

Chapter 1

Toronto: facing challenges, grasping opportunities

Over recent decades, the Toronto region has experienced one of the highest rates of population growth among OECD metropolitan regions, making it one of the economic engines of Canada. With more than 5 million inhabitants, the region generates almost a fifth of the GDP of Canada as a whole, and concentrates 40% of the nation's business headquarters. This accelerated expansion has not come at the expense of quality of life: Toronto retains its reputation as a good place in which to live. With the implementation of the Canada-US Free Trade agreement in 1989, and thanks to its strategic geographical location only a 24-hour drive from 40% of the US population, Toronto firms have successfully penetrated US markets, boosting its exports and integrating into the North American automobile production system. Toronto's diversified regional economy, which includes a number of globally competitive clusters in finance, automobile and life sciences, as well as other prosperous and dynamic sectors in entertainment and communication technologies, has benefitted from a well-educated workforce constantly refreshed by new immigrants. While the government of Canada has set in place a pro-active immigration policy, it is the Toronto region that welcomed 40.4% of the immigrants who arrived in the country from 2001-2006. Unlike immigrants in many other large cities in the world, most newcomers to the Toronto region are highly skilled.

There are nevertheless emerging challenges to Toronto's successful regional economic development model. While it was once a leader in North America in terms of job creation, the recent decline in its manufacturing jobs has highlighted the structural difficulties of some of its traditional industries. Its automobile and electronics industries now face competition from lower-cost labour markets in China, India and Mexico, exacerbated by the relative strength of the Canadian dollar. These pressures are likely to intensify as producers in lower-cost countries try to move up the value chain. Meanwhile, its dependence on knowledge-based industries makes the Toronto region vulnerable to competition from other metropolitan regions, including from within Canada.

Toronto's modest regional economic performance in recent years was partly sustained by a boom in the housing sector and by historically low interest rates. Boosted by population growth, the construction, retail and logistics sectors have expanded. This activity has helped the Toronto region to absorb many of its newcomers in the labour market, even while maintaining high labour participation rates. Yet productivity in many sectors has lagged, and the rate of innovation has remained relatively mixed in international comparisons, as will be dealt with in sections below.

Given these challenges, the Toronto region is now at a crossroads. Whether productivity can be increased will depend on whether the region can sustain its specialisation in high-value-added industries by boosting innovation. The Toronto region has a number of important advantages, including its culturally diverse and skilled labour force, but these

need to be better leveraged to create innovative firms and industries. Toronto's productivity is also constrained by the region's infrastructure, which has suffered from decades of under-investment and has not kept pace with the region's rapid population growth. An increasing number of residents and businesses are now concentrated in Toronto's suburban communities, leading to sprawl and congestion that hinder productivity, generate pollution and raise the cost of delivering public transit and other services. This chapter focuses on the main socio-economic trends in the Toronto region from an international comparative perspective, and analyses the three main challenges associated with its economy, namely: lagging productivity, untapped cultural diversity and unsustainable and inadequate infrastructure. Policy responses and governance frameworks to implement these policies are discussed in Chapters 2 and 3.

1.1. Main demographic, social and economic trends

1.1.1. A growing and sprawling region

The Toronto region is home to a large share of the population of Canada, a country notable for its strong concentration of population in urban areas. Canada's land surface is one of the largest in the world, but its population, at 31.6 million in the 2006 Census, is relatively small.¹ As a consequence, it is not densely populated, although its population is geographically concentrated: 61% of its population lives in 10% of its area, a relatively high percentage by comparison with other OECD countries. Only Australia and Iceland have higher rates of geographical concentration (OECD, 2007). A very high proportion, 53% in 2003, using OECD typology,² lives in its urban regions, which is considerably higher than the OECD average of 46%. Using the typology adopted by Statistics Canada, an even higher figure, 80% of the population, is classified as living in urban areas in 2006. This trend has been reinforced by the fact that recent immigration to Canada has principally been an urban phenomenon: of the immigrants who arrived in Canada between 2001 and 2006, 97% live in an urban area, compared with 78% of the Canadian-born population. Within this urban context, and depending on the definition, Toronto's regional population can be estimated from 5.1 million to 5.5 million, that is, between 16.2% and 17.6% of the total population and between 42% and 45.7% of the population of the province of Ontario (Table 1.1). The Toronto region is the largest urban centre in the country, with almost 50% more inhabitants than Montréal and 2.5 times more than Vancouver, Canada's two other major urban centres.

Table 1.1. Definitions of Toronto (2006)

	Population	Share of national population	Share of provincial population
City of Toronto	2 503 281	7.9%	20.6%
Toronto Region	5 113 149	16.2%	42.0%
Greater Toronto Area (GTA)	5 555 912	17.6%	45.7%
Greater Golden Horseshoe	8 102 163	25.6%	66.6%

Note: These population figures are from 2006 Census data. The Census under-count was approximately 5% in 2001 and was estimated to be at least as high in 2006.

Source: Statistics Canada, Census of Population (2006).

In this report, several units of analysis are used to define Toronto (Table 1.1):

- **The City of Toronto**, with 2.5 million inhabitants in 2006, was created through the amalgamation of six local municipalities and one metropolitan level government in 1998.
- **The Toronto region** included 5.1 million inhabitants in 2006, following the OECD methodology³ for defining metro-regions and taking into account available longitudinal datasets. This definition corresponds to the Census Metropolitan Area (CMA) defined by Statistics Canada. This definition includes the municipalities that have a high degree of functional integration with the City of Toronto as measured by commuting flows. It comprises the City of Toronto and extends into four surrounding regional municipalities, including 24 lower-tier municipalities, 23 of which are located within the Toronto CMA boundaries. These municipalities include several large outer-urban centres, such as the cities of Mississauga, Brampton and Vaughan and the Town of Markham.⁴ The term “Toronto” in this Review refers to the Toronto region, corresponding to the Toronto Census Metropolitan Area, unless indicated otherwise.⁵ This terminology should not be confused with the Municipality of Metropolitan (“Metro”) Toronto, the upper-tier municipal government, which existed from 1954 to 1997 and covered the same territory as the current City of Toronto. The Toronto Region Research Alliance has collected data for an area which it describes as Toronto Region, but which uses a different definition and which includes around 7 million inhabitants. When this definition is used in the sections below, it is indicated as “Toronto (TRRA definition)”.
- **The Greater Toronto Area (GTA)**, with 5.5 million inhabitants, is based on political boundaries that include the City of Toronto and four adjacent regional municipalities, Halton, Peel, York and Durham.⁶

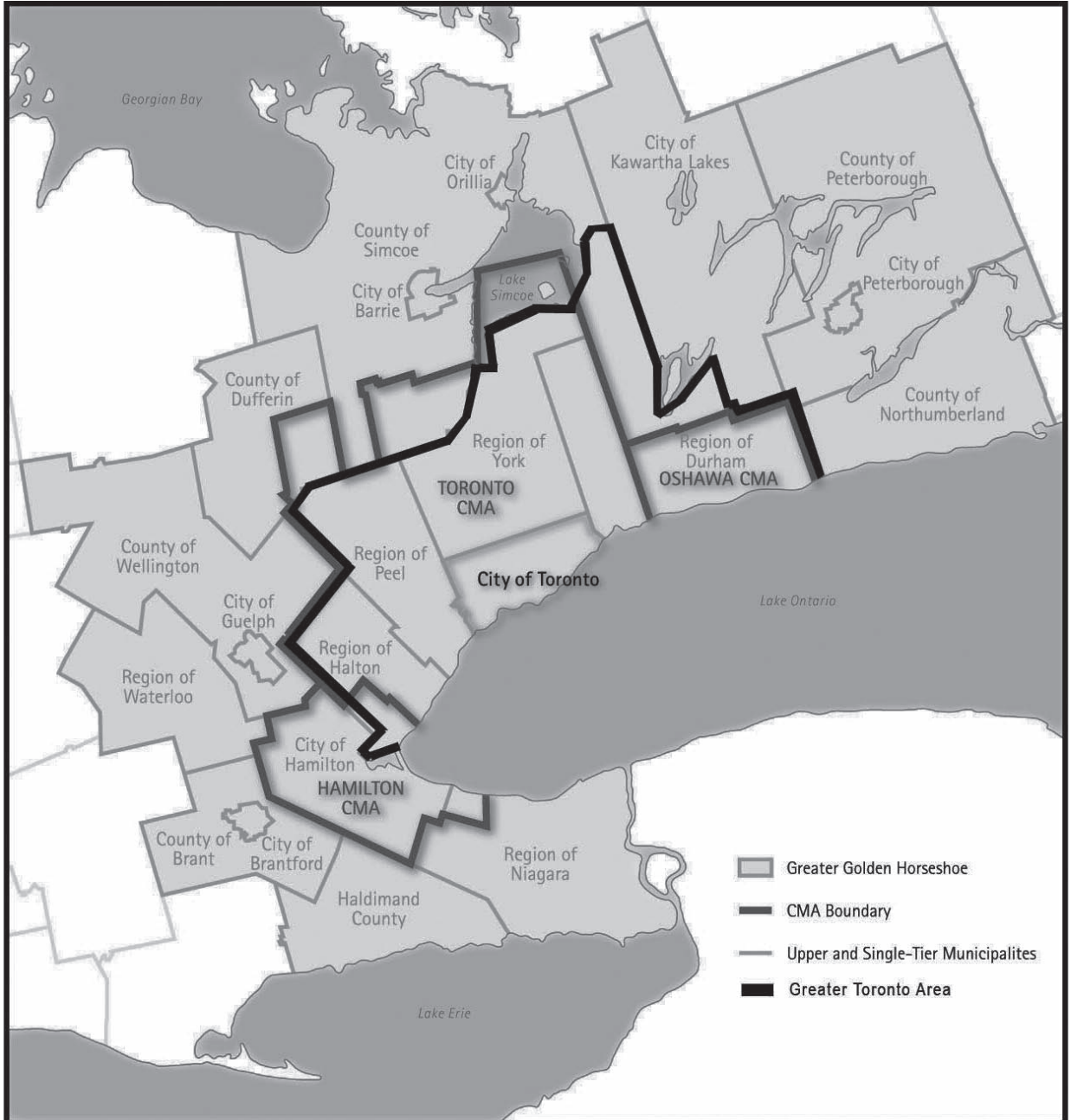
An even more extended area relevant to Toronto is the *Greater Golden Horseshoe*. This area, with 8.1 million inhabitants in 2006, covers the territory from Niagara Falls to the east of Toronto and north as far as Georgian Bay, including Kitchener-Waterloo, Barrie and Peterborough. The Golden Horseshoe has been used as a geographical distinction since the 1950s, but was first used in policy documents in the 2004 *Growth Plan for the Greater Golden Horseshoe: Discussion Paper* of the province of Ontario, because it presents a connected area of industrial activity (Figure 1.1). Its population represented 25.6% of the national population and 66.6% of the provincial population in 2006.

Between 1990 and 2005, the Toronto region’s population grew by more than 2% per year, one of the fastest growth rates among OECD metropolitan regions (Figure 1.2). Only Auckland, Dublin, Vancouver, Turkey’s major cities, and a few US metropolitan regions grew faster during this period. Most of this growth was experienced in the Toronto region as a whole, rather than in the City of Toronto itself, where population is growing less rapidly. The greatest part of this population growth is the result of immigration, for which the Toronto region is the main hub in Canada. From 2001 to 2006, the regions of Toronto, Montréal and Vancouver attracted a total of 68.9% of new immigrants to the country; the Toronto region’s share of the total number of recent immigrants was about 40.4% over the same period.⁷ Within the North American context, the Toronto region and Vancouver have the highest percentage of foreign-born inhabitants. They thus reap the benefits of a youthful population, of whom in the Toronto region approximately 70% are of working age (15-64 years). Within the OECD, this figure is exceeded only by Seoul, Busan, Prague, Vancouver, Dublin, Madrid, Warsaw, Ankara and Seattle. As a result, the Toronto region has one of the lowest elderly dependency rates among OECD metropolitan regions.

Approximately 15.8% of its population is older than 65 years old. Among metropolitan regions with similar income levels, only Dublin, Auckland, Dallas, Houston, Atlanta and Washington DC have lower elderly dependency ratios than the Toronto region.⁸

Population growth has been accompanied by urban sprawl. The Toronto region has a moderately high population density by North American standards, but is less dense than many Asian metropolitan regions, such as Tokyo and Seoul, and than several European metropolitan regions, such as London, Paris, Madrid and Rome.⁹ Municipalities within the

Figure 1.1. Map of Greater Toronto Area and Greater Golden Horseshoe

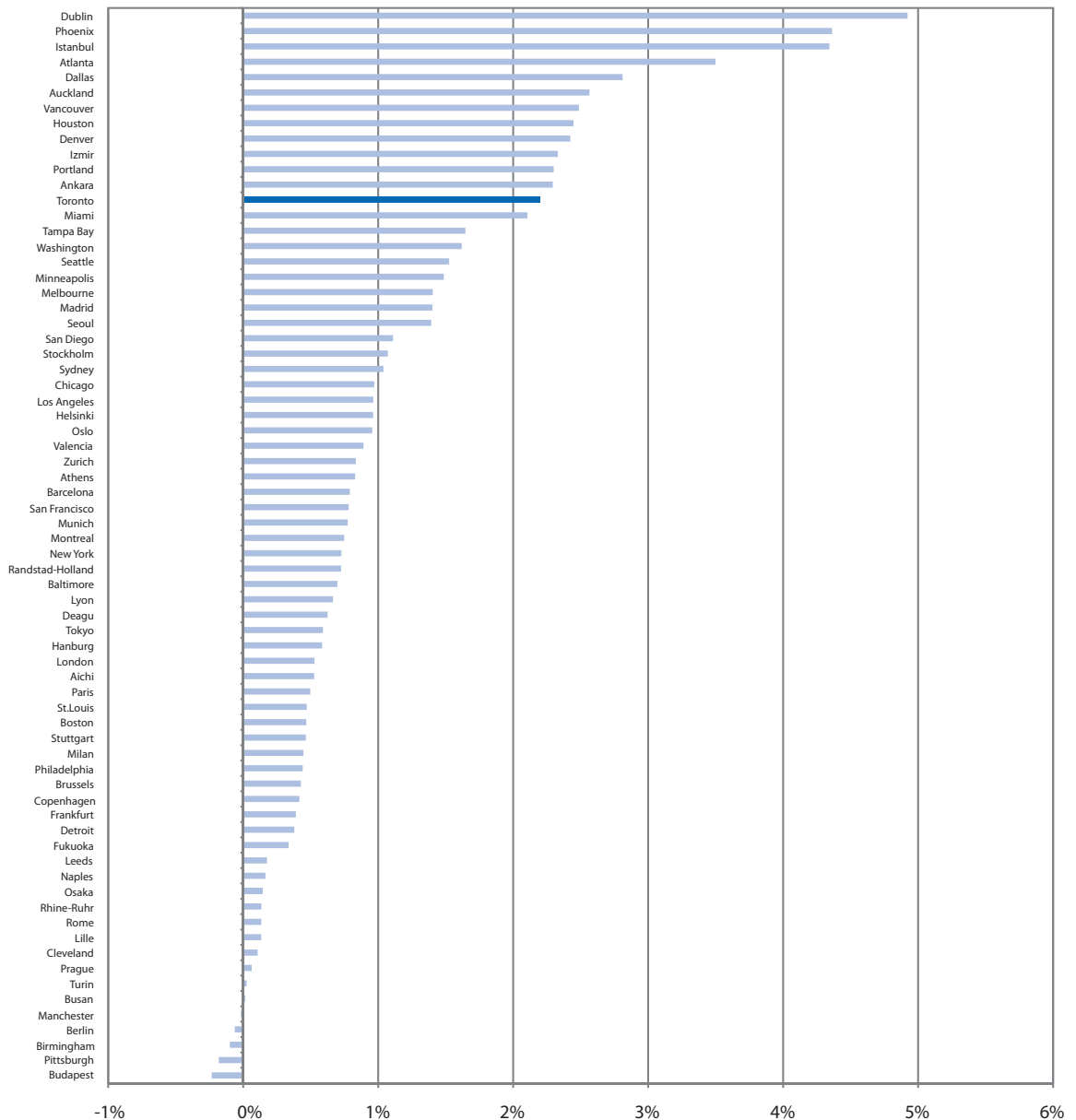


Source: Map provided by the City of Toronto.

Toronto region with the highest population density in 2001 were main economic nodes, such as the City of Toronto (with 42.7 people per hectare in the existing built-up area), Mississauga (23.9) and Markham (21.1) (Hess *et al.*, 2007). Employment and offices have increasingly become decentralised in various new urban nodes surrounding downtown Toronto. This sprawling development has brought congestion, resulting in economic and productivity losses as well as environmental and social costs and higher pressure on infrastructure development and the delivery of public services.

Steady immigration flows to the Toronto region have lent it a unique and distinctive feature: its unparalleled cultural and ethnic diversity. Of all OECD metropolitan regions, the

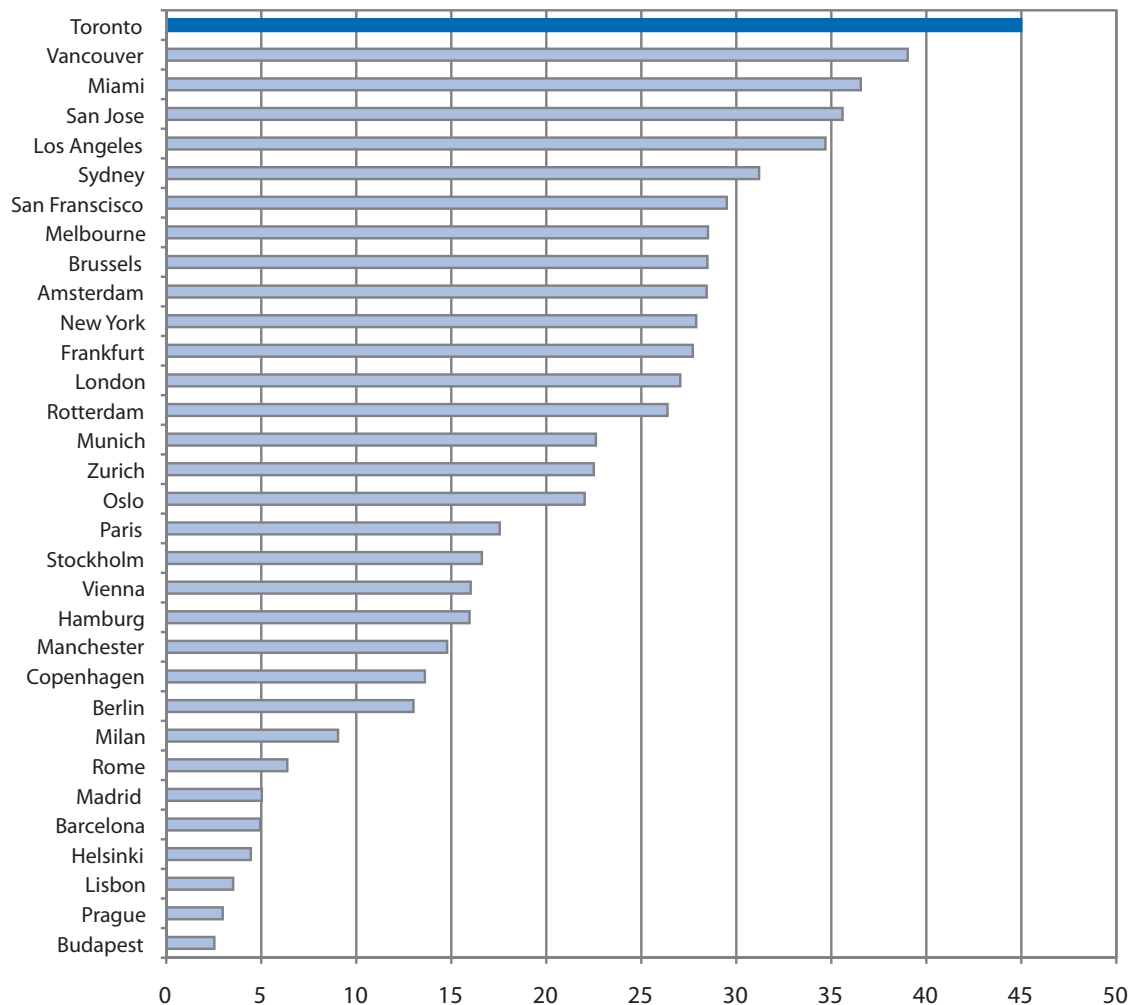
Figure 1.2. Average annual population growth in OECD metropolitan regions (1990-2005)



Source: OECD Metropolitan Database.

Toronto region has the largest proportion of foreign-born residents (46%) as a share of total population, which could be considered a close albeit imperfect proxy of cultural diversity (Figure 1.3).¹⁰ This is considerably more than other so-called global cities that are often considered the world's main multicultural cities, such as New York (28% foreign-born) and London (27%). The Toronto region also has an unusually diverse composition of different ethnicities: the four largest foreign-born population groups constitute only 15% of the total foreign-born population. By comparison, the four largest foreign-born population groups in London and New York make up 25% of their respective foreign-born populations (based on data from *www.gstudynet.org*). In other metropolitan regions in the OECD known for the size of their foreign-born population, this percentage can be 60% (Marseille) or even

Figure 1.3. Share of foreign-born population in metropolitan regions in the OECD



Source: Data from GW Centre for the Study of Globalization (*www.gstudynet.org*).

Note: Data refer to Metropolitan Statistical Areas for US cities, Census Metropolitan Areas for Canadian cities and to municipal boundaries for the other cities. Data are from 1998 (Brussels), 1999 (Paris), 2000 (Helsinki, Rome, Milan, Zurich), 2001 (Budapest, Prague, Manchester, Vienna, Stockholm, London, Frankfurt, Melbourne, Sydney), 2002 (Lisbon, Barcelona, Madrid, Hamburg), 2003 (Berlin, Munich), 2004 (Oslo), 2005 (Rotterdam, New York, Amsterdam, Los Angeles, San Jose, Miami) and 2006 (Copenhagen, Montréal, Vancouver, Toronto). The share of foreign-born population given for Toronto refers to the rate of immigrant population in the Toronto CMA.

70% (Birmingham). The six largest groups of foreign descent come from three different continents (excluding North America).

Immigration trends display several characteristics:

- The increase in the share of non-Western immigrants in Toronto's regional population has brought new challenges for integration. Before 1961, more than 90% of immigrants were of European origin, and less than 5% came from Asia. Since then, while the share of Europeans has been steadily falling, the share of newcomers arriving from countries in Asia has been increasing. From 1991 to 2006, roughly 15% of immigrants came from Europe and more than 65% from Asia. To a lesser extent, other regions of origin have also become more prevalent, with Central and South America and the Caribbean as well as Africa each at around 5%. The top five source countries from 2001-2006 were China, India, the Philippines, Pakistan and Sri Lanka. Leaving English aside, Chinese languages are now the most frequently spoken in the Toronto region, followed by Punjabi. Among recent newcomers to the City of Toronto, about 1 out of 10 report that they speak neither English nor French (Statistics Canada, 2006 Population Census). These new characteristics imply increasing challenges for public and private authorities within the field of labour market integration of immigrants.
- The Toronto region is the main gateway into Canada for immigrants, in which almost half of all immigrants to Canada settle. This sustained population increase has important implications for housing, land use and accessibility. Toronto's status as an immigrant city cannot be taken for granted. Skilled immigrants are internationally mobile and, as such, are more likely to pursue better economic opportunities elsewhere if their expectations are not met in Canada. Much of the internal migration of recent immigrants from the Toronto region remains within Southern Ontario. While the Toronto region may lose some new arrivals within one year of their arrival, they tend to settle in neighbouring CMAs, such as Hamilton, Oshawa and Kitchener-Waterloo (Newbold, 2007). The impact of population increases due to immigration in Canada is principally experienced in the Toronto region. Land use planning to accommodate population and demand for public services and infrastructure in the Toronto region are directly influenced by the settlement patterns of immigrants.
- Immigrants are not exclusively concentrated in the City of Toronto, but are spread across the different urban nodes within the Greater Golden Horseshoe, with consequences for region-wide alignment of policies and services for immigrants. Several urban nodes, such as Ajax, Pickering, Mississauga and Oakville, have immigrant arrival rates similar to and in some cases higher than those for the City of Toronto (Newbold and DeLuca, 2007). This multi-nodal structure of immigrant settlement means that services provided to immigrants in these nodes must be responsive to local circumstances, but at the same time aligned with the policies of other actors in the region.

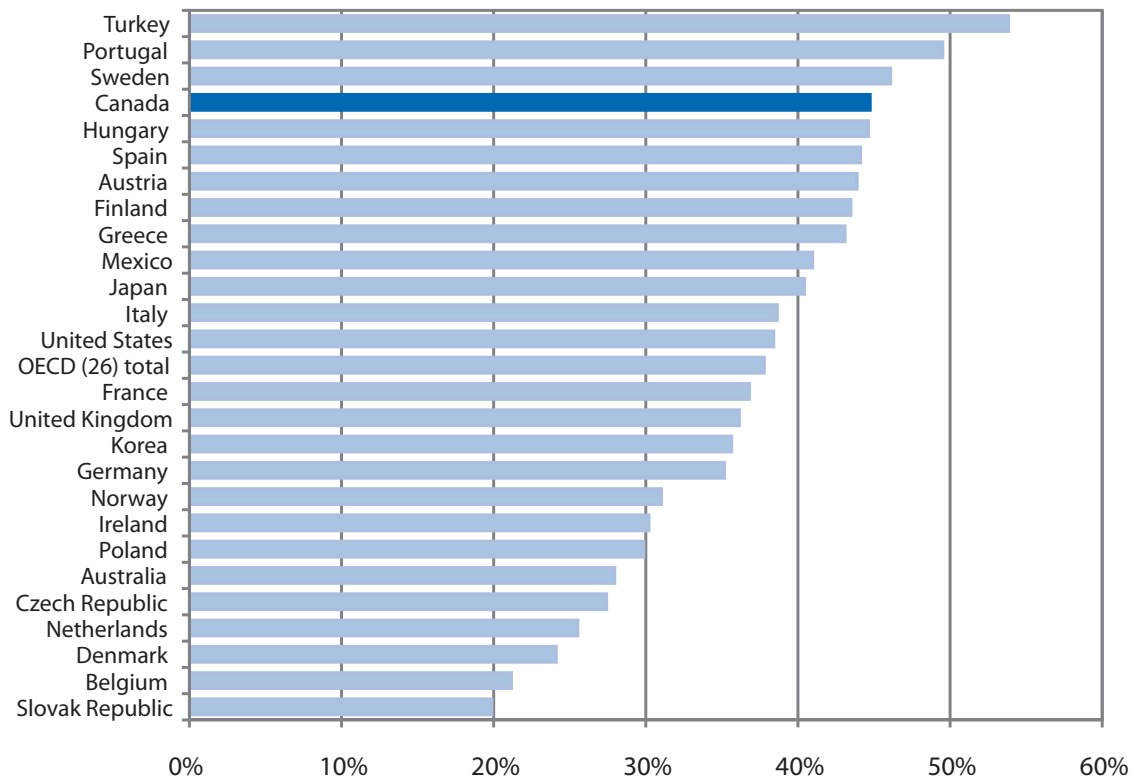
As will be discussed later, although immigrants are quite well integrated into the labour market and society, their potential for contributing to the Toronto region's economy remains under-utilised.

1.1.2. Mixed economic performance

The Toronto region is the main economic agglomeration in one of the most economically concentrated countries in the OECD. Canada concentrates almost half of its production in only 10% of its regions, a proportion exceeded only by Turkey, Portugal and Sweden (Figure 1.4). Almost one out of every five dollars in Canada originates in Toronto region, and nearly half of Ontario's production is located in the CMA. A number of metropolitan regions in smaller countries tend to produce a larger share of national GDP, but in many of those cases, Randstad in the Netherlands, Copenhagen, or Athens, for example, they represent the sole metropolitan region in their country (Figure 1.5).

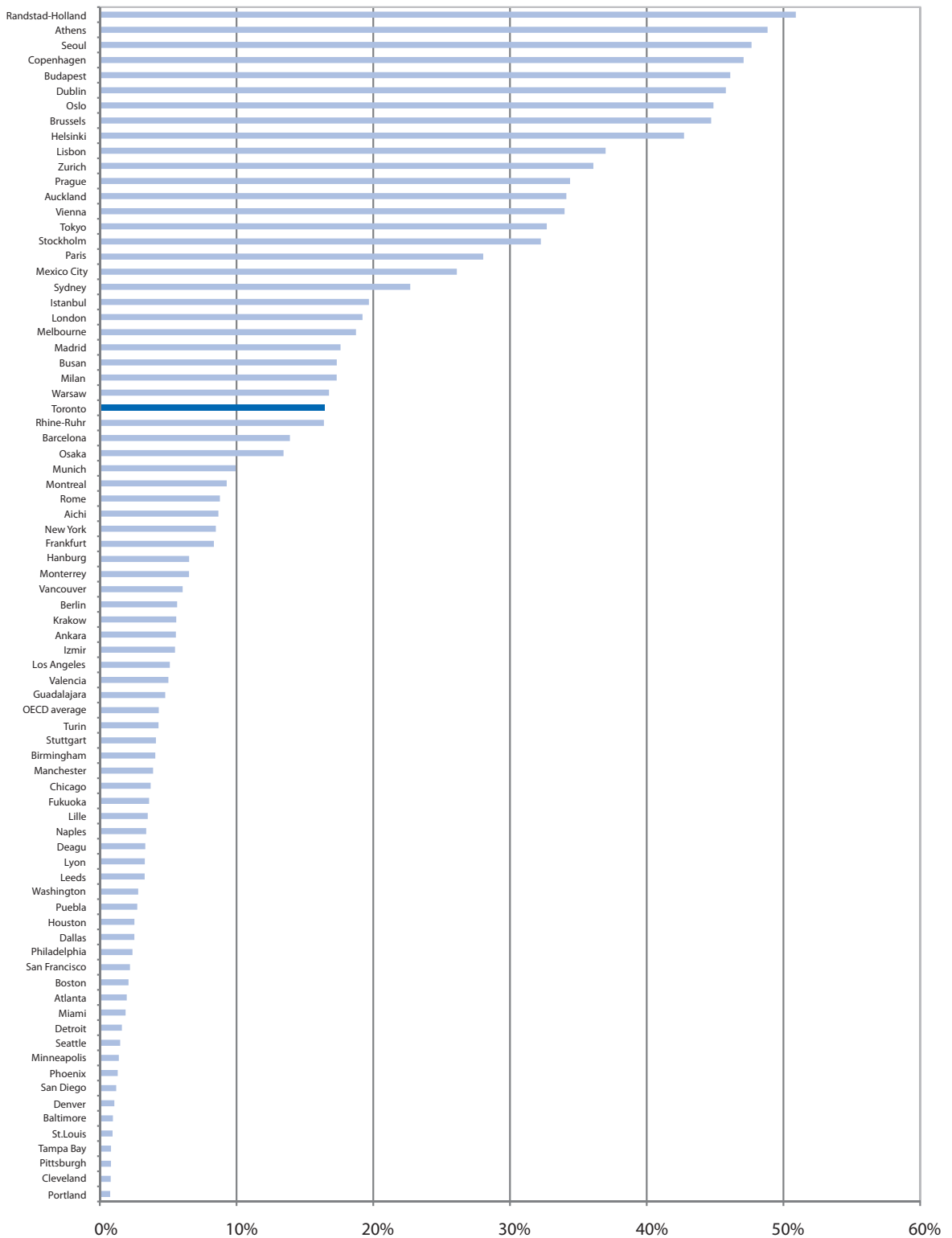
Toronto's regional economy creates positive economic spillovers for the wider Ontario economy. Although there is not an abundance of evidence concerning the importance of the role of Toronto or the main urban centres in Canada to the national economy, some indications can be drawn from the existing studies. Lefebvre and Brender (2006) found that economic growth in the nine largest Canadian metropolitan regions generated an even faster rate of economic growth in other communities within their province or region over 1987-2004, leading to intra-provincial economic convergence, but not to convergence of the main metropolitan regions themselves. One of the mechanisms through which these spillovers operate is via the labour market. Commuting patterns link the Toronto region, an area covering 16% of the population, with 21 additional CMA and Census Agglomerations

Figure 1.4. **Economic concentration in OECD countries**
Proportion of national GDP concentrated in 10% of the regions



Source: OECD (2007a).

