data in category (b). This backward-projection procedure tends to produce over-estimates of the true figures for the second term of [3], as indicated by the discussion below.

Let t_0 and t_1 refer to two consecutive censuses. The second term of equation [3] is estimated as follows:

$$
\begin{bmatrix} \text{The 'unincorporated} \\ \text{urbanized fringe} \\ \text{population' at } t_0 \end{bmatrix} = \begin{bmatrix} \text{The 'unincorporated} \\ \text{urbanized fringe} \\ \text{population' at } t_1 \end{bmatrix} \times \frac{\begin{bmatrix} \text{The total non-CTV} \\ \text{population in MAs, MUAs} \\ \text{or 'Greater Cities' at } t_0 \end{bmatrix}}{\begin{bmatrix} \text{The total non-CTV} \\ \text{population in MAs, MUAs} \\ \text{or 'Greater Cities' at } t_1 \end{bmatrix}}
$$
$$[4]$$

The MAs, MUAs or 'Greater Cities' mentioned in equation [4] are those designated as such at the t_1-census. From published census tabulations may be obtained both the t_0 and t_1 population totals of such MAs, MUAs or 'Greater Cities' *according to their areas at* t_1. It is these population totals that are used in computing the ratio shown on the right-hand side of equation [4].

Equation [4] is first applied for the 1956-61 period, with $t_0 = 1956$ and $t_1 = 1961$. The figures for the first term on the right-hand side of equation [4] are obtained directly from unpublished census tabulations (DBS, 1963), while the figures for the ratio shown on the right-hand side of [4] are obtained from published data (mentioned above). Before calculating this ratio, however, its numerator is augmented by the 1956 population of those 'unincorporated urbanized fringes' (as of 1956) which became CTVs or were annexed to CTVs between the 1956 and 1961 Censuses. This augmentation produces a slight inflation of the ratio (from the viewpoint of the area of 'unincorporated urbanized fringes' in 1961). This inflation tends to produce an over-estimation of the true 'unincorporated urbanized fringe population' in 1956 (the left-hand side of equation [4]).[1]

Equation [4] is then applied for the 1951-56 period, with $t_0 = 1951$ and $t_1 = 1956$. In this period the estimated 'unincorporated urbanized fringe population' of 1956 (see preceding paragraph) is used as the first term on the right-hand side of equation [4]. Proceeding in a similar manner for earlier periods, estimates of the second term of [3] are obtained for 1941, 1931 and 1921. In the light of the initial slight over-estimation of the value of this term in 1956 and of the comment in footnote[1] it seems safe to assume that in each of these years (and in 1951) the true 'unincorporated urbanized fringe population' is over-estimated.

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Equation [4] assumes that the rate of population growth for the whole set of 'unincorporated urbanized fringes' is equal to that of such 'fringes' within the MAs, MUAs or 'Greater Cities'. It is further assumed that the urban-rural growth rate within the 'fringes' (for a constant geographical area) within the 'fringes' of the MAs, MUAs or 'Greater Cities' is negligible. In support of the first assumption it is hypothesized that the overwhelming majority of the 'unincorporated urbanized fringe population' resides within the MAs, MUAs or 'Greater Cities'. The second assumption seems reasonable, since the rural and urban populations within the 'fringes' of the MAs, MUAs or 'Greater Cities' probably have quite similar sex-age compositions and fertility rates. It should be noted that the census distinction between rural and urban areas within these 'fringes' rests largely on the density of population within census enumeration areas. For example, the commuters who live in the 'fringe' areas with density less than 1,000 persons per square mile are classified as rural residents.

A.3 ESTIMATION FOR THE 'OTHER UNINCORPORATED AREA POPULATION' — It was necessary to estimate the third term of equation [3] only for 1921 and 1931. The population totals for unincorporated hamlets, villages and towns in 1941 and 1951 have been published (DBS, 1951 Census, Bul. SP-7). In developing the required estimations of the third term of equation [3], it is observed that the number of the unincorporated localities with a population of at least 1,000 increased sharply over the 1941-51 and 1951-61 decades, and that, at each census from 1941 to 1961 at least 95 per cent of such localities were in the 1,000-4,999 size range. These observations suggest that the ratio of the 'other unincorporated area population' to the population of CTVs is larger in 1941 than in the preceding censuses. Thus the multiplication of this ratio for 1941 (computed from published data) by the CTV populations in 1921 and 1931 will yield over-estimates of the true 'other unincorporated area population' in 1921 and 1931. This multiplication was carried out to obtain the required estimates of the third term of equation [3].

Having estimated the second and third terms of equation [3], the results were combined with the published CTV data in computing the values of equations [3], [2] and [2a]. The many tables used to obtain these estimates are listed in the source note to Table 2.1.

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Appendix B

SELECTION OF FIVE MAJOR REGIONS OF CANADA

B.1 JUSTIFICATION OF THE CHOICE OF REGIONS – For the purposes of this study the provinces have been grouped to form five areas called "major regions" (following Camu, Weeks, and Sametz, 1964). Quebec, Ontario and British Columbia are treated as separate major regions; Nova Scotia, Prince Edward Island and New Brunswick are grouped to form the Maritime Region; and Manitoba, Saskatchewan and Alberta are combined to form the Prairie Region. This breakdown is substantively meaningful because each of the major regions has had well-known and distinct economic, political and demographic histories (Wilson, Gordon, and Judek, 1965, p. 104). This particular grouping has been used by Cudmore and Caldwell (1938), who called them "economic areas of Canada"; by Camu, Weeks, and Sametz (1964); by Caves and Holton (1959); by Wilson, Gordon, and Judek (1965); and by the Economic Council (1965), among others.

The decisive reason for aggregating the data for the Maritime and Prairie provinces pertains to the quality of the basic census figures and of the estimates used in this monograph. It is generally agreed that the census data are subject to small net errors. These errors depend on the type of information being converted (for example, population counts are usually more accurate than income figures) and on the population size, among other factors. It is generally believed that the distortion created by the net errors tends to vary inversely with the size of the relevant population. The figures for some types of information used in this monograph are so small for the smaller Canadian provinces (in terms of population) that it was deemed advisable to aggregate the data for the Maritimes and the Prairies. The justification for this aggregation seems particularly strong when the various estimates developed for this monograph are considered. Many of these estimates are based partly upon assumptions that cannot be evaluated from the available information and that must be accepted or rejected mainly on the grounds of their apparent plausibility and on the internal consistency of the estimates they yield. Thus the aggregation of the estimates for the Maritimes and for the Prairies is thought to be a reasonable precautionary step.

It is well known that the five major regions are quite heterogeneous socioeconomic units. For many variables one may expect to find more intra-regional than inter-regional variation. The use of the five major regions as units in urban demographic research may be rationalized by the consideration that each of these regions contains one or more very large Canadian urban agglomerations which are major nodes in the spatial organization of the Canadian economy. Each region may be viewed as a set of communities in which economic activity is oriented in large part toward the above-mentioned nodes (the latter serving as major markets, distribution centres, and locations of central decision-making establishments of the regional economy). The assumption that there are economic linkages and interdependencies among the communities within each major region (particularly between the nodes and the outlying communities) is the essential justification for the use of the term "region", and not the homogeneity of the communities. In short, the major regions are viewed as nodal regions (Duncan et al., 1960, pp. 82-104).

The salient feature of the statistics, on a given variable, for the areas within a nodal region is the pattern of the distribution of areas among possible values of the relevant variable. If two nodal regions differ statistically, the most important differences are between the two areal distributions of the relevant statistic within each region. Each distribution has several features, such as its mean, its variance, and so on. Usually, means are compared in regional analyses. This procedure can reveal important differences between the above-mentioned distributions for the relevant regions. It is worth noting, however, that in comparing regions based on the principle of nodality (see Duncan et al., 1960, pp. 82-104, for related discussion) two, regions should not be considered lacking in significant differentials merely because their average value on the relevant variables are quite similar.

B.2 THE EXCLUSION OF NEWFOUNDLAND — A major portion of the data assembled for this monograph deals with periods of time which pre-date the entry of Newfoundland into Canada in 1949. Much of the discussion in the monograph is concerned with trends over decades reaching back beyond 1951-61 and the sudden inclusion of Newfoundland in the figures beginning in 1951 would have disturbed unduly some of the statistical series and the related interpretations. It is possible to show how the inclusion of Newfoundland data affects the indications of the statistics and to comment on the relevant figures but in doing so, the monograph would mainly have repeated discussions and data contained in the 1961 Census bulletins and General Review Volume. For these reasons, Newfoundland is not included in most of the data for Eastern Canada presented in this monograph.

Appendix C

SELECTION OF CITIES FOR OBSERVING URBAN SEX-AGE COMPOSITIONAL CHANGES SINCE 1901

In assembling the list of large Canadian cities used to obtain sample observations of changes in urban sex-age composition, two aims were kept in view. Firstly, at each census the cities listed should contain a very large fraction of Canada's urban population. Secondly, changes in the areal coverage of the data (either from the addition of cities to the list or from city boundary changes) should not significantly influence the apparent sex-age compositional shifts.

The initial step in attaining the second objective was to confine the list of cities to centres of 30,000 and over. For 1901, the initial year of the time series, the list comprised incorporated urban centres of 30,000 and over in 1901. For 1911, the sex-age distributions for cities of 30,000 and over *in 1901* was compared with that for cities of 30,000 and over *in 1911.* Because the differences between these distributions were significant, the list of cities of 30,000 and over in 1901 was used in the time series; had the differences been insignificant, however, the cities of 30,000 and over in 1911 would have been used. In each subsequent census year from 1921 to 1961 a similar comparison was made between the sex-age distribution for the cities of 30,000 and over in that year and the sex-age distribution for the 30,000-plus cities used in the preceding census year. From these comparisons it appeared that the following lists of cities would provide an adequate time series of sex-age distributional data for the larger urban centres of Canada.

Year	Cities of 30,000 and over in—
1901	1901
1911	1901
1921	1921
1931	1931
1941	1941
1951	1951
1961	1951

A Chart analogous to Chart 3.5 for cities of 30,000 and over in 1901 indicates that shifts in the areal coverage of the data do not significantly distort the historical pattern of age distributional changes shown in Chart 3.5. Further confirmation of this claim is shown by Table C.1, which presents age distributional statistics for selected alternative groups of cities from 1921 to 1951.

Table C.1—Selected Statistics of the Sex-Age Composition for the Population in Alternative Groups of Cities of 30,000 and Over, Canada, 1921-1951

NOTE.—See footnotes to Table 3.1 for definitions of age distributional statistics.

Year and Groups of incorporated cities	Masculinity ratio		Median age		Youth dependency ratio	Old-age dependency ratio
	All ages	Ages 20-24	Males	Females		
1921						
Cities of 30,000 and over in 1901[a]	93·7	85·5	26·1	25·8	46·0	5·8
Cities of 30,000 and over in 1921[b]	95·7	87·1	26·9	26·0	45·0	5·7
1931						
Cities of 30,000 and over in 1921	97·9	90·7	28·1	27·1	38·3	7·0
Cities of 30,000 and over in 1931[c]	98·0	90·8	28·0	27·0	38·8	6·9
1941						
Cities of 30,000 and over in 1931	95·4	87·8	30·2	29·9	31·2	9·1
Cities of 30,000 and over in 1941[d]	95·6	88·2	30·0	29·7	31·5	9·0
1951						
Cities of 30,000 and over in 1941	93·7	88·2	30·8	31·2	34·8	12·4
Cities of 30,000 and over in 1951[e]	93·7	88·2	30·7	31·1	35·2	12·4

[a] The second row for each year is identical with Table 3.5. The cities of 30,000 in 1901 are Montreal, Toronto, Quebec, Ottawa, Hamilton, Winnipeg, Halifax, Saint John and London.
[b] The list of cities for this row consists of those listed in footnote [a] *plus* Vancouver, Calgary, Victoria, Regina, Edmonton and Windsor.
[c] The list of cities for this row consists of those listed in footnotes [a] and [b] *plus* Brantford, Kitchener, Saskatoon, Trois-Rivières and Verdun.
[d] The list of cities for this row consists of those listed in footnotes [a], [b] and [c] *plus* Fort William, Hull, Kingston, Outremont, St. Catharines, Sherbrooke and Sudbury.
[e] The list of cities for this row consists of those listed in footnotes [a], [b], [c] and [d] *plus* Peterborough, Oshawa, Port Arthur, Sarnia, Sault Ste. Marie and Sydney.

SOURCES: Table 3.5 and its sources.

Appendix D

DEFINITION OF MAs, MUAs AND UAs IN THE 1961 CENSUS

As mentioned in Chapter Six, Section 6.1, metropolitan organization is essentially a system of economic relations among urban centres (Gras, 1922, pp. 184-186). Metropolitan *region*, at whose node is the largest urban centre — the metropolis. Within the maximum feasible distance of daily commutation to the metropolis lies its *metropolitan area* (Blumenfeld, 1961, p. 76). The metropolitan area consists primarily of closely related centres of population concentration.

