In Calvin Goldscheider (ed.) Migration, Population Structure, and Redistribution Policies. Boulder, CO: Westview Press, 1992. Pages 1-31.

1

Metropolitan Migration in Developed Countries: A Cross-National Data Base

William H. Frey

Cross-national studies have mushroomed in the field of demography over the past two decades. Yet there have been some surprising omissions. One of these, until recently, has been a lack of comparative work on internal migration leading to big city population changes in the world's developed countries of North America, Europe, and the Pacific Rim.

The reason for this void does not lie with a lack of interest on the part of academics or policymakers who witnessed unforeseen city declines and counterurbanization during the 1970s -- representing important dislocations in long-standing trends (Champion, 1989). Rather, the lack of comparative research on this topic stemmed from almost impossible complexities arising from the incomparability of urban or metropolitan definitions across countries, and the lack of uniformity in the ways internal migration data are collected among the world's developed countries.

It was into this minefield that I began to tread with a small research staff at the University of Michigan in the early 1980s. Our mission was twofold:

1. to assemble a data base that permits the analysis of internal migration stream contributions to metropolitan area population change and city-suburb redistribution for the largest metropolitan areas in the world's, then market economy countries for one period around 1970 and another period around 1980, and

2. to produce statistics and analyses that identify cross-national variations and longitudinal changes in the migration processes contributing to population shifts in these large metropolitan areas.

The present paper focuses largely on the first of these two enterprises since this was by far the most arduous part of the project. It is my hope that, by relating our experiences toward this data collection effort, other scholars will delve further in such comparative work.[1] These efforts will soon hold much more than academic interest. In light of the new consolidation of European countries which will transform international migration into internal movement, and the increasing globalization of the economy, the needs for a common definition for metropolitan (labor market) areas, and the consistent collection of internal migration statistics are self-evident. I will begin by presenting the specific data-collection objectives of the project, before discussing the background conceptual and definitional issues we encountered in preparing this cross-national migration data base.

The Michigan Metropolitan Migration Project

The Michigan Metropolitan Migration Project undertook to compile age-sex disaggregated migration stream data for 81 comparably defined metropolitan areas (with populations greater than one million or capital cities of their nation) in 14 developed countries of North America, Europe, Japan, and New Zealand.

The unique aspect of this data set is that it employs a common metropolitan unit definition for each metropolitan area. Extensive inquiries to national statistical offices, international agencies, and various migration scholars, made prior to this study, revealed that no such data set was in existence or in the process of being compiled. Although several countries had defined metropolitan areas to encompass their largest cities, this was not the case for all of them, and the international variation in criteria varied far too widely to be appropriate for a comparative study. With respect to the migration data, it was found that most nations published migration flow tabulations only according to political boundaries rather than metropolitan area boundaries.

Our research team, therefore, specified comparable boundaries across countries in accordance with the U.S. Standard Metropolitan Statistical Area (SMSA) concept and with the "functional urban

region" concept developed in Growth Centres in the European Urban System by Peter Hall and Dennis Hay (1980) and a companion study at the International Institute for Applied Systems Analysis (IIASA). The team then undertook to compile census- and population register-based migration tabulations, consistent with these definitions, from published volumes for the few countries where such tabulations were available and from special tabulations prepared by national statistical offices and cooperating universities in the remaining countries.

The migration data, descriptive statistics, and projection analyses compiled for this study constitute the first data base appropriate for examining migration stream components of metropolitan area-wide population change and city-suburb redistribution in comparably-defined large metropolitan areas located in most of the world's developed, market economy nations. Previous comparable analyses of migration patterns (Vining and Kontuly, 1978; Rogers and Willekens, 1986) have been forced to rely on political boundaries that only rarely correspond to metropolitan area-like definitions. Alternatively, previous comparative analyses of population change that used metropolitan area definitions (Davis, 1959; Hoyt, 1962; Hall and Hay, 1980) were not able to decompose that population change into analytically meaningful migration streams. The data and statistics produced by the present study permit such analyses to be undertaken.

Background

The metropolitan area (operationalized in U.S. statistical publications as the SMSA or, more recently, the MSA) constitutes a fundamental organizing concept for most of the empirical research that has been undertaken on the structure and dynamics of population change in American metropolitan areas, cities, and suburbs (see, for example, Bogue, 1953; Hawley, 1956, 1971; Schnore, 1965; Taeuber and Taeuber, 1971; Berry and Kasarda, 1977; Frey and Speare, 1988). Moreover, the compilation of U.S. census fixed-interval migration data around the metropolitan area concept has permitted a great deal of research on the migration stream contributions to metropolitan and city change (Shryock, 1964; Taeuber and Taeuber, 1965; Frey, 1978, 1980, 1984, 1985, 1987; Long, 1988).

Unlike the situation in the U.S., there does not exist a data base that will permit a comparative analysis of migration contributions to metropolitan area change across other developed countries. Aside from Kingsley Davis' meticulous designation of large (100,000+) metropolitan areas throughout the world, and the presentation of their

population totals for the 1950s (Davis, 1959) and 1960s (Hoyt, 1962), it is only recently that a comprehensive effort has been instituted to designate and present demographic statistics for comparably defined metropolitan areas in Europe (Hall and Hay, 1980). The international comparisons that have heretofore been compiled (Davis, 1969, 1972; United Nations, 1969, 1975, 1981) provide information based on the "physical" urban agglomeration concept that has generally been subject to nation-determined definitions (e.g., the urbanized area in the United States), as distinct from the "functional" metropolitan area concept defined according to common criteria (Goldstein and Sly, 1975; Hall et al., 1979). Likewise, those analyses of migration stream contributions to population change for metropolitan-type areas in European nations (e.g., Goldstein, 1963, 1965; Drewe, 1981; Golini and Gascino, 1981) have employed nationally-defined areas that are not generally comparable with each other.

The intention of this project, therefore, was to extend U.S. empirical base to facilitate comparable redistribution analyses for large metropolitan areas in other developed, market economy nations. Our work is aided by the fruits of two extensive cross-national research projects that were completed just prior to the beginning of this one.

The first of these projects, the European Urban System Project, undertaken by Peter Hall and associates at the University of Reading (England), along with collaborators at IIASA (Kawashima and Korcelli, 1982), identified metropolitan areas (called functional urban regions) for most European nations as combinations of small administrative areas on the basis of common criteria. The units defined by this project were comparable to U.S. SMSA's and represent the only recently-defined metropolitan area units that are comparable across European nations. Products of this extensive project are disseminated in Hall and Hay (1980) and in individual national reports authored by Hay and Hall and Sherrill (1976, 1977).

The second relevant project is the Comparative Migration and Settlement Project undertaken by Andrei Rogers and associates at IIASA. This project had employed internal migration data from the censuses and population registers of 17 North American and European nations for similar periods to examine various aspects of these nations' redistribution processes using multiregional demographic techniques. While these redistribution analyses focus on politically-bounded regions rather than metropolitan areas, Rogers and his associates have amassed a great deal of expertise on the estimation of comparable migration measures and rates from the seemingly disparate population register and census data sources

(Rogers and Willekens, 1986).