Figure 1.5. Metropolitan GDP as share of national economy (2007)



Source: OECD Metropolitan Database.

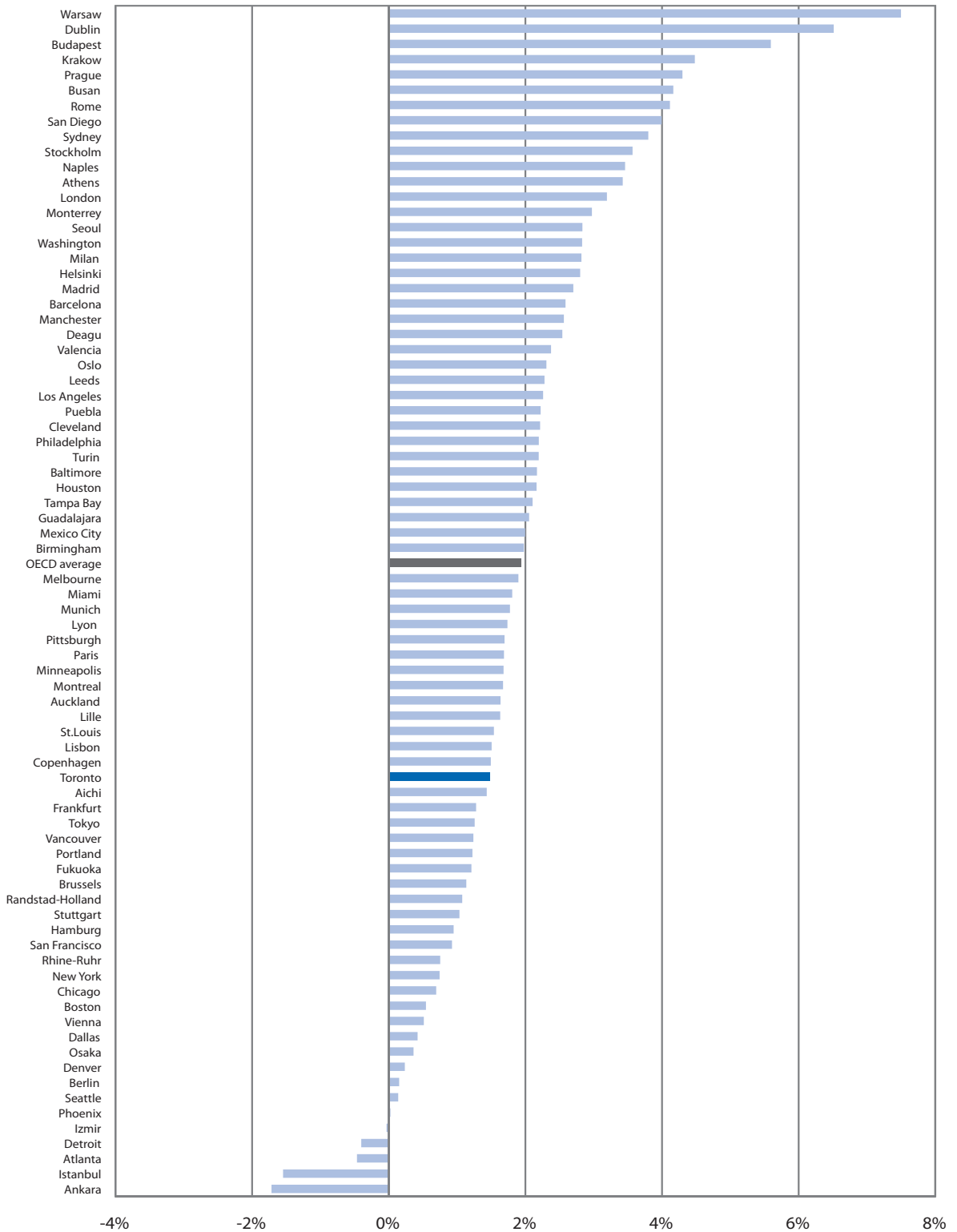
(CAs) representing 29% of the Canadian population (Ali *et al.*, 2008). Metropolitan regions also have regional spillovers related to population growth: urban centres in Canada with more than 500 000 inhabitants are found to be engines of population growth. Urban centres and rural towns benefitted from their proximity to major urban centres over 1981-2001, which probably correlates with commuting and business linkages (Partridge *et al.*, 2007). Finally, there might be regional productivity spillovers: a 10% increase in plants in science-based industries within 200 kilometres of an urban centre implied a productivity increase of approximately 2% (Baldwin *et al.*, 2008b).

The lack of sub-provincial data in Canada makes it difficult to compare Toronto's regional economic performance with that of other metropolitan regions in the OECD. Statistics Canada collects regional GDP data at the provincial level, but not at the Census Metropolitan Area level. Estimations of Toronto's regional GDP are made by the Conference Board of Canada, using data on the province of Ontario, and allocating GDP to the different CMAs according to their employment share in the different industries in the province. This method takes the different sector composition in the Toronto region into account, but assumes productivity in each sector to be similar across the whole province. As such, it may underestimate Toronto's GDP, as there is convincing empirical evidence for agglomeration effects in many OECD countries, resulting in higher productivity in metropolitan regions. There could thus be a downward bias for Toronto and other Canadian metropolitan regions when compared with other metropolitan regions in the OECD for which more accurate measurement of regional GDP and productivity exist. Caution is warranted when comparing productivity rates of OECD metropolitan region, as data on average hours worked in metropolitan regions are not available (and national averages have to be used instead). International comparison of Toronto's economic performance thus requires considerable prudence.

That being said, Toronto's economic performance yields a mixed picture, both within the domestic and the international context. Within Canada, other urban areas are outpacing the Toronto region in terms of economic growth. Calgary and Edmonton are growing faster, albeit partly as a result of their recent boom in oil production and the increase in oil prices. In fact, Toronto's per capita GDP in 2005 (USD 29 715) was slightly lower than the national average (USD 30 630), but national figures could be biased by the performance of the oil sector. On the international scale, economic growth in Toronto has been slightly lower than average among OECD metropolitan regions, mainly due to lagging labour productivity over 1995-2005 (Figure 1.6). Toronto's GDP per capita in 2005 was USD 29 715, thus ranking 47th among 74 metropolitan regions in the OECD metropolitan database, *i.e.* below many OECD metropolitan regions, including San Francisco, Boston, Paris and Milan. Its ranking in terms of labour productivity is even lower (58th out of 70) (Figure 1.7). An example of a metropolitan region that has the same regional GDP per capita but is almost one-third more productive than Toronto is Hamburg. Over 1995-2005, Toronto showed an annual output growth rate of 1.5%, while OECD metropolitan regions grew on average by almost 2% annually. Although this represents only half a percentage point below the OECD average for metropolitan regions, if this differential in economic growth is sustained for another decade, the current income gap between Toronto and the average of other OECD metropolitan regions will almost double in size. Moreover, labour productivity in Toronto has expanded at only 0.8% per year; that is, at less than half the speed of the OECD metro-regions for the same period (1.8% annually) (Figure 1.8).

Slow economic growth and a sluggish rate of productivity growth could be linked to the lack of capital investment. It has already been noted that Canada as a whole has invested heavily in the growing labour force. Such capital formation may have helped accommodate new workers, whilst not necessarily increasing the capital-labour ratio, and thus labour

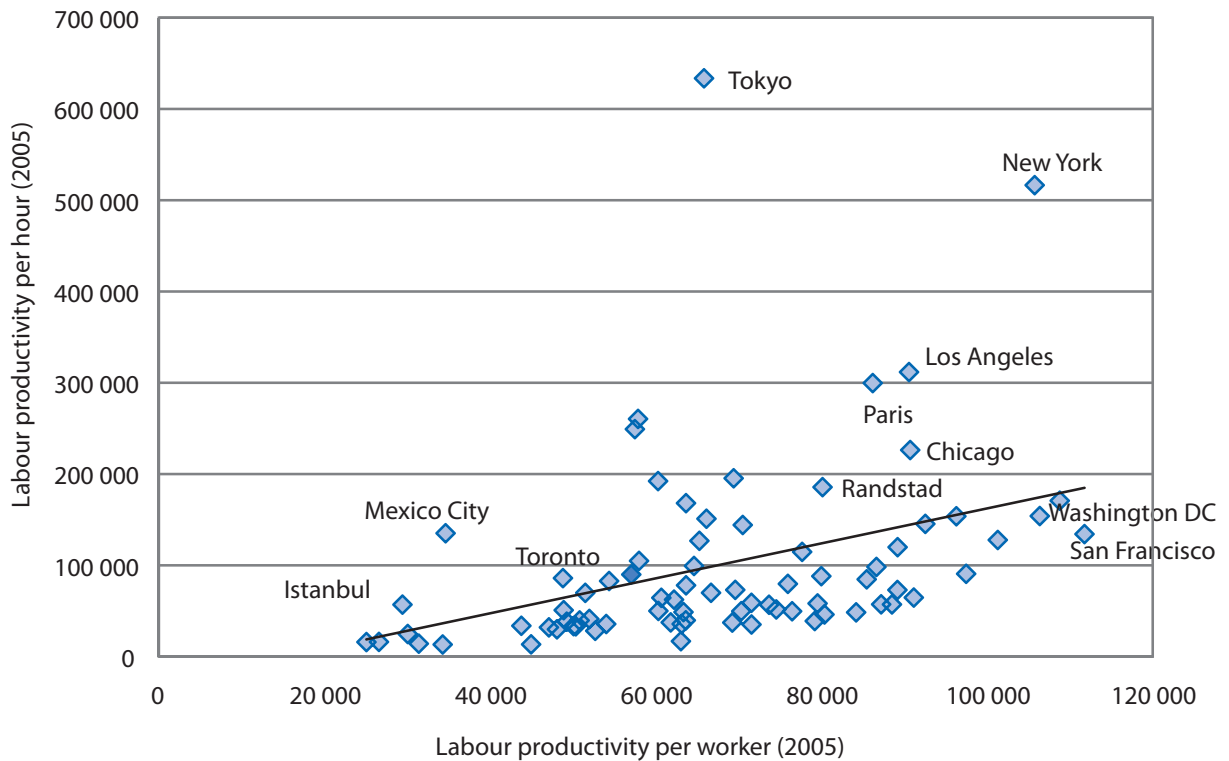
Figure 1.6. **Economic growth among OECD metropolitan regions (1995-2005)**
Average annual growth rates for per capita GDP values (1995-2005)



Source: OECD Metropolitan Database.

Figure 1.7. **Labour productivity in OECD metropolitan regions (2005)**

GDP per worker (labour productivity per worker) and GDP per worker corrected for hours worked (labour productivity per hour) in USD 2005

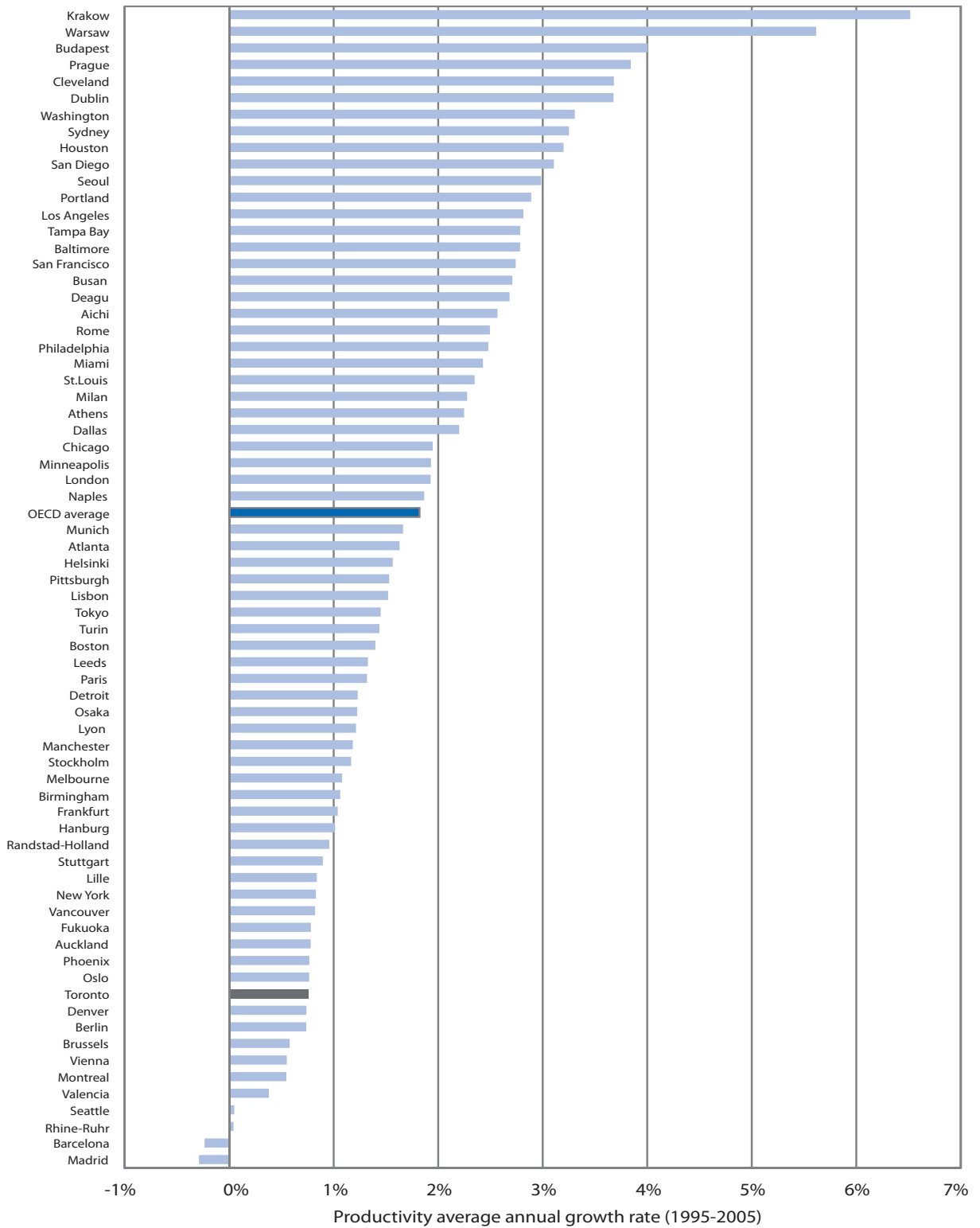


Source: OECD Metropolitan Database.

productivity may be lagging behind simply as a consequence of lack of investment in the past. Canadian businesses tended to invest less in capital per employee than their G7 counterparts between 1995-2009, although investment performance estimates for 2009 and 2010 show considerable improvements (Busby and Robson, 2009). It is possible that the influx of immigrants may have influenced the relative prices of capital and labour. New workers may have slowed down wage increases, while the recent exchange-rate appreciation may have increased the cost of new technologies, hence influencing firms' decision to use labour instead of capital. As the *OECD Economic Survey of Canada* (2008) pointed out, the composition of capital investments may have also influenced productivity, given that firms in Canada display a widening gap in information and communication technology (ICT) utilisation compared to the United States, which affects efficiency, particularly in the services sector.¹¹ Poor productivity growth in recent years was not limited to Toronto; Canada as a whole did poorly in this respect and showed an increasing productivity gap with respect to the United States and some European countries, such as the United Kingdom. While productivity in Canada as a whole grew above the OECD average in the period from 1995 to 2000, it has since weakened, with annual growth of 1% in 2001-2006, compared to an OECD average of 1.8% (OECD, 2008d).

Toronto might also be affected by the boom in natural resource production and export in Western Canada. Productivity gaps with the United States and other countries have been a concern in Canada since the 1990s, but the gap widened between 2001 and 2006. With

Figure 1.8. Labour productivity growth in OECD metropolitan regions
Average annual growth rates in labour productivity (1995-2005)



Source: OECD Metropolitan Database.

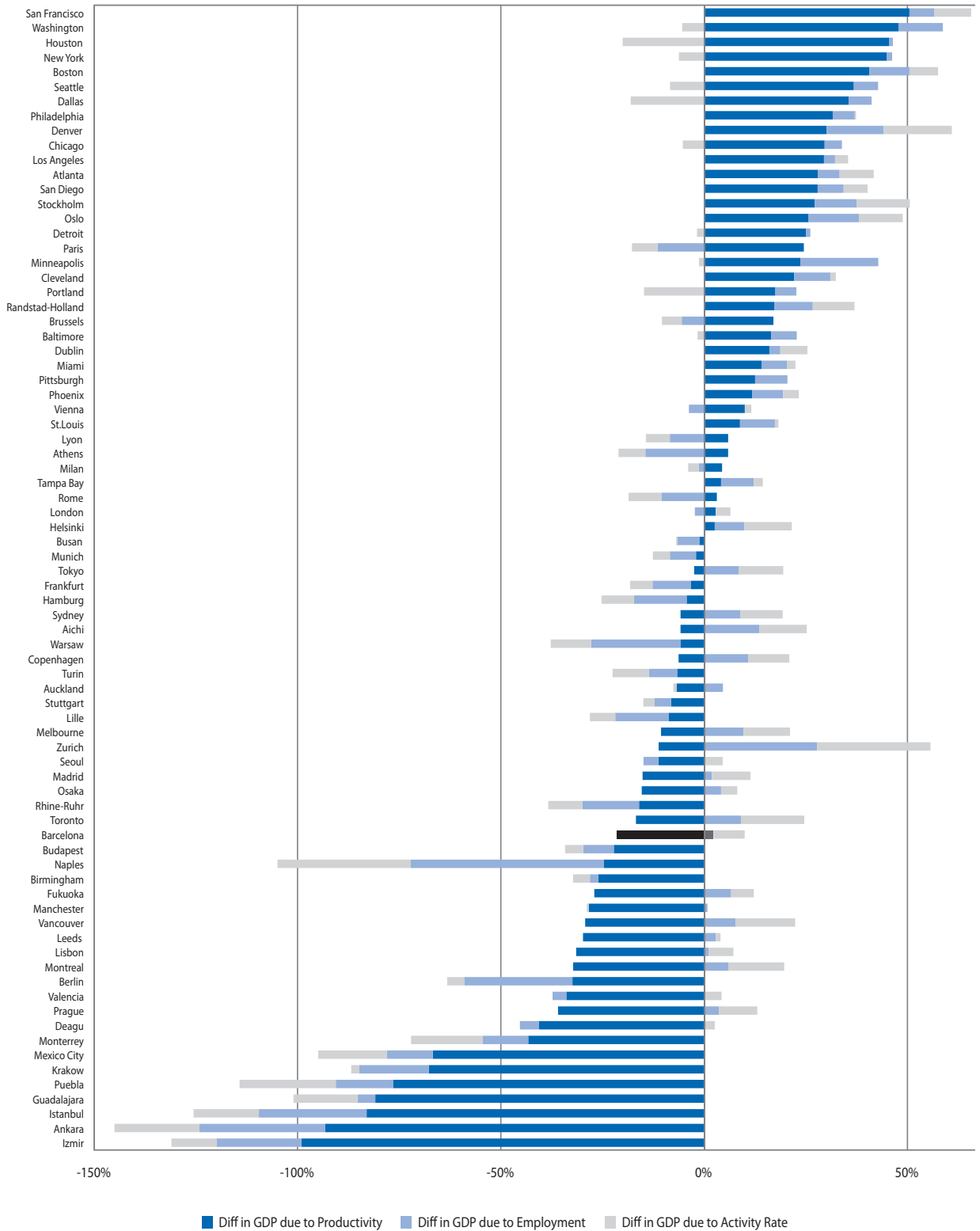
the improvement of the trade balance in Canada chiefly linked to oil prices, the country has experienced an influx of revenues from natural-resources activities that have increased wage differentials between oil production and manufacturing. Improved wages in Alberta have drawn workers to manufacturing in other provinces at a time when the inflow of cash from the oil sector has pushed up the value of the currency, making manufacturing less competitive internationally as a consequence. This crowding out of manufacturing by natural resources (“Dutch disease”), together with the appreciation of the Canadian dollar and increased global competition, might explain the decline in manufacturing employment in the Toronto region. It could also explain the higher costs of capital formation, leading to even slower productivity gains.

The need for faster labour productivity growth may be more important than ever. Canada at large is facing a productivity gap with respect to the United States, at a moment where there are already signs of an ageing population, despite large inflows of immigrants (OECD Economic Surveys, Canada 2008). Metropolitan regions in Canada are facing similar problems. In Toronto, sluggish labour productivity gains were compensated for by a healthy rate of activity and employment (Figure 1.9). Although elderly dependency rates are still below the OECD metro-regional average (Figure 1.10), Toronto has started to see a positive increase in this dependency rate (Figure 1.11). The 55-to-64 population cohort represents more than 10% of the CMA population. Even if migration continues to fuel Toronto’s labour market, elderly dependency is likely to become a pressing issue in the next decade. If productivity gains fail to materialise, future economic expansion of Toronto could be compromised.

Much of Toronto’s modest economic growth can be attributed to favourable conditions in the labour market. Thanks to the constant influx of immigrants, who are generally quite young, Toronto’s working population share (52%) is among the largest in the OECD, lower only than that in Zurich, Minneapolis and Washington DC (Figure 1.12). Moreover, Toronto has had a strong showing in job creation in recent years. Between 2002-2006, the Toronto region created more than 50 000 jobs every year; an average annual increase of 2%. Between 1995-2005, Toronto managed to reduce its unemployment rate by 1.64%, but it remains slightly above average among OECD metropolitan regions (Figure 1.13). In 2005, the unemployment rate in Toronto (6.97%) was very close to the average (6.8%) for OECD metro regions (Figure 1.14). Within the Toronto region, unemployment remains higher in the City than in the rest of the region, and since 1990 has been consistently higher than in Canada as a whole.

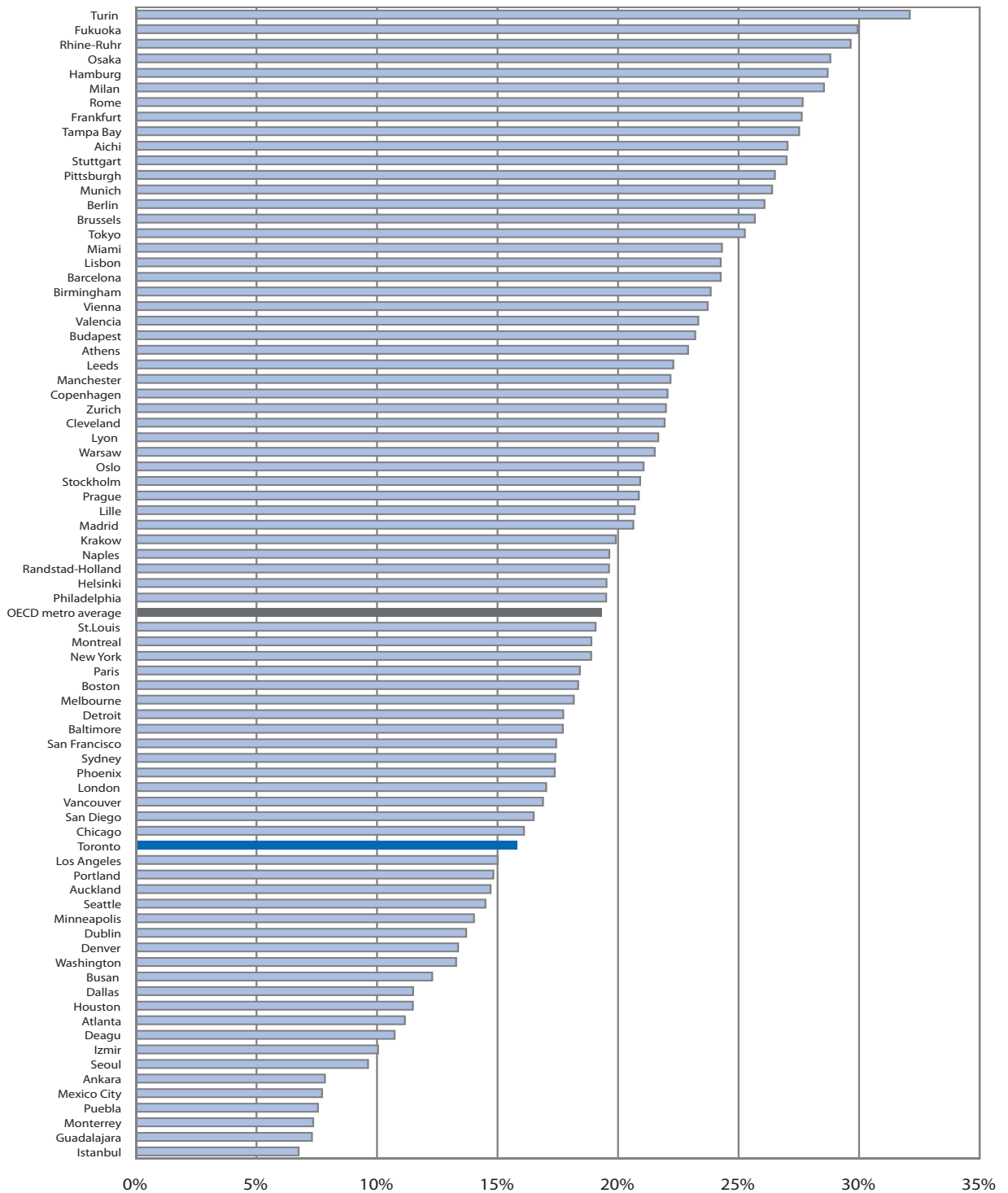
Although among Canadian metropolitan regions the Toronto region has the largest share of population with a university degree, human capital formation remains an area of opportunity available to boost the region’s productivity and innovation. Among OECD countries, Canada has one of the highest shares of population with university degrees, yet Toronto ranks average among a selection of OECD metropolitan regions (22nd out of 48) in terms of the overall share of its population with a higher-education degree. This might be explained by the fact that regional differences in higher-education attainment in Canada are relatively smaller than in many other OECD countries. As a result, many American and also some Japanese and European metropolitan regions score higher on higher-education attainment than the Toronto region (Figure 1.15). While Toronto competes in many sectors with North American cities, such as Chicago, it lags behind many of the other cities in terms of skills. The population of the Toronto region, however, has favourable rates of higher-education attainment compared with the Canadian average. This higher-education attainment rate has increased considerably since 1990, especially in the City of Toronto, where the increase has been around 10 percentage points for the younger age cohorts.

Figure 1.9. Factors behind economic growth in OECD metropolitan regions (2005)
Decomposition of economic growth



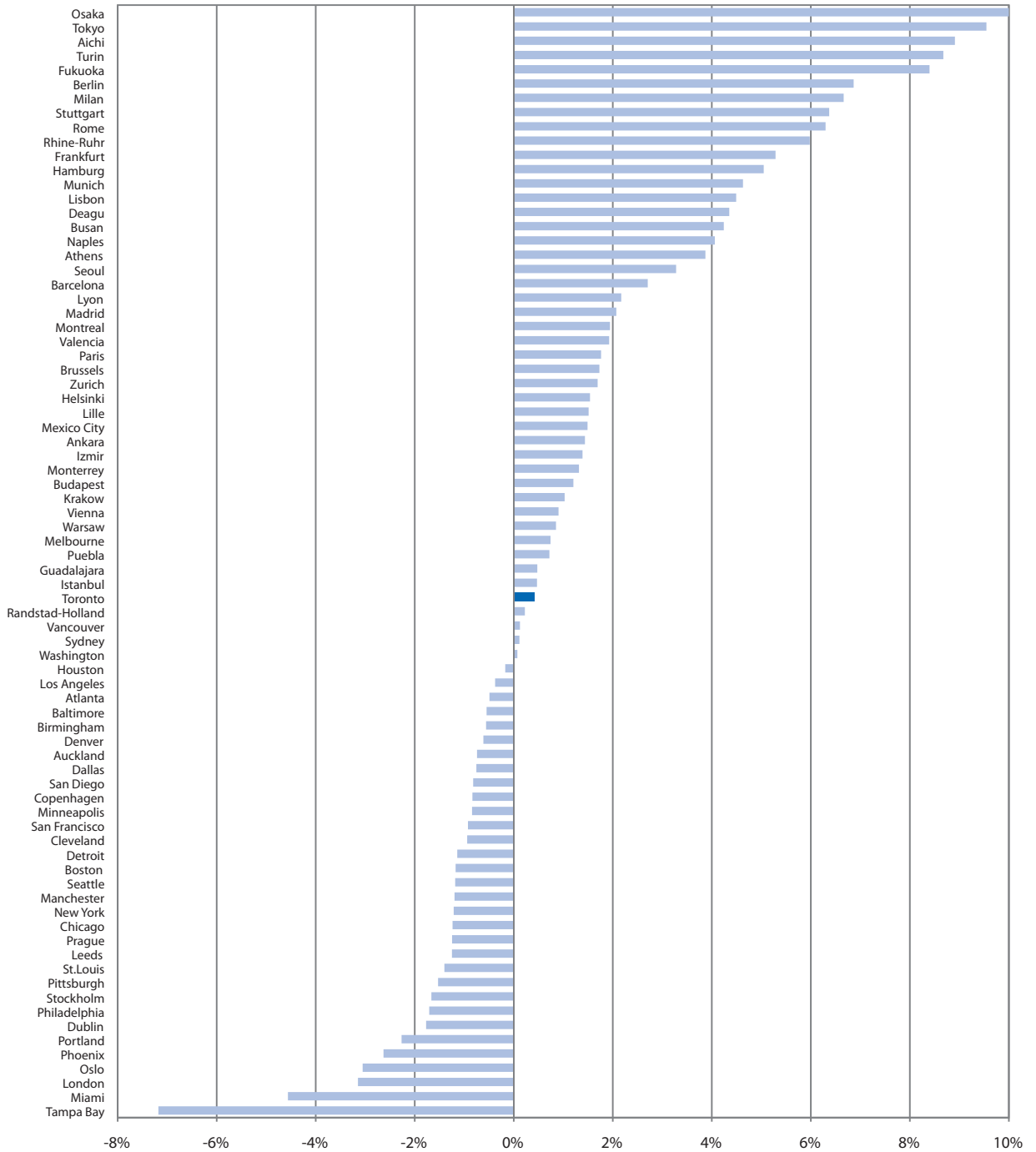
Source: OECD Metropolitan Database.

