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The Changing Economy of Urban Neighbourhoods: An Exploration of Place of Work Data for the Greater Toronto Region

Jim Simmons, Larry Bourne,
and Shizue Kamikihara

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Executive Summary

This paper addresses changes in urban economic activity in the Greater Toronto Region, measured at a neighbourhood scale, and available over time at Census intervals. It is an exploration of Statistics Canada's recently released place-of-work (PoW) employment data at the census tract level, now available for all tracted CMAs and CAs in Canada, for the years 2001 and 2006. We have chosen to explore the 1,166 census tracts in the combined metropolitan areas of Oshawa, Toronto and Hamilton as defined in 2001 (to make the tracts comparable in order to evaluate the changes).

The maps show the spatial implications of the substantial sectoral shifts that have occurred during the last 30 years, as jobs in manufacturing have disappeared or relocated to the far suburbs, while jobs in financial and business services have grown rapidly in number. This latter growth has reinforced the downtown concentration, and created a new type of work environment in the outer suburbs as a mix of office towers, industrial parks, and power centres linked together by a network of freeways.

Authors

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1. Introduction

The study of the overall geography of employment within the city has not been fashionable in recent years – aside from studies of particular industries such as design offices, technology companies, movie studios, and the like. If pressed to describe the current map of a city’s employment by economic sector, most urban analysts of a certain age would fall back on fuzzy recollections of urban land use maps from their undergraduate days – the days of heavy industry and dominant downtowns. The current distribution of workplaces, the kinds of economic specialization that have evolved over the last quarter century, and the amount and types of changes in employment location that are under way, are seldom mapped or discussed. And yet the location of these activities affects the arrangement and character of residential areas and drives massive investments in transportation facilities, as well as defining the daily life spaces of urban residents.

Fortunately, the recent release of census tract place of work (PoW) employment data for 2006 by Statistics Canada now makes it possible to map both the *distribution* and the *changes in the distribution* of employment sectors for 48 of Canada’s largest cities. This paper begins the process of exploration of the data set, and thus the geography of the urban economy, by describing the data, introducing maps of current distributions and recent changes, and evaluating a variety of relationships among the employment measures and other urban phenomena. These findings, in turn, suggest the direction and potential of future changes that have substantial implications for urban policy makers.

This case study examines the combined CMAs of Toronto, Oshawa, and Hamilton and covers most of the Greater Toronto Area. These three CMAs are increasingly integrated in economic terms, and now constitute the urbanized core of the larger Toronto Region.

This exploration should be useful in a variety of ways. Above all, it emphasizes the changes that have occurred within urban economies, and their implications for the form and future of the city. Table 1 shows the sectoral distributions of employment in the two census years, 1971 and 2006, for the same urban region. By 2006, both Public Services (including health and education) and Services to Business (including wholesale and finance) sectors contributed substantially more employment than the blue-collar sectors. Retail and the consumer services are gaining ground as well, while manufacturing, and the primary sectors have lost jobs. The complete set of services, including Services to Business, Services to Consumers, and Public Services, now

contribute 70 percent of the employment in the study region – the core of Canada’s industrial heartland – and have generated 97.5 percent of the recent growth.

**Table 1: Employment by Place of Work: Toronto Region, 1971-2006
(Toronto, Hamilton, and Oshawa CMAs)**

Employment Sector	1971	2006 (%)	Change 1971–2006 (%)	Growth Rate 1971–2006	Change 2001–2006	Growth Rate 2001–2006	Dispersion* 2006
Blue Collar	564,700	695,000	130,300	23.1	–30,400	–4.2	4.34
Primary	15,100	18,500	3,400	22.5	–600	–2.5	3.76
Connections**	78,400	152,200	73,800	94.1	5,700	3.9	6.97
Construction	88,300	84,200	–4,100	–4.6	5,300	6.7	3.69
Manufacturing	382,900	440,100	57,200	14.9	–40,800	–8.5	4.23
Services to Business	291,600	954,400	662,800	227.3	66,400	7.5	4.13
Wholesale	78,400	181,600	103,200	131.6	13,000	7.7	4.67
Financial	94,100	279,200	185,100	196.7	23,600	5.3	6.97
Business Service	119,100	493,600	374,500	314.4	29,800	6.4	3.55
Public Services	245,800	567,200	321,500	130.8	72,700	14.7	2.22
Education	90,100	190,800	100,700	111.8	25,900	15.7	2.50
Health	81,500	262,700	181,200	222.3	35,200	15.5	2.61
Public Administration	74,200	113,700	39,500	53.2	11,500	11.3	4.46
Services to Consumers	291,400	678,400	390,000	133.8	40,200	8.2	1.84
Leisure	15,500	51,800	36,300	234.2	5,100	10.9	2.80
Food and Lodging	46,800	165,900	119,100	254.5	8,700	5.5	2.27
Personal Service	61,400	136,000	74,600	121.5	13,100	10.6	1.80
Retail	167,700	324,700	157,000	93.6	13,300	4.3	2.05
Total Employment	1,393,500	2,895,100	1,501,600	107.8	147,900	5.4	2.61

* Dispersion is measured by the Coefficient of Variation (Standard Deviation/Mean), measured for census tracts.

** Transportation + utilities.

Totals for 1166 census tracts in the three urban regions in 2006, an average of 2,489 jobs per tract.

Source: Statistics Canada, *Census of Canada, 1971 and 2006*, including census tract place-of-work files.

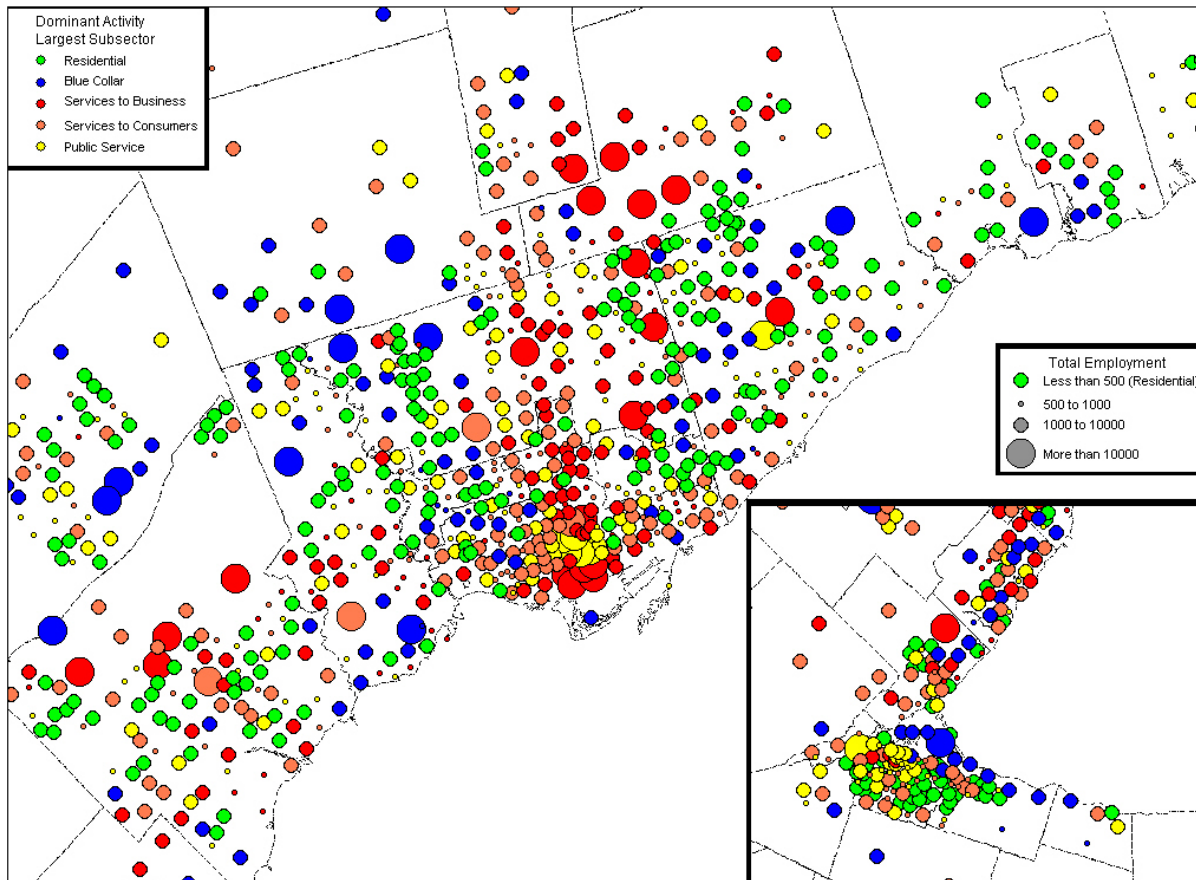
Although the spatial and sectoral definitions are slightly different for 1971 and 2006, the cumulative patterns of change are both consistent and revealing. The total employment in the Toronto region grew by 1.5 million jobs, a growth rate of 108 percent, which provides some perspective for evaluating the striking disparities in growth among the individual sectors. In 1971, manufacturing was the dominant economic activity, with 380,000 workers, equivalent to 28 percent of the employment; but by 2006, it had added only 57,000 more and represented only 15 percent of the region’s jobs. Among the other blue-collar activities, only the connections (transportation

plus utilities) sector grew substantially at 94 percent. Meanwhile, Services to Business added 663,000 jobs, thereby more than doubling in size, and Services to Consumers added almost 400,000 workers, for an increase of 133 percent. The employment structure has been transformed, and to the extent that each sector has different location requirements, the economic geography and character of the city will be changed as well.

The “Land Use” Map

Figure 1 shows the study area. The total employment in each census tract is indicated by the size of the circle. The sectoral employment specialization (more or less equivalent to land use) indicates which major employment sector supplies the largest number of jobs in the tract. The residential symbols indicate tracts that have fewer than 500 employees. The smallest circles represent 500 to 1,000 employees and the largest at least 10,000 workers. The latter are found either downtown or in distant suburban locations.

Figure 1: Land Use Map, Greater Toronto Region, 2006



Not surprisingly, the dominant activities on the map are services – Services to Business or Services to Consumers – and they contribute the largest concentrations of specialization: the financial sector downtown, the Bloor-Yonge area, and Markham, as well as business services in the tracts along the Yonge subway line, and consumer services in the retail strips of the inner city.

Blue-collar employment is surprisingly dispersed, although the traditional links with rail lines in and out of the city are still visible. Wholesaling activity has moved into the suburbs, primarily to the north and west of the City of Toronto.

The massive concentrations of blue-collar jobs around the port and along the main rail and road transportation routes have been replaced by the office towers downtown and in the new suburbs that house financial and business services and government agencies. As the service sectors become predominant, employment is more widely dispersed and more closely embedded within the residential market. The retail sector may be the most familiar example of this new spatial distribution: scattered, with a regular hierarchical size distribution: including downtown, major shopping centres, neighbourhood malls, and retail strips (see, for example, Simmons and Kamihara, 2007).

A variety of questions arise in relation to these changes. For each sector, how are the changes in employment (gains or losses) related to the initial distribution? Which activities are replacing others? Is there a regular and predictable sequence to these changes? Can changes be linked to singular events (a new factory, or hospital, or transportation link)? Or are many of the changes simply linked to recent residential development in subdivisions and condos?

The final column in Table 1 provides a basic measure of the sectoral variations in location; the degree to which the employment is geographically concentrated. The higher the value of the coefficient of variation, the greater the concentration – as is the case for blue-collar activities in general and connections in particular (e.g. transportation jobs at the airport). Services to Business tend to be moderately dispersed in selected office districts, especially in the downtown financial district. Services to Consumers are more widely dispersed, and personal services most of all. Public-sector services, such as schools and medical facilities, are widely dispersed, but government agencies less so.

These distributions and patterns of change are taking place within the context of a rapidly expanding city that serves national and international markets that in themselves are increasingly competitive. In this context, municipalities attempt to allocate land among different activities, while the provincial government shapes the transportation infrastructure and funds major employment nodes in the public sector. The overall employment distribution – especially the density and patterns of specialization – still reflects some aspects of the old economy, and the inherited social structure and lifestyles of the prewar and postwar periods. The financial industry in downtown Toronto, for instance, has both expanded in place and changed in composition. Several public-sector institutions have grown in the same way. In contrast, many of the more dispersed services follow the locations of new suburban housing.

We can evaluate and project these overall trends of change by examining the relationships among the sectors, and among the changes that have taken place, as well as associations with transportation systems and institutions. Pearson Airport, for example, has become an important employment node, as has Markham, and the intersection of Highways 400 and 407. We can also track variations with distance from downtown – as a surrogate for time of development – to evaluate the different production regimes and land use priorities of earlier years.

The paper begins with a description of the data set, and a discussion of some of the operational problems that it poses. This is followed by an examination of two distinct sets of patterns: first,

the employment distributions as recorded in 2006; and second, the set of changes recorded between 2001 and 2006. An expanding city inevitably generates patterns of change that emphasize growth at the periphery along with restructuring adjustments among different economic sectors throughout the city. The final section explores the relationships among sectors and other kinds of change within the city, in an attempt to identify causal relations.

The Census Tract Place-of-Work Data

Because the data derive from Statistics Canada's concern with employment, the questions are addressed to persons 15 years and over who are working or have worked in the last six months. These questions are administered to 20 percent of all households – the usual census sample. Data about the location of workplace initially arose from the need to classify the workplace according to industry – mine, retail, law office, etc. – and Statistics Canada has developed lists of employers, carefully classified. If you know the employer, you know the industry. But the location of the workplace provides information on commuting flows among municipalities, as well as on who commutes and the mode of commuting. Commuting is the glue that supports local labour markets, linking the employee residence to the workplace.

In earlier census years, researchers were required to purchase special tabulations for research on commuting patterns or employment distributions within the city. Beginning in 2001, however, improvements in spatial data management made it possible to deliver employment distributions broken down by 20 two-digit industrial sectors for every census tract in Canada. In 2006, this information was available for 48 urban areas and 5,076 tracts.

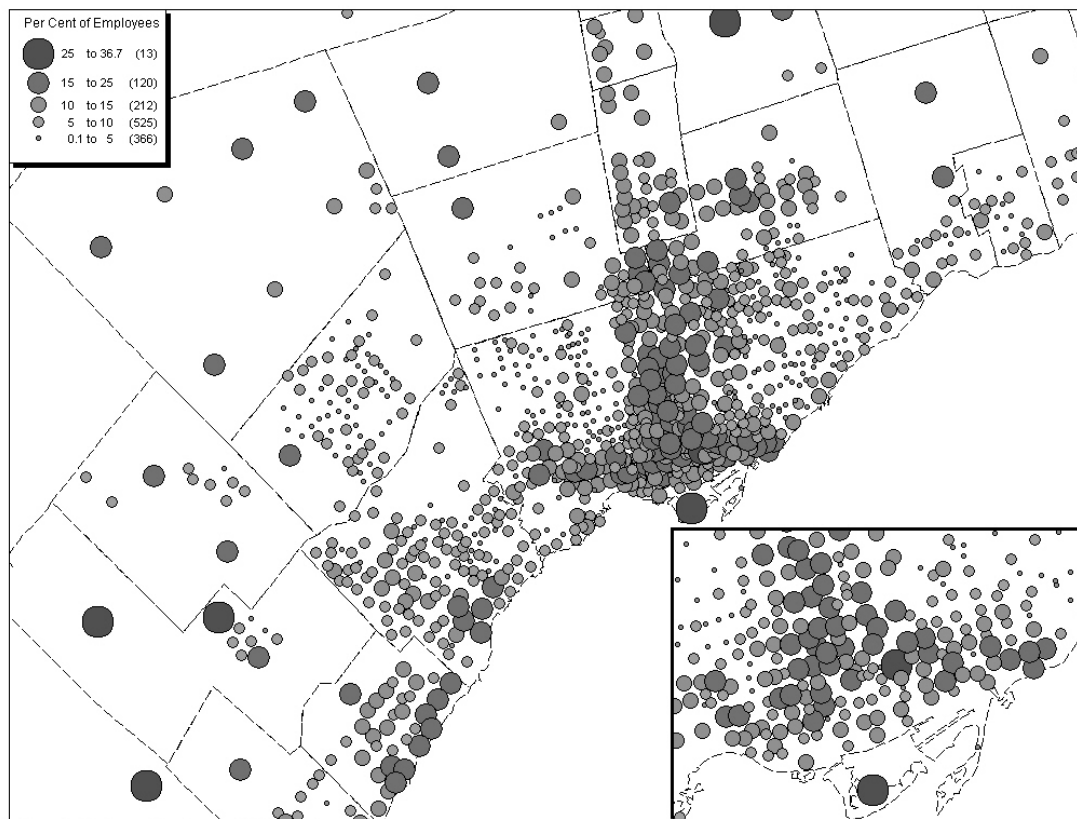
The census tract is a spatial unit used for the description of residential neighbourhoods, with an average population of about 4,400. The boundary adjustment of tracts often lags behind patterns of recent development in new suburban areas. Within the Toronto Region, for instance, tracts vary in size from 50 to 22,725 population in 2006.

