

# **Economic clusters in the Greater Toronto and Hamilton Area and their relationship with the region's transportation infrastructure**

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## 1 - Introduction

Transportation systems are a central feature of local economies. The efficient movement of people and goods is necessary for commerce to thrive. The Greater Toronto and Hamilton Area (GTHA) is at an inflection point in its development whereby a previous era of underinvestment in transportation infrastructure is posing a threat to future growth. The current moment is also a time of significant disruption in the economy due to rapid technological change and shifting geo-political circumstances. These factors introduce some risks, but also offer great opportunities. This report examines the GTHA regional economy in the context of these wider changes as well as the transportation infrastructure that will support future growth.

The economy is becoming more knowledge intensive. Prosperity increasingly depends on creativity and innovation. These are inherently social processes that require direct interpersonal interaction. This places cities in an advantageous position as they bring many people together in close physical proximity. A region's transportation system is vitally important in this respect as it is a major factor in connecting people and businesses. Local circulation, regional integration, and global connectivity are all important aspects of an urban knowledge economy. Transportation planning as it pertains to the economy can sometimes focus too narrowly on peak commuting flows while missing a bigger picture. This paper seeks to broaden the discussion of what the Greater Toronto and Hamilton region's economy needs from its transportation system in order to thrive in the 21<sup>st</sup> century.

Metrolinx's Draft 2041 Regional Transportation Plan calls for 1.2 million additional jobs by 2041 without a significant shift in the modal split towards transit and active modes (Metrolinx, 2017). This translates into over 3 million additional auto trips per year, an increase of 47% from 2011 (Blais & Burchfield, 2017). It is questionable whether this scenario can actually occur. At some point additional road congestion will hamper growth (Kennedy, 2011). This limit will likely be tested within the parameters of the Draft 2041 Regional Transportation Plan and related Growth Plan for the Greater Golden Horseshoe (Ministry of Municipal Affairs and Housing, 2017). Market forces can respond in two ways: a) growth will be increasingly oriented to dense and accessible centres which will reduce strain on the transportation system; or b) increased strain on the transportation system will decrease overall growth rates. On a fundamental level the region will struggle to grow along historical patterns of sprawl especially when the data presented in this paper suggest that a large portion of the economy is becoming increasingly urban.

This paper should be read primarily from an economic development perspective and not as a transportation planning exercise. It emphasizes the need to integrate economic development with transportation and land use planning in the GTHA. The paper also suggests that this should be done at the regional scale. In this paper the region is defined more broadly than the traditional Metrolinx geography. The study area includes six census metropolitan areas (Toronto, Hamilton, Oshawa, Barrie, Guelph, Kitchener-Waterloo, and St. Catharines-Niagara) and places in between. The rationale is that this geography covers the full extent of all the GO Transit rail corridors. The aim is to inform the current Draft 2041 Region Transportation Plan of the economic changes in the region and the spatial-connectivity issues that need to be considered.

## **2 - Five economic concepts driving change**

Before discussing the current trajectory of the economy and its regional geography, it is important to first outline major trends that are currently shaping change. This section briefly covers five topics that have major implications for the Greater Toronto and Hamilton Area and beyond. Together these phenomena will likely play an important role in shaping the geographic structure of the regional economy in the coming years.

### *The knowledge economy*

Economic growth is driven by creativity and innovation (Powell & Snellman, 2004). The ability to do things better than other people, firms, and places is what determines where growth occurs in the contemporary economy (Morgan, 2007). This is characterized as a relentless process of constant learning and adaptation. The knowledge economy depends on a highly skilled workforce (Florida, 2002; Storper & Scott, 2009). Such a workforce is generated through leading post-secondary education institutions, an openness to immigration, and employers that commit to professional development. A knowledge-driven economy development strategy is based on investing in people, institutions, and infrastructure. The primary focus is on creating value, not reducing costs. It is a race to the top, not to the bottom.

### *Agglomeration and clustering*

The knowledge economy is highly geographic. This is not just an outcome, but a fundamental feature of creativity and innovation. Learning is a social process that requires direct human interaction (Storper & Venables, 2004). Advances in information and communications technology (ICT) led some to predict the 'death of distance' (Cairncross, 1997) and the 'world is flat' (Friedman, 2005). Such visions, popular in the 1990s, led to expectations that people could 'work from anywhere' and that the economy would become more physically dispersed. Evidence from the past two decades suggests that urban areas are not declining in importance due to technological innovation. Face-to-face communication continues to be an essential mechanism in the knowledge economy (Gertler, 2003). Locating in close proximity to one another is a strategic advance that enhances learning opportunities and 'knowledge spillovers' (Jaffe, Trajtenberg, & Henderson, 1993). There are measurable benefits for related economic activities to locate in the same metropolitan region (Spencer, Vinodrai, Gertler, & Wolfe, 2009). Economic development strategies centered on industrial 'clusters' intend to coordinate growth policies based on specific sectors (Porter, 2000). The overall outcome is that knowledge-driven economic growth is spatially concentrated.

### *Economies of scale, scope, and connectivity*

Evidence from the past 10-20 years suggests that the largest metropolitan regions are pulling away from smaller and mid-sized cities on measures of productivity (Muro, 2017) and incomes (Baum-Snow & Pavan, 2012). Cities at the top of the urban hierarchy tend to have special assets such as top research institutions, deep labour markets, international airports, corporate headquarters, and a plethora of cultural amenities that give them an edge in the knowledge economy (Berry, 1961). The largest places tend to also be the most diverse places, home to a wider range of economic activities and the landing spot for the majority of international migrants (Ley &

Tutchener, 2010). New ideas are often the product of combining existing knowledge in novel ways (Weitzman, 1998). Places that offer a wider range of possibilities are more likely to develop new knowledge (Spencer, 2012). Not all knowledge is sourced locally and so connecting to other regions is also important (Meijers, Burger, & Hoogerbrugge, 2015). Large cities tend to be better connected to other regions nearby as well as globally as they tend to possess superior infrastructure such as major international airports (Brueckner, 2003). The main advantage that big places enjoy in the knowledge economy is their ability to connect more people, businesses, and ideas (Bettencourt, Lobo, Helbing, Kuhnert, & West, 2007). Efficient movement increases interaction and generates economic activity.

### *Inequality*

Economic activity tends to cluster in the knowledge economy. The problem with this is that it creates geographic inequality as some places have a wealth of assets while others a dearth (Krugman, 1991). This inequality occurs across different scales. Some countries and regions of the world are flourishing in the knowledge economy while others languish. Within rich countries, some regions do well while others struggle. In well-off metropolitan regions, some neighborhoods have enormous concentrations of wealth while others have acute poverty. These patterns have always existed to an extent, but recent evidence suggests that they are becoming more pronounced (Hulchanski, 2007). These divides fuel further inequality as property price differentials between have and have not regions impede migration. At some point, limited physical mobility begins to entrench social mobility (Chetty, Hendren, & Katz, 2016).

### *Infrastructure, institutions, and ecosystems*

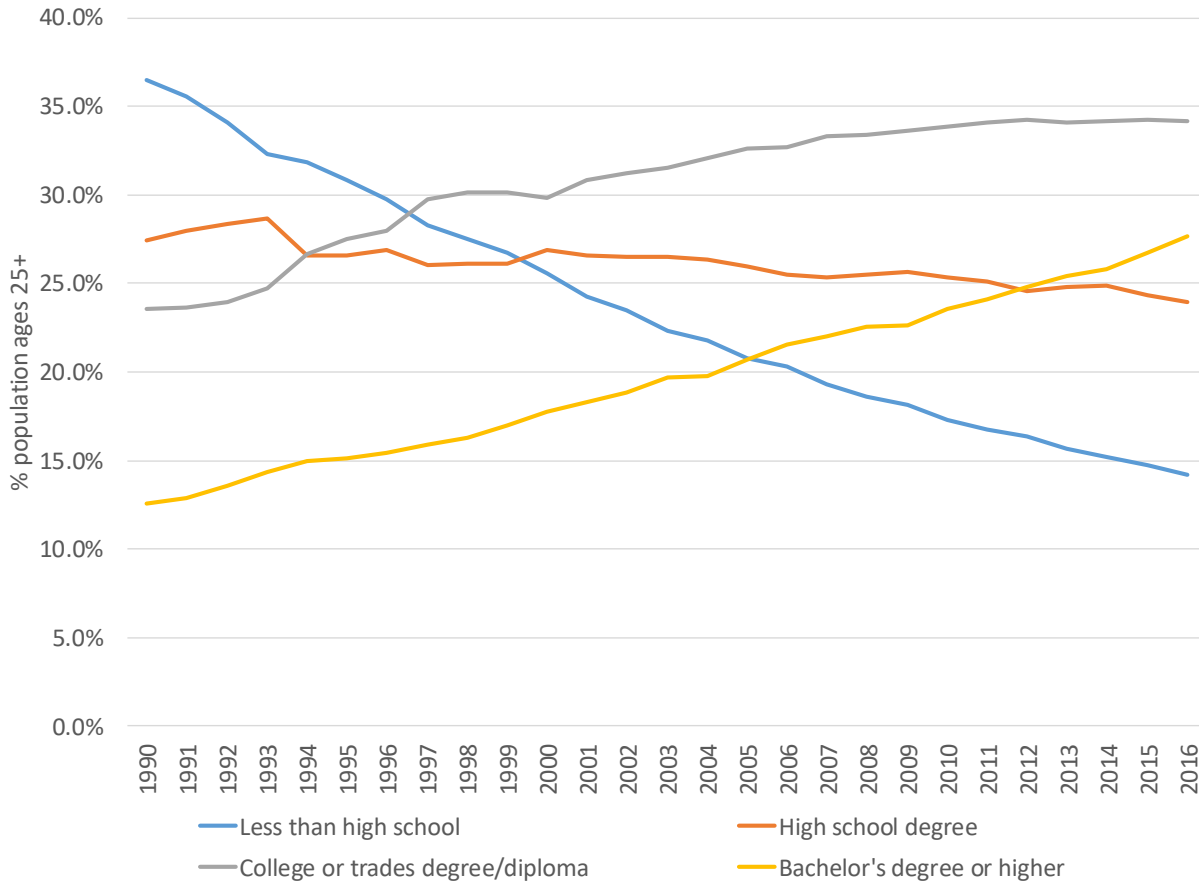
Governments attempt to develop their knowledge economies by marshalling physical and institutional resources (Cooke, Uranga, & Etzebarria, 1997). Ideally, this is done in a coordinated manner with a strategic focus that is based on existing localized strengths. Intergovernmental arrangements and competing economic interests make this a complex prospect. The ecosystem concept has increasingly been applied to local economies in an attempt to capture this complexity and organize a response (Adner & Kapoor, 2009). It recognized the web of interconnectedness between systems, and tries to avoid thinking in silos that is all too common in such situations. Regional innovation strategies tend to emphasize knowledge assets such as research universities, incubators, and other anchor institutions and their interaction with private industry (Etzkowitz, 1998). This type of economic development is seen as a progression from more traditional inward investment and site selection methods. More recently there have been attempts to join these two approaches by combining elements of knowledge economy and spatial strategies. Knowledge neighbourhoods (Spencer, 2015), innovation districts (Katz & Wagner, 2014), and smart cities (Caragliu, Del Bo, & Nijkamp, 2011) are all manifestations of this trend. The key is aligning land use with a view to facilitating interaction and learning.

### 3 – Evidence of a growing knowledge-based economy

The structure of the Canadian economy is changing. It is becoming more knowledge intensive, focused in cities, and in some ways more unequal. In this time of accelerated technological change there have been many predictions concerning ‘robots taking all the jobs’ and ‘driverless vehicles causing endless urban sprawl’. As we know from previous eras that witnessed similar anxious proclamations that the exact nature of change does not usually conform to the preconceived expectations. It is folly to try and make specific plans based on such a complex set of unknowns. Instead, it is important to understand the basic human processes of economic and social activity and how they relate to physical space and movement. The good news is that an increasingly knowledge-intensive economy is congruent with denser transit oriented city-building as it depends on social relationships and face-to-face interaction (Carlino, Chatterjee, & Hunt, 2007). The following section provides descriptive statistics on various ways that the economy has evolved over the past few decades and outlines some basic messages as to what these trends may mean for urban economies and city-building.

The growth of the knowledge-based economy can be plainly seen in the educational attainment rates for the Canadian adult population. Figure 3.1 shows the changing share of the population over the age of 25 by highest level of education for the period of 1990 to 2016. There has been a steady increase in the percent of the population with a university degree, rising from just 12.5% in 1990 to 28% in 2016. There is no indication in the data that this trend is due to taper off. The share of adults with college, trades, and other post-secondary qualifications has seen a moderate increase from 24% to nearly 35%. Adults with a high school degree has drifted slightly downwards, while the biggest change is the decrease in the percent of the population with no formal qualifications. The latter rate has dropped from 36% in 1990 to under 15% in 2016. As the demand for post-secondary qualifications has increased over the past few decades the importance of higher education institutions to the economy has risen steadily. This is not only reflected in their core mission of education and training, but is also evident in their research outputs and their connections to industry. There is a great deal of evidence to suggest that the geography of colleges and universities and their alignment with the local economy is a significant factor in regional prosperity (Etzkowitz & Leydesdorff, 1995; Anselin, Varga, & Acs, 1997).

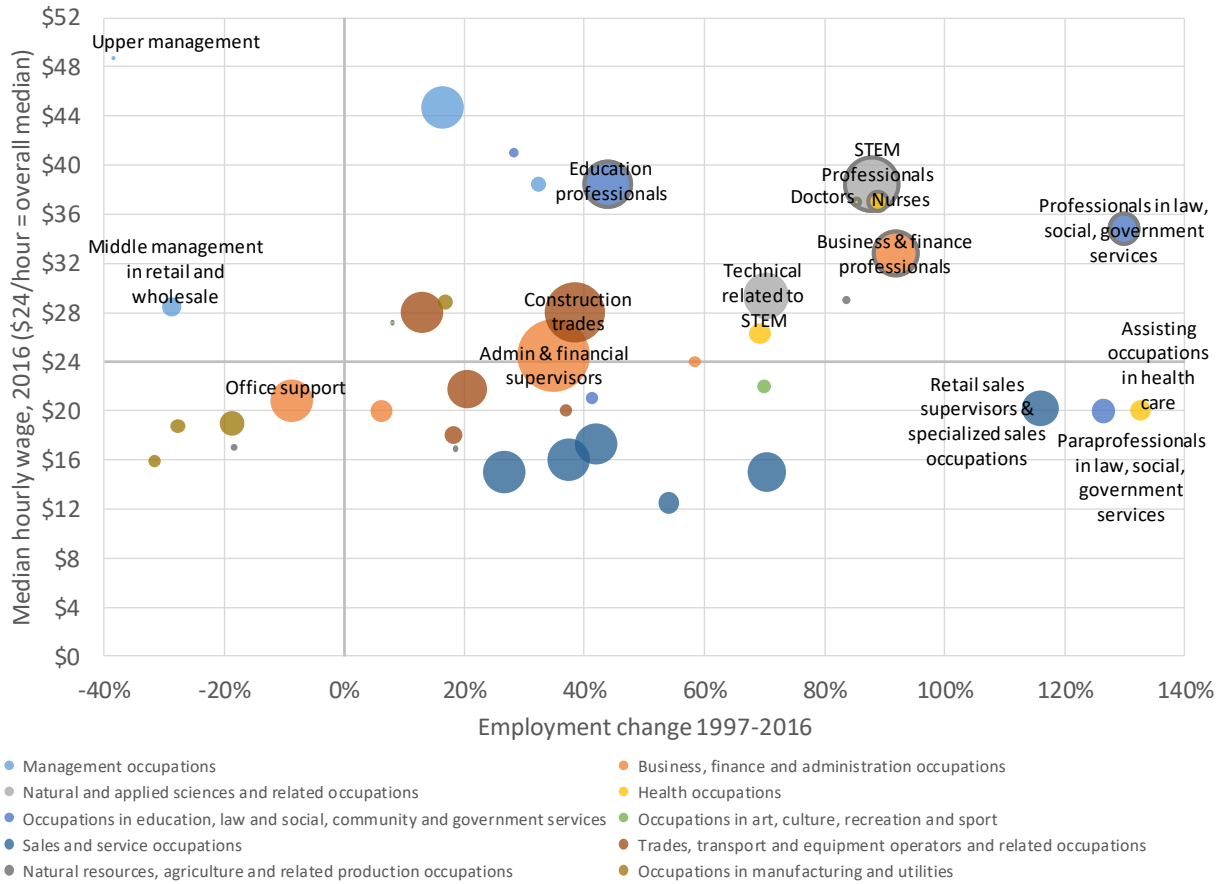
**Figure 3.1 – Change in educational attainment in Canada by population ages 25 and older 1990-2016**



The demand for post-secondary qualifications is driven by an increase in knowledge-intensive jobs. Figure 3.2 outlines the types of occupations that are growing or shrinking (x-axis), how much they typically pay (y-axis), and how many people are employed in them (bubble size). Over the course of the past twenty years there seems to be a number of related shifts in the Canadian labour market. The preeminent change fueling the knowledge economy is the growth of professional occupations (outlined in bold). This category includes: doctors, nurses, lawyers, accountants, senior civil servants, teachers, and STEM professionals including programmers. Not only have these professions grown significantly in the past twenty years, they are also amongst the highest paying. A second set of growing occupations is directly connected to professionals. These are technical and assisting occupations such as medical technologists, lab technicians, paralegals, social workers, and computer network administrators. Typically, these jobs directly support the work of professionals, but offer significantly lower wages. Many of the largest job categories such as construction trades, administrative and financial supervisors, and many sales and service occupations are tied to overall population change and have kept pace with the overall growth rate. There are two broad types of occupations that have declined, both relate to technological innovations (Muro, Liu, Whiton, & Kulkarni, 2017). Most physical labour within manufacturing industries have shrunk in the past twenty years, largely due to the automation of factory work. Office support occupations have declined and so to have middle and upper management categories as it appears that software has increased the relative autonomy of many professionals.

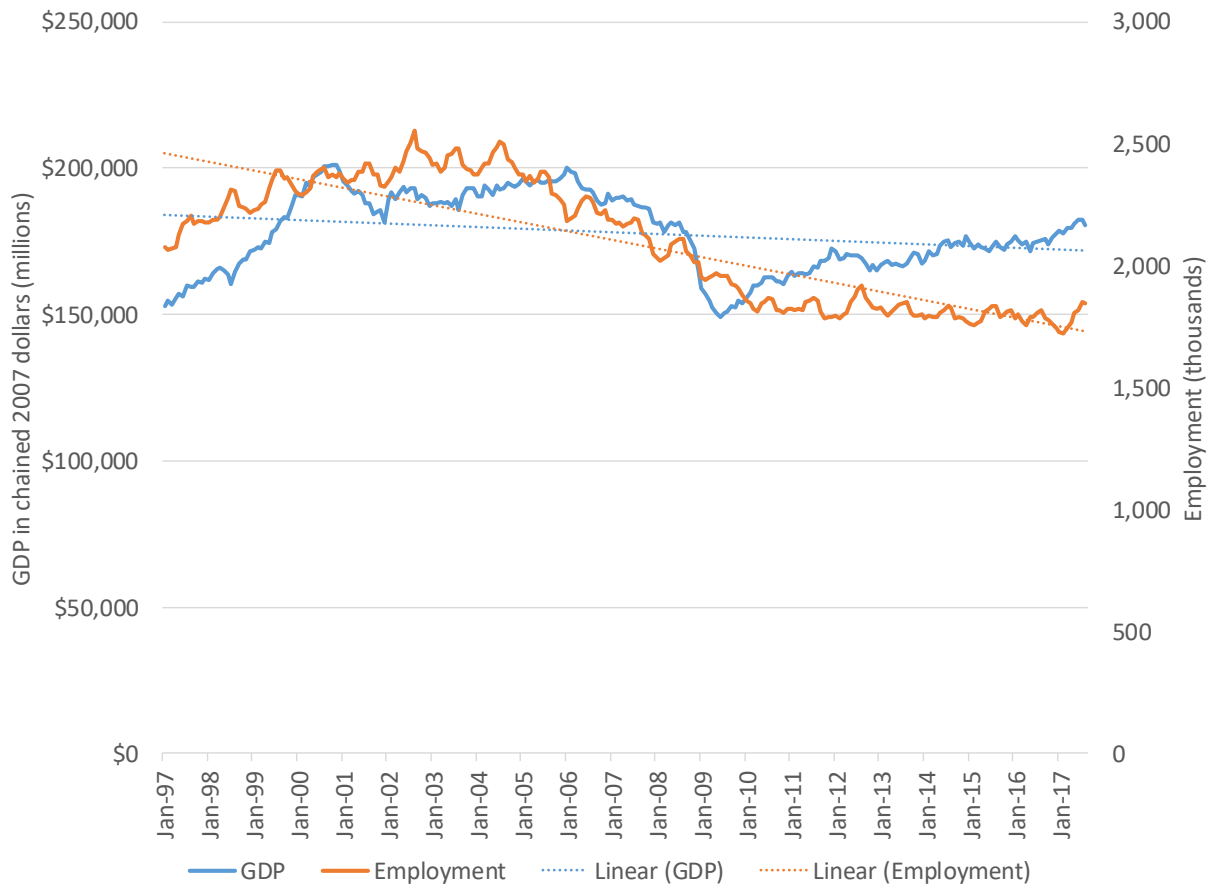


**Figure 3.2 – Employment change in Canada by job category 1997-2016**



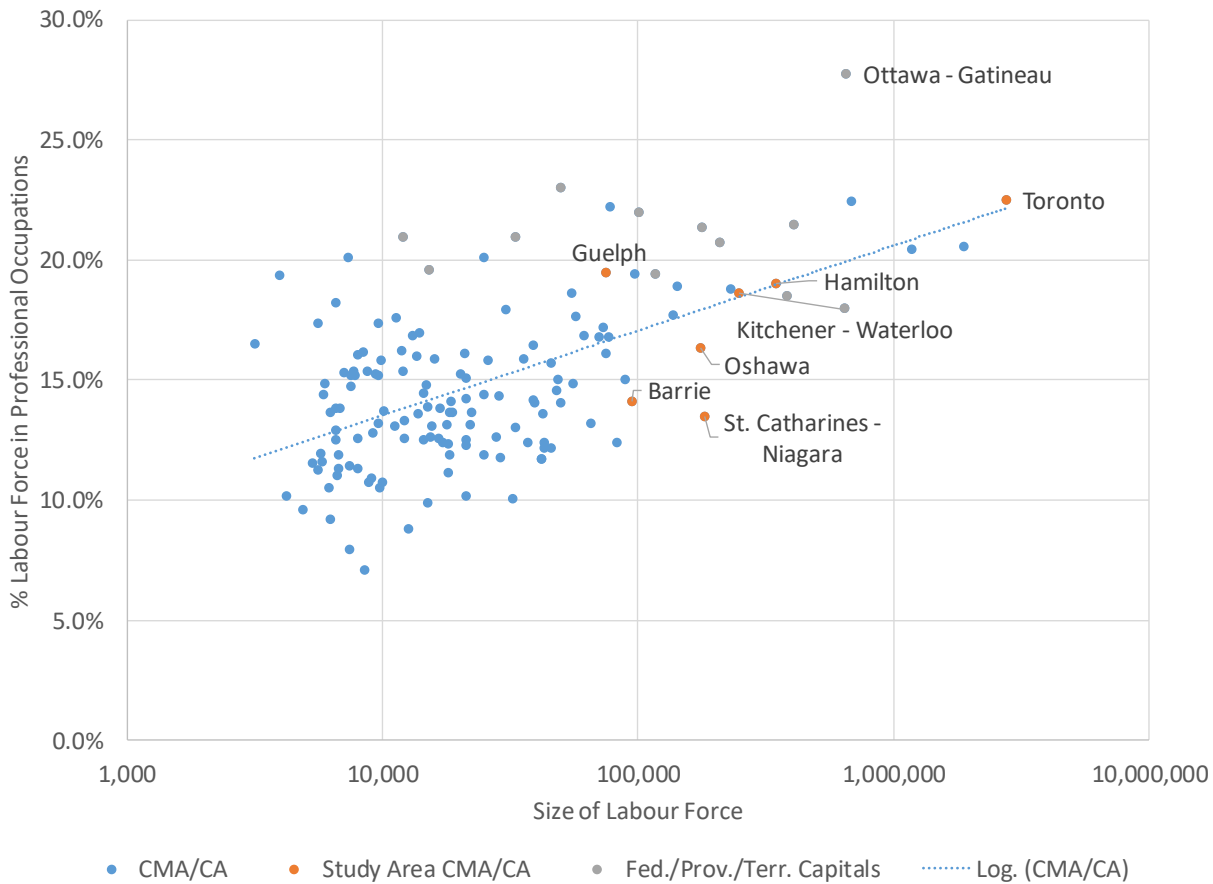
While manufacturing employment has declined in recent decades, it would be wrong to conclude that manufacturing is becoming a less important sector of the economy. Figure 3.3 shows that while manufacturing employment has declined between 1997 and 2017, total output (blue) has remained relatively stable. Since the end of the most recent recession in 2009, there has been a clear divergence with output rising and employment stable. This means that the sector is turning out the same (or more) value of goods, but needs fewer people to do so. In simple terms, productivity levels of the manufacturing have increased most likely due to improvements in technology which has displaced labour. An important takeaway is that jobs are not always the best metric to assess economic activity. This is especially true when it comes to land use planning. Manufacturing facilities tend to take up a large amount of space even when they do not employ a large number of people. Reserving land according to use based solely on jobs numbers will misallocate resources as a result. Goods movement has received an important degree of attention in recent transportation planning, but the land use implications around goods production are at risk of being sold short.

