Kitchener’s Economic Trajectory and Diversification Opportunities

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Preface

This report was prepared by Eric Protzer (doing business as Minerva Economics) for the City of Kitchener. The City of Kitchener engaged Minerva Economics for a report on Kitchener's economic diversification opportunities.

Eric Protzer is a Canadian economist who advises governments around the world on economic policy. His research has been cited by the European Union, United Nations, International Monetary Fund, Organisation for Economic Cooperation and Development, and the Inter-American Development Bank. It has been featured by Brookings and the New York Times. Eric holds undergraduate degrees in economics and mechanical engineering from the University of British Columbia, and a master's degree in technology & policy from the Massachusetts Institute of Technology (MIT). He co-authored the book "Reclaiming Populism: How Economic Fairness Can Win Back Disenchanted Voters."

Executive Summary

Kitchener is a medium-sized city in Ontario with a long-standing reputation for strengths in the tech sector of the economy. Data covering patents by technology class and employment by industry indicates that Kitchener is especially strong in software and hardware, and also fairly prominent in electronics.

The Canadian economy as a whole is facing significant medium- and near-term headwinds. Wage growth has been lower than in the US over the medium term, and Canadian GDP growth has been comparatively more intensive in resource industries and less intensive in technology industries. Housing affordability has also substantially worsened over the same time period. More recent disruptions include the advent of remote work creating vacant downtowns, pandemic-associated inflation, AI-associated technological change, and US tariff policy disrupting access to Canada's largest export market.

Kitchener is in an interesting position, however, in that it has a relatively strong tech sector (given the size of its labour market) versus US cities, as indicated by its patent output and employment composition. Leveraging the city's existing knowledge to diversify into additional related tech industries could substantially help to address its economic challenges.

This report leverages employment and patent data to identify novel industries that are related to Kitchener's existing strengths, under the peer-reviewed and highly-cited methodological framework of Economic Complexity. It applies several filters designed to ensure target industries are resilient to shocks facing Kitchener, such as avoiding industries that are highly automatable and those with high levels of remote work.

The empirical results of this analysis suggest that with appropriate supports, Kitchener could expand into the medical instrumentation and devices industry in addition to aerospace. Further investigation of specific assets needed to enter these industries is warranted, for example by talking to major companies in these fields.

Introduction

The central goal of this report is to recommend data-driven economic diversification opportunities for the City of Kitchener. To substantiate these results, it is also necessary to detail Kitchener's economic performance over the medium-term and the slate of recent shocks that it is facing. These are vital to understand because they constrain the set of economic opportunities that are realistic for Kitchener to pursue, and inform how Kitchener can set out to enter those novel industries.

This report is accordingly divided into several sections. First, it explains some important notes about the data used throughout the document. Second, it examines Kitchener's medium-term economic performance. Third, it summarizes recent shocks that are hitting Kitchener's economy. Fourth, it uses a variety of data covering different industries and cities in North America to create empirically-driven economic diversification recommendations that are specific to Kitchener. Finally, the report synthesizes all of these findings to deliver concrete recommendations for the City of Kitchener.

Notes on the Data Used

This report uses a variety of data sources covering topics such as the composition of Kitchener's employment by industry, the composition of its patenting activity by technological field, wage growth, housing prices and supply, and more. While this data has been arranged for readability for the non-specialist, there are two important aspects of the data that should be kept in mind.

First, there are different references to data that are specific to Kitchener the city versus the metro region, i.e. Kitchener-Cambridge-Waterloo. This is chiefly driven by the need, at times, to examine the metro region as a whole in order to draw economically meaningful conclusions. For certain high-level metrics, for example wage growth, it is perfectly fine to look at the city proper. However, some other metrics – especially those related to the economic composition of the city – necessarily use the metro area. This is because the metro area de facto operates as an integrated labour market, and looking solely at the city proper would therefore ignore many of the critical economic assets that Kitchener relies upon, possibly excluding entire industries.

The fact that such metrics are used in comparison to other cities in North America means it is doubly important to use the metro definition. Municipal boundaries follow political and not economic lines, and thus comparing the city proper for Kitchener to other city proper

areas in Canada and the US would create apples-to-oranges comparisons where each metro area's labour market is divided up in a different way. This would lead to spurious recommendations that are driven by noise in the data rather than a real economic signal.

Second, in numerous instances the data will be reported for the year 2021. This is because the last census conducted by Statistics Canada was in 2021. While this is now several years old, and also was during the COVID-19 pandemic, this nevertheless represents the most recent high-quality datapoint in many cases.

Kitchener's Medium-Term Economic Performance

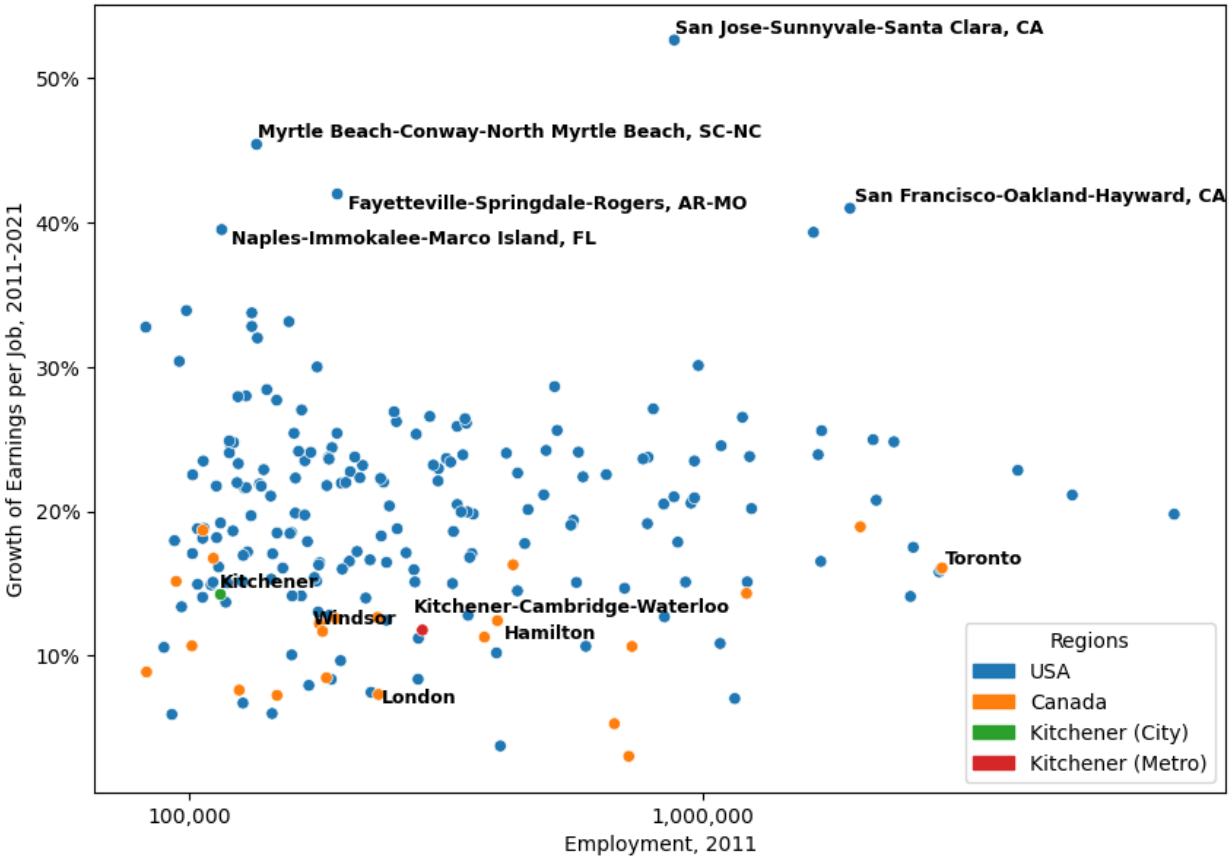
Kitchener is a medium-sized city in Ontario, which in 2024 had a city-proper population of approximately 300,000 people and a Census Metropolitan Area population of approximately 700,000. The metro area is renowned for its strength as a technology hub that is home to the University of Waterloo and hosted the headquarters of Blackberry.

An important challenge for Canada as a whole, including Kitchener, is subdued levels of wage growth that are contemporaneous with a cost-of-living crisis. Figure 1 shows real (inflation-adjusted) wage growth by city in Canada and the US from 2011-2021, with the Kitchener city proper and metro area both highlighted. The x-axis shows the size of each city's labour market in terms of the total number of employees, so that one can compare wage growth levels at different city sizes. Notably, throughout the graph the bulk of US cities are higher up the y-axis than Canadian cities (including Kitchener), indicating higher levels of real wage growth.

Many Canadian and American cities share similar geography and history, and yet Canada's standard of living has improved at a tepid pace compared to the US. Over the same time period Canada's costs of living have exploded, a point that will be emphasized later in this report. The combination of sluggish wage growth and sharply increasing costs of living poses major financial challenges for Canadians.