The main elements of the Place of Work (PoW) data for the Toronto region are identified in Table 1, and cover 2.9 million workers in 20 different industrial sectors. The sectors have been re-grouped for analysis into Blue Collar, Services to Business, Services to Consumers, and Public Services. Statistics Canada generates the sample, administers the questionnaire, and estimates the probability of error; and the industrial sectors are defined precisely and consistently over time, so we have a consistent measure of each sector of economic activity across time and space: i.e., the number of persons employed.

We have equally precise estimates of total employment, as an important aspect of local demand for services to consumers. With more than 1,100 tracts in the Toronto Region, the level of spatial detail is quite high; far more precise than the data for 28 municipalities, or the 212 Forward Sortation Areas (FSAs) defined by Canada Post that make up the region. The census tracts are the same ones that are used to provide detailed demographic data within the city, if we wish to analyze labour or consumer markets; and they are readily linked from one census to the next, so that we can track changes over time. As well, the employment data can be related to data from other sources, such as the number of stores and floor area generated for commercial polygons by the Centre for the Study of Commercial Activity (CSCA), or trip data from transportation surveys.

The PoW is defined only for workers who are actually employed, and only if they have a regular place of work within a classifiable economic sector. One interesting aspect of the current data on PoW is the growing proportion of individuals who work at home. They are included in the PoW analysis, and are also identified separately as part of the population census. Figure 2 maps the distribution as a proportion of the employed workers who reside in the tract. The range in values is surprisingly wide, from negligible to a maximum of 36 percent of workers; and the spatial patterns suggest a variety of lifestyles. The higher values are mostly found in peripheral rural areas, and include farmers; but Toronto Island represents a special urban way of life. For the most part, people who work at home are professionals, with moderate to high incomes as indicated by their locations, coupled with a strong preference for public transit, especially the subway and streetcar lines. Outside the City of Toronto, they locate along the lakeshore to the West, and in Markham to the North. Farmers aside, most belong to Richard Florida's (2002) "creative class."

Figure 2: Percent of employment working at home, 2006



Adjustments to the Data Set

While the census data from Statistics Canada have an admirable record of consistency and stability in their definitions, surveys, and compilations, they were designed for purposes that do not always accommodate the employment PoW data. The data adjustment problems can be categorized as temporal, spatial, and sectoral.

In the first instance, since the census is primarily concerned with a description of the population distribution at one point in time – the census year – the spatial units are regularly adjusted. Statistics Canada accommodates rapidly growing areas by splitting an original tract, occasionally deletes tracts that have lost most of their population, or changes tract boundaries to reflect real-world changes in political boundaries or street layout. A list of these adjustments is published for the nationwide set of tracts (Statistics Canada 2007). In this report, the 2006 tracts have been adjusted back to the 2001 boundaries in order to calculate employment changes.

The other temporal changes occur in the sectoral definitions that are part of the NAICS description of industrial sectors that emerged from the NAFTA agreement. Adjustments to this classification take place during each census interval. During the recent period, the changes were minor and largely confined to the information sector, so that they do not affect the changes measured at the simple two-digit scale used here. At the same time, the sectoral variation as currently released is insufficient for many kinds of analysis and could usefully be expanded to at least three digits in the future.

The spatial problems with the PoW data derive from the difference in focus of the population census (which groups households into neighbourhoods) and the employment data (which identify clusters of employment typically found outside neighbourhoods). To provide meaningful demographic boundaries for neighbourhoods, census tracts are bounded by the major arterial streets that themselves tend to attract commercial investment. Thus economic clusters are often found along the margins of census tracts, instead of within the residential core. Danforth Avenue in Toronto, for instance, separates census tracts to the north and south sides of the street, but it also attracts retail and service outlets that serve residents on both sides. Combining the two tracts is often a messy solution. As well, the downtowns of large urban areas such as Toronto and Hamilton usually occupy several census tracts that must be carefully aggregated. Retail power nodes also form around major highway intersections where four suburban tracts meet. For the most part, these questions of aggregation for analysis will not be addressed here. One possible solution is to integrate all the tracts within a larger spatial unit, such as a postal-code FSA or a municipality – the aggregation smoothes the tract-to-tract variation.

Because this paper is concerned with the full spectrum of economic sectors for which data are available, it is necessary to group activities into aggregates that have some meaning. The NAICS classification provides a broad grouping into production activities and services, but Table 1 regroups the services – as the largest group – into three other categories: Services to Business, Services to Consumers, and Public-Sector Services.

“Blue-Collar” activities include the primary sectors (which are very small), the very large manufacturing sector, plus the intermediate sectors of construction and “connections” (combining transportation and utilities). Altogether, these activities employ almost 700,000 workers in the region, but the numbers continue to decline. In contrast, the “Services to Business” group continues to grow rapidly, and added 65,000 jobs over the last five years. With over 950,000 employees, this is now the largest of the four sectoral groups and includes wholesale, financial services (with real estate), professional services, administration and management, plus information services. “Services to Consumers” have not yet overtaken the Blue-Collar group, but are growing more rapidly, at 8.2 percent over five years. Retail and consumer services (recreation, food and accommodation, and personal services) are activities oriented to residential areas, and tend

to locate in retail strips or strip malls. “Public-Sector Services” – education, health care, and government offices – present a more complex pattern. Some are local, such as post offices, elementary schools, and medical centres, and some are regional, such as clusters of activities around hospitals and universities. This sector is expanding rapidly in the Toronto region, adding 70,000 workers, equivalent to almost 15 percent of the workforce in 2001 or almost half of the new jobs within the region.

2. Employment: The Patterns in 2006

Perhaps the best way to introduce the employment data for 2006 is through a series of maps to display the rich spatial detail, and to explore the complex associations available within the file. We begin with Figure 3, which maps the overall distribution of employment within the Toronto region.

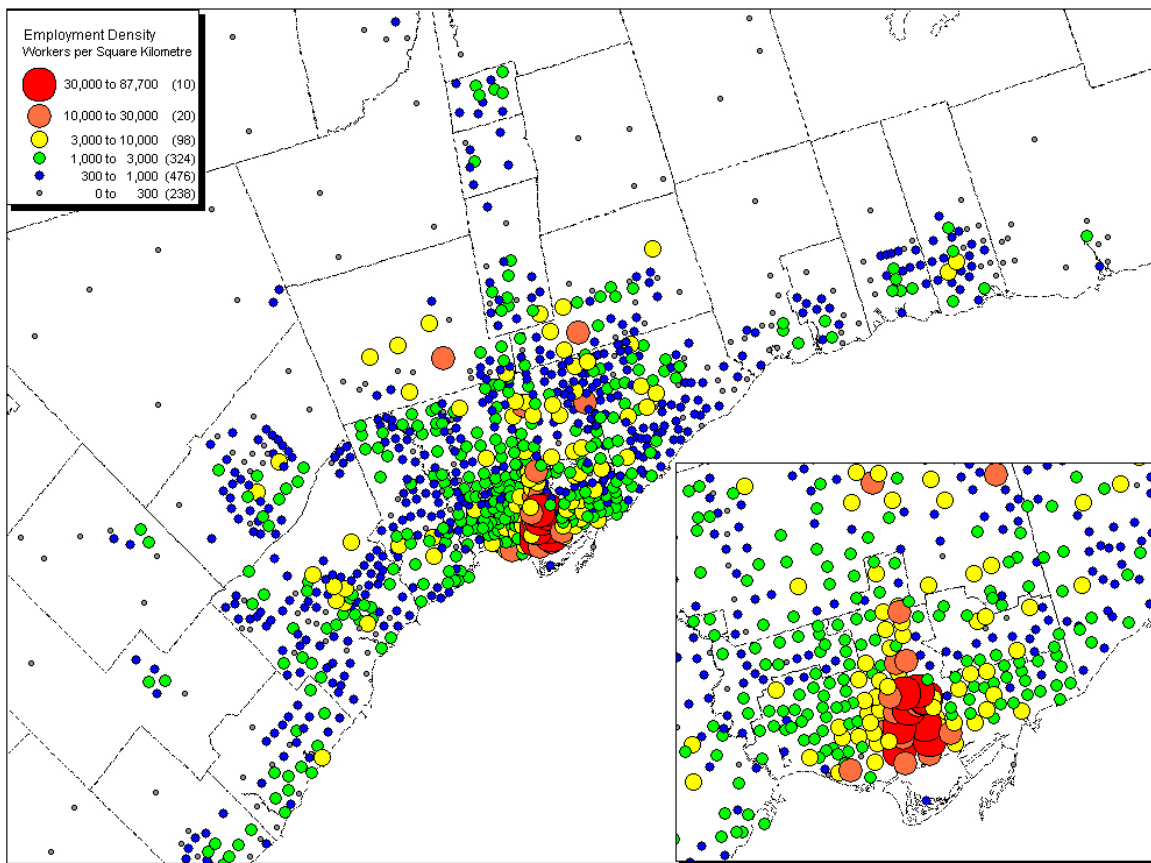
Figure 3: Employment Distribution, Toronto Region, 2006



Note the well-defined boundary of the developed urban area. Tight land-use zoning maintains Toronto's relatively high land costs and reduces the cost of servicing. There is a continuing concentration of jobs downtown and in the older urban core within the City of Toronto, as well as nodes of recent retail and office developments in Mississauga, Markham, and other suburban municipalities. The massive employment node within the apparently empty zone in the northern part of Mississauga is the Airport district, with more than 100,000 jobs. Other major nodes are the locations of the regional shopping malls: Square One, Yorkdale, Markville, Bramalea, Scarborough, Vaughan Mills, the Promenade, etc. Residential areas also include small numbers of retail and service workers, as well as those working at home.

A different perspective is provided in Figure 4, which maps employment density (jobs per km²) and distinguishes the sequence of urban development and the trajectories of economic change over time. The downtown area, the first to be settled and subsequently redeveloped repeatedly, now filled with high-rise office buildings and shops, has 10,000 to 100,000 workers per km². The surrounding tracts of the prewar city have 3,000 to 10,000 workers per km². North of Lawrence Avenue, however, employment concentrations are few and far between – at Yonge and Sheppard, and in Markham and Vaughan. The prevailing employment densities lie in the range of 300 to 3,000 workers per km², as local job concentrations are modified by the greater land area of census tracts in suburban zones.

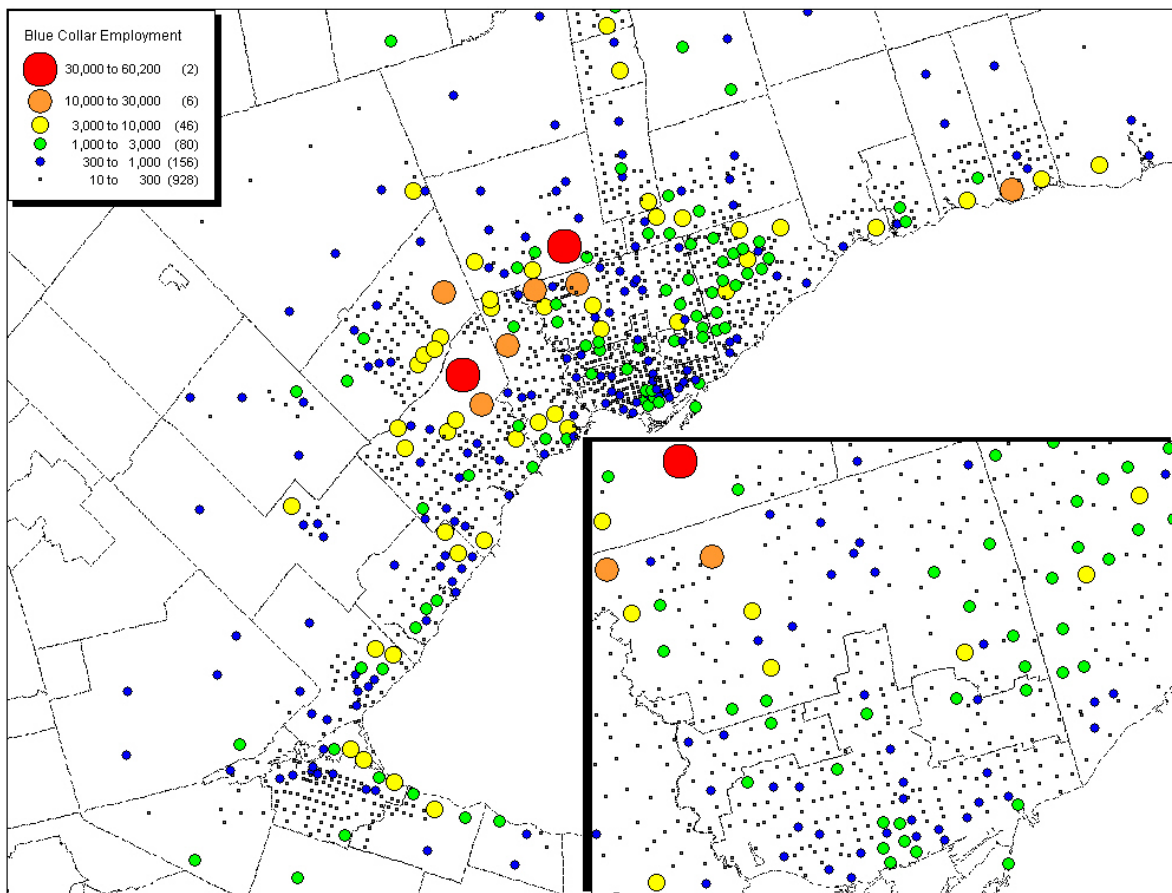
Figure 4: Employment Density, Toronto Region, 2006



The Economic Base

The exploration of the employment distribution continues with a map of Blue-Collar employment (Figure 5), including the primary sector (18,500 jobs), manufacturing, construction, and transportation and utilities. Traditionally, these were the “basic” jobs that supported the urban economy because they served national or international markets. But the primary sector has largely disappeared, except for a few head offices, while construction and connecting activities now serve the expanding Toronto Region. Only manufacturing continues to perform the basic employment role, and it is losing market share to Asian competitors. (Note that many of the employment nodes in the Blue-Collar map are not really blue-collar activities. They simply indicate the location of head offices or research groups that control blue-collar operations elsewhere.)

