



Infrastructure
Canada

THE URBAN SYSTEM AND LINKAGES

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Linkages Between Communities**

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Introduction

There can be no doubt about the significance of linkages or connections in shaping human activities and altering communities. Thirty years ago China was isolated, cut off from the rest of the world by restrictions on travel, trade, emigration and information. Once the restrictions were removed China became a major factor on the world scene, affecting the global economy, environment and geopolitics. Similar transformations, at a more modest scale, have occurred throughout Canadian history: whole regions were transformed by the railroad, northern communities opened up by bush pilots, and metropolitan suburbs created by the same expressway that isolated downtown. In a country that has so much distance and such diverse communities, the degree and pattern of connectivity among places affect every aspect of Canadian life. That said, it must be admitted that nowadays most of the changes in spatial connectivity are relatively modest, as are the impacts of change. Canada is already a closely integrated social system, and there are too many different kinds of interaction for a single innovation to alter the pattern. Still, if we look at the aggregate links among different kinds of places, or shifts among the various types of linkage, we observe a number of overall trends, as well as some research deficiencies that require our attention.

I want to begin by discussing the patterns and trends in linkage at various spatial scales, ranging from the community or neighbourhood to the international. This will be followed by a quick overview of developments in various kinds of linkages among cities and communities: information, social contacts, economic flows, migration and governance. These linkages raise the perennial concerns of researchers and policy-makers about the impacts of change in urban system relationships: do closer connections between two places increase choice, specialization and co-operation, benefiting both of them? Or do they lead to greater competition, hence uncertainty and possible decline for one of them? Or both? At that point, I will indicate some of the things that we know, and some other things that we should try to find out.

The conventional approach to the urban system focuses on the cities within a nation, and on the relationships (linkages) among those cities. The relationships help to explain the patterns of differentiation and change within the system (see Simmons and Bourne, 2003), and *vice versa*. This paper extends the approach in two ways. First, I want to emphasize the importance of international linkages, as Canadians respond to the pressures and opportunities of globalization. The location of Canada's economic and demographic growth is now largely driven by events outside our borders, and Canadians themselves are more likely to have personal links with other countries. Second, it is apparent from Table 1 that Canada is now a metropolitan nation, in which 57 per cent of the population lives in 15 metropolitan areas with more than 300,000 population. The relationships among these large cities dominate any matrix of urban linkages, with Toronto, in turn, dominating the connections among these cities. Within these metropolitan regions are thousands of residential communities that link with one another and with communities outside the city in varying degrees. These intra-urban systems replicate the urban system in varying ways, but the pattern of linkage among these communities is the unknown

story in spatial linkages. I have introduced these metropolitan communities at various points in the discussion.

Variation in Linkage by Size and Distance

The linkages among spatial units are simply the aggregate of choices made by individuals, households and economic activities. The choices may be modified by investments in transportation or other infrastructure that connect different locations. The universal relationship that governs spatial linkages incorporates two important points: first, size matters: the flows between two places are proportional to the number of potential movers in the origin multiplied by the number of opportunities at the destination. Some kinds of flows respond to similarity between origin and destination (social contacts); others increase with specialization (trade flows). Second, the greater the distance between the communities, the fewer the linkages, due to costs in time or money, or competition from alternative destinations. In some instances political or cultural boundaries have the effect of extending distances. Air passenger flows from Toronto to a city across the US border are only fifteen per cent as large as flows from Toronto to a city of the same size in Canada. Similar, but more modest, boundary effects occur between anglophone and francophone regions in Canada. Certain distances (or travel-times) are especially significant. The daily commuting range is used to define metropolitan areas in Canada because this distance also defines trade areas (markets) for shopping and recreation, as well as identifying housing markets, potential marriage partners, or participants in social organizations. The questions that interest researchers relate to the ways in which the size/distance relationship is modified in some systematic fashion, and how it is evolving over time.

As indicated in Table 1 the components of the urban system vary widely in size and number. Some 2000 rural centres range in size from a few hundred people up to 10,000. In contrast Toronto, with close to five million people, has more population than the Atlantic region or the Prairies. The size differences of communities impose a natural hierarchy upon the linkage patterns (Figure 1). Spatial units at each level mostly connect with a subset of locations at higher and lower levels. For example, Regina Saskatchewan acts as the regional service centre for a network of smaller places nearby, for which it provides retail and wholesale facilities and a variety of services, including education and health care. Regina competes with other neighbouring cities (Saskatoon) for the privilege of providing these services; but for certain kinds of specialized goods and services Regina residents travel to Winnipeg or Calgary. These settlement hierarchies are identified by mapping the most frequent destination for phone calls or migration from a given city -- if you have the data. Usually the largest outward flow goes to the nearest larger city. The map shows how Toronto dominates the hierarchical pattern of air passenger movement within Canada, attracting links from the other large cities. Note the regional subsystems: to Edmonton, Calgary and Vancouver in the West; St. John's and Montreal in the East. As Toronto continues to grow larger the regional subsystems have become relatively weaker. Activities and linkages have gradually concentrated into the largest centre. Figure 2 shows the largest linkages overall in the air passenger network -- again emphasizing the largest cities. Figure 3 maps the changes in linkages over three decades, and points out the growing significance of cities in Western Canada.