As a result of these two significant studies, and the fairly recent capability of most European countries to compile computer-generated migration tabulations according to user-requested boundaries, we determined that it would be possible to assemble the data set that would permit a comparative analysis of migration processes at work in the largest metropolitan areas.[2]

The sections that follow describe the metropolitan area definitions and regional systems that were designated for this study, the use of population register and census migration data, the population projection methodology that was employed in the analyses, and some illustrative applications of this data.

Metropolitan Area Definitions and Regional Systems

Because this data base centers around the metropolitan area concept, our objectives were: to define large metropolitan areas (with populations greater than 1 million or capital city areas) for each country according to common criteria; to distinguish between the urban centers and suburban peripheries within these metropolitan areas; and to designate a regional system encompassing the totality of each nation's territory that would be appropriate for a comparative national study.

In meeting these objectives, we had to deal with two practical considerations. First, our metropolitan areas had to be based on geographic units, or aggregations thereof, for which migration stream data could be constructed. In most cases, migration data could be constructed for fairly small units of geography (i.e., at the commune level), so that this restriction did not pose a significant problem. Second, we had to contend with fairly substantial reorganizations of administrative boundaries in several countries. In most cases, these reorganizations involved reducing the number of administrative areas (i.e., communes) usually by recombining old ones into larger units. Since most of our metropolitan area definitions predicated on the earlier, more detailed commune systems, we were forced to revise those definitions to accommodate larger post-reorganization administrative units.

Metropolitan Areas

The metropolitan area units employed for large metropolitan areas in European countries were predicated on the Functional Urban

Region definitions developed in the Hall and Hay (1980) study. While Hall and Hay disaggregated each nation's entire territory into Functional Urban Regions (of all sizes), our focus is only on large Functional Urban Regions--with populations greater than 1 million, or those surrounding capital cities. These large Functional Urban Regions are particularly suited to our purposes because: (1) they were intentionally designated to be consistent with the British Metropolitan Economic Labor Area (defined on the basis of a core area with at least 20,000 jobs and a ring of politically independent subdivisions with commuting ties to the core) and to be comparable to the U.S. SMSA; and (2) they are generally defined on the basis of administrative divisions for which the respective governments routinely collect statistics (including migration statistics). The metropolitan units we employed for Canada's three largest metropolitan areas consistent with the Canadian CMA definitions are also comparable with those with the U.S. SMSA. Neither New Zealand nor Japan appeared in the Hay and Hall (1980) or IIASA (Korcelli and Kawashima 1982) study. Our definitions for the largest metropolitan areas in these countries consisted with common usage in these countries' statistical publications.

Finally, the metropolitan area unit defined for the United States in this study, is consistent with the SMSA concept as used in 1980 census publications. In cases where several adjacent SMSAs have been grouped together to form a Standard Consolidated Statistical Area (SCSA), we have defined our areas in this manner. Hence, the 35 large metropolitan areas for the United States constitute SCSAs and SMSAs with populations greater than 1 million.

A complete list of metropolitan areas defined for this project is displayed in Figure 1.1. Within most of these metropolitan areas, the data base also distinguishes between its urban core (or central city) and suburban periphery components. These are consistent with the central city-ring designations associated with the SMSA and Canada CMA concepts, and with the urban core and suburban ring designations developed in the Hall and Hay (1980) study.

Regional Systems

Having identified the largest metropolitan areas in each nation, we next developed regional systems covering each nation's residual territory that can be used in a comparative national analysis. For most countries this regional system involves: first, identifying the largest geographic divisions within each nation (e.g., North, South, and West in the United States); and second, distinguishing between

FIGURE 1.1 List of Countries and Metropolitan Areas

NORTH AMERICA	
Canada	Montreal, Toronto, Vancouver
USA	New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Minneapolis - St. Paul, Cincinnati, Kansas City, Indianapolis, Columbus, Detroit, Pittsburgh, Milwaukee, Hartford, Dayton, Providence, Buffalo, Houston, Dallas - Ft. Worth, Miam, Baltimore, Atlanta, New Orleans, Washington, DC, San Tonion, Tampa - St. Petersburg, Los Angeles - Long Beach, San Francisco - Oakland, Seattle - Everett, Denver - Boulder, Phoenix, Portland, Scramento, San Diego
EUROPE	
Great Britain	London, Birmingham, Manchester, Glasgow, Leeds - Bradford, Liverpool, Newcastle upon Tyne, Sheffield
Sweden	Stockholm
Finland	Helsinki
Denmark	Copenhagen
Norway	Oslo
The Netherlands	Amsterdam, Rotterdam, The Hague
Belgium	Brussels, Antwerp
West Germany	Bremen, Hamburg, Munich, Frankfurt, Stuttgart, Cologne, Dusseldorf, Essen, Dortmund, Duisburg, Hannover, Mannheim, Nurnberg, Berlin
Austria	Vienna
Italy	Rome, Milan, Naples, Turin, Genoa, Palermo
AUSTRALIA - ASIA	
Japan	Tokyo, Osaka, Nagoya, Kitakyushu
New Zealand	Auckland

metropolitan and nonmetropolitan territory (or rural and urban territory) within these geographic divisions. Our identification of geographic divisions for the 14 nations draws heavily from the work of Daniel Vining and his collaborators (Vining and Kontuly, 1978; Vining and Pallone, 1982) who identified such divisions among 22 developed countries. Broad divisions designated in this work represent aggregations of major administrative subdivisions in each country (e.g., aggregations of states in the United States, or provinces in Canada). The areas are recognized as being distinct for historical, cultural, or developmental reasons. Vining and his collaborators distinguish one or more of these divisions in each country as industrial "core" regions. According to the authors, these regions represent those which are economically and politically dominant, contain the principal cities of the country, and have traditionally experienced high rates of in-migration from other, less urbanized regions of the country (Vining and Pallone, 1982). The remaining divisions in each nation are then designated as "peripheral" regions in the Vining study. In parts of our own analyses and presentation of data, we also combine the more detailed geographic divisions into a simple "core" and "periphery" region dichotomy. The number of detailed geographic divisions that we have identified for each country is shown in Figure 1.2 (second column).

Finally, within each geographic division, we have attempted, where possible, to differentiate territory into the metropolitan-nonmetropolitan distinction or the rural-urban distinction. Though this was possible with our migration data for most countries, these distinctions represent the one part of our data set which are not strictly comparable across countries. The decision to use the metropolitan-nonmetropolitan breakdown or the urban-rural breakdown depended, in large part, on the ease with which migration data could be obtained. It was our original intention to code these residual geographic division territories (i.e., outside of the large metropolitan areas) into metropolitan and nonmetropolitan categories, on the basis of distinctions and definitions drawn by Hall and Hay (1980) in Europe, and on the SMSA and CMA concepts in the U.S. and Canada. However, the detailed coding of migration data made such distinctions either impossible or prohibitively expensive for most European countries. Hence, while the U.S., Canada, Great Britain, Belgium, and New Zealand are coded according to the metropolitan-nonmetropolitan concept, the remaining European countries' territories are collapsed according to a nationally-defined rural-urban distinction (see Figure 1.2, column 3). The latter distinctions could be more readily incorporated into these countries' migration data,

because the data were pre-coded for each of these country's definitions of rural and urban status.