Figure 5: Blue-Collar Employment, Toronto Region, 2006

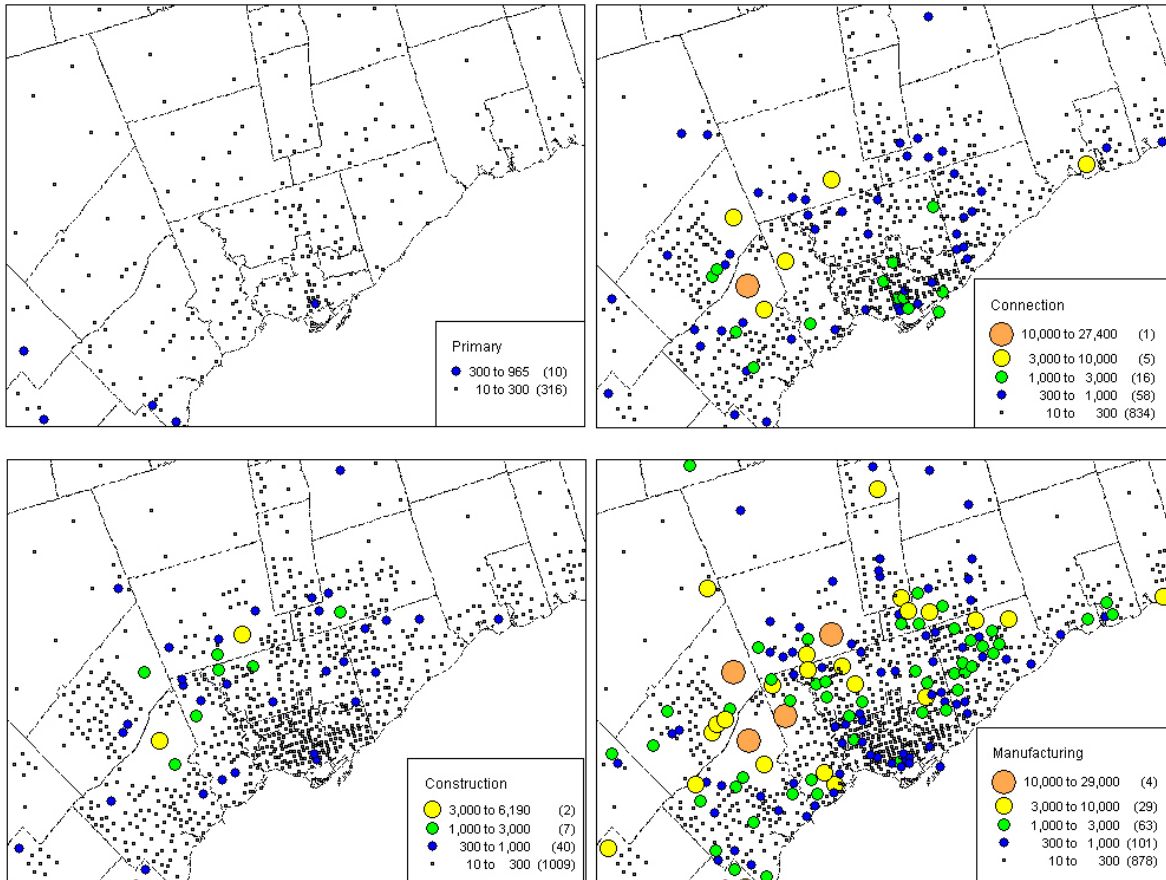


It is clear from Figure 5 that the Blue-Collar sectors have largely moved away from the city centre with its port and rail connections. The largest nodes are now in Vaughan and in Mississauga near the airport. The largest concentration of jobs is in the northwest corner of the city, between and around these two nodes. There is also a node in Oshawa at the General Motors plant, but industrial employment in Hamilton (the “Steel City”) now trails that in Brampton.

Figure 6 emphasizes the importance of the manufacturing sector within the Blue-Collar group, and the lingering role of the railroad corridors that feed into downtown Toronto from the northwest and the northeast. The lakeshore neighbourhoods in southern Etobicoke also retain some

manufacturing activity; most of the newer manufacturing employment now lies in the suburbs outside the city's boundary, and especially to the northwest. Transportation and utilities activities now focus on the Airport, with more than 25,000 jobs.

Figure 6: Blue-Collar Employment Specialization, Toronto Region, 2006



Services to Business

The real economic base of the Toronto Region these days is probably the variety of Services to Business that are mapped in Figures 7 and 8. In this category Toronto’s downtown continues to play a key role, with more than 225,000 jobs in wholesale, finance, and business services (almost one quarter of the regional total). The other significant locations are the high-rise nodes around the subway stations on Yonge St. (“replications of downtown”), especially North York, and the office concentrations in Don Mills and Markham, as well as around the Airport and at Meadowvale in Mississauga. In contrast, neither Hamilton nor Oshawa has significant downtown concentrations of these activities. Business services are widely dispersed in retail strips and strip malls and modest office buildings across the urban area.

Figure 7: Services to Business Employment, Toronto Region, 2006

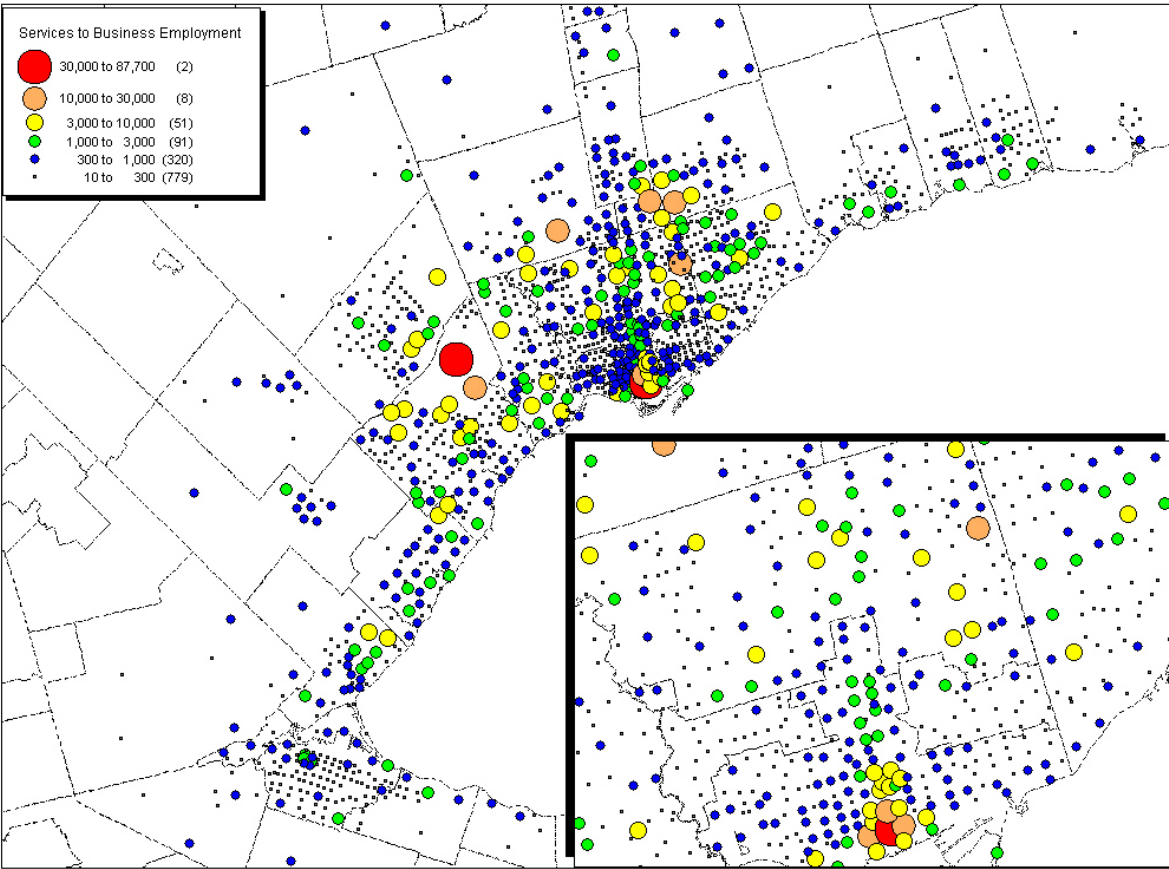
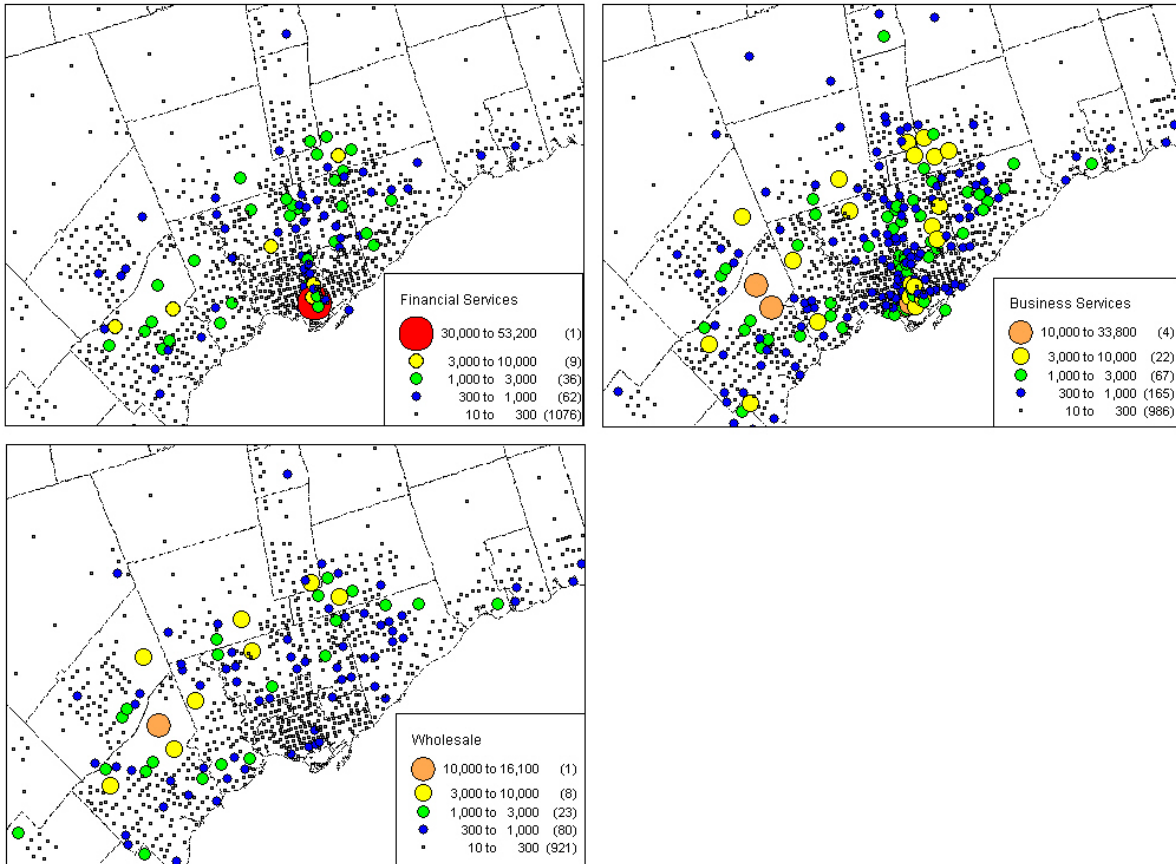


Figure 8 maps the distribution of the individual sectors in the group. Financial services are by far the most concentrated, with more than 100,000 downtown employees, and the remainder distributed within upper-income sectors in the rest of the urbanized area. Wholesale activities are the most dispersed, with 70 percent of the jobs located outside the City of Toronto. The Airport has also become an important focus. Expressway access has become the major location factor for these jobs. Business service jobs are found through the built-up area, with the most intense concentrations in and around middle-class residential areas, notably North Toronto.

Figure 8: Services to Business, Employment Specialization, Toronto Region, 2006

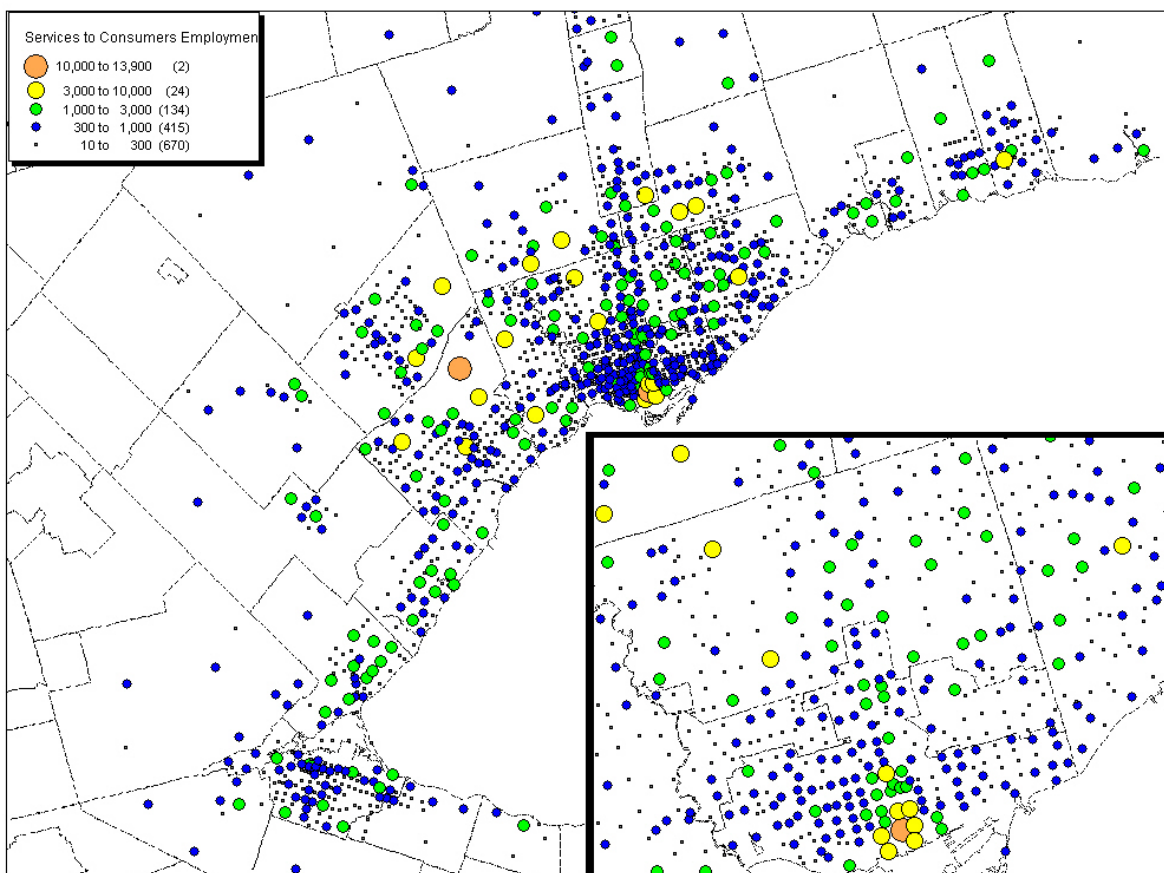


Services to Consumers

Retail, household, and personal services are the most widely dispersed economic activities in the region, with coefficients of variation (standard deviation/mean) ranging from 1.8 to 2.8 (see Table 1). As Figure 9 indicates, these activities penetrate every neighbourhood; for example, in the form of convenience stores and beauty salons.

Prior to 1950 these activities identified the natural crossroads of the city: those places where pedestrians congregated and streetcars deposited customers. Since then, however, the locations of retail and consumer services (or “commercial activity”) have been largely determined by the shopping centre developers, who have designed and constructed a complex hierarchy of facilities ranging from strip malls to community-scale malls (with supermarkets) and regional shopping centres (with department stores and fashion outlets). These developers have enjoyed the support of land use planners who sought an orderly development of commercial activity, sometimes at the expense of competition.

Figure 9: Services to Consumers Employment, Toronto Region, 2006

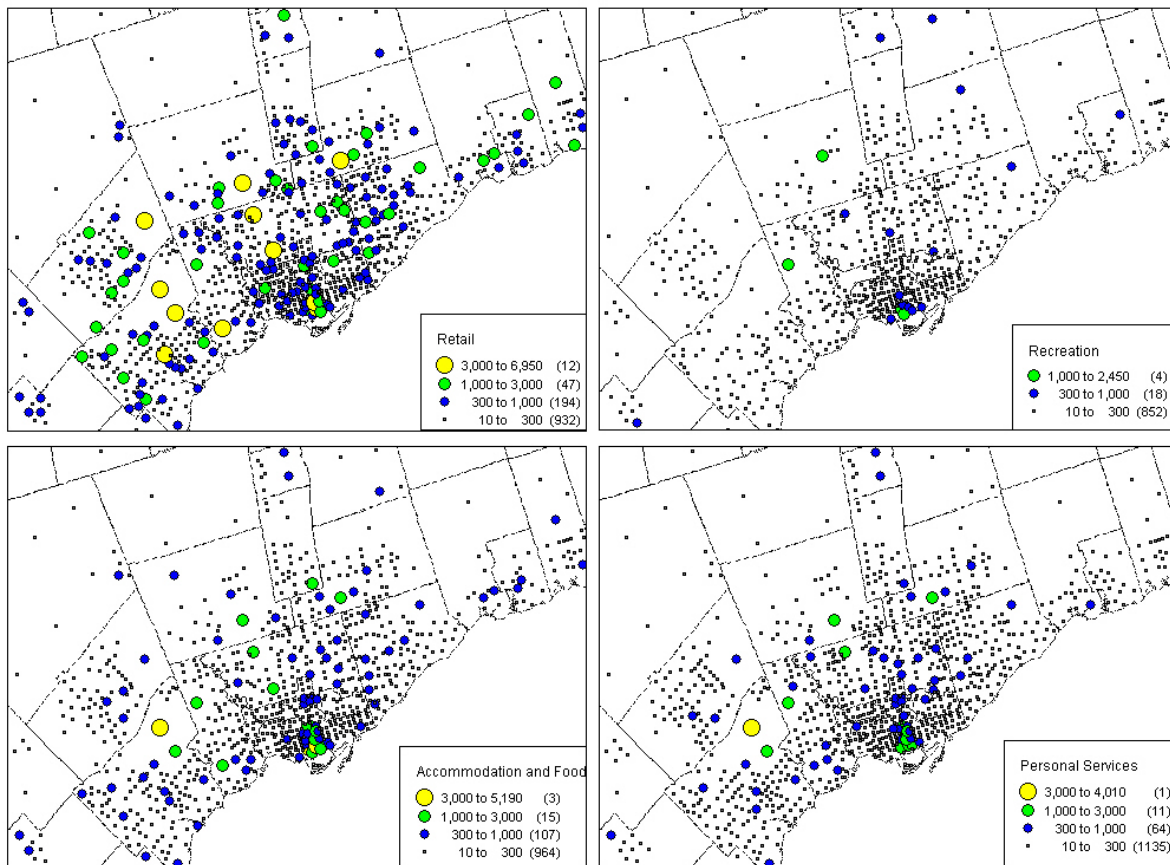


The result is the pattern shown in Figure 9, in which only two tracts exceed 10,000 jobs (Downtown and the Airport), but another 24 locations – 18 of them outside downtown – have at least 3,000 jobs and serve as regional centres. For the most part, these nodes are well-known shopping centres: Yorkdale, Scarborough Town Centre, Sherway Gardens, and the like. The only

node outside the higher density area around the City of Toronto, however, is Oshawa Centre: there is nothing west of Oakville, not even in Hamilton.