The foregoing principles are broadly consistent with the general definition of metropolitan areas adopted for the 1961 Census of Canada. According to this definition (1961 Census, DBS 92-540, p. xi) "metropolitan areas, as defined for the census, relate to groups of urban communities in Canada, which are in close economic, geographic and social relationship". In 1961 the Census Metropolitan Area (MA) in Canada was an area containing approximately 100,000 or more persons and a central city which had at least 50,000 inhabitants. The built-up part of the MA outside the central city had a density of at least 1,000 persons per square mile, and at least 70 per cent of the labour force in this part of the MA was engaged in non-agricultural activities. A criterion of linkages among the major parts of the MA was also formulated: at least 40 per cent of the non-agricultural labour force in the municipalities adjacent to the central city should consist of commuters either to the principal city or to the immediate suburban fringe of this city. However, there were no statistics available for a systematic application of this criterion, and the application actually made was largely subjective, based on informal field observations.

The 1961 Census also designated two additional types of census area on the basis of manifestations of incipient metropolitan area development. The first is the group of other Major Urban Areas (MUAs), which satisfy the criteria for MA in all respects except the size of the central city (1961 Census, DBS 92-540, p. xi). The second is a group of cities (outside of MAs or MUAs) which were found to have substantial urbanized fringes beyond their incorporated limits. Each such city and its fringe comprised an Urbanized Area (UA). Generally the UA was an agglomeration of at least 10,000 persons (1961 Census, DBS 99-512, p. 2-2).
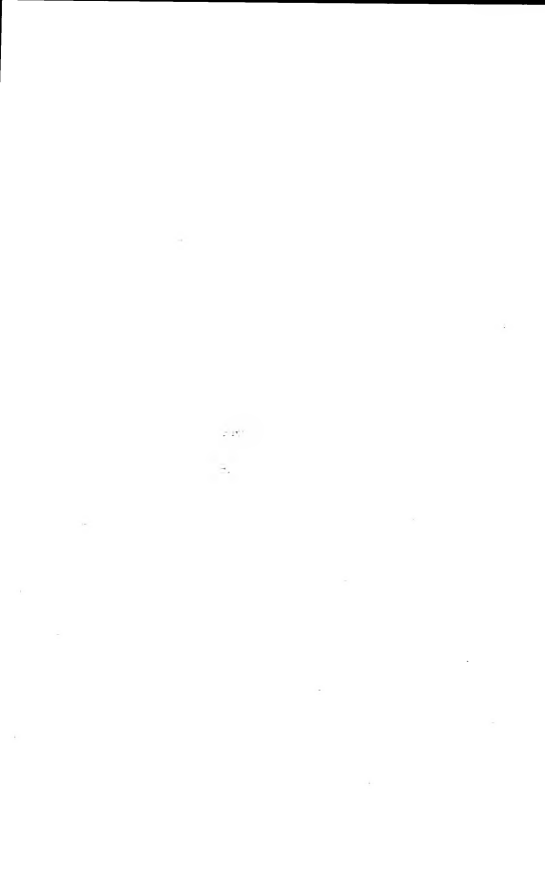
Appendix E

DEFINITION OF THE URBAN COMPLEXES

In 1956, DBS began placing in a single size group (for its urban size group tabulations) all of the urban population of a given Census Metropolitan Area (MA) or Major Urban Area (MUA). Thus the actual urban size group allocation of a given census MA or MUA is determined by its total urban population. Before 1956 each individual incorporated urban locality was allocated to a size group according to its total population, even when such a locality was part of an MA. In this monograph the current DBS practice is extended backwards to pre-1956 census years for three reasons.

(1) A great deal of new urban growth tends to spring up in close proximity to already existing large urban centres. In many cases this new urban growth may properly be considered as comprising territorial extensions of the older "parent" urban centres, even when the new growth is recognized in the census as additional urban centres.

Now, under the old (pre-1956) "size group" concept, all newly incorporated urban areas on the fringes of already existing urban agglomerations are recognized as additional urban centres merely because they are incorporated. To the extent that these newly incorporated places comprise such areas as residential suburbs, and depending on their regional distribution, they may distort unduly the regional comparisons of growth in number of urban centres. These undesired contributions to regional variation in growth of the number of urban centres are attenuated markedly by the current "size group" concept.

(2) Comparisons between regions in regard to growth in number of urban centres may be biased when the regions differ markedly in their methods of "recognizing" new urban growth on the fringes of older urban centres. In some regions several newly incorporated centres may spring up among the fringes; in other regions the dominant tendency may be toward annexation (by the older urban centres) of urban fringes. Using the old "size group" concept, the regions using the incorporation method may falsely show markedly greater growth than the regions using annexation, merely because of the regional difference in "incorporation proneness". Regional differentials in "incorporation proneness" are well established in Canada (Cudmore and Caldwell, 1938, pp. 43-49).

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(3) The current "size group" concept affords a substantively useful perspective in the study of the multiplication and spread of urban centres. It permits concentration on the multiplication and spread of the urban centres that are not in close proximity to already existing urban agglomerations. This particular type of urban growth may be explained by a somewhat different matrix of factors than the urban growth in close proximity to already existing centres. In addition, the new urban centres that are relatively distant from the already existing agglomerations, may tend to have quite different functions in regional economic integration than those in close proximity to already existing ones.

In the present study "close proximity to already existing urban centres" is defined operationally in terms of membership in one of the 1961 MAs or MUAs. Each 1961 MA and MUA is treated as just one agglomeration. In order to avoid laborious repetition of awkward phrases the centres counted in the data series based on the current "size group" concept are designated as the "urban complexes". The urban complexes of 5,000 and over comprise (a) 1961 MAs and MUAs and (b) urban centres of 5,000 and over outside of the 1961 MAs and MUAs.

There are two principal reasons for the exclusion of centres below 5,000 in population (and outside of the 1961 MAs and MUAs). In suggesting the significance of city-size distributions, emphasis has been placed on associations between city-size and economic structure and it seemed useful to view each urban agglomeration as a concentration of industrial activity. As a result of this view, it seemed desirable to attempt to exclude most of the centres not predominantly industrial in economic structure. It may be assumed that centres tend to be small where agriculture, fishing and lumbering comprise a large portion of the economic activity and that most of these non-industrial centres would be excluded from the data by treating centres of 5,000 and over only. The specific mark of "5,000" was selected because the census size-of-place tabulations have low class limits at 1,000, 5,000, and 10,000 only. The alternative of treating only centres of 10,000 and over was not chosen because it seemed desirable to avoid aggravating the error of excluding very small industrially oriented population centres.

The second reason for limiting the treatment to urban centres of 5,000 and over arises from marked interprovincial variation in incorporation practices (Cudmore and Caldwell, 1938, p. 45, for an illuminating discussion on this point). This variation in incorporation practices has resulted in noticeable interprovincial differences in the proportion of urban centres between 1,000 and 4,999 and, correlatively, in the proportion of the rural non-farm population (Cudmore and Caldwell, 1938, p. 45). Limiting the analysis to centres of 5,000 and over has attenuated sharply the effects

of interprovincial variation in incorporation practice on the apparent provincial differentials in urban development (viewed from the standpoint of number of centres of population concentration).

In addition to treating the total number of urban centres of 5,000 and over, the distribution of this total by size group is also considered. The size group classification of the DBS size-of-place tabulations (5,000-9,999, 10,000-29,999, 30,000-99,999 and 100,000 and over) has been adopted. It is understood that this classification is essentially arbitrary, and that data are readily available for obtaining a different size grouping than that used by DBS. However, because useful descriptions can be made with the DBS size grouping, the laborious task of reconstructing another and arbitrary size grouping of urban centres has not been undertaken. Although the significance of a single size group distribution is limited by the necessary arbitrariness of a size classification, useful comparisons of the pattern of urban development in different regions can be made by holding the size classification constant. Of course, the observations made from such comparison depend on the particular size classification being held constant. The stipulation is accepted that if, with a specific size classification, it is possible to show systematic regional differentials in the distribution of urban centres and to relate these differentials to other important regional variations, then the size classification is considered useful.

Appendix F

DECOMPOSITION OF THE 1951-61
URBAN-COMPLEX POPULATION CHANGE

F.1 ESTIMATION PROCEDURES — The decomposition of urban population change so as to express the separate influences of areal change, net migration and natural increase may be indicated briefly with the aid of a few symbols.

Let U mean urban population,

     o be a subscript indicating the beginning of a period

     ι be a subscript indicating the end of a period

     $o_{.1}$ be a subscript indicating *both* the beginning *and* the end of a period

     da refer to areas reclassified *from urban* (at the beginning of the relevant period) *to rural* (at the end of the period)

     na refer to areas reclassified *from rural* (at the beginning of the relevant period) *to urban* (at the end of the period)

     ua mean urban area

     NI mean natural increase (births minus deaths) over the relevant period

     NM mean net migration (in-migrants minus out-migrants) over the relevant period

     P mean population

The urban population at the end of the period is U_1, where

$$U_1 = U_0 + NI\,(ua_{0.1}) + NM\,(ua_{0.1}) + \textstyle\sum_i P_1(na_i) - \textstyle\sum_j P_0\,(da_j) \qquad [1]$$

where U_0 is the urban population at the beginning of the period,

     $NI(ua_{0.1})$ is the natural increase in the constant area which remained urban throughout the period,

     $NM(ua_{0.1})$ is the net migration to the constant area which remained urban throughout the period,

     $P_1(na_i)$ is the end-of-period population of the ith area reclassified *from rural to urban*, and

     $P_0(da_j)$ is the beginning-of-period population of the jth area reclassified *from urban to rural*.

Evidently, $P_1(na_i) = P_0(na_i) + NI(na_i) + NM(na_i)$ [2]

and it may be noted that $NI(na_i) + NM(na_i)$ represents the *population growth* in the area reclassified from rural to urban.

Thus the rate of urban population change is

$$(U_1 - U_0) / U_0 = \left[\sum_i P_0(na_i) - \sum_j P_0(da_j) \right] / U_0$$
$$+ \left[NI(ua_{0.1}) + \sum_i NI(na_i) \right] / U_0$$
$$+ \left[NM(ua_{0.1}) + \sum_i NM(na_i) \right] / U_0 \quad [3].$$

Had there been no population growth in the area reclassified from rural to urban, areal change would influence only the first term of [3]. For this reason this term is considered as the *direct impact* of areal change upon the rate of urban population change. The sum of the second and third terms of [3] is the contribution of demographic growth to the rate of urban population change, with the second term being the natural increase component and the third term being the net migration component. In each of these components the demographic growth in a constant area which was urban throughout the period, $NI(ua_{0.1}) + NM(ua_{0.1})$, and a demographic growth in the area reclassified from rural to urban, $\sum_i [NI(na_i) + NM(na_i)]$, are separately identified.

Only the first term of equation [3] may be obtained by the relatively direct extraction of data from census tabulations. The procedures used in making these data extractions will be indicated in the subsection F.2. The second and third terms are obtained by indirect estimates which are based upon several untestable assumptions. The general formulas for the second and third terms of [3] are as follows.

Obviously, the third term of [3] is

$$\left[\frac{NI(ua_{0.1}) + \sum_i NI(na_i)}{P_0(ua_{0.1}) + \sum_i P_0(na_i)} \right] \cdot \left[\frac{P_0(ua_{0.1}) + \sum_i P_0(na_i)}{U_0} \right] \quad [4].$$

The second (right-hand) ratio of [4] may be obtained directly from census tabulations, and the first ratio is estimated.

It may be observed that

$$\left[\frac{NI(ua_{0.1}) + \sum_i NI(na_i)}{P_0(ua_{0.1}) + \sum_i P_0(na_i)} \right] = \left[\frac{NI(ua_{0.1})}{P_0(ua_{0.1})} \right] \cdot \left[\frac{P_0(ua_{0.1})}{P_0(ua_{0.1}) + \sum_i P_0(na_i)} \right]$$
$$+ \left[\frac{\sum_i NI(na_i)}{\sum_i P_0(na_i)} \right] \cdot \left[\frac{\sum_i P_0(na_i)}{P_0(ua_{0.1}) + \sum_i P_0(na_i)} \right] \quad [5].$$

From the comment in the foregoing paragraph it is evident that only

$$\left[\frac{\overline{NI}(ua_{0.1})}{P_0(ua_{0.1})}\right] \quad \text{and} \quad \left[\frac{\overline{\sum_i NI(na_i)}}{\sum_i P_0(na_i)}\right]$$

may *not* be obtained directly from census tabulations.