Figure 1.10. Elderly dependency rate in OECD metropolitan regions (2005)
 Population of 65 years and older as a share of the population between 15 and 64 years old



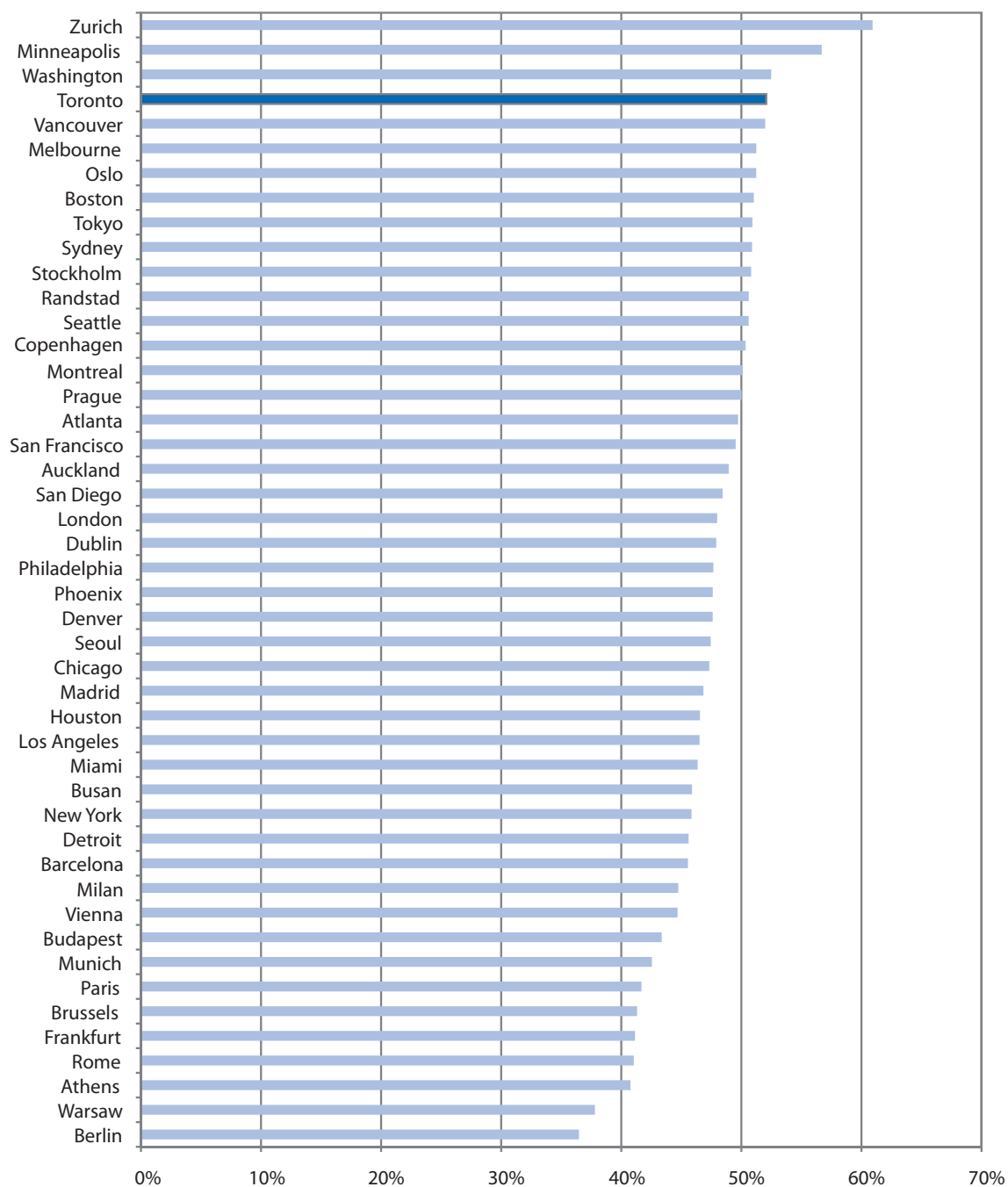
Source: OECD Metropolitan Database.

Figure 1.11. Ageing in OECD metropolitan regions
Change in elderly population rates (1995-2005)



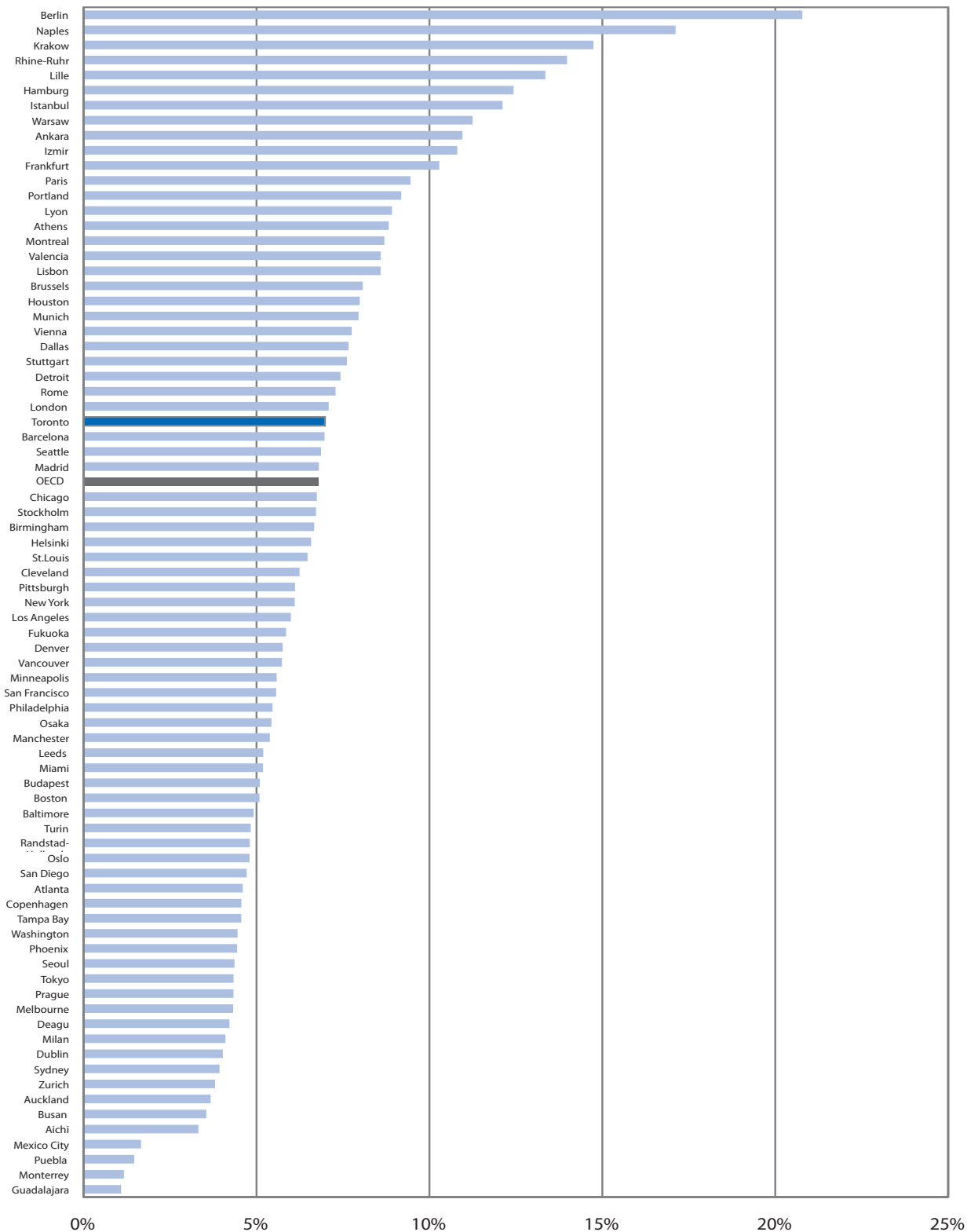
Source: OECD Metropolitan Database.

Figure 1.12. Share of the total working population in OECD metropolitan regions (2005)



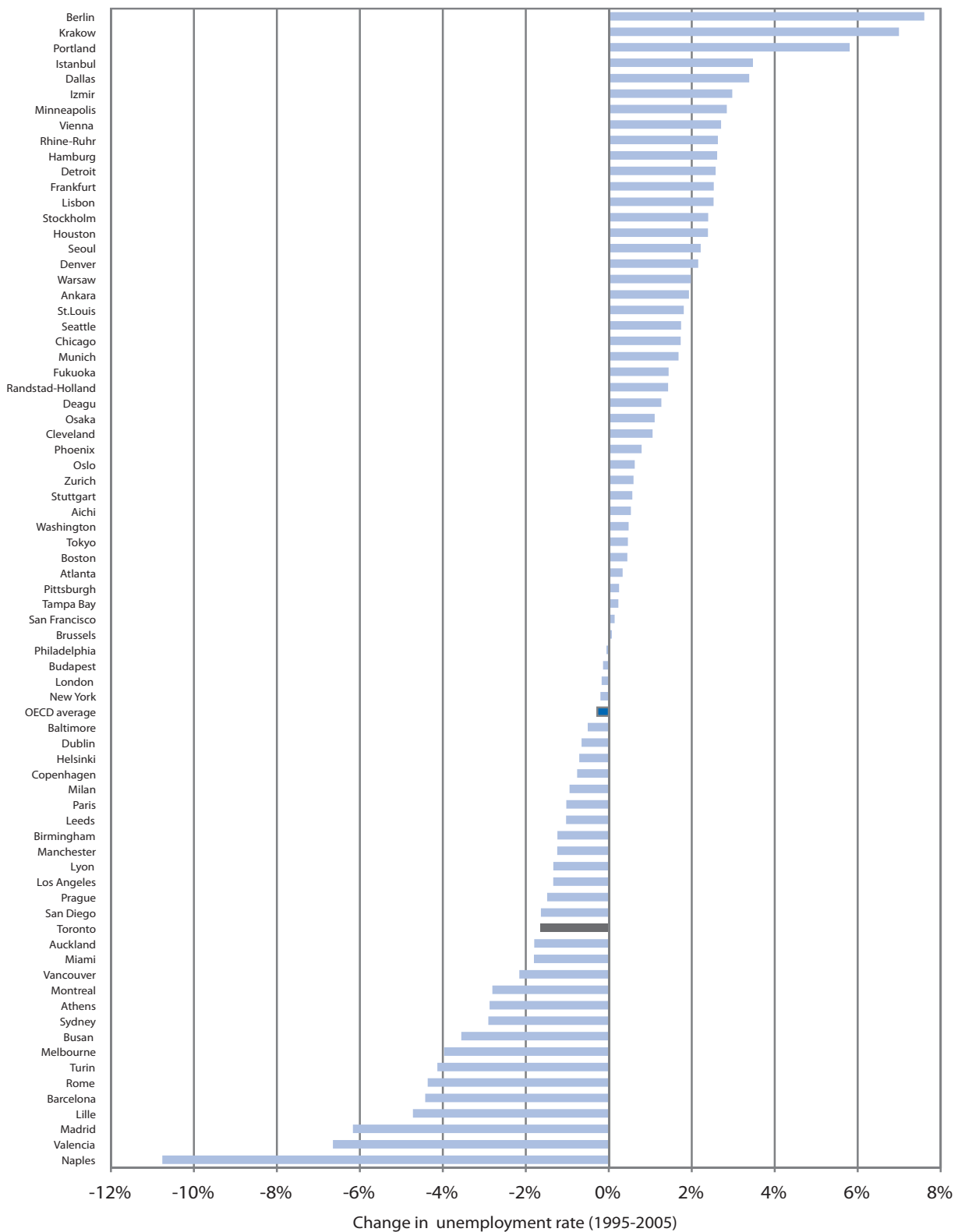
Source: Based on data from OECD Metropolitan Database.

Figure 1.13. Unemployment rates in OECD metropolitan regions (2005)



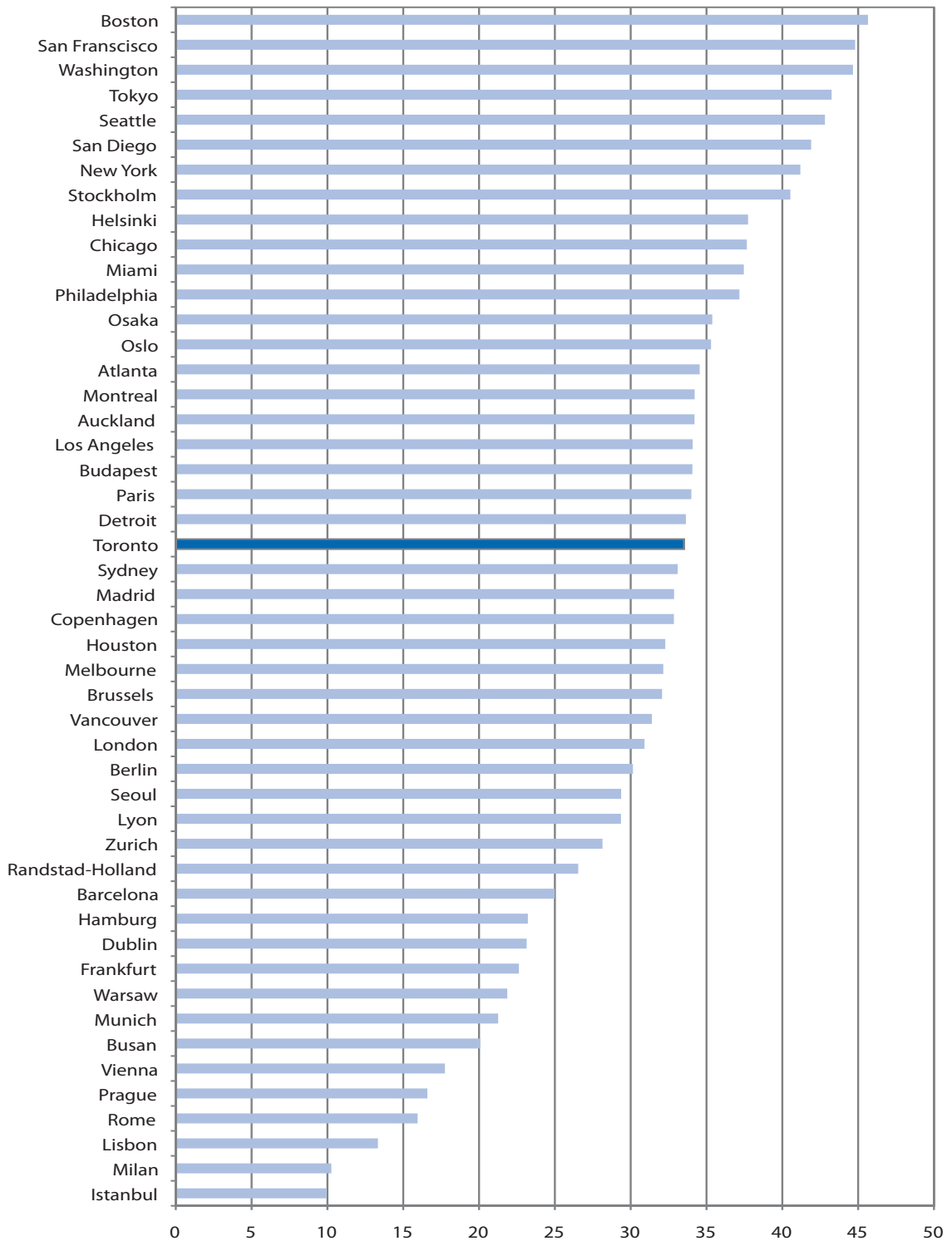
Source: OECD Metropolitan Database, based on OECD Regional Database (OECD, 2009c) using data from Eurostat and national statistical offices.

Figure 1.14. Change in unemployment rates in OECD metropolitan regions



Source: OECD Metropolitan Database.

Figure 1.15. Higher-education attainment in metropolitan regions in the OECD (2004)



Note: Higher-education attainment is defined here as the possession of a degree at least International Standard Classification of Education (ISCED)-Level 5 and 6. ISCED-level 5 refers to the first stage of tertiary education (short, medium or long duration), ISCED-level 6 refers to the second stage of tertiary education (leading up to an advanced research qualification).

Source: OECD Regional Database.

1.2. Main challenges and opportunities

Several exogenous factors can explain the sluggish economic growth and productivity in the Toronto region since the beginning of the 2000s. Much of the region's recent modest economic growth has been sustained by a boom in the housing market in a context of low interest rates and rising demand. This spurred demand in construction, sales and retail, and professional and financial services. Other traditional sectors, especially in the manufacturing industry, which still represent a large share of Toronto's economic base (20% of the regional GDP) have endured fierce competition from countries where labour is cheaper, such as China, India and Mexico, leading to a 10% decline in employment since 2002. In recent years, the low costs on which many of these sectors' comparative advantages were based has also been undermined by the appreciation of the Canadian dollar, whilst these same industries have had to deal with an increase in the price of commodities, especially from imported oil and gas, which are an important part of their production process. Finally, the high dependency of the region's export-oriented manufacturing sector on US markets has made it particularly vulnerable to the US cyclical downturn.

Mixed scores for Toronto on economic and productivity growth are also associated with internal factors linked with changes in its sectoral specialisation and its business environment; the capacity of its labour force to offer the necessary skills to foster innovation and entrepreneurship; and the infrastructure that supports business development and a pooled labour market. Three main concerns stand out in particular, namely:

1. *Lagging productivity.* Although Toronto has a diverse set of economic specialisations, it has lagged behind in productivity in many sectors. Underlying this problem are concerns about the value added of the sectoral mix, agglomeration economies in Toronto, productivity within Toronto's sectoral mix and the outcomes of innovative activities in Toronto.
2. *Untapped cultural diversity.* One of Toronto's assets in comparison with many other metropolitan regions in the OECD is its cultural diversity and the consistent influx of highly skilled immigrants. In order to leverage cultural diversity for economic competitiveness, better use could be made of immigrants' skills and potential contributions to innovation.
3. *Unsustainable and inadequate infrastructure.* Population growth in the area has had a large impact on infrastructure, land use and congestion, with consequences for air quality and sustainability. Ongoing sprawl has complicated the provision of public transit and the co-ordination of land use and transportation planning.

1.2.1. Lagging productivity

There are four ways in which productivity in Toronto can be explained and addressed:

- a. *Sectoral mix:* Is Toronto specialised in the economic sectors that generate the highest value added? Due to globalisation and several of the exogenous factors referred to above, several sectors face global competition in areas where cost advantages are sometimes the determining factor and some sectors have relocated abroad. Technological development continuously changes the value added of some sectors relative to others. Metropolitan regions across the OECD have economic specialisations in different sectors; and these differences in sectoral mix explain part of the productivity differences. The analysis of changes in Toronto's sectoral specialisation between 2001-2006 – discussed below – highlights internal structural factors influencing Toronto's economic model.

- b. *Organisation of the productive sector*: Are spatial economic patterns facilitating productivity? Spatial clustering can have a positive impact on productivity, as it stimulates knowledge spillovers. These effects appear to differ between sectors and can be more or less important depending on the geographical proximity of the firms concerned.
- c. *Productivity within sectors*: Are firms in Toronto productive in these different sectors? The question here is whether firms in Toronto perform activities within the value chains of sectors that create high value added. These could for example be high-order functions performed in head offices and globally linked regional head offices; the very presence of these might be important, but so might the question of whether the conditions are in place to continue to attract them. The extent of exports could also be considered an indicator of productive operations on an international scale.
- d. *Creating value added by innovation*: Are firms becoming more productive because they invent and innovate? Innovation is closely linked with the regional innovation system as a whole, which is influenced not only by the firms themselves, but also by higher education and research institutions. In order to create value added for business, commercialisation of research and development is particularly important.

A. Value added of sectoral mix

Toronto's sectoral industrial mix entails a strong manufacturing share as compared with many other OECD metropolitan regions. In 2006, the manufacturing sector represented 20% of the region's GDP, the largest employment share, yielding higher value added per worker than most other economic sectors. In contrast, other major metropolitan regions, for example New York, London, Paris, Madrid or Chicago, are, like Toronto, specialised in financial services, and less specialised in manufacturing (Table 1.2). Employment growth in manufacturing between 1996-2006, however, was slower than any other sector in Toronto, and declined between 2002-2006, whereas most other sectors, especially construction and finance and insurance, witnessed employment growth over this period (Table 1.3). Manufacturing employment decline was associated with the appreciation of the Canadian dollar, a rise in commodity prices and increasing global competition, especially from China (TD Economics, 2007).

Table 1.2. **Main economic sectors in Toronto**

	Employment share 2006	Share in regional GDP 2006	Value added per worker (CAD)	Average annual employment growth rate 1996-2006	Average annual employment growth rate 2002-2006
Wholesale/retail	16.1%	14.0%	64 200	3.5%	3.7%
Manufacturing	15.9%	20.1%	93 800	0.8%	-2.5%
Health	8.0%	4.1%	38 100	2.4%	3.1%
Finance, insurance, real estate	7.9%	25.8%	99 500	3.5%	6.1%
Other professional services	6.6%	4.5%	51 400	2.6%	1.0%
Education	6.2%	3.6%	42 900	3.2%	5.5%
Construction	6.0%	4.7%	57 300	6.0%	6.4%
Transport	5.1%	9.5%	59 300	1.8%	2.2%
Accommodation and food	4.9%	1.6%	23 600	1.6%	-0.5%

Source: Based on data from Conference Board of Canada.

Table 1.3. **Economic specialisations of selected metropolitan regions in the OECD (2005)**

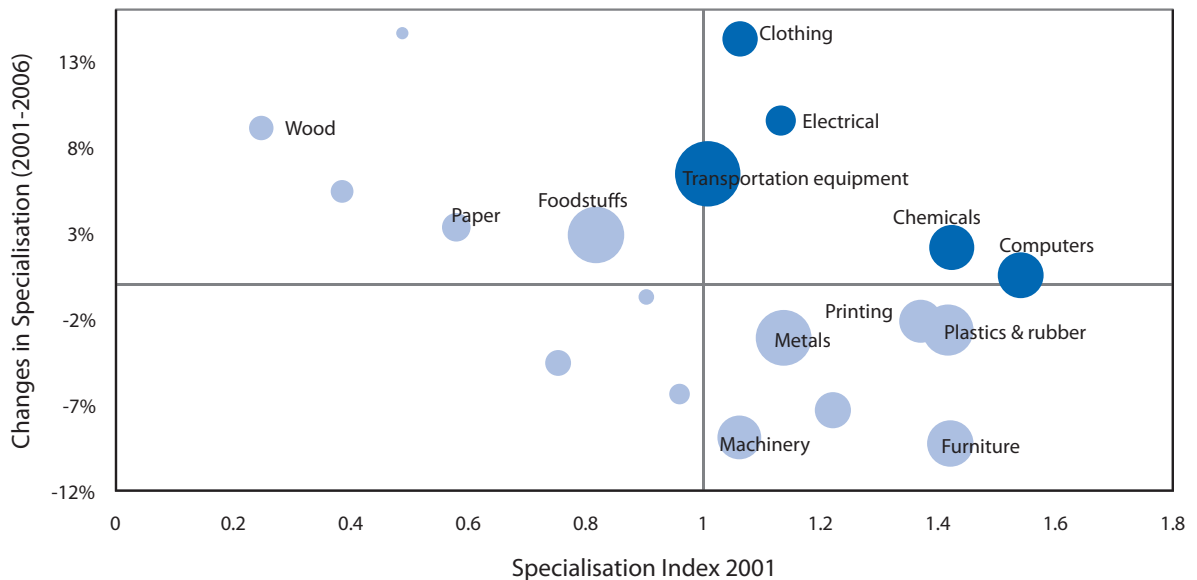
	Manufacturing	Utilities	Wholesale and retail	Hotels and restaurants	Transport, information and culture	Financial services	Health	Education
Toronto	1.38	0.74	1.05	0.71	1.31	1.61	0.68	0.72
New York	0.55	0.88	0.92	0.68	1.18	1.81	1.11	1.43
Chicago	1.03	1.04	0.96	0.86	0.98	1.15	0.87	1.08
Los Angeles	1.04	0.57	0.92	0.84	1.13	0.93	0.74	1.23
Paris	0.65	1.09	0.95	1.26	1.30	1.79	0.85	0.85
Madrid	0.67	1.14	0.96	0.88	1.40	1.52	0.98	0.98
London	0.48	0.42	0.85	1.04	1.29	1.95	0.76	0.78

Note: Scores equal to 1.0 indicate that the employment share in that sector is similar to the national average. Scores higher than 1.0 represent a higher share of regional employment in this sector than the national average, indicating specialisation. Scores lower than 1.0 represent a lower share of regional employment in this sector than the national average, indicating limited specialisation in this sector.

Source: Based on data from the OECD Regional Database

Figure 1.16. **Sectoral dynamics in Toronto (2001-2006)**

Change in specialisation by 3-digit sector



1. Specialisation is measured as the quotient of employment in the sector in Toronto in relation to employment in the sector in Canada, corrected for total employment shares in Toronto. A score of 1 means that a sector in Toronto has an employment share similar to one that would have been expected on the basis of its working population (that is, not specialised); a higher score indicates a sector in which Toronto is specialised; a lower score indicates under-specialisation.

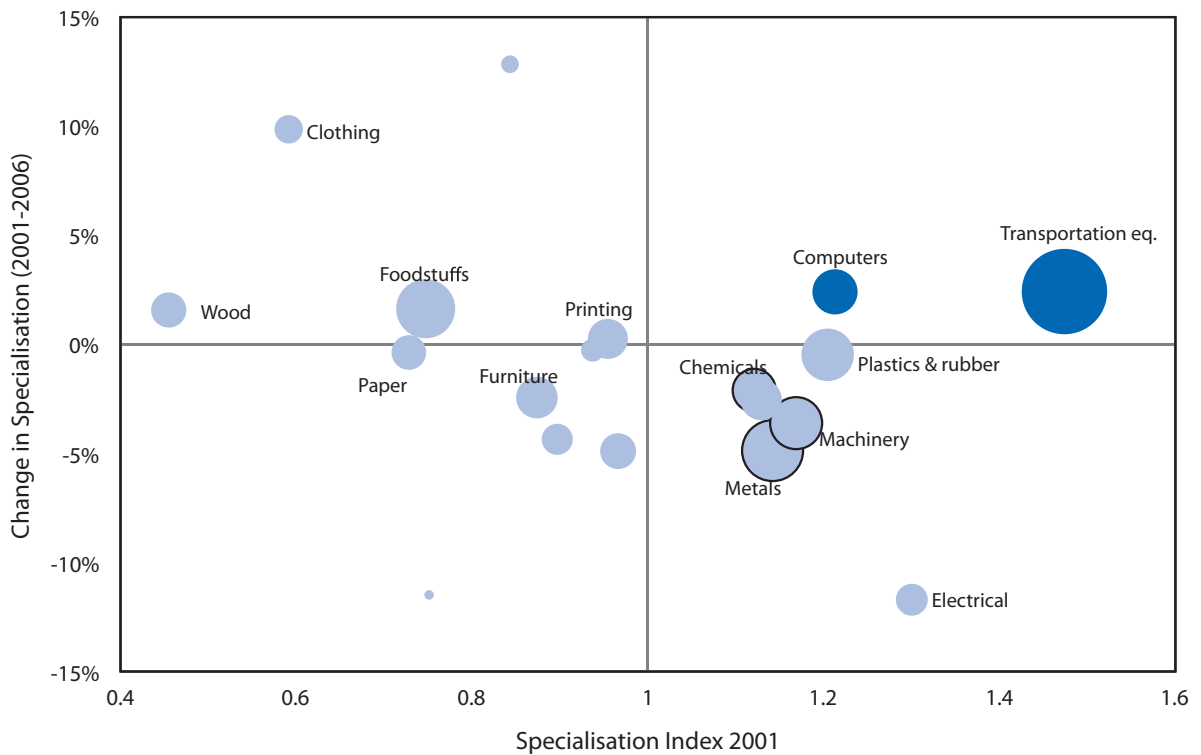
2. Bubble size denotes sector size in terms of employment.

Source: Own calculations based on data from Statistics Canada.

Although Toronto is specialised in a number of manufacturing subsectors, activities with high employment values are facing challenges. The largest manufacturing subsectors are transport equipment, foodstuffs, metal industries, the chemical industry, machinery, furniture and information technology (IT). Although some of these industries are well represented in the region, for the most part they have either lost specialisation or the city still lacks specialisation in that industry. Traditional industries in the region have lost ground to other competitors in Canada. Toronto is still specialised in metal industries, machinery, printing, plastics and furniture, but the relevance of these industries is waning (Figure 1.16). Although foodstuffs represent a growing industry as far as employment is concerned, Toronto is not yet specialised in it. Toronto’s CMA has nevertheless been successful at further specialisation in IT, the chemical industry and to a lesser extent, transport equipment.

The dynamics of specialisation in manufacturing in Ontario reflect for the most part those in Toronto, but interesting changes are taking place in the region that could have benefits for Toronto and complications for the rest of the province. While the Toronto region has a growing specialisation in typically labour-intensive activities such as clothing and electric industries, Ontario is losing jobs in these specific industries (Figure 1.17). It could be the case that the industry has retained the higher value-added parts of the value chain,

Figure 1.17. Sectoral dynamics in Ontario
Change in specialisation (2001-2006)



1. Specialisation is measured as the quotient of employment in the sector in Toronto in relation to employment in the sector in Canada, corrected for total employment shares in Toronto. A score of 1 means that a sector in Toronto has an employment share similar to what would have been expected on the basis of its working population (that is, not specialised); a higher score indicates a sector in which Toronto is specialised; a lower score indicates under-specialisation.