Figure 10 disaggregates the component economic sectors. Retail dominates these activities, and generates most of the patterns discussed above. Recreation facilities and employment, aside from the Rogers Centre and the Air Canada Centre, are widely dispersed; and the food and lodging industry is heavily oriented to downtown, as are personal services. Clearly, employment, especially the high-income jobs, provides a major market for services to consumers in its own right.

Figure 10: Services to Consumers, Employment Specialization, Toronto Region, 2006



Public Services

Public Services (Figure 11) are perhaps the most widely dispersed activities of all, with large numbers of small facilities, located in both high- and low-income neighbourhoods. At the same time, there are a number of larger employment nodes, widely scattered, with quite different locations from the commercial concentrations. In the inner city, for instance, public-sector activities locate north of downtown around Queen's Park, at the University of Toronto, and in the hospitals along University Avenue. In North Toronto a cluster occurs to the east of Yonge Street at Glendon College (part of York University) and Sunnybrook Hospital. And in Mississauga, the University of Toronto campus is the attraction, rather than the Airport.

Of the three component sectors (Figure 12), education is the most dispersed, health is the largest, with a significant downtown aggregation in the hospital complex, while public administration is both concentrated around the provincial legislature, and systematically dispersed around the urban perimeter.

Figure 11: Public Services Employment, Toronto Region, 2006

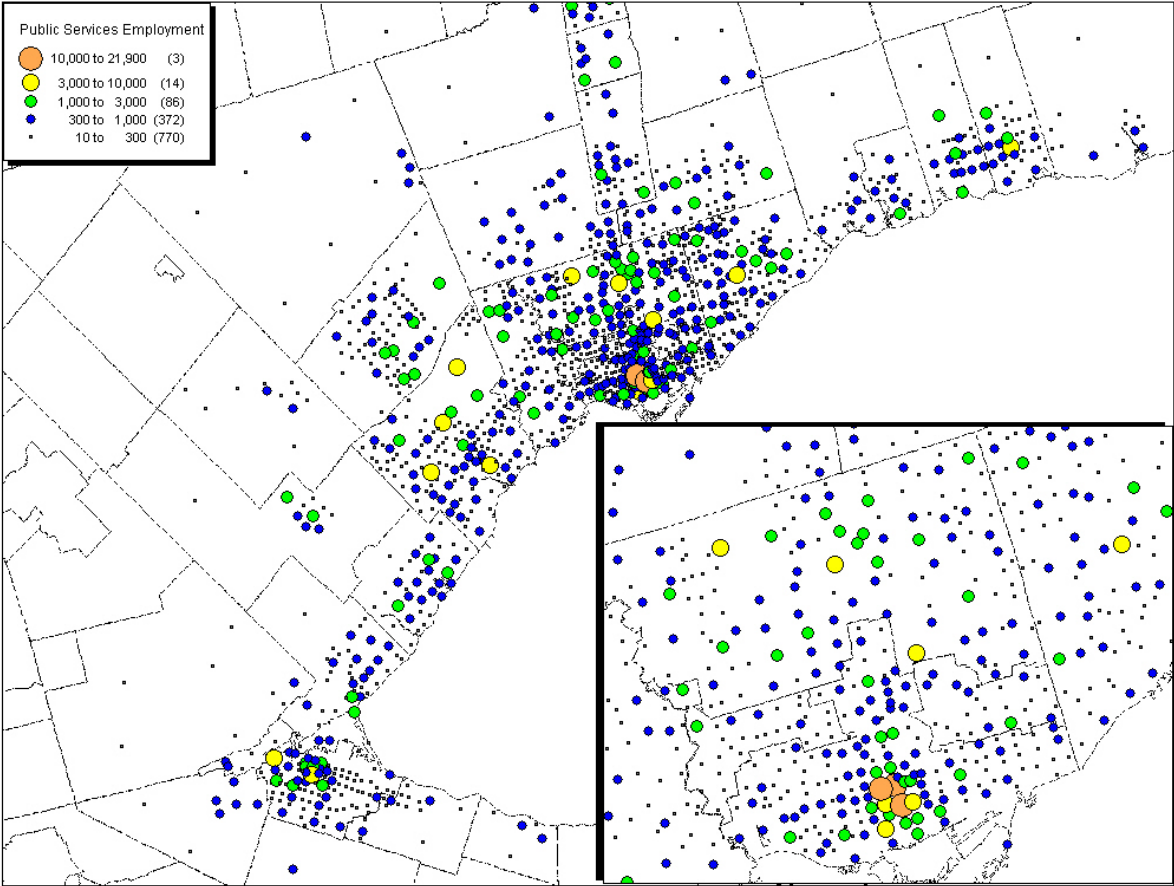
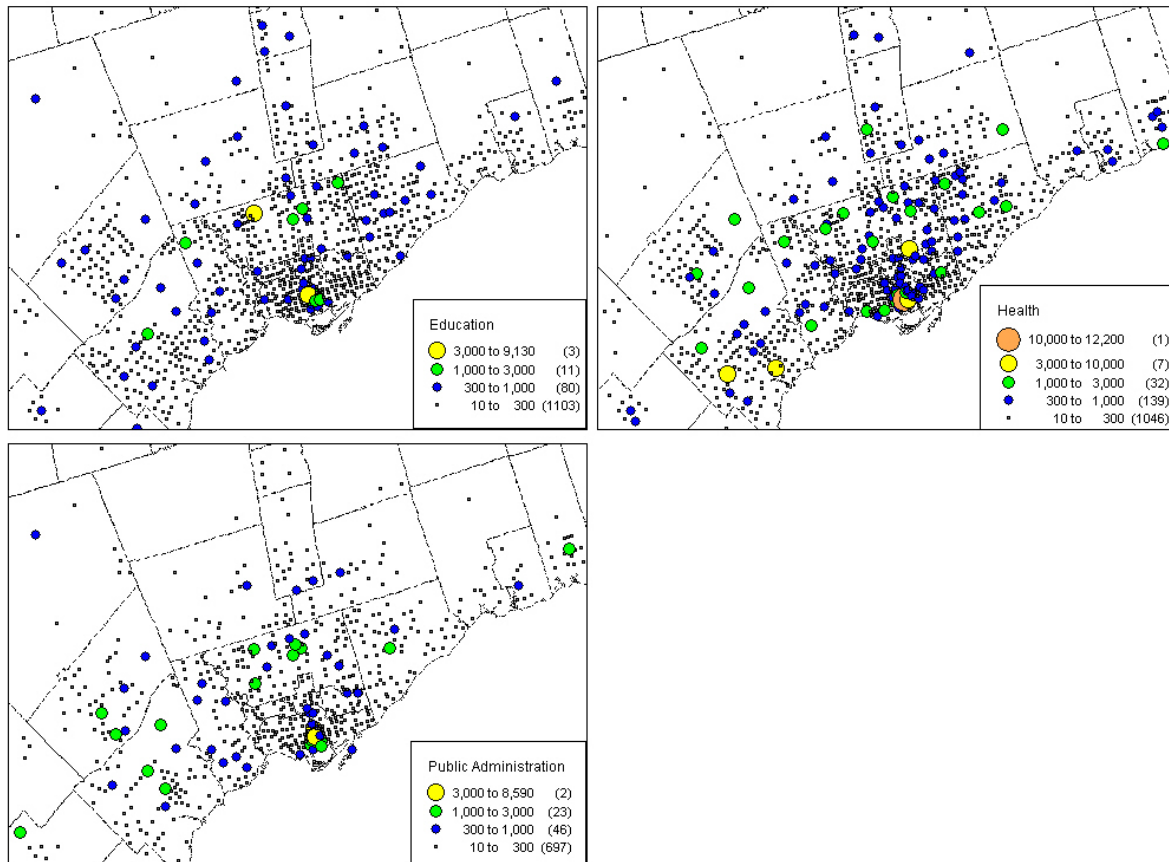


Figure 12: Public Services Employment Specialization, Toronto Region, 2006

As discussed above, the current distribution of employment (and thus urban land use) contradicts our expectations because of the massive shift from blue-collar locations towards a variety of services – the new economy? – whose location requirements are not always obvious. Some of them, such as financial activities, simply accumulate in one place, while others (professional services) seek out amenity locations and higher-income neighbourhoods, and still others (commercial services) have locations designated by developers who seek some combination of accessibility and spatial monopoly. The discussion now shifts to the patterns of short-term changes – the most recent location choices – by agents in the various economic sectors.

3. Changes in Employment: 2001 - 2006

The most valuable contribution of the PoW employment data may be the ability to track the changing geography of employment over time. Which locations are gaining or losing jobs? Where are factories giving way to business services? The census tract PoW data provide an accessible and reliable indicator of economic change within the city. Between 2001 and 2006, the Toronto Region grew substantially, its population increasing by 8.8 percent, from 5.6 million to 6.1 million. Equally relevant for this discussion was the growth in the income of the population at 13.1 percent, from \$166 billion to \$188 billion.

Table 2 indicates that the result was the substantial expansion of almost all sectors of commercial activity, so that total employment increased by 147,900, equivalent to 5.4 percent of the jobs in 2001. At the same time, the availability of data on changes in employment reminds us that urbanization is a process of continuous replacement in which outdated facilities or those that the market has deemed to be no longer viable are removed or relocated, and new ones are constructed. Jobs are created and jobs are lost.

Overall, the Blue-Collar sectors lost some 30,000 workers (-4.2 percent), while services gained almost 180,000 jobs. This transition will dominate the maps in this section. Public Services led the way with 72,000 (14.7 percent) new jobs, followed closely by Services to Business with 66,000 (7.5 percent) and Services to Consumers at 40,200 (8.2 percent). Table 2 includes two additional measures of the spatial distribution of growth. The measure of stability is the correlation between the change (growth) and the initial spatial distribution. High negative values are to be expected, since the loss of jobs occurs where the jobs are located. High positive values, as shown in the public sector, occur when the expansion of this sector takes place in or near the pre-existing facilities, for example, a hospital or university or government department expands nearby. Lower values indicate that growth is found elsewhere, probably in the newly developed areas around the suburban periphery. The second indicator represents the dispersion of the employment change, corresponding to the dispersion of the initial spatial distribution as shown in Table 1. It is measured by the ratio of the standard deviation to the mean value, so values are low when the growth is widely dispersed (e.g., services to consumers) and high when they are spatially concentrated (e.g. the connections sector). Public-sector growth is widely distributed; services to business and services to consumers less so.

Table 2: The Variety of Growth, by Sector, 2001-2006, Toronto, Hamilton, and Oshawa CMAs

Employment Sector	2006	Change 2001-2006	Growth Rate, 2001-2006 (%)	Stability* 2001-2006	Dispersion** 2001-2006
Blue Collar	695,000	-30,400	-4.2	-0.006	-14.3
Primary	18,500	-600	-2.5	-0.655	-117.3
Connections***	152,200	5,700	3.9	-0.021	31.5
Construction	84,200	5,300	6.7	0.530	17.0
Manufacturing	440,100	-40,800	-8.5	-0.237	-7.6
Services to Business	954,400	65,400	7.4	0.180	8.0
Wholesale	181,600	13,000	7.7	0.230	11.2
Financial	279,200	23,600	5.3	0.280	7.3
Business Service	493,600	29,800	6.4	-0.044	11.8
Public Service	567,200	72,700	14.7	0.560	3.6
Education	190,800	25,900	15.7	0.520	5.2
Health	262,700	35,200	15.5	0.376	4.7
Public Admin.	113,700	11,500	11.3	0.411	10.1
Services to Consumers	678,400	40,200	5.9	0.120	8.0
Leisure	51,800	5,100	10.9	-0.053	10.0
Food and Lodging	165,900	8,700	5.5	-0.007	13.3
Personal Service	136,000	13,100	10.6	0.236	7.4
Retail	324,700	13,300	4.3	0.086	15.7
Total Employment	2,895,100	147,900	5.4	0.393	5.8

* Stability is the correlation between the change in jobs over the study period, and the employment in 2001.

** Dispersion of the *change* in number of jobs, as measured by the Coefficient of Variation (Standard Deviation/Mean).

*** Transportation + Utilities.

Totals for 1,166 census tracts in the three urban regions in 2006, an average of 2,489 jobs per tract.

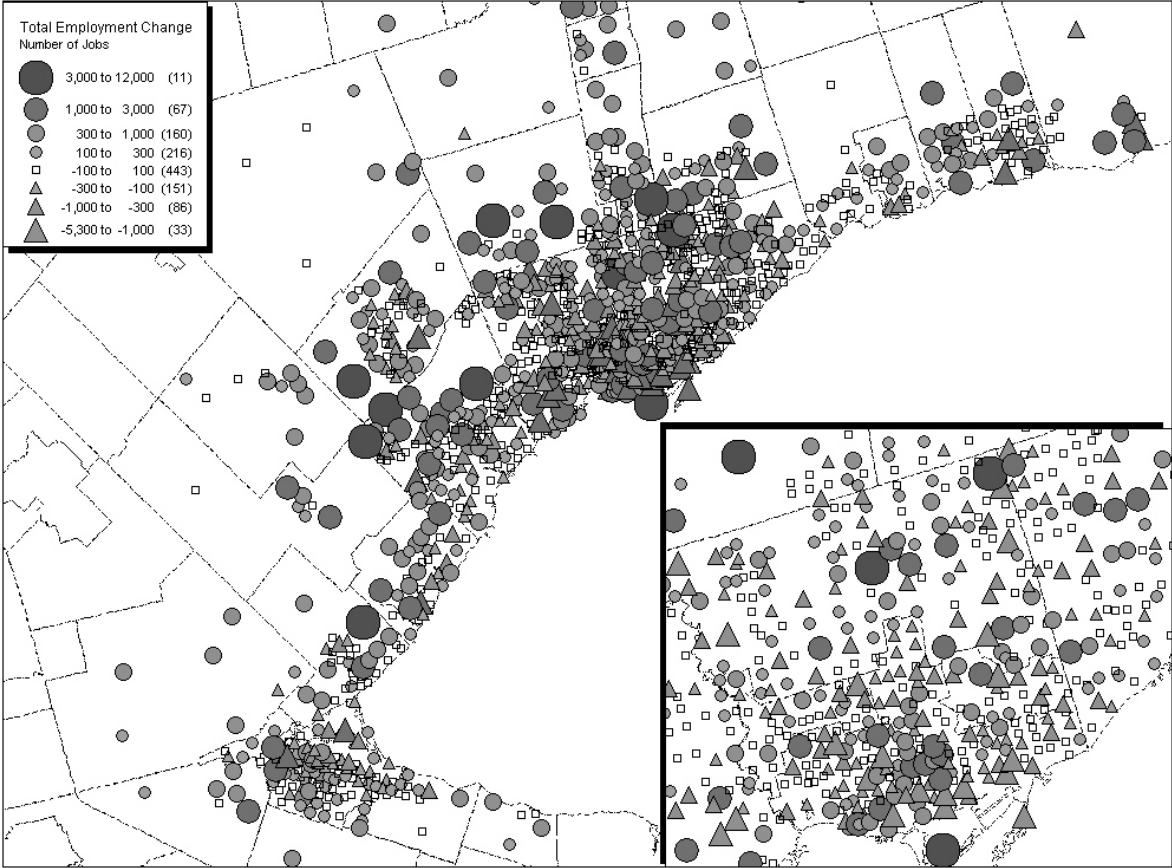
Source: Statistics Canada, *Census of Canada, 2001 and 2006*. Census tract place-of-work files.