As a result of the various metropolitan area, geographical division, and metropolitan-nonmetropolitan (or rural-urban) definitions just discussed, each country's territory can be decomposed into: the largest metropolitan areas in the country, broad geographic divisions outside of these metropolitan areas, and metropolitan-nonmetropolitan (or rural-urban) distinctions within each geographic division. For example, the United States' regional system involves 35 large individual metropolitan areas, three geographic divisions (North, South, West), and the distinction between metropolitan and nonmetropolitan within each of the three divisions. In several parts of the analyses, this geographic classification of a nation's territory is referred to as the "detailed regional system" (although in some instances several large metropolitan areas are combined to facilitate presentation).

Each country's geographic classification scheme can also be collapsed into the following six "summary regional system" categories: (1) core region--large metropolitan areas; (2) core region--other metropolitan areas (or urban areas); (3) core region--nonmetropolitan areas (or rural areas); (4) periphery region--large metropolitan areas; (5) periphery region--other metropolitan areas (or urban areas); and (6) periphery region--nonmetropolitan areas (or rural areas).

Migration Data

The migration data collected in this study involves, for each country: a matrix of migration steams across the detailed regional system outlined above; the cross classification of each of these streams by five-year age categories and sex (males and females); and, where possible, matrices of immigration and emigration streams by age and sex for each part of the regional system. Because the internal migration streams are expressed as rates, it was also necessary to collect appropriate age- and sex-specific population-at-risk data for each area in the regional system.

It was our objective to obtain the above migration data, for each nation, for one period around 1980 and another period around 1970. Irrespective of the specific year, we wished to make sure the migration periods were separated by 10-intervals. For those countries where migration stream data were drawn from decennial censuses, it was possible to collect migration data in periods that ended in 1980 (or 1981) and 1970 (or 1971). Although population registers collect

migration data on an annual basis, many European countries did not computerize their migration data until the early 1970s. For this reason, the migration data from registration countries were collected as late as 1973 and 1983 for the "around 1970" and "around 1980" time points. For two countries, Italy and West Germany, we were not able to obtain a complete migration flow matrix for the "around 1970" period. A listing of the type and year of migration data for each country is presented in Figure 1.2.

Because our metropolitan areas and regional systems differed markedly from those used in each country's national publications, almost all of the migration stream matrices had to be produced as special computer tabulations by contract with national central statistical offices or cooperating research institutions (listed in Figure 1.2, last column).

The compilation of migration stream data and population-at-risk data for this study represented the most labor-intensive portion of the research project. It involved initial visits to each central statistical office or cooperating agency and continued communications both prior and subsequent to receipt of the specially tabulated data. In some cases, a statistical office would send us a micro-file or summary tape with stream data for detailed administrative areas, so that the collapsing of these data into our own regions could be accomplished at Michigan.

Although the migration stream data almost always required a special computer tabulation, computation of population-at-risk data could often be pieced together from detailed census or population register publications. In these instances, publications were brought to Michigan through inter-library loan and the appropriate statistics were key-entered into the computer by Michigan students and aggregated into areas consistent with our metropolitan area and regional system. Michigan students were also involved in adjusting migration data for different periods to take account of the reorganization of administrative districts that occurred in several European countries. It was our goal, as far as possible, to compile the "around 1980" migration data according to the same area boundaries as the "around 1970" migration data.

Multiregional Projection Methodology

In various parts of this analysis, multiregional population projections are presented over the 50-year period, 1980-2030 (or 1981-2031), for each nation's regional system, for each large metropolitan

FIGURE 1.2 Migration Data from Michigan Metropolitan Migration Project[1]

Country	No. of Large Indiv Met Areas	No. of Geographic Division	Residual Territory	Migration Data Type	Migration Year/Period around 1970	Migration Year/Period around 1980	Government Agency/ Institution Cooperating with Michigan Met Migration Project
NORTH AMERICA							
Canada	3	3	(MN)	Census	1966-71	1976-81	Statistics Canada
U.S.A.	35	3	(MN)	Census	1965-70	1975-80	U.S. Bureau of the Census
EUROPE							
Great Britain	8	3	(MN)	Census	1970-71	1980-81	Office of Population Census/Surveys
Sweden	1	4	(UR)	Register	1973	1983	Statistics Sweden
Finland	1	2	(UR)	Register	1967	1977	Central Statistical Office
Denmark	1	2	(UR)	Register	1973	1983	Denmark Statistik
Norway	1	2	--	Register	1974	1980	Norwegian Social Science Data Center
The Netherlands	3	2	(UR)	Register	1972	1982	Central Bureau of Statistics
Belgium	2	2	(MN)	Census	1970	1981	Central Statistical Bureau and Catholic University-Louvain
West Germany	14	3	(UR)	Register	--	1977	Technische Universitat-Berlin, and Fed. Res. Inst. for States and Regions
Austria	1	4	(UR)	Census	1966-81	1976-81	Central Statistical Office
Italy	6	3	(UR)	Register	--	1981	University of Pisa, and A.D.P.S.S. Milan
AUSTRALIA-ASIA							
Japan	4	10	--	Census	1969-70	1979-80	Utsunomiya University
New Zealand	1	8	(MN)	Census	1966-71	1976-81	Department of Statistics

[1] Notes to this figure can be found at the end of this chapter.

area, and for central city and suburb components within large metropolitan areas. The projections provide a vehicle for comparing the impact of migration rates drawn from different sources, which make them not comparable for short observation periods. They also permitted a comparison of the long-term implications of two different sets of migration rates for the same area.

In the latter comparisons, two alternative 50-year projections are shown. One projection assumes that migration rates observed "around 1980" are allowed to become perpetuated over the 50 years. In the second projection, it is assumed that the migration rates observed "around 1970" are so perpetuated. Alternative projections for selected large metropolitan areas are shown in Table 1.1, for illustrative purposes.

Both projections begin with the same starting populations, assume the same age-specific fertility and mortality rates over the 50-year period, and differ only with respect to the migration rates that are assumed. The two alternative projections shown for each metropolitan area (or regions, cities, and suburbs that appear elsewhere in the study) are not intended to represent predictions for the future. Rather, they are intended to demonstrate the aggregate redistribution implications implied by the two different sets of migration processes. In this analysis, the projection is to be regarded as a descriptive tool for evaluating the redistribution tendencies associated with the set of observed migration streams.

The alternative sets of migration stream rates used for these projections are the "around 1980" and "around 1970" migration stream rates for each country that were discussed in the section above. The age-specific fertility and mortality rates that are assumed in a nation's projections also observed for a year "around 1980" as published in the United Nations Demographic Yearbook. The projection methodology that is employed for these analyses follows from Frey (1983) and is consistent with the multiregional cohort component projection approach introduced by Rogers (1975).[3]

The projection methodology (Frey, 1983) introduces a second level of projection states into the process so that, at the upper level, projections can occur across a nation's metropolitan area and regional system. At the second level, projections are computed across central city and suburb subareas within a specific metropolitan area. An illustrative set of these projections for cities and suburbs of selected metropolitan areas in our data base can be seen in Table 1.2.