2. Bubble size denotes sector size in terms of employment.

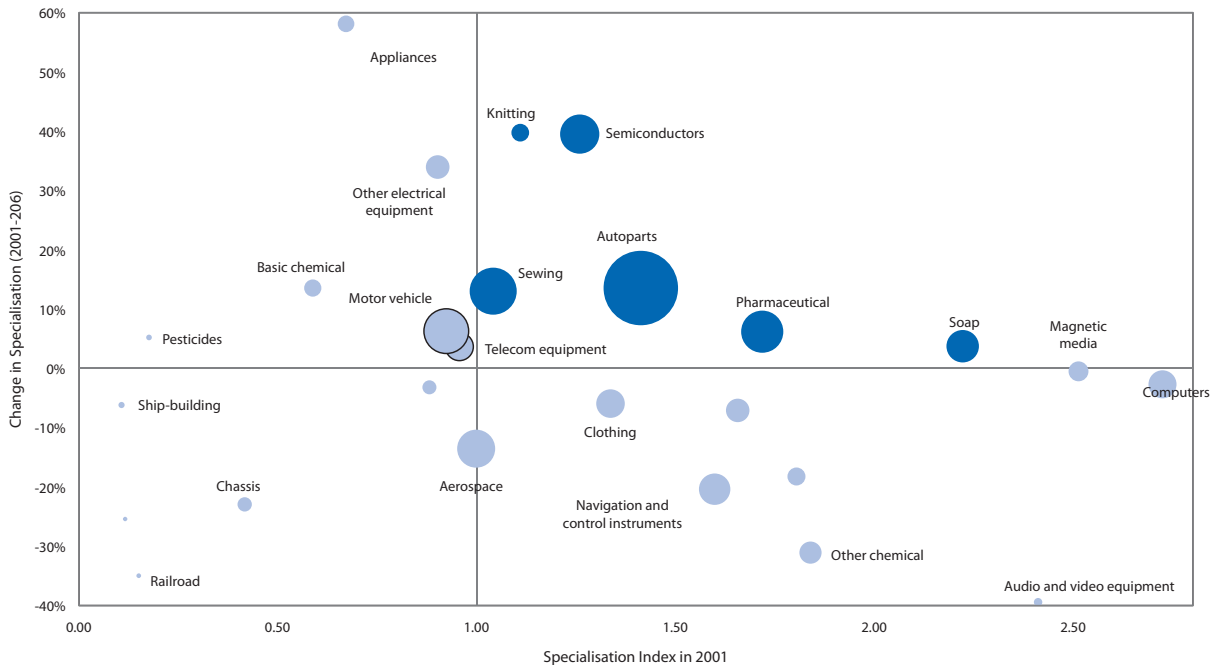
Source: Own calculations based on data from Statistics Canada.

such as design and engineering, locating them in Toronto, while the more labour-intensive processes outside the CMA have been lost to other regions in the world. Although this is difficult to assess from the available data, policy makers might be interested in addressing this trend not only for these industries, but more broadly for manufacturing. Focus could usefully be addressed to processes that entail high value added, typically those related to design and engineering. These are areas in which Toronto may have a particular comparative advantage given its capabilities (*e.g.* a skilled labour force and a high number of colleges and universities). It also has potential to further leverage its unique cultural diversity to design and create products with wide appeal to global markets. Recent data from the Council of Canadian Academies (2009) suggests that Canada has a stronger concentration of capital as well as an improvement in labour composition than does the United States. Moving to greater value-added production would require even greater investments in capital stock. This, however, would not deal with the underlying problem of low multifactor productivity (*i.e.* the efficient use of labour and capital). It should also be noted that the period between January 2002 and November 2007 was particularly unusual, in that the Canadian dollar's value against the US dollar appreciated by 76%.

The dynamics of location seem to be even more puzzling at a finer level of analysis, with some industries growing in Toronto at the expense of specialisation in Ontario as a whole, and vice versa. Taking into account industries at the four-digit level also reveals that Toronto drives specialisation in Ontario in a number of activities, such as pharmaceutical,

Figure 1.18. Dynamics of location in Toronto (four-digit industry)

Change in specialisation (2001-2006)



1. Specialisation is measured as the quotient of employment in the sector in Toronto in relation to employment in the sector in Canada, corrected for total employment shares in Toronto. A score of 1.0 means that a sector in Toronto has an employment share similar to what would have been expected on the basis of its working population (that is, not specialised); a higher score indicates a sector in which Toronto is specialised; a lower score indicates under-specialisation.

2. Bubble size denotes sector size in terms of employment.

Source: Own calculations based on data from Statistics Canada.

telecom equipment, magnetic media, semiconductors and soap production, where an increase in specialisation has been matched by a corresponding increase in Ontario as a whole. However, in some instances, Toronto has experienced an increase in specialisation, with a corresponding decrease in Ontario as a whole. The prime example of this trend is auto parts, an industry that represents the largest employment share in manufacturing at both the CMA and provincial levels; Toronto's gains in specialisation in auto parts have been matched by a decrease in Ontario's (Figures 1.18 and 1.19). A similar trend is found in chemical industries, basic chemical and appliances. In contrast, some other changes have been in the other direction, with Ontario as a whole gaining specialisation seemingly at Toronto's expense. More precisely, these include activities such as computer production, navigation and control instruments, and railroad rolling stock manufacturing, as well as shipbuilding.

The relative decline of specialisation in manufacturing over 2001-2006 has been accompanied by an increase in specialisation in commerce (wholesale/retail) and services (health, professional, accommodation/food, transport and financial). The share of employment in commerce is actually larger than in other sectors, while some activities in services such as construction have grown rapidly (6% annually between 1996 and 2006). Typical of large urban centres, the core of Toronto has been specialising in services, most notably in financial services, whilst the wider metropolitan region has specialised in manufacturing.

Figure 1.19. Location dynamics in Ontario (four-digit)

Change in specialisation (2001-2006)



1. Specialisation is measured as the quotient of employment in the sector in Toronto in relation to employment in the sector in Canada, corrected for total employment shares in Toronto. A score of 1 means that a sector in Toronto has a similar employment share as would have been expected on the basis of its working population (that is: not specialised); a higher score indicates a sector in which Toronto is specialised; a lower score indicates under-specialisation.

2. Bubble size denotes sector size in terms of employment.

Source: Own calculations based on data from Statistics Canada.

The overall analysis of Toronto's changes in specialisation highlights important structural changes. On the one hand, the sectoral shift from traditional manufacturing sectors towards construction and tertiary activities has to a certain extent shifted towards low value-added activities linked to housing-related activities (e.g. retail, construction, services). On the other hand, there might be some indications that Toronto is also fine-tuning its competitive advantage within the manufacturing sector, with an increase in specialisation in some specific segments, such as auto parts, an industry that represents the largest employment share in manufacturing, as well as in chemical industries and appliances.

B. Organisation of the productive sector

Several specialisations of Toronto's economy tend to be organised around a number of clusters, based on either spatial characteristics, inter-firm linkages or both. Considering geographical specialisation indexes and sector size, four main industry clusters can be identified: i) financial services; ii) automotive industry; iii) life sciences and biotechnology; and iv) creative industries.

i) Financial services. This sector was responsible for 25.8% of regional GDP and 7.9% of regional employment in 2006. Toronto is the financial capital of Canada. Canada's five largest banks and 80% of the foreign banks in Canada are headquartered in Toronto, as well as five Canadian pension plans and Canada's top insurers, which are responsible for 90% of the national industry's assets. Toronto's financial services sector is the third-largest in North America after New York and Chicago, directly employing 230 000 people as of May 2008, according to Invest Ontario. Toronto is also home to the Toronto Stock Exchange, the third-largest stock exchange in North America and seventh-largest in the world based on market capitalization. The financial services sector in Toronto is spatially concentrated in the central business district of the city of Toronto (downtown Toronto). The innovativeness of Canadian mutual fund companies has been found to favour geographical clustering: location within the industry cluster in Toronto enhances innovation (Bell, 2005).

ii) Automotive industry. The automotive industry has played a historic role as a major economic driver in Toronto. Although it only represents 3% of regional GDP (and 2.3% of employment), it generates value added for suppliers in the metals, machinery and equipment sectors (together 4% of regional GDP). The sector forms part of global supply chains, most prominently with supply chains of the US car industry. The three major North American auto manufacturers (General Motors, Ford and Chrysler) operate six assembly plants in the region. Automotive clusters in the Greater Golden Horseshoe are spatially concentrated in St. Catharines and Oshawa. Regional automotive companies have traditionally employed close to 50 000 workers. The Greater Golden Horseshoe hosts the second-largest automotive cluster in North America after Detroit. Toronto's position in the automotive sector is not unchallenged. Mexico's integration into the North American production system (for automotive parts), the rise of new centres of automotive production in the Southern United States (for final assembly and parts), the eroding market shares of the Big 3 American automakers and the rapidly increasing flow of automotive parts from China to North America have begun to erode the advantage of Canadian producers. Most design work in the automotive sector is concentrated near leading firms' headquarters; none of these are located in Canada. Canadian firms are suppliers, not assemblers, most of them small and not technologically advanced (Sturgeon *et al.*, 2009).

iii) Life sciences and biotechnology. Toronto can be considered a centre for human health, with firms engaged in a diverse array of life sciences, including biotechnology, pharmaceuticals, medical equipment and assistive technologies, and contract research.

The health sector represents 4.1% of regional GDP and 8% of regional employment, and the pharmaceuticals 0.6% for both regional GDP and employment. Toronto accommodates the largest cluster of biomedical and biotechnology companies in the country (over 40% of national market share), and is North America's fourth-largest medical community, home to more than half of Canada's pharmaceutical companies, as well as 80% of generic drug manufacturers. Toronto has been the site of a series of major medical breakthroughs (insulin, cardiac pacemaker, artificial kidney) and has strengths in a number of specialisations within the life sciences, including the pharmaceutical sector and the manufacture of medicine, medical instruments and equipment and supplies. In comparison with Montréal, Toronto has fewer pharmaceutical firms involved in drug discovery, and more generic drug producers. Toronto is comprised of a mix of innovative and not so innovative biotechnology firms, with the innovative firms tending to cluster together, and less innovative firms tending to be more isolated (Aharonson *et al.*, 2008).

iv) Creative industries. Toronto is central to Canada's cultural economy. Several dominant sectors, such as film, design, publishing and sound recording, represent 0.7% of regional GDP and 1.9% of regional employment. Between 1999-2004, total firms in creative industries in Toronto increased by more than 50% and employment in the sector by 29%. Toronto's film and television cluster ranks third in North America. The last decade has witnessed an increase of outsourcing and offshoring of production from Hollywood, and Toronto is now considered one of the major "runaway" production sites for Hollywood. Toronto's indigenous film production does not perform particularly well. Toronto's share of box office on the home market for English-speaking films was approximately 2.5% between 2000-2005, against 25% to 30% of home market share for successful European film clusters. Despite its strong linkages with Hollywood firms, there are only limited knowledge spillovers from this interaction. Hollywood does not outsource or offshore high-priority film projects, but mostly spin offs, second- or third-tier films. Even for these films, a large part of the activities in the value chain are retained in Hollywood (Vang and Chaminade, 2007).

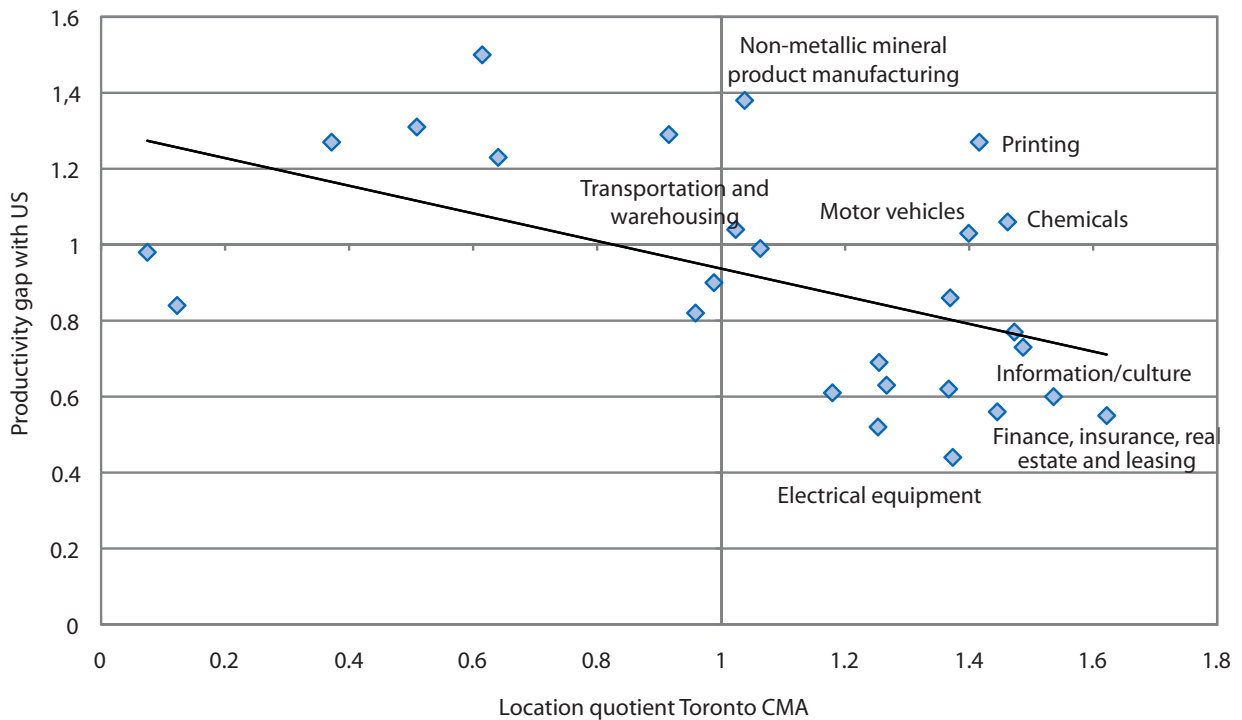
C. Value added within sectors

Productivity of sectors in Toronto is difficult to measure due to data limitations, but the comparison with average US productivity gives an indication of their competitiveness in the US markets. Although these data should be interpreted with caution, they remain relevant when considering the closeness to US markets and the dominant position of the United States in the export portfolio of firms in the province of Ontario. Taking these limitations into account, different sectors in Toronto lag behind the productivity of similar sectors in the United States.

In several of the economic sectors in which Toronto is highly specialised, Canadian productivity falls below that of the US equivalent (Figure 1.20). Moreover, Toronto's economic specialisations, such as manufacturing, computers and electronics, accounted for a large part of the productivity decline over the last decade. The largest declines in Canadian productivity over 1997-2004 occurred in the goods-producing industries. Manufacturing accounted for 42% of the post-2000 deceleration, and within the manufacturing sector, the computer and electronics industry was responsible for about one-third of the decline in manufacturing productivity growth (Rao *et al.*, 2005).

Lagging productivity might be connected to lower value-added activities in which firms in Toronto are specialised, such as the car industry and the film industry. Toronto's position in the automotive sector, for example, is challenged by Mexico and China, which can offer lower costs. Although Toronto has a strong local design sector, which could

Figure 1.20. Productivity gap and economic specialisations of Toronto (2001 Census)



Source: Based on data from Statistics Canada and Rao, S. *et al.* (2004).

attract high-value-added activities of the car industry, the application of Canadian design in the car industry is limited.¹² Most design work in the automotive sector worldwide is concentrated near lead firm headquarters; in the case of the Toronto car industry, these are located in the United States and Japan (Sturgeon *et al.*, 2009). A similar concentration on lower value-added activities in Toronto can be observed in the film business. Many of the activities in the value chain, such as pre-production, are kept in Hollywood, and outsourcing is drawn to Toronto because of lower production costs, not because it has any specialised competences that are hard to find in Los Angeles (Vang and Chaminade, 2007).

Lagging productivity might also be explained by the relatively low creative job content in many high-value-added sectors in Toronto. Ontario has a relatively high share of industries that by their nature have high creative content, such as financial services, education and knowledge creation, and information technology. These industries have, however, been found to operate with less creative content than in peer US states; that is, they have relatively fewer professions that require the highest levels of analytical and social intelligence skills (Martin and Florida, 2009).¹³

Toronto, however, also has several assets it could use to improve firms' productivity within their sectors. These competitive assets, in addition to low crime, high life expectancy, stable political and social environments, include: head office functions, global high-order functions, an attractive business environment for firms and an advantageous exports position.

Head office functions

Toronto continues to be the Canadian leader with regards to head offices. These are relevant for metropolitan economies because they tend to generate employment in service sectors connected to these head offices and which benefit from proximity to them, such as consulting, accountancy and advertising firms. Head offices also bring innovative and high-value-added jobs that help boost productivity growth. In 2007, the Toronto Region was the location for 871 head offices, representing 63% of all head offices in Ontario, and by far the largest number in Canada (the second Canadian city was Montréal, with 487 head offices). Head office employment in Toronto represented 56 700 jobs. Between 1999-2007, there was an increase in both the number of head offices (5.4%) and head office employment (14.1%) in Toronto. These increases are smaller than those in Calgary and Edmonton, which witnessed head office employment growth of 64.6% and 33.7% respectively over this period albeit at much lower levels. This was more favourable than developments in Montréal and Vancouver, where head office employment decreased during this period.

High-order functions in global services

A considerable number of academic papers have been devoted to determining which cities have attracted high-order global functions in different service industries (*e.g.* Taylor and Derudder, 2003; Taylor, 2004). Although these analyses do not assess urban competitiveness, the global position of a city has economic relevance: global cities concentrate activities in places where the highest value added is generated and which can easily attract highly skilled foreign workers. Underlying this research is the notion that globalisation and economic restructuring have led to specialisation of economic functions, and that certain cities have managed to dominate global economic activity in certain sectors. A classic example is the finance sector, in which London, New York and Tokyo have become the prime global cities (Sassen, 1991). There are different methodologies used to rank global cities, including for instance the mapping of the largest global firms for advanced services and their regional offices in different cities around the world. Although these different approaches involve methodological weaknesses and data limitations, they can provide a broad picture of how a city positions itself among the so-called group of global cities for some specific functions. Using this approach, several trends can be highlighted for Toronto:

- Toronto has been found to rank 15th in the world among well-connected global service firms. Sectors in which Toronto is particularly well connected globally are accounting and advertising (Table 1.4).
- It ranks highly for executive placement firms: in North America, it takes second place (with Chicago) behind New York, and worldwide, only London, Sydney, Paris and Amsterdam have a higher concentration of global head-hunting firms (Faulconbridge *et al.*, 2008).
- Despite its high rate of specialisation in the financial sector, Toronto is not one of the 20 most globally connected cities in finance, according to the GaWC Database.¹⁴ This database contains counts of headquarters and other functions in selected global services firms in different sectors, in order to obtain a measure of global inter-linkedness and hierarchies between cities in different industries (Taylor and Derudder, 2003; Taylor, 2004). Other studies, however, come to other conclusions. The Global Financial Centres Index (GFCI), published bi-annually by the City of London since March 2007, has consistently ranked Toronto among the top 15 global financial centres. In its most recent index, Toronto was in 11th

position. This index, however, is based on a different methodology, using several external indexes and answers to questionnaires sent out to people working in the financial sector.

A favourable environment for attracting high-value-added businesses

Toronto enjoys favourable business environment conditions, despite barriers to competition in professional services and business taxes that could discourage investment. Canada is ranked highly on the Ease of Doing Business ranking of the World Bank (at seventh in the world), indicating that it has relatively few cumbersome regulations and obstacles to entrepreneurship. On other rankings as well, Canada rates as friendly to businesses. It takes a relatively limited time to get permits to start businesses, it has limited restrictions on trade, and it has a low score on corruption indexes (World Bank 2008, Transparency International, 2009). At the same time, it has regulatory barriers to competition in four professional services, legal, accounting, engineering and architecture, that are higher than in many other OECD countries. These regulations are usually provincial, limiting inter-provincial trade in services. Moreover, Canada had one of the highest marginal effective tax rates on investment in the OECD in 2005. This differential is being lowered through corporate tax-cutting commitments made by a succession of federal governments, but these tax rates will still remain 10 percentage points above the OECD average in 2010. In addition, provincial taxation policy discourages investment by taxing debt and shareholders' equity and by sales taxes that are generally

Table 1.4. **Ranking of presence of global services firms in OECD cities**

Rank	Total	Accounting	Advertising	Finance	Law
1	New York	London	London	London	New York
2	London	Düsseldorf	New York	New York	Washington, DC
3	Paris	New York	Brussels	Hong Kong	London
4	Hong Kong	Paris	Madrid	Singapore	Los Angeles
5	Tokyo	Tokyo	Sydney	Tokyo	Paris
6	Los Angeles	Toronto	Toronto	Frankfurt	San Francisco
7	Singapore	Chicago	Milan	Paris	Hong Kong
8	Frankfurt	Milan	Paris	Zurich	Brussels
9	Milan	Sydney	Los Angeles	Sydney	Moscow
10	Sydney	Washington, DC	Singapore	Madrid	Tokyo
11	Brussels	Atlanta	Stockholm	Milan	Chicago
12	San Francisco	Brussels	Amsterdam	Taipei	Warsaw
13	Washington, DC	Frankfurt	Copenhagen	Mexico City	Frankfurt
14	Madrid	San Francisco	Istanbul	Seoul	Singapore
15	Toronto	Amsterdam	Düsseldorf	Sao Paulo	Miami
16	Zurich	Dallas	Melbourne	Buenos Aires	Milan
17	Moscow	Hamburg	Prague	Jakarta	Bangkok
18	Mexico City	Hong Kong	Sao Paulo	Kuala Lumpur	Budapest
19	Chicago	Johannesburg	Zurich	Los Angeles	Dallas
20	Sao Paulo	Los Angeles	Barcelona	Moscow	Prague

Note: The unit of analysis is a city as defined by its municipal boundaries. The methodology is based on a count of headquarters and other functions in selected global services firms in these different sectors.

Source: GaWC Database and Taylor, P. (2006).

not refunded on capital goods purchased by firms, leading to a marginal effective tax rate for business in Ontario in 2007 that was the highest of all Canadian provinces (OECD, 2008; OECD, 2006). A provincial tax reform to be implemented in 2010 (see Chapter 2) has been designed to address these fiscal issues.

In addition, costs of operating in Toronto, including office rents, are relatively low. An international survey by KPMG on business costs in cities worldwide rated Toronto in the moderate bracket: around 5 percentage points lower than Chicago, still lower than New York City and Paris, and around a fifth lower than in London and Frankfurt. St. Louis and Sydney offered comparable business costs. Within Canada, Vancouver had higher business costs than Toronto, and Montréal somewhat lower costs (KPMG, 2008). Moreover, costs of office space are limited in Toronto; not only from an international perspective, but also when compared nationally. The average office rent in the most expensive area of Toronto (its central business district) is around EUR 163 per square metre per year, which is considerably lower than almost all major cities in the world, including New York, Chicago, London and Paris. Similar rents on the American continent are available only in Atlanta and Monterrey, and equivalent rents cannot be found in major European cities. Within Canada, Calgary, Vancouver and Ottawa have higher office rents, and only Montréal offers office space with lower average rents (Cushman and Wakefield, 2009). Although concerns have been raised that not enough office space within the city of Toronto was developed in the early 2000s (Canadian Urban Institute, 2005), this has not translated into tighter conditions and higher prices on the Toronto office market, which raises doubts as to its pertinence.

Relatively modest international airline connectivity might, however, compromise the city's attractiveness to global service industries. Good external accessibility by air is an important criterion for the location of globally oriented service industries, as it permits swift and frequent access to many destinations. Some hub airports, as in Amsterdam and Atlanta, for example, provide interconnections for transit passengers and a dense network of frequent flights to many destinations, which would be impossible to sustain by relying solely on home markets. Toronto's Lester B. Pearson International Airport cannot be considered one of the most important flight hubs for international passengers (Derudder *et al.*, 2007). It was ranked only 29th in the world in 2006 in terms of passenger traffic, with a relatively low share of hub passengers and relatively under-developed interconnectivity compared to Chicago, Los Angeles, San Francisco and New York.¹⁵ Toronto's position in airline connectivity fell in the 1990s, and there are indications that this decline continued in the last decade, while other North American airports, such as New York, Miami and Los Angeles, gained in importance (Matsumoto, 2007).

An export position dominated by proximity to the US

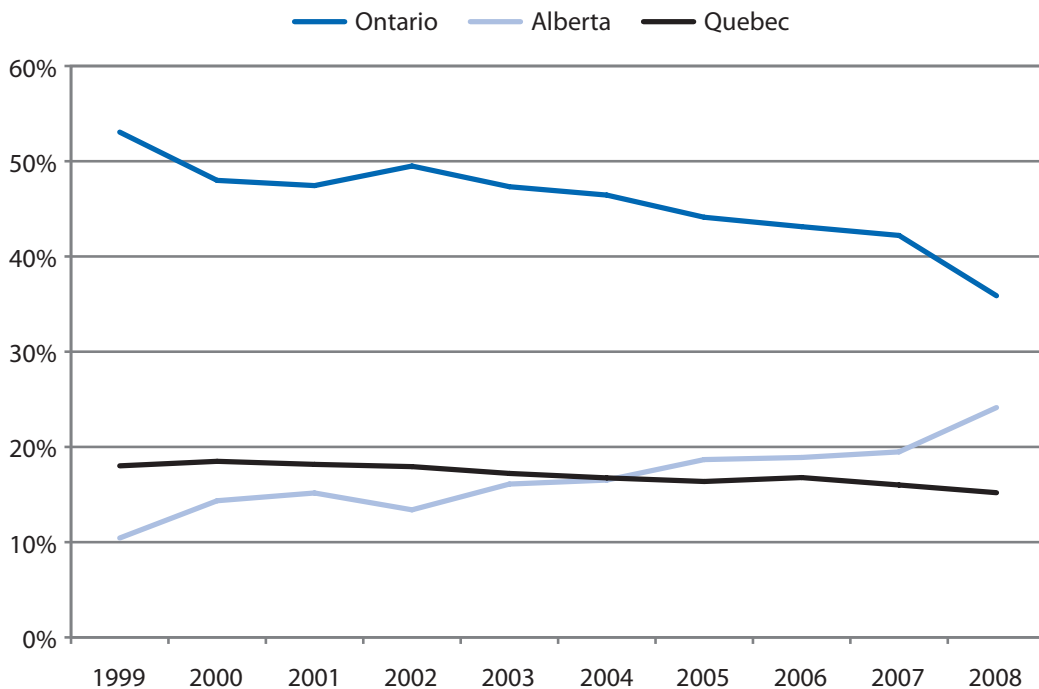
There are no data on exports at the regional or local level, but existing data at the provincial level can provide some indication of the exporting position of the Toronto region. They are, however, likely to understate Toronto's export position, which may be relatively larger than Ontario's given its geographic proximity to the United States. Several trends can be highlighted:

- The export position of the province of Ontario within Canada has become less dominant in the last decade. The domestic export rate of Canada was 28.4% of GDP in 2008; this is average among OECD countries. Canada exported USD 456 billion in 2008, making it the tenth-largest exporter in the world. The province of Ontario had a slightly lower domestic export rate, namely 27.8% in 2008, and contributed a share of the Canadian exports (35.9%) that corresponds to its share of the

national economy (36.7% in 2008). Representatives of export firms have indicated that official data undercount exports in services, which are especially relevant to areas with service-oriented economies such as Toronto. The province of Ontario provided a large share of the exports in three of the five main exporting items of Canada, namely motor vehicles, machinery and electronic machinery (Figure 1.21). This share has decreased over the last ten years, from 53% in 1999 to 36% in 2008, especially in machinery. At the same time, the share of the second-largest exporting province, Alberta, has increased from 10% to 24%, largely due to the impact of oil price developments on export performance of Alberta's oil and gas sector (Table 1.5).

- Exports from Ontario are highly oriented towards the United States. About 82% of its total domestic exports in 2008 went to the United States and 5% to the United Kingdom; other exporting destinations were Norway and Mexico. Exports to China were at 1% of total exports. The dominance of the United States as an export destination is similar for other provinces in Canada, although the US share of Ontario's exports is higher than the average in Canada (78%). This strong orientation towards the United States can be explained by geographical proximity, combined with economic specialisation patterns: it has been shown that especially in the automobile sector, the cross-border linkages between Canada and the United States are so large that the border between the two economies has virtually disappeared, although heightened security resulting from the 9/11 attacks has re-instated border stringency (François and Baughman, 2007).¹⁶ Cross-border movements of goods form an important part of total exports of Ontario; if re-exports were included, Ontario's export rate would be 32.1% rather than 27.8% in 2008 (Industry Canada Trade Data Online Database 2009). A main consequence

Figure 1.21. Shares of domestic Canadian exports by three leading provinces (1999-2008)



Source: Trade Data Online, Industry Canada.

of this high dependency on the US market is the linkage of Ontario to business cycles in the United States. Ontario has long benefitted from economic growth in the United States, but has suffered since 2008 from the economic downturn there. The automobile industry, for instance, has been particularly affected by the global economic crisis that started in 2008, which strongly affected the United States. Ontario's exports have gradually become more diverse: domestic export shares to the United States declined from 93.5% in 1999 to 81.7% in 2008, and export shares to Asia (excluding the Middle East) increased from 1.5% in 1999 to 3.6% in 2008. However, export levels to countries other than the United States still remain small. The majority of exports are in manufacturing and raw materials, rather than in services: the top 25 export items from Ontario are all manufactured products or raw materials, although some service firms have indicated that their export levels are not reflected in official statistics. The integration of Ontario firms in global supply chains is low, as can be observed from its low share of re-exports other than with the United States. This reflects the tendency for Canadian exports in general (Lemaire and Cai, 2006; Goldfarb and Chu, 2008).

Table 1.5. **Main Canadian export sectors and provincial shares**

	Share of Canadian exports	Main exporting province	Share of province in national export
Mineral fuels and oils	21%	Alberta	60%
Motor vehicles and parts	15%	Ontario	94%
Machinery	8%	Ontario	61%
Electronic machinery/equipment	5%	Ontario	67%
Wood	3%	British Columbia	51%

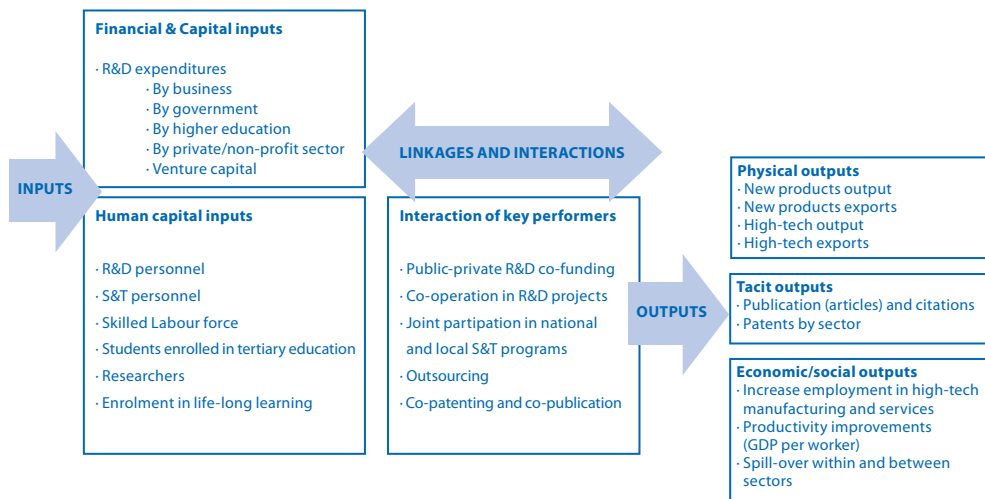
Source: Foreign Affairs and International Trade Canada (2007), (2008).

D. Adding value added through innovation

Innovation is central to productivity, but measuring innovation activity, notably at the metropolitan level, is a challenging task, due to data limitations and the multi-faceted nature of innovation. Data on several traditional innovation indicators is available at the provincial level in Canada, as is the case in most OECD countries, but it is not consistently collected at the metropolitan level (Figure 1.22). The Toronto Region Research Alliance has made a laudable effort to collect data for an area designated as the “Toronto Region” (an area of about 7 million inhabitants, larger than the definition for Toronto region in this Review, but smaller than the Greater Golden Horseshoe), which gives an indication of the state of innovation in Toronto.¹⁷ The traditional innovation indicators are limited and therefore do not capture the multi-faceted character of innovation: patent data, for example, may not always pick up innovative activity.¹⁸ “Hidden” innovation, which does not show up in indicators such as R&D expenditures and patents, can partly be revealed by innovation survey data at company level regarding whether, why, how and with whom companies innovate. Such data do not appear to exist separately for firms in the Toronto region.

Scores of the Toronto region have been mixed on several of the innovation output indicators, including: (i) patents; (ii) publications and citations; (iii) high-tech employment and (iv) high-tech entrepreneurship.