In turn this performance gap begs the question of why US cities have enjoyed superior economic growth. Figure 2 explores this issue by decomposing which sectors contributed to what share of US and Canadian GDP growth from 2011-2021. Sectors are sorted by the gap between contributions to US and Canadian growth; that is, the industries at the top of the graph contributed more strongly to US growth, whereas those at the bottom contributed more strongly to Canadian growth. This reveals that US growth was far more concentrated in tech-intensive sectors of the economy than Canada (such as professional,

Figure 1. City Size versus Real Wage Growth in Canada and the US, 2011-2021



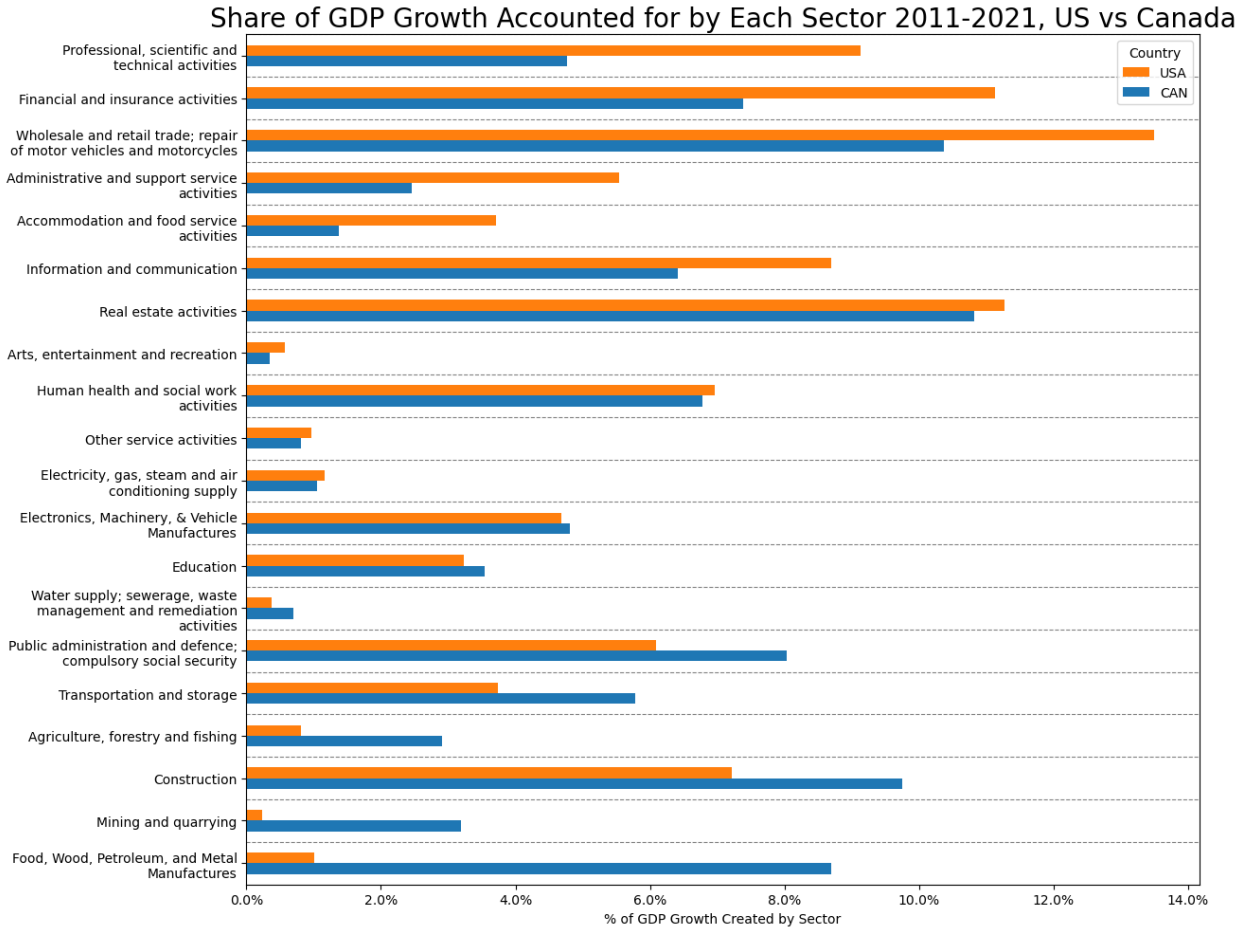
Data Sources: Statistics Canada, US Bureau of Economic Analysis

scientific, and technical activities), whereas Canada was comparatively more concentrated in resource sectors (such as mining and quarrying).

Many Canadian cities, including Kitchener, do well on scientific output, as shown in Figure 3. Yet on the whole, Canadian businesses fail to invest in commercial R&D (Figure 4) and Canada's patent output has been persistently low for decades (Figure 5). Figures A.1 and A.2 in the Appendix show that Canada's weak commercial innovation is accompanied by a Venture Capital system that has stronger funding levels than some European counterparts, but is considerably weaker than best-in-class performers such as the US and Israel.

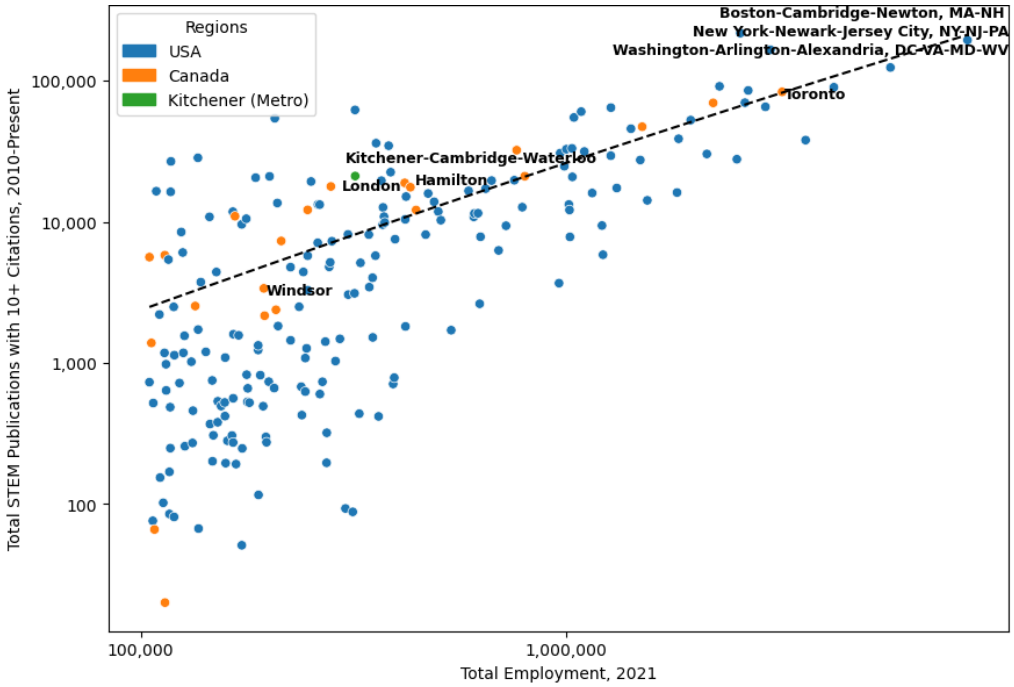
Kitchener is in a unique position within Canada because it is the *only* city that patents at US rates for its city size, as shown in Figure 6. This presents an interesting strategic position for the city of Kitchener. Its innovation output is highly competitive given the size of its labour market, yet in absolute terms this output is still far smaller than major US players such as San Francisco and New York City.

Figure 2. Share of GDP Growth Accounted for by Each Sector for the US vs Canada, 2011-2021



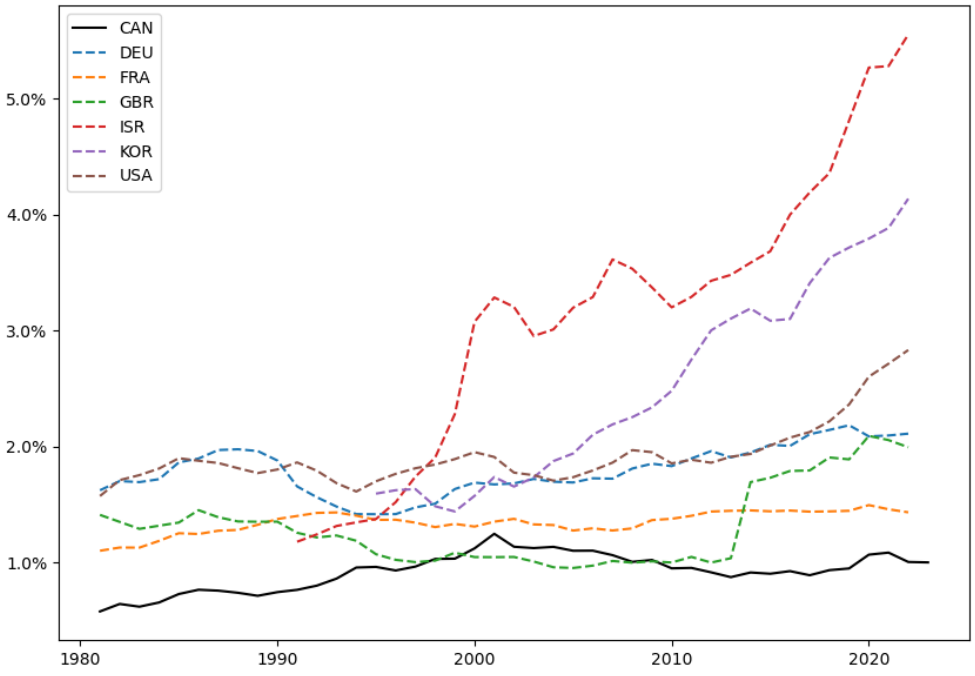
Data Sources: OECD

Figure 3. STEM Scientific Publications vs. City Size, US and Canada



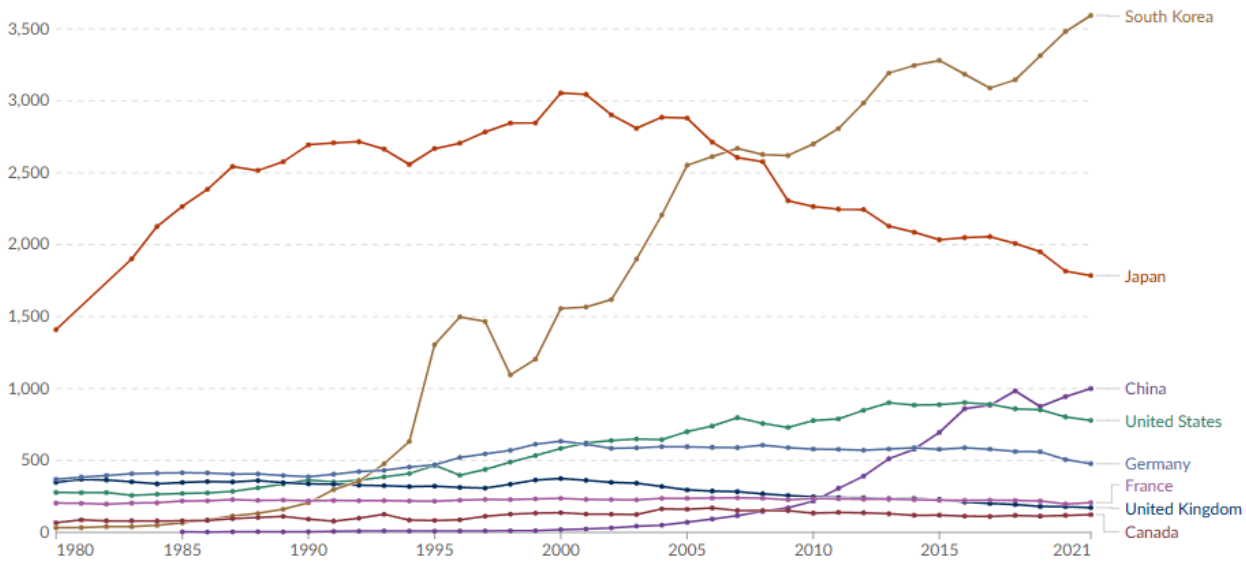
Data Sources: Statistics Canada, US Bureau of Economic Analysis, OpenAlex