Figure 13 shows the change in total employment across the region. The pattern clearly marks the expanding edge of the urbanized area, which sprawls along the lakeshore and northward. During this period there was rapid employment growth in Mississauga and Brampton to the west, and across the northern fringe, in Vaughan and Markham, and farther north along Yonge Street. Employment has also increased in the suburbs in the far east and far west of the region. Surprisingly, considerable employment growth also takes place at specific locations within the City of Toronto, around the downtown core and along the northern border.

This expansion within the city is partially offset by substantial declines elsewhere as part of the deindustrialization process. Job losses track the U-shaped blue-collar zone that has developed historically along the rail lines that lead in and out of the city, from Rexdale to the edges of downtown, and northeast into Scarborough. Looking at Table 2, we can hypothesize that the job losses primarily take place in older industrial zones, while much of the growth occurs in the new office buildings that house business and financial services. At the same time, more modest declines are observed throughout the present City of Toronto. With these overall changes in mind,

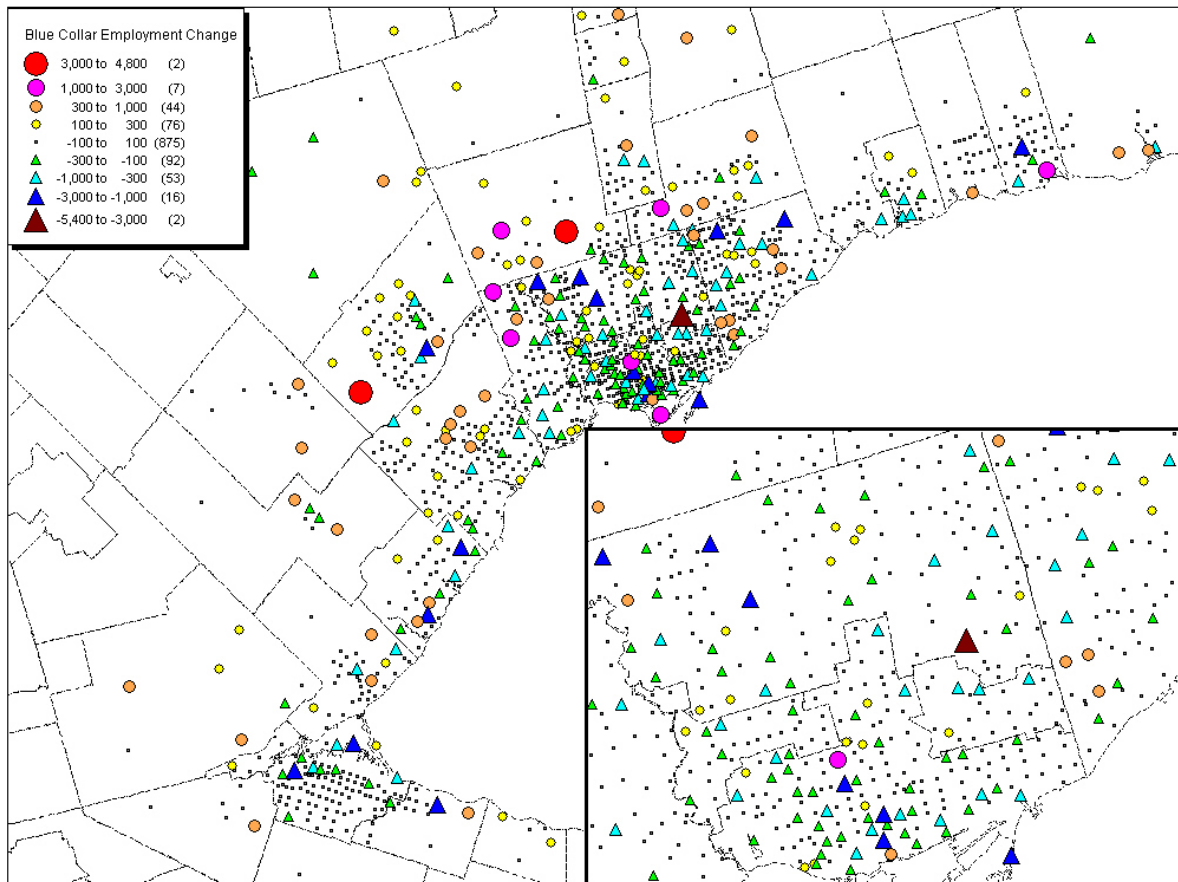
we will look at change by economic sector, including Blue-Collar activities, Services to Business, Services to Consumers, and Public Service, in that order.

Figure 13: The Change in Employment, Toronto Region, 2001–2006



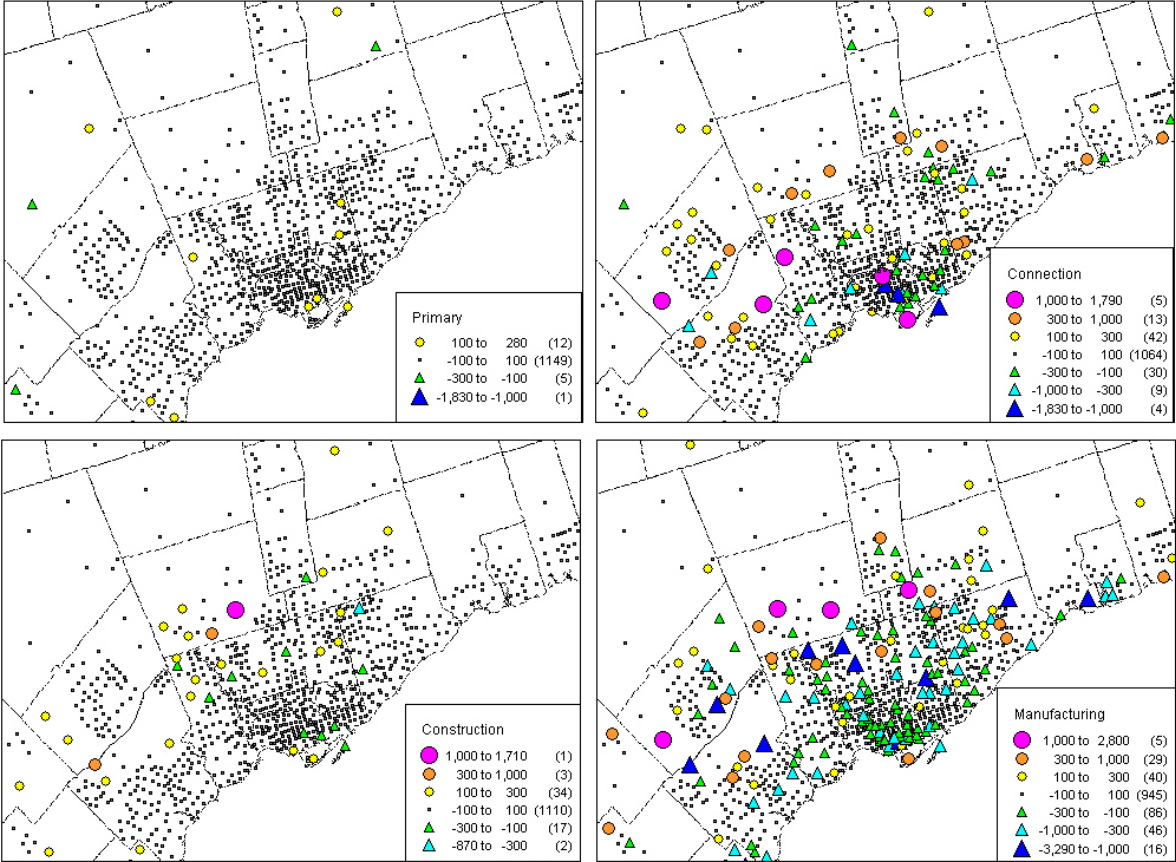
The Economic Base

The Blue-Collar component of the regional economy lost more than 30,000 workers over five years, equivalent to 4.2 percent of the 2001 value. No doubt this change reflects overseas competition and the effects of new technologies and increasing land costs. The distribution of decline shows a clear pattern of change, much as one would expect (see Figure 14). There have been consistent losses throughout the City of Toronto along with substantial nodes of growth in the outer parts of the GTA. Within the city, the decline follows the U-shaped corridor of older industry noted previously. Other areas of decline are found east and west along the lakeshore in Durham Region and Mississauga, as well as in Hamilton. At the same time, substantial new employment has been added north of the city in Markham, Vaughan, and Brampton. But even these municipalities include occasional tracts with declining employment. One can only imagine what more recent problems in Ontario manufacturing have done to accentuate this distribution.

Figure 14: Changes in Blue-Collar Employment, Toronto Region, 2001–2006

The map of specialization for the various components of blue-collar employment decline (Figure 15) is, as expected, dominated by manufacturing, which shows widespread declines, with the exception of half a dozen locations around the northern perimeter of the City of Toronto. The losses along the rail corridors within the City are particularly marked. Most of the growth in blue-collar employment has been contributed by the transportation and utilities sectors (connections), with new jobs in both the central city and the suburbs, notably around the Airport. Still, for the most part, Blue-Collar activities survive by relocating to more spacious accommodation in suburban areas with lower costs and better access to expressways.

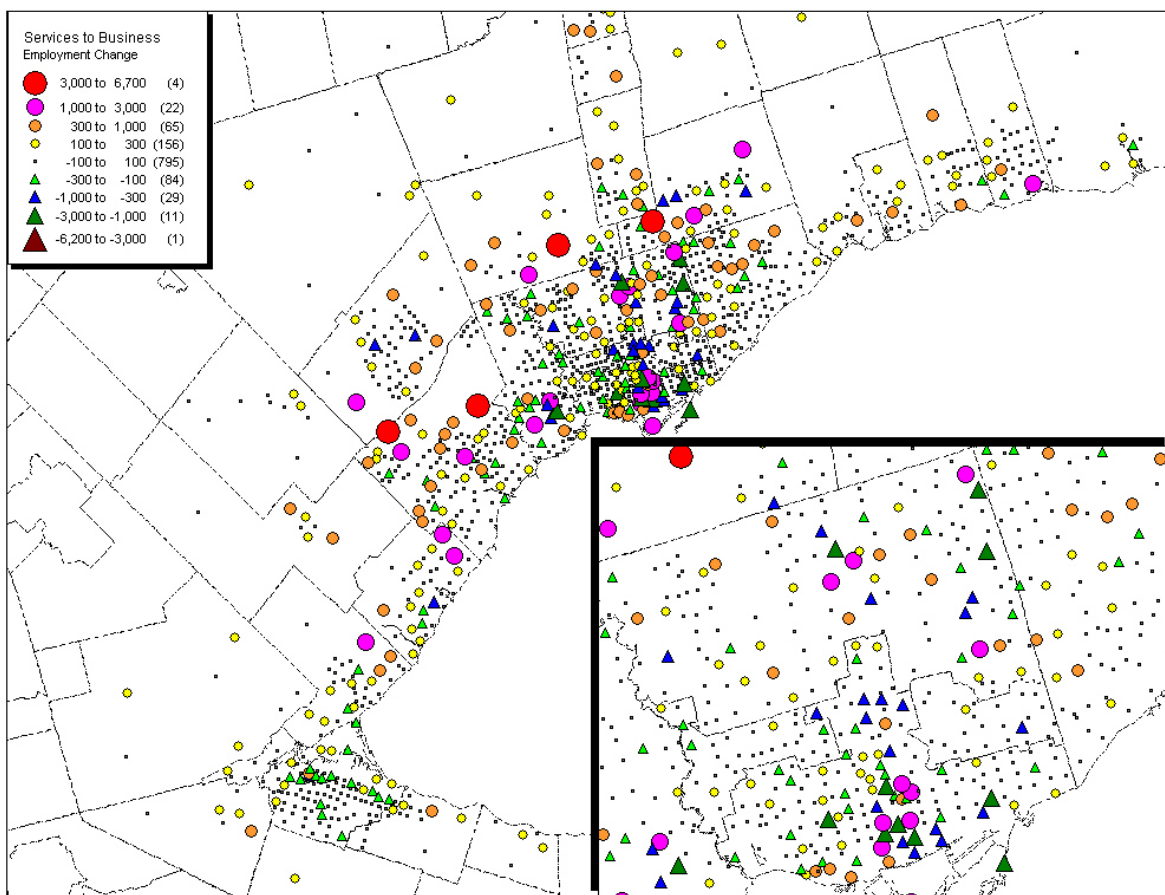
Figure 15: Changes in Blue-Collar Employment Specialization, Toronto Region, 2001–2006



Services to Business

While the traditional economic base was losing 30,000 jobs, the current economic base of the Toronto economy, Services to Business, added twice as many, for a growth rate of 7.5 percent. These sectors display substantial growth and some occasional declines across the region (Figure 16), with significant concentrations of growth in selected locations: downtown, at Yonge and Sheppard, and in the upper Don Valley northward into Markham. Etobicoke, Meadowvale, and the Airport also attracted substantial number of new jobs. Presumably these are the growth nodes where future office development will be encouraged to support economic growth and transit use in the Toronto Region.

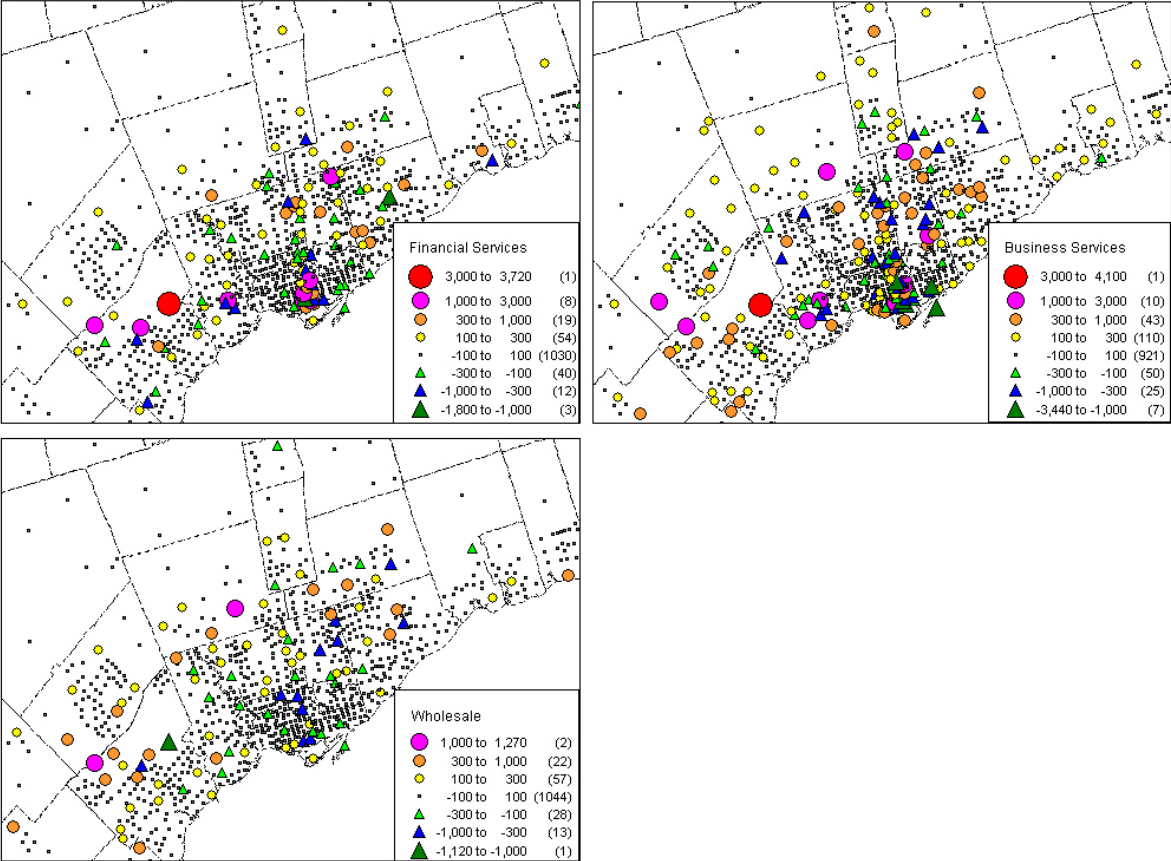
Figure 16: Changes in Services to Business Employment, Toronto Region, 2001–2006



Within the overall growth pattern of services to business there are subtle variations (Figure 17). Wholesaling is rapidly abandoning the inner city in favour of highway-oriented suburban locations. Vaughan and Mississauga have gained jobs, while the City of Toronto is the loser. In financial services, however, downtown continues to attract new employment, more than one-quarter of the regional total. The area around the Airport has become an important secondary concentration.