**Figure 3.3 – Manufacturing employment and GDP in Canada 1997-2017**



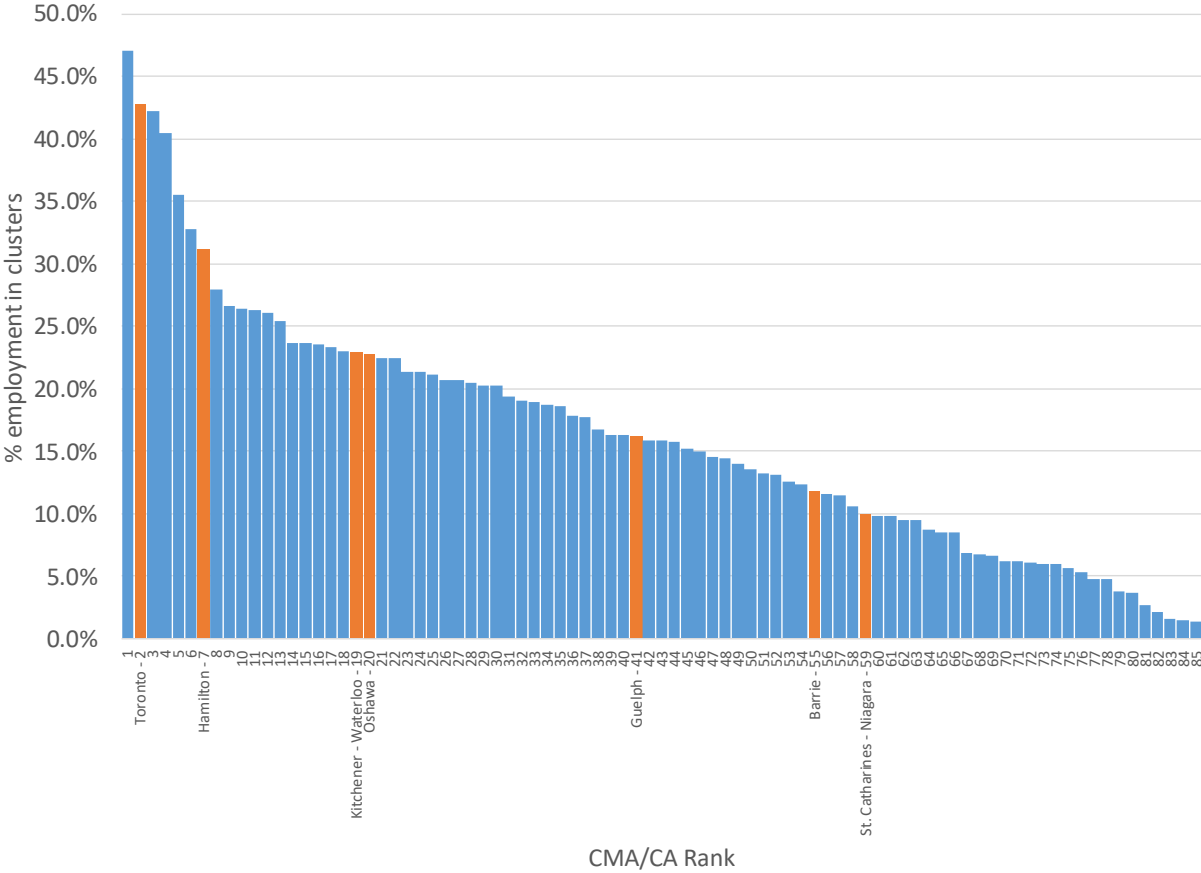
Professional occupations are among the highest paying and fastest growing category of jobs. They tend to be found in greatest number in two types of places: administrative capitals and the largest cities. Figure 3.4 plots the size of the metropolitan labour force against the share of professionals of the total. The trendline displays the (logarithmic) relationship between city size and share of professionals with Toronto being the largest metropolitan area and a labour force comprised of 22.5% professionals. Guelph, Hamilton, and Kitchener-Waterloo are all just under 20%, while Oshawa, Barrie, and St. Catharines-Niagara all closer to 15%. The knowledge economy is stronger on the western side of the Greater Golden Horseshoe area than the north, south, and east.

**Figure 3.4 – Professionals as a share of labour force by size of metropolitan region**



The clustering of economic activity is known to produce superior outcomes for businesses and workers. Industrial clusters are generally defined as a set of related firms, institutions, infrastructure, and labour within close geographic proximity (Porter, 2000). The basic theory is that firms are more productive when they are part of an efficient local system that aligns resources towards common needs. A critical mass of a set of related industries enables the development of localized infrastructure, training programs, specialized skilled labour and other inputs which generate a positive feedback into the system. Regions that specialize in certain industries are in a better position to focus public investment that produce greater returns. The European Commission currently favours a program of regional ‘Smart Specialization’ whereby advanced metrics are used to identify optimal local development pathways so that public resources can be marshalled for maximum impact (McCann & Ortega-Argiles, 2015). Figure 3.5 draws on information from the Cluster Atlas of Canada to identify the degree to which the labour force of each metro area is employed in strong local clusters (Spencer, 2014). The CMAs of the study area are highlighted in orange and show that Toronto leads with over 40% of workers employed in clusters, while Hamilton is second with just over 30%. Barrie and St. Catharines-Niagara have the least amount of cluster employment at 12% and 10% respectively.

**Figure 3.5 – Share of work force employed in clusters by metropolitan region**



#### **4 – Regional patterns of business and industry**

People tend to work in closer physical proximity with one another than they reside. This basic stylized fact is what shapes general daily transportation patterns. Businesses cluster together as they benefit from being able to more easily interact with one another. For the parts of the economy that rely on human interaction, exchange, and learning there is a payoff to scale as it exponentially increases the possibilities of connection and combination with others. This is a major reason why such types of economic activities tend to cluster in the largest metropolitan regions of the country. Toronto is the largest municipality in Canada in terms of residents and jobs. It is also the most connected place based on commuting flows. Large regions offer significant productivity gains, but they must provide real opportunities for connectivity which is why the transportation system is so vital.

The diagram in Figure 4.1 shows the overall commuting patterns for the country based on data from the 2016 census. Each dot represents a lower-tier municipality. The colour corresponds to the region of the country (Ontario is blue) and the size displays the number of jobs (place of work). The lines are instances of at least 100 daily commuters between municipalities in at least one direction. This figure highlights how central and connected the GTHA is relative to the rest of the country. Montreal is the only other metropolitan region that approached the scale of the GTHA and is somewhat flattered in this picture as there are a greater number of smaller municipalities in its orbit. Conversely, the diagram underscores how dispersed the Canadian economy is and how many isolated communities there are. This reinforces the relative agglomeration advantages of the Toronto region.

Figure 4.1 – Commuting network diagram of all Canadian municipalities (CSDs), 2016

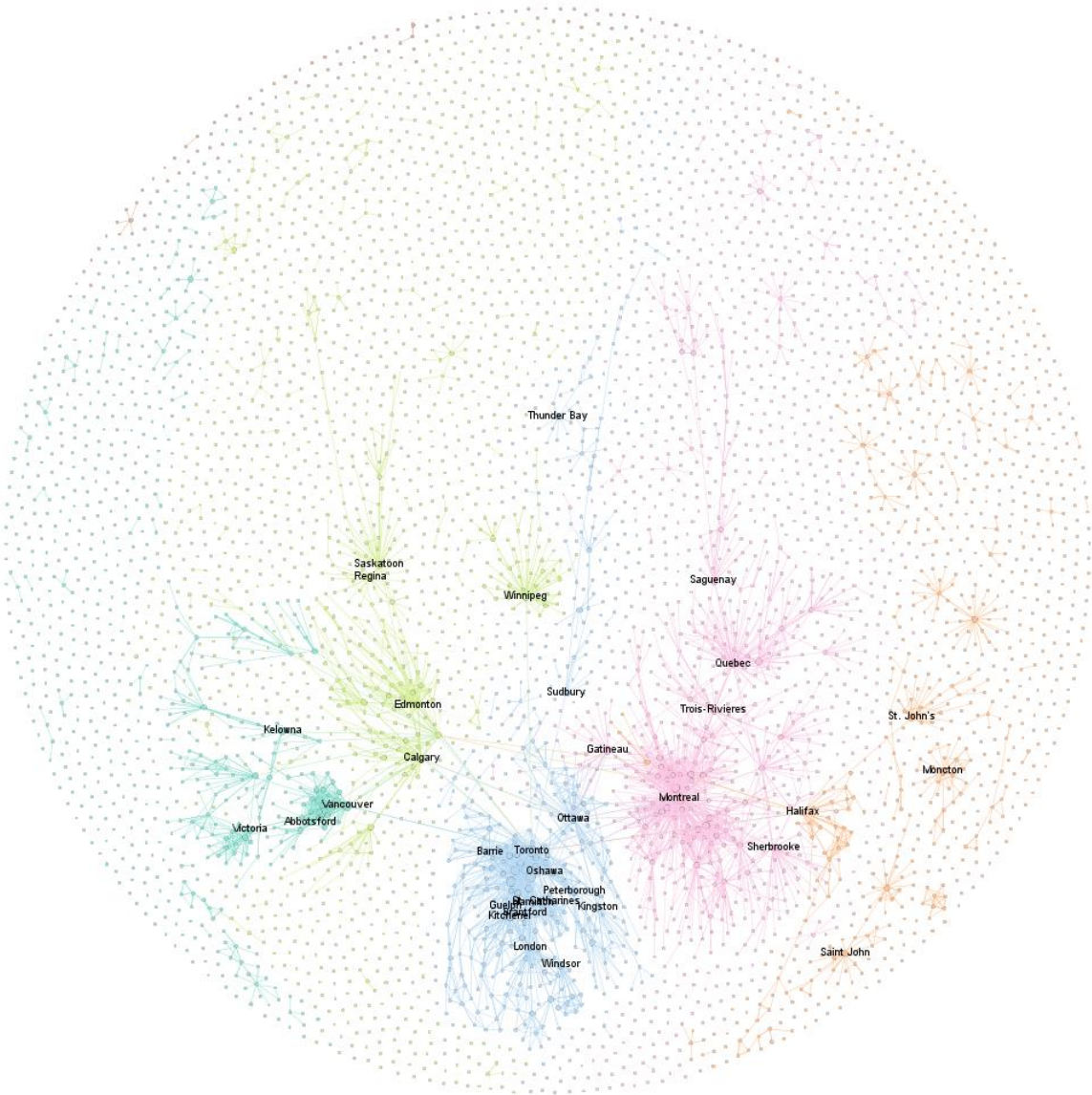


Figure 4.2 repeats the same metrics as Figure 4.1 but focuses solely on Ontario municipalities. In this case, the communities that possess GO train stations are highlighted in green, with planned Regional Express Rail (RER) stations noted by the darker shade. This picture further underscores the central position of Toronto in the Province's economy. It also displays the extent to which the GO train network connects the central portion of the Ontario economy. For the GTHA region to reach its full potential as an economic region it will require additional investments in transportation infrastructure that maximizes connectivity.

**4.2 - Commuting network diagram of Ontario municipalities (CSDs), 2016**

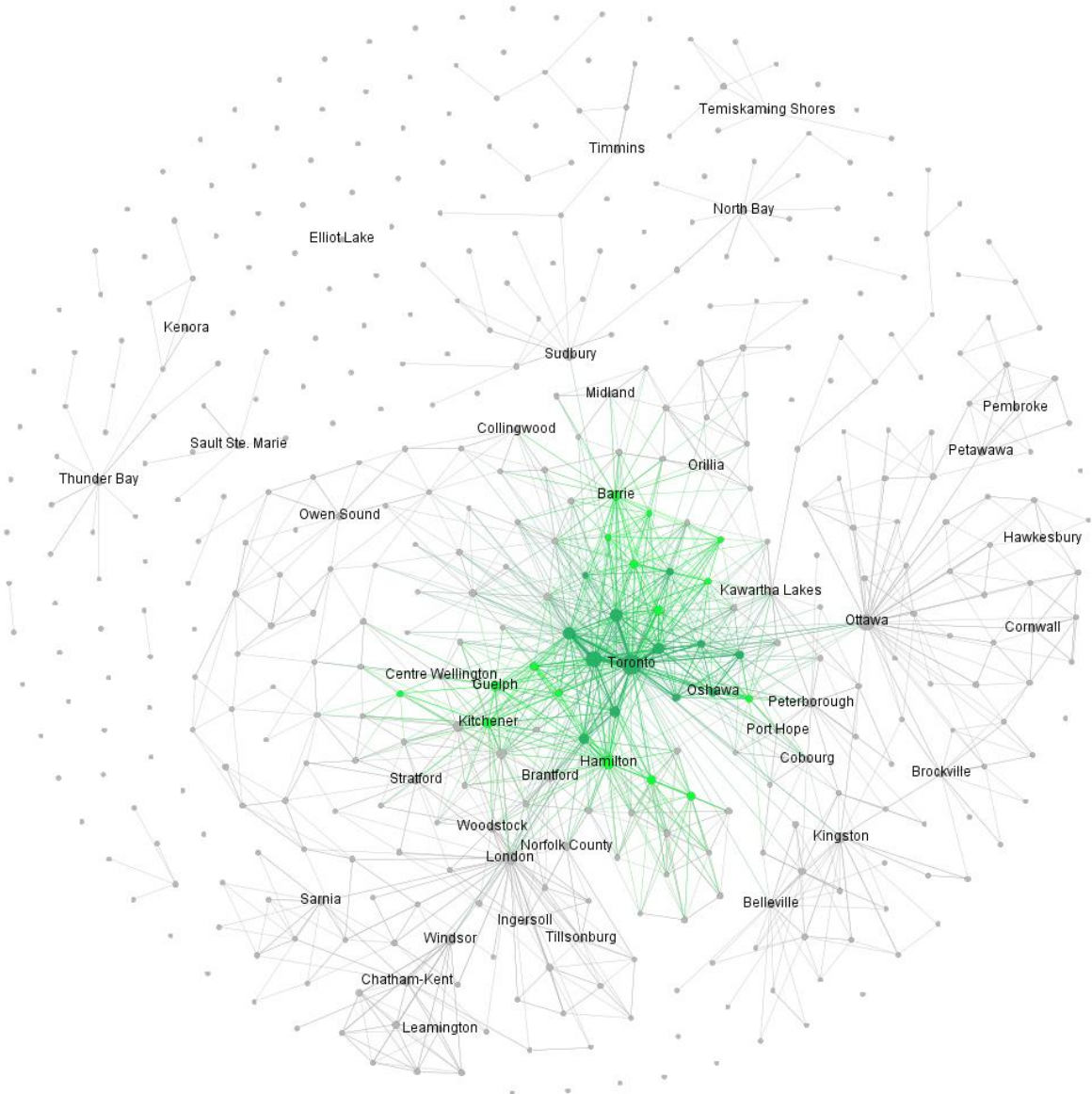


Figure 4.3 shows data from the Wider Economic Benefits studies commissioned by Metrolinx (Volterra Partners, 2014). These numbers show the productivity gains associated with the clustering of economic activity in the GTHA. The municipality of Toronto possesses a significant advantage over its neighbours. Furthermore, this advantage is far greater in the downtown area of the city where business densities are the highest in the region.

**Figure 4.3 – Productivity gains from agglomeration (from Wider Economic Benefits study)**

Productivity Estimates (GVA per Worker Adjusted for Density)			
	Base Productivity	Density uplift vs. average	Adjusted productivity
Toronto centre	67,042	860%	124,695
Toronto City	65,627	127%	84,547
Hamilton	68,967	-46%	72,666
Brampton	70,138	-17%	72,769
Markham	66,860	-41%	76,878
Mississauga	71,339	8%	76,078

*Source: Volterra Calculations*

It is no coincidence that the largest and most successful urban economies in the world such as New York, London, and Tokyo have the most extensive public transit systems as well as the densest business districts and highest land values. In the GTHA, the downtown core of Toronto, is the central node of the public transportation system as well as the location of the densest cluster of businesses (please see Figure 4.4)<sup>1</sup>. Other urban centres, such as Hamilton, Kitchener, and Markham, also show high business densities, but are not nearly at the same scale as Toronto. Downtown Toronto is also experiencing the most business growth (please see Figure 4.5). Part of this is due to the fact that the types of economic activity that benefit the most from agglomeration effects, such as finance and business services, are also amongst the fastest growing sectors in the GTHA. It is likely that these trends will continue into the foreseeable future, increasing demand for downtown Toronto office space, and ultimately creating additional demand on the related transportation infrastructure.

<sup>1</sup> Data source: Dun & Bradstreet business establishments with full street address and 6-digit NAICS.



Figure 4.4 – Business density for the GTHA (2017)

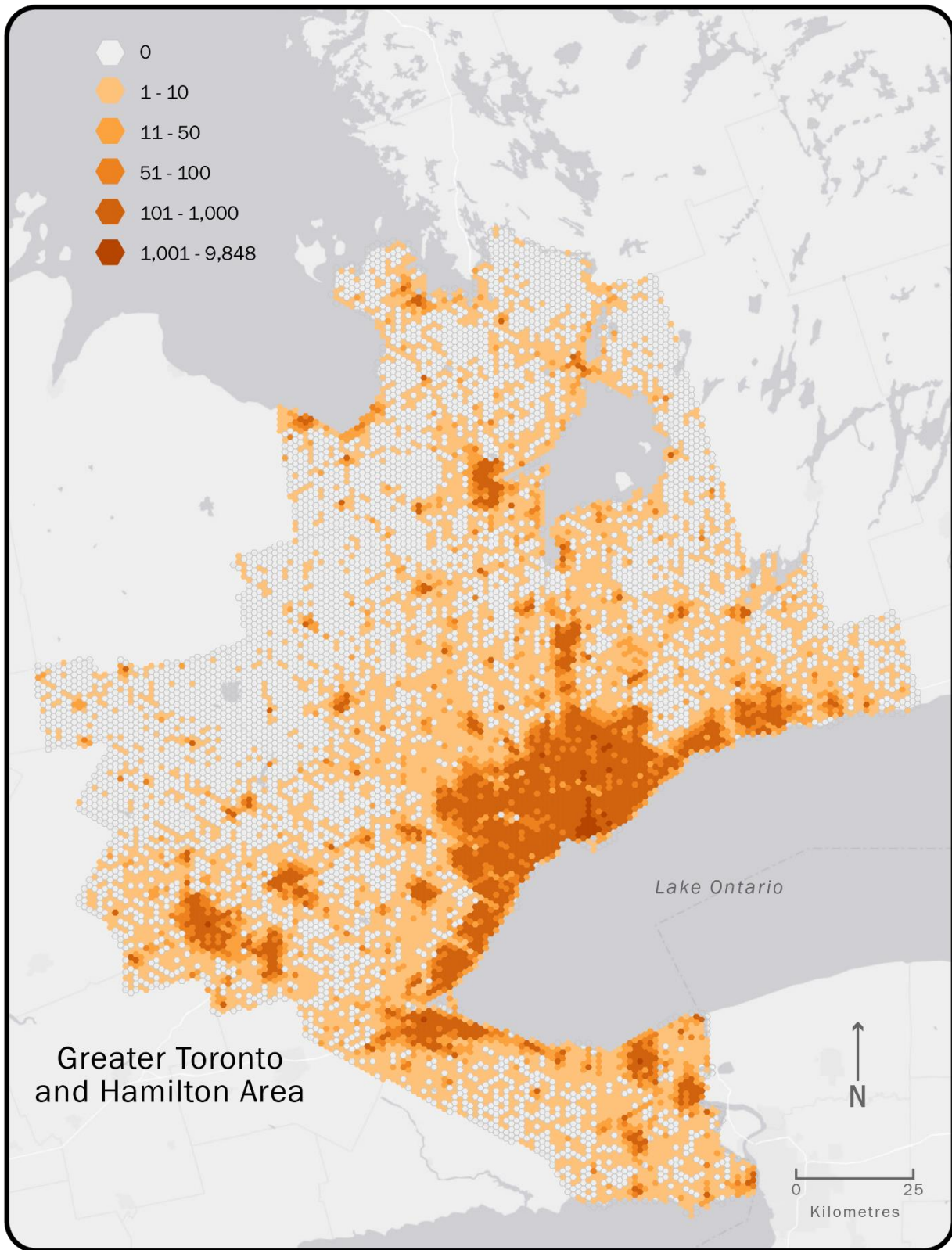
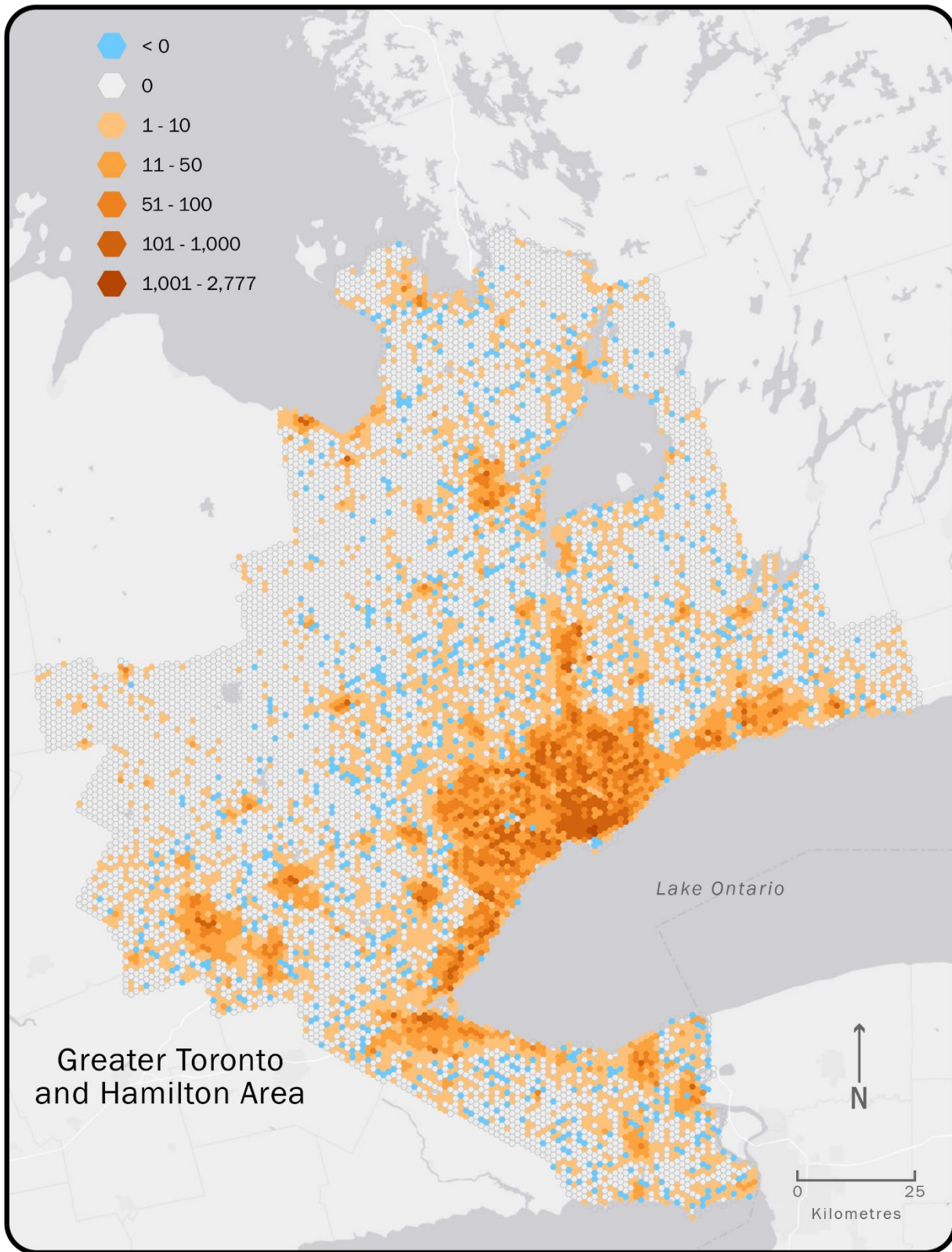