TABLE 1.1 Alternative 50-year Projections of Net Migration for Individual Large Metropolitan Areas in Selected Developed Countries, assuming "around 1970" and "around 1980" migration processes

Country	*Met. Area*	*Region Type*	*1980 Population (million)*	*Projected Percent Change due to Net Migration Over Years: 1981-2031 assuming alternative migration processes*	
				"around 1970" mig. process	*"around 1980" mig. process*
Canada	Montreal	Core	2.8	-2.8	-33.6
	Toronto	Core	3.0	-15.1	-11.4
	Vancouver	Periphery	1.3	+37.1	+23.6
Great Britain	London	Core	9.2	-15.2	-6.9
	Birmingham	Periphery	2.9	-81.6	-13.5
	Manchester	Periphery	2.0	-22.2	-10.5
	Glasgow	Periphery	1.6	-30.1	-13.8
	Liverpool	Periphery	1.4	-20.2	-11.9
	Newcastle	Periphery	1.3	-21.9	-5.1
	Leeds	Periphery	1.3	-14.8	-7.9
	Sheffield	Periphery	1.9	-17.3	-4.7
Sweden	Stockholm	Core	1.5	-18.9	+2.7
Finland	Helsinki	Core	1.7	+17.7	+4.4
Denmark	Copenhagen	Core	1.9	-9.3	-1.5
Norway	Oslo	Core	0.5	-7.6	-6.2
The Netherlands	Amsterdam	Core	2.4	-9.1	-6.4
	Rotterdam	Core	1.8	-12.1	-7.2
	The Hague	Core	1.3	-19.2	-12.4

continues

TABLE 1.1 Alternative 50-year Projections of Net Migration for Individual Large Metropolitan Areas in Selected Developed Countries, assuming "around 1970" and "around 1980" migration processes (continued)

Country	Met. Area	Region Type	1980 Population (million)	Projected Percent Change due to Net Migration Over Years: 1981-2031 assuming alternative migration processes	
				"around 1970" mig. process	"around 1980" mig. process
Belgium	Brussels	Core	2.7	+2.6	+1.9
	Antwerp	Core	1.6	+0.4	+5.3
West Germany	Cologne	Core	2.0	--	-2.0
	Dusseldorf	Core	1.8	--	+0.5
	Dortmund	Core	1.7	--	-21.8
	Essen	Core	1.3	--	-1.3
	Duisburg	Core	1.2	--	-15.8
	Hamburg	Periphery	2.9	--	+6.3
	Munich	Periphery	2.8	--	+15.2
	Stuttgart	Periphery	2.4	--	+8.1
	Frankfurt	Periphery	2.3	--	+13.0
	Mannheim	Periphery	1.8	--	+9.3
	Nurnberg	Periphery	1.7	--	+11.7
	Hannover	Periphery	1.5	--	+6.6
	Bremen	Periphery	1.3	--	+4.2
	Berlin	Periphery	1.9	--	-7.9
Austria	Vienna	Core	2.5	+4.8	+0.1

(continues)

TABLE 1.1 Alternative 50-year Projections of Net Migration for Individual Large Metropolitan Areas in Selected Developed Countries, assuming "around 1970" and "around 1980" migration processes (continued)

Country	Met. Area	Region Type	1980 Population (million)	Projected Percent Change due to Net Migration Over Years: 1981-2031 assuming alternative migration processes	
				"around 1970" mig. process	"around 1980" mig. process
Italy	Milan	Core	4.2	--	-7.2
	Turin	Core	2.0	--	-14.6
	Genoa	Core	0.9	--	+1.3
	Rome	Periphery	3.8	--	+4.3
	Naples	Periphery	3.5	--	-16.6
	Palermo	Periphery	1.4	--	-1.9
Japan	Tokyo	Core	28.6	+17.8	+5.8
	Osaka	Core	17.3	+16.9	-5.0
	Nagoya	Core	9.9	+13.6	+1.9
	Kitakyushu	Periphery	4.5	-30.4	-1.4
New Zealand	Auckland	Core	0.8	+15.8	+17.9

Source: Michigan Metropolitan Migration Project

[1]1980-2030 for West German, Italy, and Japan

TABLE 1.2 Projections of City and Suburb Population Change, 1981-2031, for Individual Large Metropolitan Areas in Selected Developed Countries, assuming "around 1980" migration processes

Country	Met. Area	City Population Observed 1981	City Population Projected % Change 1981-2030[1]	Suburb Population Observed 1981	Suburb Population Projected % Change 1981-2030[1]	Percent in Suburb Observed 1981	Percent in Suburb Projected 2031	Diff. 2031-1981
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Canada	Montreal	967	-13.6	1830	+3.4	65.4	69.4	-4.0
	Toronto	592	-41.6	2382	+38.1	80.1	90.5	+10.4
	Vancouver	408	+1.0	842	+90.4	67.4	79.5	+12.1
Great Britain	London	4990	6.0	4163	-28.0	45.5	36.2	-9.3
	Birmingham	1872	-40.6	1125	+23.0	38.2	56.2	+18.0
	Manchester	968	-27.8	1050	-10.1	52.0	57.5	+5.5
	Glasgow	807	-32.4	769	-7.7	48.8	56.5	+7.7
	Liverpool	843	-37.7	578	+5.5	40.7	53.7	+13.0
	Newcastle	841	-37.0	491	+15.0	36.9	51.6	+14.7
	Leeds	1151	-28.1	123	+84.3	9.6	21.4	+11.8
	Sheffield	531	-28.2	316	+0.9	37.3	45.5	+8.2
Sweden	Stockholm	723	-5.0	725	+4.0	50.1	52.3	+2.2
Finland	Helsinki	1143	-10.5	549	+3.3	32.5	35.7	+3.2
Denmark	Copenhagen	1364	-32.4	536	-20.6	28.2	31.6	+3.4
The Netherlands	Amsterdam	857	-40.6	1578	-9.4	64.8	73.7	+8.9
	Rotterdam	750	-50.0	1034	-2.4	58.0	72.9	+14.9
	The Hague	686	-45.6	628	-8.2	47.8	60.2	+12.4
Belgium	Brussels	985	-1.5	1723	-23.0	63.6	57.8	-5.8
	Antwerp	915	-8.4	653	-15.4	41.6	39.7	-1.9

continues

TABLE 1.2 (continued)

Country	Met. Area	City Population Observed 1981	City Population % Change 1981-2030[1]	Suburb Population Observed 1981	Suburb Population % Change 1981-2030[1]	Percent in Suburb Observed 1981	Percent in Suburb Projected 2031	Diff. 2031-1981
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
West Germany	Cologne	977	-18.8	1052	-43.3	51.9	42.9	-9.0
	Dusseldorf	590	-16.6	1222	-42.5	67.4	58.8	-8.6
	Dortmund	608	-47.5	1080	-54.3	64.0	60.7	-3.3
	Essen	648	-39.6	600	-39.9	48.1	48.0	-0.1
	Duisburg	558	-50.5	645	-39.8	53.6	58.4	+4.8
	Hamburg	1645	-35.1	1294	-22.7	44.0	48.4	+4.4
	Munich	1299	+1.7	1449	-38.2	52.7	40.4	-12.3
	Stuttgart	581	+31.5	1789	-43.0	75.5	57.2	-18.3
	Frankfurt	629	+17.3	1661	-40.6	72.5	57.2	-15.3
	Manheim	597	+9.4	1156	-42.5	65.9	50.5	-15.4
	Nuremberg	685	+3.7	1033	-42.2	60.1	45.6	-14.5
	Hannover	535	-1.1	930	-44.4	63.5	49.5	-14.0
	Bremen	555	-23.8	692	-34.8	55.5	51.6	-3.9
Austria	Vienna	1531	-10.0	955	+28.3	38.4	47.1	+8.7
Italy	Milan	2104	-34.1	2111	-7.3	50.1	58.5	+8.4
	Turin	1170	--37.3	907	-23.9	43.7	48.5	+4.8
	Genoa	763	-36.4	173	-10.9	18.5	24.1	+5.6
	Rome	2840	-19.9	1049	+22.9	27.0	36.2	+9.2
	Naples	1363	-48.1	2155	+3.5	61.3	75.9	+14.6
	Palermo	702	+2.2	670	-29.2	48.9	39.8	-9.1
Japan	Tokyo	11596	+8.3	16964	+27.2	59.4	63.2	+3.8
	Osaka	8473	-3.5	8858	-5.9	51.5	50.5	-1.0
	Nagoya	6213	-0.4	3645	-6.9	37.0	35.5	-1.5