International linkages have also grown disproportionately, largely through the relaxation of restrictions on cross-border flows and the deregulation of airlines, television, postal services, and the like. All kinds of linkages have grown rapidly during the last fifteen years, but both international trade and immigration have grown much faster than domestic flows (Table 2).

Residential communities within metropolitan areas are more numerous than non-urban communities, including more than 5000 census tracts, for example. As well, metropolitan communities attract almost all of the national population growth and are far more diverse than rural communities in every sense: both richer and poorer, with an extraordinary range of lifestyles and ethnic groups. They are more dissimilar than rural communities, but located much closer together. One problem for analysis is the lack of any obvious means of identifying or classifying these communities. Census tracts and FSAs are too arbitrary; municipalities are far too large in many of our cities (*e.g.* Toronto, Calgary) (see Bourne, 1999). Most municipalities, however, have identified community planning districts that would serve the purpose. Another difficulty is the compartmented nature of metropolitan life: people live in communities but share the workplace with different people, and their after-hours activities may involve still another set of people in another part of town. At any rate, we know very little about the ways these urban communities connect with each other or with the larger urban area to which they belong. Nor do we know much about how they relate to other communities outside the urban area or to communities in other cities. Similar linkage hierarchies may exist within metropolitan regions: neighbourhood, community, and municipality -- but the hierarchical patterns at that scale are much less precise -- and becoming even fuzzier over time -- because distance exerts fewer constraints within the city. Big city residents are less likely to go to the nearest mall, school or hospital than rural residents. Instead they will drive across the city for a specialized product or service.

The Content of the Linkages

Students of linkages emphasize the different kinds of flows that connect spatial communities, as listed in Table 3. We can begin with shared information, as the most widely dispersed linkage; one that underlies many other kinds of linkage (first you find out, then you choose). Information includes all the various kinds of media and their delivery systems. In general, there has been an enormous increase in access to information throughout the world system, and at all levels in the settlement hierarchy. As well, information flows have shifted connections towards larger centres (choice has increased while access costs decline). We may have more community newspapers, but people now spend more time with national and international media. The internet (and Google) has had an extraordinary impact on information available on specialized topics, and the growth of internet penetration is impressive (Statistics Canada, 2003).

Personal contact includes mail, telephone, face to face, and e-mail. Again, the last two decades have witnessed an explosion of change, due both to technology and deregulation. Phone calls are cheaper; cell phones provide more access; e-mail has replaced the postal service. People can now work at home or at the cottage. Inter-urban and even international contacts are inexpensive and readily available. Again the structure of contacts is shifting up the urban hierarchy. The changes that encourage interaction at a distance also weaken those spatial communities that are based on neighbouring or the workplace. We have only so much time, and the cell phone and the

internet disconnect us from our partners and neighbours at home and at work. One suspects that community-based organizations may be left behind in the process. Also left out of this explosion of change are groups like the elderly and the lowest socio-economic (least-educated) members of the community, since the new technologies require both initial investment and basic technical skills.

Economic flows of money and goods generate two distinct patterns of spatial contact. First, households consume, and they travel to stores and larger centres of consumption to do so. The provision of goods and services is the economic basis for many smaller centres in rural areas, and as the number of jobs in the various services continues to grow far faster than jobs in mines and factories, these consumption activities potentially play a greater role in community growth. A variety of studies tell us that these activities are also shifting up the settlement hierarchy into larger centres. Stabler (2002) has documented the gradual disappearance of service activities in smaller centres in Saskatchewan as the time required to drive to larger places has declined. In similar fashion, smaller shopping centres and shopping strips within older communities in metropolitan areas are losing ground to big box stores and power centres on the outskirts of the city. Overall, the competitive advantage goes to the largest metropolitan areas. They have markets large enough to support the specialized business and professional services that are driving economic growth. As Canada's metropolitan areas continue to grow larger and the effect of distance declines, these places absorb most of the growth in services (Coffey, 2000).