Figure 4. Business R&D as a Share of GDP by Country



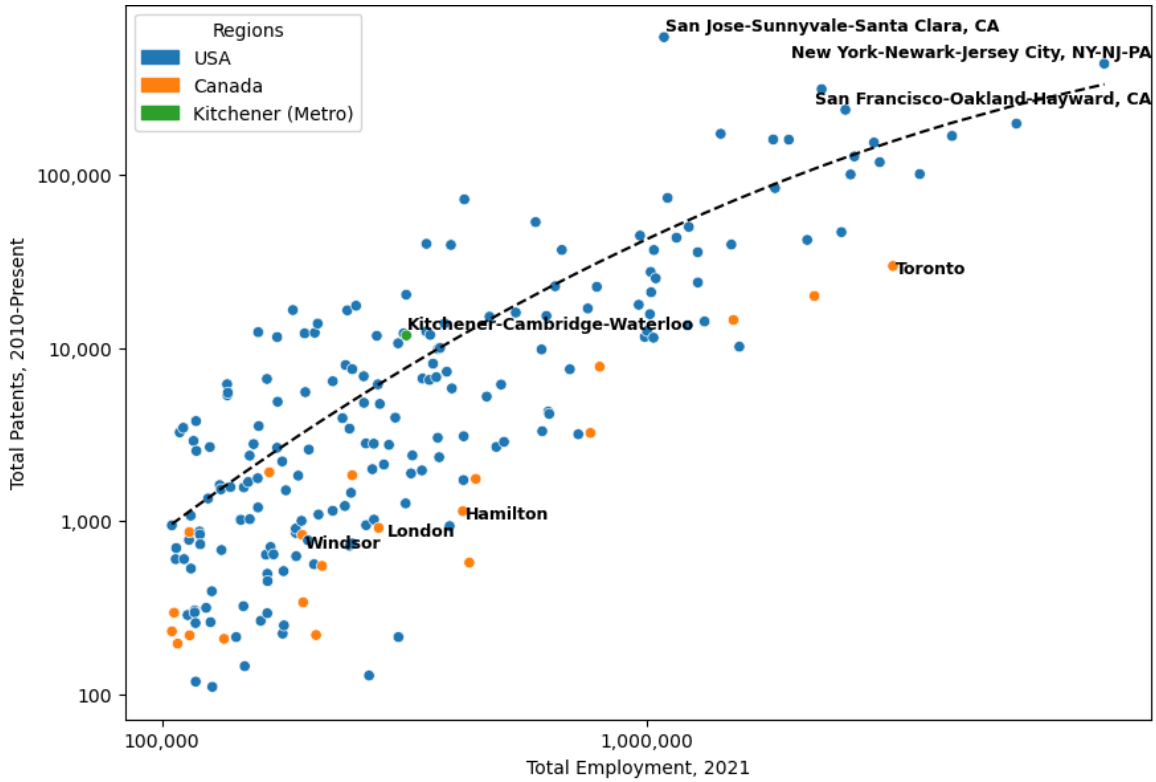
Data Sources: OECD

Figure 5. Annual Patent Applications per Million People by Country



Data Sources: Our World in Data

Figure 6. Patent Output vs City Size, US and Canada



Data Sources: Statistics Canada, US Bureau of Economic Analysis, PatStat

The medium-term picture, as such, indicates that Canada has suffered from low wage growth that results in significant part from a weak tech economy. Kitchener is nevertheless in an interesting position within that national picture, because it performs well on patent output for its city size. This indicates that Kitchener could be positioned to expand its tech economy, thereby directly tackling these problems.

Shocks Hitting Kitchener's Economy

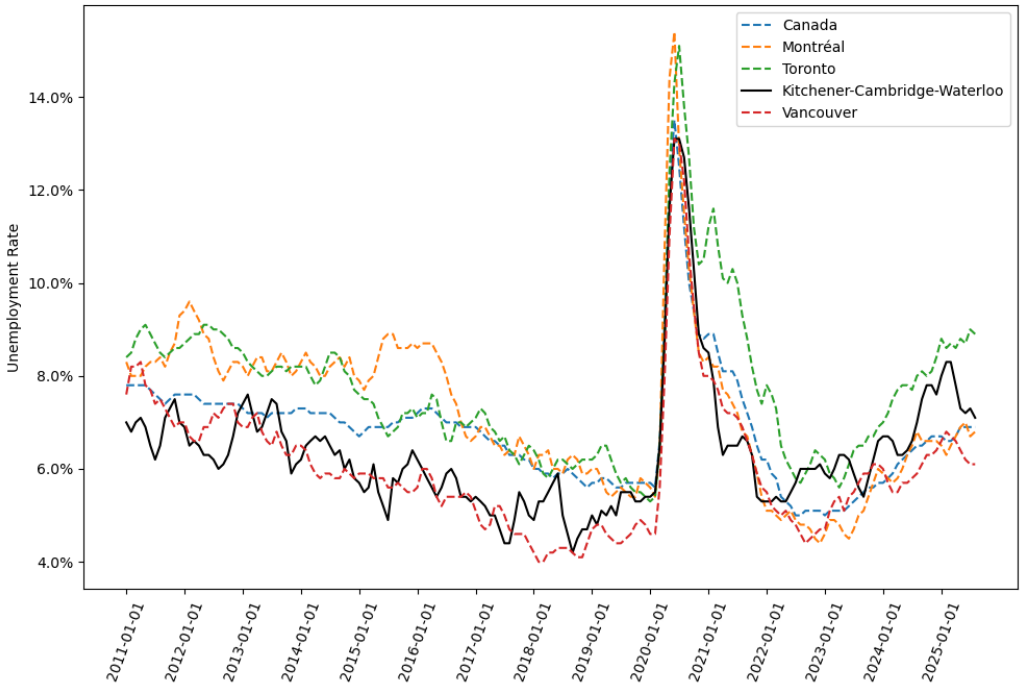
Recent Economic Shocks

A number of shocks have hit Canada's and Kitchener's economy in recent years. Some of these are relatively recent, having mainly developed since the onset of the COVID-19 pandemic. Figure 7 shows that unemployment in Kitchener and several nearby cities has ticked up since 2022, and Figure 8 shows that inflation has also increased in recent months (and was also very high during the COVID-19 pandemic, which has baked price increases into the economy). Figure 9 shows that office vacancy rates have massively increased in the Kitchener downtown since 2020. Figure 10 demonstrates that President Trump's tariff policies have significantly undermined Ontario's exports to the US since the start of 2025. In addition, there is growing concern about the impact of automation from Artificial Intelligence on labour markets, as discussed for example by Acemoglu and Restrepo (2022).

These near-term shocks indicate that Kitchener's economic diversification targets should have several important qualities, beyond what might normally be preferable (such as high wage levels):

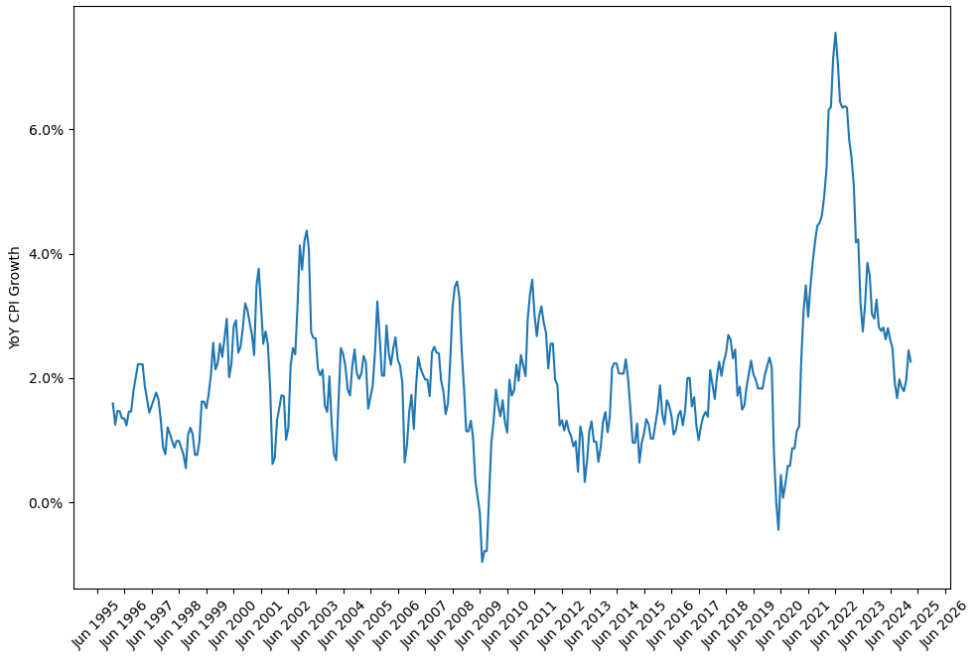
- The disruption of Canada's trade relationship with the US suggests that new industries should ideally be tradable over long distances, so that they can enter non-US markets
- High vacancy rates in the Kitchener downtown suggest that industries that are not highly intensive in remote work may be preferable to pursue
- The growth of Artificial Intelligence suggests that industries that not intensive in highly-automatable tasks may be preferable