It should be noted that $ua_{0.1}$ contains both incorporated (CTV) and unincorporated (Unc) urban centres. In symbols $ua = CTV + Unc$. Thus

$$\frac{NI(ua_{0.1})}{P_0(ua_{0.1})} = \left[\frac{\overline{NI}(CTV_{0.1})}{P_0(CTV_{0.1})}\right] \cdot \left[\frac{\overline{P_0}(CTV_{0.1})}{P_0(ua_{0.1})}\right]$$

$$+ \left[\frac{\overline{NI}(Unc_{0.1})}{P_0(Unc_{0.1})}\right] \cdot \left[\frac{\overline{P_0}(Unc_{0.1})}{P_0(ua_{0.1})}\right] \qquad [6].$$

Only

$$\left[\frac{\overline{NI}(CTV_{0.1})}{P_0(CTV_{0.1})}\right] \quad \text{and} \quad \left[\frac{\overline{NI}(Unc_{0.1})}{P_0(Unc_{0.1})}\right]$$

may *not* be obtained by direct data extractions from census tabulations.

In the foregoing comments the terms "urban" and "rural" have been used without restriction because the formulas indicated are quite general. In this monograph these formulas have been applied to the urban complexes of 5,000 and over and *not* to the whole urban population. Use of the whole urban population would have entailed prohibitively time-consuming data processing, as a result of numerous boundary changes among the smaller urban centres. At each census (1951 or 1961) the urban complexes of 5,000 and over were defined (for the purposes of Table 5.4) as: (a) urban population with the Census Metropolitan Areas, Major Urban Areas or Urbanized Areas ("urban" according to the then prevailing census definition, and MAs or MUAs as delineated in the particular census), and (b) population in incorporated cities, towns or villages of 5,000 and over located *outside* of group (a). Population in *unincorporated* areas (particularly urbanized fringes of the larger incorporated centres) is included in group (a).

Vital statistics (births and deaths) and census data (P_0) for a sample of Canadian cities are used to estimate $NI(CTV_{0.1})/P_0(CTV_{0.1})$. This sample consists of two groups of incorporated urban centres of 5,000 and over in 1951. These groups are (a) centres that had no boundary changes in the 1951-61 intercensal period, and (b) centres where the boundaries were negligible.[1] Table F.1 lists the cities alphabetically by province and indicates the proportion of each province's incorporated urban population

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in centres of 5,000 and over (in 1951) which is included in the sample cities. The sample selection was of the non-probability type, and the sample may be characterized as a purposive sample (see Hansen, Hurwitz and Madow, 1953, c. 3, for relevant discussion).

Table F.1 – Centres included in the Sample for Estimating 1951-61 Natural Increase Ratios in Incorporated Areas, where Boundary Changes are Controlled

NOTE.—Unless otherwise stated, the names refer to incorporated cities or towns. Other areas used (e.g., Montreal Island) provide the only convenient means of handling the significant boundary changes of a very large urban agglomeration.

Province	Centres[a]
Prince Edward Island.	Charlottetown, Spring Park, Summerside
Nova Scotia	Amherst, Dominion, Glace Bay, Halifax, New Glasgow, New Waterford, North Sydney, Springhill, Stellarton, Stewiacke, Sydney, Sydney Mines, Truro, Yarmouth
New Brunswick	Campbellton, Chatham, Dieppe, Edmundston, Fredericton Lancaster, Rothesay, Saint John
Quebec ....⁀.......	Arthabaska, Arvida, Baie-de-Shawinigan, Black Lake, Bourlamaque, Cap-de-la-Madeleine, Chicoutimi, Coaticook, Drummondville-Ouest, Iberville, Joliette, Jonquière, Kénogami, Lachute, Lac-Mégantic, La Tuque, Magog, Malartic, Montmagny, Montreal Island, Grand'Mère, Lennoxville, Plessisville, Quebec, Rimouski, Rivière-du-Loup, Rivière-du-Moulin, Rouyn, Sherbrooke, Sorel, St-Agathe-des-Monts, St-Georges, St-Hyacinthe, St-Jean, St-Jérôme, St-Joseph, St-Joseph-de-Sorel, Ste-Rosalie, Shawinigan, Thetford Mines, Trois-Rivières, Valleyfield, Victoriaville
Ontario	Collingwood, Eastview, Forest Hill, Fort Francis, Fort William, Guelph, Hamilton, Hawkesbury, Ingersoll, Keewatin, Kenora, Midland, Mimico, New Toronto, Niagara Falls, Oakville, Oshawa, Ottawa, Parry Sound, Pembroke Peterborough, Port Arthur, Renfrew, Riverside, Sarnia, Sault Ste. Marie, Swansea, Thorold, Tillsonburg, Timmins, Toronto, Waterloo County, Weston, Windsor, Whitby
Manitoba	Brandon, Dauphin, Flin Flon, Selkirk, St. Boniface, Transcona, Tuxedo, Winnipeg
Saskatchewan	Regina, Saskatoon, Sutherland, Swift Current, Yorkton
Alberta	Beverly, Bowness, Calgary, Edmonton, Medicine Hat
British Columbia.....	Alberni, Chilliwack, Nelson, New Westminster, North Vancouver, Penticton, Port Alberni, Port Coquitlam, Port Moody, Prince Rupert, Trail, Vancouver, Victoria

[a]The 1951 population in these areas as a percentage of the 1951 population in incorporated urban centres of 5,000 and over: Maritimes, 85.1 per cent; Quebec, 95.5 per cent; Ontario, 70.8 per cent; Prairies, 83.9 per cent; British Columbia, 93.4 per cent.

SOURCE: 1961 Census, DBS 92-535, Tables 9, 10 and 11.

For estimating $NI(Unc_{0.1})/P_0(Unc_{0.1})$, the counties or census divisions[3] containing the bulk of the unincorporated urban population (particularly those containing census Metropolitan Areas, Major Urban Areas and Urbanized Areas) were selected. From the vital statistics and census data for these counties or census divisions were subtracted the corresponding data for the incorporated centres included in the sample. The data remaining after the subtractions were used to compute the natural increase ratios, NI/P_0, which served as estimates of $NI(Unc_{0.1})/P_0(Unc_{0.1})$. These same ratios served as the estimates of $\sum_i NI(nai)/\sum_i P_0(nai)$. Table F.2 lists the counties or census divisions for which the data were obtained.

Table F.2 — Counties or Census Divisions from which Data were Drawn for Estimating Natural Increase Ratios for Fixed-Boundary Urban Areas Outside of Incorporated Centres of 5,000 and Over

Province	Counties or Census Divisions
Nova Scotia	Cape Breton, Colchester, Halifax
New Brunswick	Saint John, Westmorland
Quebec	Beauharnois, Chambly, Châteaugay, Chicoutimi, Île Jésus, Laprairie, Richelieu, St-Hyacinthe, Terrebonne, Vaudreuil
Ontario	Carleton, Essex, Lambton, suburban part of London MA (fixed-boundary data given in DBS 92-512, Table X), Peel, Welland, Wellington, Wentworth, York
Manitoba	Census Division Nos. 5, 6 and 9 (numbers prevailing before 1961)
Saskatchewan	Census Division Nos. 6, 7 and 11
Alberta	Census Division Nos. 1, 2, 8 and 11
British Columbia	Census Division Nos. 4 and 5

In computing the approximate value of the second term of equation [3], the elements of expression [4] and equations [5] and [6] which could be procured by direct extractions from the census tabulations were obtained. Then by putting the above-mentioned estimates into equation [6], inserting the values computed from [6] into [5], and placing the values computed from [5] into [4], the approximation to the second term of [3] is obtained.

In order to estimate the third term of equation [3], the same sample of counties or census divisions (as that mentioned above) and an augmented sample of incorporated centres[3] were used. The estimated net migration

ratios for these sample areas were obtained from the general formula: net migration ratio = population growth rate minus natural increase ratio. Substituting NM for NI in expression [4], in equations [5] and [6], and in the preceding discussion, the procedure for estimating the third term of equation [3] is indicated.

There are three key assumptions in the above-mentioned procedures. Firstly, it is assumed that the natural increase ratio, NI/P_0, for the selected sample of cities is approximately the same as that for all incorporated urban centres of 5,000 and over (holding their 1951 boundaries constant). Secondly, it is assumed that the natural increase ratio for the parts of the selected counties or census divisions outside of the above-mentioned sample cities is approximately the same as that for unincorporated areas (constant boundaries) which remained urban in 1951 and 1961. The third key assumption is that the natural increase ratio for unincorporated areas ($Unc_{0.1}$ — boundaries constant) is the same as that for the areas added to the urban territory over the 1951-61 decade.

There are two main impediments to an effective test for any of these assumptions. Firstly, the relevant census and vital statistics data for all incorporated urban centres are affected by numerous boundary changes. Except where a whole incorporated centre of 1,000 and over is annexed, vital statistics data are not available for the individual areas involved in annexations. Even if the data were available, the cost of making the detailed adjustment of vital and census statistics would not be worth the resulting gain in the information presented here. Secondly, except for the unincorporated parts of MAs, vital statistics are not readily available for unincorporated centres.

Lacking a basis for testing the above-mentioned assumptions, one must be satisfied with vague judgements about their plausibility. The first assumption seems plausible because the great bulk of the incorporated urban centre (of 5,000 and over) population (at the major regional level) is included in the selected sample of cities. The second assumption seems plausible because the selected counties or census divisions are mainly those containing 1961 MAs, MUAs, or UAs, where the unincorporated urban population (particularly the suburbs of large cities) are concentrated. The third assumption seems plausible because the areas added to the urban territory over the 1951-61 decade are mostly localities containing suburban populations, populations that should be similar to those of the unincorporated urban areas which are close to large cities.

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F.2 AREAS RECLASSIFIED OVER THE 1951-61 DECADE — Three different categories of areas were added to the urban territory over the 1951-61 decade.

(a) Some areas classified as rural in 1951 were reclassified as urbanized fringes of cities within the 1961 MAs, MUAs, and UAs over the 1951-61 decade. The 1951 populations of these areas were estimated from detailed studies of maps of the 1951 and 1961 MAs and of rates of growth for the fringes (constant areas used) of cities within the 1961 MAs. The estimation procedure is described in subsection F.3.

(b) Some areas which were not within the urban complexes of 5,000 and over as of 1951 were annexed to cities within these complexes over the 1951-61 decade. For all cities within the 1961 MAs and MUAs, the 1951 populations of annexed areas may be computed directly from census tabulations. Most of the other cities which had annexations annexed whole municipalities, permitting immediate access to the 1951 annexed area population (available in census tabulations). For the remaining cities which had annexations the municipality containing the annexed territory is known, permitting simple and good estimates of the sizes of the annexed populations in 1951. The errors in these estimates are negligible.

(c) Some areas which were outside the urban-complex area in 1951 passed above the 5,000-population mark by 1961. The 1951 populations of these areas (adjusted in the few cases which had 1951-61 annexations) were obtained directly from the census tabulations.

Areas reclassified from urban to rural over the 1951-61 decade fall into two categories.

(a) In 1951 the whole area of an MA was classified as urban but in 1961 only the urbanized parts were classified as urban. As a result, some MAs had fringes which were reclassified from urban to rural between the 1951 and 1961 censuses. The 1951 populations of these areas were estimated by the procedure described in subsection F.3.

(b) Centres which were in the urban-complex territory in 1951 may have declined below the 5,000-population mark by 1961. However, no centres actually sustained such a decline over the 1951-61 decade.

F.3 ESTIMATING THE CONTRIBUTION OF CHANGES IN THE CENSUS DELINEATION OF URBANIZED FRINGES OF CITIES — Between 1951 and 1961 there was some increase in the types and number of areas which were eligible for classification as urbanized fringes of established urban centres. In 1951 urbanized fringes were delineated by DBS for 15 MAs, whereas in 1961 urbanized fringes were delineated for 17 MAs, 20 MUAs and 30 UAs. (Any single member of these types of areas may contain

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several incorporated urban centres — which sometimes comprised one continuous built-up area.) In addition, DBS changed the boundaries of those urbanized fringes delineated in 1951. No data have been published for the contribution of the above-mentioned changes to the 1951-61 observed urban population growth, and it was necessary to prepare estimates for the purposes of this monograph. The estimation proceeded as follows.

The percentage of population in urbanized areas was computed for each of the 1961 unincorporated fringes of MAs and MUAs from the available data (DBS, 1963, and 1961 Census, DBS 92-528). For each UA the percentage of population in urbanized areas was computed for each of the municipalities containing its fringes from the available data (DBS, 1963, and 1961 Census, DBS 92-539). These percentages were then applied to the 1951 populations of the areas equivalent to the 1961 fringes (1961 Census, DBS 92-528 and DBS 92-539) yielding the estimated 1951 population of the urbanized parts of the 1961 fringe areas. (Within an MA, MUA or UA, each separately identified part of the fringe was treated separately so that re-definitions from urban to rural, and vice versa, could be distinguished.)