Something similar is happening on the production side, but at a different spatial scale. A variety of international trade agreements, exploited by multi-national corporations, have placed points of production (or assembly) farther and farther from the points of consumption. Canada -- and Canadian cities -- competes with more and more countries that are farther and farther away. The 'China Price' defines manufacturing costs throughout the world, and international commodity markets determine the prices for our coal and other mineral products; hence the viability of places that produce them. The links to external markets have become as important as access to the domestic market, and they increase the uncertainty in the economies of small communities.

In the past the net flow of migrants -- an important part of community population growth -- was linked to economic growth. The actual movement of migrants resembles the flow of telephone calls or letters, based on city size and distance; but the differences, or net flows, track the patterns of employment change. This relationship continues for movers within Canada, but these domestic migration flows have been overwhelmed by the growth in international migration. With annual immigration levels ranging from 250,000 to 300,000, population growth due to net immigration is now greater than natural increase and much higher than the net domestic migration flows among cities. The recent immigrants, however, are less sensitive to job creation. They prefer those urban communities with existing ethnic communities and organizations to help them to adjust and find jobs. They avoid large parts of Canada -- notably smaller centres and rural areas, and Atlantic Canada. This spatial concentration supports higher population growth rates in larger cities, but it also has many implications for linkage patterns.

In 2001 about 18.4 per cent of Canadians (one in six) originated outside of the country. To the extent that these immigrants retain some links with the country of origin they increase the level of international contact -- social and economic (and possibly future immigration) -- relative to

domestic links. As well, their domestic connections may favour other large cities where there are similar concentrations of immigrants (the links between Markham ON and Richmond, BC). What we don't know is how well integrated they are with respect to non-immigrant communities within Canada, either within the same metropolitan region or with nearby smaller centres.

Governance includes a whole spectrum of linkages in the public sector. It begins with the institutional framework of federal, provincial, and municipal that fits the reality of the urban system very poorly, since it does not recognize the great metropolitan areas. Even so, there have been a variety of moves to integrate smaller municipal units, and/or to develop regional governments for larger cities and regional authorities for specific public services. As metropolitan areas continue to expand more rapidly than institutions can adjust, new forms of multi-level co-operation will be required to provide infrastructure for their populations. Most other aspects of governments, in contrast, are based on exchanges of influence and financial flows that do reflect the changing concentrations of population and economic activity. Both representation in government (the demand side) and public service delivery (the supply side) are shifting toward the larger metropolitan centres in the same way as the private sector.

What do we Know?

- We have all been overwhelmed by the accelerated growth in linkages of all kinds, and at all spatial scales, due to improvements in technology and widespread deregulation. Inevitably, the spatial patterns of linkage have changed as a result.
- Although we continuously adjust to these linkage changes, we have little systematic information about their magnitude or geography. Statistics Canada informs me that the only source of annual information about inter-urban linkages – the air passenger flows – has been discontinued because of ‘competition issues’.
- The data and research that are available suggest that linkages are shifting up the settlement hierarchy toward larger and more distant locations. In both rural and metropolitan communities residents are looking outside the community for jobs, for information, and for services. The size and diversity of opportunities have become more attractive, while the distance away is less and less a deterrent.
- The result is a concentration of population and economic activity in the largest cities (Table 4). The larger the city, the higher the average growth rates, with the smallest cities and non-urban areas in decline. Population decline in smaller places occurs everywhere but Ontario and the Prairies (i.e. Alberta). Almost half the urban centres with less than 300,000 people are now losing population. This pattern has become stronger in each succeeding Census (accentuated by the declining level of natural increase, and the higher levels of immigration). Those cities that grow are located close to expanding metropolitan areas (Barrie, Abbotsford), or in Alberta (Grande Prairie, Fort McMurray), or are rich in amenities (Kelowna, Parksville). The map in Figure 4 describes the loss of commercial employment over the last decade -- all across the northern frontier, in the most isolated communities.
- The concentration of people and activity at the metropolitan scale is polarizing the inter-urban linkages, bringing everyone closer to Toronto and other large cities, thus reinforcing the growth of these places. At the same time, cities in Quebec and the

Atlantic region are losing ground relative to Western Canada, and specific cities are gaining vis-a-vis regional competitors (Calgary over Winnipeg; Toronto over Montreal).

- International linkages now play a greater role in Canada's urban system; and Canadians themselves are becoming more international. The national boundaries are more open so that the North American and international networks provide markets, competitors, capital investment and immigration.
- With more and more Canadians living in large metropolitan areas, the kinds of relationships that exist among communities within the city become as significant as the urban system. We have little sense of the totality of connections that shape a metropolitan neighbourhood, let alone how they are changing. (Although see Tindall and Wellman, 2001). Most of our data are partial – information on commuting or shopping behaviour – but we don't know how widely people travel around the city, how they obtain information, where their friends live, or how their lives are changing as they age. At the same time, the diversity of urban communities suggests that these patterns must be very different from one neighbourhood to the next.
- The preference for larger and more diverse communities is a logical human response to the partial removal of distance constraints. Most of us prefer to have more choice: more products (the big store), more recreation, a greater variety of mates, jobs, or houses. But not everyone benefits from the greater choice. Larger markets are more competitive in every sense. Local business finds it difficult to survive. Seniors are especially resistant to greater travel and increased scale, and they represent a growing share of the population.