Figure 7. Unemployment Rate in Kitchener vs Peers



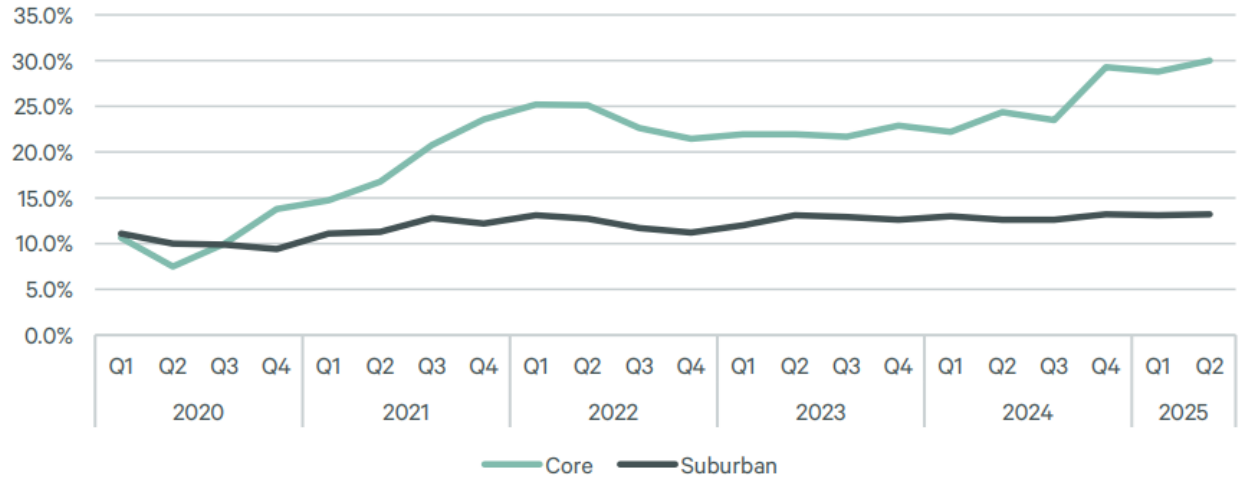
Data Sources: Statistics Canada

Figure 8. Consumer Price Index Inflation in Canada



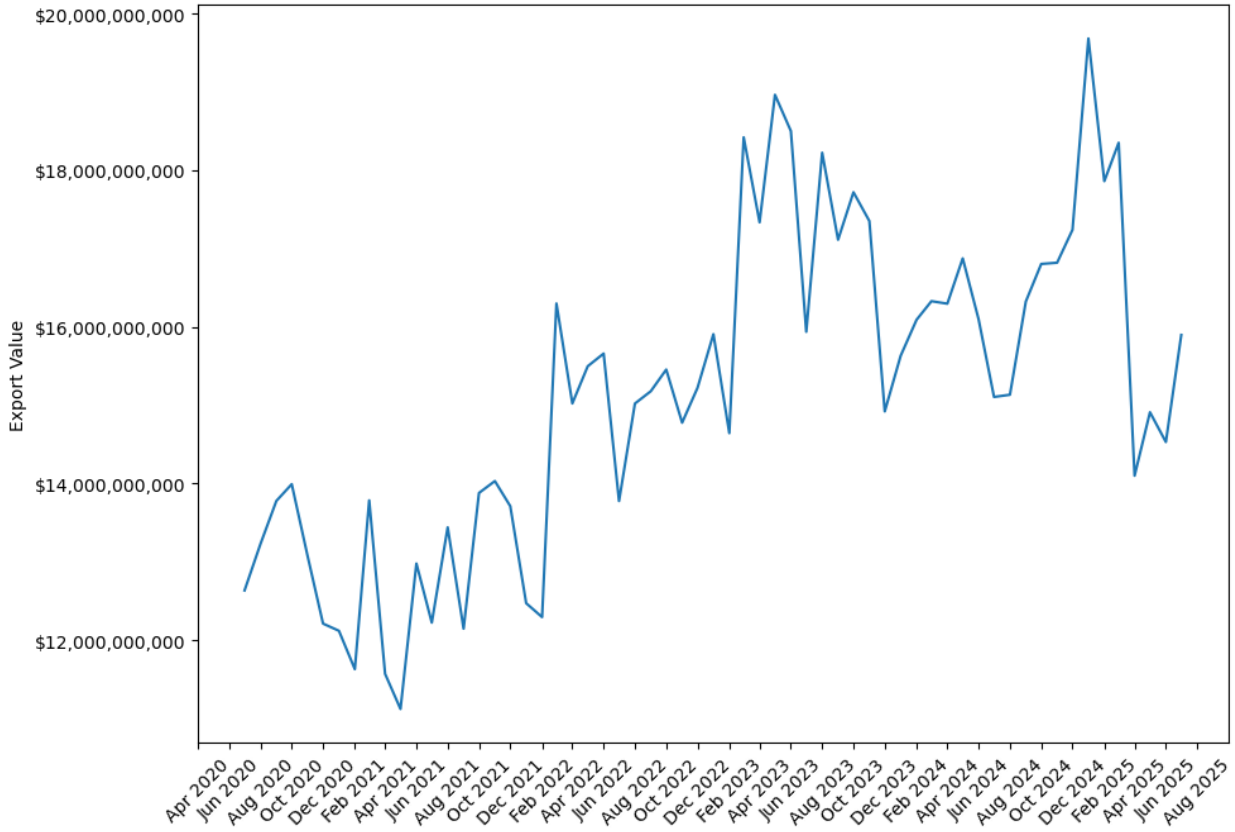
Data Sources: Statistics Canada

Figure 9. Office Vacancy Rates in Kitchener



Data Sources: CBRE

Figure 10. Ontario's Monthly Exports to the US in CAD



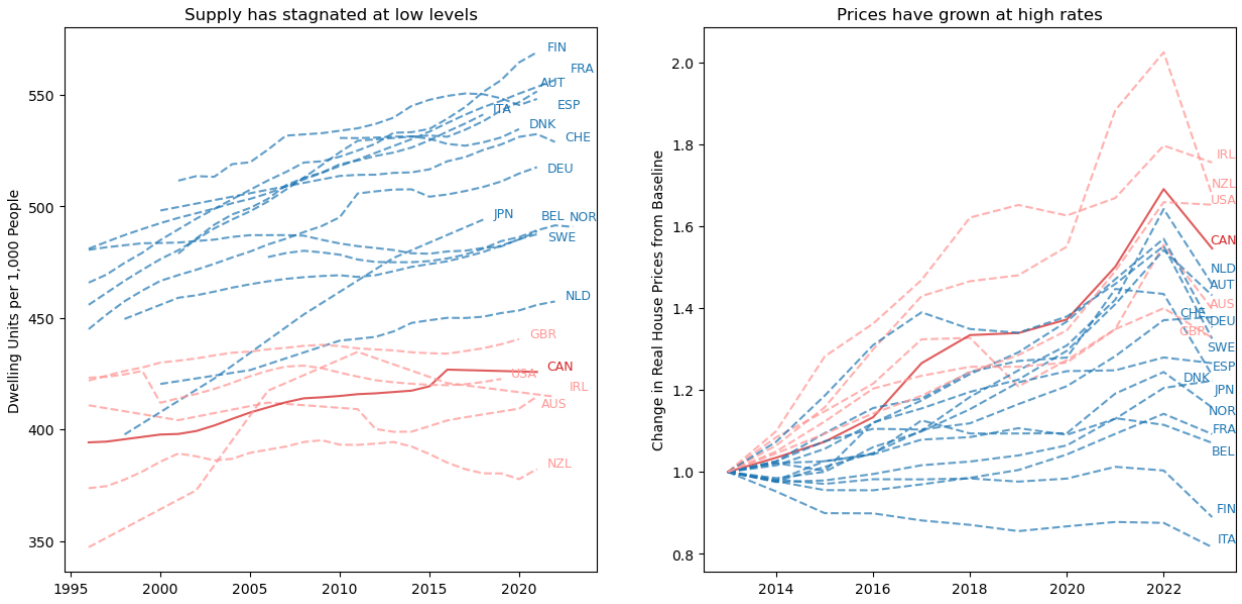
Data Sources: Statistics Canada

Canada's Housing Crisis

An ongoing shock that has built up over a longer timeframe is Canada's housing affordability crisis. This not only places a financial burden on residents of Kitchener, but severely impacts the rest of the economy. The housing crisis abrogates powerful economy-of-scale effects in cities by limiting the number of people who can afford to live there, and diverts investment into housing rather than industries with higher potential for productivity growth. According to OECD data, Canada has conducted the most Gross Fixed Capital Investment in housing as a share of GDP of any developed country for every year running since 2010.

Figure 11 shows that Canada's levels of housing supply per capita are very low versus non-Anglosphere developed countries[1]. Given that price is a result of supply and demand, it is therefore wholly unsurprising that these severe shortages have led to enormous growth of housing prices.

Figure 11. Housing Supply is Not Responding to Prices in Canada and the Anglosphere



Data Sources: OECD

[1] Anglosphere countries have especially low housing supply due to their similar regulatory systems that are rooted in common law legal institutions.

In the 2021 census data, Kitchener had especially low levels of housing supply per capita by Canadian standards, whether measured in dwellings, bedrooms, rooms, or square feet of living space per capita (Figures A.3 – A.6 in the Appendix).

It must be acknowledged that a number of high-rise buildings have been approved and constructed in downtown Kitchener in recent years, with the express aim of easing these supply deficits. However, a back-of-the-envelope calculation suggests that this added supply is not yet sufficient. If one adds the Kitchener metro area's total private dwelling units in 2021 to the total number of dwelling units approved since 2018[2] and divides by the 2024 population, the resultant number of dwelling units per capita is slightly *lower* than it was in 2021 (0.382 versus the prior value of 0.399). While these new permitted units are valuable, they are not sufficient to keep up with the population growth of the Kitchener metro area.

For any economic good, when supply shortages exist there is no credible way to restore broad-based affordability other than addressing the root problems that have caused supply shortages. Differences in factors such as the cost of materials, labour, and financing are not so extremely different among high-income countries that they can credibly explain Canada's shortages. Rather, there are major differences in how restrictive housing regulations are of new, dense housing supply.

The status quo in Canada generally, for instance, is that each city creates its own zoning rules (often very many); frequently subjects critical processes such as rezoning to lengthy and uncertain public hearings and town council votes; and often charges large development fees, such that the cost of city infrastructure is partly paid for through elevated housing prices rather than property tax collection. Conversely in Japan, for example, zoning is conducted nationally such that there are only twelve different types of zones in the entire country; rezoning decisions are simply approved by city staff, rather than being subjected to public hearings and/or town council votes; and development fees are generally not applied. These differences not only expand the number of units that are allowed to be built in Japan, but reduce the cost of development so that additional supply can be built to meet demand at lower price points. In turn, supply is much higher and price growth is much lower.

Economic research has, commensurately, repeatedly linked regulatory restrictions on housing to unaffordability. For example:

[2] The year of 2018 is chosen to reflect possible lags between building approvals and construction. Building permit data is from Statistics Canada.

- Zabel and Dalton (2011) find that minimum lot sizes in the US can increase housing prices twenty to forty percent
- Hilber and Vermeulen (2016) find that the South East of England would have had 25% lower housing prices if it had followed the relatively less restrictive regulatory regime of the North East of England
- Molloy et al. (2022) find that a one standard deviation increase in regulatory restrictions on housing supply leads to 10% faster price growth in the US (which, with the power of compound growth, can quickly become very significant)

A thorough review of Kitchener's housing regulations is beyond the scope of this particular report, which is focused on Kitchener's economic diversification prospects. Nevertheless, Kitchener policymakers can best address the housing crisis by exhaustively identifying measures to aggressively expand the housing supply.