In 1951 urbanized fringes were delineated about the 1951 MAs. Before using the 1951 figure for a separately identified part of 1951 MA fringe, that figure was reduced by the population (1951) which was involved in intercensal new incorporations or annexations to existing incorporated centres (since such populations are automatically excluded from the 1961 fringe area, which is unincorporated). Then the reduced fringe figure was subtracted from the estimated 1951 population of the urbanized parts of the 1961 fringe (described in the preceding paragraph) to obtain a measure of the "definitional change" element for the particular fringe part in question. (The whole of the 1951 MA fringes were designated as urbanized in the 1951 census.) If the result of the subtraction is positive then rural-to-urban re-definition is considered to have occurred; if the result is negative it is taken as re-definition from urban to rural. In the cases of the MUAs and UAs, no urbanized fringes were designated in 1951. Thus all of the re-definition is from rural to urban.

The key assumptions of this estimation refer to equalities of population growth rates. The above-mentioned use of percentages assumes that the urbanized and rural populations of each MA, MUA and UA fringe part grew at the same rate, holding either the 1961 or the 1951 areas constant. This assumption is not unreasonable, since each fringe part is a small and relatively densely populated area in which the urban and rural populations (as defined by DBS) probably live in close proximity to each other. It may be that many members of both populations work in the commercial and industrial centres of the MA, MUA or UA in question.

Table F.3 — Components of the Direct Contribution of Areal Change to the Rate of Population Change for Urban Complexes of 5,000 and Over, Major Regions of Canada, 1951-61

NOTE.—"Direct contribution of areal change" is defined in Subsection F.1 of this Appendix and the definition of "urban complex of 5,000 and over" is given in the text of this Appendix.

Major Region	1951 population in urban complexes of 5,000 and over[b] ('000)	1951-61 percentage change in the urban-complex population[c]	Estimated percentage change attributable[a] to the size of the 1951 population in —				
			Fringes reclassified from-urban to rural[d]	Fringes reclassified from rural to urban[e]	Areas annexed to urban complexes[f]	Centres passing above the size limit[g]	
	A	B	C	D	E	F	C+D+E+F
Canada.................	7,299	51.7	−0.9	2.5	2.3	3.3	7.2
Maritimes.............	452	27.9	−3.7	5.5	0.9	3.4	6.1
Quebec...............	2,274	48.7	−0.6	1.0	0.8	4.9	6.1
Ontario...............	2,880	56.3	−0.6	4.2	4.1	2.3	10.0
Prairies..............	960	63.1	−0.6	–	1.9	3.3	4.6
British Columbia	733	42.2	−1.3	2.5	1.0	2.4	4.6

[a] Percentage change in population that each of the listed sources would have produced by itself.

[b] Regional figures do not add to Canada total due to rounding.

[c] See footnote[f] to Table 6.3 for definition of the percentage change in population.

[d] Areas within the unincorporated fringes of 1951 MAs (all of which were classified as urban) but in the rural (as classified in the census) parts of unincorporated fringes of the 1961 MAs.

[e] Areas outside of the 1951 MAs but classified as urban in 1961 and within the 1961 MAs, MUAs or UAs.

[f] Excludes areas already classified within the 1951 urban complex area.

[g] Centres which were less than 5,000 in 1951 and were at least 5,000 in 1961. The 1961 areas of the centres are used in obtaining the population figures for 1951. No centres passed below the 5,000-mark in the 1951-61 intercensal period.

SOURCES: 1961 Census, DBS 99-512, Table 2 — DBS 92-538 — DBS 92-539.

The data needed for testing the estimations described in this Appendix are not readily available. Such data would require a detailed search of unpublished census records. In any event, the figures resulting from the estimation are so small in relation to the observed urban growth (Table F.3) that a large element of error (relative to the estimated figures) could be tolerated before the relevant general conclusions of the pertinent parts of this monograph must be altered significantly.

Only in Ontario is the 'change-of-fringe' element as much as 10 per cent of the observed urban growth. This is partly due to the facts that 6.6 per cent of the 1961 national urban fringe population for MAs, MUAs and UAs is in Ontario, and that a large rural-to-urban reclassification of fringes has been made for the Toronto MA. In 1961 for the first time the Toronto MA fringe included parts of Markham and Vaughan Townships in York County, and parts of Halton, Ontario and Peel Counties. Altogether, the MUAs, UAs and Toronto MA account for 85 per cent of the estimated 1961 population of 263,000 re-defined from rural to urban in Ontario.

The net urban-to-rural re-definition of fringes shown in Table F.3 for the Prairie region is consistent with the available data for such reclassification over the 1951-56 and 1956-61 periods. In this region there was no reclassification of fringes in the 1951-56 period, but there were sizable rural-to-urban reclassifications in 1956-61. The reason for the much larger rural-to-urban redefinitions shown for the 1956-61 period (1961 Census, DBS 92-536) than for the 1951-61 period is the fact that in 1956 a more liberal definition of urbanized fringes was used than in either 1951 or 1961 (1961 Census, DBS 99-512, pp. 2.1-2.3).

F.4 ESTIMATES OF NATURAL INCREASE AND NET MIGRATION RATIOS FOR URBAN CENTRES AND URBAN SIZE GROUPS — Some ratios mentioned and defined in subsection F.1 served as the estimated natural increase and net migration ratios presented in Table 5.6. The ratios are as follows: —

Ratio	Incorporated centres	Unincorporated centres
Natural increase	$NI(CTV_{0.1})/P_0(CTV_{0.1})$	$NI(Unc_{0.1})/P_0(Unc_{0.1})$
Net migration	$NM(CTV_{0.1})/P_0(CTV_{0.1})$	$NM(Unc_{0.1})/P_0(Unc_{0.1})$

For incorporated centres, natural increase and net migration ratios were also estimated for the different urban size groups. The same ratios were used for the unincorporated parts of each urban size group.

The sample of cities used to obtain the natural increase and net migration ratios, $NI(CTV_{0.1})/P_0(CTV_{0.1})$ and $NM(CTV_{0.1})/P_0(CTV_{0.1})$, was classified into the four size groups according to size in 1951. For each size group sub-sample ratios analogous to those mentioned above were computed. Then, applying equation [6] to each size group in turn, the natural increase ratios were estimated for urban size groups. Substituting NM for NI in equation [6], the same procedure yielded the net migration ratios for the urban size groups.

F.5 ESTIMATING NET MIGRATION RATIOS FOR THE PARTS OF REGIONS OUTSIDE OF THE URBAN COMPLEXES — Substituting NM for NI in equation [6], this equation gives the net migration ratio for the urban complexes (constant geographical area). Multiplying this ratio by the 1951 urban-complex population yields the estimated net migration to the urban complexes.

The estimated net migration (1951-61) for the major regions have been published (1961 Census, DBS 99-511, Table 2). Subtracting from the published data the estimated net migration for the urban complexes gives the estimated net migration to the area outside of urban complexes. Dividing this residual by the 1951 population residing outside of urban complexes yields the estimated net migration ratio for the area outside of urban complexes.

Appendix G

LIFE TABLE SURVIVAL RATIOS FOR ESTIMATING NET MIGRATION BY SEX AND AGE

G.1 ESTIMATION PROCEDURES

The net migration ratio estimates for persons alive at the start of a decade have been prepared according to the survival ratio technique. Let $P_a(x,t)$ refer to the population of place a which is aged x at time t, and $R(x)$ be the proportion of $P_a(x,t)$ which is expected to survive ten years (up to time $t + 10$). Then the survival ratio estimate of net migration is defined as $NM_a(x,t) = P_a(x + 10, t + 10) - R(x) \cdot P_a(x,t)$, and the estimated net migration ratio is defined in this monograph as $NM_a(x,t)/P_a(x,t)$. The survival ratio estimate is subject to various errors, and some preliminary work has been done toward developing methods for identifying the values of the estimate which are large enough to be treated as being relatively insensitive to these errors (Stone, 1966). Since the relevant literature is quite extensive and available (Siegel and Hamilton, 1952; Lee, 1957; Zachariah, 1962; and Stone, 1966), no discussion of the quality of net migration estimates is made in this monograph.

In this monograph $R(x)$ is estimated from life tables for major Canadian regions, which are the most desirable available. The life tables for a given region are applied to the cities and counties or census divisions in the region, since survival ratios tailored to individual cities are not available. As urban mortality rates have tended to be somewhat higher than rural mortality rates in Canada (Slater, 1960b), the use of the major regional life tables tends to produce understatement of net in-migration and overstatement of net out-migration for cities and highly urbanized areas. These tendencies are quite slight (particularly in recent decades) due to the smallness of the urban-rural mortality differential (Slater, 1960b), and their effects on the migration estimates are confounded with distortions created by other sources of error in these estimates. The data required for testing the accuracy of the life table survival ratios (in applications to the selected cities and counties or census divisions) are not available, and one must be satisfied with the kind of approximate evaluation of life table survival ratio estimates indicated by Stone (1966).

The survival ratio for a given decade is computed from the L_x-column (Barclay, 1958) of the life tables for the beginning and ending years

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(*t* and *t* + *10*, respectively) of the decade in question. The estimated survival ratio is

$$\hat{R}(x) = \left[L_{x + 10}(t + 10) + L_{x + 10}(t) \right] \Big/ \left[L_x(t + 10) + L_x(t) \right] \quad [1].$$

Thus the survival ratio is *estimated* by averaging *L* values from the life tables for the beginning and end of the decade in question, a process which assumes a generally linear trend in mortality rates over the decade.

The values of equation [1] may be computed directly from published life tables for the 1931-41, 1941-51, and 1951-61 periods. For the 1921-31 period, estimates of L_x values for Canada and the major regions are required. The procedure used to prepare these estimates may be indicated as follows.

Let R_h be the survival ratio for a given sex-age group in the *h*th region, and R_C be the corresponding survival ratio for Canada. The ratio $R_h/R_C = r_h$ was computed for 1931-41, 1941-51 and 1951-61. The ratio was observed to be quite stable (in each region) and its average, $\bar{r}_h$, was computed. The value of R_C was then estimated for 1921-31, $R_C(21\text{-}31)$ and the regional survival ratios were estimated by $\bar{r}_h \cdot R_C(21\text{-}31)$. The estimation of $R_C(21\text{-}31)$ is indicated in the following paragraphs.

Appropriate values of equation [1] regarding 1921-31 may not be computed directly from the published life tables because the only life table located for the year 1921 (Keyfitz, 1931) pertains to Canada *minus* Quebec province. Therefore all-Canada L_x values from the 1921 life table have been estimated for the purposes of this monograph. There are at least three difficulties with the 1921 life table. Firstly, it does not include Quebec, since this province entered the Federal vital registration area in 1926. Secondly, the initial age (the life table radix) is age zero, while that in the 1931 life table is age zero. Thirdly, it is based on mortality data for 1921 alone, while that for 1931 is based on a three-year average of mortality data centering on 1931. In order to use the 1921 life table, it was necessary to make a number of assumptions concerning these sources of non-comparability between this and the 1931 life tables. It is assumed that between 1921 and 1931 there was a stable relation between the sex-age specific mortality rates for Canada *including* Quebec and those for Canada *excluding* Quebec. The DBS vital statistics data do not permit a rigorous test of this assumption. We have observed some relevant unadjusted infant mortality and crude death rates in 1921 and 1931. Table G.1 does show notable 1921-31 changes in the relation between rates for Canada including Quebec and those for Canada excluding Quebec but these changes cannot be taken as strong bases for rejecting the above-mentioned assumption, because the figures are affected by registration and enumeration errors.

Table G.1 – Infant Mortality and Crude Death Rates for Canada, With and Without Quebec, 1921 and 1931

NOTE.—Exclusive of the Yukon and Northwest Territories.

Item	1921			1931		
	Canada with Quebec	Canada without Quebec	A/B[a]	Canada with Quebec	Canada without Quebec	D/E[a]
	A	B	C	D	E	F
Infant mortality rate[b]	102	89	1.15	86	72	1.19
Crude death rate[c]	12	11	1.07	10	10	1.06

[a] Computed from unrounded figures.
[b] Number of deaths among persons less than one year of age per 1,000 live births. These figures are unadjusted for under-registration or for age misclassification.
[c] Number of deaths per 1,000 population. These figures are unadjusted for under-registration or for net enumeration error.
SOURCES: DBS *Vital Statistics* (annual), 1921 to 1961 (1956, Tables 8, 18 and 29); 1961 Census, DBS 99-511, Table 1.

The above-mentioned assumption may be stated symbolically, in order to indicate how it is used in computations.