Figure 4.5 – Change in number of businesses 2009-2017



The Wider Economic Benefits studies demonstrate that there tend to be productivity gains associated with clustering. However, these studies also show that different sectors of the economy respond differently to clustering. Benefits are greatest for industries that involve a great deal of face-to-face interaction. They are weakest for industries that are focused on goods production and movement. In transportation terms, congestion is good for human-centered activities as it intensifies interaction, while it is negative for goods-centered activities as it acts as a drag on efficient production and distribution (Duranton & Puga, 2001). Therefore, any transportation plan that aims to support economic development must be sensitive to the different needs of different industries.

Varying transportation needs for industries can be detected to a degree by observing the inter-regional patterns of business clusters. In general terms, some industries tend to be urban focused while others are suburban. Access to other key infrastructure such as airports, water ports, or border linkages can also impact location decisions. Anchor institutions such as universities may play a role in the location of knowledge-intensive industries. Figures 4.6 and 4.7 are illustrative of how stark differences can be in patterns of industrial location. Figure 4.6 displays the highest spatial concentrations of creative and cultural industries according to location quotient<sup>2</sup> (LQ). They are most prevalent in neighbourhoods adjacent to the central business district in downtown Toronto such as Queen West and the Distillery District. The creative and cultural industries are amongst the most socially intensive types of economic activity, and are sensitive to neighbourhood conditions that help foster interaction (Spencer, 2015).

Figure 4.7 shows where the auto manufacturing sector is most prevalent in the GTHA. The largest concentration exists in the northwestern suburbs of Toronto, with secondary concentrations in Durham, Barrie, Oakville/Burlington, Guelph, and the Kitchener-Waterloo-Cambridge region. The auto industry relies heavily on goods movement and just-in-time delivery systems. It is also strongly connected to the wider North American auto production system in Southwestern Ontario, Michigan, and other mid-western US states. This places a premium on road accessibility, especially with regards to access to key border crossings.

These two examples are meant to illustrate the differing location patterns of business in different types of industries. Dense agglomeration tends to be favorable to industries that involve frequent and direct human interaction, while industries relying on goods production and movement can be negatively affected by urban environments. Appendix A contains additional maps and examples.

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<sup>2</sup> A location quotient (LQ) is calculated by dividing the local share of a phenomenon by the overall share. For example, if industry x = 10% of local businesses and 5% of overall businesses the LQ = 2. Another way of interpreting this is to say that a LQ of 2 means a phenomenon is twice as prevalent locally as it is overall. Conversely, if an LQ = 0.5 a phenomenon is half as prevalent locally as it is overall.



Figure 4.6 – Business location quotients for creative and cultural industries, 2017

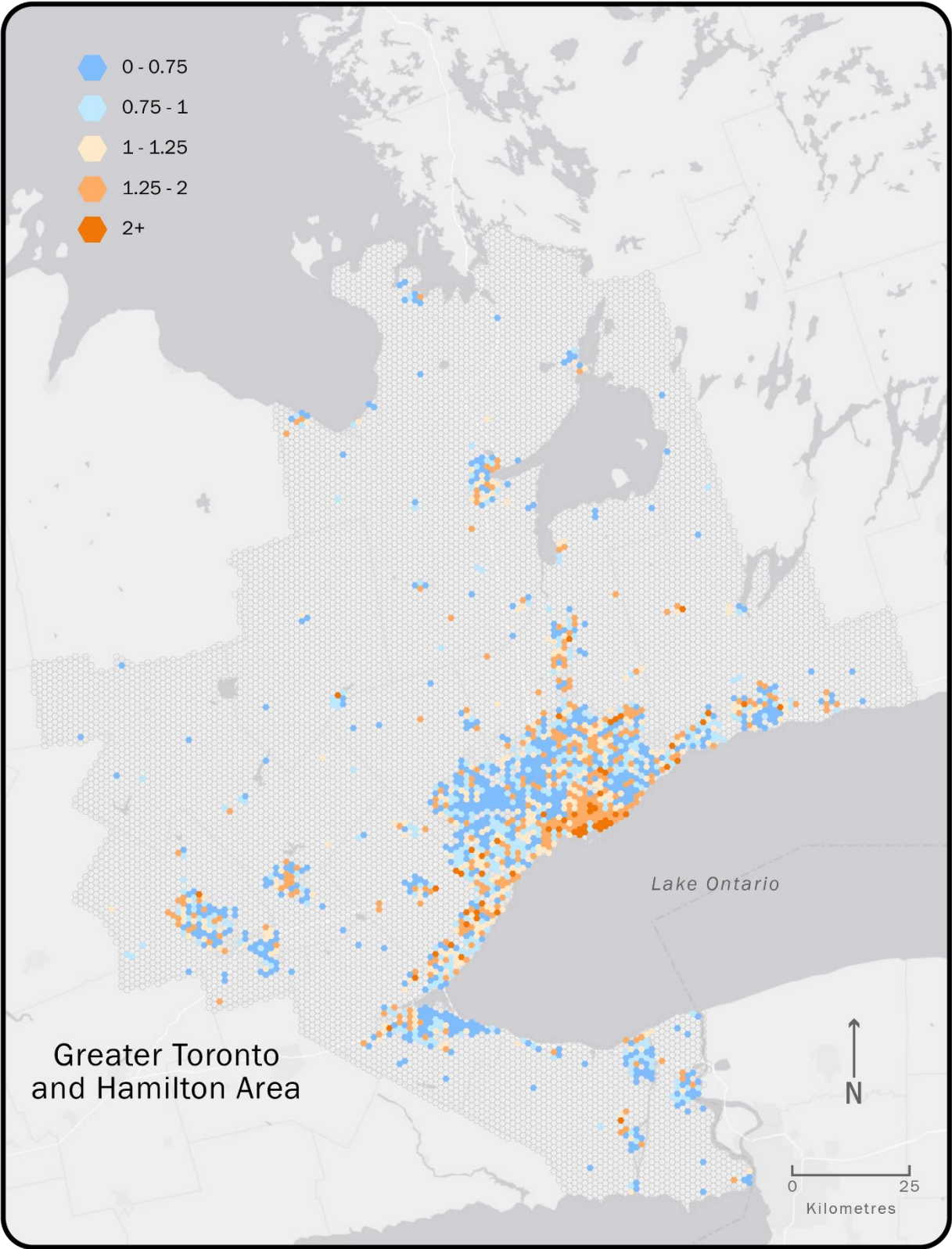
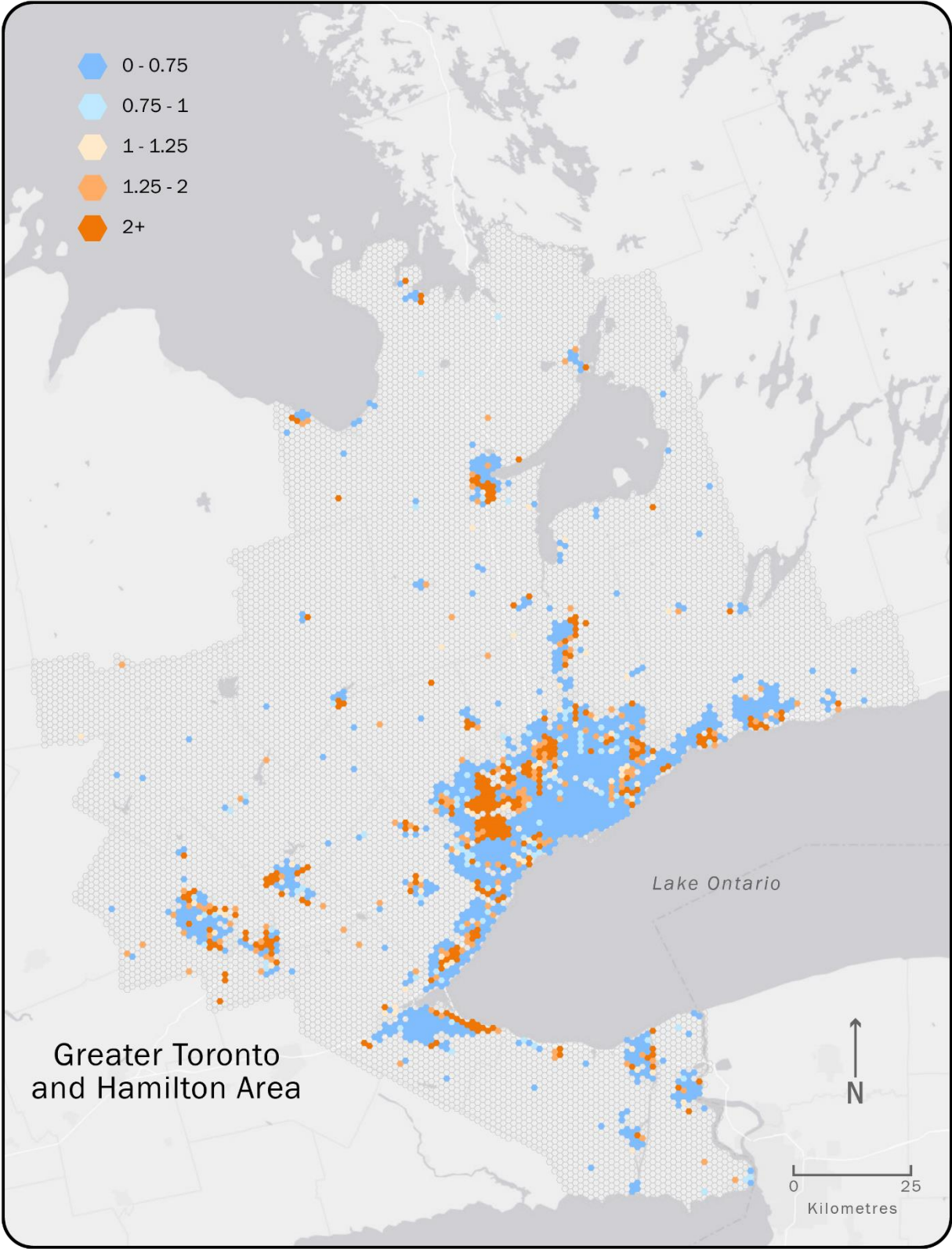


Figure 4.7 – Business location quotients for auto manufacturing industries, 2017



As industries differ from one another in how they produce and market their products, they have different location requirements. The transportation infrastructure is a major factor of these decisions. Some types of business tend to depend more on mass public transportation, while others are oriented to private vehicles including heavy trucks. Freight rail is an additional consideration for businesses that need to move large amounts of heavy material and goods. Public transit can also lessen congestion on roads which helps facilitate the movement of goods. It is important that all elements of the transportation system be aligned for maximum efficiency. This is easier said than done as there is finite capacity that inevitably generates a degree of conflict between different types of users.

These differences are also reflected in land use patterns. In general terms, 'employment lands' are often separated from residential uses. Employment lands take on varying characteristics depending on the type of businesses that are present. Business locations that involve manufacturing or logistics typically require more space and access to highways. Such activities tend to create environmental issues that are not compatible with residential uses. These sort of industries are one of the main reasons land use zoning was originally created. Increasingly however, a larger share of employment is in sectors that are human-centered with minimal associated environmental issues that pose a direct problem for residential uses. In many instances the mixing of residential and employment uses of this nature are actually beneficial as their co-location increases social interaction and exchange. Such areas are typically dense and are sustained by public mass transportation.

Being situated on a transit line or next to a transit stop is not enough on its own to generate dense mixed-use development (Farber & Grandez, 2017). The position of businesses within the overall system is crucially important. Being situated in a central location is greatly more advantageous as overall connectivity to the region is the main factor that can sustain dense urban environments. Figure 4.8 demonstrates that business density peaks at the central point of the GTHA public transportation system in downtown Toronto. This map shows all of the higher order (GO/subway/LRT/BRT) transit stops in the GTHA that are currently operational or approved to be built. A buffer of 800m is used for TTC subway stations and planned RER GO trains stations while a 400m buffer is used for the remainder. Business counts top 10,000 for some stops in downtown Toronto while they taper quickly towards suburban areas.

Figure 4.9 charts the business counts on the Yonge-University-Spadina subway line (Line 1). The five stations on both segments between Queen Street and Union Station have roughly 12,000 businesses within 800m. These stations also have seen the most business growth between 2009 and 2017. Going north, business counts taper to around 5,000 per subway station before falling further. Eglinton and North York Centre, both identified as Urban Growth Centres in the regional Growth Plan, have 1500-3000 businesses nearby. Further out, especially on the University-Spadina segment, business counts drop to under 1,000. It is likely safe to assume that the primary function of stations with such low levels of nearby business is to serve local residents and their journeys to work in the core.

Figure 4.10 shows the Lakeshore East and West Go transit rail stations and associated business counts. This pattern differs from the previous subway example as there are over 11,000 businesses within 800m of Union Station, but then there is a radical and immediate drop-off to roughly 1,000 business at the next set of stations on each corridor. Only at Hamilton is there a significant jump in nearby businesses on the entirety of the two lines. This suggests that the main function of the GO system is to transport suburban residents to the core and back. There is currently little evidence of significant urban-economic development associated with suburban GO stations.

Figure 4.8 – Business density by train/subway/LRT/BRT station (current and planned), 2017

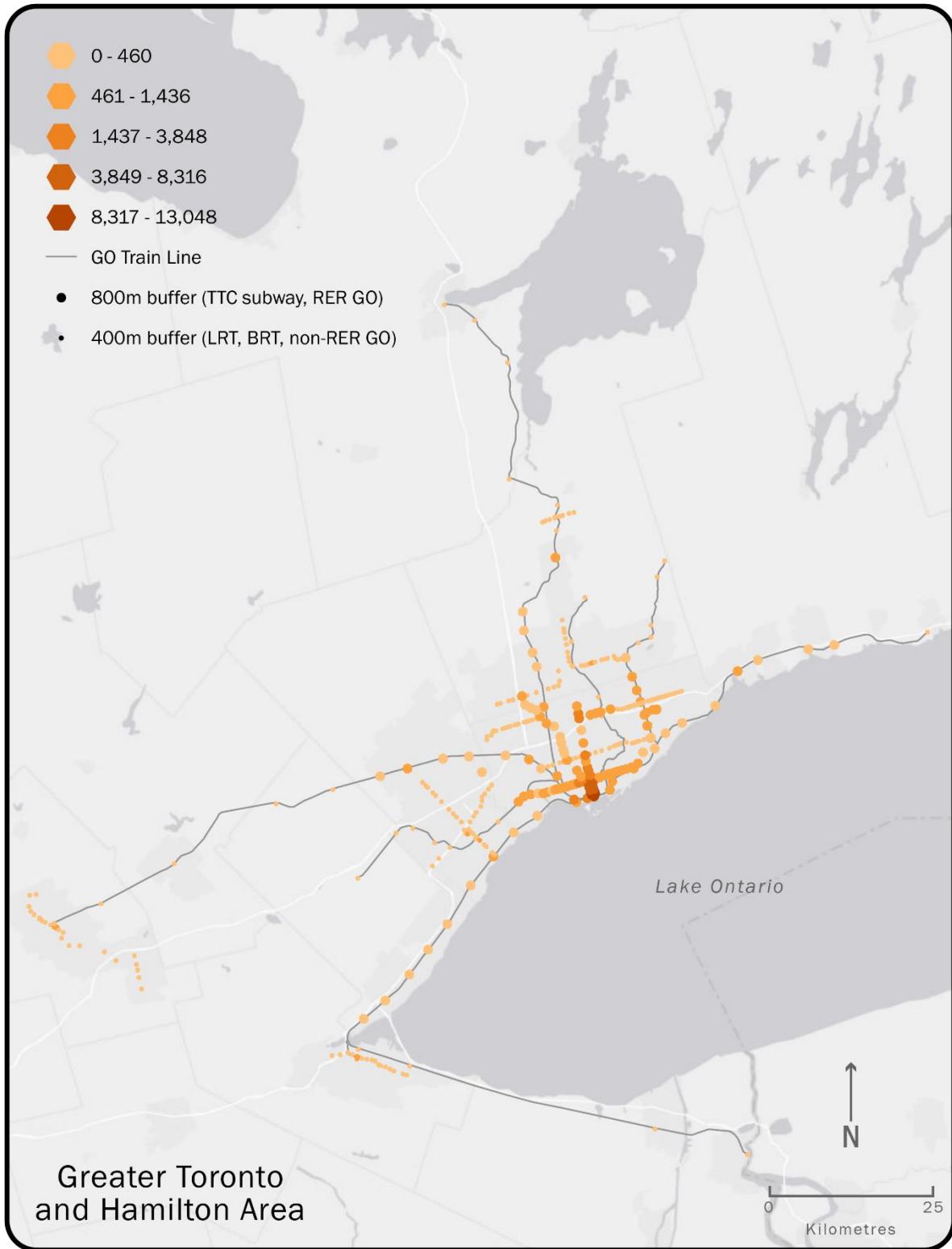




Figure 4.9 – Business counts for Yonge-University-Spadina subway stations (800m radius)