Figure 1.22. Traditional innovation indicators

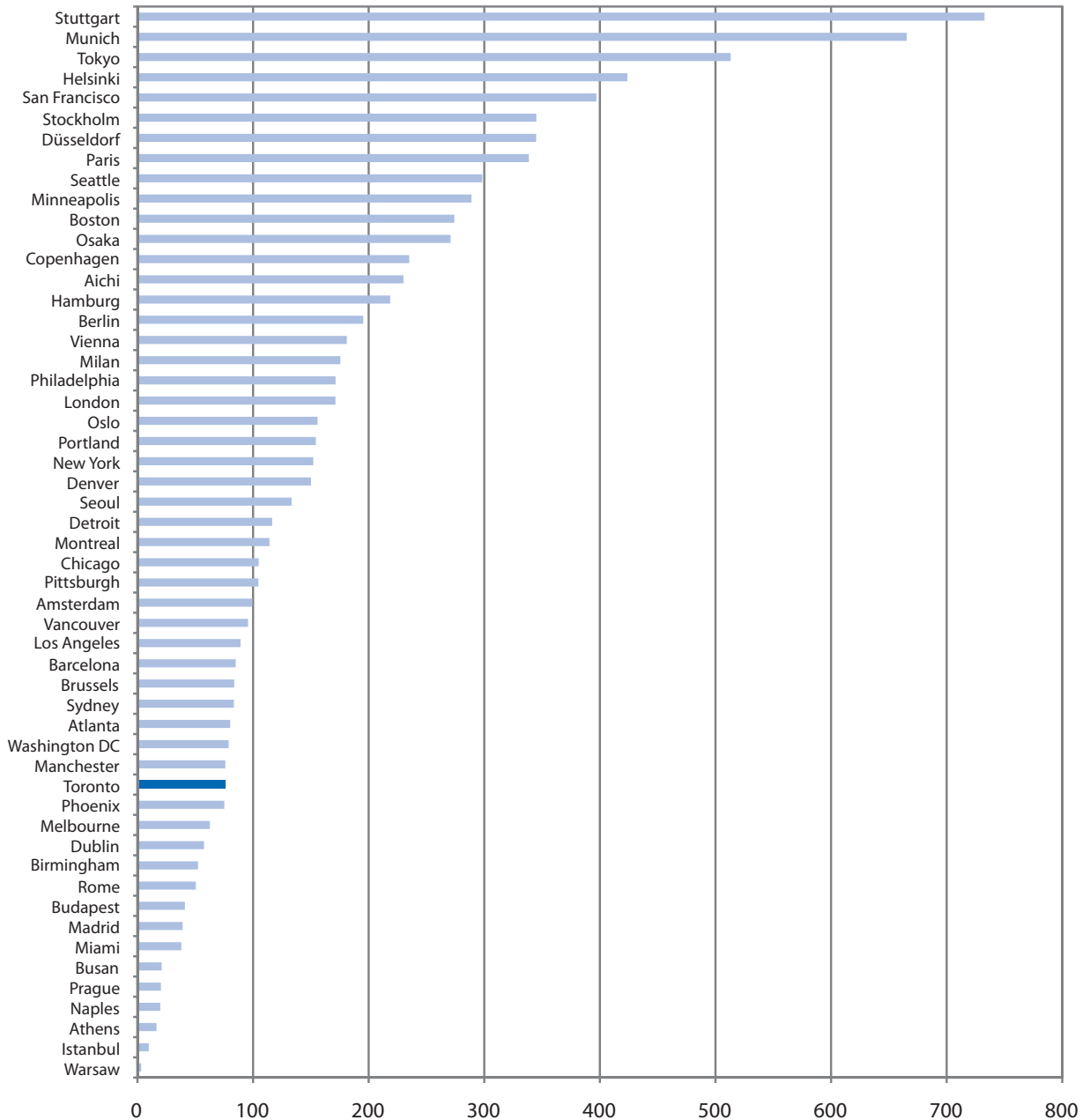


Source: OECD (2008e).

- Patents.* The City of Toronto was not highly ranked in 2005 with regards to patent applications, as compared to several Japanese and American cities, and some in Europe, such as Paris and London (Figure 1.23). The two regions of York and Peel registered more patents per inhabitant than in the City of Toronto, which suggests that the number of patent applications per million inhabitants for the Toronto region overall might be higher. The City of Toronto is not amongst the cities with high patent applications in ICT and biotechnology (Figure 1.24).¹⁹ The University of Toronto was not in the top 20 of universities worldwide with highest patent applications in 2007, according to the World Intellectual Property Organisation (WIPO, 2008); it was fourth among Canadian universities, but 53 universities in the United States produced more patent applications in 2007 (AUTM, 2008).²⁰ The situation in the Toronto region reflects that of Canada, where the number of patents is under the OECD and EU25 averages. These indicators should be interpreted with caution, as the regional context in Toronto might differ from those in other regions: the relatively low ranking of the Toronto region might be explained by the fact that the hospital sector (which is strong in Toronto) is excluded in most of these rankings, and because private universities from the United States are included (which have a stronger market-oriented mandate). Moreover, it should be noted that the strength of the life science cluster in the Toronto region is, according to some observers, not adequately captured using traditional indicators such as patents and patent citations, firm spin-offs, and levels of venture capital and R&D investments. The less research-intensive generic pharmaceutical sector in the Toronto region and its combination of technologies and competencies from different economic sectors has led to high levels of innovation within the broader biomedical sphere that are not captured by these indicators (Gertler and Vinodrai, 2009).
- Publications and citations.* The number of scientific publications in Toronto (TRRA definition) was around 180 per 100 000 inhabitants in 2006, performance that is reasonably good by comparison with other North American regions; this figure is one-quarter of the average output of publications in Silicon Valley. The number of

publications from Toronto (TRRA definition) represents one-third of all publications generated in Canada. The impact of these publications from Toronto (TRRA definition), as measured by citations, was relatively low as compared to other North American metropolitan regions.²¹ A large share of these publications were produced at the University of Toronto, which had the second-largest output of publications among North American universities in the period running from 2003-2007, after Harvard University, and occupied the sixth position with regards to citations.²²

Figure 1.23. Patent applications per million inhabitants in cities in the OECD (2005)



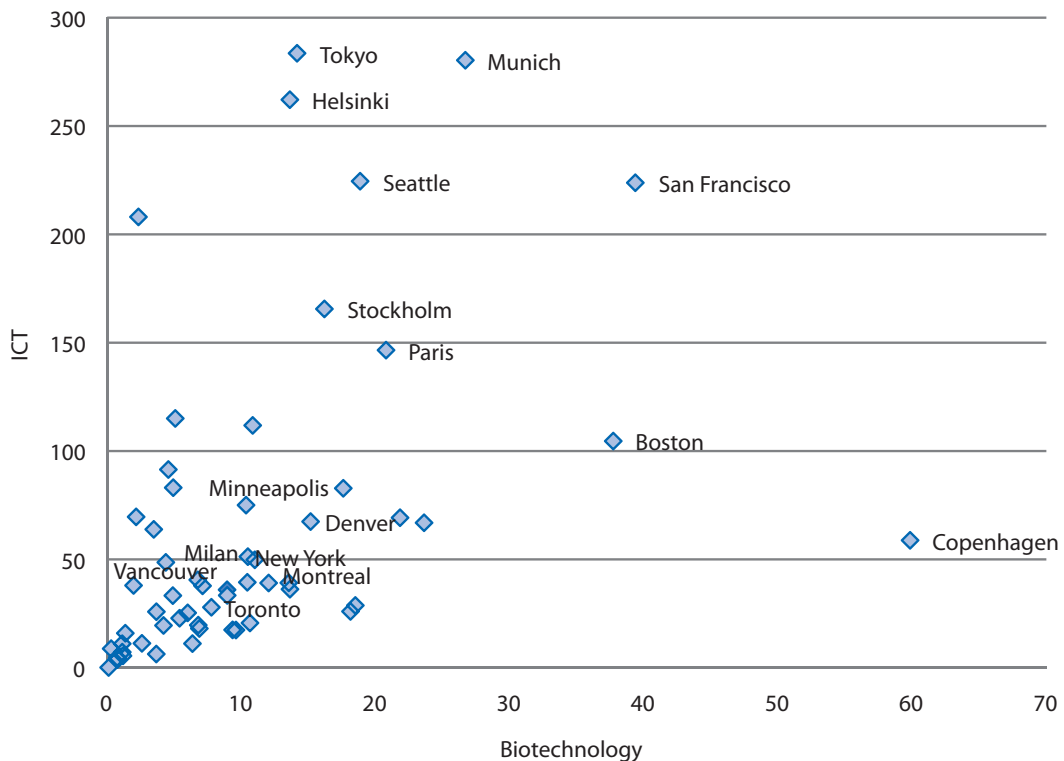
Note: Territorial units are defined at the TL3-level. In the case of Canada, this represents city boundaries.

Source: OECD Science and Technology Database.

According to the QS World University Rankings 2008, the University of Toronto is tied for first (with Caltech, MIT, Harvard, Princeton and several other universities) for citations per faculty. According to 2008 Academic Ranking of World Universities data, the University of Toronto ranks third in the world for “Total number of articles indexed in the Science Citation Index”, but 37th on highly cited researchers and 30th on citations in Nature and Science. University of Toronto researchers have between 1980-2008 consistently won more awards from prestigious international bodies than any other Canadian university (University of Toronto, 2009).

- *High-tech employment.* The Toronto region had the seventh-largest concentration of science and engineering employment among North American metropolitan regions in 2000-2001 and the 30th-largest share of science and engineering employment in relation to its total population, with only Boston, San Francisco and Washington DC scoring higher on both indicators (Beckstead and Brown, 2006). The Toronto Region counted on average 14 of the 500 fastest-growing technology firms in North America between 2001-2007, comparing favourably with the Research Triangle, Illinois and Michigan. World-leading regions in this indicator, such as Silicon Valley and Massachusetts, had respectively four and two times more of these firms relative to the Toronto region (Deloitte and Touche). A 2009 report from the Milken Institute ranked Toronto 15th out of 50 North American metropolitan regions in terms of high-tech industrial performance. The Toronto region was noted for its strengths in value-added industries such as: information services; medical and diagnostic labs; motion

Figure 1.24. Patent applications in ICT and biotechnology in OECD cities (2005)



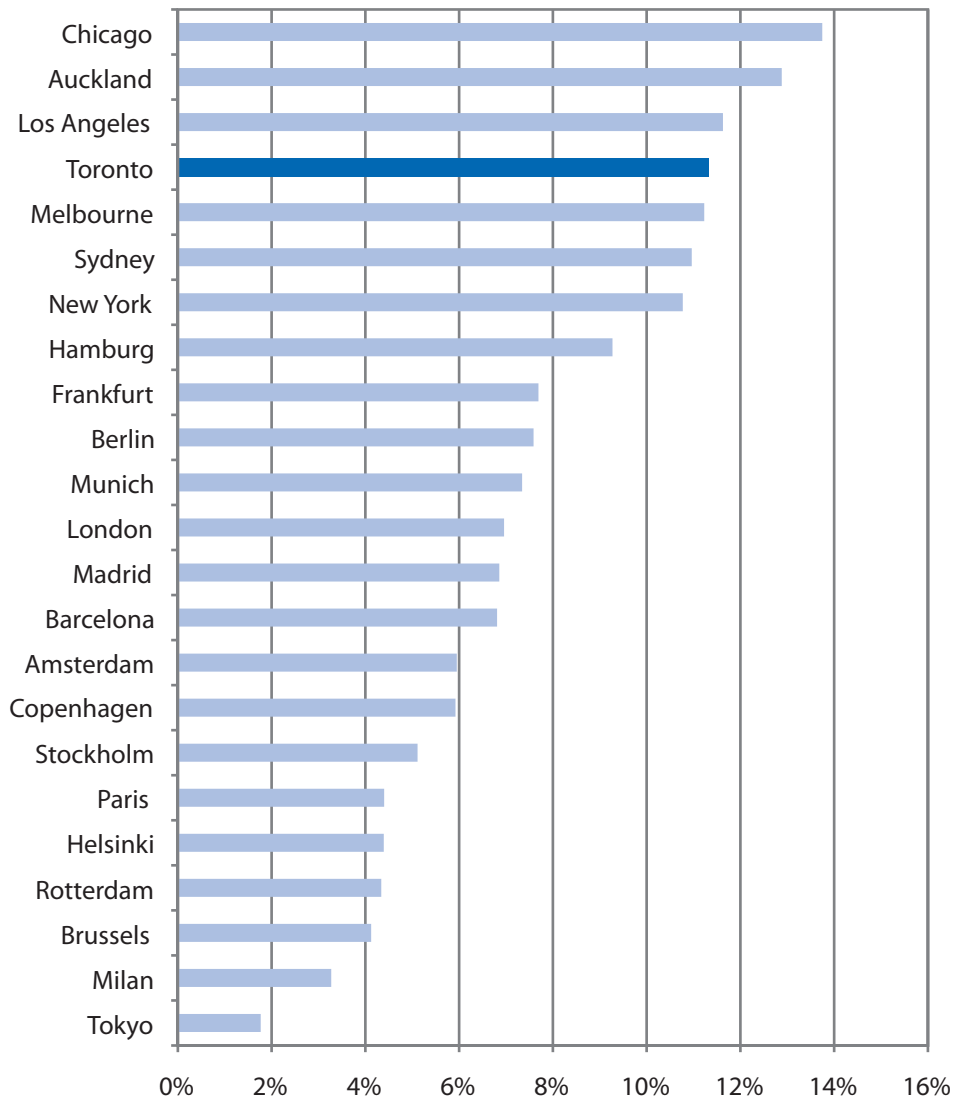
Note: Territorial units are defined at the TL3-level. In the case of Canada, this represents city boundaries. Patents applications per million inhabitants.

Source: OECD Science and Technology Database.

picture and video industries; computer systems designs; and pharmaceuticals. The Toronto region is ranked tenth in North America by the size of its high-tech labour sector (DeVol *et al.*, 2009).²³

- *High-tech entrepreneurship.* Among a selection of OECD metropolitan regions, the Toronto region has one of the highest shares of early-stage entrepreneurs in technology sectors and shows a high degree of early-stage entrepreneurial activity oriented toward new product markets. The Toronto region is one of the metropolitan regions in the OECD with the highest rates of entrepreneurship (Figure 1.25). Right behind

Figure 1.25. **Entrepreneurship rates in selected OECD metropolitan regions (2001-2006)**



Note: These data show early-stage entrepreneurial activity rates from metropolitan regions for which sufficient data were available. These areas include suburbs and reflect labour market areas. Early-stage entrepreneurial activity is defined as nascent entrepreneurship (involved in setting up a business), and the rate of owner-managers of a new business (i.e. businesses that have existed for up to 3.5 years). The unit of analysis is the metropolitan region.

Source: Bosma, N. *et al.* (2008).

Chicago, Auckland and Los Angeles, it is far more entrepreneurial than most other metropolitan regions in the OECD, and is perceived by its population as a highly favourable place to start a business, according to surveys (Acs *et al.*, 2008).

Innovation is facilitated by human capital levels in the Toronto region that are reasonably strong. As was mentioned before, the Toronto region has 33% higher education attainment as compared to the average of 30.8% for 48 OECD metropolitan regions in 2004. However, some forms of human capital that typically drive technology-based innovation are relatively lower in the Toronto region than in other North American urban centres. In terms of engineering degrees, for example, approximately 55 new degrees per 100 000 inhabitants were awarded in 2007 in Toronto (TRRA definition), which was relatively low in comparison with several North American regions, such as the Research Triangle in North Carolina, Silicon Valley, Massachusetts and Michigan. Toronto (TRRA definition) is however doing well from a Canadian perspective: around 4.5% of the labour force in Toronto (TRRA definition) had a university background in engineering in 2001, well above the Canadian average (2.9%) and also above the average in Ontario (3.6%) (TRRA, 2008).

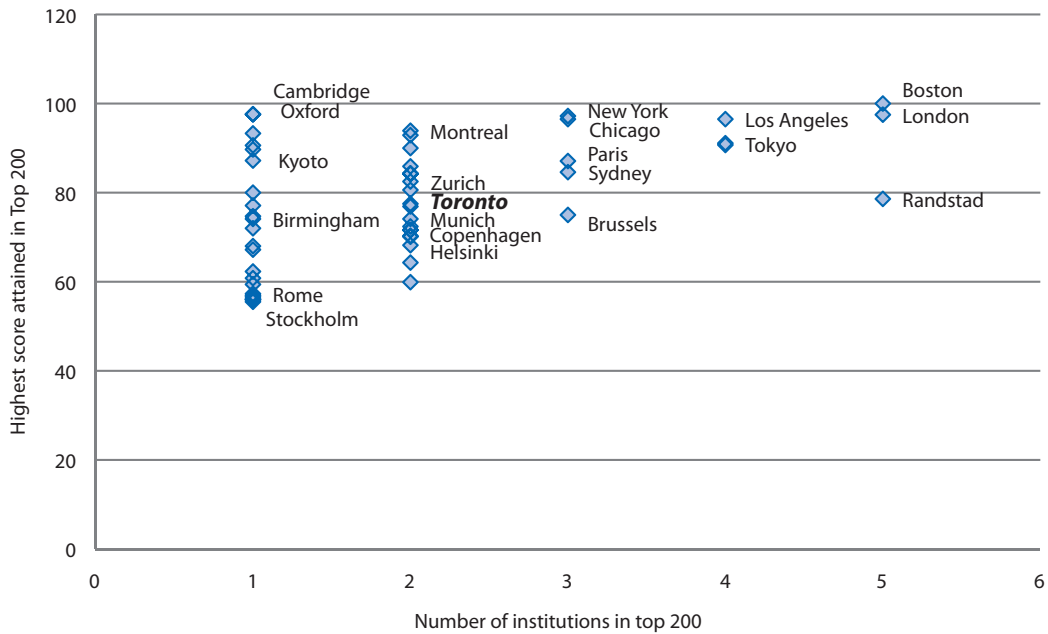
Innovation in the Toronto region is also enabled by the presence of several high-ranking universities with what appear to be strong specialisations in technology, natural science, arts and humanities and business education. Five universities among the higher education institutes in the Greater Golden Horseshoe area figure in international university rankings, two of which are in the Toronto region (Table 1.6).²⁴ These two are the University of Toronto and York University. A selection of metropolitan regions in the world (in particular Boston, London, Randstad, Los Angeles and Tokyo) scores higher than Toronto in having more than two higher education institutes in the Times Higher Education Supplement ranking, although these findings have to be interpreted with caution, as some universities that are not represented in the rankings could be strong in certain specialisations (Figure 1.26).²⁵ The University of Toronto has strong specialisations in technology, natural sciences and arts and humanities, in which it ranks among the best 15 universities in the world and as the premier Canadian university (THES, 2007), although some caution is warranted, as rankings are not always able to capture specialisations relevant to innovation capacity.²⁶ In addition, Toronto has a strong set of business education institutions, including the Schulich School of Business at York University and the Rotman School of Management at the University of Toronto.²⁷ The Greater Toronto Area has in total 332 centres of excellence and research institutes. The majority of these are associated with the University of Toronto and other universities and colleges in the region, including the University of Ontario Institute for Technology, established in 2003. Advanced research collaborations take place in the Canadian Institute for Advanced Research, the Ontario Centres of Excellence, the MaRS Discovery District and several other institutions.

Table 1.6. **Higher education institutes in the Greater Golden Horseshoe in international rankings**

Universities/rankings	Shanghai	THES	ENSM	Taipei	Wuhan
University of Toronto	23	45	84	12	11
McMaster University	87	108		89	95
University of Waterloo	151	112		274	226
University of Guelph	203			314	283
York University	402		205	326	

Source: Shanghai (2008), THES (2007), ENSM (2007), Taipei (2007), Wuhan (2007).

Figure 1.26. Number of high-quality universities in OECD metropolitan regions (2007)



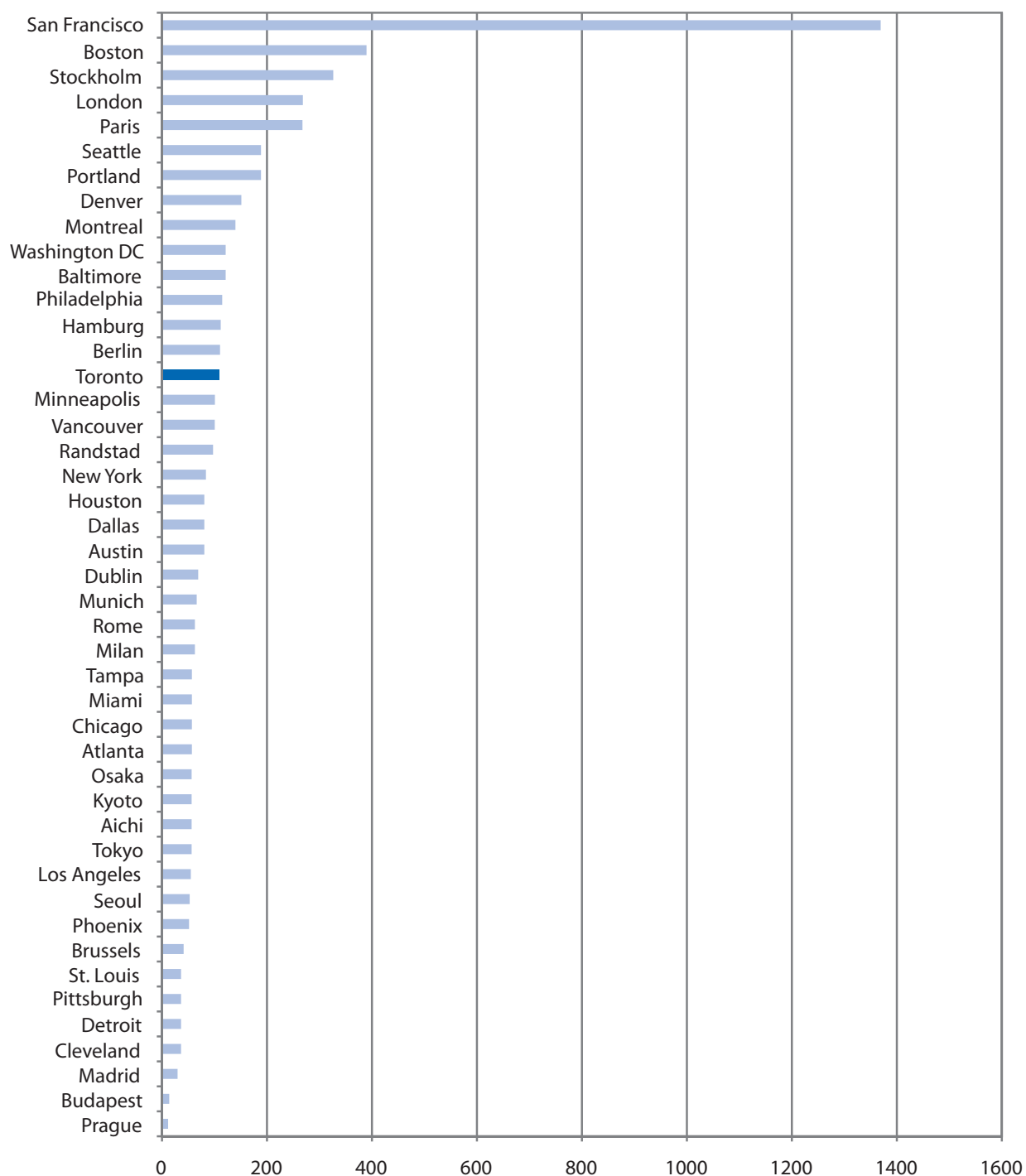
Note: A score of 100 is the highest that a university can receive, indicating excellent quality. The units of analysis are metropolitan regions as defined in the OECD Metropolitan Database.

Source: Based on data from THES (2007).

Box 1.1. Worldwide rankings of universities

There are several worldwide rankings for universities. The Academic Ranking of World Universities by the Shanghai Jiao Tong University analyses 3 500 universities and ranks 500 universities, evaluating quality of education, size, research output, impact and prestige. Citations in natural sciences journals and number of Nobel Prize-winners and Field medalists (in mathematics) weigh relatively heavily in this index. The Times Higher Education Supplement ranking of 200 universities worldwide gives relative weight to academic reputation as reviewed by 1 000 academic peer reviewers; proxies for scientific output (citations); and quality of education (student/staff ratio). The Professional Ranking of World Universities by the École Nationale Supérieure des Mines de Paris evaluates the performance of each university by looking at the labour market perspectives of its alumni. Its main criterion is the number of CEOs of Fortune Global 500 firms who studied at each university. The Performance Ranking of Scientific Papers for World Universities by the Higher Education Evaluation and Accreditation Council of Taiwan evaluates publications of scientific papers. It uses three criteria: research productivity, research impact and research excellence, using bibliometric methods to analyse the performance of the top 500 universities in the world. The Research Centre for Chinese Science Evaluation of Wuhan University ranks universities based on essential science indicators, taking into account publication counts and citation frequency in more than 11 000 journals around the world in 22 research fields.

Figure 1.27. Private equity in selected OECD metropolitan regions (USD per capita)



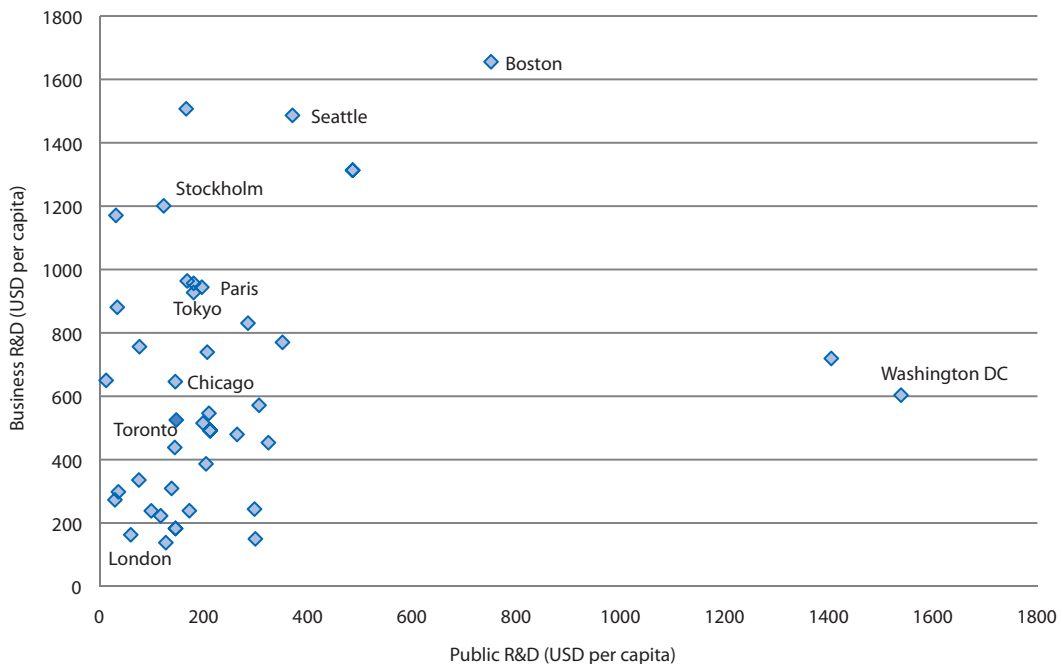
Note: Year and methodology not provided in the source. Provincial Canadian data for Ontario, Quebec and British Columbia are taken as a proxy for those in Toronto, Montréal and Vancouver.

Source: Huggins, R. *et al.* (2008).

One possible explanation for mixed innovation outcomes in Toronto is R&D spending in Ontario. The relationship between innovation outcomes such as patent applications and R&D spending in general is not linear. The level of both public and private R&D spending in Ontario is no more than average, and lags behind several of the leading metropolitan regions in the OECD (Figure 1.28). Gross domestic R&D expenditures in Ontario are larger than the Canadian average: they accounted for CAD 1 008 per capita in 2006 and 2.27% of Ontario’s GDP; the per capita number represented the highest number among Canadian provinces, the GDP share the second-highest after Quebec. Within Canada, Ontario is the province where the largest share of R&D expenditure comes from business and the smallest from federal research funding (Statistics Canada, 2009). Federal research funding in the areas of health and natural sciences in Toronto (TRRA definition) is relatively low in comparison with several North American regions, in particular with the Research Triangle, Massachusetts and Silicon Valley, where federal funding is seven to 25 times higher.

Innovation outcomes might also be connected to private finance for innovation in the Toronto region, which is not abundant in comparison with other regions in the OECD. In order to finance innovations, firms can make use of the private capital market in the form of private equity. Estimations of average private equity per capita in the Toronto region range from CAD 38 per capita, to CAD 89 and USD 110.²⁸ Although this is higher than many other metropolitan regions in the OECD, it does not come near to the average private equity capital that is available in metropolitan regions like San Francisco – by far the leading metropolitan region (USD 1 370), Boston (USD 390) and Stockholm (USD 325) (Figure 1.27). Montréal is also doing better in attracting private equity, despite Toronto’s leading national position in the financial sector. Venture capital investments in the Toronto region were around USD 260 million in 2005, which is fairly limited in comparison with

Figure 1.28. **Public and business R&D in selected metropolitan regions**



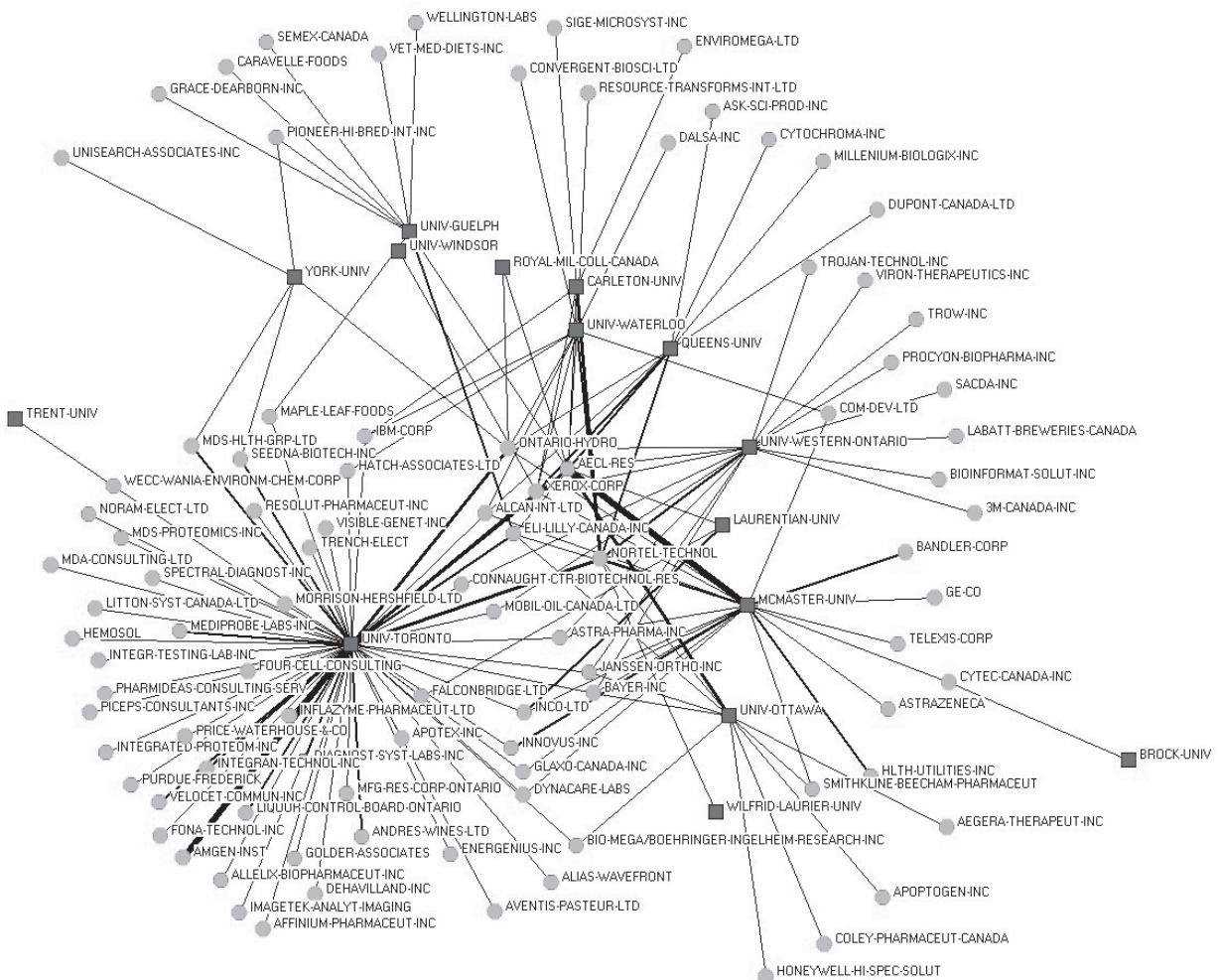
Note: Year and methodology not provided in the source. Provincial Canadian data for Ontario, Quebec and British Columbia are taken as a proxy for those in Toronto, Montréal and Vancouver.