Source: Michigan Metropolitan Migration Project

[1] 1980-2030 for West Germany, Italy, and Japan

Illustrative Analyses for Canada

The kind of analyses that are possible with the Michigan Metropolitan Migration data can be illustrated for Canada. Here we designated the detailed regional system to consist of the three largest metropolitan areas -- Montreal, Toronto, and Vancouver -- where the residual population was classed into three broad regions (East, Central, West) and metropolitan and nonmetropolitan territories within these three regions.[4] (The regions in this detailed system are listed in the upper panel of Table 1.3.) The more parsimonious summary regional system combines both Montreal and Canada into the "core region-large metropolitan area" category. The remaining categories of the East region are treated as part of the core. Vancouver is considered to be the peripheral region's large metropolitan area, and the Central and West regions are combined to form the remaining categories of the peripheral region. (See lower panel of Table 1.3.)

Alternative population projections across the areas of Canada's regional system were computed from two different observed sets of migration stream rates. As with other nations in this study, one of the sets of rates was observed "around 1970" and the other "around 1980". (These two sets of rates were constructed, respectively, for the periods 1966-71 and 1976-81, based on the 5-year fixed-interval migration questions in the 1971 and 1981 Canadian censuses.) Both projections started in the year 1981, and were computed over a 50-year period, through the year 2031.

Table 1.3 shows the type of analyses that can be used to compare the long-term redistribution implications of two different sets of migration stream rates. Here, population changes -- under each projection -- are shown for the nine detailed areas, and are decomposed into their respective natural increase and net migration components. When the migration rates observed "around 1970" drive the projection (projection A), the greatest projected net migration gain is found in the Vancouver metropolitan area (+37.7%), along with projected net out-migration for all categories of the East region. This projected core-to-periphery redistribution is also evident for the Central regions.

When the "around 1980" migration stream rates were used to drive the projections (projection B), core-to-periphery redistribution was still apparent. However, the net migration gains are more confined to Canada's West region, with particularly strong gains in the nonmetropolitan West (+39.9%). The other sharp change occurred in the East region. While all categories of this region continue to lose net migrants over the projection period, Montreal's losses increase

TABLE 1.3 Alternative Projections of Population Change, 1981-2031 and Demographic Components. Detailed Regional System and Summary Regional System. Projection A assumes migration process observed around 1970. Projection B assumes migration process observed around 1980

Regional System/ Area Type	*Population Size*			*Demographic Components of Projected Change*[a]						
	Observed	*Projected 2031*		*Projection A*				*Projection B*		
	1981	*A*	*B*	*Total Change*	*Natural Increase*	*Net Migration*	*Total Change*	*Natural Increase*	*Net Migration*
Detailed Regions									
Montreal Met Area	2797045	3826057	2727383	+36.8	+39.6	-2.0	-2.5	+31.1	-33.6
Toronto Met Area	2974470	3601987	3635000	+21.1	+36.2	-15.1	+22.2	+33.6	-11.4
Vancouver Met Area	1250225	2216995	2015797	+77.3	+39.6	+37.7	+61.2	+37.7	+23.6
East Met	539565	663677	665274	+23.0	+43.5	-20.5	+23.3	+41.0	-17.8
East Nonmet	1670775	2060657	2071787	+23.3	+31.4	-8.1	+24.0	+29.0	-5.8
Central Met	3588975	5222404	4490619	+45.5	+40.9	+4.7	+25.1	+31.5	-6.4
Central Nonmet	5530765	7465392	6887453	+35.0	30.9	+4.1	+24.5	+28.5	-4.0
West Met	2359075	3489885	4088658	+47.9	+46.3	+1.6	+73.3	+61.0	+12.0
West Nonmet	3352370	4367967	6333231	+30.3	+34.2	-3.9	+88.9	+49.0	+39.9
Total	24063265	32915021	32915202						
Summary Regions									
Core-Large Met	5771515	7428044	6862383	+28.7	+75.8	-9.1	+19.7	+64.7	-22.2
Core-Other Met	539565	663677	665274	+23.0	+43.5	-20.5	+23.3	+41.0	-17.8
Core Nonmet	1670775	2060657	2071787	+23.3	+31.4	-8.1	+24.0	+29.8	-5.8
Periph-Largo Met	1250225	2216995	2015797	+77.3	+39.6	+37.7	+61.2	+37.7	+23.6
Periph-Other Met	5948050	8712289	8579277	+46.5	+87.2	+3.4	+98.4	+92.8	+0.9
Periph-Nonmet	8883135	11833359	13220684	+33.2	+65.1	+1.1	+113.5	+77.5	+12.6
Total	24063265	32915021	32915202						

[a]expressed as a percentage of 1981 population

dramatically with projection B (to -33.6%). Hence, while the core-to-periphery shifts are still evident with a projection driven by "around 1980" migration rates, there appears to be a greater trend toward counterurbanization within each region.

To explore the underlying dynamics further, it is useful to ask: Which streams' exchanges are most responsible for the dramatic declines shown by Montreal and the increased gains shown in the nonmetropolitan West? The answer to this can be assessed by decomposing each area's projected net migration rate into its projected migration stream exchanges with each of the other regions in the system. Such a decomposition is presented in Table 1.4, which shows that the increased net out-migration from Montreal is due to higher negative net migration exchanges with each of the other areas in the system. Still, the greatest shifts between projection A and projection B occur for Montreal's exchanges with Toronto (from -6.4% to -13.5%), with the Central Region, and with small metropolitan areas in the West. It is significant to note that Montreal's increased net out-migration, with projection B, is <u>not</u> primarily due to redistribution "down the hierarchy" within its own region.

In contrast, the nonmetropolitan West's increased net migration, with projection B, <u>is</u> consistent with such a "down the hierarchy" redistribution. Although this area increased its gains through migration stream exchanges with each of the other areas in the system, the bulk of this increase occurred within the West -- through increased gains from Vancouver and smaller metropolitan areas in the West region.

Some other useful information, provided by the data base, are the age-specific migration rates which underlie the projection processes. Examination of age-specific in-migration ratios, out-migration rates, and net migration rates, for Montreal and the nonmetropolitan West (shown in Figure 1.3), provide insights into the age-relatedness underlying the migration-driven projections.