Some Research Directions

Let us assume that technology continues to overcome distance constraints, more and more Canadians live in large cities, and international migrants and trade will shape urban growth. What do we need to know about the urban system?

- We need to do a better job of monitoring linkages within the urban system. In this era of bar codes and postal codes there is no excuse not to sample flows among (and within) cities on a regular basis: public transportation, mail, telephone calls, cheques, etc. Statistics Canada's focus on provinces ignores metropolitan areas that are far larger spatial units, and much more meaningful for most people.
- It would be useful to develop measures of the 'institutional completeness' of communities, in the sense of their ability to provide the full range of private and public sector services; and to monitor changes in these facilities (such as concentrations or deficiencies) over time.
- We need to explore the impact of international linkages on the urban system. We have data on immigration through the Census, but not about the variety of economic flows at the sub-provincial level: international firms, exports, imports, etc. As these linkages play a larger role in urban growth, how does the urban system respond? What kinds of certainly or uncertainly are imported? Or does it matter for large complex metropolitan regions?

- What role do immigrants to Canada play in the globalization process? What kinds of links do they maintain with the country of origin? Do they eventually develop the same domestic linkages as native-born Canadians?
- It is clear that in future fewer and fewer Canadian cities will continue to grow. We must explore the implications of non-growth such as incomes, facilities and services. Are there threshold size levels for viability? And how do these thresholds vary with distance from the growth centres?
- Since the majority of Canadians now live in large metropolitan centres, we must develop more useful definitions of communities within the city, based on common social characteristics as well as propinquity and access to services. We can combine the fine-grained database from the Census, the geodemographics expertise of market researchers, and geographic information system technology to introduce policy-makers to the number and diversity of urban neighbourhoods across the country.
- Given well-defined metropolitan communities we should monitor their linkage patterns in systematic fashion, including shopping trips, commuting patterns, social contacts, information sources, etc. For example, is location within the city more significant than age or ethnicity? How does transportation or other infrastructure investment modify these patterns?
- At this point we could ask specific questions: does rapid urban growth disrupt the linkages among metropolitan communities in predictable ways? What neighbourhoods and activities are affected?
- How does the aging of households modify urban linkages at both the inter-urban and intra-urban scale? Seniors are, after all, the most rapidly growing demographic group; but in many ways they resist the lure of greater mobility and more choice, and favour the known and the local.

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TABLE 1

THE CANADIAN URBAN SYSTEM, 2001

<u>Number of Cities</u> Size/Region	BC	Prairies	Ontario	Quebec	Atlantic	Canada	Share of Canada Total
Over 1 m.	1	0	2	1	0	4	
300-1,000k.	1	3	5	1	1	11	
100-300k.	2	2	8	3	4	19	
30-100k.	9	8	15	13	4	49	
10-30k.	14	11	11	12	9	57	
Total	27	24	41	30	18	140	
<u>Urban Population</u> (in 000s)							
Over 1 m.	1987	0	5489*	3684	0	11160	37.2%
300-1,000k.	312	2561	2194	683	359	6109	20.4
100-300k.	295	419	1197	446	523	2879	9.6
30-100k.	540	392	867	619	221	2638	8.8
10-30k.	273	184	183	244	170	1054	3.5
Total Urban	3407	3556	9929*	5676	1272	23840	79.4
Non-urban	594	1518	1481	1561	1013	6167	20.6
Region	4001	5074	11410	7237	2285	30007	100.0

Territories cities grouped with BC.

*Note that Ontario excludes the 258,000 residents of the Ottawa-Gatineau CMA who live in Gatineau. Quebec includes them.

Source: Statistics Canada, Census of Canada, 2001.

TABLE 2

THE GROWTH IN LINKAGE, 1981-2001

Linkage	1981	1986	1991	1996	2001
Air Passengers					
Domestic	41.2m	42.0	40.9	46.8	52.5*
USA	10.1m	10.9	12.5	17.1	20.8*
Int'l	3.7m	5.1	7.2	10.0	13.0*
Motor Vehicle Reg'n	10.3m	11.2	13.1	13.5	17.1**
Telephones	11.9m	13.4	15.8	18.1	26.1
Immigration Gross	128.6k	99.2	244.3	224.9	256.3
Net	78.5k	50.2	151.9	165.6	140.1
Inter-provincial Mig'n	399.5k	290.0	316.7	292.9	290.5
Net	85.0k	32.8	44.7	30.9	43.9
Natural Increase	200.3k	188.7	206.1	140.1	110.0
Imports/GDP	22.1%	23.2	21.2	29.4	33.1

* Year 2000

** Change in definition

Source: various Statistics Canada publications.