Kitchener's Economic Diversification Opportunities

Overview of Methodology

To assess specific economic diversification opportunities for Kitchener it is essential to acknowledge that places tend to enter new economic activities that are related to existing ones (Hidalgo et al. 2007). For example, developing countries often jump from textile manufacturing to light electronics manufacturing because they both rely on labour-intensive assembly line production; but less often from textile manufacturing to aeroplane design because the latter requires totally different advanced engineering knowledge. Similarly, cities with a history in the electronics industry may more easily enter new robotics industries due to overlapping required capabilities.

As an analogy, one can imagine economic diversification as being like a game of Scrabble. Each place has different letters, and each industry is akin to a word in that it requires a set of letters. Ergo, if a place has deep knowledge of the letters H, A, I, and R, it only needs to acquire one more letter (C) to make CHAIR. But it would require several additional letters (B, E, and D) to make BREAD. Thus it is easier for the place to jump to CHAIR than BREAD.

In the real world, we cannot always observe all the capabilities ('letters') that are required for each industry. The pharmaceutical industry, for instance, might require a wide variety of infrastructure, logistics support, and scientific knowledge in different domains in order to thrive, and it may not be realistic to catalogue and measure all of these inputs. But it is still

possible to infer what other industries share many capabilities with the pharmaceuticals industry by measuring whether they strongly co-locate.

Consequently, it is possible to make good predictions of future economic diversification by observing what a given place already makes, and looking at what other places produce in conjunction with those activities. The field of Economic Complexity (Hidalgo and Hausmann 2009; Hidalgo et al. 2007) has developed empirical methods around this principle, which are applied to Kitchener herein.

Executing this analysis for Kitchener is done chiefly using data on the number of people employed in each industry in each city in the US and Canada. Data is available in the NAICS classification system, which covers several hundred industries. Two main metrics of an industry's potential growth are used:

- **A measure of Kitchener's growth potential in an industry given its existing capabilities.** A machine learning algorithm (details of which are in the Appendix) predicts how many people it would expect to be employed in a given industry in Kitchener, given employment totals in each other related industry. Ahuja et al. (forthcoming) show that when predicted employment exceeds actual employment, this difference is predictive of future employment growth. Intuitively, this reflects a strongly supportive industrial ecosystem that could support additional employment in the industry in question.
- **A measure of Kitchener's growth potential in an industry in the upper limit given its city size.** Policymakers may want to know not only which industries Kitchener could easily enter with existing capabilities, but which industries could be entered if numerous new capabilities were acquired. Different industries are realistic and unrealistic at a given city size, and it is therefore useful to calculate how big an industry can realistically get at Kitchener's size. For intuition, resource industries tend to have the largest employment share in small cities; manufacturing industries tend to have the largest employment share in medium-sized cites; and skill-intensive service industries tend to have the largest employment share in large cities.

In addition, several filters are used based on metrics associated with each industry. These are designed to filter for industries that are attractive in general, and also to filter for industries that are resilient to the challenges previously identified in this report. Each filter is explained in technical detail in the Appendix.

- **Tradability**. The analysis excludes non-tradable industries such as barber shops and restaurants, because these rely solely and trivially on local demand. Tradable industries, in contrast, sell goods and services to geographies beyond the local city.
- **Positive industry-wide growth.** The total industry-wide growth (covering the US and Canada combined) is calculated from 2011 – 2021. Only industries with positive growth are included, to ensure that Kitchener targets growing and not shrinking opportunities.
- **High wage levels.** Industries are filtered for those with average US earnings of at least $60,000 USD.
- **Modest exposure to remote work.** Those industries in which the share of hours worked remotely exceeds 50% are discarded.
- **No extreme automation risk.** The bottom 10% of industries that are most susceptible to automation
- **Distance tolerance.** For industries corresponding to tradable goods (as opposed to services), international trade data is used to measure how distance resilient each good is (i.e. whether it is typically traded over long or short international distances).

Kitchener's Economic Composition

Before detailing the specific industries that Kitchener may be able to grow into, it is useful to provide background on the industries Kitchener has strengths and weaknesses in. This allows a for a more thorough evaluation of any specific target industry. Herein both the composition of employment and patent output are examined.

Figure 12 presents a summary of Kitchener's employment concentration in different industry clusters. Industries are clustered based on similar task composition (as detailed in the Appendix). The x-axis shows Kitchener's share of employment in each industry, while the y-axis shows whether Kitchener's employment share is higher or lower than one would expect given the total city size. Scatter points are coloured according to whether they are relatively intensive in university-educated occupations (orange dots) versus unintensive (blue dots). Especially prominent scatter points are labeled with an example industry.

Figure 12. Employment Share vs. Specialization for Kitchener Metro Area by Industry Cluster, 2021

*Data Sources: Statistics Canada, US Bureau of Economic Analysis, O*NET, OEWS*

Figure 12 quickly reveals some of Kitchener's leading economic features:

- There is a large share of employment in the cluster containing "Other Schools and Instruction," and this is also higher than most cities of Kitchener's size (as captured by the y-axis value). This reflects the presence of the University of Waterloo in the Kitchener metro area.
- Several tech-related industry clusters have much larger employment shares than a typical city of Kitchener's size: see the clusters containing "Data Processing, Hosting, and Related Services," "Engine, Turbine, and Power Transmission Equipment Manufacturing," and "Motor Vehicle Manufacturing." It is important to observe that these strengths are in software and traditional hardware, whereas other potential clusters (such as biotech) are not featured so prominently.

Further inspection of specific industry clusters helps to shed more light on these strengths and weaknesses. Figures A.7 – A.9 in the Appendix show that Kitchener is very strong in software employment, and approximately on par with average US performers in electronics and biotech given its city size. Figure A.10 lists the specific NAICS industries in each of these clusters.

Patent data adds further colour to these patterns. Patent fields are clustered based on the similarity of the scientific fields they cite. Figures A.11 – A.14 in the Appendix show that Kitchener's patent output is very strong for its size in ICT and Telecommunications (i.e. software-related fields), approximately on par with the average US city in electronics, and firmly below US output levels in biotech and aerospace.

Together, this demonstrates that Kitchener is especially strong in software-related tech and also has a reasonable presence in hardware and electronics. It is somewhat weaker in aerospace and biotech.

Empirical Results for Economic Diversification Targets

Two main analyses of possible industry targets are presented herein. These both analyze 4-digit NAICS industries (not industry clusters). Table 1 shows industries that are predicted to have a higher number of employees than they currently do, and thus have a supportive industrial ecosystem that may be able to support further growth. Table 2 shows industries that could get larger at Kitchener's city size, even if this would require substantial investment in new capabilities. For both Tables, the filters previously discussed have been applied. Table A.1 in the Appendix reports all statistics for all tradable industries, without filtering out industries.

In Table 1, pay particular attention to the columns corresponding to existing employment in 2021 and the predicted level of employment. In Table 2, conversely, examine the existing employment in 2021 and the employment that is possible at the 90th percentile given the city size.

A few observations can be made about the results in these two tables. For one, the Electric Power Generation industry should likely be disregarded, as this depends somewhat on natural geography. Second, there is possible room for growth in several specific tech industries. Instrumentation manufacturing looks especially promising, because it both has significant room for growth at Kitchener's city size and is predicted to have more employees than it currently does. Manufacturing of aerospace parts, semiconductors and other electronic components, pharmaceuticals, and basic chemicals could be larger given

Kitchener's city size, but do not have higher predicted than actual employment. Notably, all of these tech fields are relatively distance-resilient. Third, there is modest growth potential in creative industries (film and independent artists), with somewhat higher predicted than actual employment.

Table 1. Industries Kitchener Could Grow with Existing Capabilities

NAICS Code	NAICS Name	2021 Emp.	Predicted Emp.	Emp. at 90th Percentile	US Wages	More Distance Tolerant than This % of Exports	More Automation Resilient than This % of Industries
2211	Electric Power Generation, Transmission and Distribution	890	1604	2539	$67,950	N/A	37%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	695	998	2322	$70,770	94%	16%
5121	Motion Picture and Video Industries	535	652	820	$61,280	N/A	29%

7115	Independent Artists, Writers, and Performers	695	710	599	$63,560	N/A	25%

Table 2. Industries That Could be Larger Given Kitchener's City Size

NAICS Code	NAICS Name	2021 Emp.	Predicted Emp.	Emp. at 90th Percentile	US Wages	More Distance Tolerant than This % of Exports	More Automation Resilient than This % of Industries
2211	Electric Power Generation, Transmission and Distribution	890	1604	2539	$67,950	N/A	37%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	695	998	2322	$70,770	94%	16%

3364	Aerospace Product and Parts Manufacturing	775	262	1846	$70,620	99%	28%
3344	Semiconductor and Other Electronic Component Manufacturing	600	506	1533	$64,390	79%	23%
3254	Pharmaceutical and Medicine Manufacturing	585	261	1514	$64,030	100%	28%
3251	Basic Chemical Manufacturing	150	146	908	$62,130	84%	56%
5413	Architectural, Engineering, and Related Services	5565	3604	6129	$72,910	N/A	11%

These results are supplemented by an analysis with similar methodology to Table 1, as applied to patents. Table 3 shows patent fields that are predicted to be larger than they currently are in Kitchener, based on patent output in related fields. Electronics-related technology fields feature prominently in this list, and several aerospace-related fields also appear.

The final concluding section interprets these empirical results in light of all the material in this report.

Table 3. Top Patent Clusters Predicted to Be Larger in Kitchener

Patent Cluster	# Patents	Predicted # Patents
Materials, Surfaces & Electronics	210	377
Transport & Handling Devices	315	455
Power Systems & Smart Grids	99	201
Aerospace & Aviation	35	101
Advanced Photonic & Energy Systems	56	115
Printing & Imaging Tech	107	148
Wearables & Therapeutic Devices	17	49

Vehicle Propulsion & Control	42	70
Material Processing & Packaging	10	31
Turbines & Jet Propulsion	14	33

Conclusion: Interpretation and Synthesis of Findings

The Canadian economy, Kitchener included, faces significant headwinds. Wage growth has been weak, affordability has worsened, and the onset of US tariffs presents severe disruption to Canada's largest trade relationship.