The tracts in decline are widely scattered. There are substantial declines downtown and within the Yonge Street Corridor (which might be due to the expansion of the financial sector, or to conversion for residential use), while growth is widely dispersed into Markham and north to Newmarket, and around the northern perimeter of the Greater Toronto Area.

Figure 17: Changes in Services to Business Employment Specialization, Toronto Region, 2001–2006

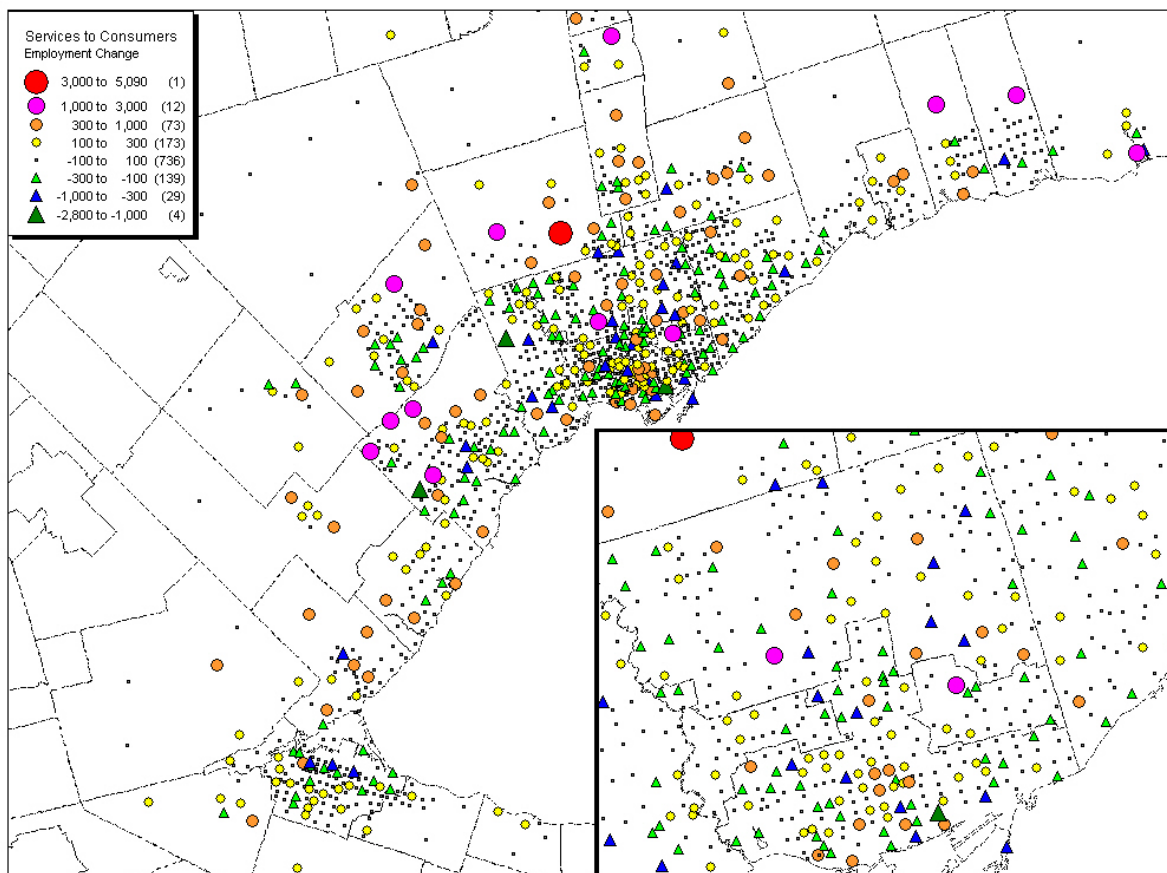


Services to Consumers

These activities – the private-sector component of non-basic activity – have also grown substantially during the study period, adding 40,000 jobs, at a rate of 8.2 percent over five years. As indicated earlier, both retail and consumer services are widely dispersed, so that the amount of change in a single tract is quite modest – seldom greater than 3,000 workers, and usually less than 300 (Figure 18).

At the same time, the distribution of growth is widely dispersed – essentially defining the built-up area of the Toronto Region. Services to Consumers largely track the locations of market growth in population and income. Table 1 indicated that growth in both retail and consumer services has very low correlations with the pre-existing commercial structure. For the most part, growth is positive outside the boundaries of the current City of Toronto, but modest declines are observed in areas of population decline in older sections of the City, as retail strips are eroded by the loss of market and older shopping centres are threatened by power retail.

Figure 18: Changes in Services to Consumers Employment, Toronto Region, 2001–2006

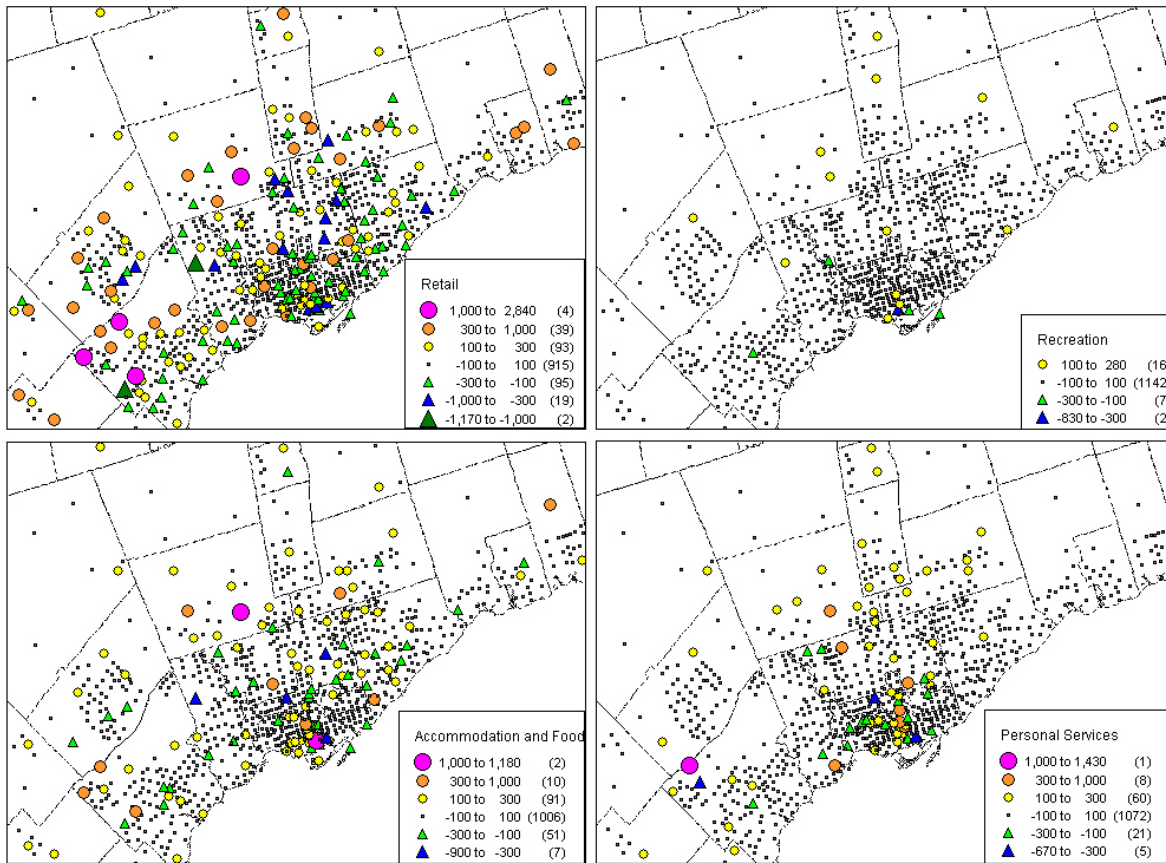


Substantial additions of new employment occur in suburbs where new regional shopping centres and power retail nodes have been developed: for example, Vaughan Mills, Meadowvale Town Centre, Newmarket, and Heart Lake in Brampton.

Within the Services to Consumers group (Figure 19), the retail sector contributes only half the growth and has suffered most of the losses – mostly downtown and within the inner-city shopping strips, as well as in older malls such as Woodbine and Lawrence Plaza. The major gains are registered in the outer suburbs, in regional shopping centres and power nodes. This trend represents the replacement of older retail facilities by newer and larger units, in areas of market growth on the periphery. The remaining services to consumers, recreation, food and accommodation, and personal services are mostly expanding, except for a few declining retail strips in the inner city.

Growth in these sectors is remarkably diverse and widespread, including both older areas and more recently developed suburbs. Restaurants and personal services serve all parts of the city and all income groups, as fast foods and a variety of services absorb larger and larger shares of urban income. The entertainment district at the west end of downtown, and the Vaughan Mills supercentre are the current growth nodes for restaurants, while personal services are thriving in midtown Toronto.

Figure 19: Changes in Services to Consumers Employment Specialization, Toronto Region, 2001–2006

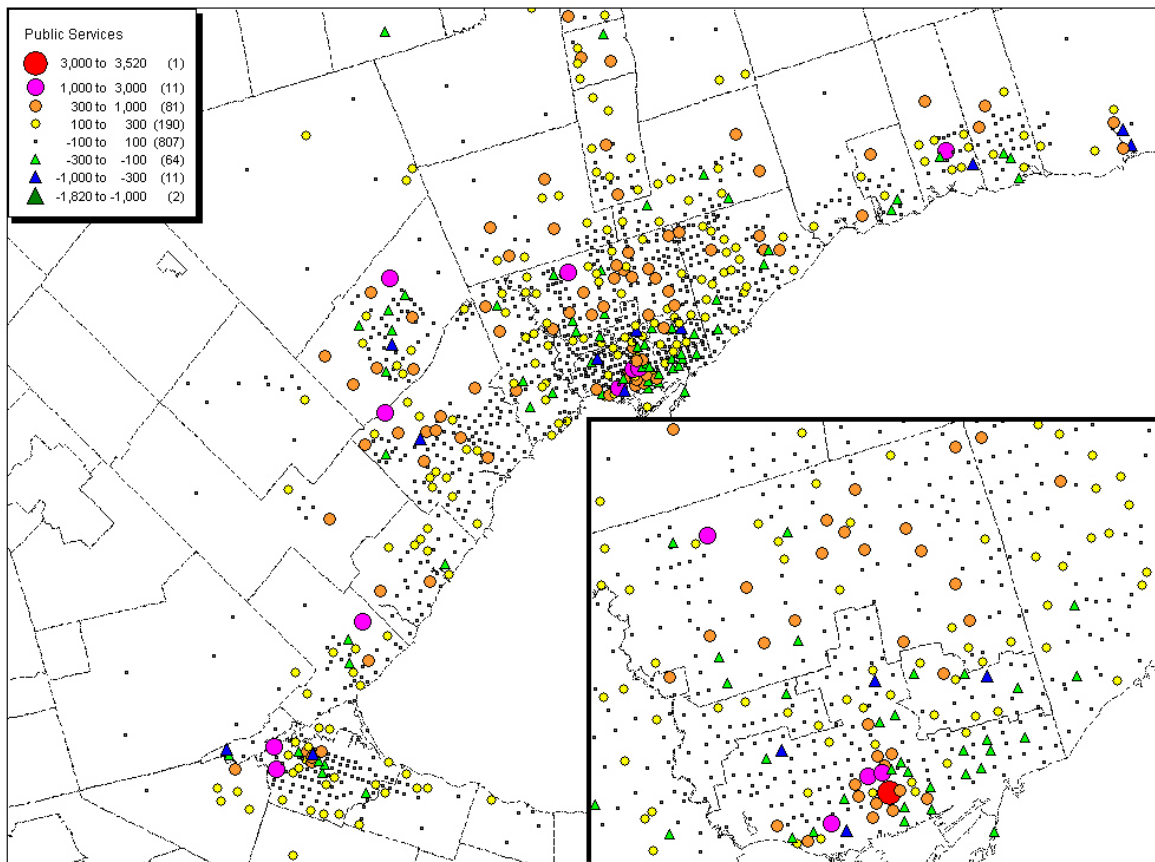


Public Services

Surprisingly, the public service group included the most rapidly growing sectors of all within the Toronto Region, adding 72,000 workers at a growth rate of 14.7 percent. One can speculate whether government spending is the real source of Toronto's growth, or simply a "rebound" after the cutbacks of the Conservative provincial government in the 1990s.

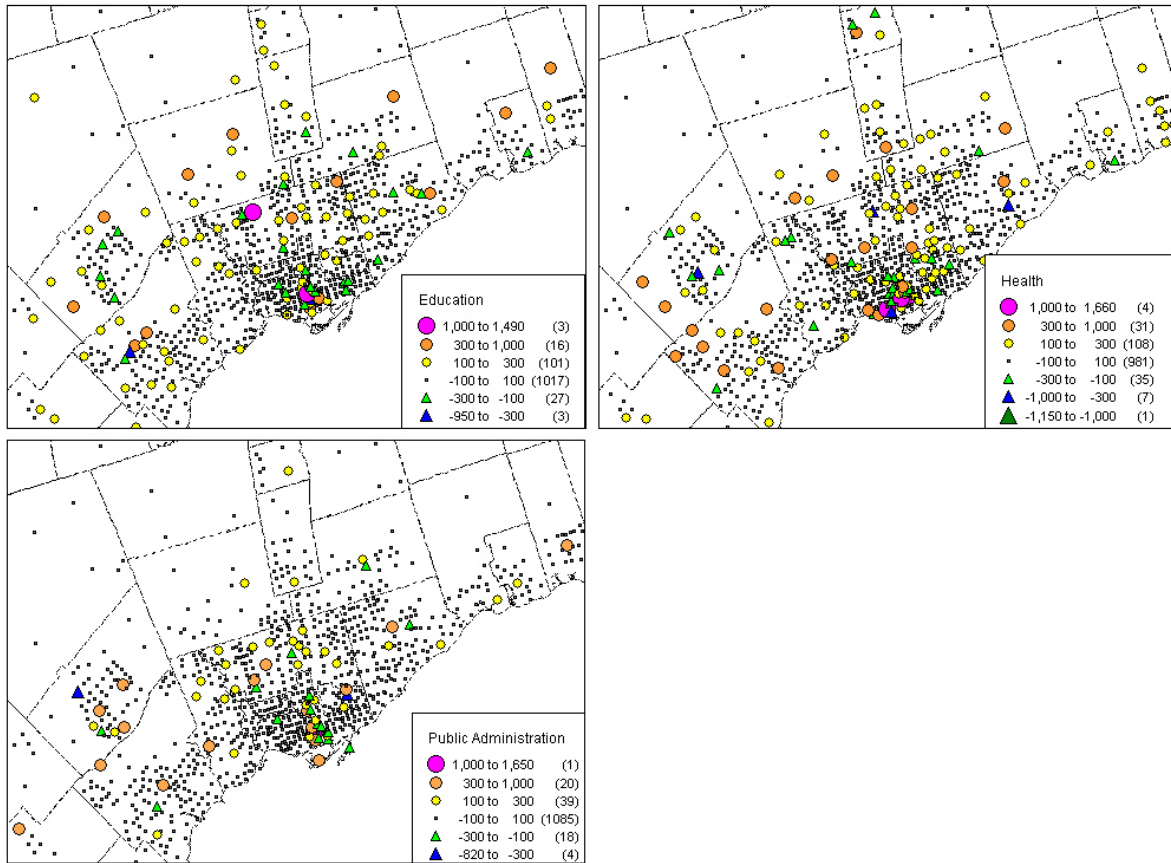
It is notable that the pattern of change in this sector was by far the most predictable, with a correlation of 0.56 between new employment and the prior distribution of employment in 2001 (Figure 20). Above all, public-sector growth was substantial, and widely dispersed throughout the built-up area. Some of the largest additions took place in familiar locations: at Queen's Park in downtown Toronto, or around the teaching hospitals and universities, and in associated research institutes. Declines occurred in some of the inner-city tracts, and there was one major institutional closure in Newmarket.