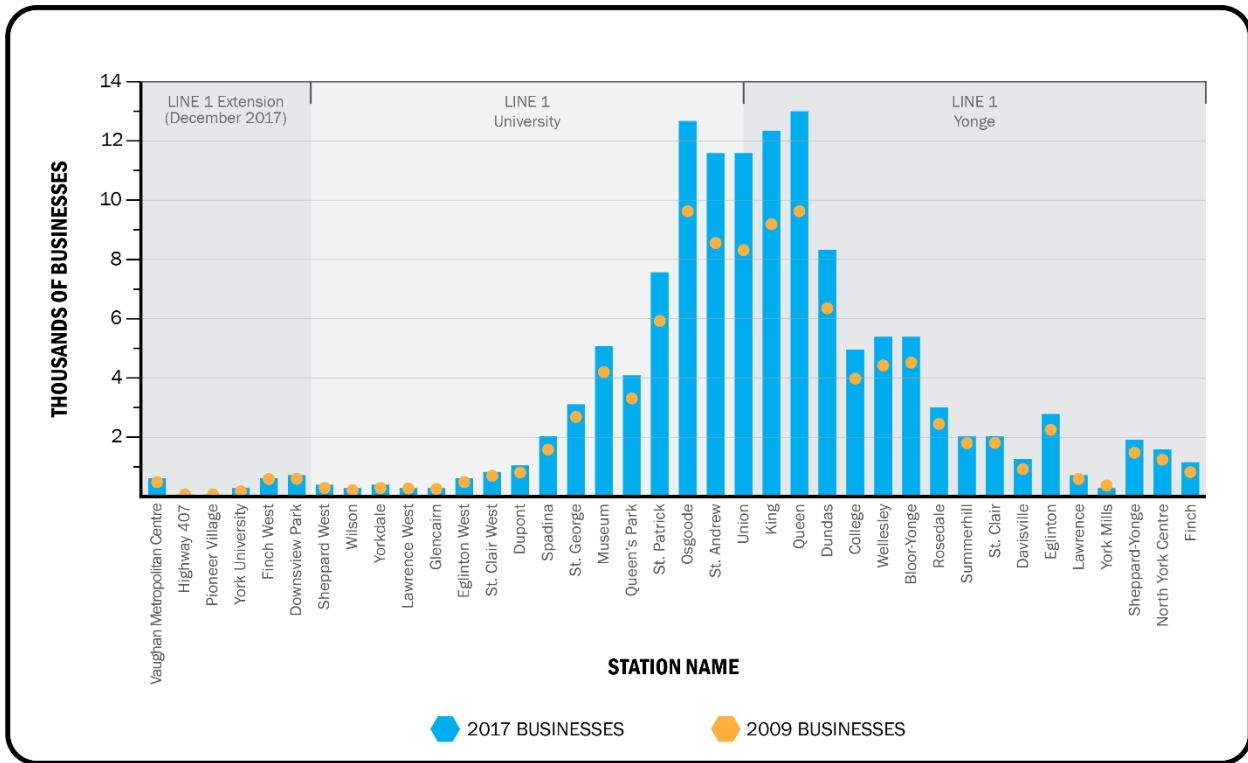
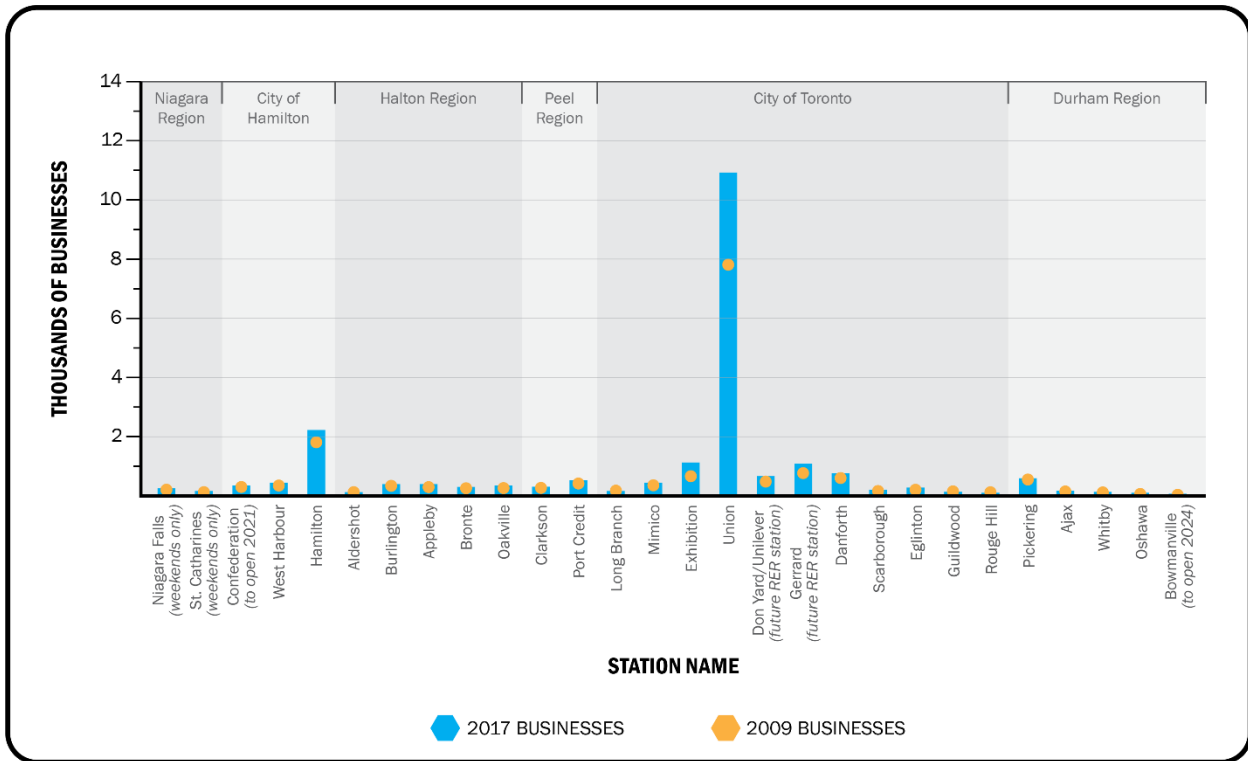


Figure 4.10 – Business counts for Lakeshore East & Lakeshore West GO trains stations (800m radius)





There are relatively small numbers of businesses in suburban areas that are in close proximity to higher order transit stations. This is not the case for highway infrastructure. Figure 4.11 maps all of the highway interchanges in the GTHA and creates business counts for the areas with 3km. Most of the built-up area in the GTHA is within this buffer. The growth of the region in the past 50 years is arguably more closely associated with this infrastructure than mass public transportation infrastructure.

Where the GTHA highway infrastructure meets the central section of the public transportation system in downtown Toronto, business counts tops 30,000. Unlike the public transportation system, they do not show similar patterns of business tapering in suburban areas. There is a sharp drop-off outside downtown Toronto, but typically much more consistent business counts next to the main highways corridors in the region. Figure 4.12 shows the business counts for the Gardiner Expressway and QEW from the Don Valley to Niagara. Outside the core, business counts at each interchange are roughly in the 4,000-6,000 range from Toronto, through the Regions of Peel and Halton to Hamilton. Figure 4.13 displays similar levels (if not slightly higher) of business near to 401 highway interchanges through Peel region and Toronto. This is not accidental, but rather the product of intentional planning that places employment lands in close proximity to major highways. The infrastructure itself is generally hostile to immediately proximate residential development and beneficial to goods movement and so makes sense in this context.

In general there are two patterns of economic land use associated with the two main types of regional transportation infrastructure. A dense downtown that is predominantly served by mass public transit, and a mid-density set of highway corridors throughout the region. Going forward one of the main questions will be which type of economic activity is likely to generate more future growth. This thinking should be central to transportation planning in the region.

Figure 4.11 – Business density by highway interchange, 2017

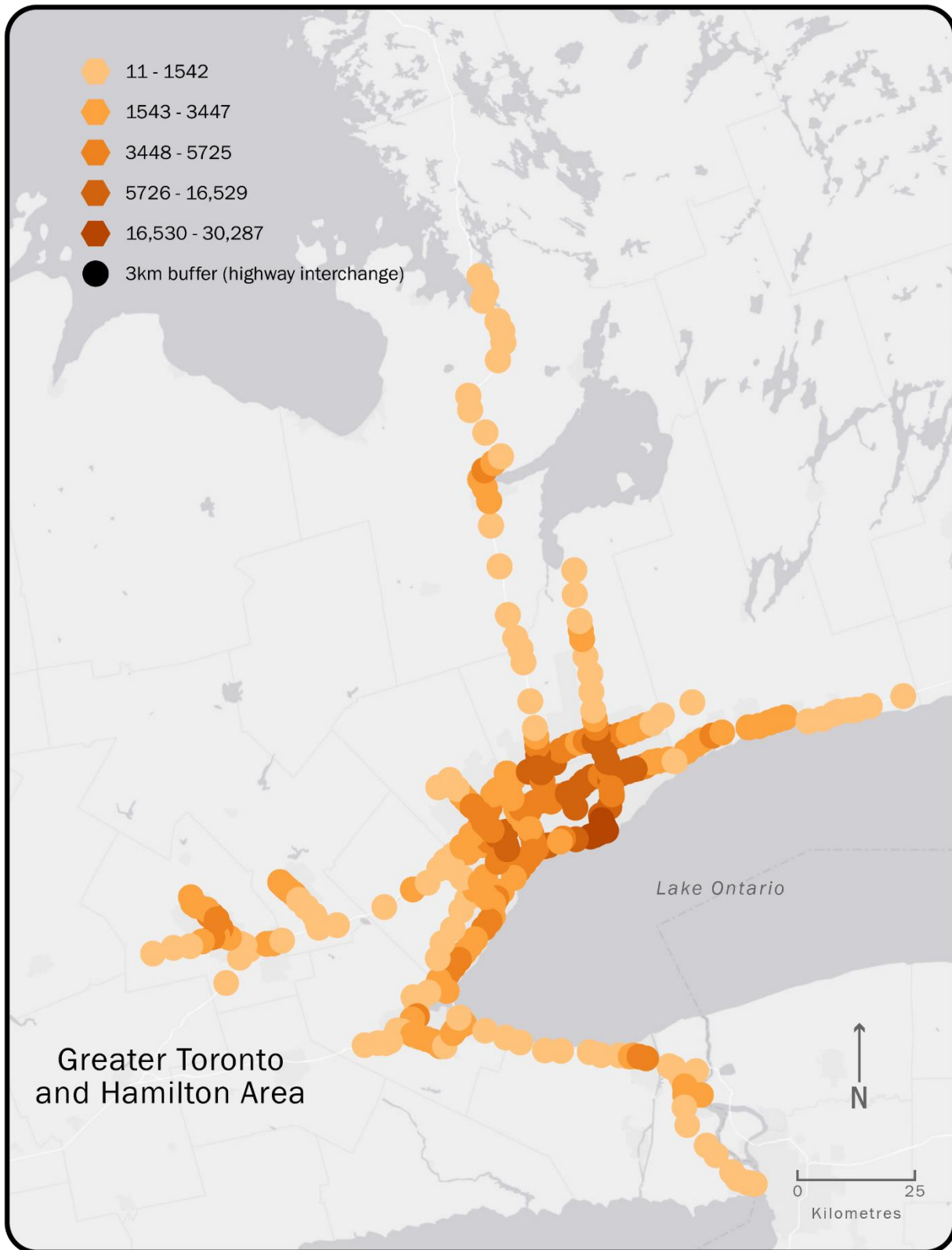


Figure 4.12 – Business counts for Gardiner/QEW highway interchanges (3 km radius)

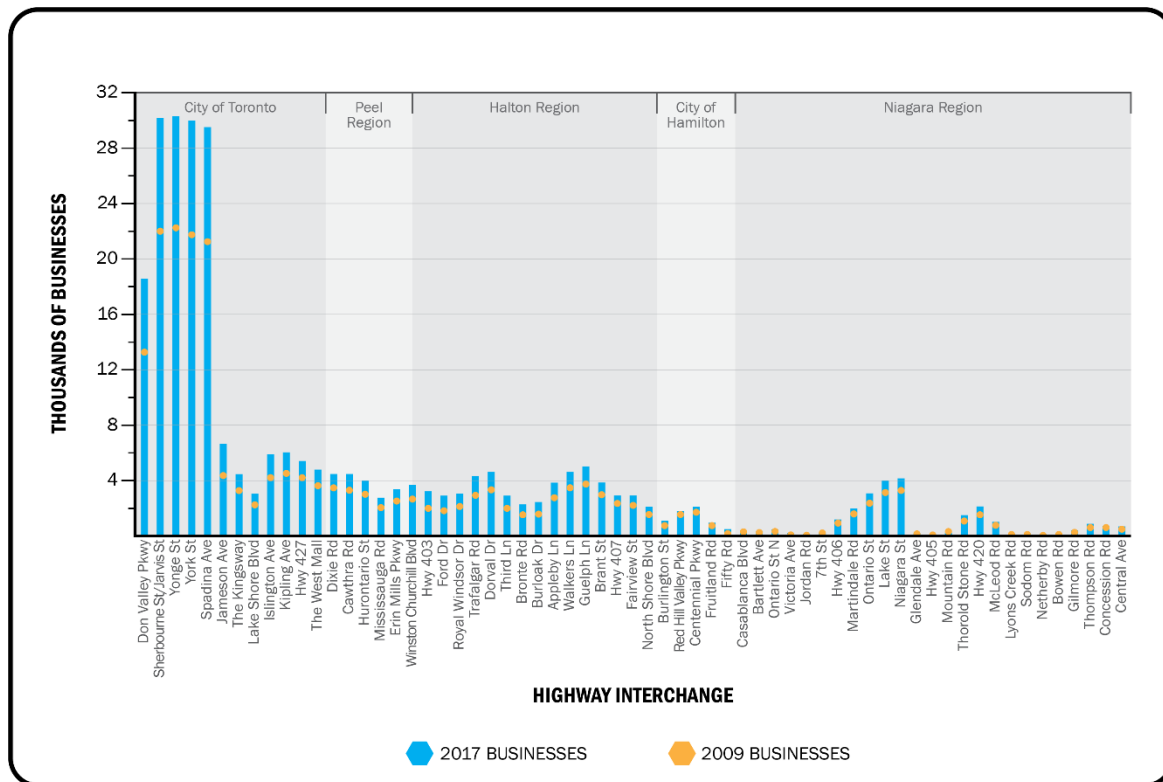
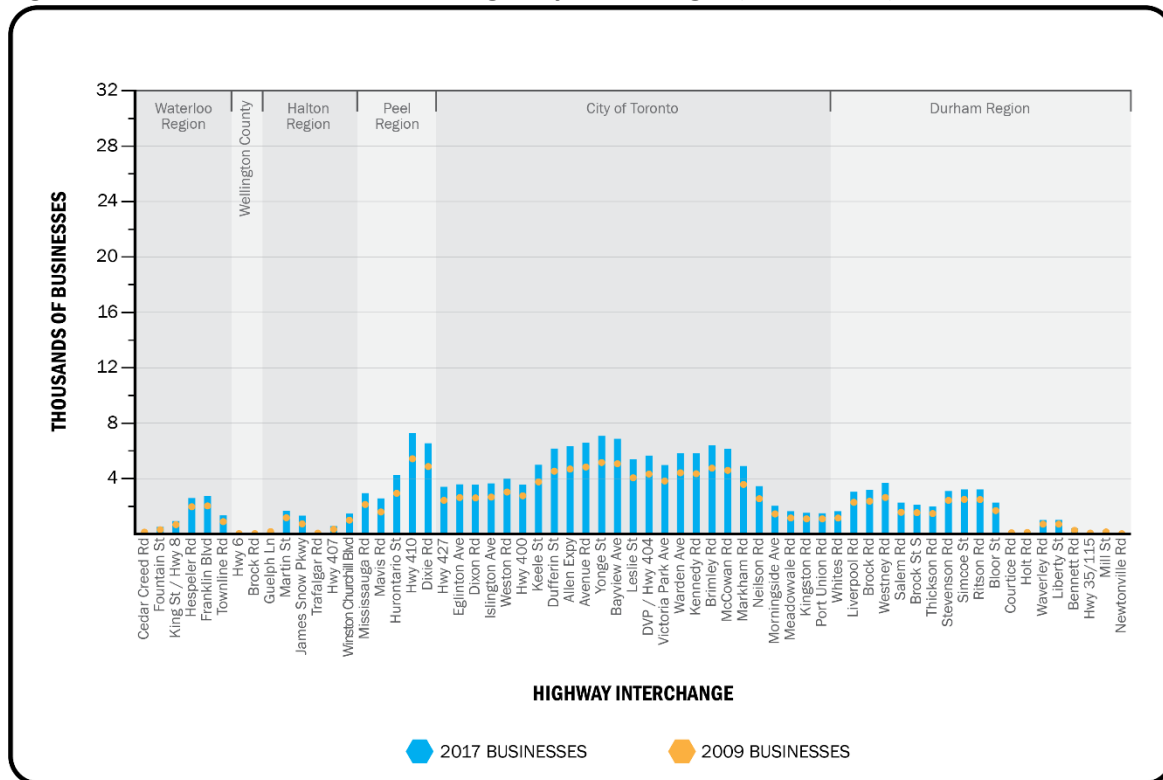
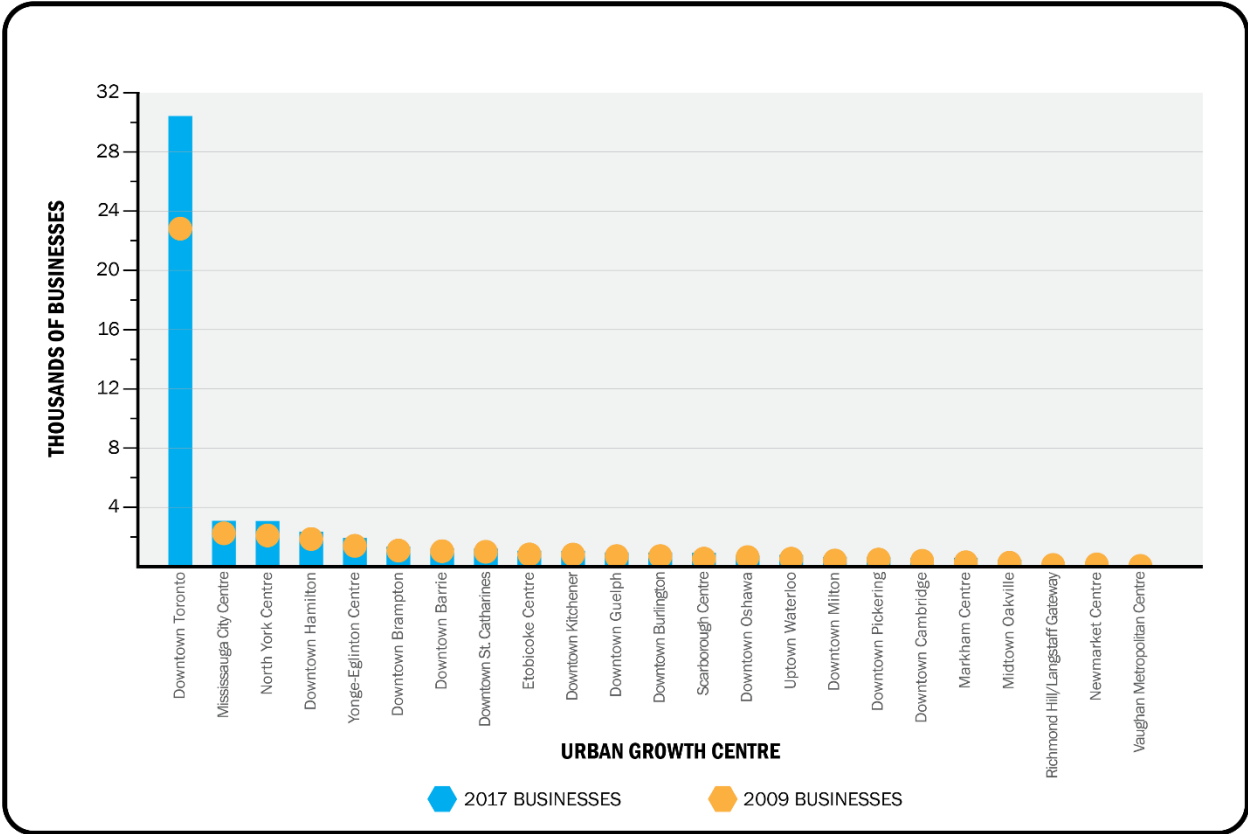


Figure 4.13 – Business counts for 401 highway interchanges (3 km radius)



Beyond downtown Toronto there is a commitment in the Growth Plan to encourage development in additional ‘Urban Growth Centres’ (UGCs). These places are identified as urban areas with minimum densities for both residential and economic uses. Figure 4.14 shows the business counts for the Urban Growth Centres identified in the Growth Plan that fall within the study area. Downtown Toronto is by far the largest with just over 30,000 businesses. This is more than all other UGCs combined which total 22,513. Moreover, downtown Toronto added more businesses (7,569) between 2009 and 2017 than all other UGCs combined (5,531). Any notion that the core has limited growth potential has yet to emerge in the data. Downtown Toronto is the preminent location for finance, business services, creative and cultural industries, and information and communication technologies (ICT) services. These are among the largest and fastest growing sectors of the regional economy. They are highly knowledge intensive, employing large numbers of professionals. As they are the industries that tend to benefit the most from clustering in dense urban environments, they will likely continue to drive growth in the region in Toronto’s downtown core. There may be some politically motivated desire to attempt to spread such economic activity more widely. While some urban regions in the world can say they are truly ‘polycentric’ in their development pattern, there is no current indication that the GTHA can be genuinely described in this way or will be in the near future. Downtown Toronto is unique within the region. Its economic density and transportation centrality place it in a category of its own. Discussing it in terms that make it seem on par with the other UGCs is potentially counterproductive.

**Figure 4.14 – Business counts for Urban Growth Centres, 2017**

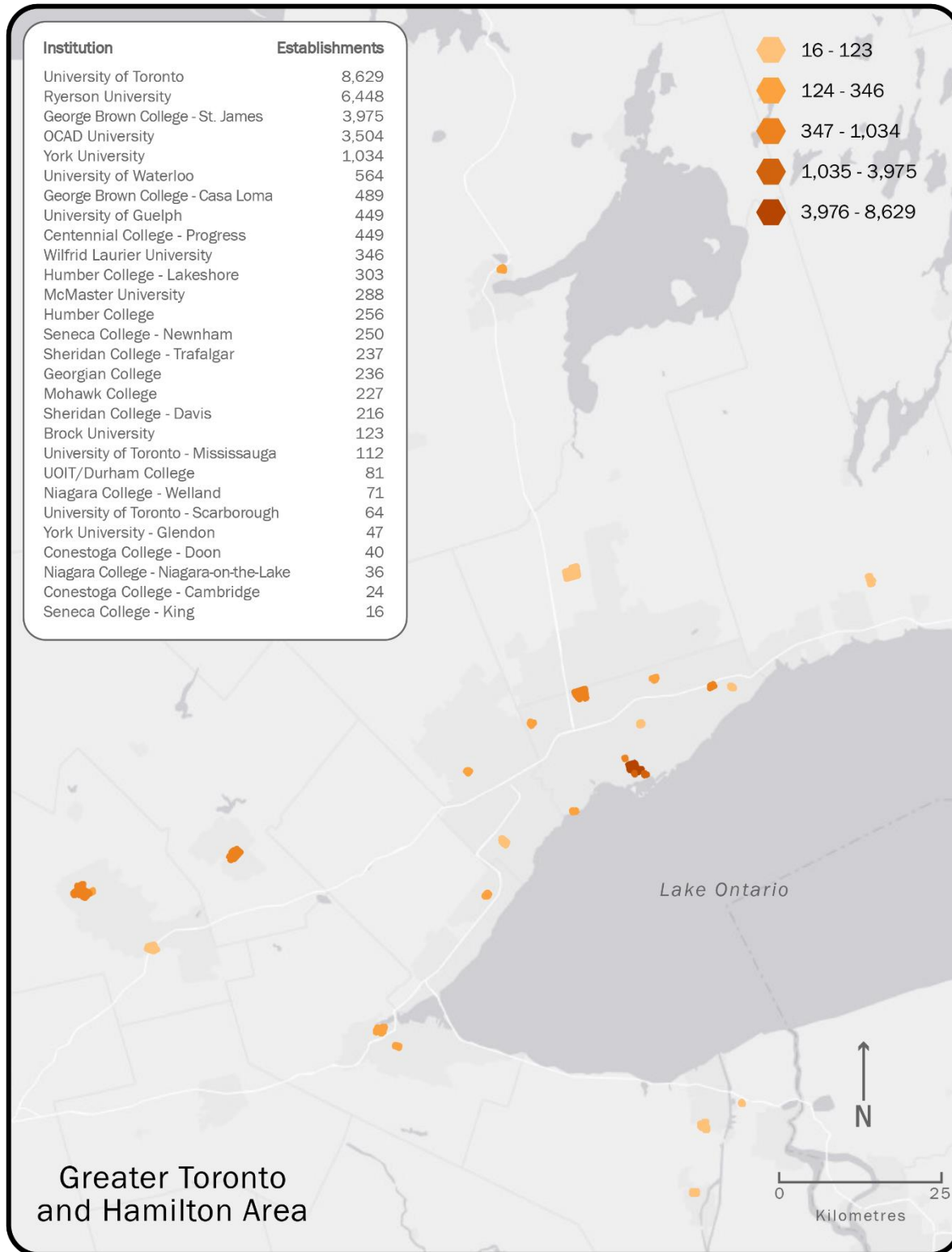


Higher education campuses are another type of economic anchor that risk receiving less than their fair share of attention. In their own right campuses generate a lot of travel activity as there are hundreds of thousands of students, staff and faculty in the GTHA. Travel times are often off-peak as campus schedules do not always conform to the typical 9 to 5 work day. Beyond these direct impacts, higher education institutions are increasingly seen as anchors of the knowledge-based economy, not just in terms of their core mission of educating students, but playing an important role in producing economically valuable research. Such activity can lead to entrepreneurial activity of students and faculty members, whereby new companies are formed and often incubated in dedicated on-campus facilities. The University of Waterloo has a long history of generating successful start-up companies and many other colleges and universities in Ontario have begun to emulate this model.