TABLE 3

THE TYPE OF LINKAGE

Category	Subcategory	Technology	Change	Spatial Impacts
Information		Media Internet	Rapid growth	International sources Metropolitan sources
Contacts		Mail, Phone Internet Airlines	Reduced Costs Deregulation	More calls, trips, Longer distances
Economic	Consumption Production Migration	Stores, transport Transport	Bigger stores Trade agreements Higher quotas	Concentration International sources More immigrants
Public Sector	Choices Services	Amalgamation, Centralization, Coordination	Larger delivery units More transfers Infrastructure agencies	Less variation Larger spatial systems

TABLE 4

POPULATION GROWTH WITHIN THE CANADIAN URBAN SYSTEM, 1996-2001

Urban Population Growth (1000s)

Size/Region	BC	Prairies	Ontario	Quebec	Atlantic	Canada	Share
Over 1 m.	155	0	473*	111	0	739	63.7%
300-1,000k.	8	209	111	11	16	355	30.6
100-300k.	22	6	56	-4	-9	72	6.2
30-100k.	8	28	-5	-3	2	33	2.8
10-30k.	-5	4	-2	-3	-7	-15	-1.3
Total Urban	188	247	633*	112	3	1185	102.2
Non-urban	-8	26	23	-14	-52	-25	-2.2
Total Region	180	273	656	98	-49	1160	100.0

Growth Rates

Size/Region	BC	Prairies	Ontario	Quebec	Atlantic	Canada
Over 1 m.	8.5	0	9.2*	3.0	0	7.1
300-1,000k.	2.5	8.9	5.3	1.6	4.7	6.2
100-300k.	8.1	1.4	4.9	-0.9	-1.6	2.6
30-100k.	1.5	7.7	-0.5	-0.5	1.1	1.2
10-30k.	-1.7	2.1	-0.9	-1.2	-4.0	-1.2
Total	5.9	7.5	6.8	1.9	0.3	5.2
Non-urban	-1.3	1.7	1.5	-0.9	-4.8	-0.4
Region	4.7	6.1	6.1	1.4	-2.1	4.0

Territories cities grouped with BC.

* Ontario excludes the 11,000 population growth that occurred in Gatineau. It is credited to Quebec.

Source: Statistics Canada, Census of Canada, 2001.