For both periods, the age-relatedness of in-migration, out-migration, and net migration show characteristic patterns for Montreal. In-migration to the metropolitan area tends to peak during the early 20s, coincident with educational and first employment opportunities and "big city" amenities that are often attractive to young adults. Out-migration tends to peak in the late 20s, as many of these young adults decide to move elsewhere. It peaks again around retirement time as ties to the area's labor force become broken. Out-migration, therefore, tends to peak during the early 20s and, again, slightly during the very oldest years.

TABLE 1.4 Projected Net Migration Exchanged across Detailed Regional System for 1981-2031. Projected A assumes migration process observed around 1970. Projection B assumes migration process observed around 1980

Area Type/ Projection	*1981-2031 Percent Change due to Total Net Migration*	*Decomposed into Net Migration Exchange with Area Type:*								
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Montreal Met Area										
Projection A	-2.8	--	-6.4	-2.8	-0.1	-0.8	+9.2	-0.6	-0.6	-0.5
Projection B	-33.6	--	-13.5	-2.9	-0.5	-1.0	-3.3	-4.9	-5.8	-1.6
2. Toronto Met Area										
Projection A	-15.1	+6.1	--	-2.0	+1.5	+1.1	+0.1	-23.4	+1.8	-0.2
Projection B	-11.4	+12.7	--	-2.4	0.0	-0.9	-1.9	+11.1	-5.3	-2.5
3. Vancouver Met Area										
Projection A	+37.7	+6.4	+4.8	--	+0.9	+0.9	+5.5	+3.7	+29.9	-14.3
Projection B	+23.6	+6.5	+5.8	--	+1.2	+1.0	+6.1	+5.0	+18.4	-20.4
4. East Met Area										
Projection A	-20.5	+0.6	-8.1	-2.1	--	+4.9	-8.1	-3.8	-3.4	-0.5
Projection B	-17.8	+2.8/	-0.2	-2.8	--	-3.9	-2.4	+0.7	-7.4	-4.5
5. East Nonmet										
Projection A	-8.1	+1.1	-2.0	-0.7	-1.6	--	-2.6	-0.5	-0.8	-1.0
Projection B	-5.8	+1.8	+1.6	-0.8	+1.3	--	+0.8	+1.7	-6.1	-6.1

(continues)

TABLE 1.4 Projected Net Migration Exchanged across Detailed Regional System for 1981-2031. Projected A assumes migration process observed around 1970. Projection B assumes migration process observed around 1980 (continued)

Area Type/ Projection	*1981-2031 Percent Change due to Total Net Migration*	*Decomposed into Net Migration Exchange with Area Type:*								
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
6. Central Met Area										
Projection A	+4.7	+0.6	-0.1	-1.9	+1.2	+1.2	--	+2.9	+1.0	-0.3
Projection B	-6.4	+2.6	+1.6	-2.1	+0.4	-0.4	--	+2.0	-6.8	-3.6
7. Central nonmet										
Projection A	+4.1	-4.7	+12.6	-0.8	+0.4	+0.2	-1.9	--	-0.7	-1.0
Projection B	-4.0	+2.5	+6.0	-1.1	-0.1	-0.5	-1.3	--	-5.2	-4.2
8. West Met Area										
Projection A	+1.6	+0.7	-2.3	-15.9	+0.8	+0.6	-1.5	+1.6	--	+17.6
Projection B	+12.0	+6.9	+6.7	-9.7	+1.9	+4.3	+10.3	+12.3	--	-20.3
9. West Nonmet										
Projection A	-3.9	+0.5	+0.2	+5.3	+0.1	+0.5	+0.4	+1.6	-12.4	--
Projection B	-39.9	+1.3	+2.2	+7.6	+0.7	+3.0	+3.9	+6.9	+14.3	--

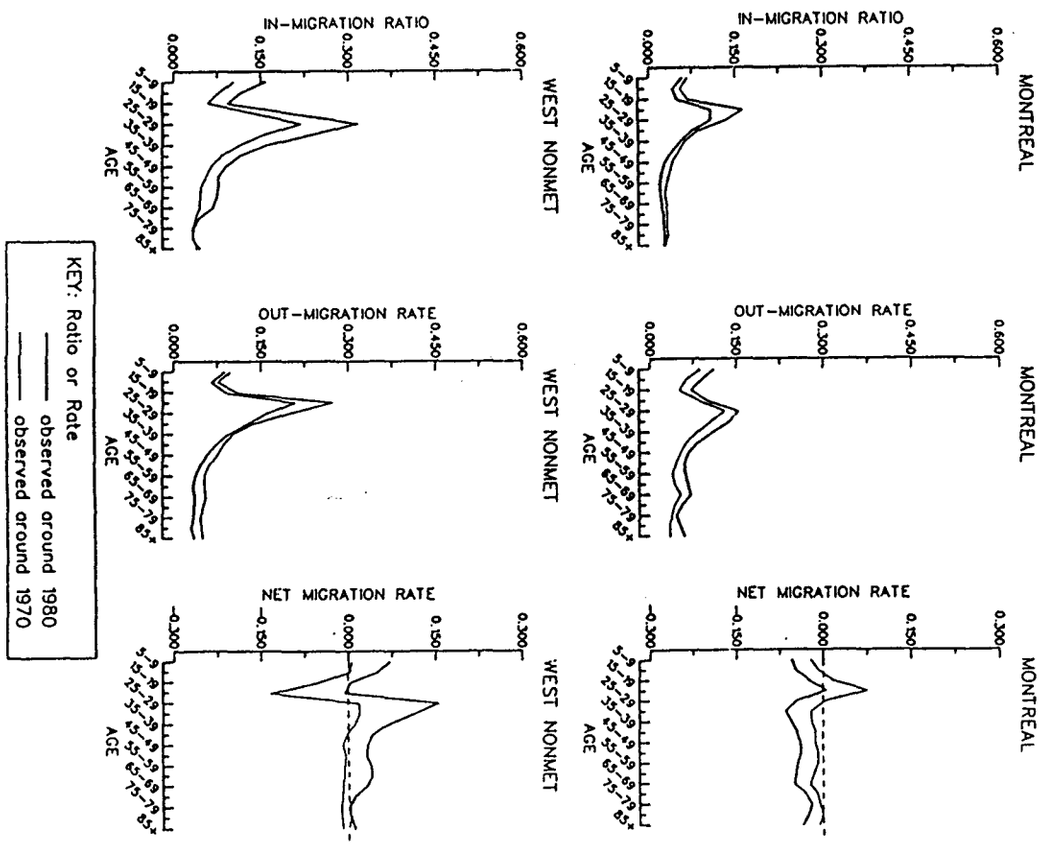

FIGURE 1.3 Observed Age-specific Migration Rates for Montreal Metropolitan Area, and the West Non-metropolitan Region for observed periods around 1970 and 1980

More relevant to the earlier projection comparisons, these plots show that the characteristic patterns of each of these rates stayed pretty much intact, but that the overall levels go up and down with each observed migration period. One important qualification to this statement is the significantly-reduced in-migration levels shown for young twenties adults in the "around 1980" period. Also, out-migration tends to peak somewhat earlier among the near-elderly in the later period. Both of these patterns show up in the net rates, and also underlie the projection comparisons above.