Let L_x mean the life table stationary population in the five-year age group x
C mean Canada including Quebec
$\bar{C}$ mean Canada excluding Quebec
21 mean 1921
31 mean 1931
$\tilde{L}_x$ mean estimated value of L_x.
The assumption implies that

$$\frac{L_x(C, 31)}{L_x(\bar{C}, 31)} \cdot L_x(\bar{C}, 21) = \tilde{L}_x(C, 21) \qquad [2].$$

The left-hand side of equation [2] may be computed from data presented by Keyfitz (1931).

As mentioned above, the initial age (radix) of the available 1921 life table is age five. Fortunately, Keyfitz (1931) and DBS (1947) have made available life tables for 1931 based on the radixes of age zero and age five. These life tables permit one to adjust easily the 1921 L_x values to a radix of age zero.

Let R_0 mean a radix of age zero
R_5 mean a radix of age five.

The following estimating equation has been used.

$$\frac{L_X(C, 31, R_O)}{L_X(C, 31, R_s)} \cdot \hat{L}_X(C, 21, R_s) = \hat{L}_X(C, 31, R_O)$$ [3].

The term $\hat{L}_X(C, 21, R_s)$ is obtained from equation [2], and is computed from values based on the life tables with radix at age five.

As one might expect the ratio $L_X(C, 31, R_O)/L_X(C, 31, R_s)$ was very stable among five-year age groups. Among males it ranged from 0.890323 to 0.890346. Among females it ranged from 0.910000 to 0.910028.

Because only the age-five radix was used in computing the 1921 life tables, equations [2] and [3] cannot be used in obtaining the 1921-31 survival ratios for males and females aged 0-4 in 1921. For this age group the general method employed by Keyfitz (1950) has been used. The relation between the survival ratio for England and Wales and that for Canada in 1931 is applied to the survival ratio for England and Wales in the 1921-31 decade.[1] Ten-year survival ratios for males and females were computed from the 1931 life tables for England and Wales and for Canada.[2] For each sex the Canadian survival ratio was divided by the English survival ratio. The resulting quotient was applied to the 1921-31 survival ratio for England and Wales, which was computed from the English life tables for 1921 and 1931, yielding the estimated Canadian survival ratio for 1921-31. Clearly, the assumption made in using the English life tables is subject to an unknown margin of error.

A crude check on the plausibility of the estimates of survival ratios for Canadians aged 0-4 in 1921 was made by a study of the ratio of the male to the female survival ratios in that age group. For the decades 1921-31 (the present estimate), 1931-41, 1941-51 and 1951-61 the ratios of the male to the female survival ratios for persons aged 0-4 at the beginning of each decade were 0.9961, 0.9957, 0.9965 and 0.9975, respectively. These figures suggest that the present estimates for 1921-31 are plausible in their conformity with the general level of the ratio of male to female survival ratios. Of course, the figures for 1931-41 to 1951-61 suggest a linear increase in the ratio, which the 1921-31 estimate does not confirm. However, this divergence of the 1921-31 estimate does not seem large enough to damage seriously its plausibility.

As mentioned above, the 1921 life table is based on death rates for the year 1921, whereas the 1931 life table is based on rates which employ a three-year average of deaths for 1930-32. (The federal death registration area was set up in 1921 and DBS data were not available for obtaining an average of deaths for the years 1920-22.) In using the 1921 life table,

it has been assumed arbitrarily that this difference between the 1921 and 1931 life tables had a negligible influence on the computed survival ratios.

The earliest date for which death rates for an average of three years can be compared with those for the mid-year of those years is 1931. For this year the unadjusted crude death rate for Canada is 10.2 based on the three-year average of deaths, while the rate is 10.1 based on 1931 deaths only. The unadjusted infant mortality rate is 83 based on the three-year average of infant deaths and live births, while it is 85 based on 1931 infant deaths and live births (DBS, 1934; and DBS, 1935). From these observations, and from the usually close similarity between the infant mortality rate and the life table mortality rate at age zero, it would seem plausible to assume that the absolute error in the survival ratios attributable to the above-mentioned assumption may be taken as being less than 0.002. Thus it assumed that the values of the first two decimal places of the computed survival ratios would not be changed if a three-year average of deaths in Canada for 1920-22 should be obtained.

This restriction on the accuracy of the computed survival ratios applies mainly to the use of the survival ratios to estimate the *level* of net migration. It should be weakened when one is concentrating on substantial age differentials in net migration ratios.

In preparing the net migration ratios by age group for counties (Table 7.5) and for the Principal Regions of Metropolitan Development (Table 7.4), the life table survival ratio technique described above has been used. The census data (population counts by five-year age group) refer to practically constant geographical areas. For Table 7.5 the survival ratios used are just those indicated above. For Table 7.4, because it was necessary to depart from the five-year age grouping, survival ratios tailored to the age groupings in this table were computed from the regional life tables. It was also necessary to apply the survival ratios to data in which males were not separated from females. For this purpose a weighted sum of the sex-specific survival ratios (for a fixed age group) was used. The weight for each sex-specific survival ratio was the proportion of that sex in the 1951 population (for the fixed age group) of the major region in question.

G.2 MEASURING THE IMPACT OF NET MIGRATION ON AGE DISTRIBUTIONAL CHANGE — The measurement of the impact of net migration upon age distributional change in Chapter Five is an application of the technique of standardization. Essentially, this technique involves the breakdown of a quantity into its components. One or more of the components is (or are) held fixed in a selected manner, while the others are allowed to

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vary. The consequences of fixing certain of the components are then compared with the observations one makes when all the components are allowed to vary.

Consider the case where a variable is observed at two points in time, and the difference between its initial and terminal values is to be analysed through standardization. The contribution of a given component of this difference may be examined in at least two ways. Firstly, we may compute the terminal value which the variable would have if the component in question did not change since the initial observation. Then the difference between this hypothetical terminal value and the actual one is taken as a gauge of the contribution of the component. This approach is used in this monograph. Secondly, we may compute the change which *would* have taken place in the variable *if only* the component in question changes between the initial and terminal observations. This hypothetical change may be taken as a measure of the contribution of the component to the actual change in the variable. These two usually yield different absolute contributions, but the relative importance of the members of a set of components should be roughly similar.

In the following analysis the male and female populations are treated separately. The age distribution of each is defined as a collection of proportions and change in the age distribution is defined as a change in at least one of these proportions.

Gauging the contribution of net migration to age distributional change involves measurement of the impact of net migration on each of the proportions comprising the age distribution. For n proportions (corresponding to n age groups) there are n measurements, the average result from which may be termed the "general contribution" of net migration to age distributional change.

Migration is seen as having a direct impact and an indirect impact. The direct impact is the immediate result of net migration on population change, determined by the number of migrants surviving to the end of the migration period. The indirect impact is the net contribution of migrants to the numbers of births and non-migrant deaths, a contribution that can be measured only partially and crudely from the available data. In measuring the relative importance of migration in age distributional change, a hypothetical age distribution is constructed — the end-of-period distribution which would have been observed if there were no migration at all (with the result that *both* net migration and the interaction of net migration with natural increase are zero).

In gauging the direct and indirect impacts of net migration upon age distributional change, two hypothetical age distributions are computed. The general approach may be indicated briefly as follows: —

Let p refer to the proportion of population in a given age group

     o and $_1$ refer to the beginning and end, respectively, of a selected migration period,

     h_{p_1} mean the proportion of population in a given age if net migration is zero for persons in that age group at the end of the migration period,

     H_{p_1} mean the proportion of population in a given age if (a) net migration is zero for persons in that age group at the end of the migration period *and* (b) the indirect impact of net migration is zero.

The hypothetical age distributions indicated above contain the proportions h_{p_1} and H_{p_1}. With these distributions the observed change in the age distribution may be decomposed as follows:

$$p_1 - p_0 = (p_1 - h_{p_1}) + (h_{p_1} - H_{p_1}) + (H_{p_1} - p_0) \qquad [4].$$

The difference $(p_1 - h_{p_1})$ is attributed to net migration, that is it is the measured direct impact of migration. The difference $(h_{p_1} - H_{p_1})$ is the change attributed to the indirect impact of migration (the interaction of net migration and natural increase). The difference $(H_{p_1} - p_0)$ is the residue unexplained by migration, and fertility is probably the most important determinant of this residue.

The hypothetical end-of-period age distribution under the assumption of zero net migration is computed as follows. Let NM_a be the survival ratio estimate of net migration for persons aged a at the end of the migration period, and let P_{a_1} be the observed population aged a at the same time. Then compute $P_{a_1} - NM_a$. The hypothetical age distribution is the set of n ratios, $(P_{a_1} - NM_a)/\sum_{a}^{n}(P_{a_1} - NM_a)$. In short, net in-migration is taken away from the end-of-period population while net out-migration is added to the same population.

The expected end-of-period population in the age group $a + 10$ (for a ten-year migration period) is

$$P(a, o) \cdot R_a \qquad [5],$$

where $P(a,o)$ is the population aged a at the beginning of the migration period and R_a is the estimated probability of surviving ten years for a person aged a at the beginning of the period.

In order to obtain the expected number of survivors among the within-period births to this hypothetical population, it is assumed that its end-of-period child-woman ratios are approximately the same as those for the

observed population. Following the technique used by Lee (1957, p. 65), let

$C(0-4, 1) / F(15-44, 1)$ be the ratio of children aged 0-4 to women aged 15-44 in the *observed* population at the end of the migration period,

$C(5-9, 1 / F(20-49, 1)$ be the ratio of children aged 5-9 to women aged 20-49 in the *observed* population at the end of the migration period,

$EF(15-44, 1)$ be the number of females aged 15-44 in the above-mentioned hypothetical population, and

$EF(20-49, 1)$ be the number of females aged 20-49 in the above-mentioned hypothetical population.

Then, the expected numbers of children aged 0-4 and 5-9 in the above-mentioned hypothetical population are defined as:

$$\frac{C(0-4, 1)}{F(15-44, 1)} \cdot EF(15-44, 1) \qquad [6]$$

and

$$\frac{C(5-9, 1)}{F(20-49, 1)} \cdot EF(20-49, 1) \qquad [7]$$

respectively.

Assuming the sex ratio for the observed end-of-period population, these numbers may then be broken down by sex.

Using expressions [5], [6] and [7] we build up the hypothetical population which *would* have been observed at the end of the migration period *if* both the direct and the indirect impacts of migration were absent.

Suppose the comments in the two preceding paragraphs referred to the *first* of a sequence of migration periods. For example from 1901 to 1961 there are seven decennial censuses demarcating six intercensal periods. From the foregoing supposition the survival ratio mentioned above refers to the 1901-11 period, and the hypothetical population refers to 1911. Now this 1911 hypothetical population may, in turn, be subjected to the 1911-21 survival ratios and to the 1921 child-woman ratios. This process would generate a hypothetical 1921 population, based on the assumption of no direct or indirect impact of migration over the two decades. The process may be applied again to generate hypothetical 1931, 1941, 1951 and 1961 population, based on the assumption of no direct or indirect impacts of net migration over the six decades from 1901 to 1961. The sequence of hypothetical age distributions so generated provides an approximate picture of the path which *the age* distributional change would have followed had there been no in-migration or out-migration over the 60-year period.

As mentioned in Subsection G.1, the earliest Canadian regional life tables based on a three-year average of deaths pertains to 1931. The survival ratios for Canada mentioned in Subsection G.1 were extrapolated

backwards to 1911-21 and 1901-11. Then the relations between comparable Canadian and regional survival ratios (for the decades since 1931) were used to estimate the required Quebec and Ontario survival ratios for 1901-11, 1911-21 and 1921-31. The values extrapolated for Canada are mainly adjustments of data provided by Keyfitz (1950). Quotients of the author's survival ratio estimates for Canada (1921-31, 1931-41 and 1941-51) divided by those of Keyfitz (1950) were extrapolated backwards to 1911-21 and 1901-11. These quotients were then multiplied by Keyfitz' (1950) Canadian survival ratio estimates for 1911-21 and 1901-11, yielding the above-mentioned adjustment.

Appendix H

ADJUSTMENT OF VITAL STATISTICS FOR ESTIMATING NET MIGRATION, 1921-31 AND 1931-41

The vital statistics estimate of net intercensal migration is defined as follows. Let P_O and P_1 represent the initial and terminal populations of the area in question. Let B and D represent the intercensal births and deaths to residents of this area. The vital statistics estimate of net intercensal migration is $NM = P_1 - P_O + D - B$ and the net migration ratio is defined in this monograph as NM/P_O. The required birth and death data are obtained from *Vital Statistics*, an annual publication by DBS.