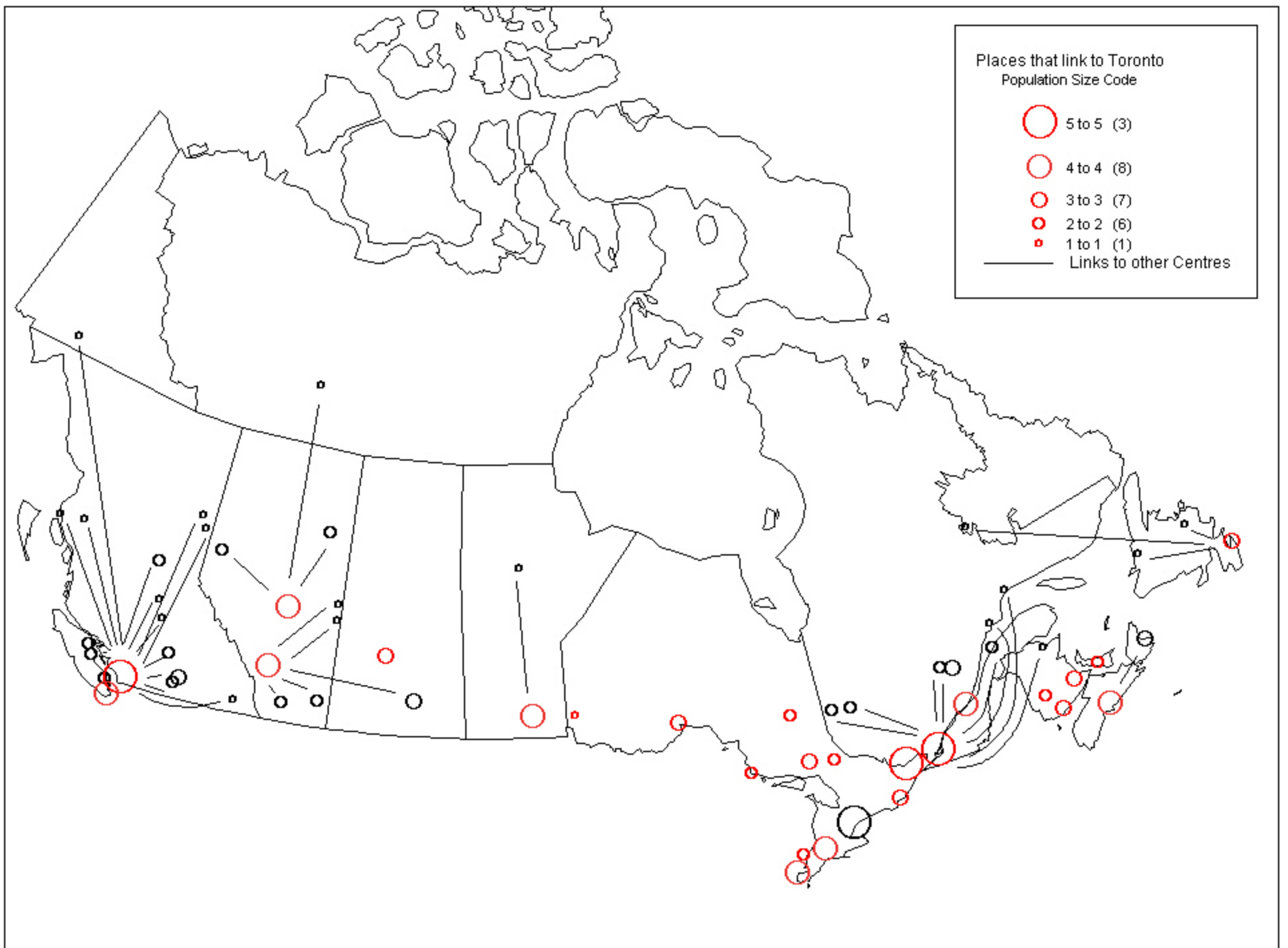


FIGURE 1 The Urban Hierarchy in 1999

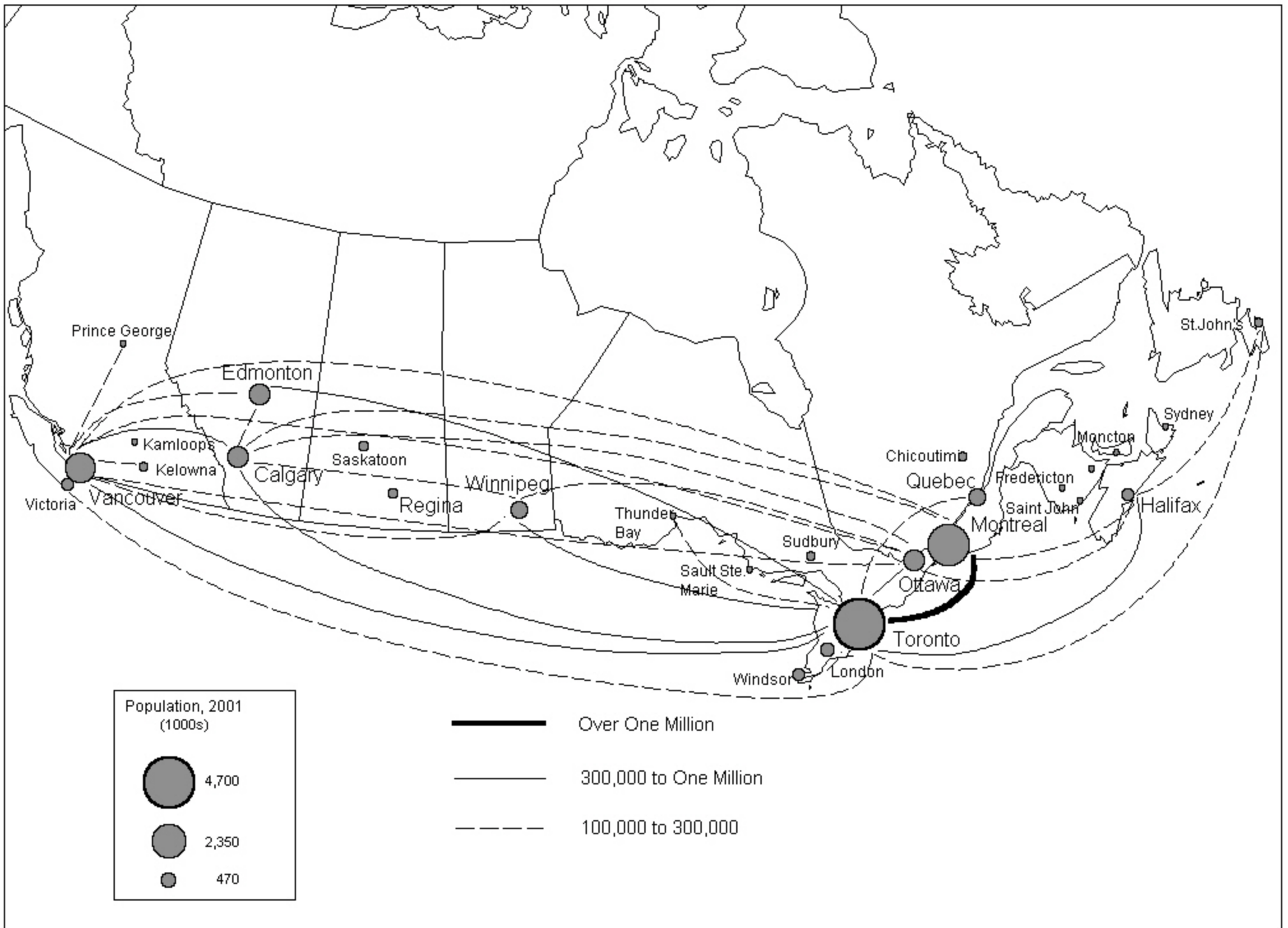