The age-migration patterns for Canada's nonmetropolitan West region resemble almost a mirror image of Montreal's patterns. That is, while Montreal's in-migration peaked during the early 20s, the nonmetropolitan West region's out-migration peaks during this time. Conversely, the latter region's in-migration peaks during the late 20s and, again, during the retirement years. These suggest characteristic urban and rural age-related patterns that also show up in the net migration rates.

Again mirroring Montreal, the nonmetropolitan West's characteristic patterns remain pretty much the same for both periods of observation, but the overall levels of these rates shift. Still, there is an accentuation of the in-migration peak and an exaggerated decline of the out-migration peak for the "around 1980" rates -- leading to more elevated levels of net in-migration at those ages.

A final illustration of analyses possible with the Michigan Metropolitan Migration data base involves projections of intra-metropolitan, central city - suburban population redistribution. The data shown in Table 1.5 contrast two alternative city-suburb projections for the three large Canadian metropolitan areas. Consistent with the two-level methodology discussed earlier, both projections assume the "around 1980" set of streams between these three metropolitan areas and the other six areas of the detailed regional system. (They are consistent with projection B in Tables 1.3 and 1.4.) In Table 1.5, the alternative projections refer to redistribution only between central city and suburbs (as well as the allocation of metropolitan in-migrants to city and suburb destinations). Moreover, in addition to decomposing total projected change into natural increase and net migration, net migration can be further decomposed into inter-metropolitan (or inter-regional) migration, and intra-metropolitan (or city-suburb) residential mobility components.

The results shown in Table 1.5 indicate that, for Montreal, intra-metropolitan mobility plays a smaller role in city and suburban projected change than is the case for Toronto and Vancouver. Moreover, in both Toronto and Vancouver there has been an increase

TABLE 1.5 Demographic Components of Change for Alternative 1981-2031 Population Projections, Central Cities and Suburbs of Large Individual Metropolitan Areas. Projection A assumes migration processes observed around 1970. Projection B assumes migration processes observed around 1980

	Demographic Components of 1981-2031 Projected Change[a]											
	City Population					*Suburb Population*						
Metropolitan Area	*Total Change*	*Natural Increase*	*Net Migration*			*Total Change*	*Natural Increase*	*Net Migration*				
			Total	*Inter Met*	*Intra Met*			*Total*	*Inter Met*	*Intra Met*		
Montreal												
Projection A	-15.7	+22.5	-38.1	-23.6	-14.5	+4.5	+35.6	-31.2	-38.8	+7.7		
Projection B	-13.6	+23.1	-36.6	-30.0	-6.6	+3.4	+35.3	-31.9	-35.4	+3.5		
Toronto												
Projection A	-16.4	+27.4	-43.8	+25.3	-69.1	+31.8	+35.2	-3.4	-20.6	+17.2		
Projection B	-41.6	+30.4	-72.0	+24.3	-96.3	+38.1	+34.4	+3.7	-20.3	+24.0		
Vancouver												
Projection A	+36.6	+27.6	+9.0	+52.0	-43.0	+73.2	+42.5	+30.7	+9.8	+20.8		
Projection B	+1.0	36.6	-35.6	+48.7	-84.3	+90.4	+38.2	+52.2	+11.4	+40.8		

[a]expressed as percent of 1981 population

in intra-metropolitan suburbanization with projections driven by the "around 1980" rates (projection B). Hence, while Vancouver's central city gains by +48.7% due to inter-metropolitan redistribution, it loses -84.3% as a result of redistribution with its own suburbs -- when the "around 1980" migration process is assumed. In Toronto, the city-to-suburb exchange dominates the city's population change under both projections, and the city loses even more when the "around 1980" rates are assumed. For Montreal, in contrast, the "around 1980" rates provide for less intra-metropolitan city-to-suburb redistribution under projection B. Yet, under both projections, Montreal's central city loses net migrants through its large negative exchange with other metropolitan areas and regions.

These examples serve to illustrate the kinds of analyses that are possible with the migration data base we have assembled. Of course, focusing only on Canada, we did not take advantage of the cross-national comparisons that are possible. One such study has investigated the validity of two theories that suggest different hypotheses for core-to-periphery redistribution among the 13 nations in our study (Frey, 1988). However, there are many other redistribution questions that can be investigated with these comparative migration data.

Notes

Note to Figure 1.2: Standard tabulations for migration data of the Michigan Metropolitan Migration Project include internal migration flows between large individual metropolitan areas, core and periphery regions and residual metropolitan-nonmet (or urban-rural) territory of nations--disaggregated by sex and 5-year categories, regions and residual metropolitan-nonmet (or urban-rural) territory of nations--disaggregated by sex and 5-year categories. Metropolitan areas included are those with populations greater than one million in 1970. The number of geographic divisions are identify by core and periphery regions. One region is the core region; the remaining regions are displayed as a single periphery region in the analyses). The residual territory outside of large metropolitan areas, (MN) denotes further breakdown into metropolitan-nonmetropolitan territory; (UR) denotes further breakdown into urban-rural territory.

1. In this vein, I express my gratitude to Sid Goldstein who by example, influence, and kind cooperation both inspired and encouraged me toward undertaking this effort.
2. A six-month stay at IIASA, from the period September, 1980-March, 1981, enabled me to explore the possibility of producing the necessary migration tabulations with academic scholars and government statisticians in ten European countries. Subsequent funding by NICHD over the period January, 1983-December, 1987, enabled me and a small research staff at the University of Michigan to pursue these arrangements, assemble appropriate data, and undertake the required analyses to complete this project.

   Over this period, the project benefitted from the expertise and cooperation of a variety of scholars. Among these were Peter Hall and Dennis Hay at the University of Reading (England), Andrei Rogers at the University of Colorado, Frans Willekens at NIDI (Netherlands Interuniversity Demographic Institute), Ingvar Holmberg at the University of Gothenburg (Sweden), Rainer MacKensen at Technical University-Berlin (West Germany), Alberto Bonaguidi at University of Pisa (Italy), Guido Martinotti at Social Science Data Archive Program, Milan (Italy), Michel Poulain at Catholic University-Louvain (Belgium), Atsushi Otomo at Utsunomiya University (Japan), Martin Schuler at Federal Polytechnic College of Lausanne (Switzerland), and Bjorn Henrichsen at Norwegian Social Science Data Center (Norway).

3. One methodological note: when the migration rates are drawn from annual population registers ratherts than from fixed-interval census data, it becomes necessary to estimate migration stream rates that are conditional on survival over a five-year interval for use with the (Frey, 1983) algorithm. This estimation can be accomplished with multiregional demographic computer programs developed by Rogers and colleagues (Willekens and Rogers, 1978).
4. The geographic regions, East, Central and West, are defined in terms of Canadian Provinces as follows:

   East = Atlantic Provinces (Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick)
   Central = Quebec and Ontario
   West = Prairie Provinces (Manitoba, Saskatchewan, Alberta, British Columbia, Northwest Territory, and Yukon Territory)

   The metropolitan-nonmetropolitan distinction within each of these regions is consistent with definitions employed by the Canadian census (Ross, 1984).

References

Berry, B.J.L. and K. D. Kasarda. 1970. Contemporary Urban Ecology. New York: MacMillan.