A significant reason for Canada's tepid economic growth is its inability to sufficiently grow its technology industries. While Canada's scientific output is impressive, it systematically lags on business R&D and patent output. Compared to the US, Canada's economic growth relies far more on resource industries and far less on technology-intensive industries.

Kitchener is in a unique position within Canada, however, in that its patent output is competitive with US cities of the same size. While it is still far smaller in absolute terms than the largest American players – such as San Francisco and New York City – it suggests that Kitchener has a relatively healthy innovation ecosystem that could be carefully expanded. Successfully enhancing the growth of Kitchener's tech ecosystem would in turn substantially help to address the critical aforementioned challenges in the Canadian economy.

Empirical analysis of specific industries with growth potential suggests a few potential growth areas to invest in:

- **Medical instrumentation and devices.** The empirical results show that Kitchener's existing capabilities could support additional growth in instrumentation, and that it can also get substantially larger at Kitchener's city size. Ageing global populations

are likely to support increasing global demand for biotech and medical technology, and thus medical instrumentation specifically could be a promising field to enter. This especially makes sense in light of Kitchener's existing strengths in software and electronics, which may use overlapping knowledge. Pharmaceuticals, conversely, may be somewhat more difficult to enter given the lesser prominence of chemical and biotech industries within Kitchener.

- **Aerospace.** While the aerospace industry is relatively weak in Canada as compared to the US, changing geopolitical trends could lead to increased demand. American foreign policy is leading Canada and other Western countries to invest more in military production and technology, evidenced for example in increases in Canada's defense budget; Canada applying to host a major defense development bank for Western countries and allies; and Sweden's prospective production of fighter jets in Canada. Kitchener has a sufficiently large labour market that it could, in principle, support a larger aerospace industry, and several aerospace-related patent fields are predicted to have larger output than they currently do, suggesting that Kitchener has knowledge in related technology fields. The latter finding is especially plausible in light of Kitchener's strengths in software, electronics, and traditional hardware.
- **Creative industries, but mainly as an amenity.** Arts-related industries are predicted to be slightly larger in Kitchener than they are presently, and have quite modest upwards total potential given Kitchener's city size. The reality is that creative industries function best as a source of tradable income in very large cities with deep talent pools, such as Los Angeles, Toronto, and Vancouver. Nevertheless a vibrant local arts scene is an important amenity that positively impacts quality of life, and as such this may be worth devoting a modest amount of resources to.

A number of policy interventions could be explored in order to support Kitchener's expansion into novel industries:

- **Program design in tandem with the University of Waterloo and other metro municipalities.** It would be worth reviewing both research and teaching programs at the University of Waterloo related to medical devices and aerospace. While an adequate supply of talent is not a *sufficient* condition to activate these industries, it is arguably a *necessary* condition. If gaps are identified, potential funding sources could be mapped out from private donors, the provincial government, and the federal government.
- **Participate in national-level conversations about defense spending to position Kitchener as an investment destination.** Ontario is making a bid for nearby Toronto to host the previously-mentioned major defense development bank, which

could have positive spillovers to Kitchener. Sweden has not yet decided where in Canada it would produce fighter jets, and Kitchener could pitch itself as a good location. These are relatively rare opportunities that could significantly strengthen Kitchener's aerospace ecosystem. Given global geopolitical trends, other opportunities may yet arise.

- **Gather detailed information on capabilities needed to enable a medical device industry.** Kitchener should endeavour to 1) talk to major medical device companies and 2) identify and analyze cities of Kitchener's size with strong medical device industries, both with the goal of mapping critical capabilities needed for a medical device industry. It is plausible that the nature of the industry may require very specific assets, such as well-equipped research hospitals to run clinical trials or particular types of medical laboratories.
- **Explore further housing policy reform.** Kitchener, like much of Canada, faces a housing supply shortage. As discussed, this has severe repercussions for the broader economy. While a review of regulatory restrictions affecting housing supply in Kitchener is beyond the scope of this particular report, the severity of the crisis and its impact on the rest of the economy indicate that additional reforms should be exhaustively investigated.

To be sure, Kitchener should proceed with caution in pursuing any novel industries. US foreign policy has created massive global economic uncertainty, and Canada's alternative trade partners are situated across oceans. Nevertheless its existing strengths in important technological fields empirically suggest growth potential. Some initial steps to pursue these opportunities are not expensive, such as reviewing and identifying relevant capabilities, and would thus warrant action. Larger subsequent investments (e.g. building a research hospital) could be decided on after this information has been obtained.

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Appendix

Technical Details of Methodology

Machine Learning Algorithm Used to Predict Industry Size

US County Business Patterns data from Eckert et al. (2020), which imputes missing values with a very high degree of accuracy, is used to tabulate US data on employment by 4-digit NAICS code by Metropolitan Statistical Area (MSA) for 2016. Census data from Statistics Canada is used to tabulate Canadian data on employment by 4-digit NAICS code by Combined Statistical Area (CSA) for 2021. Small differences in 4-digit NAICS codes are manually harmonized. Altogether, this provides a snapshot of the composition of each city's employment by industry in the US and Canada.

Each industry's task composition is then computed using US O*NET and OEWS data. The former covers the set of tasks that each occupation is intensive in, and the latter covers the occupation composition of each NAICS industry. The weighted task composition of each industry is calculated using the wage bill of each occupation within an industry.

For each particular NAICS industry, an xgboost algorithm is trained in Python with the specific job of predicting employment for that particular industry. It trains on data covering every city except Kitchener, specifically reading in the log employment in a city for the ten industries with the highest task-based similarity to the outcome industry in question. After training, it runs a prediction for Kitchener based on Kitchener's log employment in each of the ten most-related industries.

Looping through each industry, one at a time, yields out-of-sample predictions for log employment by industry in Kitchener.

Measuring Employment at the 90th Percentile Given City Size

A reasonable upper limit on how big an industry can get at Kitchener's city size is computed by running a quantile regression, for the 90th percentile, of log employment on log total city employment plus log total city employment squared. This provides a fitted value of how big employment can get at the 90th percentile, given the total size of Kitchener's labour market.

Industry Filter Variables

Only tradable industries are considered, as per the list of tradable NAICS industries computed by Porter, Delgado, and Stern (2016). They use measures such as the geographic dispersal versus concentration of industries to identify those which are plausibly tradable versus non-tradable.

Industry-wide employment growth from 2011-2021 is computed using US QCEW data and Census data from Statistics Canada.

Wage data by industry is obtained from US OEWS data.

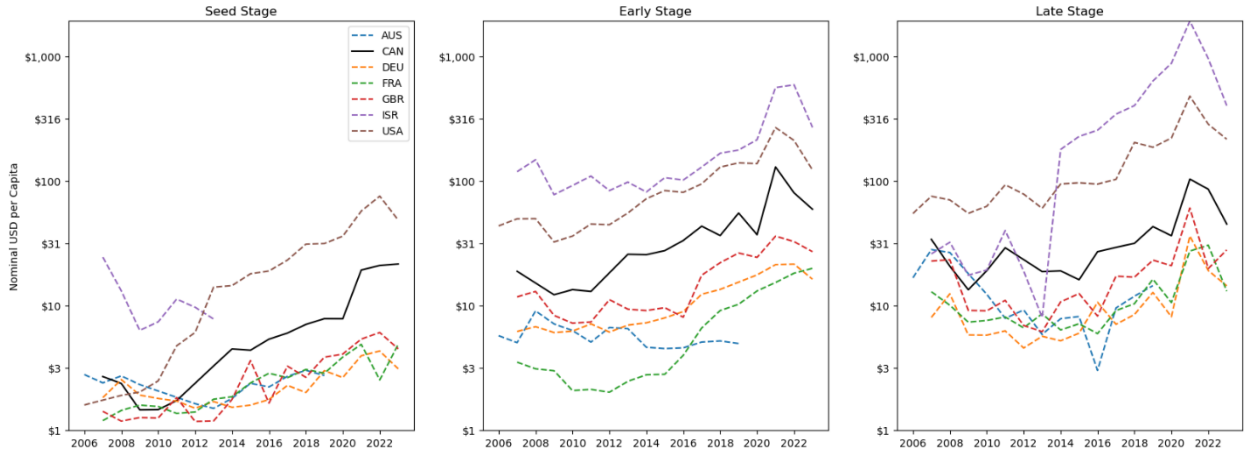
Remote work intensivity by industry, i.e. the effective share of hours worked remotely, is computed using microdata from the US Current Population Survey. This data was accessed via IPUMS.

The risk of automation by NAICS industry is obtained from Felten, Raj, and Seamans (2021). They use O*NET data on the workplace abilities used in each industry, where several abilities (such as reading comprehension and image recognition) are highly susceptible to automation. Thus more susceptible industries use these automatable abilities more intensively.

The distance tolerance of goods-producing industries is calculated by first running gravity models of trade on each HS-coded export (one regression per export), then concording those exports to the NAICS classification system for industries. The trade regressions use export data from the Atlas of Economic Complexity and the CEPII Gravity Database (Conte, Cotterlaz, and Mayer 2022). The coefficient on log country-country distance is extracted from each regression. The HS-NAICS crosswalk from Pierce and Schott (2012) is used to convert results to NAICS.