Figure 2 Air Passenger Flows, 1999. Within Canada

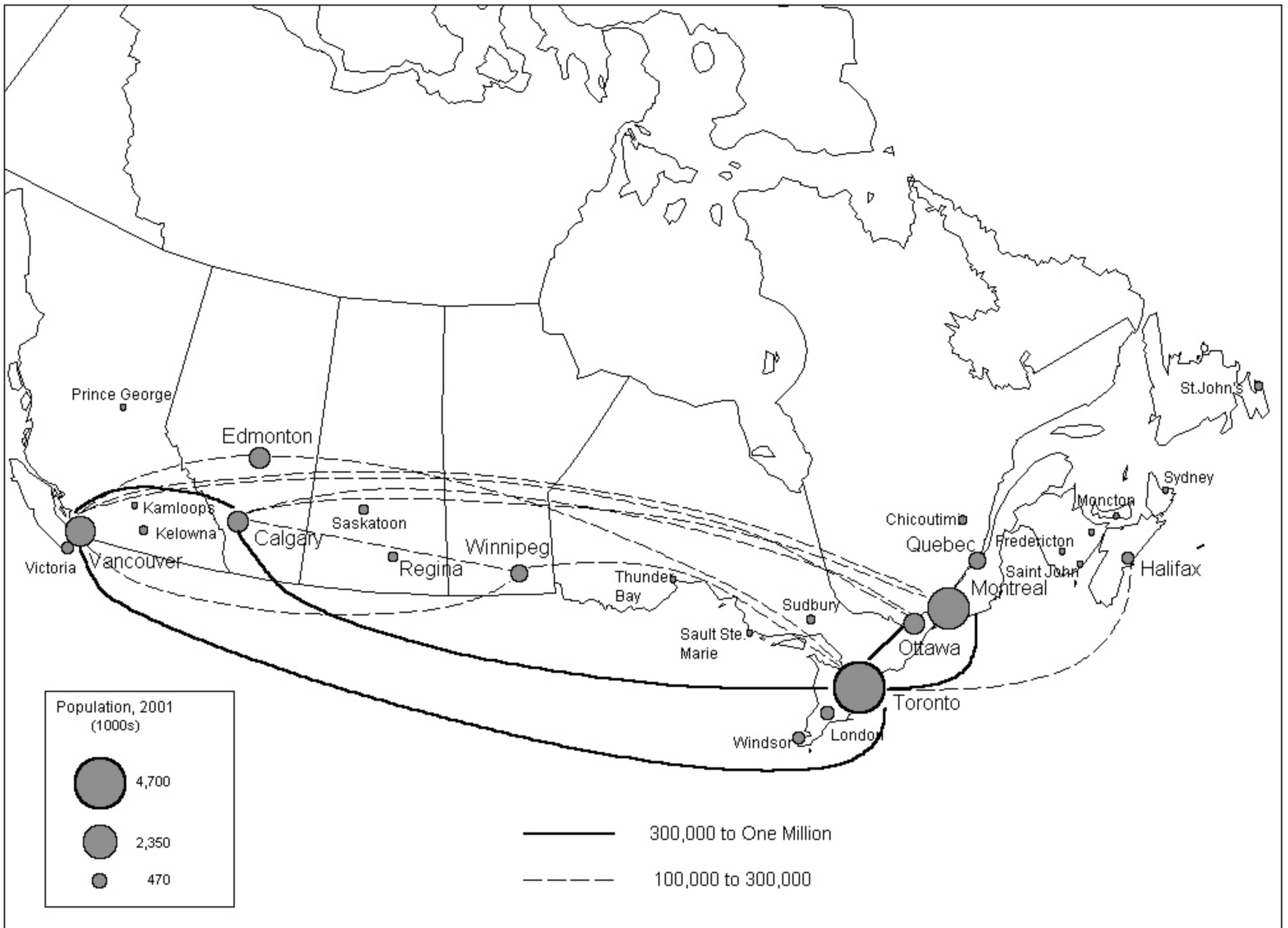


Figure 3 Changes in Air Passenger Flows, 