As equation *(1)* indicates, the computation of the vital statistics estimate is quite straight forward once the requisite data are available. In Canada, a difficulty is posed by the fact that vital statistics have been published annually on a place-of-residence basis only since 1944. In regard to the 1941-51 period net migration estimates for counties or census divisions (1951 Census Vol. IX, Table 3) have been published on the basis of place-of-residence allocations of the relevant births and deaths, but no such estimates have been published for cities. For the 1921-31 and 1931-41 periods no net migration estimates for counties, census divisions or cities have been published by DBS. In preparing vital statistics estimates of net intercensal migration over the 1921-31 and 1931-41 periods (as well as 1941-51 for cities) for this monograph, adjustments of the place-of-occurrence vital statistics have been made.

For counties, census divisions and incorporated urban centres of 1,000 and over, place-of-residence allocations of births and deaths have been published for 1930-32 and 1936 (DBS, 1934; DBS, 1935; and DBS, 1939). Use was also made of unpublished DBS tabulations of place-of-residence allocations of births and deaths for 1940, 1941, 1942, and 1943. From these and the published data, ratios of births by place of residence to births by place of occurrence (and similarly for deaths) were computed for each county or census division and for selected cities for 1931, 1936, and 1941 to 1946.

For each of these 200-plus areas the time series of ratios showed a trend stable enough to justify the use of simple averages of the ratios as correction factors for the vital statistics by place of occurrence for the

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whole 1931-41 and 1941-51 (cities only) intercensal periods. In many cases the ratios were sufficiently close to 1.000 to warrant the direct use of the place-of-occurrence data. By multiplying a correction factor by the appropriate place-of-occurrence data the estimated place-of-residence allocation of the data is obtained.

For the 1921-31 period the time series of ratios was extrapolated backwards to 1921 for each area. With two major exceptions, the average of the extrapolated 1921 ratio and that computed for 1931 was used as the correction factor for the vital statistics for the 1921-31 period. The first exception pertains to extrapolations which "carried" a ratio from a value of 1.000 or above in 1931 to a ratio below 1.000 in 1921. A ratio larger than one indicates that some births (or deaths) to residents of the area were occurring *outside* of the area. Rural areas near to cities and towns are likely to show ratios larger than one. It was assumed that the ratio for an area would not change from a value of less than one in 1921 to a value greater than one in 1931. Thus, the correction factor for 1921-1931 was arbitarily set equal to 1.000 whenever the extrapolation indicated a ratio below one in 1921 and above one in 1931. The second major exception is that ratios which were 1.000 for 1931-41 remained 1.000 for 1921-31.

Appendix I

LIST OF CENSUS AND MUNICIPAL SUBDIVISIONS COMPRISING THE PRINCIPAL REGIONS OF METROPOLITAN DEVELOPMENT[1]

("Co." = county; "par." = parish; "mun." = municipality; "twp." = township)

Halifax MA	Subdivision D, Halifax Co.
Saint John MA	Lancaster par., St. John Co.
	Lancaster city, "
	Simonds par., "
	Rothesay par., Kings Co.
	Rothesay town, "
	Westfield par., "
	Saint John city, St. John Co.
Montreal MA	Montreal and Jesus Islands Co.
	Chambly Co.
	St-Joachim-de-Châteauguay mun., Châteauguay Co.
	Châteauguay town, "
	Châteauguay-Centre town, "
	Châteauguay-Heights town, "
	Léry town, "
	St-Eustache mun., Deux-Montagnes Co.
	Ste-Marthe-sur-le-Lac mun., "
	St-Eustache town, "
	St-Eustache-sur-le-Lac town, "
	Laprairie Co.
	Repentigny mun., L'Assomption Co.
	St-Paul-l'Ermite mun., "
	Repentigny town, "
	Charlemagne village, "
	Rosemère mun., Terrebonne Co.
	Ste-Thérèse-de-Blainville mun., "
	Ste-Thérèse-O.-W. mun., "
	Ste-Thérèse city, "
	Rosemère town, "
	Vaudreuil Co.
Quebec MA	Quebec Co.
	Lévis Co.
Hamilton MA	Wentworth Co.
Kitchener-Waterloo MA	Waterloo Co.

London MA . . . .   London twp., Middlesex Co.
                                         Westminster twp., "
                                         London city,   "

Ottawa MA . . . .   Gloucester twp.,   Carleton Co.
                                         Nepean twp.,   "
                                         Ottawa city,   "
                                         Rockcliffe Park village,   "
                                         Hintonburg village   "
                                         Ottawa East village   "
                                       Hull city,   Hull, Co.
                                         Gatineau town,   "
                                       Pointe Gatineau town,   "
                                       Templeton village,   "
                                       Templeton W. mun.,   "
                                       Aylmer town,   Gatineau Co.
                                       Deschênes town,   "
                                       Hull, part. S. mun.,   "
                                       Hull, part. W. mun.,   "

Sudbury MA . . . .   Sudbury Co.

Toronto and Hamilton MAs . .   Halton Co.
                                         York Co.
                                       Pickering twp.,   Ontario Co.
                                       Ajax town,   "
                                       Pickering village,   '   "
                                     Toronto twp.,   Peel Co.
                                       Port Credit town,   "
                                       Streetsville village,   "

Windsor MA . . . .   Sandwich E. mun., Essex Co.
                                         Sandwich S. mun.,   "
                                         Sandwich W. "   "
                                         East Windsor city,   "
                                       Windsor city,   "
                                       La Salle town,   "
                                       Riverside town,   "
                                       Sandwich town,   "
                                       Walkerville town,   "
                                       Ojibway town,   "
                                       Tecumseh town,   "

Winnipeg MA . . . .   Division No. 20

Calgary MA . . . .   31. Foothills mun., Division No. 6
                                         44. Rocky View mun.,   "
                                         Calgary city,   "
                                       Bowness town,   "
                                         Forest Lawn town,   "
                                       Rouleauville town,   "

Edmonton MA[2] .... 83. Strathcona mun.,   Division No. 11
                              Sturgeon Co. No. 15 mun.,   "
                              84. Stony Plain mun.,   "
                              Wetaskiwin Co. No. 10 mun.,   "
                              Wetaskiwin city,   "
                              Edmonton city,   "
                              Beverly town,   "
                              Entwistle village,   "

Vancouver MA .... Subdivision C, Division No. 4
                            Subdivision D,   "

Victoria MA .... Subdivision A, Division No. 5

Regina Area............... 159. Sherwood mun., Division No. 6
                            Regina city   "

Saskatoon Area .... 344. Cory mun., Division No. 11
                             Saskatoon city,   "

Appendix J

ESTIMATION OF NET MIGRATION RATIOS FOR REGIONAL GROUPINGS OF MAs, MUAs AND OTHER AREAS, 1951-61

DBS (1961 Census, 99-512, Table X) has presented net migration ratios for areas very closely approximating the 1961 MAs, and these data have been used to prepare the figures for MAs in Table 6.3. As a step in the preparation of the above-mentioned ratios, intercensal (1951-61) natural increase figures (births minus deaths) were computed by DBS (1961 Census, 99-512 Table X). For the data presented in Table 6.3, the natural increase totals were aggregated by major region and natural increase ratios (natural increase divided by 1951 population) were computed. Population growth rates (intercensal population change divided by 1951 population) were then computed for each regional group of 1961 MAs, and these refer to the areas of the MAs in 1961 (1961 Census, DBS 92-535, Table 10). For each group of MAs, the estimated net migration ratio is the population growth rate minus the natural increase ratio.

Population growth rates (1951-61) may be computed directly from published data (1961 Census, DBS 92-535, Table 11) for the 1961 areas of the MUAs. For each regional group of MUAs, natural increase ratios were estimated from the data for selected counties and for the sample of cities described in Section F.1 of Appendix F. The net migration ratios were then estimated in the same manner as that indicated above.

The regional groups of cities or counties used to estimate the natural increase ratios for MUAs are as follows:—

Maritimes.................. Cape Breton County (Nova Scotia) and Westmorland County (New Brunswick)

Quebec.................... (MUAs consist entirely of incorporated centres) The incorporated centres of Chicoutimi, Jonquière, Arvida, Kénogami, Rivière-du-Moulin, Drummondville-Ouest, St-Jean, Iberville, Shawinigan, Baie-de-Shawinigan, Grand' Mère, St-Georges, Sherbrooke, Lennoxville, Trois-Rivières, Cap-de-la-Madeleine and Valleyfield.

Ontario................... The counties of Lincoln and Frontenac. The incorporated centres of Fort William, Port Arthur, Guelph, Niagara Falls, Oshawa, Whitby, Peterborough, Sarnia, Sault Ste. Marie, Timmins and Thorold.

Column C of Table 6.3 refers to incorporated urban centres of 5,000 and over (in 1951) which are outside the MAs or MUAs. After adjustments (headnote to Table 4.4) made to provide 1951 population totals for the 1961 areas of these centres, population growth rates for regional groups of these centres were computed. Natural increase ratios were estimated from the census and vital statistics for the sample of cities described in Section F.1 of Appendix F (excluding the cities in MAs and MUAs). Using these natural increase ratios and the above mentioned population growth rates, net migration ratios were estimated in the manner indicated in the opening paragraph of this appendix.

The population growth rates, natural increase and net migration ratios for selected mainly rural farm counties or census divisions (Table 6.3) were computed directly from data published by DBS (1961 Census, 99-511, Table 2). The list of counties or census divisions is as follows:—

Prince Edward Island . . . . Kings

Nova Scotia . . . . Inverness

Quebec . . . . Bellechasse, Bonaventure, Compton, Frontenac, Huntington, L'Islet, Lotbinière, Napierville, Nicolet

Ontario . . . . Bruce, Dufferin, Dundas, Glengarry, Prince Edward, Russell

Manitoba . . . . Census Divisions 1, 3, 4, 10, 11, 12, 13, 14 and 15 (numbers prevailing before 1961)

Saskatchewan . . . . Census Divisions 1, 3, 9, 10, 12, 13, 15 and 17

Alberta . . . . Census Divisions 4, 7, 12 and 13 (divisional system introduced in the 1956 Census).

Column E of Table 6.3 refers to the parts of the major regions which are not included in Columns A, B, C or D. The natural increase, net migration, and population totals for this area are obtained by subtracting from the relevant major-regional figures (1961 Census, DBS 99-511, Table 2) those for the areas covered by columns A, B, C and D. From the figures which remain after the subtractions, the net migration and natural increase ratios are computed.

Appendix K

ESTIMATING THE COMPONENTS OF POPULATION GROWTH FOR THE PRINCIPAL REGIONS OF METROPOLITAN DEVELOPMENT, 1921-31 TO 1951-61

The data presented in Table 6.4 for the Principal Regions of Metropolitan Development (PRMDs) refer to roughly constant geographical areas (headnote to Table 6.2). Thus these data may be used to generate decennial population growth rates for the PRMDs as well as for the remaining parts (taken as a whole) of Canada, where the rates are largely undisturbed by boundary changes. For each major region, such growth rates were computed for the decades 1921-31 to 1951-61. Natural increase ratios were then estimated for the two types of areas — PRMDs and the remainder of the major region in question. These ratios were estimated from data for counties or census divisions. The estimated ratio for the PRMDs consists of the natural increase ratio for the group of counties or census divisions containing PRMDs; the estimated ratio for the remainder of each major region is based on the data for all other counties or census divisions within the major region. Having computed the growth rates and natural increase ratio estimates, the net migration ratios were estimated in the manner indicated in Section F.5 of Appendix F.

The data for the natural increase ratios were obtained from various sources. For 1921-31 and 1931-41 the estimates described in Appendix H were used. For 1941-51 and 1951-61 appropriate published data (DBS, 1951b, Table 3; and 1961 Census, DBS 99-511, Table 2) were used. The counties or census divisions selected for estimating the natural increase ratios for PRMDs are as follows: —

Maritimes .... (counties)
                                Halifax, Saint John

Quebec .... (counties)
                                Montreal and Jesus Islands, Chambly, Châteauguay,
                                Deux Montagnes, L'Assomption, Laprairie, Terre-
                                bonne, Vaudreuil, Québec, Lévis, Hull-Gatineau

Ontario .... (counties)
                                Wentworth, Waterloo, Middlesex, Carleton, Sudbury,
                                York, Halton, Ontario, Peel, Essex

Prairies................... (census divisions)
In Manitoba, Division 6 (number prevailing before 1961): in Saskatchewan, Divisions 6 and 11; in Alberta, Divisions 6 and 11 (divisional system introduced in the 1956 Census)

British Columbia .... (census divisions)
Divisions 4 and 5.