Bogue, D. J. 1953. Population Growth in Standard Metropolitan Areas, 1900-1950. Washington, DC: U.S. Government Printing Office.

_____. 1957. Components of Population Change in Standard Metropolitan Statistical Areas. Oxford, Ohio: Scripps Foundation.

Champion, A. G. (ed.). 1989. Counterurbanization: the Changing Pace and Nature of Population Deconcentration. London: Edward Arnold.

Davis, K. 1959. The World's Metropolitan Areas. Los Angeles: University of California Press.

_____. 1969. World Urbanization 1950-1970, Vol. I: Basic Data for Cities, Countries, and Regions. Berkeley: Institute for International Studies, University of California.

_____. 1972. World Urbanization 1950-1970, Vol. II: Analysis of Trends, Relationships, and Developments. Berkeley: Institute for International Studies: University of California.

Drewe, P. 1981. The Structure and Composition of the Population of Urban Areas with Special Reference to Inner City Areas (Northern and Central Europe). Committee of Experts on the Population of Urban Areas, Council of Europe. Strasbourg: Council of Europe.

Frey, W. H. 1978. "Population Movement and City-Suburb Redistribution: An Analytic Framework." Demography 15:4, pp. 571-588.

_____. 1980. "Status Selective White Flight and Central City Population Change." Journal of Regional Science 20:1, pp. 71-89.

_____. 1983. "A Multiregional Population Projection Framework that Incorporates Both Migration and Residential Mobility Streams." Environment and Planning-A 15, pp. 1613-1632.

_____. 1984. "Lifecourse Migration of Metropolitan Whites and Blacks and the Structure of Demographic Change in Large Central Cities." American Sociological Review 49 (December), pp. 803-827.

_____. 1985. "Mover Destination Selectivity and the Changing Suburbanization of Metropolitan Whites and Blacks." Demography 22:2, pp. 223-243.

_____. 1987. "Migration and Depopulation of the Metropolis: Regional Restructuring or Rural Renaissance?" American Sociological Review 52 (April), pp. 240-257.

_____. 1988. "Migration and Metropolitan Decline in Developed Countries." Population and Development Review 14(4), pp. 595-628.

_____. 1989a. "Michigan Metropolitan Migration Project: Part I: Overview and Illustrative Data." Research Reports No. 89-152. Population Studies Center, The University of Michigan, Ann Arbor.

_____. 1989b. "Michigan Metropolitan Migration Project: Part II: Definitions of Metropolitan Areas and Regions." Research Reports No. 89-153. Population Studies Center, The University of Michigan, Ann Arbor.

Frey, W. H. and A. Speare, Jr. 1988. Regional and Metropolitan Growth and Decline in the U.S. A 1980 Census Monograph. New York: The Russell Sage Foundation.

Goldstein, S. 1963. "Some Economic Consequences of Suburbanization in the Copenhagen Metropolitan Area." American Journal of Sociology 68, pp. 551-564.

_____. 1965. "Rural-Suburban-Urban Population Redistribution in Denmark." Rural Sociology 30, pp. 267-277.

Goldstein, S. and D. F. Sly. 1975. Working Paper I: Basic Data Needed for the Study of Urbanization. Liege: International Union for the Scientific Study of Population.

Golini, A. and G. Gesano. 1981. The Structure and Composition of the Population of Urban Areas with Special Reference to Inner City Areas (Southern Europe). Committee of Experts on the Population of Urban Areas, Council of Europe. Strasbourg: Council of Europe.

Hall, P. and D. Hay. 1980. Growth Centers in the European Urban System. London: Heinemann.

Hall, P., D. Hay, R. Sammons, and J. Liddell. 1979. Definition and Measurement of Urban Areas. A Report to the Commission of the European Communities. Reading: University, Geography Department.

Hawley, A. H. 1956. The Changing Shape of Metropolitan America. Glencoe, Illinois: The Free Press.

_____. 1971. Urban Society: An Ecological Approach. New York: Ronald Press.

Hay, D. and P. Hall. 1976a. Urban Regionalization of Great Britain, 1971. Working Paper 1. Reading: University, Geography Department.

_____. 1976b. Urban Regionalization of Sweden, 1970. Working Paper 2. Reading: University, Geography Department.

_____. 1976c. Urban Regionalization of Denmark, 1970. Working Paper 3. Reading: University, Geography Department.

_____. 1977a. Urban Regionalization of Belgium, 1970. Working Paper 4. Reading: University, Geography Department.

_____. 1977b. Urban Regionalization of Norway, 1970. Working Paper 5. Reading: University, Geography Department.

_____. 1977c. Urban Regionalization of Portugal, 1970. Working Paper 6. Reading: University, Geography Department.

_____. 1977d. Urban Regionalization of The Netherlands, 1970. Working Paper 7. Reading: University, Geography Department.

_____. 1977e. Urban Regionalization of Italy, 1970. Working Paper 8. Reading: University, Geography Department.

_____. 1977f. Urban Regionalization of Spain, 1970. Working Paper 9. Reading: University, Geography Department.

Kawashima, T. and Korcelli, P. (eds.). 1982. Human Settlement Systems: Spatial Patterns and Trends. CP-82-S1. Laxenburg, Austria: IIASA.

Long, Larry H. 1988. Geographic Mobility in the U.S. The Population of the United States in the 1980s. New York: Russell Sage.

Rogers A. and F. Willekens. 1986. Migration and Settlement: A Comparative Study. Hingham, MA: Kluwer Academic Publishers.

Schnore, L. F. 1965. The Urban Scene. New York: The Free Press.

Sherrill, K. 1976. Functional Urban Regions of Austria. RM-76-71. Laxenburg, Austria: IIASA.

_____. 1977. Functional Urban Regions and Central Plane Regions in the Federal Republic of Germany and Switzerland. RM-77-17. Laxenburg, Austria: IIASA.

Shryock, H. S. 1964. Population Mobility Within the United States. Chicago: University of Chicago Community and Family Study Center.

Taeuber, I. and C. Taeuber. 1971. People of the U.S. in the Twentieth Century. U.S. Bureau of the Census. Washington, DC: U.S. Government Printing Office.

Taeuber, K. E. and A. F. Taeuber. 1965. Negroes in Cities. Chicago: Aldine Publishing Company.

United Nations. 1969. Growth of the World's Urban and Rural Population 1970-2000 . New York: United Nations E.69.

_____. 1975. Trends and Prospects in the Population of Urban Agglomerations, 1950-2000, as Assessed in 1973-1975. Population Division Working Paper. New York: United Nations ESA/8/WP.58.

_____. 1981. Patterns of Urban and Rural Population Growth. Population Studies No. 68. New York: United Nations.

Vining, D. R. and T. Kontuly. 1978. "Population Dispersal from Major Metropolitan Regions: An International Comparison." International Regional Science Review 3, pp. 49-73.

Vining, D. R. and R. Pallone. 1982. "Migration Between Peripheral and Core Regions: A Description and Tentative Explanation of the Patterns in 22 Countries." Geoforum 13(4), pp. 339-410.

Willekens, and A. Rogers. 1978. Spatial Population Analysis: Methods and Computer Programs RR-78-18. Laxenburg, Austria: IIASA.