Campus-based research can also function in partnership with existing businesses. Private funding for research and joint ventures are increasingly common. These knowledge 'spillover' processes are believed to be important components of local economic development policy. Relationships between campuses and business are strengthened by locating in close physical proximity. Areas immediately surrounding campuses have become popular locations for businesses who wish to directly tap into these sources of knowledge and talent. When a critical mass is reached, such neighbourhoods are sometimes referred to as 'innovation districts'.

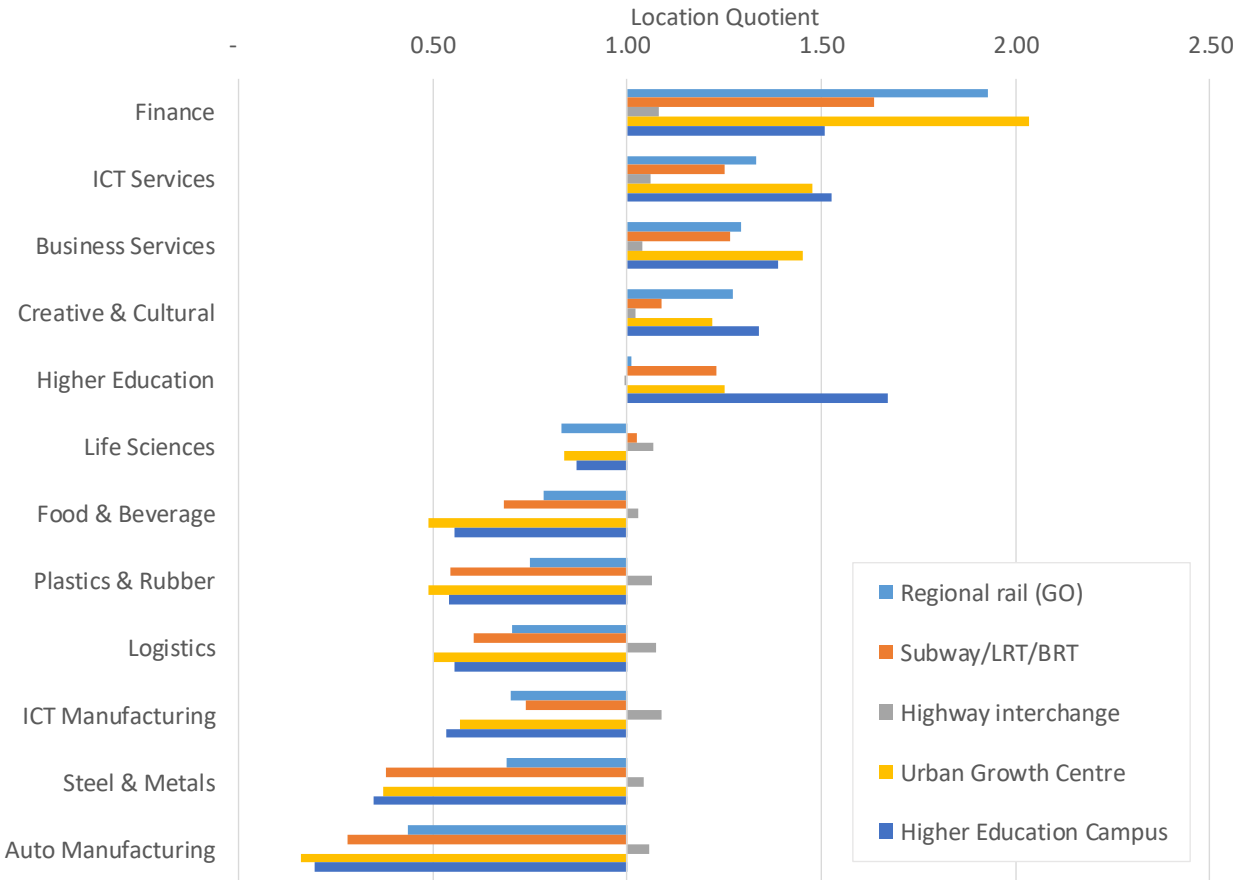
Figure 4.15 shows all of the major higher education institutions (with buffer) in the GTHA. Unsurprisingly, downtown campuses such as University of Toronto - St. George, Ryerson, OCADU, and George Brown – St. James all have at least 3,000 businesses in their immediate vicinity. At the other end of the spectrum many campuses are relatively isolated. York – Glendon, University of Toronto Scarborough, and University of Ontario Institute of Technology (UOIT) all have less than 100 businesses in close proximity. Going forward it is important that any new campus developments be integrated into urban environments if they are to maximize their economic impact. In the meantime, additional efforts to connect higher education institutions to the region should result in significant economic gains for the GTHA and the country as a whole.

**Figure 4.15 – Business counts by higher education campuses and surrounding ‘innovation districts’**



The GTHA economy is doing very well by global standards. It has one of the most highly educated workforces in the world and is increasingly in the radar of major global corporations such as Google and Amazon as a place to invest. The types of economic activity that are currently responsible for a lion’s share of the region’s growth are knowledge intensive sectors such as finance, ICT services, business services, and creative and cultural industries. These clusters are also the ones that tend to be the most ‘urban’. Figure 4.16 shows location quotients for twelve cluster types based on the five major forms of infrastructure discussed in this section (ranked in order of geographic association with regional rail). The aforementioned cluster types are all strongly associated with mass public transportation infrastructure, urban growth centres, and higher education campuses. Conversely, cluster types such as life sciences, food & beverage, plastics & rubber, logistics, ICT manufacturing, steel & metal, and auto manufacturing are all negatively associated with public transit stations and more closely aligned with highway interchanges. The former, more urban, group of clusters is a much larger share of the regional economy with 136,883 businesses to 55,505 for the more suburban set. While both types are important and require investment, it is the urban set that is likely to drive the most economic growth in the near future as well as place the highest demands on the public transit system.

**Figure 4.16 – Cluster location quotients by major type of infrastructure**



## 5- Policy discussion

### *Better integrate economic development with transportation, and land use planning*

What is the goal of the regional transportation system? By investing in it what are we trying to achieve? Some would say it is about creating compact urban development. Others would suggest that it is a way to improve environmentally sustainability. Other still make the case that a strong public transportation system can reduce social inequality. All of these are worthwhile and non-mutually-exclusive goals. However, this paper suggests that economic development be the central consideration in transportation planning for the region. Such an approach could deliver on the additional goals as a matter of course.

The knowledge economy is going to be the foundation of growth for the region as a whole going forward. It is concentrated in downtown Toronto, by far the densest area of the region, and will likely continue to be. Businesses benefit from clustering together as it facilitates interaction and exchange. Finance, business services, ICT services, and creative and cultural industries are the sectors that experience the largest gains. These are among the fastest growing sectors and they will continue to seek out urban locations as it is in their interest to do so. Aligning investments in public transit that connects downtown Toronto and other downtowns such as Hamilton, Kitchener, and Guelph, is good economic development policy and good growth policy. Connecting such places to Pearson International Airport is another important consideration as these sectors rely heavily on doing business in other cities and countries.

The knowledge-based economy is in many ways the physical glue of the region. It is the strong force at the center that draws others near. As residents tend to want to minimize their commutes, they will typically chose to live close to where they work. If they work in a central area, many will want to live close by. This dynamic can help create a denser and more urban region. Economic development and transportation infrastructure are not enough on their own to fulfil this end. Land use planning needs to be incorporated in a strategic manner in order to generate the 'complete community' vision that has begun to take hold in the GTHA. Land use planning, especially the Growth Plan, and regional transportation planning undertaken by Metrolinx are increasingly being coordinated. An economic development strategy for the GTHA that takes into account the spatial dynamics of the economy is the big missing piece that needs to be incorporated into an overall plan for the region.

### *Design thinking, broader models, and better data*

The Draft Regional Transportation Plan outlines a number of growth scenarios for the future of the GTHA. This paper suggests that strong growth in the core is the most likely due to the trajectory of the knowledge-based economy. This is somewhat beside the point. Instead of asking what the future may look like there should be more debate as to the future that we want for the region. Market forces will play a large role in the direction of the GTHA, but these forces can be harnessed to shape the region in a manner that is determined to be most desired. While the Growth Plan goes a long way towards achieving this goal, without directly integrating transportation planning and economic development policy it cannot be considered a comprehensive vision for the region. Such an exercise is a highly complex task that would need to delicately balance the need for regional integration with local democratic concerns.

Developing a comprehensive vision for the region must be broadly consultative and should avoid being narrowly technocratic. While cost-benefit business case studies are an important piece of information for ensuring value



for money, this type of analysis should be seen as just one tool in a wider assortment of inputs. Broader models that incorporate approaches such as ‘design thinking’ and behavioral economics would help the process of developing a comprehensive plan. Such a process would involve seeking direct input and guidance from citizens, business, Non-governmental Organizations, and key institutions across the region. It would also benefit greatly from better data.

There has never been a greater opportunity to expand data collection and analysis than the present. Unlocking administrative data for planning purposes is only in its infancy, but offers immense potential. In this regard, the PRESTO card, being rolled out across the region by Metrolinx, could provide far richer data on the movement of people than current survey instruments such as the census. Regional fare integration which would depend on a tap-on/tap-off system would be an important step in being able to track trips based on origin and destination. This would not only help in transportation planning, but would also offer new insights into economic planning and site selection. Understanding where people are throughout the day and where people are intersecting (or not intersecting) is not currently well understood. As other jurisdictions roll out such systems, it will increasingly be a competitive disadvantage for the GTHA as long as something similar is not in place.

### *Rethinking governance at the regional scale*

Local economies function on a regional scale, not at the municipal level. Hundreds of thousands of people cross municipal borders on a daily basis to get to work in the GTHA. Similar number of companies do business across the same borders on a regular basis. These borders are inconsequential to these movements unless they somehow become an obstacle. However, municipal borders do become obstacles when people are forced to switch transit providers and pay a second fare. Increased regional integration of the transit system would benefit the economy as it would facilitate the movement of people between municipalities. Linking as many places directly to downtown Toronto and Pearson Airport should be seen as the top two priorities as they are the most important and unique economic assets in the GTHA. Continuing to ‘urbanize’ traditionally suburban economic areas should also be tightly intertwined with expanded transportation infrastructure and services.

Various proposals have been floated for changing the transit governance in the GTHA. This paper suggests that there is also a need for a regional economic development plan that would inform both land use and transportation planning at the same scale. This should not be read as an exclusion of all other scales, whether they be local, provincial, or national, but rather an endorsement of recognizing the functional geography of the economy and its transportation needs. Currently, the Ontario Ministry of Municipal Affairs’ Growth Secretariat and Metrolinx coordinate their planning for the GTHA region. Organizations such as the Toronto Regional Board of Trade (TROB) and Toronto Global operate on a similar scale, but are not in a position to create comprehensive economic development plans. The additional issue is that these organizations have no political equivalent, but instead rely on decisions from the Province, municipalities, and specific constituencies in the case of the TROB.

One of the rationales for creating a regional transportation authority is that it could reduce ‘politics’ from the planning process. This is not quite right. All planning is inherently political as basic questions such as ‘what is the goal of the transit system’ need to be addressed through political processes. There is no single objective optimal transit system. Models and data used to support decisions are always going to involve human decisions and will be affected by conflicting priorities. What needs to be reduced is the crass political decisions based on electoral geographies and faulty notions of spatial equity.

A genuinely regional approach to planning must recognize that different parts of the region have different characteristics and different needs. The analysis presented in this paper shows that the economic structure of the region varies significantly between municipalities and so the infrastructure demands likewise vary. That being said, it is politically difficult to suggest that downtown Toronto and Pearson Airport are going to be the main economic engines for the foreseeable future and thus require special consideration when it comes to investments in transportation infrastructure. The risk of implementing a regional governance system is that ‘fair share’ thinking takes over and undermines the regional concentrations of strength. This is why a regional economic development strategy is necessary, as such an exercise would make explicit how and where the GTHA economy is going to grow and what is needed to support that growth. Transportation and land use planning would be greatly enriched from such an exercise.

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## **Appendix A - Location quotient cluster maps for the GTHA, 2017**