Source: Huggins, R. *et al.* (2008).

other metropolitan regions in North America. Venture capital in the Toronto region is mainly invested in software (32% of total investment in 2005), telecommunications (14%) and biotechnology (10%). Metropolitan regions such as Massachusetts tend to direct more of their venture capital into biotechnology and medical equipment (WCKI, 2008).

Productivity could further benefit from collaboration between higher education institutions and industries, but rates of collaboration are declining. Around 160 collaborations between universities and firms in Ontario were reported in 2004, which can take the form of co-operation in research, possibly followed by joint publications and patents. Much of the collaboration in Ontario is centred at the University of Toronto (Figure 1.29). A more detailed indication of the collaboration between universities and industries comes from papers written in Ontario universities co-authored with industries in Ontario and Canada. Of the 10 600 papers produced by Ontario universities, 1.5% were co-written with Ontario industries and 2.1% with Canadian industries. This collaboration is not exclusively regional: of the papers co-written by Ontario industries, around 36% were with Ontario universities in 2004, the rest with universities located elsewhere. University-industry cooperation between 1999-2004 shows a decline: the number of university-industry collaboration and joint papers

Figure 1.29. Links between higher education institutes and industry in Ontario



Source: Province of Ontario.

almost halved over this period (SCI Database). Although the University of Toronto had the highest number of start-ups in 2007 among Canadian universities, its licensing income ranked fifth. The income of licenses of the University of Toronto is limited in comparison to US universities, several of which have licensing incomes 50 times as high as those of the University of Toronto.²⁹ The University of Toronto scores relatively high on the number of new spin-off companies and new disclosures (University of Toronto, 2009). Based on data for Canada, doubts have been raised as to the outcomes of university-industry collaboration: Canada performs well in terms of firms with new-to-market product innovations, but the share of turnover due to these products is among the lowest in the OECD area (OECD, 2008d). Inter-linkages between firms play an essential role in incremental innovation in metropolitan regions. Despite initiatives to map economic sectors in the Toronto region, relatively little is known about firm inter-linkages.

1.2.2. Leveraging cultural diversity

Impact on urban competitiveness

The link between cultural diversity and the competitiveness of urban economies is subject to lively debate. Two vehicles by which diversity may influence performance have been identified. On the one hand, diversity may encourage the consideration of new ideas, and change the way in which productive processes are carried out, enhancing productivity at the workplace. On the other hand, diversity may come at a price, as cultural differences often imply language differences that can become communication barriers that increase disputes or conflicts at work. Recent research suggests that cultural diversity may, overall, have a positive impact on urban economies (Box 1.2).

The Toronto region is the most culturally diverse urban centre in Canada. Although Canada is one of the OECD countries that has a high immigrant population, cultural diversity varies widely across cities in Canada. According to the Hachman Index of Cultural Diversity (HICD), Toronto is the most culturally diverse urban centre in Canada, with a score of almost four times the average for Canadian cities (Figure 1.30).³⁰ Moreover, a number of cities that rank high for diversity are also located in the Golden Horseshoe region (e.g. Hamilton or Oshawa). Large cities usually present higher values of diversity, but not always, as in the case of Quebec City, which presents below-average values of diversity. Contrastingly, relatively small urban centres can also be very culturally diverse, as in the case of Guelph (Ontario), Regina (Saskatchewan) or Kelowna (British Columbia) (Figure 1.31).

In the case of Canada, cultural diversity is associated with higher earnings. Diversity could be related to better economic performance in cities, perhaps leading to productivity gains or innovation (Figure 1.32). Although the Toronto region might be taking advantage of its diversity, a number of cities in Canada, such as Ottawa and Oshawa, have higher earnings yet lower levels of diversity. Economic growth in the Toronto region is lower than in many urban areas in Canada, despite the diversity in the metropolitan region (Figure 1.33). High earnings in other urban centres, such as Calgary, might be more related to the composition of its industry (high-paying jobs in the oil and gas sector) rather than cultural diversity. The presence of well-performing sectors and their strong growth could attract immigrants and hence increase cultural diversity; in such a case, it is not cultural diversity that exerts a positive impact on economic growth. A clear causal link between diversity and performance cannot be established without running an econometric model and without reliable GDP figures at the sub-provincial level in Canada.³¹

Box 1.2. Cultural diversity and urban economic performance

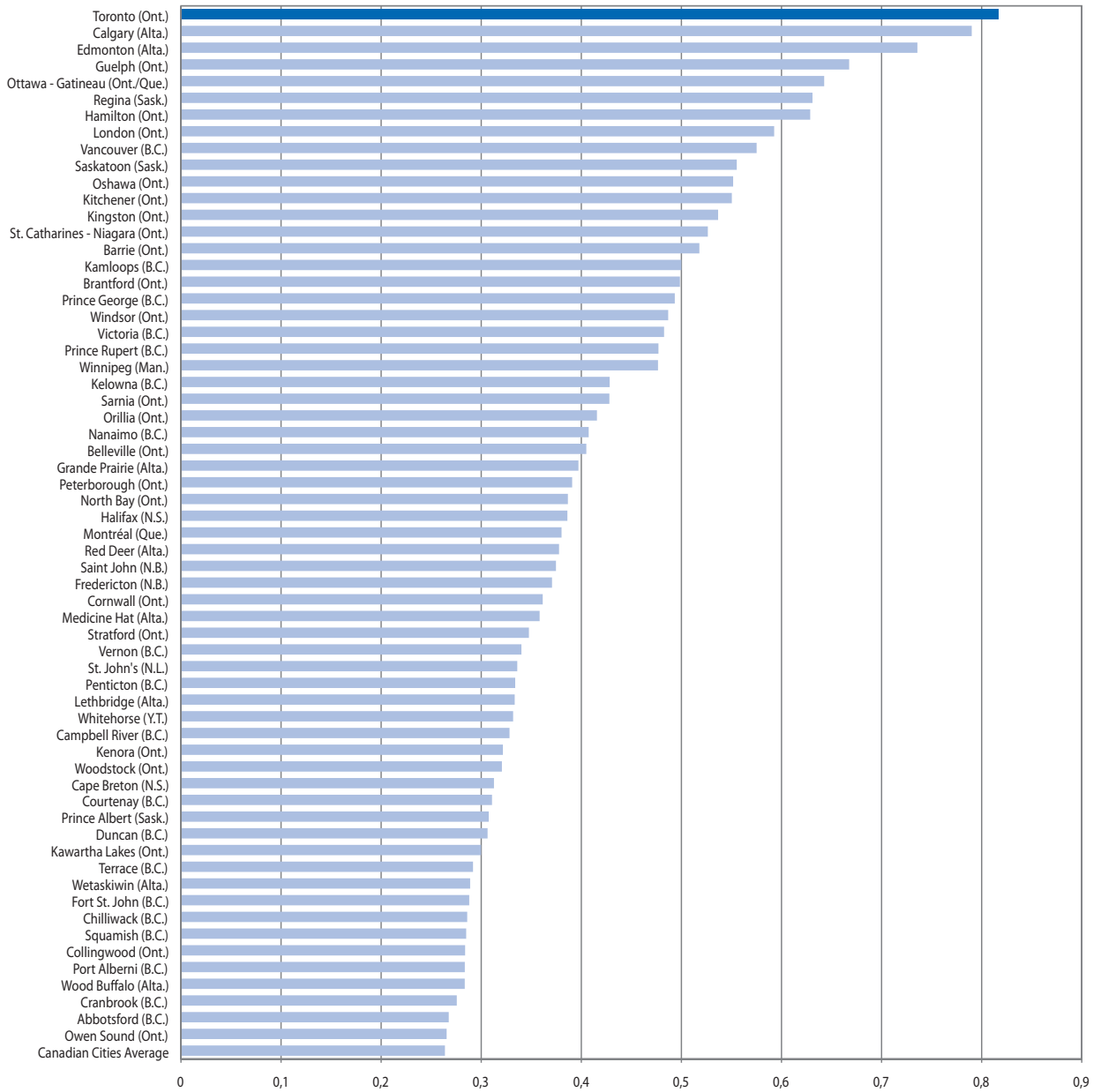
A number of studies relating diversity to urban agglomeration suggest that cultural diversity can have positive economic consequences. Sassen (1994) studies “global” cities, such as London, Paris, New York and Tokyo, and their strategic role in the development of activities that are central to world economic growth and innovation, such as finance and specialised services. A key characteristic of “global” cities is the cultural diversity of their population. Bairoch (1985) sees cities and their diversity as the engine of economic growth. More recently, Florida (2002) argues that cultural diversity helps to attract knowledge workers, thereby increasing the creative capital of cities and the long-term prospect of knowledge-based growth (Gertler, Florida, Gates and Vinodrai, 2002).

These insights suggest that cross-country comparisons may not target the correct level of aggregation to identify the possible positive effects of diversity. Finer spatial units, such as cities, where differences more easily interact, seem more appropriate laboratories. The focus on cities makes it possible to control for differences in institutional quality and stage of development. Glaeser, Scheinkman and Shleifer (1995) examine the relationship between a variety of urban characteristics in 1960, and urban growth (in income and population) between 1960 and 1990 across US cities. They find that racial composition and segregation are basically uncorrelated with urban growth. However, segregation seems to positively influence growth in cities with large non-white communities. Alesina and La Ferrara (2005) use the basic specification of Glaeser, Scheinkman and Shleifer (1995) to estimate population growth equations across US counties over the period from 1970-2000. Consistent with their result at the country level discussed above, they find that diversity has a negative effect on population growth in initially poor counties and a less negative (or positive) effect for initially richer counties.

Following Roback (1982), Ottaviano and Peri (2006a) develop a model of a multicultural system of open cities that allows them to use the observed variations of wages and rents of US-born workers to identify the impact of cultural diversity on productivity. They find that on average, US-born citizens are more productive in a culturally diversified environment. This is robust to the use of instrumental variables, thus implying a causal relationship between diversity and productivity. This result is qualified in two specific respects. First, cultural diversity in a locality has a negative effect on the provision of public goods, which is consistent with previous findings at the national level. Second, the positive effects are stronger when only second- and third-generation immigrants are considered, which suggests that the positive effects are realised only when some degree of integration between communities has taken place. The foregoing insights contrast with earlier findings by Borjas (1995 and 2003) showing a negative impact of immigrants on the wages of native-borns and a positive impact on capital returns. However, these findings rely on the key assumptions of perfect substitution between native-borns and foreigners as well as on a fixed capital stock. Allowing for imperfect substitutability between native-borns and foreigners as well as endogenous capital accumulation, Ottaviano and Peri (2006b) find that the effects of immigration on the average wages of native-borns are positive and quite significant. Moreover, they find that the effect is particularly strong for the most educated (college graduates) and negative for the least educated (high school drop-outs). The latter result is consistent with analyses showing a negative impact of immigrants on the relative wages of less educated workers (Borjas 1994, 1999, 2003; Borjas, Freeman and Katz 1997; and to a minor extent, Butcher and Card 1991; Card 1990 and 2001; Friedberg 2001; Lewis, 2003). Bellini, Ottaviano, Pinelli and Prarolo (2008) provide an overview of the relationship between diversity and economic performance across a large set of European regions and find that diversity is positively correlated with productivity.

Peri and Sparber (2008) further investigate the substitutability between immigrants and native-borns sharing the same levels of educational attainment and experience. They show that less-educated workers specialise in differentiated production tasks. Immigrants are likely to have imperfect language (or equivalently, “communication”) skills, but possess physical (or “manual”) skills similar to those of native-born workers. Thus, less-educated native-born workers have a comparative advantage in jobs demanding communication skills, while immigrants are in comparison better able to compete in occupations requiring manual labour. Immigration encourages workers to specialise accordingly. Importantly, language-intensive tasks earn a comparatively higher return, and those returns are further enhanced by the increased supply of labour-intensive tasks that complement them. Therefore, productivity gains from specialisation, coupled with the high compensation paid for communication skills, mean that the presence of foreign-born workers does not result in pronounced adverse consequences for wages paid to less-educated native-borns.

Figure 1.30. Ranking of cultural diversity in Canadian cities
 Most diverse cities in Canada, according to the Hachman Index of Cultural Diversity (HICD)



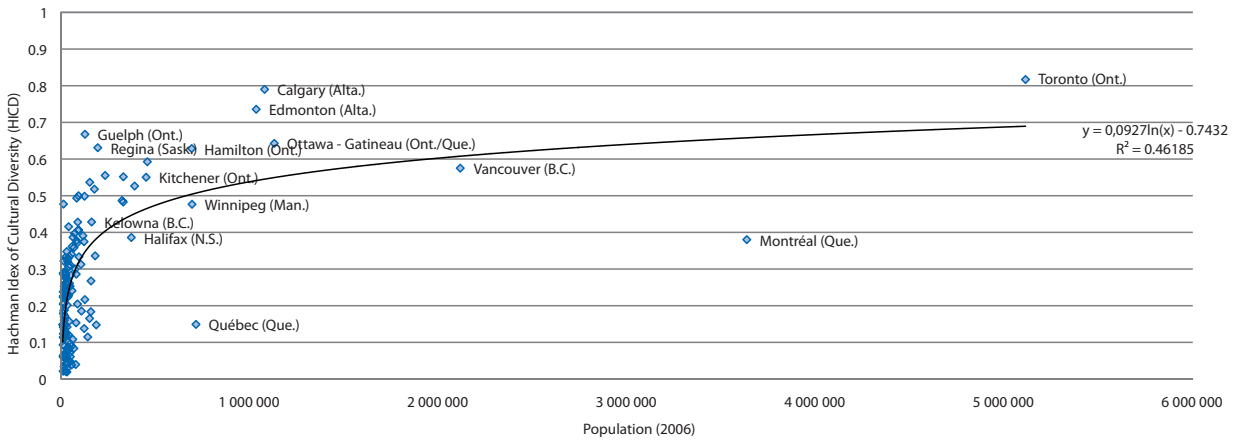
The Hachman Index of Cultural Diversity is defined as:

$$HICD = \frac{1}{\sum_i \left(\left(\frac{m_{ei}}{m_e} * m_{ci} \right) \right)}$$

where m = migrants e = ethnic group and i = city

Source: Own calculations based on Statistics Canada 2006 Population Census.

Figure 1.31. Cultural diversity and city size in Canada
Hachman Index of Cultural Diversity (2005)



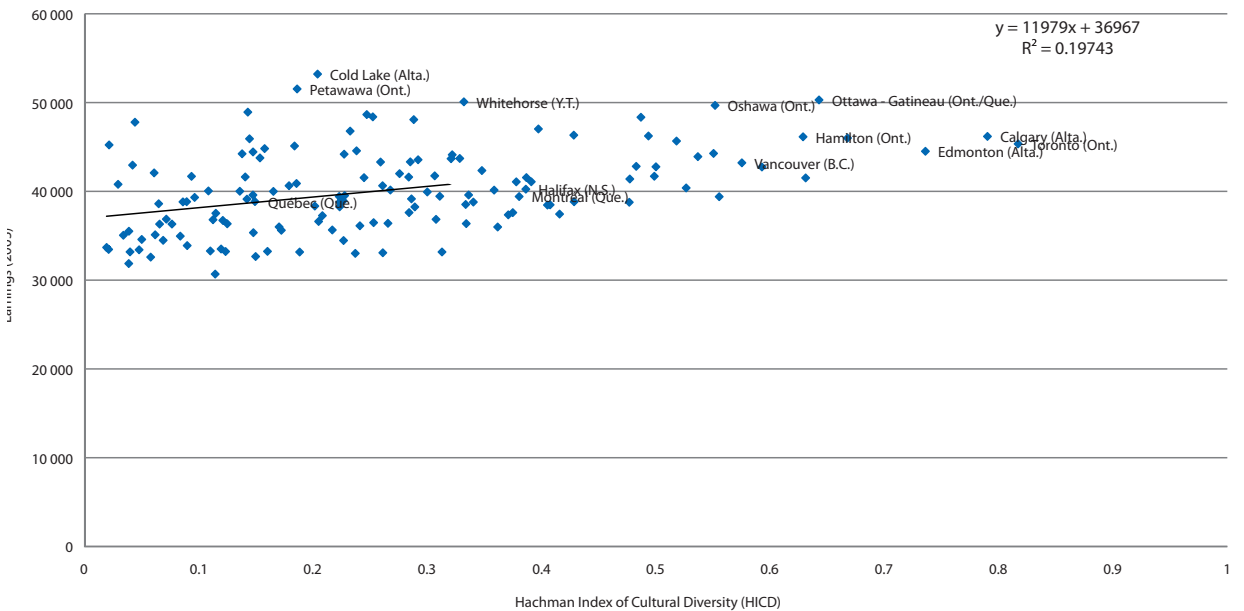
The Hachman Index of Cultural Diversity is defined as:

$$HICD = \frac{1}{\sum_i \left(\left(\frac{m_{ei}}{m_e} * m_{ei} \right) \right)}$$

where m = migrants e = ethnic group and i = city

Source: Own calculations based on Statistics Canada 2006 Population Census.

Figure 1.32. Cultural diversity and earnings in Canadian cities
Relationship between EHDI index values and median earnings across Canadian CMAs and CAs



1. Median earnings and HICD are both calculated from data derived from the Canadian Population Census of 2008 that make reference to 2005 data.

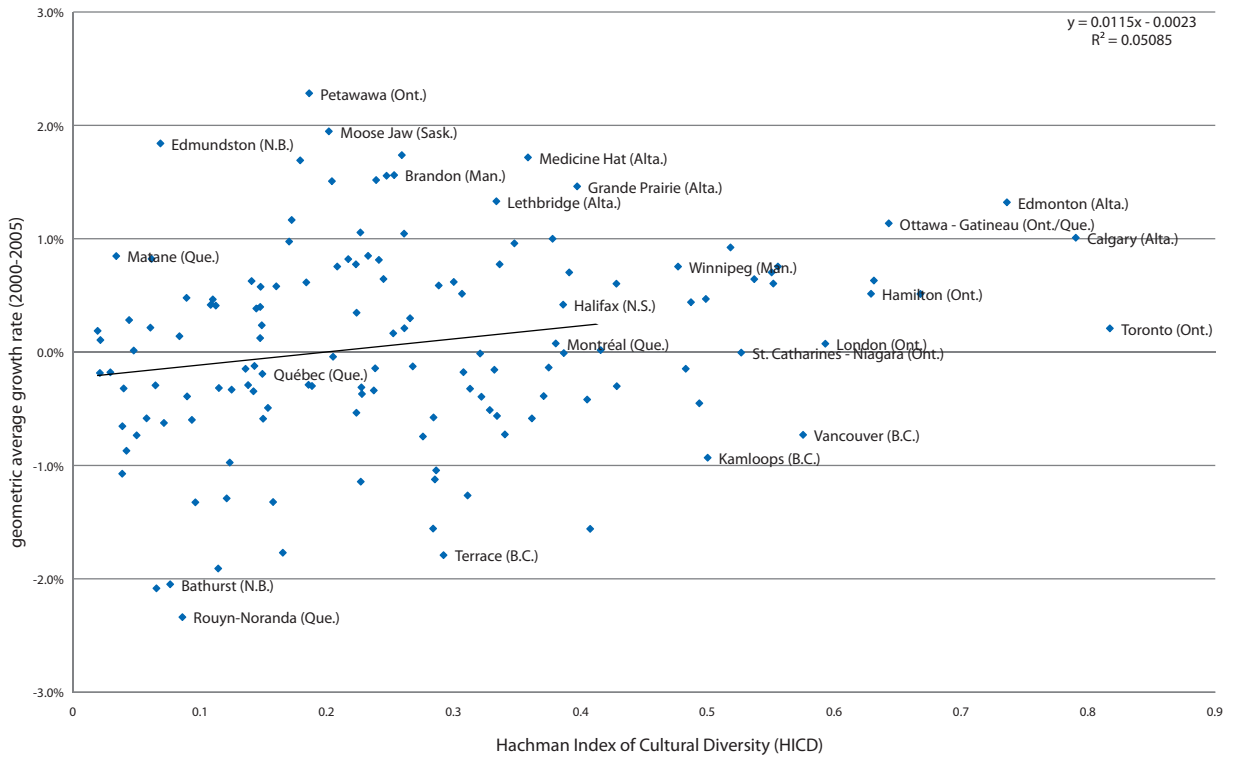
2. The Hachman Index of Cultural Diversity is defined as:

$$HICD = \frac{1}{\sum_i \left(\left(\frac{m_{ei}}{m_e} * m_{ei} \right) \right)}$$

where m = migrants e = ethnic group and i = city

Source: Own calculations based on Statistics Canada 2006 Population Census.

Figure 1.33. Cultural diversity and economic growth



The Hachman Index of Cultural Diversity is defined as:

$$HICD = \frac{1}{\sum_i \left(\left(\frac{m_{ei}}{m_e} * m_{ei} \right) \right)}$$

where m = migrants e = ethnic group and i = city

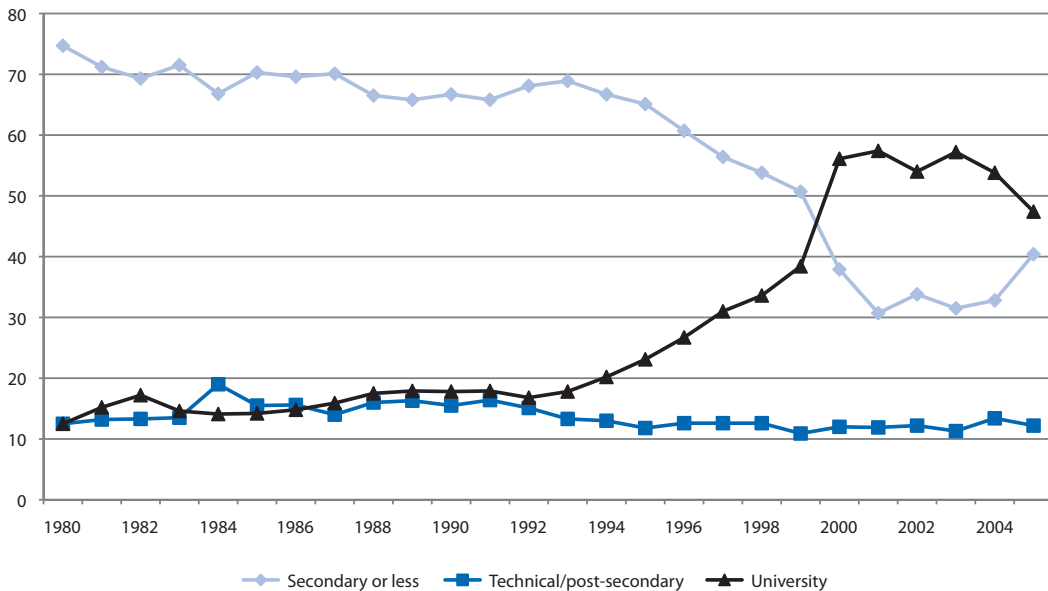
Source: Own calculations based on Statistics Canada 2006 Population Census.

Skills of immigrant population: an under-used asset

Recent migrants to the Toronto region are more highly educated than non-migrants. Around 26% of non-migrants older than 15 years had a bachelor's degree or higher in 2006, as compared with 43% for Toronto residents who immigrated between 2001 and 2006 (2006 Census, Statistics Canada). Since the second half of the 1990s, and even more so following changes in the points system in the federal immigration policy in 2002, the proportion of highly skilled immigrants that are admitted into Canada has increased (Figure 1.34).³² At the same time, the average education level of different newcomer communities in Toronto varies considerably. Immigrants from Russia, Korea, Iran and Pakistan have, on average, a significantly higher degree of educational achievement than does the population of the Toronto region at large, while newcomers from Sri Lanka and Italy tend to be less well educated. The disparities in average education levels for different foreign-born population groups are in large part related to the period when these groups arrived. Immigrants who arrived in the 1950s-1960s, for example, were subject to lower educational requirements for entry into Canada than those who have arrived in the past decade. Foreign-born populations that have arrived more recently will thus in most cases have higher education levels.

Canada, like the Toronto region, remains an attractive destination for international students, attracting 5% of foreign students worldwide. This is less than in the United States (20%),

Figure 1.34. **Educational attainment of immigrants to Toronto**
Permanent residents arriving in Toronto 1980-2005; percentage by education



Source: City of Toronto, Social Development Finance and Administration Division (2008), “The city of Toronto: a profile of diversity”.

UK (11%), Germany (9%), France (9%) and Australia (6%), but ahead of Japan (4%). Between 2000 and 2006, Canada’s share of the international student market remained constant, while the US share fell markedly (from 25% to 20%). There were however large increases in market shares in Australia, France and Japan. Despite high fees, campuses in Canada are relatively internationalised, with international students accounting for 7.4% of total enrolments in the tertiary-type A and advanced research programmes. More or less similar rates are found in the Toronto region, with 6% international students at York University and 11% at the University of Toronto. In Canada, the internationalisation is most pronounced in advanced research programmes, where international students represent 21.4% of enrolments (above the OECD average of 15.9%) (OECD, 2008c).

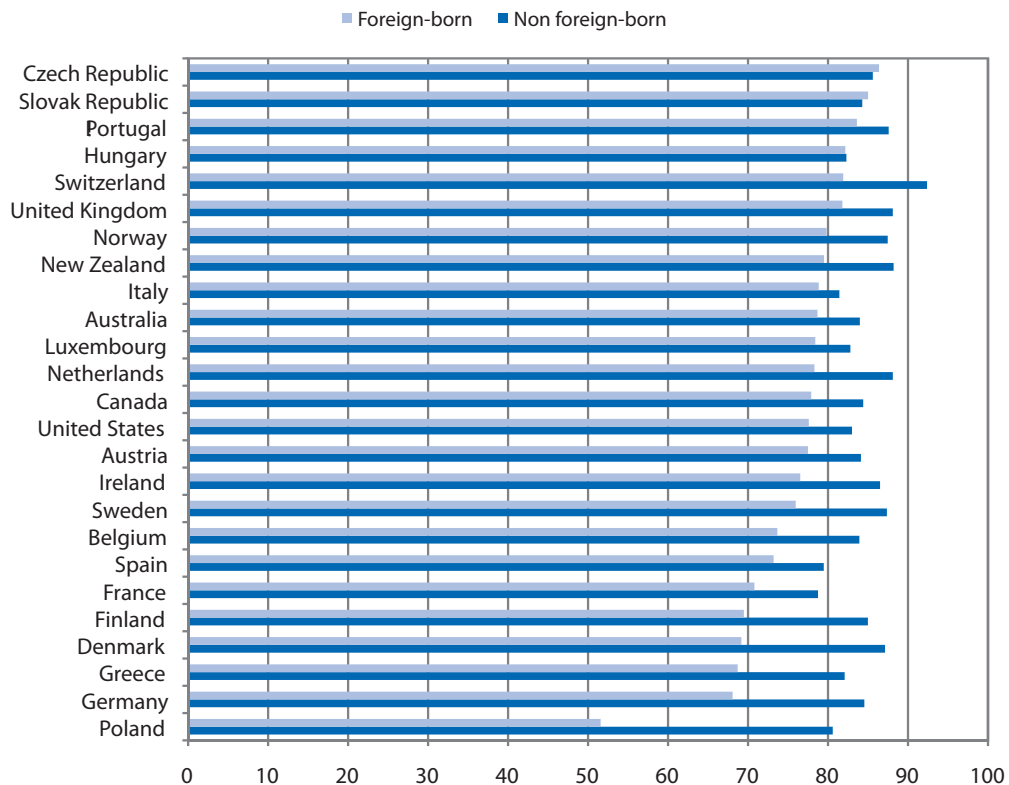
In comparison with other OECD members, Canada is doing relatively well at facilitating the entry of immigrants into the labour market, although not necessarily into professions or jobs that are commensurate with their skill level and educational background. The employment rate for highly skilled non-foreign-born Canadians is 6.5 percentage points higher than the employment rate for highly skilled immigrants (OECD Immigration Database, based on 2001 Census). Although not remarkably large in comparison to other OECD countries, this gap is larger than that of other OECD countries which, like Canada, have been successful in attracting highly skilled foreigners, such as the United States and Australia (Figure 1.35). Canada is doing well in integrating low-skilled immigrants: the employment rate of the low-skilled foreign-born population is actually slightly higher than the rate for native-born Canadians. There are, however, several OECD countries, like the United States, Luxembourg, Greece, Italy and Austria, where the employment rate of foreign low-skilled labour far exceeds the non-foreign-born rate (Figure 1.36).

Reflecting national trends, many highly skilled immigrants in the Toronto region are unemployed or working in jobs well below their level of training, expertise or education.

While recent immigrants to the Toronto region are, on average, far better educated than immigrants who arrived 20, 30 or 40 years ago, they end up more likely to be unemployed. Within the Toronto region, the 2006 unemployment rate among very recent immigrants of core working age (25 to 54 years) is 11%, but 4% for Canadian-born Torontonians;³³ unemployment rates for very recent immigrants were 18.1% in Montréal and 9.6% in Vancouver. At the same time, the Toronto region compares favourably to Montréal and Vancouver with regards to employment rates: very recent immigrants living in the Toronto region were the most likely to be employed of the three largest CMAs and had the smallest difference in the share of their core working-age populations who were employed compared to the Canadian-born in the metropolitan area (Zietsma, 2007). In Toronto, Montréal and Vancouver, 30.9% of immigrants suffer a labour market mismatch, insofar as they are employed in a job that does not correspond to their skills and qualifications. This mismatch rate is approximately 10% for the Canadian-born population (Haan, 2008)³⁴ and may damage the overall immigrant experience in the Toronto region, which was perceived as the least satisfactory among newly arrived immigrants in large Canadian metropolitan regions.^{35,36} Maximising the potential of the immigrant population takes on an added importance in light of the ageing population and low endogenous birth rate in Canada and the Toronto region.