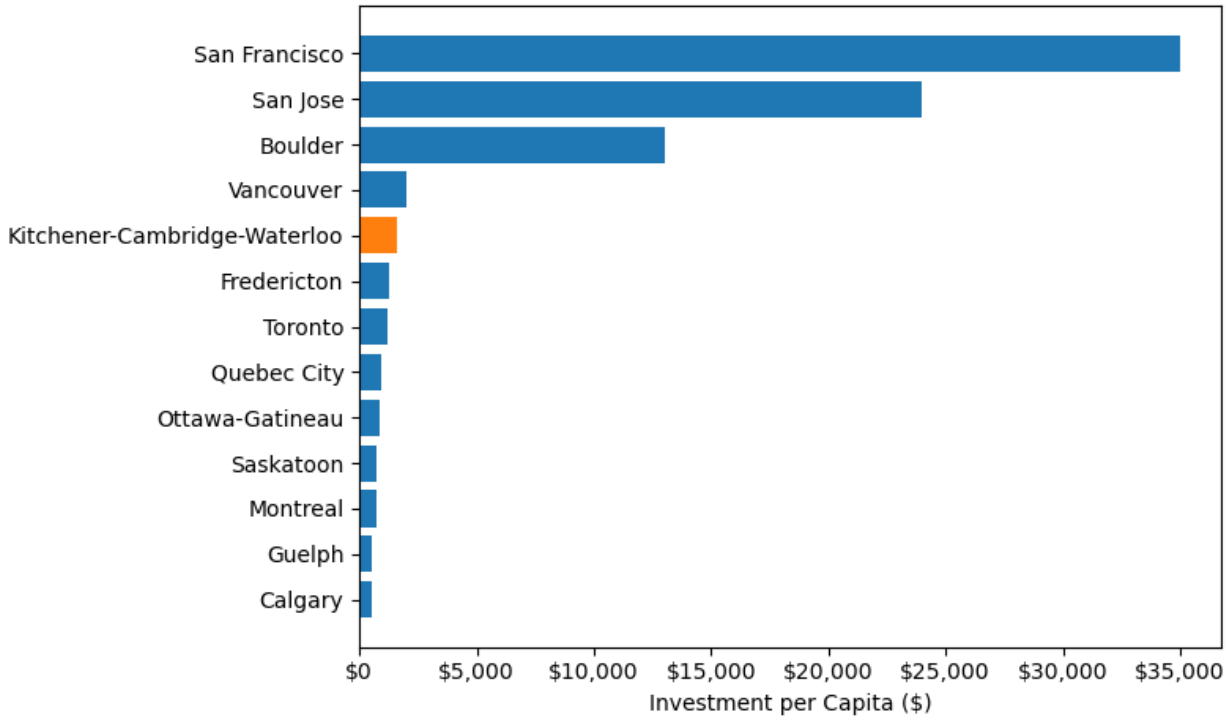
Figures

Figure A.1 Venture Capital Investment per Capita by Country and Business Stage



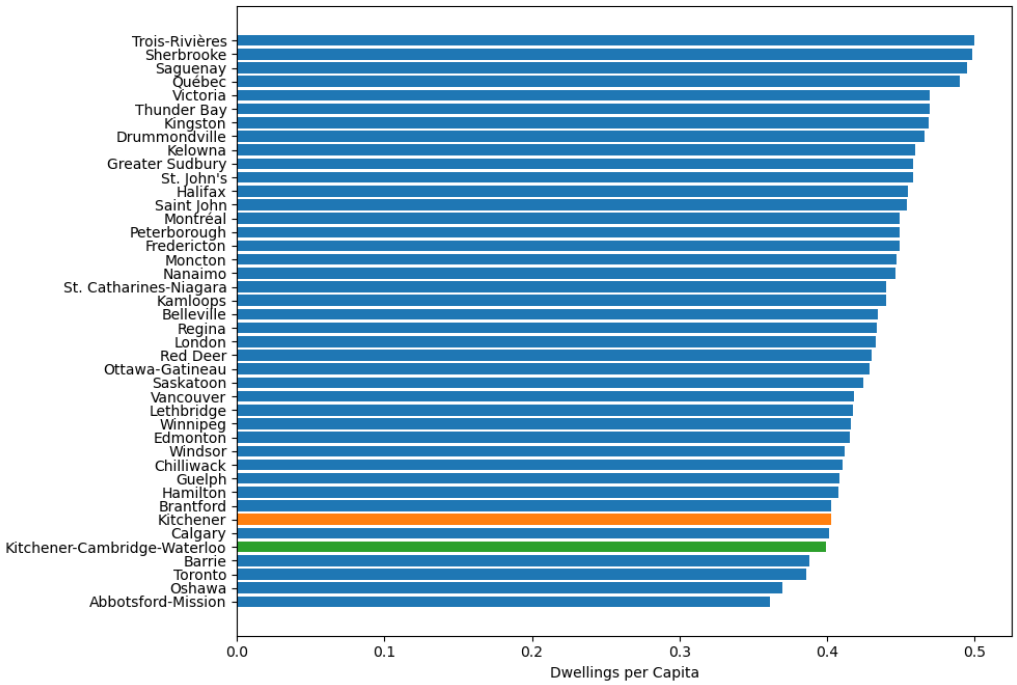
Data Sources: OECD

Figure A.2 Venture Capital Investment per Capita by City, 2019-2021



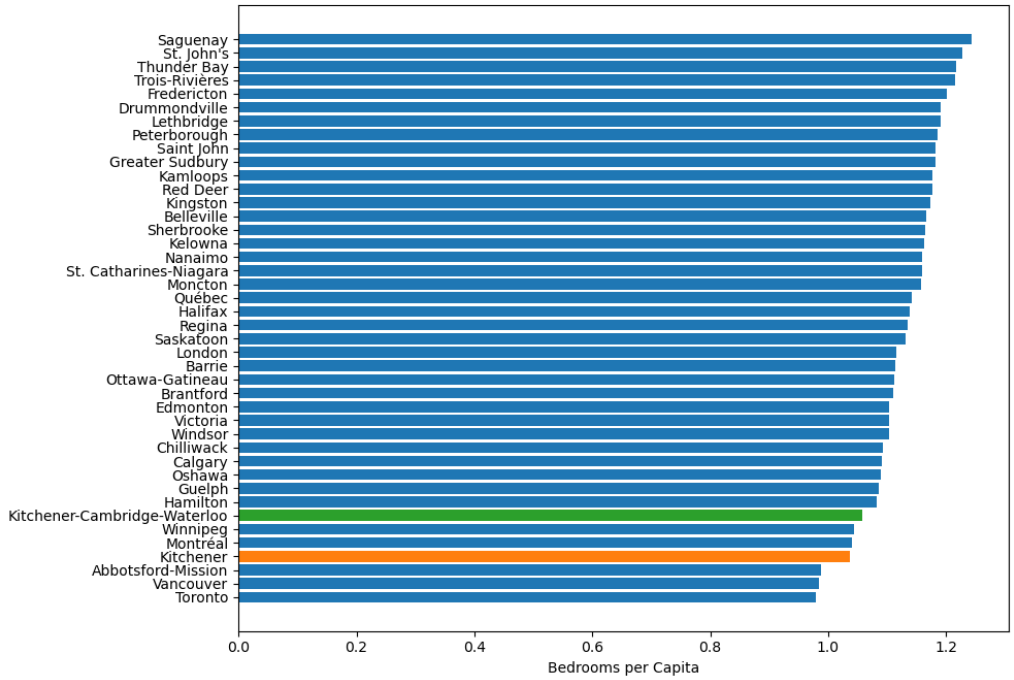
Data Sources: Pitchbook

Figure A.3 Dwellings per Capita by City, 2021



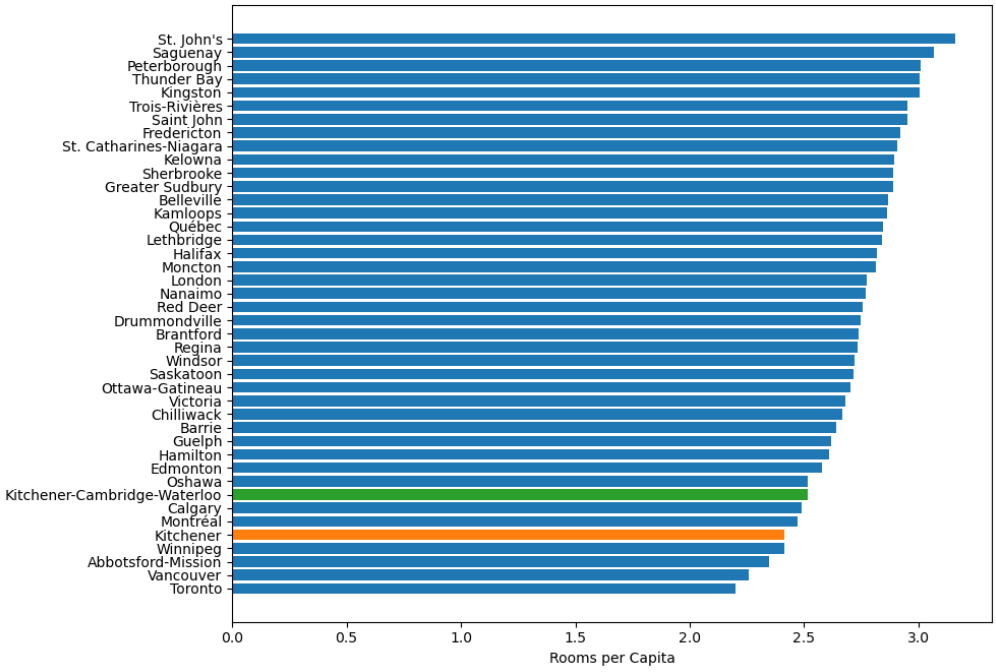
Data Sources: Statistics Canada

Figure A.4 Bedrooms per Capita by City, 2021



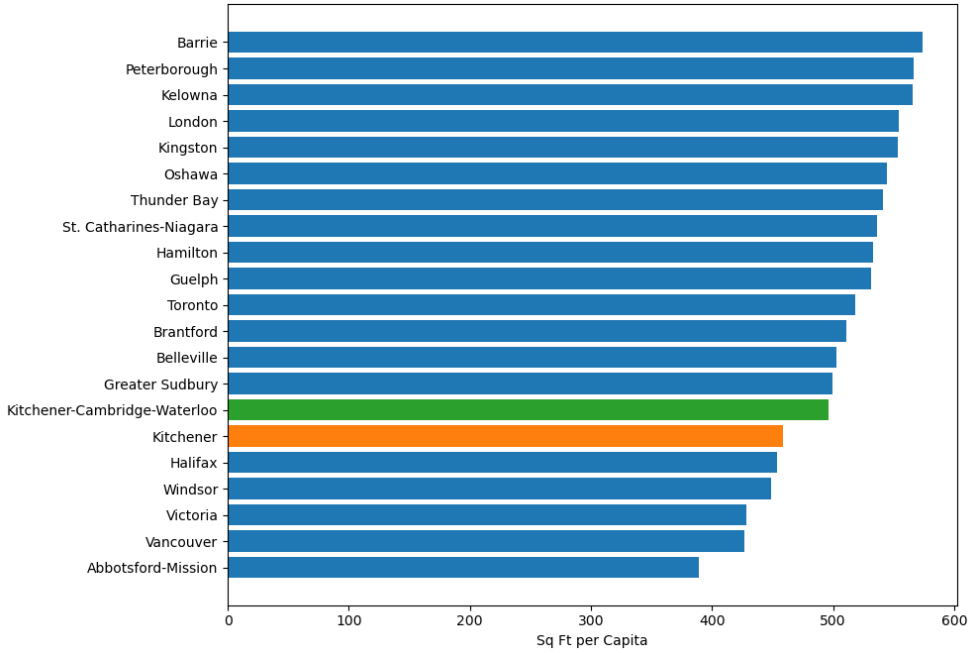
Data Sources: Statistics Canada

Figure A.5 Rooms per Capita by City, 2021



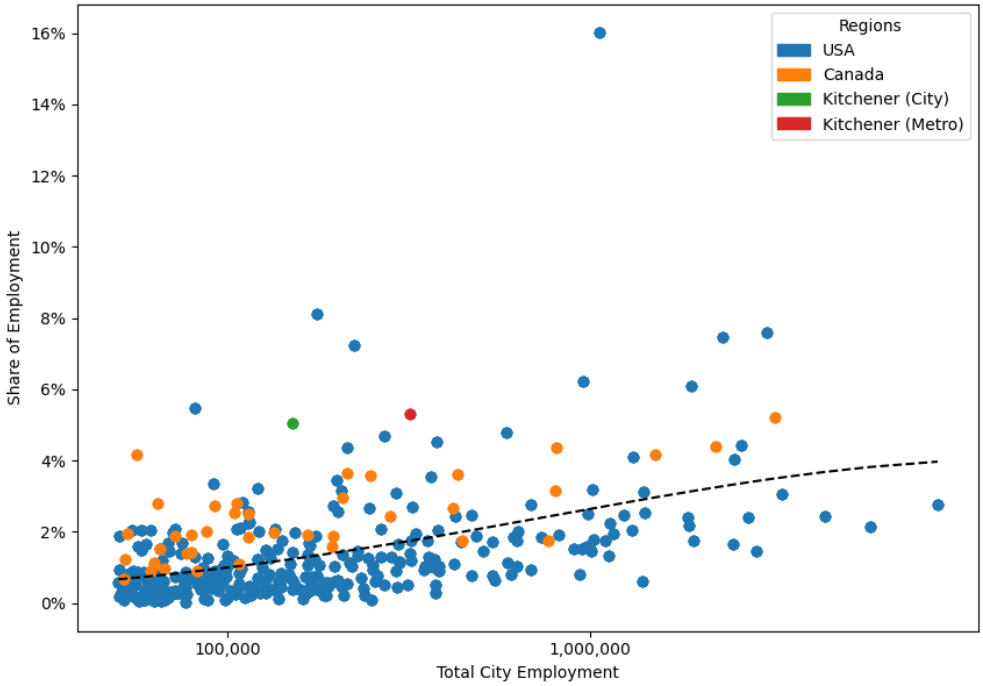
Data Sources: Statistics Canada

Figure A.6 Square Feet of Living Space per Capita by City, 2021



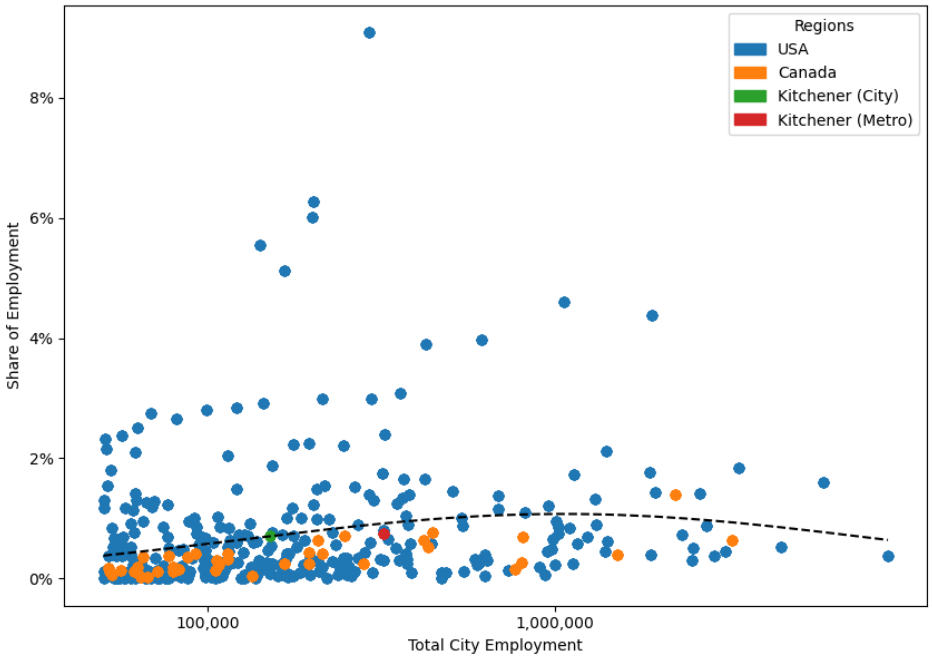
Data Sources: Statistics Canada

Figure A.7 Share of Employment in Computer Science Cluster



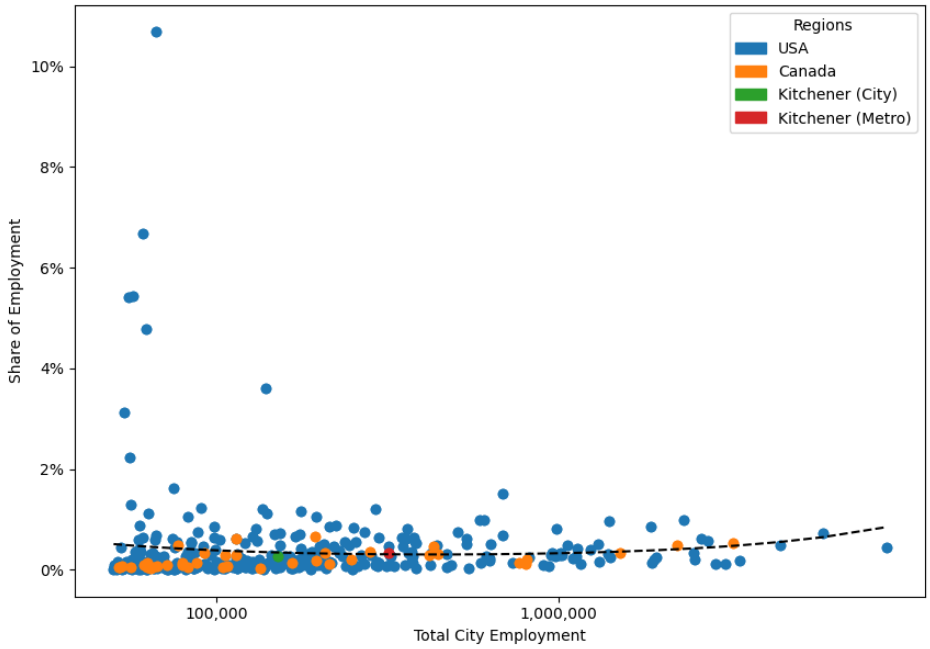
Data Sources: Statistics Canada, US Bureau of Economic Analysis

Figure A.8 Share of Employment in Electronics Cluster



Data Sources: Statistics Canada, US Bureau of Economic Analysis

Figure A.9 Share of Employment in Biotech Cluster



Data Sources: Statistics Canada, US Bureau of Economic Analysis

Figure A.10 Table of Industries in Computer Science, Electronics, and Biotech Industry Clusters

	List of 4-Digit NAICS Industries
Computer Science	Software Publishers; Data Processing, Hosting, and Related Services; Other Information Services; Computer Systems Design and Related Services
Electronics	Computer and Peripheral Equipment Manufacturing; Communications Equipment Manufacturing; Audio and Video Equipment Manufacturing; Semiconductor and Other Electronic Component Manufacturing; Navigational, Measuring, Electromedical, and Control Instruments Manufacturing; Manufacturing and Reproducing Magnetic and Optical Media; Aerospace Product and Parts Manufacturing

Biotech	Pharmaceutical and Medicine Manufacturing; Medical Equipment and Supplies Manufacturing