**Figure A.1 – Auto manufacturing business location quotients, 2017**

**Figure A.2 – Business services business location quotients, 2017**

**Figure A.3 – Creative and cultural business location quotients, 2017**

**Figure A.4 – Financial services business location quotients, 2017**

**Figure A.5 – Food & beverage business location quotients, 2017**

**Figure A.6 – Higher education business location quotients, 2017**

**Figure A.7 – ICT manufacturing business location quotients, 2017**

**Figure A.8 – ICT services business location quotients, 2017**

**Figure A.9 – Life sciences business location quotients, 2017**

**Figure A.10 – Logistics business location quotients, 2017**

**Figure A.11 – Plastics & rubber business location quotients, 2017**

**Figure A.12 – Steel & metal business location quotients, 2017**

Figure A.1 – Auto manufacturing business location quotients, 2017

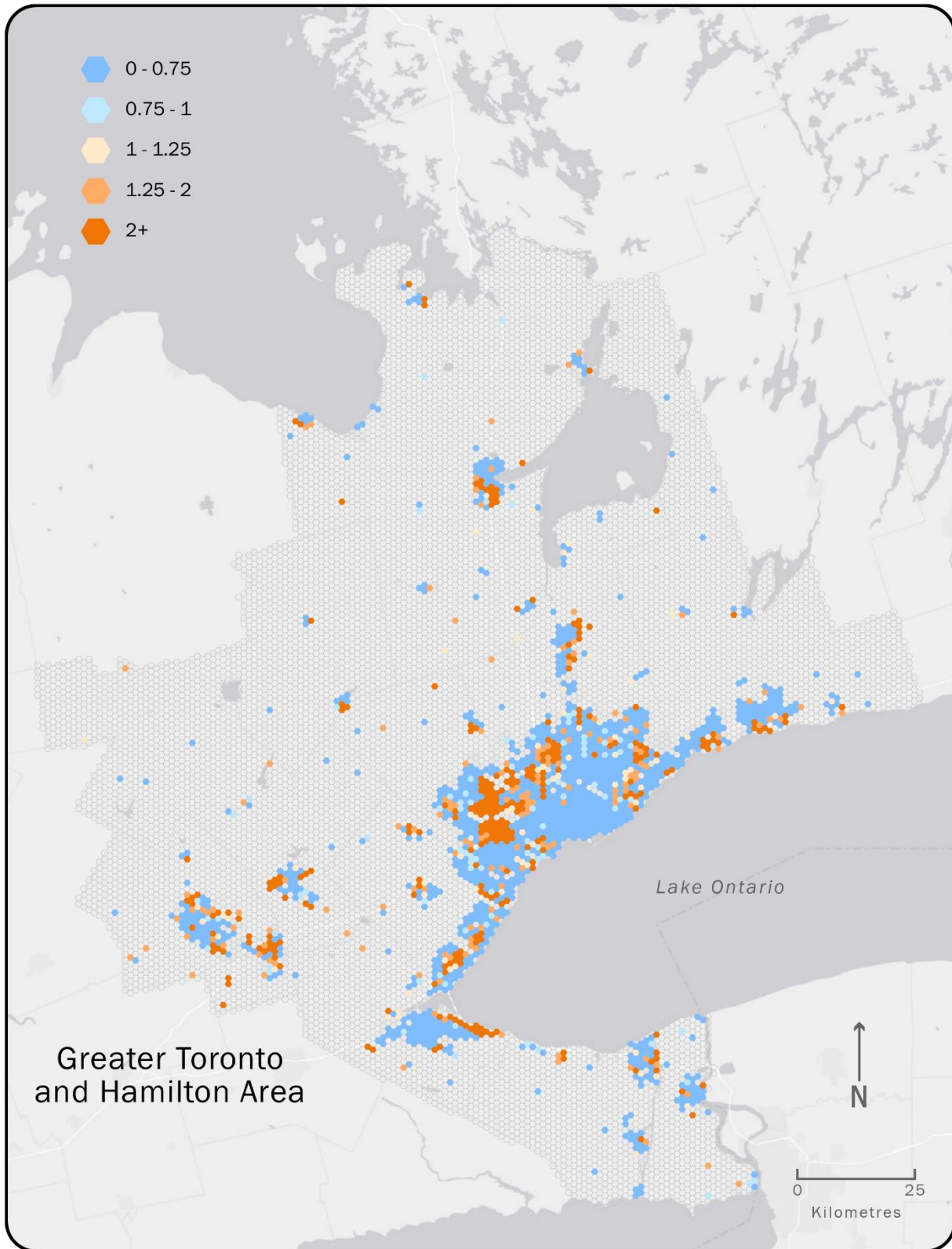




Figure A.2 – Business services business location quotients, 2017

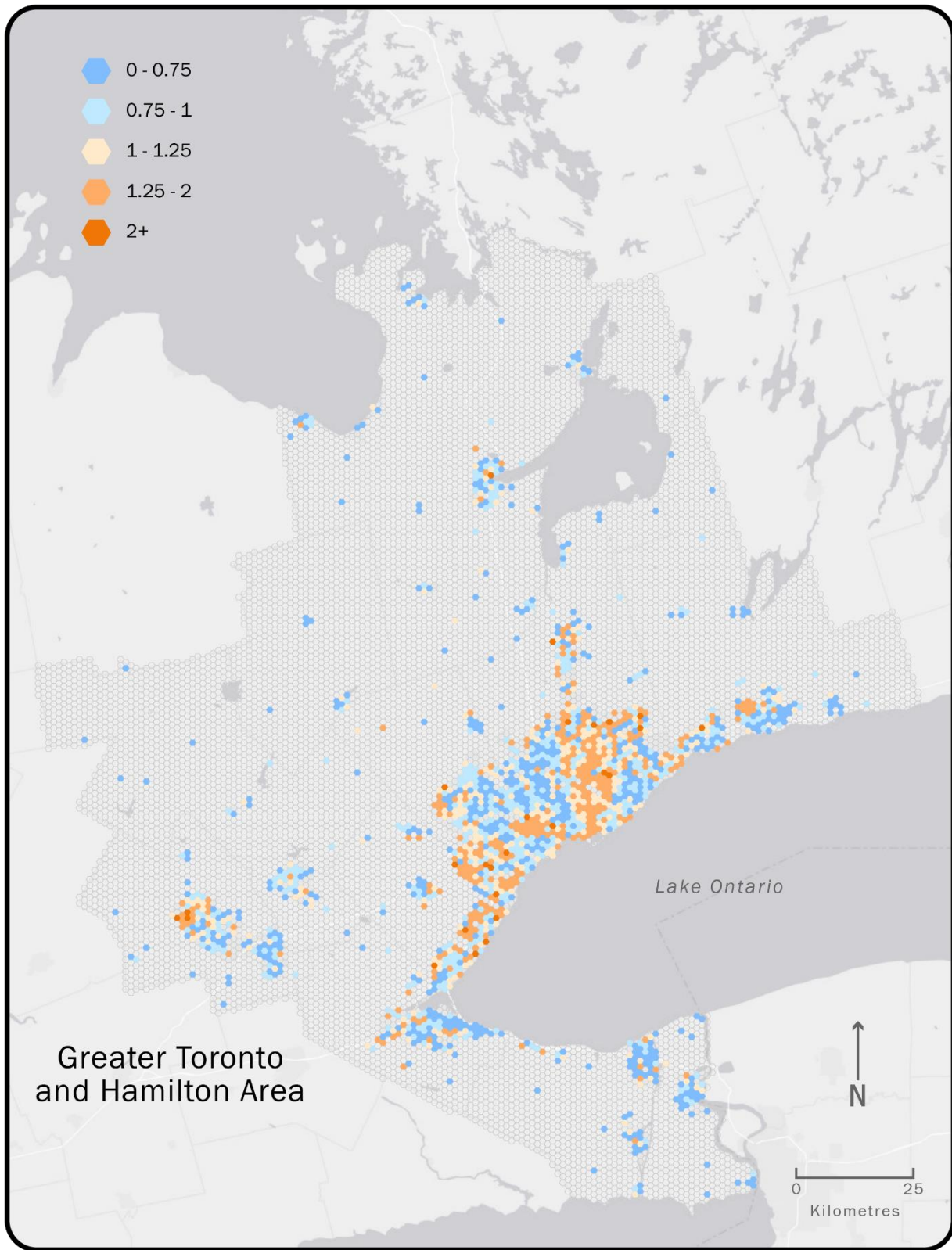




Figure A.3 – Creative and cultural business location quotients, 2017

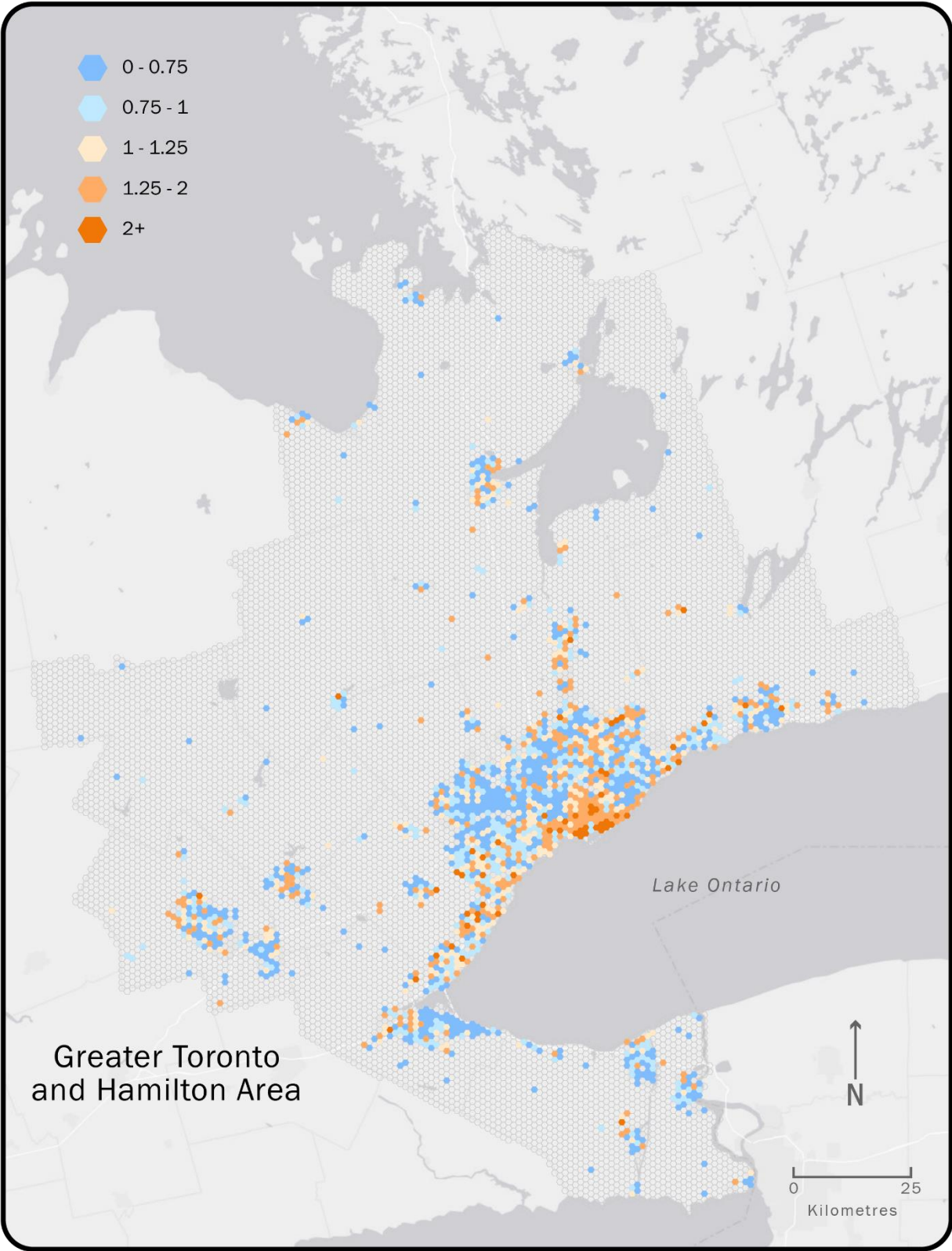


Figure A.4 – Financial services business location quotients, 2017

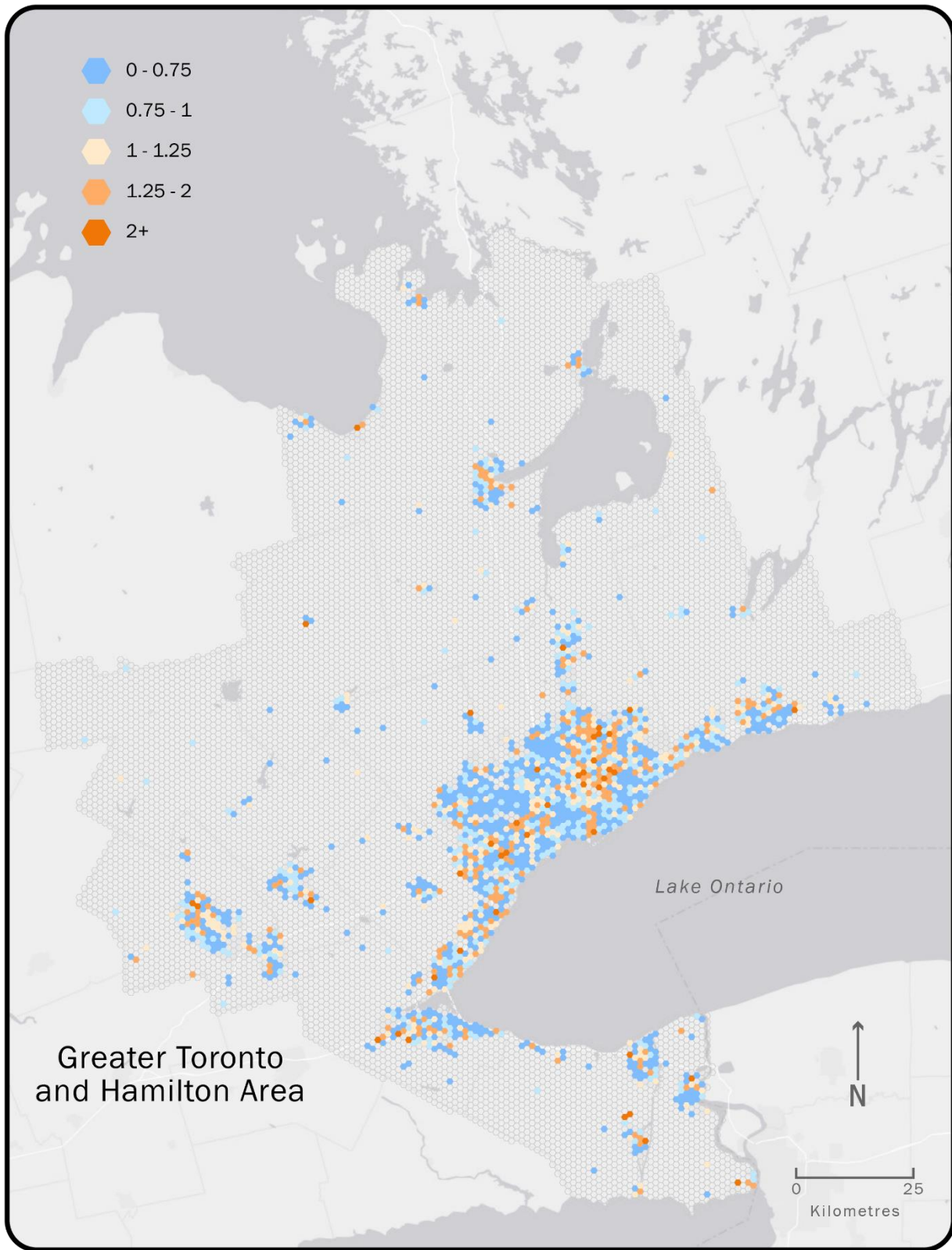


Figure A.5 – Food & beverage business location quotients, 2017

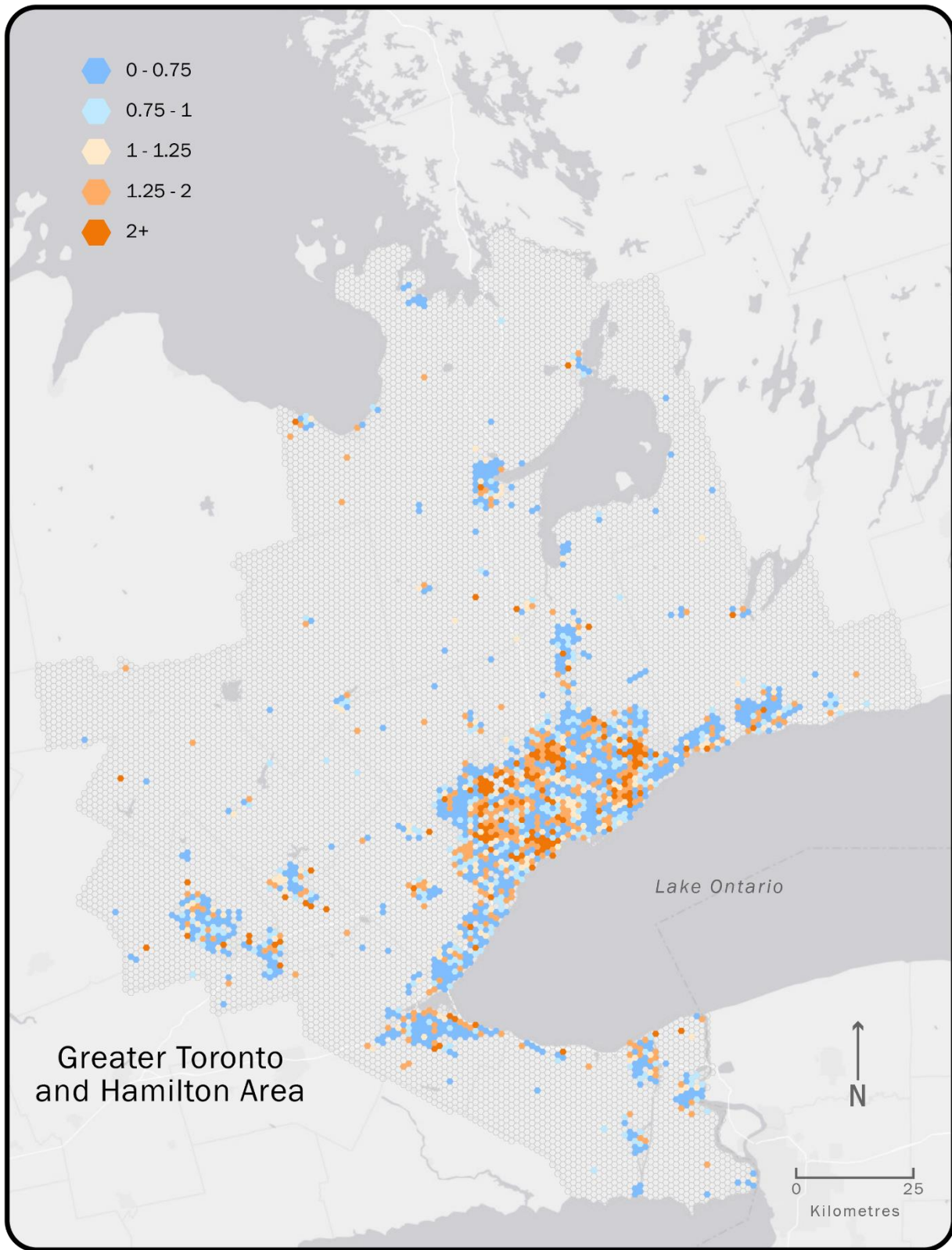




Figure A.6 – Higher education business location quotients, 2017

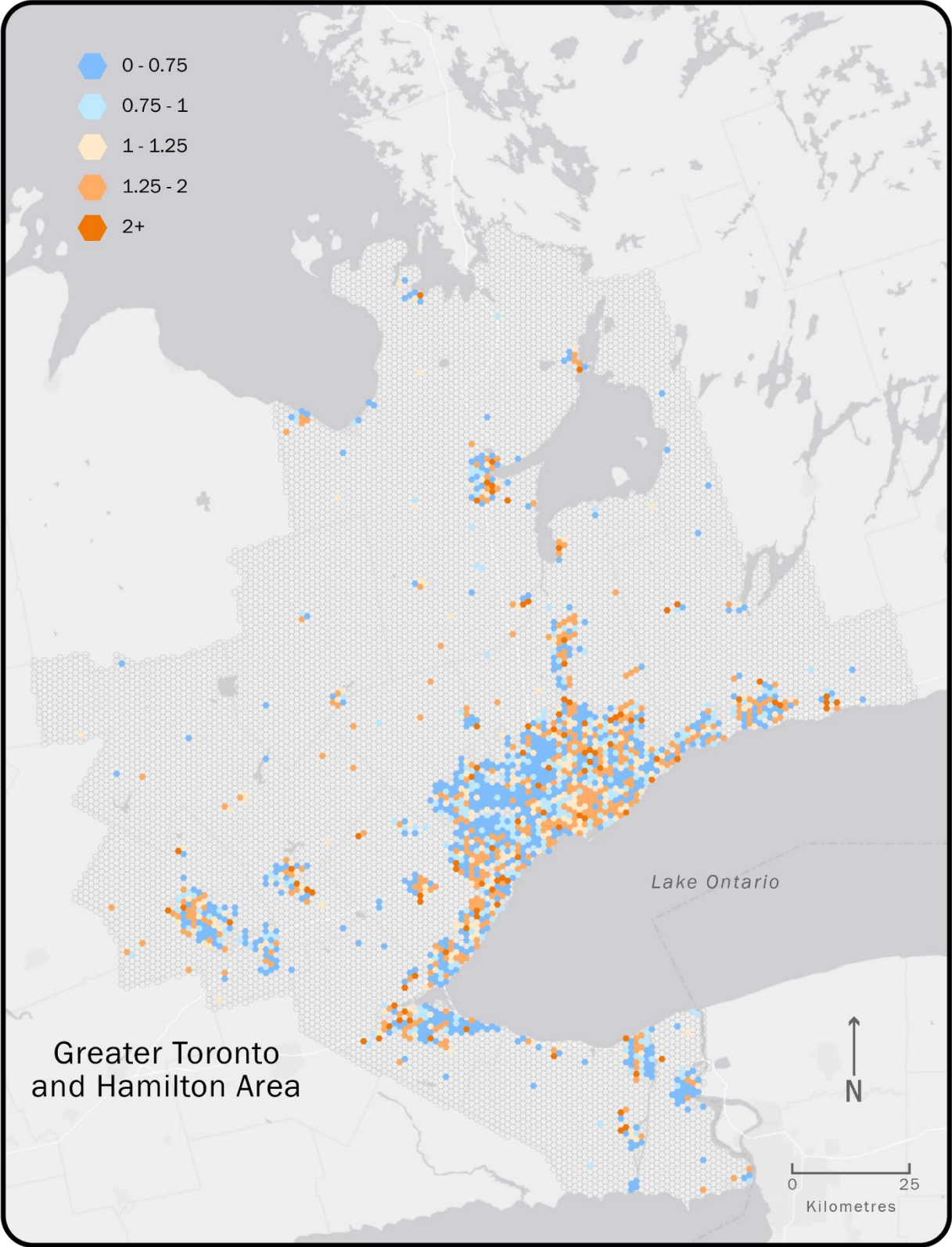


Figure A.7 – ICT manufacturing business location quotients, 2017

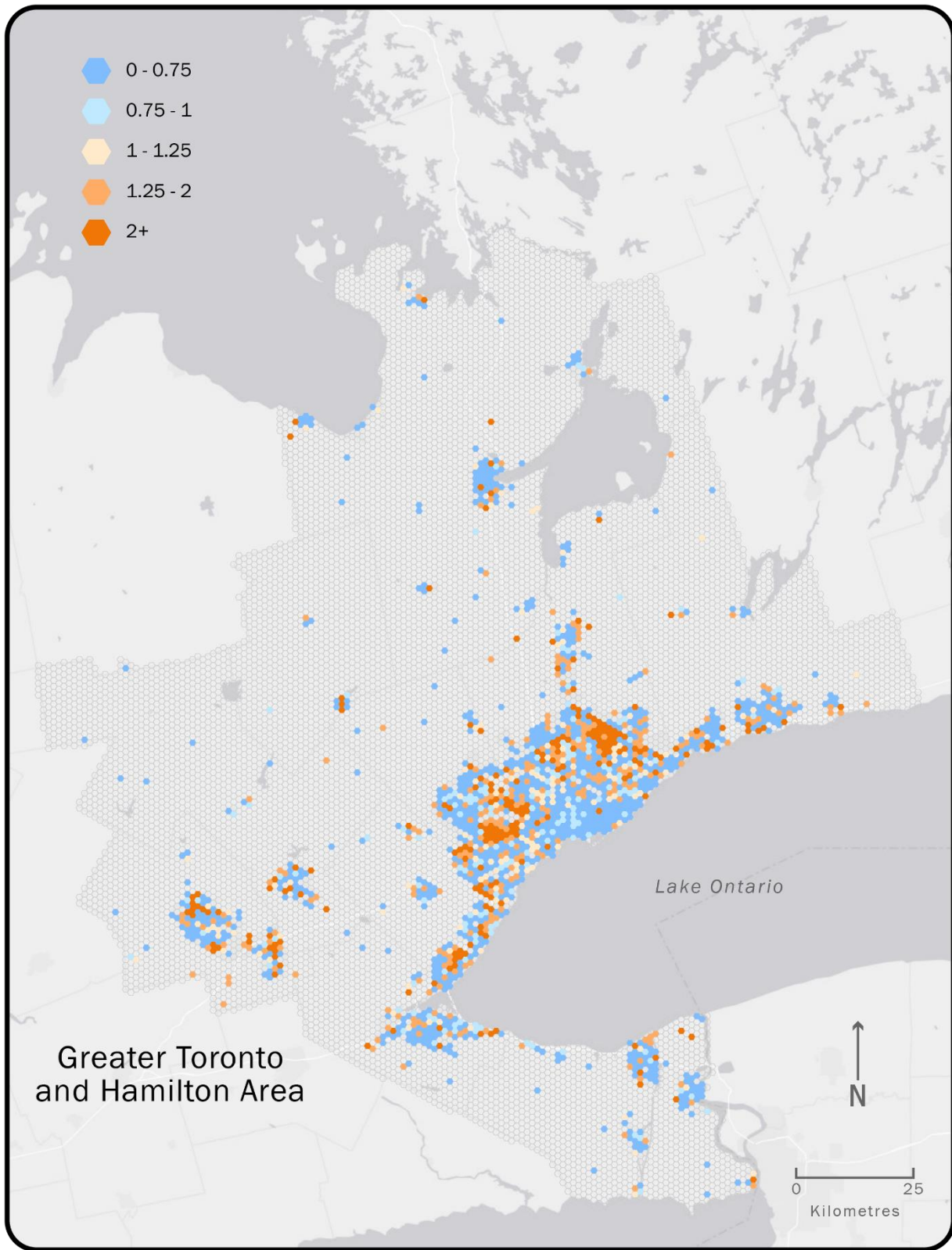