Figure 20: Changes in Public Services Employment, Toronto Region, 2001–2006



The patterns of change for the three components of public-sector change are shown in Figure 21. Each one grew rapidly, but the health sector is largest and grew the most. Each sector displays similar characteristics, in that substantial growth in established locations, either downtown or around existing facilities, is balanced by the systematic development of new facilities to serve the expanding suburban population.

Figure 21: Changes in Public Services Employment Specialization, Toronto Region, 2001–2006



We will now explore the regularities among the sectors and within the larger context of a growing urban area, during a period of rapid economic transformation.

4. Relationships: A Correlation Analysis

The maps of employment and employment change can be interpreted only insofar as they can be linked to each other, or to changes over time to the overall geography of the city, or to particular institutional developments, such as the expansion of Pearson Airport. In exploring these relationships, we will examine correlations among the sectors, and the changes in sectors; plot the variations with distance from the downtown core, and observe the effects of the transportation system.

Among the Sectors

Table 3 indicates the correlations among the geographies of the main sectors of the employment data set. These correlations were initially mildly inflated by the presence of several very large employment concentrations within the 2006 census tract file. In order to compensate for size effect, the 10 largest tracts in the region (each one with more than 30,000 jobs) were set aside in this analysis.

The Table reveals two clusters of associations among employment sectors – one based on transportation and accessibility, and the other based on the various services – that are linked by networks of interdependence and common access to the market and nearby consumers. The former links jobs in construction, manufacturing, wholesale, and transportation and utilities. The highest correlation is 0.687 between manufacturing and construction. The second cluster links activities that serve customers and/or share commercial facilities, including both services to business, and services to consumers. The strongest correlation is 0.746 between finance and business services. While retail is mildly linked to wholesale and the connecting activities, the stronger links are with the other services. Retail and service activities are indirectly linked by the construction of facilities that serve nearby customers, such as retail strips and strip malls. Note that the distributions of public-sector activities are very weakly correlated with other sectors.

The logic underlying these correlations derives, in the first instance, from a series of planning and investment decisions. On the one hand, large traffic-generating activities are restricted by planners to industrial zones – often adjacent to transportation facilities and terminals. Market-oriented services, in contrast, are housed in visible (and often expensive) locations, that have been constructed by commercial real estate developers: high-rise offices, shopping centres,

strip malls, and the like. Recently, however, retail employment has been gradually shifting from the former location type to the latter, as activities that once formed informal clusters with consumer services on retail strips or along arterial roads are gradually moving to big box stores and power centres that may be located within the same industrial zone as construction companies and wholesalers (Hernandez and Simmons, 2006). This mix will pose an increasing problem for planners in the future. The other exception is the complex requirements of the public sector: partly composed of large immovable institutions such as town halls and universities, and partly providing a set of community services that share the same market access requirements as commercial services.

Table 3: Employment by Sector, 2006: Correlations

Sector	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Primary ^a	1.000									
2. Connections ^b	0.103	1.000								
3. Construction	0.238	0.482	1.000							
4. Manufacturing	0.087	0.390	0.687	1.000						
5. Wholesale	0.122	0.432	0.681	0.666	1.000					
6. Retail	0.080	0.277	0.382	0.305	0.425	1.000				
7. Finance ^c	0.137	0.191	0.238	0.178	0.366	0.371	1.000			
8. Business Services ^d	0.180	0.319	0.383	0.331	0.545	0.427	0.746	1.000		
9. Consumer Services ^e	0.220	0.344	0.494	0.352	0.478	0.653	0.606	0.680	1.000	
10. Public Services ^f	0.014	0.150	0.114	0.069	0.194	0.251	0.319	0.325	0.150	1.000

^a Includes agriculture and mining.

^b Includes utilities and transportation.

^c Includes finance and real estate.

^d Includes information, professional, management, and administrative.

^e Includes recreation, accommodation and food, and other services.

^f Includes education, health and public administration

For 1,156 census tracts, excluding the 10 largest tracts that had total employment greater than 30,000.

Over Time

Since PoW data is available for only one time period (2001-2006), it is difficult to model the sequences of change or processes by which the employment patterns evolve. At the same time, the correlations among the recent patterns of growth in various sectors over the five-year study period (Table 4) may be instructive.

Although the correlations are complex, they reflect current processes of change, rather than the historical accumulation of various land use decisions and policies. As discussed earlier, part of the complexity derives from the decline in employment that has taken place in the primary and manufacturing sectors. These declines free up space for redevelopment for other sectors, assuming the zoning permits. At the same time, the correlations largely reflect the much greater activity that occurs in the growing suburban tracts.

Table 4: Employment Change by Sector: Spatial Correlations: Toronto Region, 2001-2006

Sector	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Primary ^a	1.000									
2. Connections ^b	0.313	1.000								
3. Construction	0.336	0.319	1.000							
4. Manufacturing	0.044	0.153	0.145	1.000						
5. Wholesale	0.195	0.115	0.423	0.209	1.000					
6. Retail	0.059	0.122	0.427	0.182	0.349	1.000				
7. Finance ^c	0.144	0.150	0.170	-0.087	-0.052	0.068	1.000			
8. Business Services ^d	0.297	0.347	0.386	0.097	0.275	0.282	0.351	1.000		
9. Consumer Services ^e	0.368	0.207	0.532	0.133	0.367	0.464	0.252	0.396	1.000	
10. Public Services ^f	0.023	0.069	0.134	-0.028	0.127	0.159	0.265	0.028	0.216	1.000
Concentration/ Dispersion^g	-0.655	-0.021	0.530	-0.237	0.230	0.086	0.280	-0.044	0.134	0.560

^a Includes agriculture and mining.

^b Includes utilities and transportation.

^c Includes finance and real estate.

^d Includes information, professional, management, and administrative.

^e Includes recreation, accommodation and food, and other services.

^f Includes education, health, and public administration.

^g The correlation between employment in 2001, and the change, 2001-2006.

For 1,156 census tracts, excluding the ten largest tracts that had total employment greater than 30,000.

In general, the sectoral correlations for change, as expected, are much weaker than the overall patterns that were shown in Table 3. The strongest links are with construction employment – suggesting that this change in employment typically follows new development projects. Wholesale, retail, and consumer services share this relationship. A more conventional correlation links retail with commercial services, as these activities tend to grow or decline together. Business services and financial activities share new office facilities as well. And it appears that the release of manufacturing space is not advantageous for wholesaling activities. Once again, the growth of public services displays the lowest correlations with other economic sectors, since their locations are linked to the growth of residential areas.

At the bottom of Table 4, the index of concentration or dispersion is the correlation between the employment change and the distribution in 2001. It is strongly negative for the declining sectors, since losses can occur only in places that had them in the first place. Strongly positive values occur for sectors that are spatially specific, such as construction (in areas of growth) and the public sector. Values are low for many of the largest sectors where employment growth occurs in both new locations and existing sites.

With Distance

The detailed map of variation in the growth of employment permits analysts to explore some of the urban context that explains the spatial redistribution. For example, are employment changes by different economic sectors linked through location?

One simple approach evaluates trends in centralization and decentralization tendencies by measuring whether sectoral employment changes are associated with distance from downtown (Yonge and Queen). The significance of this measure is its association with the period of development of the urban landscape and infrastructure – the street layout, transportation system, industrial technologies, population and employment density, land use requirements, and lifestyles of the city in earlier decades.

Table 5 compares the growth patterns for total employment with the growth of the more specialized employment sectors by five-kilometre bands. Blue-Collar, Services to Business, Services to Consumers, and Public Services account for –20.6 percent, 44.9 percent, 49.2 percent, and 27.2 percent, respectively, of the total employment growth.

Table 5: Employment Change with Distance: 2001-2006

Distance Band (km)*	Total Jobs, 2006 (1,000s)	Change, 2001-2006 (1,000s)	Growth Rate (%)	Change in Jobs (1,000s)			
				Blue-Collar	Business Services	Consumer Services	Public Services
0-5	520.1	3.3	0.6	-8.9	-1.4	2.3	10.6
5-10	225.4	-12.6	-5.3	-15.0	-0.3	-0.1	2.2
10-15	286.1	9.2	3.3	-5.6	5.5	-1.0	9.7
15-20	330.7	10.0	3.1	-6.1	8.0	0.1	7.2
20-25	417.4	44.8	12.0	7.0	19.2	9.3	8.3
25-30	204.4	20.6	11.2	-1.5	7.8	6.6	7.0
30-35	276.1	31.3	12.8	3.2	12.6	8.2	6.9
35-40	83.0	11.6	16.2	0.3	3.6	4.0	3.3
40-45	127.8	26.4	26.0	4.7	8.5	7.0	5.8
45-50	99.6	6.7	7.2	-0.3	1.7	2.3	2.6

* Distance from Queen and Yonge.

Scanning Table 5 from top to bottom, the maximum values for total employment occur between 20 and 25 kilometres, and so do the maximum values of change. This band lies just beyond the northern border of the City of Toronto. The highest growth rates occur farther out, however, in the zone 40 to 45 kilometres distant, at the northern edge of the next row of municipalities. The change in total employment is positive for all distance rings except the second band, and altogether the five inner bands generated 55,000 new jobs in total. At the same time, the outer five bands contribute almost 100,000 new jobs. Table 5 indicates the volume and rapidity of change that occurs within various employment sectors throughout the city and the region.

The columns for the four main component sectors simply measure the change in number of employees. Thus the Blue-Collar sectors have lost 30,400 in total, and employment changes in

five of the innermost six bands are negative. Growth in the four outer bands is positive, adding 15,700 new jobs, but the pattern of redistribution to the perimeter is consistent. Despite the concentration of Services to Business in the inner city, there has been a modest redistribution toward the periphery as well. The two innermost rings have lost 1,700 workers, while the growth in the outer bands is strong and consistent. Services to Consumers display a similar pattern, although downtown has gained employment and the next two bands recorded modest losses. By and large, the changes reflect the spatial redistribution of the Toronto market. Public-sector services, in contrast, display more growth in the inner five bands (38,000) than in the outer five (25,600), reinforcing the notion of spatially conservative location priorities.

Table 6 presents a variant of the distance correlation that may be more meaningful to readers who are familiar with the Toronto region, by using a series of five zones that differentiate the Greater Toronto Horseshoe region according to the period of development, and thus to the kinds of technologies and lifestyles that were characteristic at the time.

Table 6: Employment Sectors by Zone: Toronto Region

Zone/Sector*	All Jobs (1000s)	Blue-Collar (1000s)	Services to Business (1000s)	Services to Consumers (1000s)	Public Services (1000s)
Employment, 2006					
Downtown	400.0	17.5	223.6	70.6	88.2
Inner City	262.7	37.7	79.7	78.2	66.3
Outer City	675.3	165.4	216.3	150.5	141.1
Suburbia	1,316.9	404.7	389.7	314.0	205.1
Exurbia	247.5	69.7	45.0	65.1	66.7
Change in Employment, 2001-2006					
Downtown	3.6	-5.9	0	0.4	9.0
Inner City	-16.9	-13.0	-5.6	-1.0	1.8
Outer City	23.0	-16.2	16.4	0.7	20.3
Suburbia	148.7	13.0	58.1	40.1	34.0
Exurbia	13.9	-8.3	-2.5	-0.1	9.4

*Inner City is the former City of Toronto plus York and East York; Outer City includes North York, Etobicoke and Scarborough; Suburbia is the remainder of the GTA; and Exurbia lies outside the GTA.

Downtown was settled in the 19th century, but has been repeatedly redeveloped so that it now represents a high-density urban core with high-rise offices and a transportation hub that brings in commuters from across the region. The workforce is dominated by finance and business services, plus services – mostly food and accommodation – for these workers. A surprising amount of public-sector activity continues here, including City Hall, the provincial government, a medical complex and two universities. Growth is modest, but positive (less than 1 percent).

The Inner City, in contrast, is losing jobs at the rate of almost 7 percent over five years. It includes that part of the city that was developed before the Second World War, in the era of street cars and public transit. The older housing and accessible locations have proven to be highly at-

tractive to higher-income families, and the services they require; while blue-collar jobs and business services are relocating to less expensive and more accessible locations.

The Outer City is the suburban zone that was developed during the first wave of suburbanization between 1950 and 1970, and is now available for redevelopment. Early suburbia was designed so that Dad would drive to work, but the kids and Mom walked to the school and the mall. The workplaces were confined to industrial districts that are now losing blue-collar jobs to office complexes for services to business and public sector activities. Overall job growth is modest (3.5 percent).

Suburbia – defined as the four regions surrounding the City of Toronto – has absorbed most of the growth over the last 30 years. Thus it represents the most recent pattern of urban development in which every adult is mobile, employment and consumer services are widely dispersed, and the employment growth is almost 90 percent services. There are huge concentrations of employment as shown in previous maps, but without any apparent relationship to the earlier spatial structure of the city.

Exurbia lies largely beyond the study area used in the rest of this analysis; it includes the remainder of the Greater Golden Horseshoe, stretching from Peterborough to Barrie to Kitchener to Niagara. In contrast to Suburbia, the exurban region is highly dispersed with employment concentrations structured by their relationships to the Toronto core, the expressway network, and the metropolitan areas to which they belong.

Transportation

An important aspect of the effect of distance is the transportation system, which also varies regularly over time: evolving from the pedestrian city, to the streetcar era, and the automobile; but also varying sectorally to reflect the public investment in selected areas of the city; such as the subway, expressways, and more recently, the GO train system. The transportation network (Figure 22) identifies specific nodes of past and potential employment growth: at subway stops, expressway intersections, and GO Train stations.

Table 7 indicates the relationships between different kinds of employment and the transportation nodes, but the findings require a caveat. The construction of transportation networks follows a spatial-temporal sequence that tracks earlier employment growth. In other words, they tend to lag rather than lead. For the most part, subway stops represent locations that have been developed for a long time: areas of previous growth, rather than current growth, although some of them have recently become nodes of residential intensification. GO Train stations, in contrast, identify areas of potential growth that may or not develop as growth nodes in the future; but the tracks they run on were built to serve the industrial structure of a century ago. Many suburban stations are simply parking lots. Expressway intersections, depending on their location, may belong either to the past or to the future of employment growth.