Appendix L

SUPPLEMENTARY TABLES

Table L.1 – Population, Canada and Major Regions, 1851 to 1961
(in thousands)

Census years	Canada[a]	Maritimes	Quebec	Ontario	Prairies	British Columbia
1851	2,431	533[b]	890	952	c	55
1861	3,223	664	1,112	1,396	c	52
1871	3,641	767	1,192	1,621	25[d]	36
1881	4,268	871	1,359	1,927	62[d]	49
1891	4,734	881	1,489	2,114	152[d]	98
1901	5,324	894	1,649	2,183	420	179
1911	7,192	938	2,006	2,527	1,328	392
1921	8,776	1,000	2,361	2,934	1,956	525
1931	10,363	1,009	2,875	3,432	2,354	694
1941	11,490	1,130	3,332	3,788	2,422	818
1951	13,648	1,257	4,056	4,598	2,548	1,165
1961	17,743	1,440	5,259	6,236	3,179	1,629

[a] Exclusive of Newfoundland, Yukon Territory and Northwest Territories. Regional figures may not add to Canada due to rounding.

[b] Prince Edward Island population is for 1848.

[c] Figures for Manitoba unavailable; Saskatchewan and Alberta not yet created.

[d] Manitoba only; Saskatchewan and Alberta not yet created.

SOURCES: 1931 Census, Vol. I, Table 1a; 1961 Census, DBS 99-511, Table 1.

Table L.2 — Components of Change in the Number of Urban Complexes of 5,000 and Over, Canada, 1871-81 to 1951-61

NOTE.—"Urban complex" is defined in Chapter Four, Section 4.1. Exclusive of Newfoundland, Yukon Territory and Northwest Territories.

Decades	No. of urban complexes at beginning of decade	Change in the number of urban complexes	Components of changes[a]	
			New incorporations[b]	Graduations[c]
1871-81	19	16	–	16
1881-91	35	9	1	8
1891-1901	44	9	1	8
1901-11	53	23	2	21
1911-21	76	12	–	12
1921-31	88	13	–	13
1931-41	101	11	2	9
1941-51	112	25	1	24
1951-61	137	53	4	49

[a] No urban complex declined below the 5,000-mark or was dissolved as a corporate entity over the 1871-1961 period.

[b] Centres which were less than 5,000 in population and were unincorporated at the beginning of the decade but were at least 5,000 and incorporated at the end of the decade.

[c] Centres which reached or passed above the 5,000-population figure over the decade, without changing their corporate status.

SOURCES: 1871 Census, Vol. I, Table VI, p. 428; 1881 Census, Vol. I, Table VI, p. 406; 1891 Census, Vol. I, Table VII, p. 370; 1941 Census, Vol. I, Table 7; 1956 Census, Vol. III, Table 3; 1961 Census, DBS 92-535, Tables 10 and 11 — DBS 92-536, Table 2.

Table L.3 – Population in Urban Complexes, by Size Group,
Canada and Major Regions, 1951 and 1961

NOTE.—"Urban complex" is defined in headnote to Table 5.5.

Size Group (as in 1951)	Population ('000) [a]	
	1951[b]	1961
Canada		
5,000 and over	7,779	10,957
100,000 and over	5,198	7,558
30,000-99,999	1,286	1,767
10,000-29,999	796	1,007
5,000- 9,999	499	625
Maritimes		
5,000 and over	468	571
100,000 and over	134	184
30,000-99,999	219	257
10,000-29,999	55	63
5,000- 9,999	60	66
Quebec		
5,000 and over	2,352	3,240
100,000 and over	1,748	2,467
30,000-99,999	246	322
10,000-29,999	242	307
5,000- 9,999	115	144
Ontario		
5,000 and over	3,206	4,537
100,000 and over	2,076	3,024
30,000-99,999	580	825
10,000-29,999	374	466
5,000- 9,999	177	222
Prairies		
5,000 and over	983	1,547
100,000 and over	678	1,093
30,000-99,999	128	208
10,000-29,999	103	145
5,000- 9,999	74	101
British Columbia		
5,000 and over	770	1,062
100,000 and over	562	790
30,000-99,999	113	154
10,000-29,999	22	25
5,000- 9,999	73	93

[a] Regional figures may not add to Canada totals due to rounding.

[b] Population for the 1961 areas of the centres.

SOURCES: *Vital Statistics* (annual), 1921 to 1961 (1951, Table 26; 1952 to 1960, Table 7; 1961, Table 57); 1951 Census, Vol. I, Tables 12 and 13; 1961 Census, DBS 92-536, Table 12 – DBS 92-539 – DBS 99-511, Table 8; DBS, "Component Parts...", 1963.

Table L.4 – Life Table Survival Ratios for Canada and Major Regions, Ten-Year Intervals 1921-61 and Five-Year Intervals 1951-61

NOTE. — The computation of survival ratios is described in Appendix G. The life tables up to and including 1941 are based on mortality rates which exclude Newfoundland deaths and population but the opposite is true of the life tables since 1941.

Sex and age group	1921-31	1931-41	1941-51	1951-61	1951-56	1956-61
	Canada					
Males						
0 — 4	0.96187	0.97368	0.98342	0.99047	0.99339	0.99460
5 — 9	0.97730	0.98339	0.98800	0.99193	0.99635	0.99706
10 — 14	0.97192	0.97819	0.98367	0.98766	0.99497	0.99556
15 — 19	0.96518	0.97242	0.97940	0.98403	0.99214	0.99265
20 — 24	0.96355	0.97048	0.97801	0.98320	0.99121	0.99183
25 — 29	0.96148	0.96781	0.97559	0.98133	0.99100	0.99191
30 — 34	0.95431	0.96049	0.96853	0.97552	0.98934	0.99025
35 — 39	0.94340	0.94837	0.95506	0.96275	0.98497	0.98603
40 — 44	0.92637	0.92847	0.93240	0.93955	0.97601	0.97744
45 — 49	0.89697	0.89636	0.89732	0.90304	0.96081	0.96264
50 — 54	0.85186	0.84946	0.84693	0.85013	0.93791	0.93988
55 — 59	0.78655	0.78119	0.77832	0.77998	0.90477	0.90641
60 — 64	0.68645	0.68251	0.68521	0.69083	0.86122	0.86207
65 and over	0.36177	0.36143	0.36834	0.38164	0.65505	0.65775
Females						
0 — 4	0.96565	0.97787	0.98686	0.99298	0.99479	0.99583
5 — 9	0.97892	0.98604	0.99149	0.99545	0.99755	0.99818
10 — 14	0.97294	0.98112	0.98895	0.99443	0.99722	0.99789
15 — 19	0.96436	0.97442	0.98537	0.99291	0.99631	0.99720
20 — 24	0.95861	0.96960	0.98234	0.99130	0.99555	0.99658
25 — 29	0.95423	0.96557	0.97866	0.98864	0.99451	0.99573
30 — 34	0.94807	0.95990	0.97263	0.98370	0.99259	0.99410
35 — 39	0.93978	0.95143	0.96319	0.97505	0.98906	0.99105
40 — 44	0.92622	0.93743	0.94877	0.96158	0.98322	0.98584
45 — 49	0.90196	0.91321	0.92631	0.94176	0.97496	0.97799
50 — 54	0.86513	0.87505	0.89125	0.91063	0.96215	0.96594
55 — 59	0.80409	0.81643	0.83656	0.86188	0.94090	0.94646
60 — 64	0.70701	0.72770	0.75263	0.78871	0.90857	0.91601
65 and over	0.38124	0.38911	0.40604	0.43337	0.69044	0.69983

Table L.4 – Life Table Survival Ratios for Canada and Major Regions,
Ten-Year Intervals 1921-61 and Five-Year Intervals 1951-61 – continued

Sex and age group	1921-31	1931-41	1941-51	1951-61	1951-56	1956-61
	Atlantic Region					
Males						
0 – 4	0.95937	0.97268	0.98124	0.98892	0.99220	0.99360
5 – 9	0.97557	0.98257	0.98715	0.99132	0.99592	0.99670
10 – 14	0.96943	0.97486	0.98233	0.98775	0.99502	0.99538
15 – 19	0.96145	0.96658	0.97671	0.98417	0.99243	0.99269
20 – 24	0.95855	0.96339	0.97377	0.98226	0.99084	0.99168
25 – 29	0.95588	0.96068	0.97033	0.97964	0.99024	0.99135
30 – 34	0.94985	0.95555	0.96486	0.97348	0.98821	0.98929
35 – 39	0.94177	0.94673	0.95502	0.96235	0.98447	0.98509
40 – 44	0.92772	0.92919	0.93557	0.94255	0.97691	0.97753
45 – 49	0.90170	0.89947	0.90396	0.91022	0.96391	0.96484
50 – 54	0.86261	0.85765	0.85903	0.86454	0.94407	0.94430
55 – 59	0.80437	0.79384	0.79681	0.80425	0.91609	0.91576
60 – 64	0.70941	0.69883	0.70731	0.72347	0.87942	0.87791
65 and over	0.37515	0.37784	0.38064	0.39513	0.66580	0.66928
Females						
0 – 4	0.96305	0.97579	0.98435	0.99255	0.99434	0.99547
5 – 9	0.97743	0.98504	0.99066	0.99573	0.99772	0.99820
10 – 14	0.96971	0.97673	0.98633	0.99457	0.99732	0.99801
15 – 19	0.95891	0.96615	0.98062	0.99225	0.99586	0.99724
20 – 24	0.95293	0.96134	0.97771	0.98976	0.99463	0.99637
25 – 29	0.94893	0.95846	0.97447	0.98662	0.99339	0.99510
30 – 34	0.94248	0.95247	0.96779	0.98175	0.99152	0.99319
35 – 39	0.93523	0.94569	0.95903	0.97391	0.98821	0.99015
40 – 44	0.92344	0.93453	0.94632	0.96122	0.98257	0.98553
45 – 49	0.90039	0.91207	0.92469	0.94246	0.97471	0.97828
50 – 54	0.86614	0.87754	0.89236	0.91282	0.96286	0.96691
55 – 59	0.80992	0.82581	0.84426	0.86537	0.94285	0.94803
60 – 64	0.71764	0.74428	0.76656	0.79413	0.91311	0.91783
65 and over	0.39412	0.40918	0.41820	0.44333	0.69702	0.70498

Table L.4 – Life Table Survival Ratios for Canada and Major Regions, Ten-Year Intervals 1921-61 and Five-Year Intervals 1951-61—continued

Sex and age group	1921-31	1931-41	1941-51	1951-61	1951-56	1956-61
			Quebec			
Males						
0 — 4	0.95617	0.96532	0.97912	0.98866	0.99198	0.99364
5 — 9	0.97518	0.98140	0.98707	0.99139	0.99596	0.99665
10 — 14	0.96991	0.97599	0.98290	0.98749	0.99474	0.99541
15 — 19	0.96260	0.96906	0.97780	0.98412	0.99209	0.99271
20 — 24	0.96030	0.96650	0.97530	0.98295	0.99109	0.99196
25 — 29	0.95753	0.96309	0.97247	0.98008	0.99043	0.99179
30 — 34	0.94905	0.95369	0.96450	0.97325	0.98839	0.98956
35 — 39	0.93621	0.93913	0.94875	0.95934	0.98362	0.98469
40 — 44	0.91690	0.91738	0.92321	0.93398	0.97352	0.97532
45 — 49	0.88478	0.88376	0.88539	0.89358	0.95649	0.95939
50 — 54	0.83715	0.83561	0.83244	0.83700	0.93143	0.93423
55 — 59	0.76941	0.76575	0.76153	0.76353	0.89589	0.89862
60 — 64	0.66668	0.66476	0.66537	0.67112	0.84928	0.85226
65 and over	0.34960	0.35023	0.35542	0.36946	0.64458	0.64880
Females						
0 — 4	0.96041	0.96979	0.98331	0.99154	0.99362	0.99505
5 — 9	0.97608	0.98218	0.99003	0.99515	0.99732	0.99790
10 — 14	0.96919	0.97550	0.98637	0.99418	0.99700	0.99782
15 — 19	0.95921	0.96650	0.98104	0.99238	0.99601	0.99717
20 — 24	0.95230	0.95994	0.97667	0.99028	0.99494	0.99636
25 — 29	0.94728	0.95531	0.97258	0.98663	0.99335	0.99532
30 — 34	0.94057	0.94919	0.96615	0.98081	0.99099	0.99323
35 — 39	0.93129	0.93933	0.95579	0.97143	0.98694	0.98973
40 — 44	0.91734	0.92538	0.94061	0.95739	0.98081	0.98429
45 — 49	0.89147	0.90168	0.91542	0.93464	0.97194	0.97612
50 — 54	0.84950	0.85973	0.87496	0.89656	0.95626	0.96162
55 — 59	0.78216	0.79433	0.81392	0.84053	0.93065	0.93756
60 — 64	0.67993	0.70033	0.72337	0.76067	0.89379	0.90316
65 and over	0.36301	0.37246	0.38709	0.41123	0.67563	0.68557

Table L.4 – Life Table Survival Ratios for Canada and Major Regions,
Ten-Year Intervals 1921-61 and Five-Year Intervals 1951-61 – continued