Figure A.8 – ICT services business location quotients, 2017

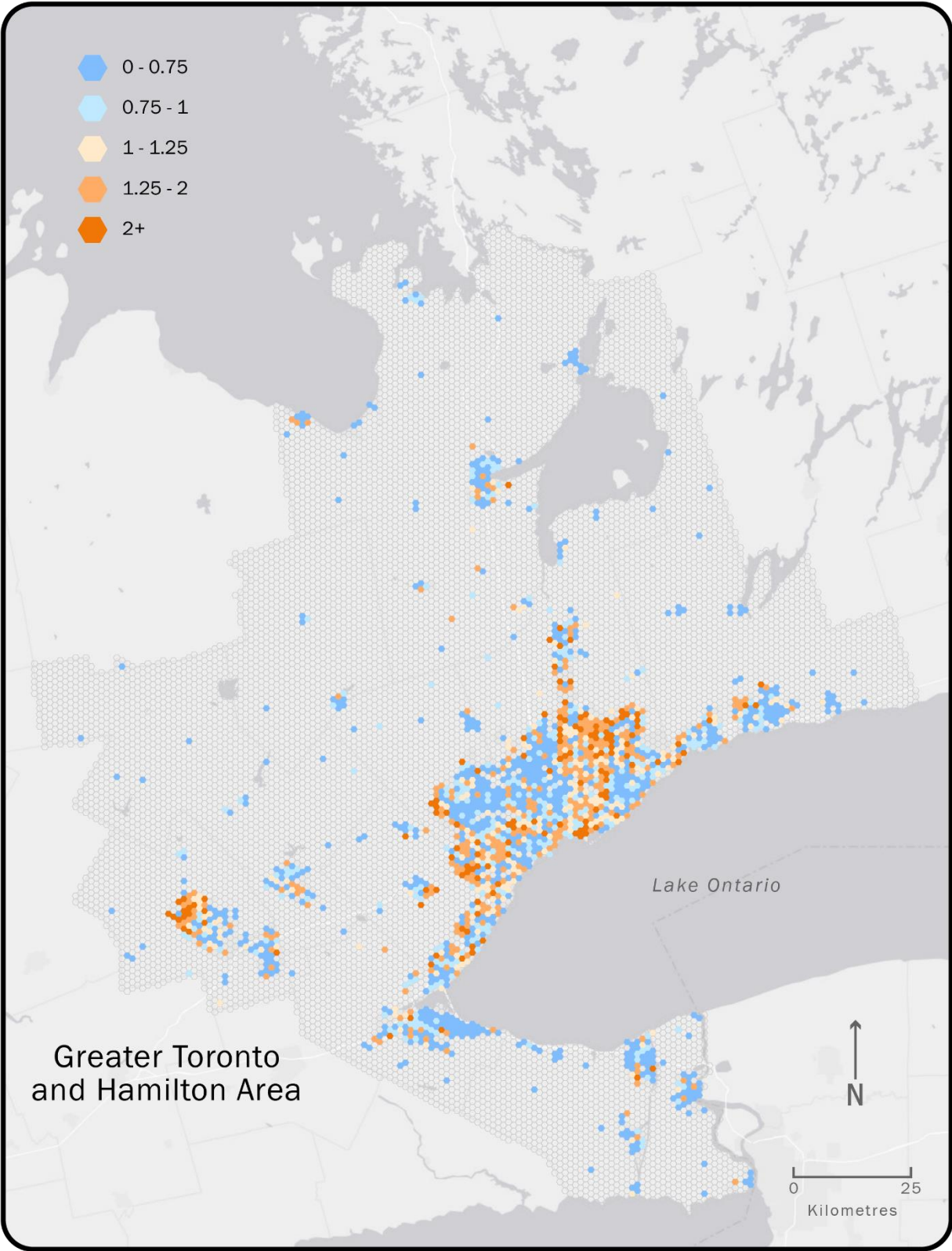




Figure A.9 – Life sciences business location quotients, 2017

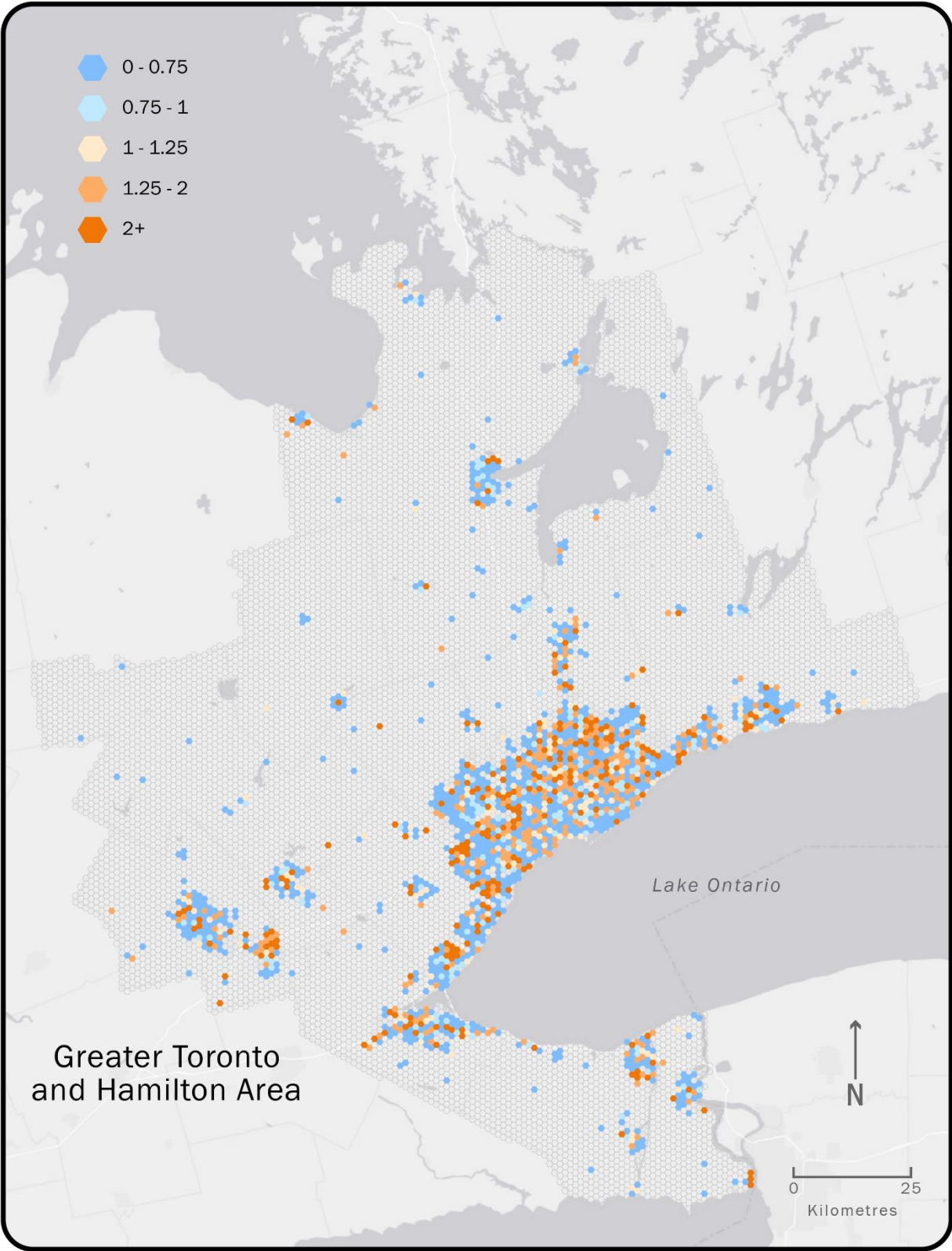


Figure A.10 – Logistics business location quotients, 2017

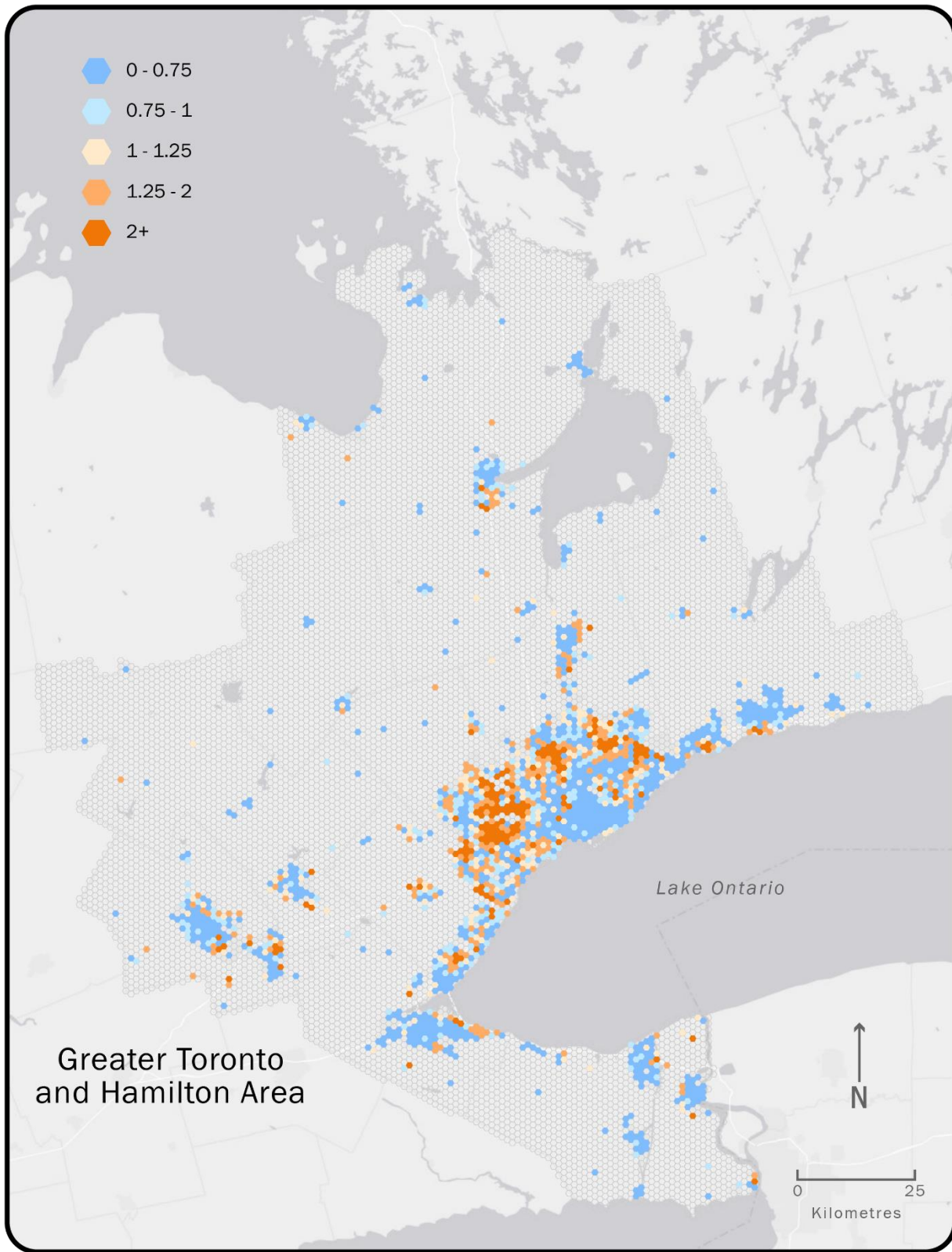


Figure A.11 – Plastics & rubber business location quotients, 2017

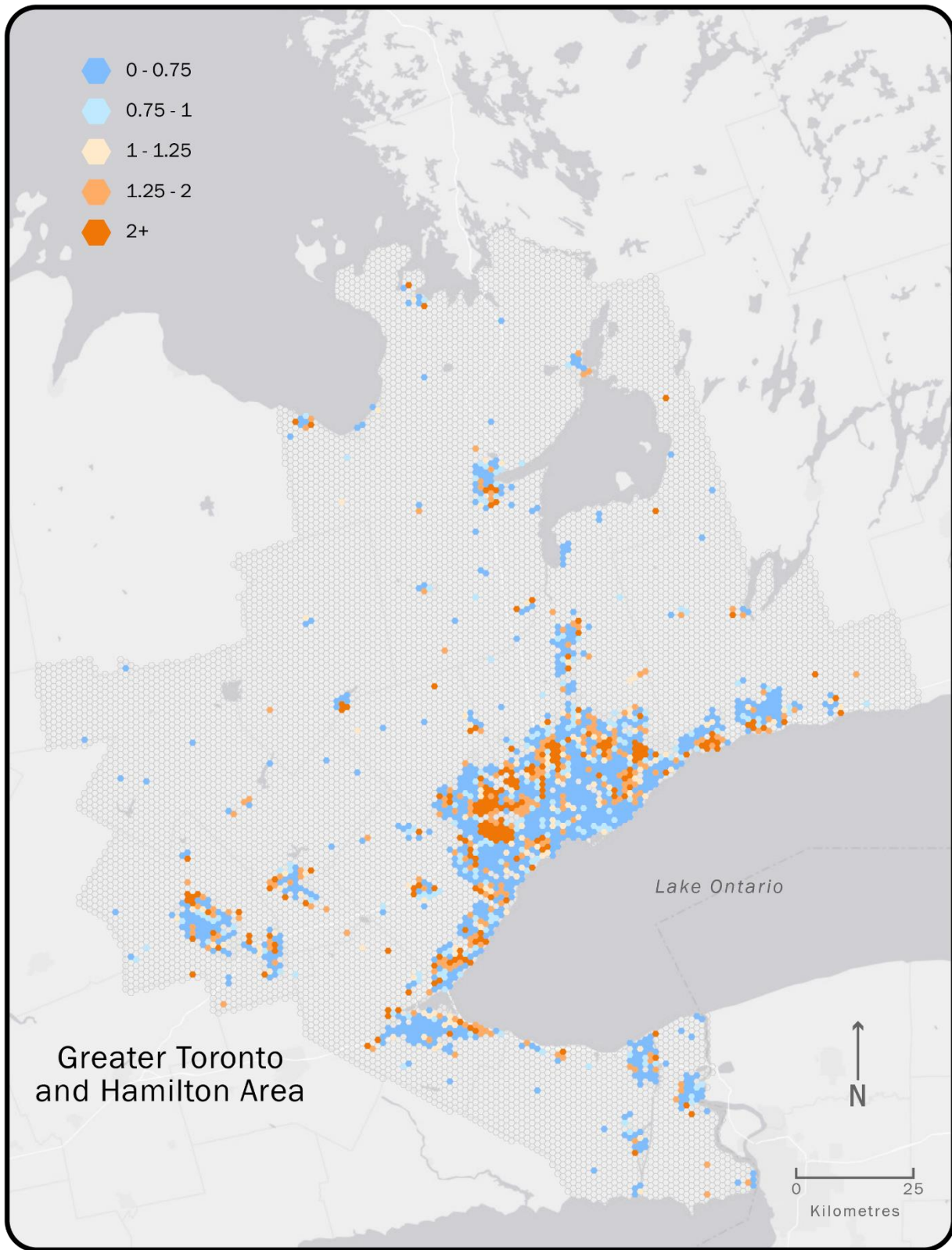
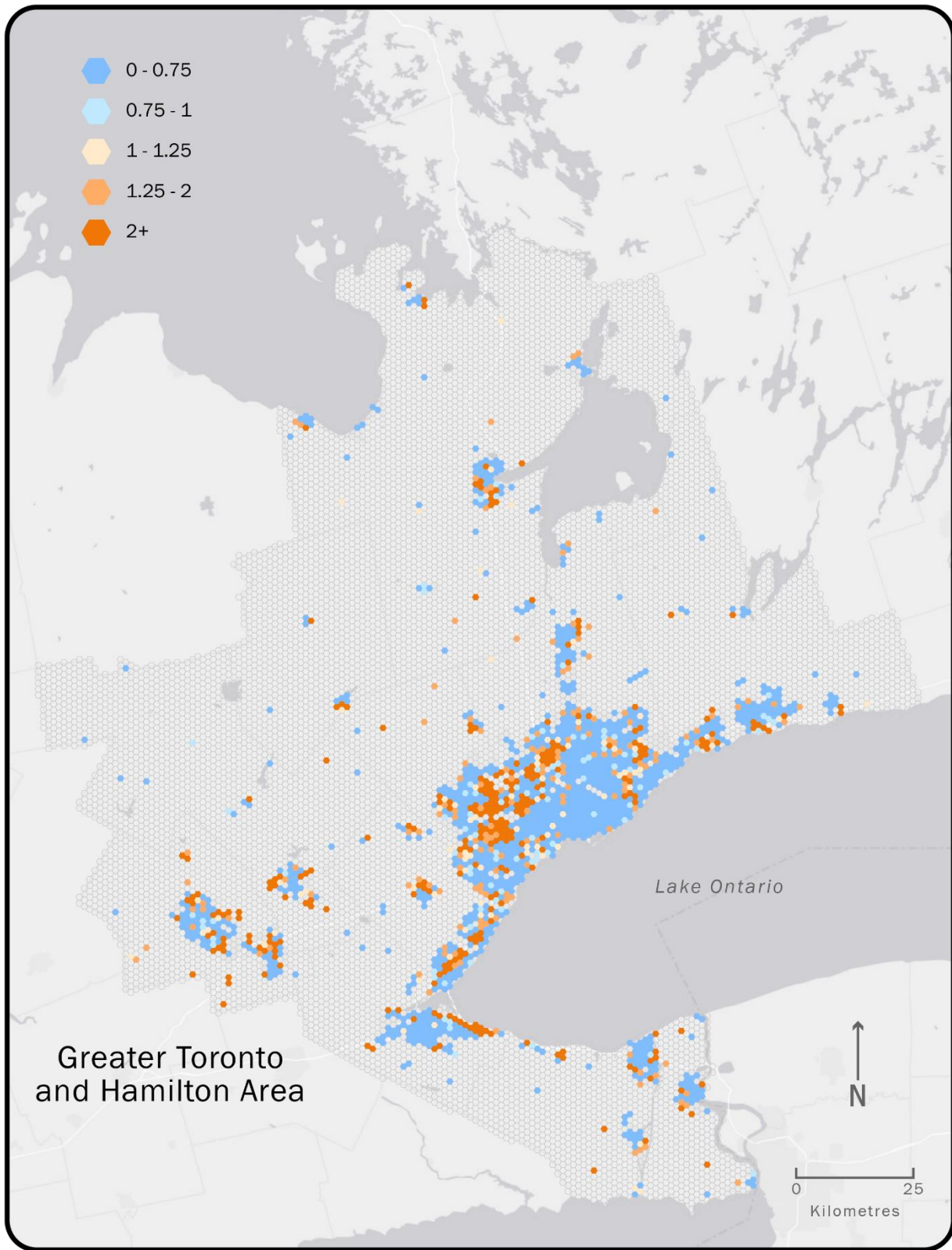




Figure A.12 – Steel & metal business location quotients, 2017



## **Appendix B – Business counts by public transit station (800m radius)**

**Figure B.1 – Business counts for Lakeshore East and Lakeshore West stations**

**Figure B.2 – Business counts for Kitchener stations**

**Figure B.3 – Business counts for Barrie and Stouffville stations**

**Figure B.4 – Business counts for Milton and Richmond Hill stations**

**Figure B.5 – Business counts for Yonge-University-Spadina subway line (Line 1)**

**Figure B.6 – Business counts for Bloor-Danforth subway line (Line 2) & Scarborough LRT (Line 3)**

Figure B.1 – Business counts for Lakeshore East and Lakeshore West stations

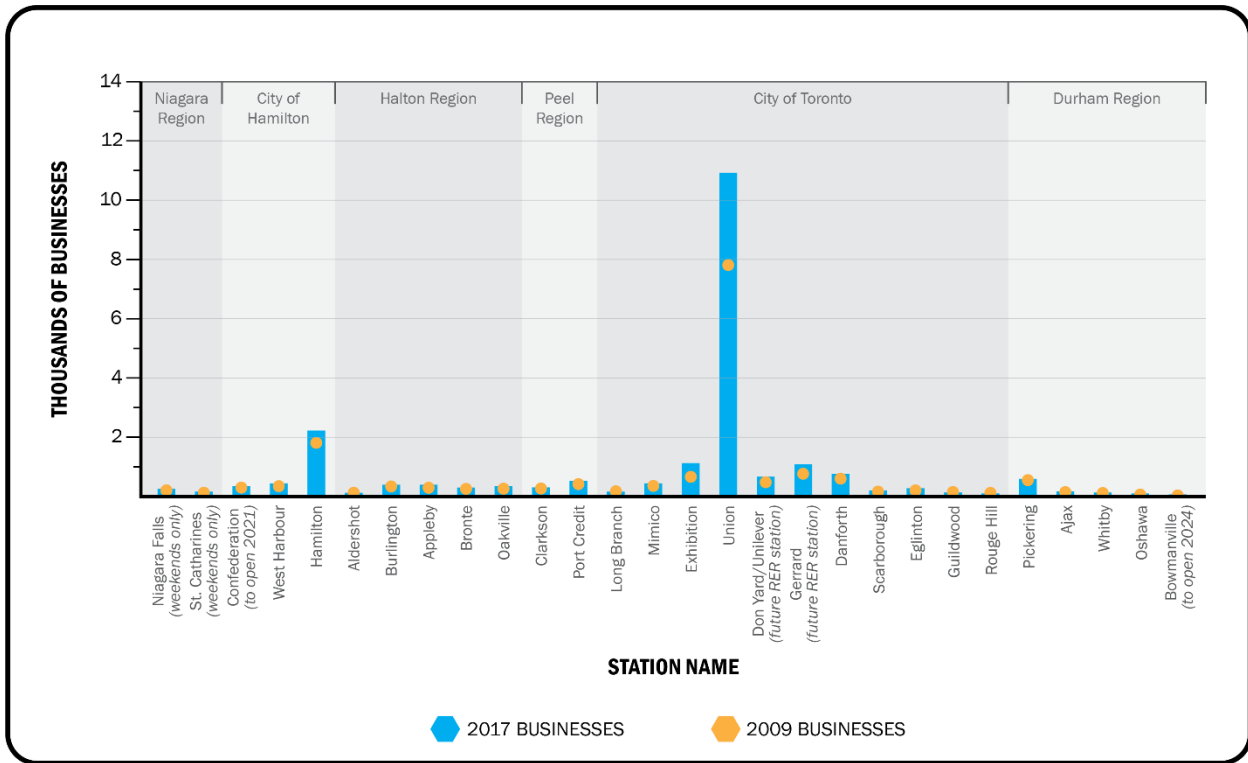


Figure B.2 – Business counts for Kitchener stations

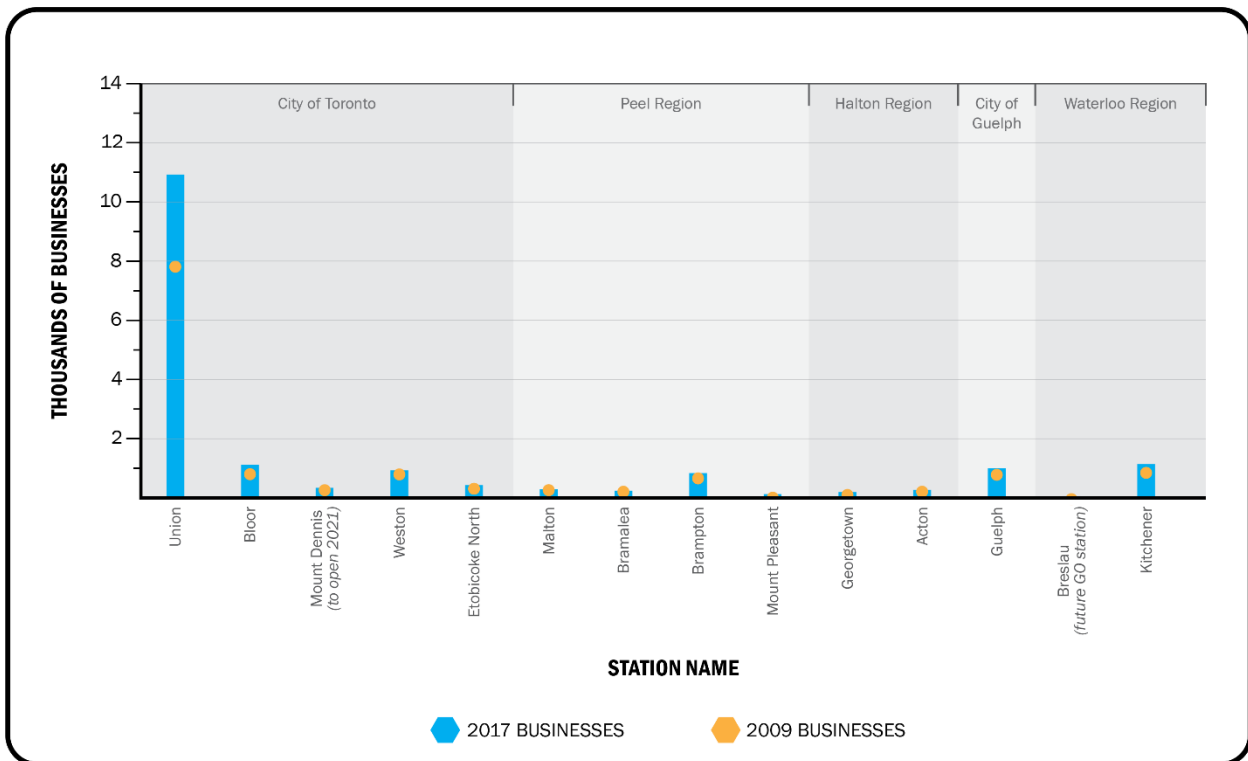




Figure B.3 – Business counts for Barrie and Stouffville stations

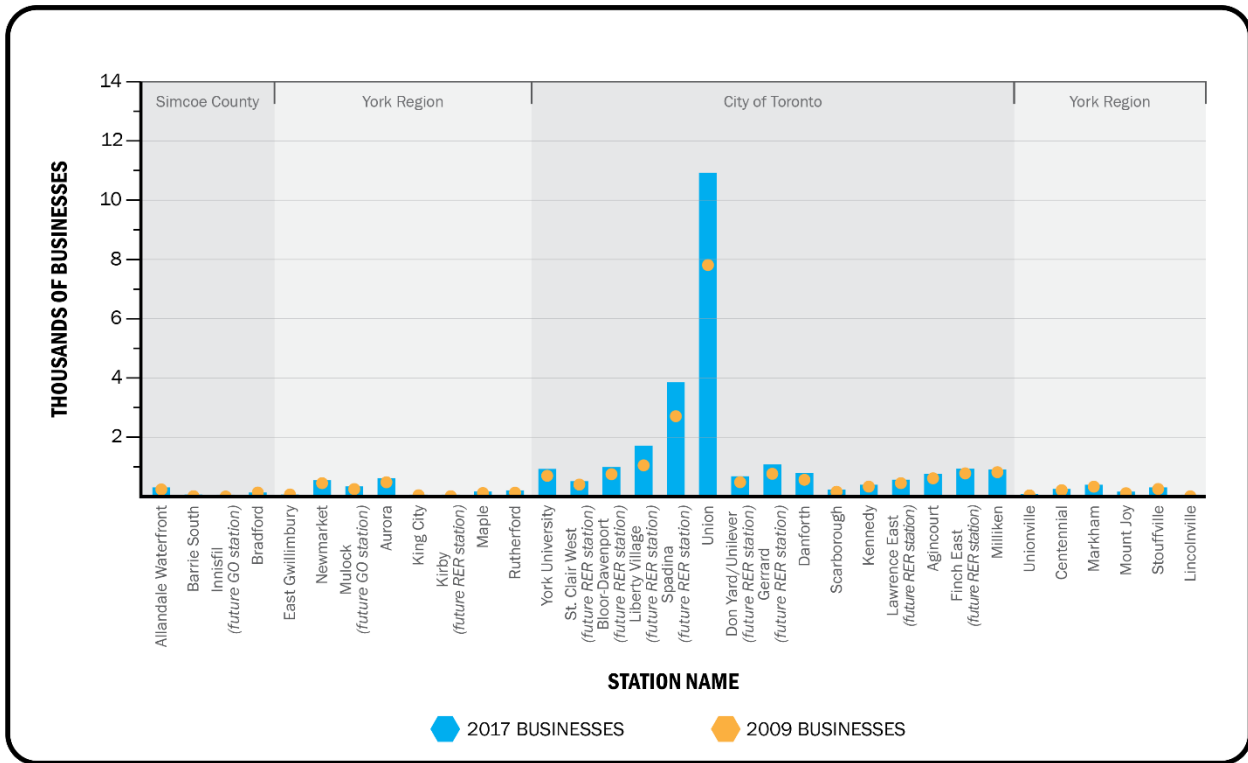


Figure B.4 – Business counts for Milton and Richmond Hill stations

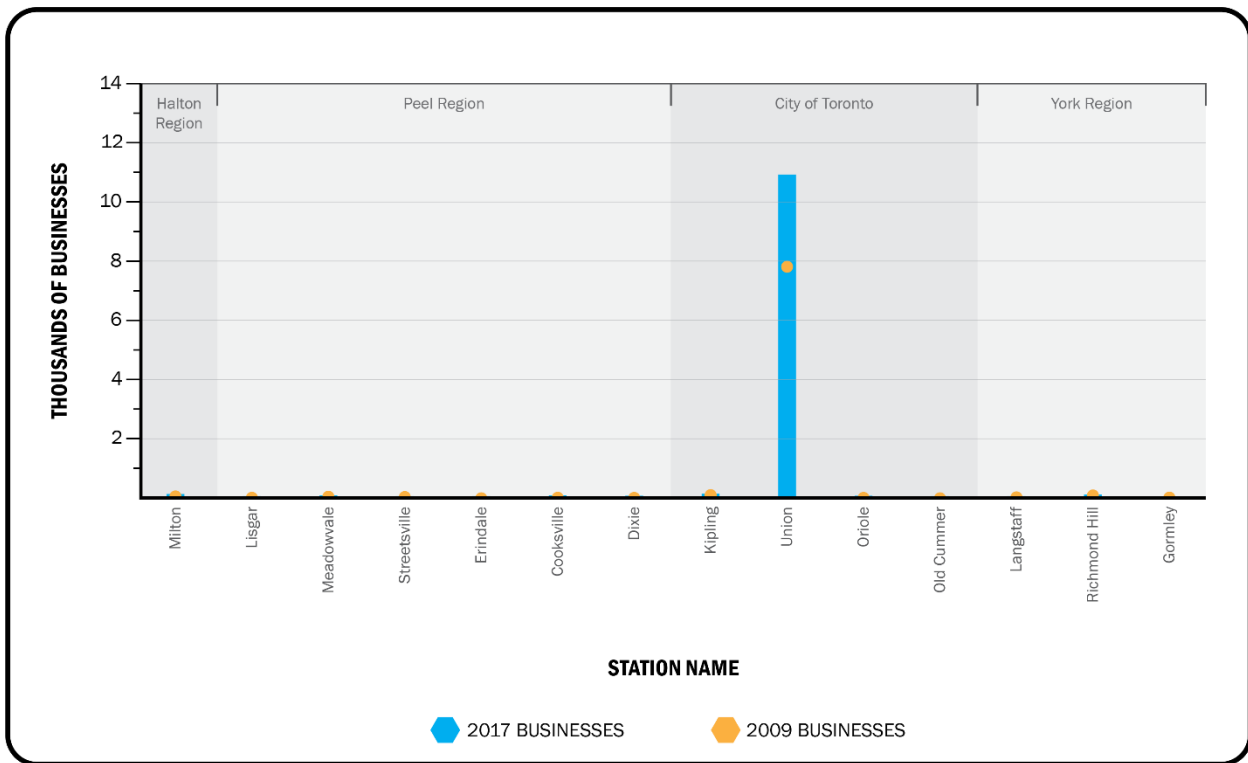


Figure B.5 – Business counts for Yonge-University-Spadina subway line (Line 1)