Credential qualification, lack of Canadian work experience, language proficiency and social and cultural competencies are found to be the main explanations for the labour market integration outcomes of immigrants to the Toronto region. Nearly one out of four recent

Figure 1.35. **Employment rates of highly skilled foreign-born and non-foreign-born population in OECD countries (2003-2004)**



Note: Data for Canada based on 2001 Census for reasons of international comparability. Highly skilled population is defined as those with education at ISCED-levels of 5 and 6.

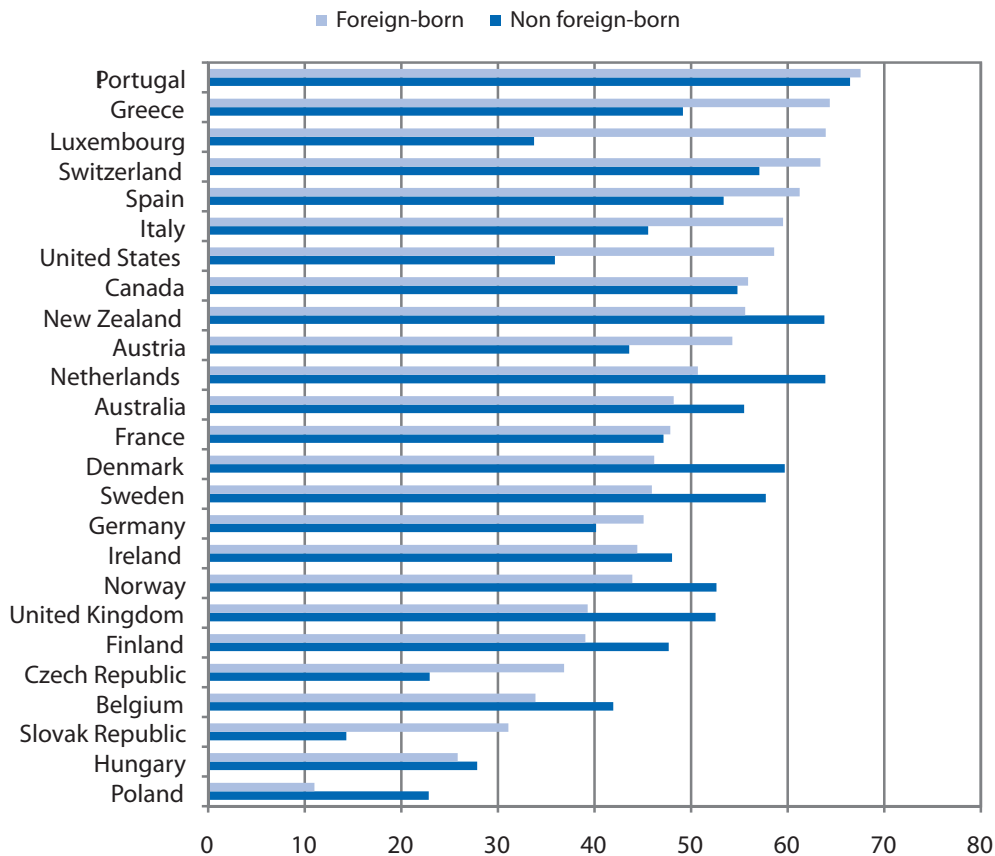
Source: OECD Immigration Database.

immigrants affirmed that their qualifications and work experience were not recognised (Statistics Canada, 2003). Language problems were reported by a relatively large proportion of recent immigrants to Ontario. Whether language ability is the primary indicator for immigrant economic success in the Toronto region remains unclear. Only 13% of recent newcomers to the Toronto region cited language difficulties as the “area of most serious difficulty in the labour market”, which outperformed the national average of 15% and rates in Calgary (18%) and Vancouver (18%).³⁷ While these levels of language proficiency are self-reported by newcomers, a lack of profession-specific language competency has been reported by Canadian employers as a reason for not hiring newcomers.

The potential to leverage cultural diversity for innovation outcomes

Research suggests that cultural diversity could in some situations contribute to innovation performance, but no studies exist on whether and how cultural diversity fosters innovation in Toronto. The presence of highly skilled immigrants has also been found to have a positive impact on the number of patents in cities (Box 1.3). A positive and significant correlation has been found between ethnic diversity and innovative strength in Canada generally; however, cultural diversity offers a weaker explanation for innovative performance

Figure 1.36. **Employment rates of low-skilled foreign-born and non-foreign-born population in OECD countries (2003-2004)**



Note: Data for Canada based on 2001 Census for reasons of international comparability. Low-skilled population is defined as those with education at ISCED-levels of 0, 1 and 2.

Source: OECD Immigration Database.

Box 1.3. Immigration, innovation and business performance

In a study on the relationship between skilled immigration and innovation in the United States from 1950-2000, it is found that one percentage point rise in the share of immigrant college graduates in the population increases patenting by 8-15%; the equivalent range for immigrants with post-college education is 15-33%. A one percentage point rise in the share of immigrant scientists and engineers in the workforce increases patenting by at least 41% (Hunt and Gauthier-Loiselle, 2008). Kerr and Lincoln (2008) have quantified the impact of changes in H-1B admission levels, the visa programme that governs most admissions of temporary immigrants into the United States for employment in patenting-related fields. They find that total invention increases with higher admission levels, primarily through the direct contributions of ethnic inventors over the 1995-2006 period. Chellaraj, Maskus and Mattoo (2005) find that both international graduate students and skilled immigrants have a significant and positive impact on future patent applications, as well as on future patents awarded to university and non-university institutions. Their central estimates suggest that a 10% increase in the number of foreign graduate students would raise patent applications by 4.7%, university patent grants by 5.3% and non-university patent grants by 6.7%. Increases in skilled immigration also have a positive, but smaller, impact on patenting.

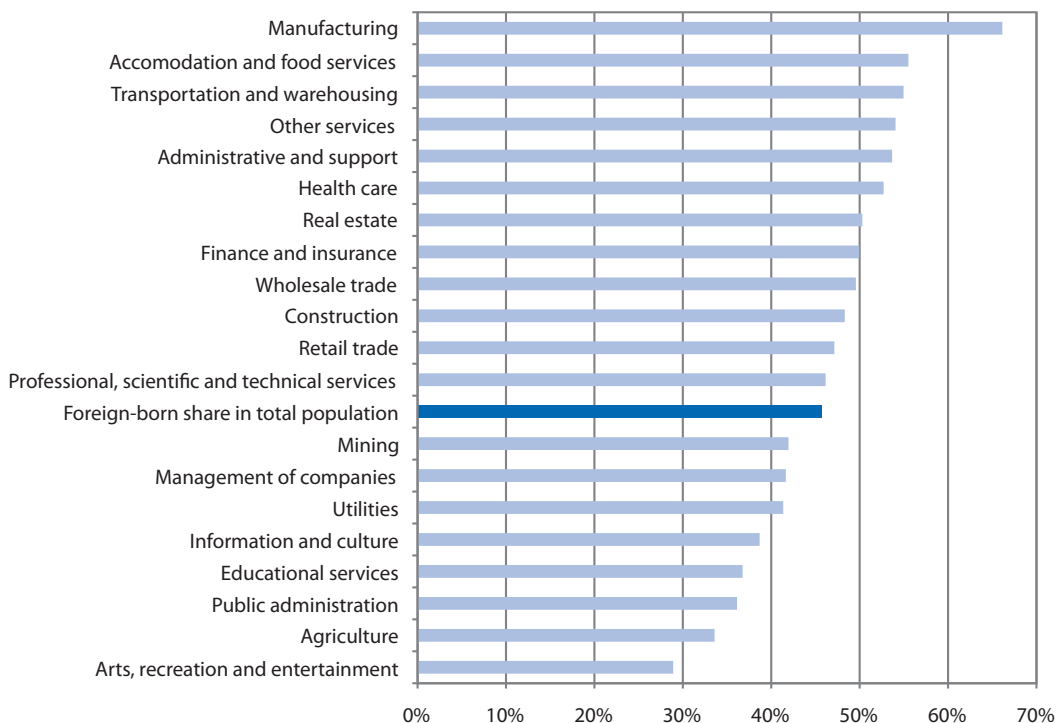
Growth in a city's share of ethnic patenting has been found to correlate closely with growth in total national patenting. Across a sample of US metropolitan regions over 1975-2004, an increase of 1% in a city's ethnic patenting share correlates with a 0.6% increase in the city's total invention share. This coefficient is remarkably high, as the ethnic share of total invention during this period was around 20% (Kerr, 2008a). International patent citations confirm that knowledge diffuses through ethnic networks, and manufacturing output in foreign countries increases with an elasticity of 0.1-0.3 to stronger scientific integration with the US frontier (Kerr, 2008b).

The prospect of increasing interchanges across domains at a number of levels is often associated with creativity. There is a potentially fruitful dynamic as cultures and their systems encounter each other. These are edges and points of intersection where great opportunities exist for creative abrasion (Westwood and Low, 2003). McLeod *et al.* (1996) found that creative ideas produced by culturally heterogeneous groups were of better quality and more functional than those produced by culturally homogeneous groups. Teams composed mostly of ethnic minorities rated working with the group to be more enjoyable (Paletz *et al.*, 2004). In other studies, the importance of context is stressed as crucial in determining the nature of diversity's impact on performance. In some groups, diversity may improve performance, while in other groups, diversity may be detrimental to performance. Racial diversity may enhance performance when organisations foster an environment that promotes learning from diversity; and diversity as a source of innovation (Kochan *et al.*, 2003). More diverse groups were found to make higher-quality decisions (McLeod *et al.*, 1996), to generate more creative ideas and to have the potential for increased productivity (Jackson 1991, Bantel and Jackson 1989). With the exception of a few studies carried out in the United States, there is a gap in empirical studies linking ethnic diversity to key financial and international business performance indicators (Shoobridge, 2006). This limited number of studies indicates, however, that racial diversity, as a knowledge-based resource, positively influences business performance. Firms that had more diverse workforces reported higher levels of business performance and better financial performance (Richard 1997, Richard and Johnson 2001, Hartenian and Gudmundson 2000; Salomon and Schork 2003).

than human capital and creativity indicators (Gertler *et al.*, 2002).³⁸ These studies tend to point at correlations rather than causalities and have in many cases left the reasons for the relation between cultural diversity and innovation unexplained. Unfortunately, there are no existing studies to document whether and how cultural diversity has fostered innovation in the Toronto region specifically.

The foreign-born population in Toronto is generally employed in sectors where the benefits of cultural diversity are potentially less obvious. Ethnic diversity could present a competitive advantage for firms in knowledge-based sectors. A study on the effects of ethnic diversity on US industries found positive impacts in sectors with many highly educated workers and where creative decision-making and idea generation were essential to the service or good being produced (Sparber, 2006). Although these findings might be US-specific, and although ethnic minorities, immigrants and foreign-born population do not refer to the same population groups, there might be some relevance for these findings to the Toronto region. The economic sectors in which the foreign-born population in the Toronto region is highly over-represented are manufacturing, hotels and restaurants, transportation and warehousing, as well as wholesale trade, construction and retail trade sectors that generally rely less on innovative inputs benefiting from intercultural interaction (Figure 1.37). With regards to the most knowledge-intensive sectors, the picture is mixed: the foreign-born population is, for example, over-represented in finance and scientific and technical services, and under-represented in the management of companies, information and culture and educational services.

Figure 1.37. Shares of foreign-born population in economic sectors in the Toronto region (2006)



Source: Statistics Canada 2006 Census.

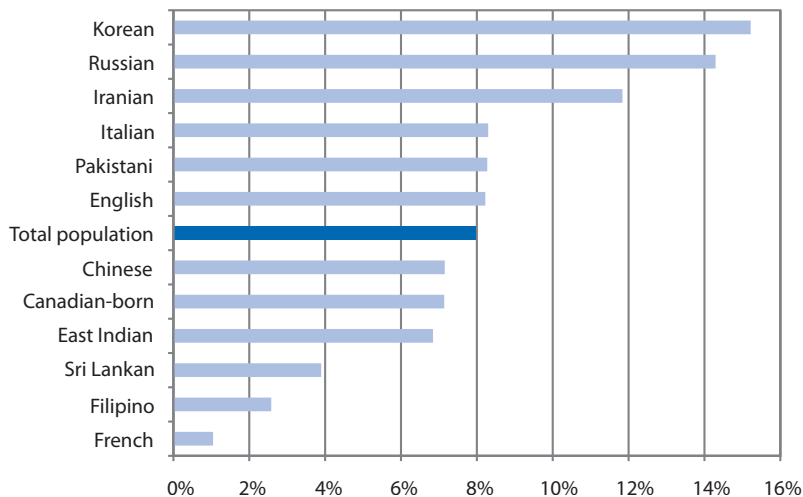
Limited association of exports and immigrants in the Toronto region

Cultural diversity in the Toronto region does not appear to have a large impact on the composition of its export markets, as is the case in California. There is a strand of research that has highlighted the gains from immigration and diversity that may accrue in terms of enhanced international trade. For example, Saxenian (1999) discussed how a trans-national community of Indian engineers helped to outsource software design from Silicon Valley in California to Bangalore in India, and Bardhan and Howe (1998) found that for every 1% increase in the number of first-generation immigrants from a given country, exports from California to that country have been found to rise nearly 0.5%. No evidence exists of an export diversity effect for the Toronto region in terms of international ethnic networks at the provincial level (the only one that can be evaluated, due to the lack of data on international trade at the sub-provincial level). Whereas the Chinese community is now the largest immigrant group in the area, the relative importance of trade with China is below the national average. Ontario's shares of overall exports and imports with China are 1.0% and 9.3% respectively, compared with national averages of 2.2% and 9.9%. Although trade with China has increased over the last decades in parallel with the growing Chinese immigrant population, trade volumes remain rather limited: California, for example, managed to export 7.6% of total export value to China in 2008 (Foreign Trade Division, U.S. Census Bureau, 2009). Cultural diversity may have an impact on the composition of export markets only under certain circumstances that happen to exist in California, but not in the Toronto region, *e.g.* market conditions, geographical position and availability of logistic facilities (sea ports). An area where Toronto region's immigrant population could be leveraged for export markets is tourism, considering the over-representation of immigrants in some of the tourism sub-industries.

Making use of entrepreneurial activities of newcomers and foreign-born population

Immigrants to the Toronto region are more entrepreneurial than non-migrants. While there are differences in self-employment by country of origin, established immigrants in general are much more likely to be self-employed than non-migrants. The self-employment rates for those who immigrated before 1961 are more than two times as high as for other Canadians. In

Figure 1.38. **Self-employment rates of selected foreign-born population groups in the Toronto region (2006)**



Source: Statistics Canada 2006 Census.

addition, several foreign-born population groups in the Toronto region are considerably more entrepreneurial than Canadian-borns. Self-employment rates among Korean and Russian foreign-born immigrants are twice as high as the average population in the Toronto region, but other foreign-born population groups (French, Filipino and Sri Lankan) are much less often self-employed (Figure 1.38). Immigrants' endowments can be used to find opportunities, especially to create ethnic businesses and ethnic niches, which can make up a considerable share of the metropolitan labour market (Van Gelderen 2007).³⁹ This is also the case in the Toronto region, in particular among large foreign-born population groups such as the Chinese (Box 1.4). Some areas in the Toronto region use ethnic commercial strips as a marketable branding mechanism to produce nearby residential gentrification, such as the City of Toronto's Gerrard India Bazaar (Hackworth and Rekers, 2005).

Social cohesion

As the largest immigrant gateway in Canada, Toronto has historically excelled in the integration of newcomers. Indicators of social integration include feelings of belonging, voting behaviour, citizenship rates, inter-ethnic friendships and marriages, as well as ethnic community involvement. The 2003 General Social Survey indicated that immigrants to Canada have a strong sense of belonging, for the older cohorts even stronger than the Canadian-born population.⁴¹ Data from the Ethnic Diversity Survey indicate that newcomers are voting at levels that are similar or higher than the Canadian-born.⁴² Civic engagement among visible minorities is substantial (Picot, 2008), and about 85% of eligible immigrants in Canada take up citizenship, among the highest rates in the world (Statistics Canada 2006 Census, Banting, Courchene and Seidle, 2007). Immigrants are less likely

Box 1.4. Chinese entrepreneurs in Toronto

In 2003, there were 64 Chinese shopping centres in Toronto, 62 outside the city core, with sizes ranging from 15 store units and 9 500 square feet to 200 units and 285 000 square feet (Wang, 2004). Chinese ethnic businesses in Toronto have been able to capture a significant share of the Chinese immigrant market for consumer goods. In surveys and focus groups, a consistent preference for ethnic stores over mainstream stores is revealed. Chinese and mainstream travel agencies are substitutes, but Chinese and mainstream supermarkets and electronic stores are complements. Ethnic identity and trans-national relationships are found to be closely related to preferences for ethnic businesses. Those who identify themselves more strongly as Chinese and who engage in more trans-national activities tend to patronise Chinese businesses more frequently than those at a lower level of ethnic identification and trans-national involvement (Wang and Lo, 2007).

Locational patterns of ethnic businesses differ depending on the different industrial sectors. In a study on Chinese entrepreneurs in Toronto, it appeared that Chinese manufacturing firms are more likely to be located in non-Chinese neighbourhoods, whereas Chinese businesses in retail, finance, insurance and real estate are more likely to be found in Chinese neighbourhoods (Fong *et al.*, 2008). Chinese businesses no longer concentrate in the Chinatown located in the central city. They scatter to almost every part of the city, a large number of them to the suburbs.⁴⁰ Of all the Chinese businesses in the City of Toronto and York Region, 78% are located in suburbs. The level of clustering is also higher in the suburbs: on average, 17 Chinese businesses are located in suburban neighbourhoods, as compared with only 14 in city neighbourhoods. About 4% of neighbourhoods in the city, but 16% in the suburbs do not have any Chinese business presence. Ethnic manufacturing businesses cluster in areas that have easy access to transportation networks; city ethnic businesses in various industries do not have to be located in ethnic neighbourhoods or in certain areas to maximise customer flow. Suburban ethnic businesses are only significantly associated with higher proportions of recent co-ethnic immigrants. Ethnic enclaves are not necessarily related to areas characterised as having a substantial proportion of ethnic members with limited socio-economic resources (Fong *et al.*, 2007).

than Canadian-borns to volunteer (40% vs. 49%). However, those immigrants who did volunteer contributed slightly more hours (171 vs. 163) (Hall *et al.*, 2009). Cross-ethnic friendships are more common in the Toronto region than many cities in the United States and Britain, as has been revealed by studies of junior high school students in the area (Smith and Schneider, 2000; Schneider *et al.*, 2007).⁴³ Similarly, research shows that 23% of the marriages recorded in the Toronto region in 2001 were ethnically mixed, a rate higher than the national rate and on a par with many diverse cities in the United States and Europe (Lee and Boyd, 2008; Coleman, 2004; Kalmijn, 1998).^{44,45}

Although the Toronto region is a worldwide example for the integration of immigrants, some challenges remain. Social integration of immigrants in Canadian cities, and the Toronto region, has been relatively successful over the past decades. Yet the demographic evolution of the population, and spatial and economic trends, raise a number of challenges for integration which, if not addressed, could have an impact on labour productivity and the economic potential of the Toronto region. These include: (i) strain on housing, (ii) trends toward spatial concentration in certain (often high-poverty) neighbourhoods and (iii) infrastructure needs.

Strain on housing

Many of the Toronto region's new immigrants face housing stress at levels that exceed those of non-migrants and immigrants elsewhere. In 2005, 60% of newly arrived immigrants in the Toronto region spent at least half of their income on housing costs, exceeding rates in Vancouver (56%) and Montréal (52%) (Statistics Canada, 2005) (Table 1.7). The majority of the "housing poor" in the Toronto region are immigrants: 62% of all households spending at least 30% of total before tax income on housing were immigrant households (Preston *et al.*, 2007). According to case studies of samples of specific immigrant groups, housing stress is particularly acute for Jamaicans and Somalis and to a lesser extent recent Punjabi and Sinhalese immigrants, who tend to have higher rates of home ownership (Ferdinands, 2002; Murdie, 2002; Oliveira, 2004). Nevertheless, over time, the need for housing amongst immigrants falls to levels comparable to non-immigrants: *e.g.* in 2001, the incidence of core housing need in the Toronto region was 41.9% for immigrants who arrived in Canada during the period 1996-2001, compared to 16.7% for those who arrived before 1979.⁴⁶

Demand for rental housing will continue to grow in the Toronto region thanks to a consistent flow of immigrants, who generally start their housing tenure with rental housing. The construction of rental housing units over the last decade has been limited and mostly focused on high-income groups. Although there is a considerable vacancy rate of rental homes in the City of Toronto, these vacant homes are not sufficient to accommodate the expected population growth. Moreover, the long waiting lists for social housing and other indicators mentioned above suggest that housing affordability is a significant issue.

**Table 1.7. Housing costs in the three largest metropolitan regions in Canada (2001)
(as a proportion of family income for immigrants)**

	Montréal	Toronto	Vancouver	Canadian immigrant average
Family lodged for free	3.08%	3.85%	3.39%	4.42%
Less than 30%	22.56%	16.78%	22.32%	33.50%
30%-49.9%	22.82%	19.41%	18.36%	21.94%
50% and over	51.54%	59.97%	55.93%	40.14%

Note: The category, "Don't know, refused, not stated", is excluded from the calculations in this graph.

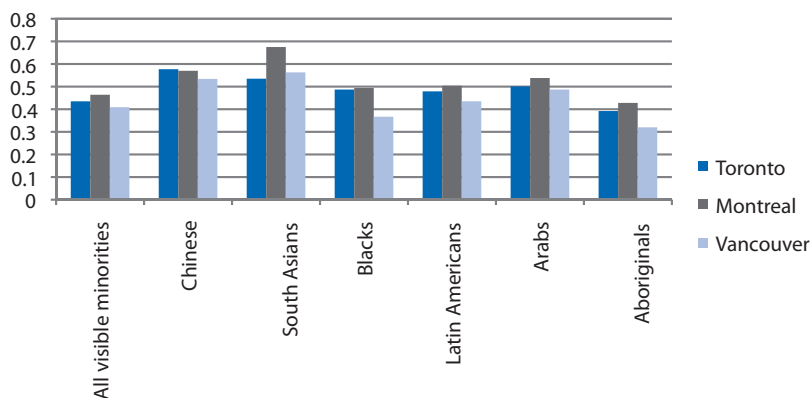
Source: Statistics Canada (2005), compiled in Mendez *et al.* (2006)

The relative affordability of housing in the suburbs has led to an outward shift of immigrant communities. The recent suburbanisation of the immigrant population differs from historical patterns. While before 1970, immigrants who arrived in the city settled primarily in immigrant gateway communities east and west of the downtown business core,⁴⁷ in 2006, due to the elevation of home prices in the city centre and a greater supply of housing stock in the periphery, almost of all of the Toronto region's newly arrived immigrants first settled in the suburbs. New ethnic communities have burgeoned in the inner suburbs, where high-rise private rental apartments provide affordable housing, especially for low-income immigrants and refugees from Asian, African and South American countries. The outer ring of suburbs, by contrast, is often inhabited by Chinese and East Indian newcomers who can generally afford homeownership.⁴⁸ These include Indian immigrants in Mississauga and Brampton and the Chinese communities in Scarborough, Markham, and Richmond Hill (Murdie, 2008a).⁴⁹ Ethnic enclaves in these areas have crystallised and are marked by extensive business and institutional presence (Murdie, 2008b).

Spatial concentration, often in low-income neighbourhoods.

Immigrants are increasingly concentrated in low-income neighbourhoods in suburban locations. In 1981, the majority of the “low-income” family population in higher-poverty neighbourhoods were Canadian-born (55.2%).⁵⁰ Twenty years later, 65% of the “low-income” families were immigrants, while non-immigrants accounted for just 35%. In 2001, four times more immigrant families lived in low-income neighbourhoods than twenty years earlier. An index to reveal the level of concentration in relation to the distribution of whites – an index of dissimilarity – illustrates a lower level of racially mixed neighbourhoods than London, Vancouver and Sydney, but higher than Montréal and many US cities (Walks and Bourne 2006; Musterd, 2005) (Figure 1.39).⁵¹ Large increases in racial minorities produced a rise in the number of racial majority-minority neighbourhoods, particularly amongst Chinese and South Asian communities.^{52,53} This residential concentration is not always connected with neighbourhood poverty, and in many cases reflects a choice rather than a constraint, but it underlines the importance of having a transport infrastructure in place that can provide quick access from residential areas to employment opportunities across the region.

Figure 1.39. Residential concentration indexes in Toronto, Montréal and Vancouver (2001)



Note: The unit of analysis is the metropolitan area (Census Metropolitan Area). The residential concentration indexes are expressing dissimilarity, calculated in relation to the distribution of whites (non-visible minorities and non-Aboriginals).

Source: Walks and Bourne (2006).

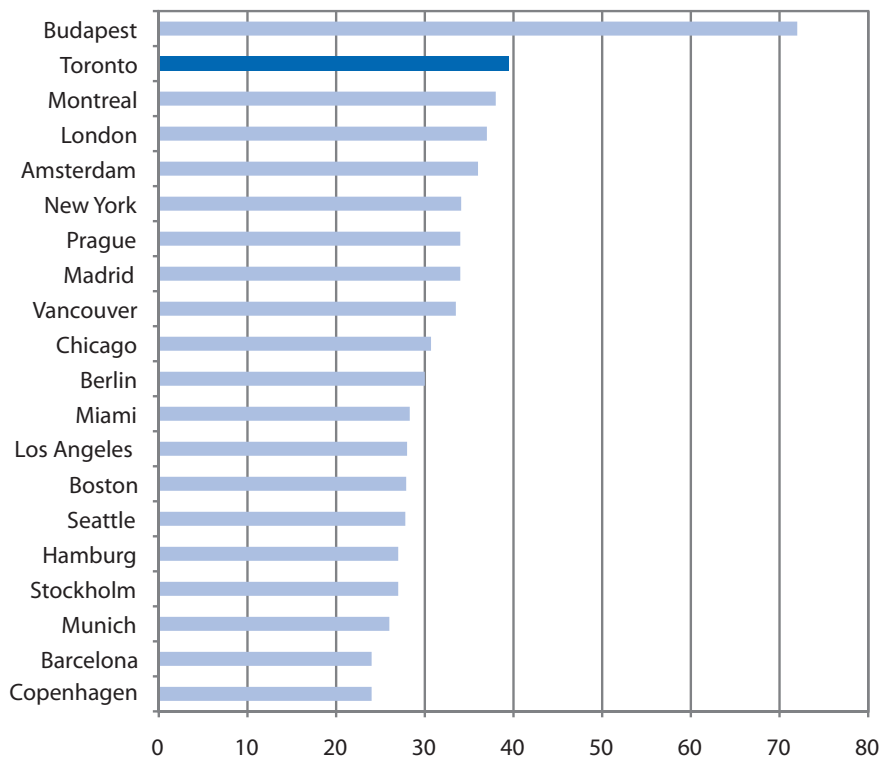
New infrastructure needs

The crystallisation of immigrant communities in the Toronto region and continuous population growth have created new needs for additional infrastructure in these neighbourhoods. In the past, immigrants benefitted from social services that were mainly concentrated in the city centre where they resided. Several social service organisations operating in the Toronto region, such as the United Way of Greater Toronto, have called for the construction of additional community infrastructure – early learning and child care, social housing, English and French language training, accessible recreation programs – in these diversifying neighbourhoods. Continuous population growth has implications for the infrastructure and other services required. Public transport should be leveraged to better facilitate inter-urban mobility and to improve access to jobs for residents living in Toronto’s inner suburbs and other suburban communities in the Toronto region.

1.2.3. Unsustainable and inadequate infrastructure and environment challenges

Rapid urban development and population growth in the Toronto region has resulted in high congestion costs and productivity losses. Average commuting time in the Toronto region is now one of the highest among metropolitan regions in the OECD and has increased in recent years, although differences with other metropolitan areas remain relatively small

Figure 1.40. Average commuting time (of all commuters and different commuting modes) in minutes in OECD metropolitan regions (2005)



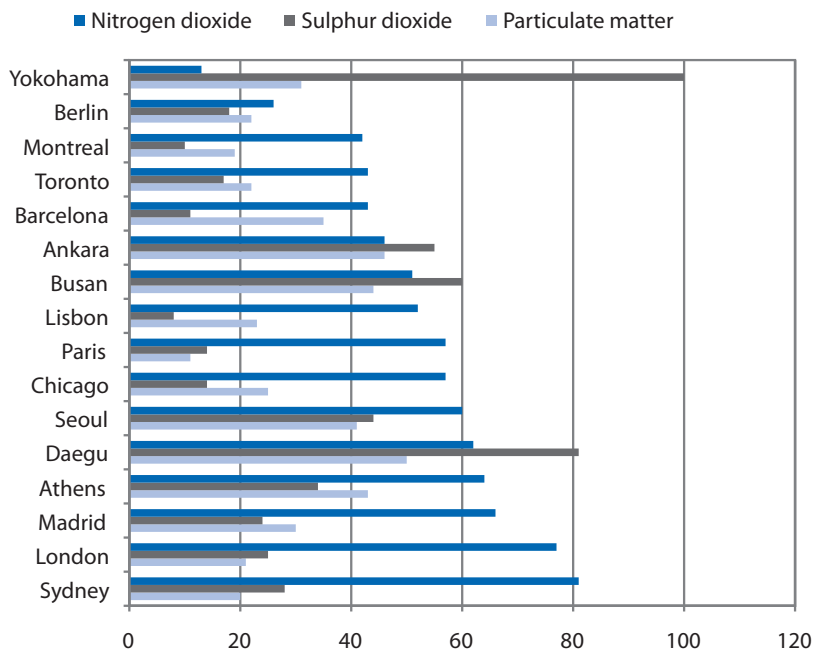
Note: The unit of analysis is the metropolitan region. Time of travel from place of residence to place of work is established through time surveys by the different statistical bureaus.

Source: Statistics Canada 2005, US Census 2005, EU 2005.

(Figure 1.40). Depending on the unit of analysis, estimated congestion costs range from CAD 1.6 billion to CAD 2.2 billion (in 2001-2002) up to CAD 4.1 billion in 2031.⁵⁴ Annual costs for commuters in 2006 were estimated at around CAD 3.3 billion per year and the annual economic costs at CAD 2.7 billion for the Greater Toronto and Hamilton Area. Congestion costs in the Toronto region are the highest of all major urban areas in Canada (Transport Canada, 2006). This has important economic, social and environmental implications. The competitiveness of several large economic sectors in the Toronto region (wholesale, retail, logistics and food) is dependent on quick transportation unhindered by delays. Congestion might constrain commuting, thus limiting the labour pool effectively available in the Greater Golden Horseshoe. Finally, congestion adds to air pollution and has consequences in terms of human health in the area.