1971-1999. Within Canada

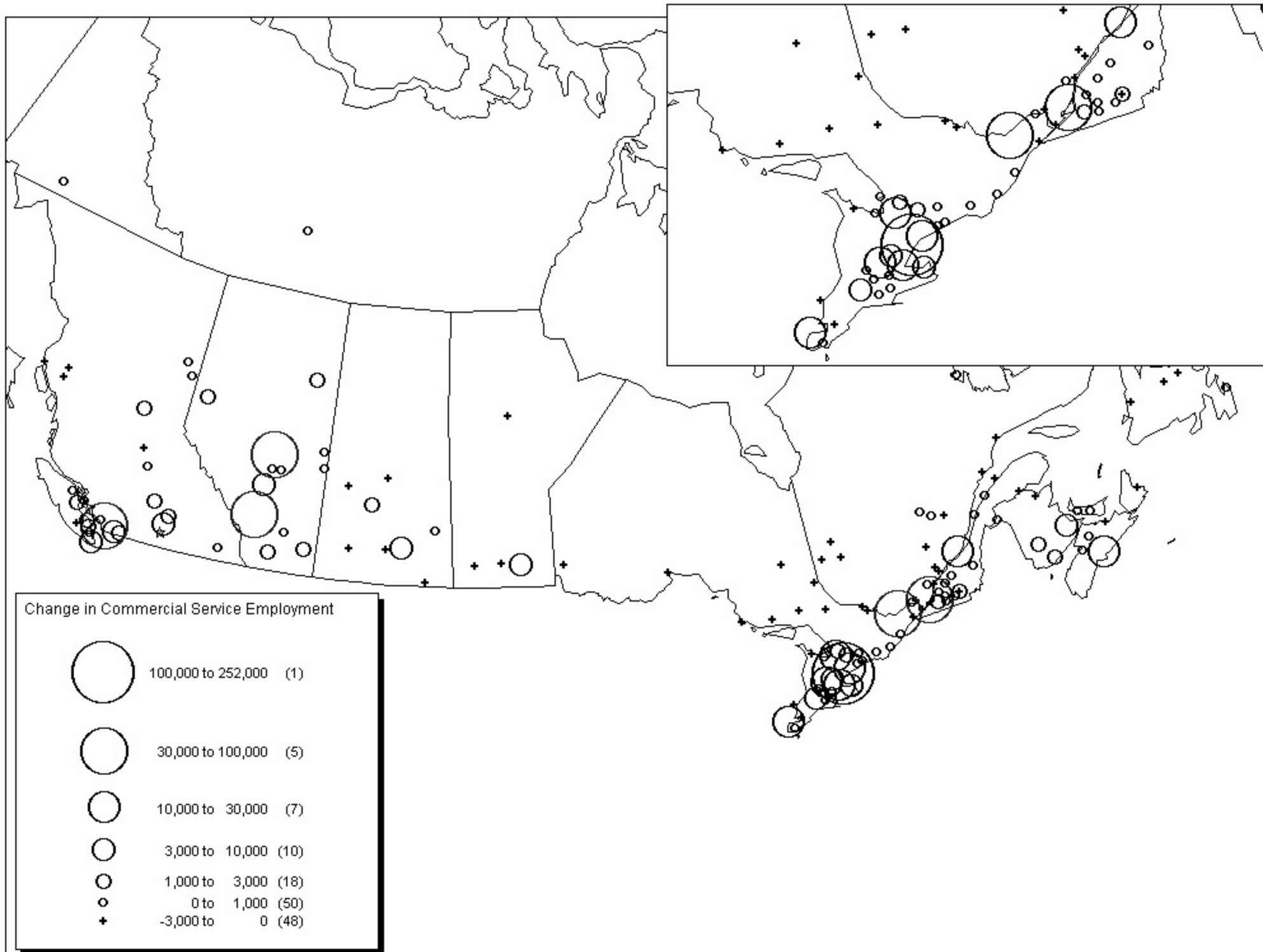


FIGURE 4 Change in Commercial Service Employment, 1991-2001