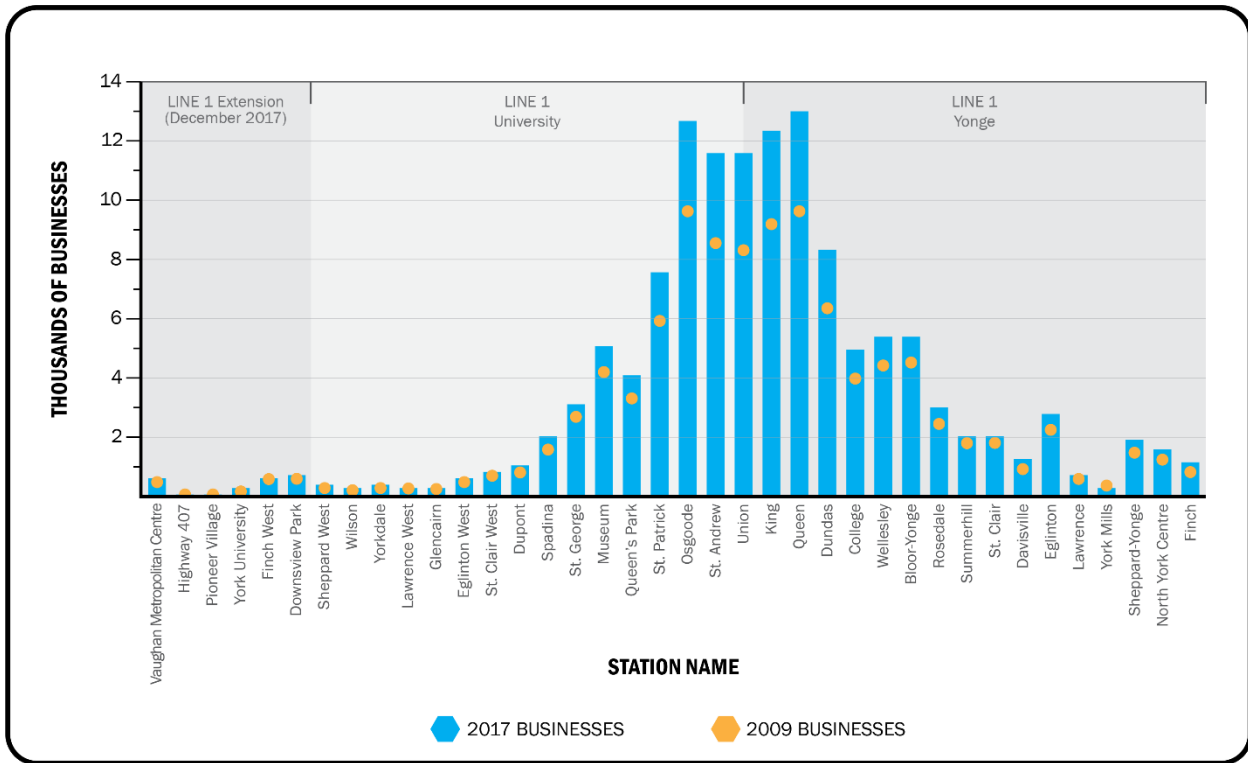
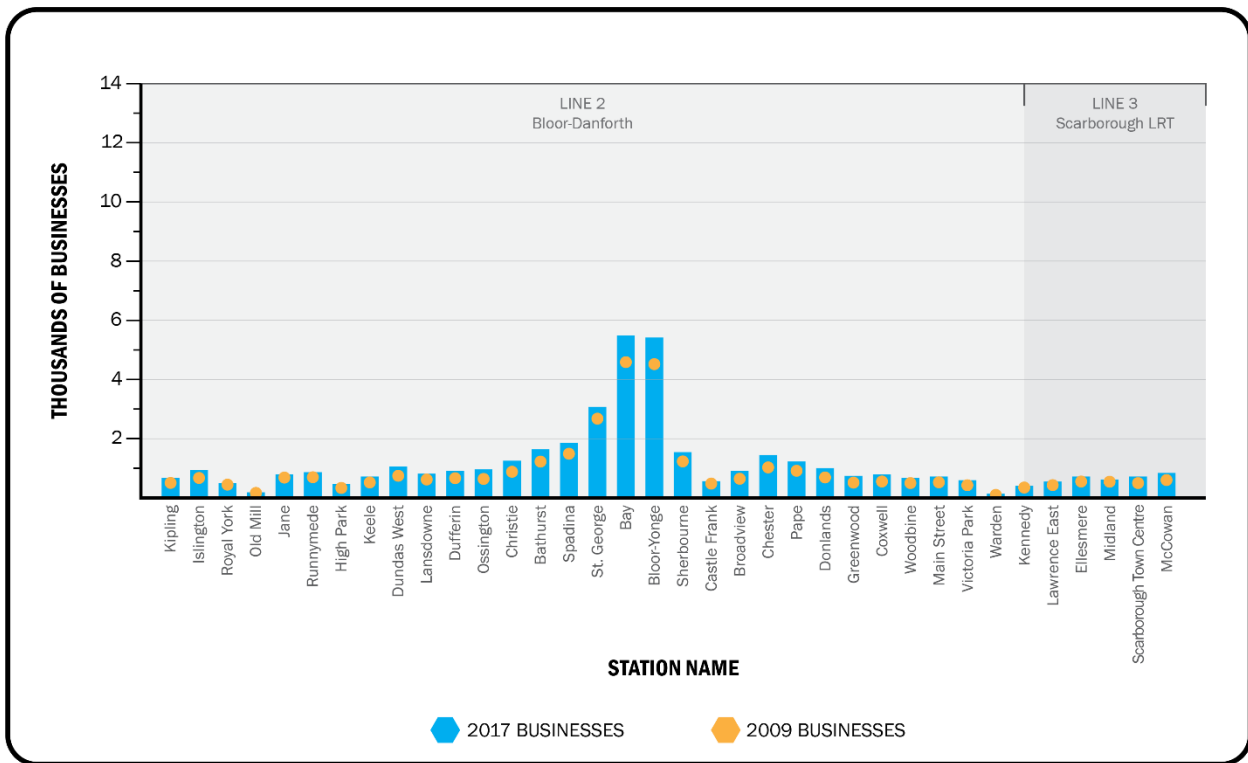


Figure B.6 – Business counts for Bloor-Danforth subway line (Line 2) & Scarborough LRT (Line 3)



## **Appendix C – Business counts by highway interchange (3km radius)**

**Figure C.1 – Business counts for Highway 400 interchanges**

**Figure C.2 – Business counts for Highway 401 interchanges**

**Figure C.3 – Business counts for Highway 403 interchanges**

**Figure C.4 – Business counts for Highway 404 interchanges**

**Figure C.5 – Business counts for Highway 407 interchanges**

**Figure C.6 – Business counts for Gardiner-QEW interchanges**

Figure C.1 – Business counts for Highway 400 interchanges

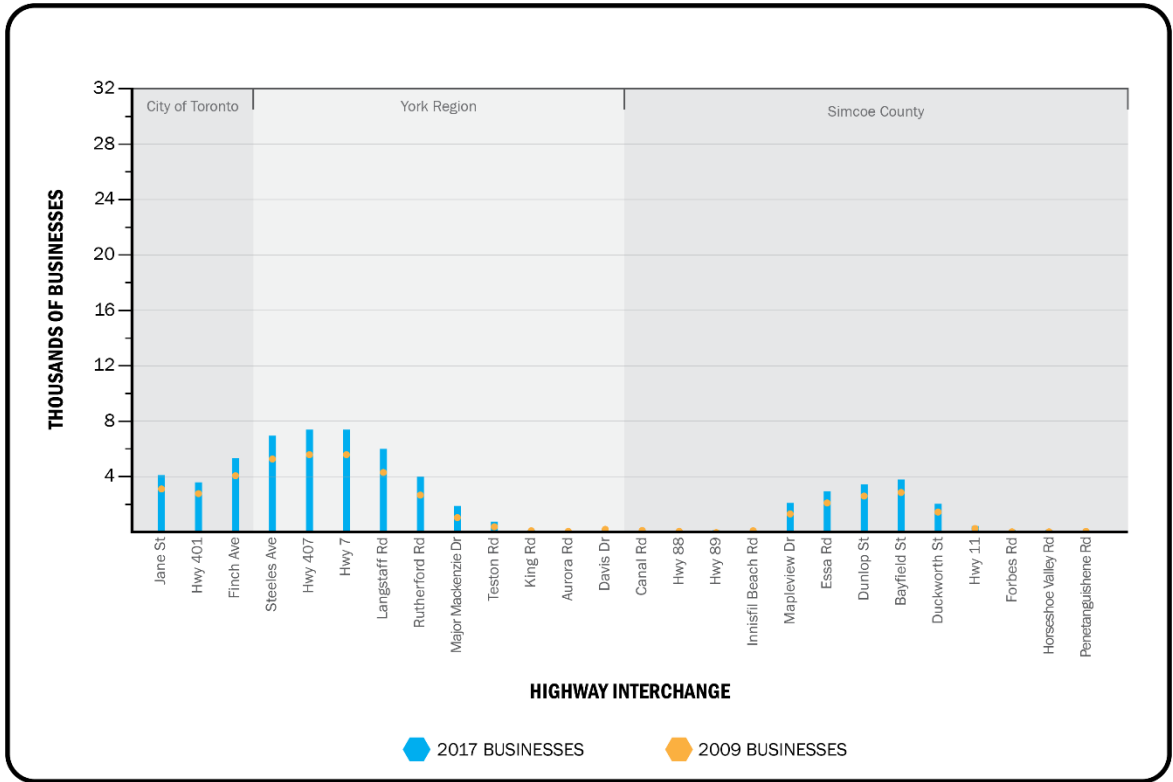


Figure C.2 – Business counts for Highway 401 interchanges

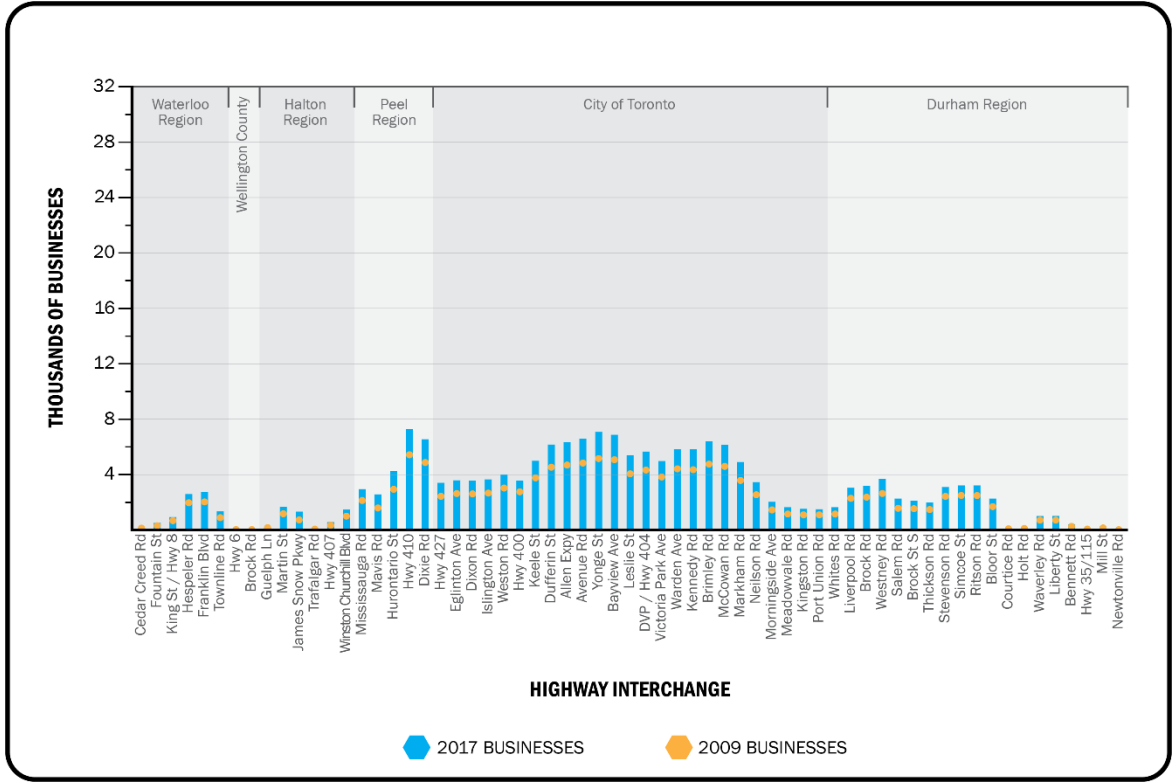


Figure C.3 – Business counts for Highway 403 interchanges

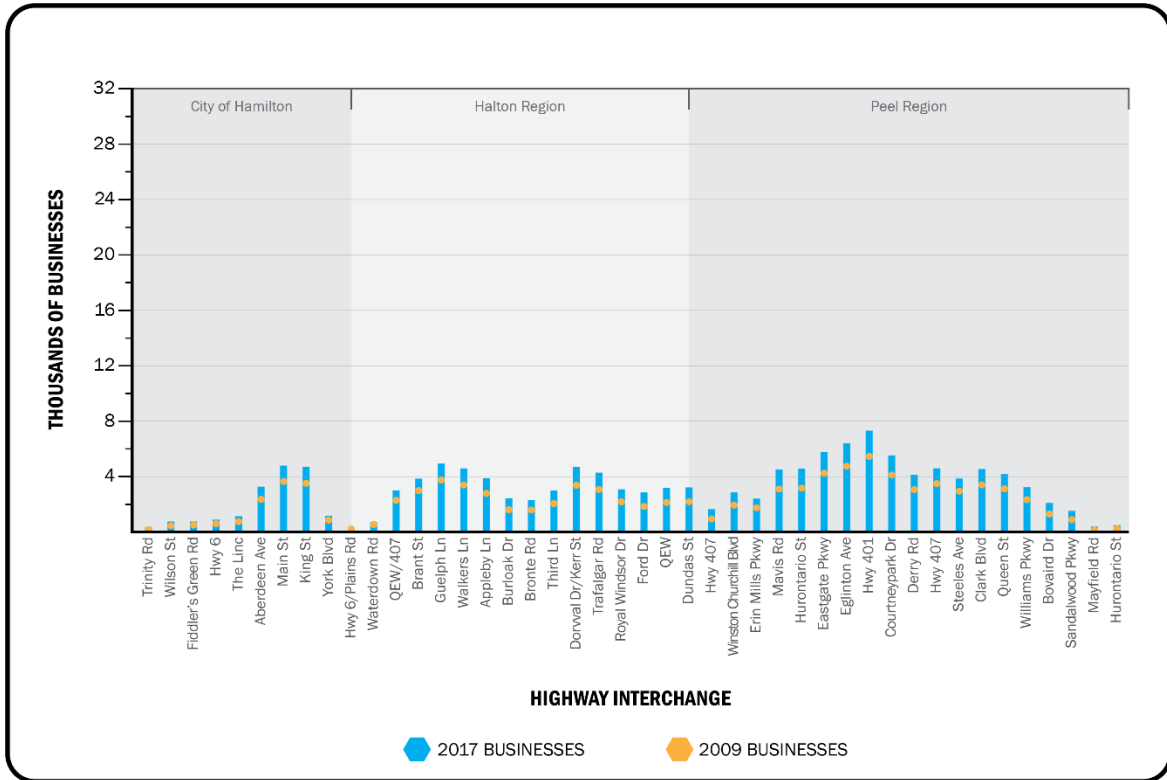


Figure C.4 – Business counts for Highway 404 interchanges

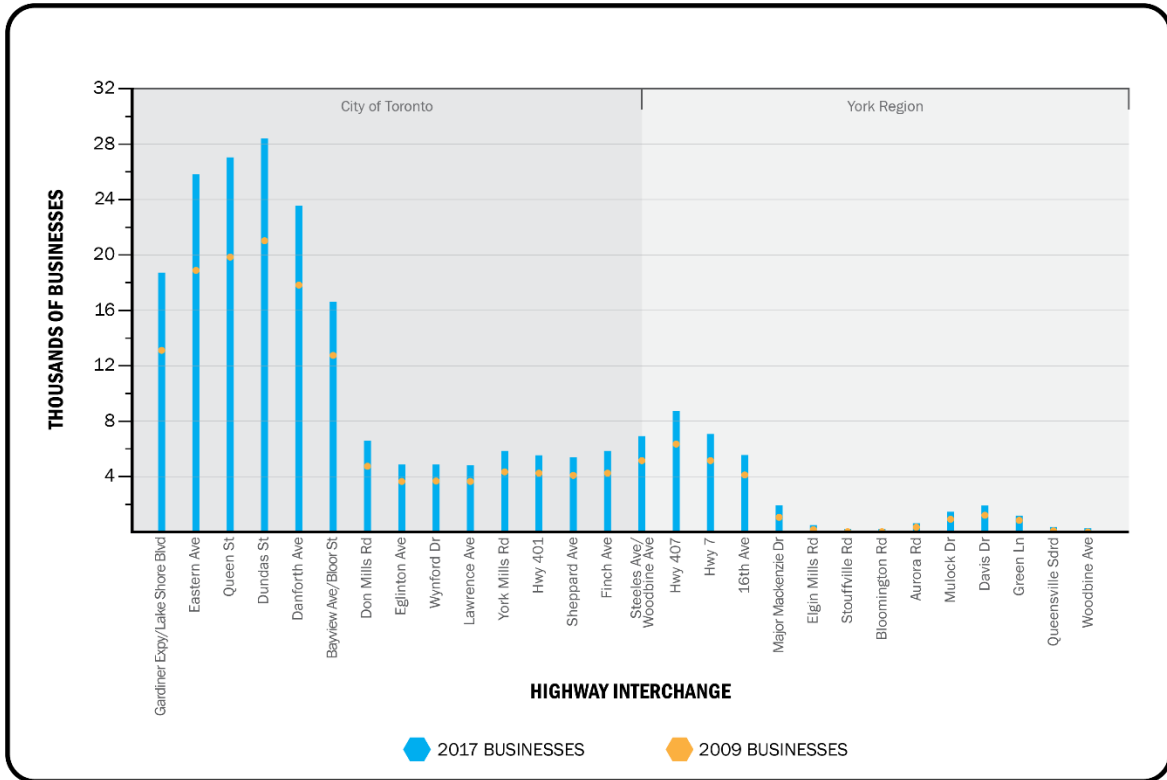


Figure C.5 – Business counts for Highway 407 interchanges

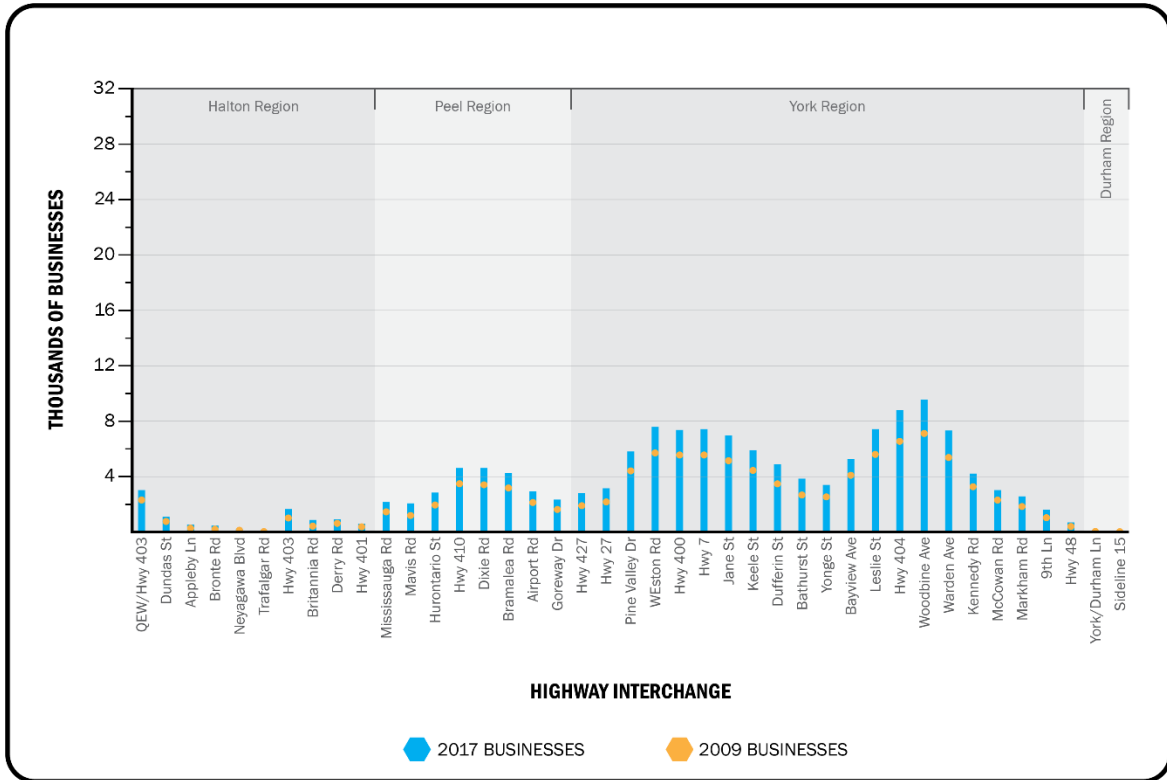


Figure C.6 – Business counts for Gardiner-QEW interchanges