Congestion impairs air quality and impinges on the health of Toronto residents. When comparing cities of similar size, the Toronto region appears to score fairly well on several air quality indicators.⁵⁵ It has relatively low concentrations of particulate matter, sulphur dioxide and nitrogen dioxide (Figure 1.41).⁵⁶ Vehicles are the largest source of carbon monoxide (85%) and nitrogen oxide (69%) emissions within the Toronto region, and a significant source of particulate matter (16%). In addition, vehicles are a significant and chronic source of “air toxins”. Air pollution due to traffic has been estimated by the City of Toronto’s Medical Officer of Health to cause 440 premature deaths per year in the city alone. According to the Ontario Medical Association (2005), smog and exposure to air pollutants have been associated with approximately 6 000 premature deaths, 17 000 hospital admissions and 29 million minor illnesses each year in Ontario. Air pollution from

Figure 1.41. **Air quality in selected metropolitan regions**
(between 2.5 million and 10 million inhabitants)



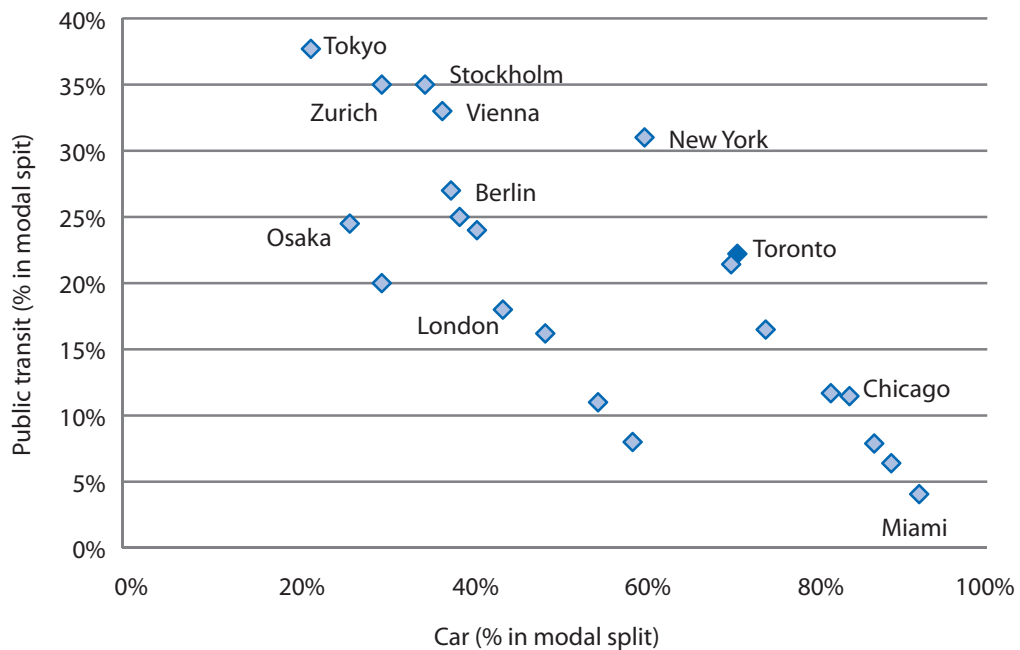
Source: Sources: NO₂ measurements for cities in the OECD derive from OECD Environmental Data Compendium 2002, EEA (AirBase), and national statistical websites (cited in OECD, 2009b). They refer to 2002. Data on particulate matter concentrations are from Pandey *et al.* (2006) (cited in World Bank, 2007). These data refer to 2004.

ground-level ozone and particulate matter costs the Ontario economy CAD 7.8 billion in lost productivity, health care costs, pain and suffering, and premature loss of life. A little over one-third of the greenhouse gas emissions are sourced from transportation, most notably diesel trucks and passenger vehicles (ICF International, 2007). Congestion alone has been estimated to produce 651 318 tonnes of CO₂ emissions each year (Transport Canada, 2006). Nevertheless, air quality throughout the Toronto region is not uniform.⁵⁷ Neighbourhoods in the Toronto region marked by low education, one-parent families and low median income were more likely to have higher NO₂ exposure (Buzzelli and Jerrett, 2007). In terms of green house gas emissions, the top ten most polluting tracts are located in the lower-density suburbs, and their high emissions are largely due to private auto use (VandeWeghe and Kennedy, 2007).

Congestion and air pollution in the Toronto region is related to high car dependency. The Toronto region is one of the metropolitan regions in North America with the highest share of public transit in the modal split, around 23% in 2006, only surpassed by New York City. The share of the Toronto region is comparable to those of many European metropolitan regions, such as London, Munich and Amsterdam, but falls well below public transit shares in Japanese cities like Tokyo (Figure 1.42). Despite the high use of public transit, the Toronto region has one of the highest rates of car use among OECD metropolitan regions (71% in 2006). European metropolitan regions have been able to lower car use through walking and cycling, which is fairly limited in the Toronto region.

The Toronto region's automobile use has been facilitated by its increasingly polycentric urban form. High to medium density is critical in supporting an environment where public

Figure 1.42. **Public transport and car transport as % of modal split**



Note: The modal split describes the percentage of travelers using a particular type of transportation. The unit of analysis is the metropolitan region. Data on Canadian metropolitan regions refer to 2006, US metropolitan regions to 2005, Japanese metropolitan regions to 2005.

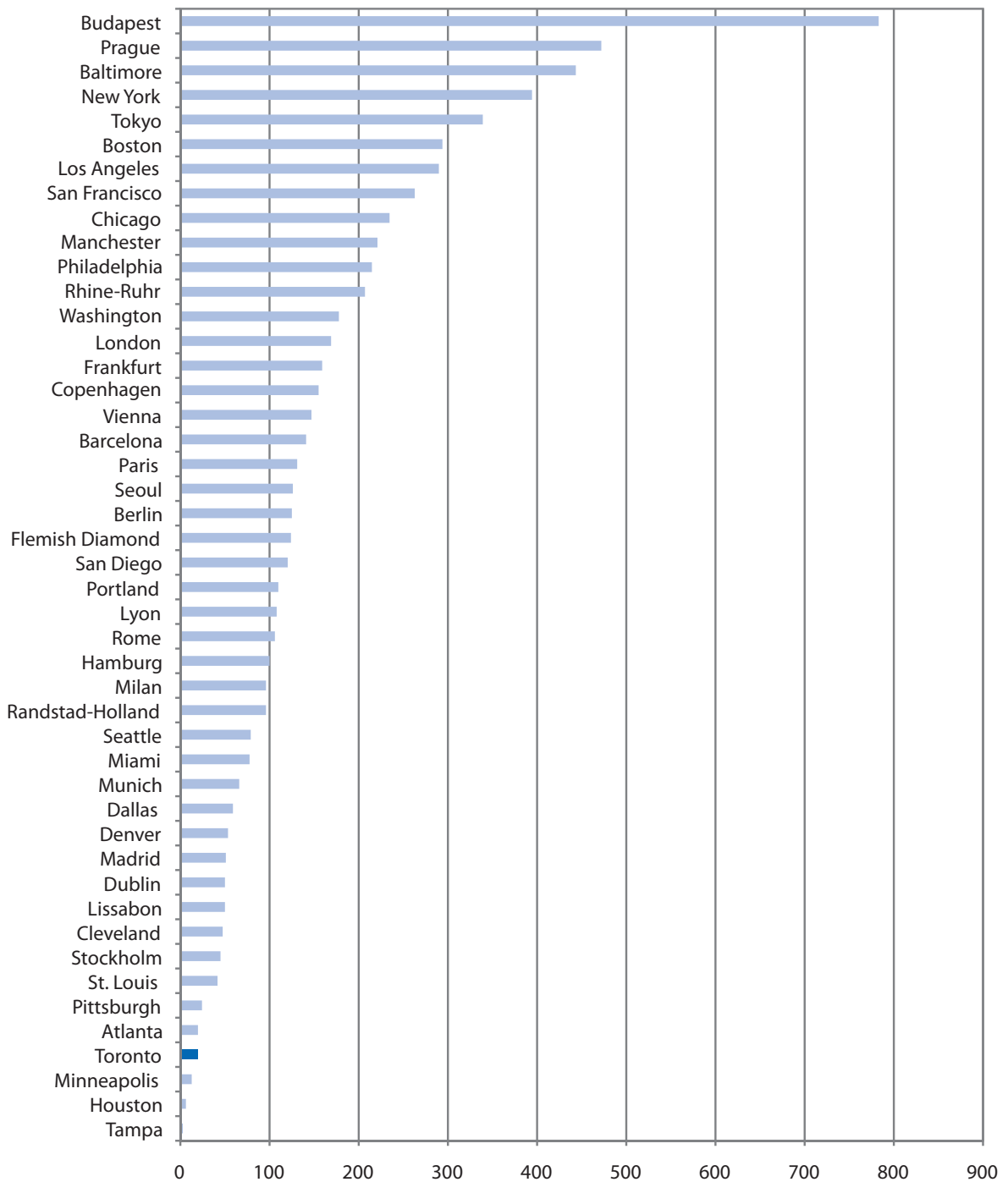
Source: Statistics Canada, Census USA, Japanese Ministry of Land and Transport, Apel *et al.* (1998), Krag, Ege and Dyck-Madsen (2005), Zwerts and Nuyts (2004) and City of Copenhagen (2006).

transportation systems can be financially viable. It has been found that density explains nearly 60 percent of the variations observed in transit ridership (Pushkarev and Zupan, 1977). Several established public-transit cities, such as New York, Tokyo and London, have higher densities than the Toronto region. The Toronto region's density has fallen mainly due to the suburbanisation of economic production. While 59% of Montréal's employment is located within 10 kilometres of the CMA's central point, only 32% of the Toronto region's employment is within 10 kilometres of downtown Toronto. Indeed, 29% of jobs are located at least 20 kilometres away from the central point. Several high-density suburban nodes have been established in the Toronto region, often the result of deliberate region-wide policies of planned concentration, such as the developments alongside the airport and near certain highways, *e.g.* Highway 7. Many of these included concentrated clusters of office parks: office space in the suburban centres of North York, Scarborough and the City of Mississauga, for example, grew by 250% from 1981 to 2004 (Charney, 2005a). This urban sprawl carries costs not only in the form of congestion and air pollution, but also on individual households: Miller *et al.* (2004) have shown that households in suburban regions poorly served by transit spend more of their household income on transportation than other households.

Under-investment in the Toronto region's infrastructure, particularly public transit, over the past few decades offers an additional explanation for its low public transit share in suburban areas. While between 1955 and 1977, new investment in urban infrastructure grew by 4.8% annually, it grew by only 0.1% per year between 1978-2000 (Golden and Brender, 2007). The investment in public transport in Toronto (as a percentage of GDP) between 1993-1997 was one of the lowest in selected OECD metropolitan regions (Scheurer *et al.*, 2005, cited in Slack and Bourne, 2006). Much of this was interrelated with intergovernmental issues. Between 1955 and 2007, much of the funding for infrastructure in Canada shifted to sub-national levels of government. During this period, the federal share of public infrastructure steadily declined, from 26.9% in 1955 to 5.3% in 2007, while that of the local level of government increased from 26.7% to 54.9%.⁵⁸ As explained in the governance chapter, local revenue sources have not kept pace with expenditure requirements, and the result has been a deterioration of existing local infrastructure. Although the government of Canada and government of Ontario have since 2007 made additional funds available for infrastructure in Toronto, a more sustainable infrastructure financing scheme is required to both address the existing infrastructure deficit and keep pace with forecast urban growth.⁵⁹

Although comparative data on transit in different metropolitan regions need to be interpreted with caution, it appears that transit infrastructure in the Toronto region is relatively limited in comparison to European metropolitan regions and several US metropolitan regions. One of the indicators to compare transit infrastructure is the relationship between a metropolitan region's metres of railway track and its population size or surface area. Although this indicator is not perfect, as differences in freight railway track capacity (which are unrelated to transit infrastructure) and non-rail public transit options could distort the comparison, it is useful for international comparison because the data informing this indicator are relatively standardised and available. These data are, however, not available for all metropolitan regions in the OECD, and railway track data for Ontario are used as a proxy for the Toronto region; this leads arguably to an underestimation of Toronto's railway capacity. Using this indicator, Toronto's railway capacity is 19 metres per square kilometre, which is not only limited compared to European metropolitan regions, but also compared to most US metropolitan regions. It is considerably lower than railway capacity for European polycentric regions such as Randstad-Holland (96 m/km²), the Flemish Diamond (124 m/km²) and Rhine-Ruhr-area (207 m/km²) (Figure 1.43). In addition to this, other characteristics confirm Toronto's relatively limited transit infrastructure endowment, such as the

Figure 1.43. **Railway capacity in selected OECD metropolitan regions (2003)**



Source: BTI (2007), OECD (2009b), Japanese Ministry of Land, Infrastructure, Transport and Tourism, Korean Ministry of Land, Infrastructure and Maritime affairs.

lack of high-speed railway connections between the core city and the international airport. Although Toronto's Pearson International Airport is one of the larger airports on the North American continent, there is no high-speed rail connection between the airport and the city, as is the case in several OECD metropolitan regions, such as Stockholm and Oslo. Efforts are under way, however, to make this connection, and on 21 January, 2009, the Province of Ontario announced that Metrolinx is leading a project to expand GO Rail services and build a rail link to Pearson International Airport from downtown Toronto. The expansion is expected to provide two-way, all-day service.

Infrastructure is not only a necessary condition for growth but, together with human capital and innovation, a determinant for growth in regions across the OECD (OECD, 2009a). The state of the Toronto region's infrastructure could therefore significantly strain its capacity to compete with other OECD metropolitan regions. In addition, developing a sustainable mode of funding public transit is a key issue, given demographic projections and immigrant settlement patterns. It has been shown that recent immigrants are much more likely to use public transit to commute to work than the Canadian-born, also after controlling for demographic characteristics, income, commuting distance and residential distance from the city centre (Heisz and Schellenberg, 2004). This has important implications. First, projections for future public transit needs should take into account that the urban population is not only growing, but shifting towards a high-use group. Second, immigrants have a high use rate no matter how far they live from the downtown core. Unlike earlier cohorts of immigrants, who initially settled in the downtown areas of metropolitan regions in Canada, many immigrants in the 1980s and 1990s tended to settle directly in suburban areas. This has implications for the routing of transit services.

Notes

1. Statistics Canada's April 2009 population estimate was 33 592 686 people.
2. The OECD regional typology distinguishes between three types of regions: predominantly urban regions, predominantly rural regions and intermediate regions. These regions are defined using three steps. The first step consists in classifying regions at a lower geographical level (local units) as rural if their population density is below 150 inhabitants per square kilometre (500 inhabitants for Japan and Korea, to account for the fact that its national population density exceeds 300 inhabitants per square kilometre). A second step consists in aggregating this lower level into TL3 regions and classifying the latter according to the percentage of population living in local units classified as rural. A TL3 region is classified as predominantly urban if the share of population living in local units classified as rural is below 15%. An additional criterion is based on the size of the urban centres included in the TL3 regions. A region that would be classified as intermediate on the basis of the first two steps becomes predominantly urban if it contains an urban centre of more than 500 000 inhabitants (1 million for Japan and Korea) representing at least 25% of the regional population.
3. The OECD methodology defining functional metropolitan regions considers population size, population density and commuting flows as an indicator of whether an urban area represents a contained labour market, that is, an area in which commuting within the region is considerably higher than between it and the surrounding areas (OECD, 2006).
4. Statistics Canada has strictly defined criteria for CMAs. The urban core municipality must have at least 100 000 inhabitants to form a Census Metropolitan Area. For inclusion in the CMA, adjacent municipalities must have high integration with the urban core, evidenced by significant commuter flows. In order to establish this, several rules have been established. One of these rules is the Forward Commuting Flow rule, which requires a minimum of 100 commuters, with at least 50% of the employed labour force living in the municipality working in the delineated urban core. Another rule is the Reverse Commuting Flow rule, which requires a minimum of 100 commuters, with at least 25% of the employed labour force working in the municipality, lives in the delineation urban core. The Toronto CMA is comprised of the city of Toronto and 23 other municipalities: Ajax, Aurora, Bradford West Gwillimbury, Brampton, Caledon, East Gwillimbury, Georgina, Georgina Island, Halton Hills, King Township, Markham, Milton, Mississauga, Mono Township, Newmarket, Tecumseth, Oakville, Orangeville, Pickering, Richmond Hill, Uxbridge, Whitchurch-Stouffville and Vaughan.
5. The US definition of Metropolitan Statistical Area refers to a larger urban area than the Canadian definition of CMA; the Hamilton and Oshawa CMA's would be consolidated with the Toronto CMA if US definitions had been used.
6. The GTA is slightly larger than the Toronto CMA, since it includes most of the Oshawa CMA. Greater Toronto Area (GTA) refers to the City of Toronto plus the surrounding regions of Durham, York, Peel and Halton, which include 24 municipalities: Ajax, Aurora, Brampton, Brock, Burlington, Caledon, Clarington, East Gwillimbury, Georgina, Halton Hills, King Township, Markham, Milton, Mississauga, Newmarket, Oakville, Oshawa, Pickering, Richmond Hill, Scugog, Uxbridge, Whitby, Whitchurch-Stouffville and Vaughan. A term commonly used to designate the suburban areas in the GTA outside the City of Toronto is the "905 area", a reference to the telephone area code assigned to the area before the city's area code was split in 1992. The telephone area code for the City of Toronto is 416. Urban-suburban dichotomies in Toronto often coincide with these different telephone area codes.

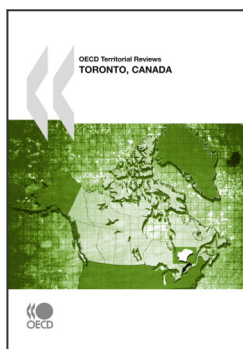
7. Another 28.3% spread across the remaining urban areas, while only 2.8% chose to live in a rural area.
8. Other metropolitan regions with lower elderly dependency ratios, but lower income levels than Toronto, are cities in Turkey, Korea and Mexico.
9. These data are based on comparisons of gross densities of metropolitan regions and are subject to several limitations, as these data do not look at the actual built-up areas (net densities) and are highly dependent on boundaries drawn for metropolitan regions.
10. Although some studies use immigrant and foreign-born population interchangeably, these categories do not mean exactly the same thing in Canada, as foreign-born population is considered a sum of immigrants and non-permanent residents. The share of 46% for Toronto actually refers to immigrant population in the Toronto region.
11. As will be discussed in Chapter 2, the harmonisation of the general sales tax and the provincial sales tax, announced in the 2009 Ontario Budget, is expected to reduce the marginal effective tax rate on investment substantially.
12. Economic sectors in Canada with high investment in product design and development (as a share of total sales) are aerospace product and parts (22.1%), pharmaceuticals and medicine (21.2%) and computer and electronic product manufacturing (18.2%). Relatively low shares of investment in product design and development occur in motor vehicle manufacturing (6.2%), motor vehicle parts (4.6%) and motor vehicle body and trailers (2.9%) (Industry Canada, 2008).
13. In this study (Martin and Florida, 2009), professions have been categorised according to the analytical and social intelligence skills required in their jobs. The creative content of sectors is established by taking into account all the different professions in a certain sector. On the basis of this modelling, the creative content of 41 sectors in Ontario has been compared with those of peer US states.
14. Similar studies of other business sectors show that Toronto does not figure in the top 15 world cities with the highest global architectural practice (Knox and Taylor, 2005), but that it ranks 16th as a global media city. This is measured as the number of enterprise units of 33 global media firms located in the respective city: as many as 38 units of 15 different global media firms are located in Toronto. One of these firms (Thomson) has its parent company in Toronto (Krätke, 2003).
15. Toronto's Pearson Airport has also been found to have relatively inward-looking connections: over 96% of the nodal hierarchy (that is, the connections for which it is the dominant airline node) of Toronto airport is located in Canada (Grubestic et al., 2008).
16. Geographic proximity could also to some extent lead to an overstatement in international trade statistics of the trade relations with the United States and understate those with other countries, as Canada's imports from other countries via the United States could be recorded as originating from the United States, and Canada's exports to other countries via the United States may end up being recorded as exports to the United States, as these statistics are collected through customs forms.
17. The Toronto Region has in the TRRA definition been defined as the city of Toronto plus the regions of Durham, Halton, Peel, Waterloo, the cities of Guelph, Hamilton and the county of Wellington, counting 7 million inhabitants.
18. Bessen and Meurer (2008) have argued that instead of encouraging innovation, patents could in fact interfere with innovative activity in many industries.
19. An alternative measure would have been the number of patents per R&D investment. This could be considered a measure of the effectiveness of R&D spending (as it measures patent outcomes compared to input), but the calculation of this measure is not possible due to data limitations (patent data for Toronto are available at TL3 level, but not R&D spending).
20. Hospitals affiliated with the University of Toronto are not included in these data. Canadian universities that had more new patent applications in 2007 were McGill University, the University of British Columbia and Université Laval (AUTM, 2008).

21. These citations are measured with different methodologies, such as ARIF and ARC. The Average Relative Impact Factor (ARIF) is a weighted measure of citations in science and social science journals that demonstrates the importance of a journal in its field. Average Relative Citations (ARC) indicate the average number of times that papers from academics in a region are referenced by other academics, providing an indication of the relevance of the work as determined by academic peers. Both indicators confirm the pattern for the Toronto Region.
22. This is the number of publications indexed by Thomson ISI over 2003-2007 (source: Thomson ISI Database). The University of Toronto had a particularly high number of publications in health and life sciences, materials science and environmental engineering.
23. The Tech Pole-Index is created by the Milken Institute and ranks location quotients and patterns of growth of city-regions in 19 high-tech industry categories. These results are then aggregated to determine overall high-tech performance. This benchmarking metric is based on employment and wages; it also looks at the concentration of technology in the local economy and each metro's relative share of aggregate North American activity.
24. Not all universities in the Toronto Region appear in these international rankings. This is for example the case for the Ryerson University.
25. These findings have to be interpreted with caution, since the metropolitan regions and institutes concerned are of differing sizes, and having several small high-quality institutes is not necessarily preferable to having one bigger one. At the same time, it indicates the variety and choice that inhabitants of metropolitan regions have when choosing a high-quality university.
26. The University of Toronto figures among the best 15 universities in the world in fields as diverse as social sciences, arts and humanities, technology, natural science and the life sciences. In all these subjects, University of Toronto ranks highest among Canadian universities, with the exception of life sciences and social sciences, where McGill University in Montréal ranks higher (THES, 2007). The universities that score higher are mostly from the United States, as well as the University of Tokyo and some from the United Kingdom.
27. Schulich School of Business ranks third in the Aspen Institute ranking, 11th in the Wall Street Journal ranking, 24th in the Economist ranking, 48th in the Financial Times ranking, 83rd in the University of Texas ranking. Rotman School of Management scores 24th in the Wall Street Journal ranking, 30th in the ranking of University of Texas and 40th in the Financial Times ranking.
28. The Toronto Region Research Alliance estimated that in 2005, CAD 38 per capita was invested as venture capital in the Toronto Region Research Alliance area. Estimations based on the Thomson Financial database showed the investment in the "Toronto area" (roughly equivalent to the Toronto CMA) to be CAD 89 per capita in 2007. The World Knowledge Competitiveness Indicators in 2005 for Ontario indicated around USD 110 of venture capital per capita in Ontario.
29. Licensing income of the University of Toronto over 2007 was USDA 2.5 million. This was USD 791 million for New York University (AUTM, 2008).
30. Recent progress in the academic literature has focused on establishing a link between cultural diversity and economic performance. To that effect, a number of indexes measuring the extent to which cities have a mix of cultures have been created and later linked to economic growth and productivity. A measure of cultural diversity can be created by using a Hachman index applied to Canadian immigration statistics. Such a Hachman Index of Cultural Diversity (HICD) was applied to Canada's 144 cities (CMA and CA).
31. An econometric model that takes into account earnings would encounter severe problems of misspecification, as many of the variables that would determine earnings are not available.
32. Economic immigrants to Canada are selected with a selection grid in which points are awarded according to several criteria. The maximum number of points is 100, and the pass mark for admission is 67. In the 2002 revision of the points system, the weight assigned to education was raised to 25 points.

33. Based on data from 2006 Census of Statistics Canada.
34. Employment mismatch in the quoted study is assessed for those with a bachelor's degree or higher, and defined as anyone who is working in a job that requires only a high-school diploma or less. These findings are based on 2001 Census Data from Statistics Canada.
35. After two years, 35% of a specific immigration cohort sampled in Toronto, as measured in the LSIC study, affirmed that their experience in Canada had not met their expectations; no other large metropolitan region exhibited such a low rating (Statistics Canada/Statistique Canada, 2003).
36. The probability of employment mismatch is highest for non-English or French speakers and does not decrease with time spent in Canada. Employment mismatch is particularly high for Filipinos, who have mismatch rates that are 34% higher than whites. Blacks, Koreans, Latinos and South Asians are also considerably more likely to experience mismatch, although their rates are less than half that of Filipinos. Of the visible minorities in Montréal, Toronto and Vancouver, only Chinese and Japanese immigrants do not have under-employment rates that are significantly different from whites⁷ (Haan, 2008).
37. These data refer to a representative sample of newcomers to Canada, aged between 25 and 44 years, interviewed between 2001 and 2002, two years after their arrival in Canada.
38. This is the correlation between the Mosaic Index and the Tech-Pole Index as quoted in note 23.
39. In a study of labour market niche-ing involving 100 ethnic groups living in 216 US metropolitan regions, it was found that approximately 14% of the labour force of these areas was employed in ethnic niches; this was 31% for non-European ethnic groups, including those from Latin America, the Caribbean and Asia (Wilson, 2003).
40. Suburban is here defined as those neighbourhoods in the five former municipalities now forming the City of Toronto, which had housing that was one standard deviation above the average year of housing built. All census tracts in York Region are considered to be suburban.
41. The 2003 General Social Survey indicated that 88% of immigrants who arrived in Canada between 1980 and 1990 had a strong sense of belonging, which was higher than that of Canadian-born respondents (85%). The strength of sense of belonging for recent immigrants (*i.e.* those who arrived between 1990 and 2003) is similar to the Canadian-born (84%).
42. Voter participation is lower for those who arrived between 1991 and 2001, as compared with immigrants who arrived earlier. Findings also show that attachment to ethno-cultural roots is not a barrier to electoral participation.
43. An investigation of inter-ethnic friendship among 79 grade 7 and 8 students (aged 12-14) in two schools in the city of Toronto indicate that cross-ethnic friendships were not as rare as found in studies on the United States and Britain. Participants in the study were found to be relatively non-ethnocentric in their choice of friends: the difference between in-group (52.44%) and out-group friends (47.56%) was slight and not significant (Smith and Schneider, 2000). Another study on inter-ethnic friendships of 390 junior high school students in multi-ethnic neighbourhoods of Montréal and Toronto found, however, that co-ethnic friendships were more likely than inter-ethnic friendships to survive a six-month interval. Co-ethnic friendships were found to be more cohesive and stable than inter-ethnic friendships (Schneider et al., 2007)
44. There are, however, significant differences between ethnic groups. The ethnic groups with the lowest inter-ethnic marriages were South Asians, Chinese, Arabs and Jews. The highest degrees of ethnically mixed marriages were realised by Europeans and Japanese (Rodriguez-Garcia, 2007).
45. Inter-ethnic marriages might not only be an indicator of social integration, but also have effects on productivity: immigrants married to native-born spouses could assimilate faster than comparable immigrants married to foreign-born spouses, because spouses could play an integral role in the human capital accumulation of their partners. Meng and Gregory (2002), for example, found evidence of a substantial inter-ethnic marriage premium for non-English speaking immigrants in Australia, but a similar effect has not been found in the United States (Kantarevic, 2004).

46. A household is said to be in core housing need if its housing falls below at least one of the adequacy, suitability, or affordability standards and if it would have to spend 30% or more of its total before-tax income to pay the median rent of alternative local housing that is acceptable (meets all three standards). Adequate dwellings are those reported by their residents as not requiring any major repairs. Suitable dwellings have enough bedrooms for the size and make-up of resident households, according to National Occupancy Standard (NOS) requirements. Affordable dwellings cost less than 30% of total before-tax household income.
47. Most came from southern European countries such as Greece, Italy and Portugal, and attached considerable importance to home ownership. Typically, they purchased relatively inexpensive housing, undertook extensive renovations and rented parts of the house to other people from their home countries to pay the mortgage. Subsequently, many of these immigrants capitalised on the increased equity in their inner-city houses to buy more modern and spacious houses in the suburbs. There, they often formed spatially concentrated residential enclaves and developed new or relocated ethnic businesses and institutions (Murdie, 2008).
48. In Toronto, there are considerable differences within immigrant subgroups. Ghosh (2006) for instance, found that Indian Bengalis aided by an immigration agency often lived in overcrowded and poor-quality homes, while the housing careers of Indian Bengalis who had familial ties or were recruited through employers were better housed. These findings, however, should be carefully considered in light of evidence that suggests that cultural factors may determine how tenure options are perceived and valued by different groups of people living in Toronto (Skaburskis, 1996).
49. The changing ethnic landscape was documented through the 2006 Census and mapped through the Greater Toronto Urban Observatory. For maps of the spatial distribution of 25 different ethnic categories in Toronto, Montréal, and Vancouver, see www.urbancentre.utoronto.ca/gtuo/dl_urban_ethno_mosaic.html.
50. The United Way of Greater Toronto and the Canadian Council on Social Development (2006) define high-poverty neighbourhoods as those that have twice or more the national average poverty rate of economic families. They calibrated this to the 1981 threshold (13.0% national poverty rate), which measured a high-poverty neighbourhood as one with at least 26.0% of its residents living in poverty. The authors employ the Low-Income Cut-Off (LICO) measurement developed by Statistics Canada to compare the relative economic well-being among Canadian households. Using this measure, a Toronto family of a husband and wife and two children in 2004 is considered poor if its income is less than CAD 36 247.
51. These findings correspond with findings on urban areas in five immigration countries, showing that ethnic residential segregation is generally less pronounced in Australia and New Zealand than in Canada, England and the United States (Johnston et al., 2007).
52. Neighbourhoods are here defined as Census tracts, over 30% of whose population is either from a single racial minority group or from a combination of racial minority groups.
53. By 2001, approximately half of all Census tracts in Toronto exceeded the 30% level; this was only 27% in 1991 and 7% in 1981. Among single-minority neighbourhoods, 60% were Chinese and a third South Asian. Net out-migration of whites had rapidly reduced the population shares of whites (Hou, 2006).
54. Transport Canada (2006) estimated congestion costs in Toronto in 2002 to be CAD 1.6 billion. The Greater Toronto Services Board (GTSB) has estimated that congestion in the Greater Toronto/Hamilton area costs around CAD 2 billion per year, due to delays in the movement of people and goods (cited in TD Bank, 2004). The Toronto City Summit Alliance has estimated that the costs of congestion will rise from CAD 2.2 billion in 2001 to CAD 4.1 billion in 2031 (Toronto City Summit Alliance, 2007).
55. Metropolitan regions of similar size are here considered to be metropolitan regions with between 2.5 million and 10 million inhabitants.

56. The only metropolitan region that scores better on all these three air quality measures is Montréal. Paris scores better on two of these three indicators. If smaller metropolitan regions are included in the selection, more do better than Toronto on air quality.
57. Similarly, variation in total car and building related emissions is quite significant between Census tracts, ranging from 3.1 to 13.1 tonnes of carbon dioxide equivalents per year.
58. The provincial share has been more or less constant.
59. The extent of the infrastructure gap for the whole country was estimated in 2003 at between CAD 50 billion and CAD 125 billion (Mirza, 2007), of which one-sixth would be in transport. Other estimations pointed to an infrastructure gap in 2008 of up to CAD 200 billion (Brox, 2008). The Canadian Urban Transit Association has estimated that transit systems across the country need CAD 20.7 billion for infrastructure between 2006 and 2010.



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