Sex and age group	1921-31	1931-41	1941-51	1951-61	1951-56	1956-61
				Ontario		
Males						
0 — 4	0.96442	0.97963	0.98704	0.99163	0.99428	0.99543
5 — 9	0.97754	0.98511	0.98947	0.99246	0.99667	0.99733
10 — 14	0.97243	0.98025	0.98543	0.98834	0.99527	0.99577
15 — 19	0.96651	0.97530	0.98224	0.98527	0.99275	0.99304
20 — 24	0.96539	0.97355	0.98174	0.98492	0.99221	0.99247
25 — 29	0.96308	0.97036	0.97902	0.98313	0.99215	0.99265
30 — 34	0.95524	0.96225	0.97083	0.97719	0.99031	0.99091
35 — 39	0.94337	0.94925	0.95642	0.96329	0.98566	0.98675
40 — 44	0.92427	0.92734	0.93172	0.93780	0.97592	0.97730
45 — 49	0.89142	0.89166	0.89236	0.89868	0.95946	0.96094
50 — 54	0.84206	0.84116	0.83718	0.84139	0.93473	0.93665
55 — 59	0.77298	0.77052	0.76528	0.76563	0.89857	0.90015
60 — 64	0.67170	0.67191	0.67271	0.67165	0.85187	0.85205
65 and over........	0.35418	0.35395	0.36321	0.37196	0.64872	0.64862
Females						
0 — 4	0.96843	0.98450	0.99068	0.99397	0.99565	0.99652
5 — 9	0.97979	0.98915	0.99347	0.99596	0.99785	0.99831
10 — 14	0.97466	0.98541	0.99203	0.99524	0.99770	0.99811
15 — 19	0.96709	0.98023	0.98973	0.99402	0.99713	0.99753
20 — 24	0.96171	0.97610	0.98701	0.99257	0.99645	0.99688
25 — 29	0.95711	0.97153	0.98279	0.99028	0.99553	0.99611
30 — 34	0.95053	0.96520	0.97635	0.98515	0.99355	0.99473
35 — 39	0.94177	0.95598	0.96664	0.97604	0.98998	0.99155
40 — 44	0.92732	0.93999	0.95178	0.96219	0.98402	0.98592
45 — 49	0.90227	0.91340	0.92891	0.94268	0.97591	0.97782
50 — 54	0.86504	0.87424	0.89261	0.91251	0.96335	0.96595
55 — 59	0.80336	0.81600	0.83619	0.86295	0.94193	0.94723
60 — 64	0.70558	0.72732	0.75191	0.78744	0.90846	0.91615
65 and over........	0.37707	0.38322	0.40436	0.42881	0.68973	0.69792

Table L.4 – Life Table Survival Ratios for Canada and Major Regions,
Ten-Year Intervals 1921-61 and Five-Year Intervals 1951-61 – continued

Sex and age group	1921-31	1931-41	1941-51	1951-61	1951-56	1956-61
	Prairies					
Males						
0 – 4	0.96327	0.97826	0.98501	0.99149	0.99388	0.99526
5 – 9	0.97716	0.98456	0.98858	0.99274	0.99694	0.99760
10 – 14	0.97216	0.98060	0.98453	0.99804	0.99540	0.99580
15 – 19	0.96604	0.97662	0.98087	0.98390	0.99230	0.99261
20 – 24	0.96502	0.97569	0.98017	0.98320	0.99128	0.99154
25 – 29	0.96413	0.97438	0.97882	0.98250	0.99135	0.99185
30 – 34	0.95863	0.96900	0.97370	0.97786	0.99028	0.99107
35 – 39	0.95017	0.95887	0.96327	0.96744	0.98671	0.98746
40 – 44	0.93797	0.94265	0.94599	0.94964	0.97986	0.98048
45 – 49	0.91518	0.91543	0.91776	0.92101	0.96839	0.96916
50 – 54	0.87602	0.87201	0.87290	0.87645	0.94964	0.95108
55 – 59	0.81606	0.80849	0.80876	0.81245	0.92105	0.92293
60 – 64	0.71595	0.71053	0.71454	0.72142	0.88011	0.88209
65 and over	0.37558	0.37673	0.38175	0.39650	0.66649	0.67009
Females						
0 – 4	0.96617	0.98173	0.98752	0.99298	0.99473	0.99593
5 – 9	0.97867	0.98800	0.99189	0.99528	0.99756	0.99824
10 – 14	0.97343	0.98477	0.98994	0.99420	0.99718	0.99772
15 – 19	0.96593	0.98003	0.98730	0.99308	0.99622	0.99702
20 – 24	0.96086	0.97590	0.98451	0.99193	0.99578	0.99685
25 – 29	0.95693	0.97173	0.98226	0.99008	0.99527	0.99613
30 – 34	0.95149	0.96630	0.97708	0.98627	0.99377	0.99478
35 – 39	0.94444	0.95904	0.96878	0.97905	0.99083	0.99245
40 – 44	0.93195	0.94607	0.95507	0.96707	0.98582	0.98810
45 – 49	0.90974	0.92353	0.93469	0.94981	0.97812	0.98098
50 – 54	0.87743	0.89049	0.90380	0.92333	0.96735	0.97106
55 – 59	0.82043	0.83599	0.85284	0.87963	0.94838	0.95449
60 – 64	0.72639	0.74840	0.77270	0.81255	0.91905	0.92751
65 and over	0.39544	0.40669	0.41967	0.44903	0.69959	0.71170

Table L.4 – Life Table Survival Ratios for Canada and Major Regions,
Ten-Year Intervals 1921-61 and Five-Year Intervals 1951-61–concluded

Sex and age group	1921-31	1931-41	1941-51	1951-61	1951-56	1956-61
	British Columbia					
Males						
0 — 4	0.96173	0.97483	0.98381	0.99145	0.99409	0.99492
5 — 9	0.97497	0.98098	0.98604	0.99223	0.99669	0.99734
10 — 14	0.96769	0.97399	0.97948	0.98616	0.99447	0.99553
15 — 19	0.95928	0.96621	0.97402	0.98062	0.99036	0.99164
20 — 24	0.95774	0.96411	0.97320	0.97965	0.98917	0.99016
25 — 29	0.95639	0.96218	0.97147	0.97851	0.98924	0.99037
30 — 34	0.95005	0.95589	0.96477	0.97389	0.98798	0.98915
35 — 39	0.93952	0.94404	0.95051	0.96272	0.98414	0.98573
40 — 44	0.92203	0.92299	0.92676	0.94036	0.97543	0.97824
45 — 49	0.89403	0.89189	0.89356	0.90512	0.96044	0.96404
50 — 54	0.85182	0.84882	0.84618	0.85393	0.93851	0.94241
55 — 59	0.78729	0.78302	0.77705	0.78399	0.90520	0.90988
60 — 64	0.69140	0.68996	0.68788	0.69762	0.86233	0.86609
65 and over	0.37094	0.37106	0.37553	0.39423	0.66163	0.66685
Females						
0 — 4	0.96525	0.97916	0.98731	0.99296	0.99448	0.99613
5 — 9	0.97707	0.98428	0.99067	0.99538	0.99750	0.99847
10 — 14	0.97144	0.98068	0.98858	0.99362	0.99600	0.99787
15 — 19	0.96371	0.97590	0.98591	0.99224	0.99600	0.99670
20 — 24	0.95852	0.97154	0.98353	0.99082	0.99524	0.99622
25 — 29	0.95500	0.96918	0.98049	0.98845	0.99435	0.99555
30 — 34	0.95015	0.96541	0.97560	0.98448	0.99289	0.99407
35 — 39	0.94234	0.95719	0.96654	0.97666	0.99007	0.99162
40 — 44	0.92933	0.94426	0.95216	0.96371	0.98423	0.98645
45 — 49	0.90749	0.92339	0.93221	0.94538	0.97595	0.97916
50 — 54	0.87461	0.88765	0.90269	0.91851	0.96480	0.96868
55 — 59	0.81997	0.83378	0.85603	0.87718	0.94759	0.95202
60 — 64	0.72963	0.75447	0.77777	0.81155	0.92030	0.92569
65 and over	0.40045	0.41236	0.42847	0.45041	0.70215	0.71095

SOURCES: DBS 84-510, 1947; DBS 84-512, 1960; DBS 84-517, 1964; Keyfitz, 1931,
Table 9; Keyfitz, 1950, Table 2; 1931 Census, Vol. II, Table 25; 1941 Census, Vol. II, Table
24; 1951 Census, Vol. I, Table 24; 1961 Census, DBS 92-542, Table 24; unpublished 1921
Census tabulations.

Table L.5 – Population for the Principal Regions of Metropolitan Development in Canada, 1901-61

NOTE. — "Principal Regions of Metropolitan Development" are defined in Chapter Six, Section 6.2.

Principal Regions of Metropolitan Development	1901	1911	1921	1931	1941	1951	1961
	Population (in thousands)						
Halifax	51	58	75	79	99	134	184
Saint John........	51	54	61	63	71	78	96
Montreal..........	415	616	796	1,086	1,216	1,504	2,156
Quebec	117	133	158	207	241	297	383
Hamilton..........	79	112	154	190	207	266	359
Kitchener-Waterloo	53	63	75	90	99	126	177
London	52	61	74	87	97	129	181
Ottawa..........	103	133	168	197	236	296	436
Sudbury	16	30	43	58	81	110	166
Toronto	303	478	686	901	1,002	1,264	1,942
Windsor	22	32	66	117	129	163	192
Winnipeg..........	48	157	229	295	302	357	476
Calgary	8	56	78	103	112	156	290
Edmonton	15	48	87	116	136	211	374
Vancouver	–	–	224	338	394	562	790
Victoria	–	–	64	70	86	122	162
	Per cent change[a] in population since last census						
Halifax	–	13.4	30.6	4.1	25.5	35.8	37.3
Saint John........	–	4.7	14.2	2.5	13.1	10.5	22.0
Montreal..........	–	48.6	29.2	36.3	12.1	23.6	43.3
Quebec	–	13.9	18.5	30.7	16.7	23.0	29.2
Hamilton	–	40.6	37.5	23.7	8.8	28.7	34.9
Kitchener-Waterloo	–	19.0	20.2	19.4	9.9	27.8	40.1
London..........	–	18.5	20.9	18.0	11.6	32.7	40.6
Ottawa..........	–	28.4	26.4	17.6	19.9	25.3	47.2
Sudbury	–	84.9	44.5	35.4	38.7	35.6	51.4
Toronto	–	57.7	43.6	31.3	11.2	26.2	53.6
Windsor	–	44.7	103.4	77.2	10.6	26.1	17.6.
Winnipeg..........	–	223.7	46.0	28.7	2.4	18.1	33.4
Calgary	–	570.2	39.5	33.0	8.1	39.7	85.8
Edmonton	–	215.5	83.0	32.4	17.9	55.1	77.1
Vancouver..........	–	–	–	51.3	16.5	42.7	40.6
Victoria..........	–	–	–	9.1	23.3	41.5	33.5

[a]Computed from the unrounded data.

SOURCES: 1961 Census, DBS 92-535, Tables 9, 10 and 11–DBS 92-539.

FOOTNOTES TO APPENDICES

Appendix A

[1] For each period the numerator of equation [4] is augmented in a similar manner, in order to include the t_0 population in suburbs (as of time t_0) which were either incorporated or annexed between t_0 and t_1.

Appendix F

[1] For the cities which had negligible boundary changes the figure used for P_a ($CTV_{0,1}$) was that for the area of the city as of 1961. As these boundary changes were annexations by the cities, the natural increase ratio is thus slightly *under-stated*; because the denominator reflects the 1951 population in the 1961 area while the numerator fails to include natural increase in the annexed area for the period *preceding* annexation.

[2] The data used for counties or census divisions are affected by boundary changes to a negligible extent. See the record of boundary changes in the notes to 1961 Census, DBS 99-539.

[3] This sample was augmented to include a number of cities which had substantial 1951-61 annexations; but whose 1951 populations *in their 1961 areas* were known from census data. (The missing data were vital statistics for the annexed areas preceding their annexation.) The augmented sample was used to compute the growth rate (on a constant geographical area) mentioned below.

Appendix G

[1] Keyfitz (1950) assumed that the relation between Canadian and English mortality was sufficiently stable to warrant this method, and his celebrated paper is based in large part on this assumption. The suitability of the English survival ratios in estimating Canadian survival ratios before 1931-41 has been questioned by McDougall (1961).

[2] No life table for England and Wales in 1941 is available.

Appendix I

[1] See Chapter Six, Section 6.2, for the definition of these Regions. Some of the listed subdivisions were annexed by cities between 1901 and 1961, and thus do not exist today.

[2] A number of small villages and towns (totalling 18,000 persons in 1961) were inadvertently omitted from the data. As the inclusion of these areas would have a negligible statistical effect on the growth rates of the Regions, these omissions were not corrected.

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