Figure 22: The Transportation Network, Toronto Region

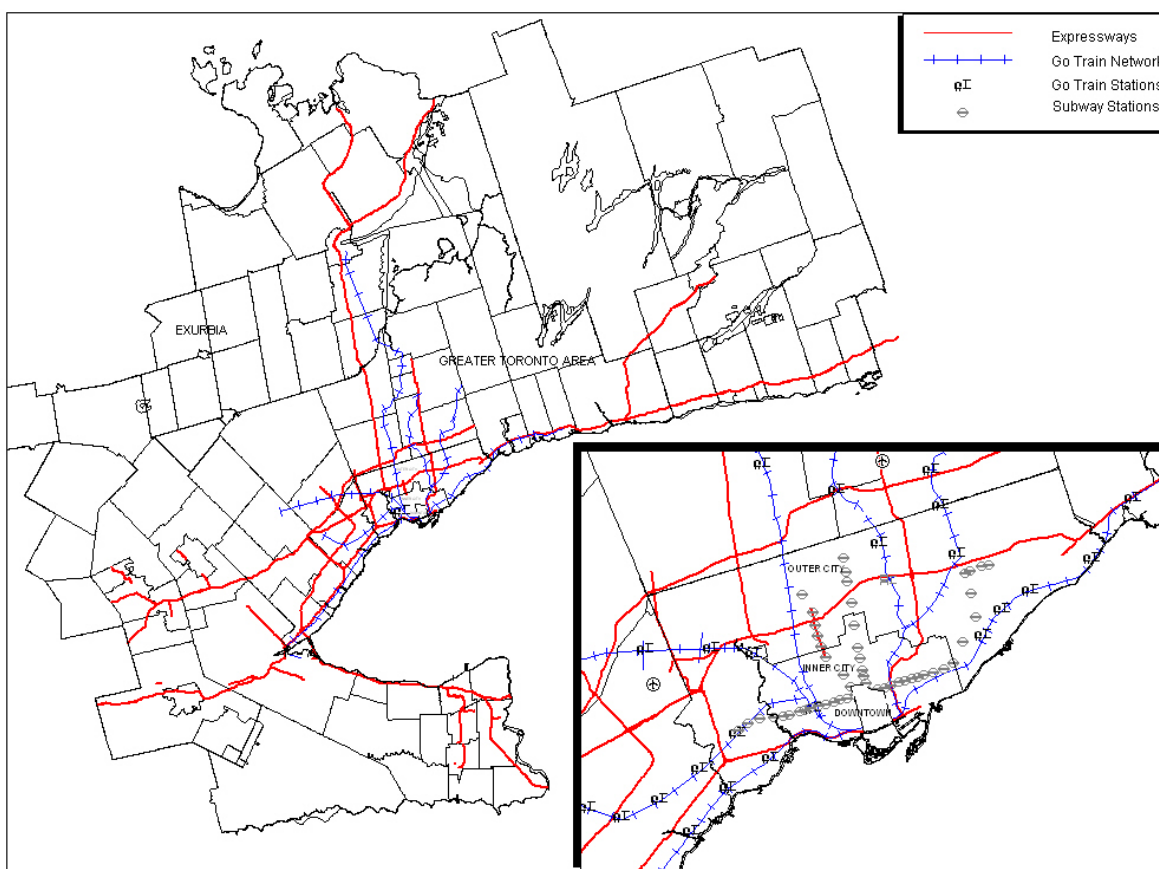


Table 7: Employment and Transportation Nodes (Average number of jobs per tract)

Sector*	Subway Stop		Expressway Node		Go Train Station	
	With	Without	With	Without	With	Without
Employment In 2006						
Blue Collar	569	599	1,665	317	2,266	447
Business Service	2,502	614	1,777	568	1,767	734
Consumer Service	1,162	511	1,069	454	1,319	516
Public Service	1,237	395	604	455	715	466
All Sectors	5,470	2,119	5,115	1,794	6,067	2,163
Number of Tracts	126	1,041	241	927	95	1,073
Change in Jobs, 2001-2006						
Blue Collar	-111	-16	22	-38	-18	-27
Business Service	28	60	217	15	250	40
Consumer Service	23	36	87	21	150	24
Public Service	124	57	122	49	127	58
All Sectors	64	137	448	47	509	95

*Sectors are identified in Table 1.

The first part of Table 7 indicates the current distribution of employment around the nodes. Subway stops attract, or were located to serve, a variety of activities, but have proven to be especially attractive to Services to Business, followed by the Public Services and Services to Consumers. For the most part they are not oriented to Blue-Collar activities.

Highway intersections, which are disproportionately suburban, are attractive to both industry and offices (Services to Business) but less so for Services to Consumers, and much less so for Public Services.

Because GO Trains run on the old rail lines, they run through blue-collar areas, but nowadays the stations also attract some Services to Business and Services to Consumers. Again, the Public Services, at least at this scale, are less oriented to accessibility.

In general, the transportation system is oriented to the most developed employment locations, but there are significant differences in the sectoral response to the emergence of different nodes, especially in the case of Blue-Collar and Public Service activities.

The second half of the table indicates recent location priorities. Blue-Collar activities are in widespread decline, except near expressway intersections. The converse is true for Services to Business, characterized by universal growth, especially at expressway intersections and GO Train stations. Consumer Services and Public Services show a similar pattern. During this period, the subway system has ceased to stimulate employment growth – which now occurs far beyond its reach – and expressways and GO Trains determine significant locations, with the effect of the latter showing impressive promise if land use and transportation decisions can be coordinated.

5. Implications for Research and Public Policy

An understanding of the current employment composition of neighbourhoods, either across the city or region, or within particular districts, can clarify many of the issues that currently plague urban analysts. Which employment activities are compatible or incompatible with others? What kinds of land use allocations are appropriate for a given community? What kinds of economic transitions are likely to occur within a given time period?

This section begins with a brief summary of the findings, and continues with a list of potential research projects that derive from the data and the empirical results. It finishes with a brief discussion of policy issues, especially those at the regional scale, that are raised by the provincial government's plans for the Greater Golden Horseshoe.

Research Summary

1. The release of employment place of work data by census tract provides analysts with consistent measures of economic activity at the neighbourhood level, and thus the potential to evaluate processes of economic restructuring and land use transition within the city.
2. Urban economies have been completely transformed over the last three decades, as the traditional blue-collar activities of the old economy have given way to an explosion of services. And within these broad categories, the location priorities of firms have been transformed so that new industries, for example, may now have to compete with retail power centres for locations around expressway intersections, or with the residential development in the inner city.
3. The need for the various industrial sectors to adjust their location requirements coincides with the needs created by the peripheral expansion of a rapidly growing city. As a result the land use and employment mix vary with distance from the city centre, that is, with the period of development and the conditions prevailing at that time.
4. By identifying tracts that are predominantly residential, and mapping the most important economic sector in the remaining tracts, researchers can generate a reasonable version of a land use map that generalizes the overall patterns of economic activity and employment across the city.

5. In 2006 the overall employment distribution approximated the developed portion of the Greater Toronto Area plus the Hamilton Region. In Durham, York, and Halton, the southern tiers of municipalities were largely developed, and there was little unoccupied land remaining in either Toronto or southern Peel regions. Downtown Toronto continues to house the largest single concentration of employment, but significant nodes are also apparent in the suburbs of Markham, Vaughan, Mississauga, and Brampton.
6. A map of employment density effectively delimits the temporal sequence of development, with by far the highest values in downtown, surrounded by lower values in the prewar city, and a substantial decline in the regions primarily served by the automobile.
7. The long-term decline in blue-collar employment is exacerbated by the pressures to adapt factory locations to changing transportation requirements. These activities are now more suburban than central city.
8. In contrast, Services to Business (including finance) now dominate Toronto's employment in both magnitude and growth rate. In particular, they support the continuing role of downtown and the adjacent inner city, but they have also become prominent in several suburban areas, notably Markham, Vaughan, the Airport and Mississauga (Meadowdale).
9. Consumer Services is a large sector, but widely dispersed in space to serve the expanding residential market. In the prewar city, the services located in informal retail strips, but since 1950 they have been diverted to planned shopping centres of various sizes designed, located, and constructed by development firms and oriented to the highway system. Recent innovations in big box commercial formats find them competing for low-cost space with wholesale and industrial activities.
10. Changes in employment by sector provide a snapshot of economic restructuring in the city; and identify which jobs (land uses) are replacing others in various locations. Some industries (finance, public sector) tend to expand within and around previous concentrations, while others expand in new suburban locations (consumer services).
11. The overall change in employment affects the entire area of urban development, but within the City of Toronto, growth is frequently offset by widespread decline, while the change beyond the city limits is largely positive.
12. The blue-collar sector is rapidly abandoning the older manufacturing areas in the inner city, but is only partially replaced by new industries in the newer suburban zones, where even Brampton, Mississauga, and the Durham region have witnessed significant losses of manufacturing employment.
13. If Services to Business is the new economic base, the future of the city will be closely linked to the success of downtown intensification and job creation in downtown and nearby inner-city locations: the Yonge Street Corridor, the Don Valley through Markham, and a developing corridor to the west, stretching from Central Etobicoke through Mississauga to Meadowdale.
14. Services to Consumers continues to expand, but these services are widely dispersed throughout the urbanized area, although the more affluent west side does better than the east.

The growth analysis identifies the familiar pattern of the retail hierarchy, offset by the widespread loss of jobs in older areas of the City of Toronto.

15. The Public Sector was the fastest growing employment sector between 2001 and 2006, and is clearly part of the new economic base. Although the location of growth is strongly related to the previous (2001) distribution, there is also widespread growth throughout the urban area, along with modest declines in many parts of the inner city.

16. The spatial correlations among the various employment sectors roughly resemble the groupings used throughout the paper. The Blue-Collar sectors, along with wholesaling, are closely correlated with each other; so too are Services to Business, with Services to Consumers making up a third dimension – although linked to the second. In part these groups derive from the imprint of the planning process, which isolates activities that generate noise and traffic from residential areas and Services to Consumers. Public Services tend to locate relatively independently of the others.

17. Changes in these activities have distinctive location patterns, oriented to the expanding periphery of the urban areas. As well, the decline in Blue-Collar activities in the older part of the city frees up space that can be converted to residential or commercial uses, if zoning permits, or to professional and business services in the new economy.

18. A series of distance rings around the city centre reveals the sequence of land use patterns in various eras, each reflecting different lifestyles, industrial requirements, and transportation systems. The employment growth rates are very low (0.8 percent) in the innermost 20 km (the City of Toronto – including Downtown) but rise to 13 percent over the next 20 km, and a maximum of 26 percent in the 40-km ring.

19. Different employment sectors show distinctive patterns with respect to distance from downtown. Public-sector employment is growing in every zone, but especially in the very centre of the city. Blue-Collar activities are everywhere in decline except in the outer suburban ring between 20 and 45 km distance. The peak growth band for Services to Business and to Consumers is between 20 to 30 km.

20. Similar variation is evident in the response of employment growth to transportation facilities. Subways seem to have become largely irrelevant to employment growth in all sectors; while the growing sectors, aside from a few specialized nodes in the inner city, are competing for sites near expressway intersections and GO Train stations. Pearson Airport has become a significant growth pole for the region.

New Directions

The census tract PoW data open up a variety of research opportunities in the future.

First, it may be possible to encourage Statistics Canada to provide more detailed PoW data with three- or four-digit NAICS categories, so that we can further explore the recent trends in economic specialization within the city. Three-digit categories differentiate among specialized types of industry, as well as services such as food stores, pharmacies, and gas stations, for example. The three-digit categories have been provided for employment data in the Business Register

and for the SARTRE (small area retail trade estimates) files for retail sales in the past, although somewhat restricted by confidentiality rules.

Second, since the fundamental role of the census tract is the description of the population – hence the market – in all of its demographic and economic detail, the interaction with PoW data could be further explored in a variety of ways. Table 8 examines the overall interdependence of the growth of employment and the growth of population and income. Does growth occur simultaneously in these indices, as it does in suburban expansion, or does redevelopment and intensification permit residential growth at the expense of employment? Table 8 suggests that within the three-city region employment, growth in employment, population, and growth in population are all related, since most growth occurs in the larger suburban tracts. This relationship is strongest in the case of Consumer Services, as one might expect, and weakest for Blue-Collar activities. Neither income per capita nor changes in income per capita appear to be relevant for employment growth – even for Services to Business. In the same way, one could explore relationships within the labour market, or the impact of employment restructuring on housing markets, or on emerging ethnic communities. Alternatively, one might usefully explore these relationships specifically for subregions such as downtown, the inner city, or the western suburbs.

Table 8: Correlations With Census Variables

Sector/Variable	Population	Population Change	Total Income	Income Change	Income Per Capita
Total Employment	0.188	0.184	0.219	0.186	0.072
Change, 2001-06	0.384	0.410	0.347	0.376	0.004
Blue Collar	0.119	0.124	0.086	0.108	-0.049
Change, 2001-06	0.125	0.116	0.132	0.192	0.029
Serv. To Business	0.129	0.126	0.192	0.145	0.118
Change, 2001-06	0.202	0.218	0.188	0.205	-0.013
Serv. To Consumer	0.216	0.209	0.245	0.207	0.091
Change, 2001-06	0.336	0.369	0.295	0.323	0.011
Public Services	0.112	0.104	0.143	0.109	0.055
Change, 2001-06	0.279	0.338	0.245	0.300	0.001

For 1,156 census tracts, excluding the ten largest tracts that had total employment greater than 30,000.

Third, PoW data can also be linked to other databases. Perhaps the most relevant is the regular Transportation for Tomorrow Survey, which describes the spectrum of daily trips carried out for a sample of households within the Greater Golden Horseshoe. It includes trips to the workplace, shopping trips, and trips to schools and other institutions; thus providing the connection between the origin and destination of trips, as well as indicating the kinds of households in each neighbourhood that made the trips. Although the spatial units used in the transportation study are not the same as Census tracts, they can be adjusted and aggregated to fit within some intermediate level units.

Fourth, the Centre for the Study of Commercial Activity (CSCA) has begun to link census tracts to more detailed information on commercial centres throughout the region, including the number of stores and floor area of various kinds, or the mixture of retail chain outlets that are found

there. Census tracts will always be imperfect units for analysis, because they do not match the boundaries of commercial districts (defined as polygons), but there are so many of them that it should be possible to elaborate the overall spatial relationships between markets and Consumer Services – jobs or stores.

Ideally, a variety of gravity-type interaction formulations would link the employment mix within a tract to the population and market characteristics of surrounding areas. For example, it is possible to study the relationship between service employment and market characteristics at varying distances. Employment is a much better measure of economic activity than simple floor area, especially once the relationship between jobs and commercial sales can be calibrated.

Fifth, the PoW data provide relatively precise evidence of employment change that permits the exploration of the processes of economic change. It should be possible to map the regions of rapid growth or decline, and to identify the places that are undergoing rapid economic transitions, just as we can map changes in residential neighbourhoods, as immigrant neighbourhoods expand, or high-income families move in. Employment change in different economic sectors can be linked to changes in public facilities, or transportation systems (expressways or transit), or markets, or the introduction of new technologies in specific locations.

Finally, the massive decline and/or relocation of blue-collar employment, with the concomitant expansion of service jobs, raises questions about the ongoing social reorganization of the city. Can we use the residential census and PoW data in conjunction with the transportation survey to study the processes of change within a single neighbourhood or across the entire city? Does a major plant closure affect households in the immediate area? And, if so, how far does the impact extend?

Policy Issues

Recently the economic future of Ontario and the Toronto region has been under the microscope, with studies by the City of Toronto (Clark 2007), the Martin Prosperity Institute (DiFrancesco 2009 and others), the Economic Summit of the Greater Toronto Region (2009), and the Conference Board of Canada (Wolfe, forthcoming), among others. For the most part, the analyses focus on the production sectors at the provincial or metropolitan scale and ignore the issues of spatial distribution described above. The exceptions below tend to focus on consumption rather than production: where and how will people live and work and shop. One suspects that further research on the place of work data will eventually identify workplace clusters and amenities that are as significant for urban lifestyles as residential neighbourhoods.

The Province of Ontario (2006a) has recently laid out an ambitious plan for the Greater Golden Horseshoe (GGH) called *Places to Grow*. The initial plan sought to minimize the costs of new infrastructure within the region (for transportation and utilities) and to reduce the loss of farmland through urban development through higher densities (intensification) and transit provision. More recent concerns about economic competitiveness, the price and availability of oil, and the reduction of carbon emissions, as well as widespread concerns about the costs of housing and government during the recession, have added urgency to the process. The general thrust of the plan is the encouragement of nodes of high density throughout the region, and the greater use

of public transit. Greenfield development will be discouraged, developed land will be recycled to other uses, and public transit will link high-density locations..

Places to Grow projects a growth of 3.7 million people between 2001 and 2031 (29 percent growth rate), with an additional 1.75 million workers. Where these workers will work depends on the current employment distribution and the recent trends in job location by sector, as well as on policy decisions, both local and provincial. The ability to anticipate the patterns of 2031 will reflect our degree of understanding of today's patterns.

A follow-up study to *Places to Grow* (Province of Ontario, 2008) identified 25 key locations within the region as Urban Growth Centres, in which employment and population concentrations will be encouraged. Filion (2007) has questioned the viability of these nodes, and with PoW data there is an opportunity to further evaluate their past performance.

The Province's growth plan (2006b) also establishes a growth boundary around the urbanized core. This plan will have a number of effects on employment distributions, but two contradictions stand out. While it will increase the price of land and thus encourage more intense development inside the boundary, it may also encourage firms to leapfrog the greenbelt and create jobs that are even more distant from the urbanized core.

More or less in parallel with the planning process for the GGH, the Province and the Greater Toronto Area have initiated *The Big Move*, a planning process administered by a regional agency called Metrolinx (2008) to reshape and resolve the transportation needs of that region and to plan for future growth. It anticipates a dense network of rapid transit facilities throughout the currently urbanized area to serve the growth centres and an additional 30 gateway centres at key transportation nodes and institutions.

In addition to these comprehensive planning issues, there will be hundreds of other debates that concern the allocation of land for employment or residential purposes, and by workplace sector. Some of these debates invoke the provincial policies, such as the peculiar decision to exclude retail employment from the designated employment lands, but most of them will involve local issues.

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