Table A.1. Variables for All Tradable NAICS Industries with Available Data for Kitchener

NAICS Code	NAICS Name	2021 Emp.	Predicted Emp.	Emp. at 90th Percentile	US Wages	Share of Hours Worked Remotely	More Distance Tolerant than This % of Exports	More Automation Resilient than This % of Industries
1133	Logging	60	20	171	$ 36,970	3%	1%	96%
2111	Oil and Gas Extraction	70	35	544	$ 92,270	14%	12%	24%
2121	Coal Mining	0	7	8	$ 53,560	2%	13%	90%
2122	Metal Ore Mining	60	22	180	$ 56,540	9%	91%	79%
2123	Nonmetallic Mineral Mining and Quarrying	125	143	306	$ 44,240	4%	36%	86%
2131	Support Activities for Mining	110	141	683	$ 51,880	10%	N/A	83%
2211	Electric Power Generation, Transmission and Distribution	890	1604	2539	$ 67,950	19%	N/A	37%
2213	Water, Sewage and Other Systems	405	299	345	$ 48,030	8%	N/A	51%
2362	Nonresidential Building Construction	1295	1746	2248	$ 56,730	5%	N/A	67%
2371	Utility System Construction	715	1103	1914	$ 49,290	5%	N/A	92%
2379	Other Heavy and Civil Engineering Construction	155	110	395	$ 51,840	5%	N/A	89%
3111	Animal Food Manufacturing	495	36	334	$ 37,970	8%	10%	75%
3112	Grain and Oilseed Milling	125	90	397	$ 44,190	8%	10%	70%
3113	Sugar and Confectionery Product Manufacturing	125	165	489	$ 35,630	8%	26%	74%

3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	90	177	924	$ 35,500	5%	17%	83%
3115	Dairy Product Manufacturing	190	537	1049	$ 39,290	5%	24%	78%
3116	Animal Slaughtering and Processing	3000	2103	2145	$ 28,810	2%	48%	99%
3117	Seafood Product Preparation and Packaging	10	28	166	$ 31,330	13%	51%	93%
3118	Bakeries and Tortilla Manufacturing	2120	691	1346	$ 31,770	5%	11%	76%
3119	Other Food Manufacturing	995	379	1192	$ 38,160	10%	42%	78%
3121	Beverage Manufacturing	695	396	1037	$ 41,070	10%	4%	67%
3122	Tobacco Manufacturing	0	7	6	$ 55,330	15%	40%	79%
3131	Fiber, Yarn, and Thread Mills	25	2	54	$ 30,870	27%	46%	98%
3132	Fabric Mills	55	40	343	$ 36,210	12%	43%	90%
3133	Textile and Fabric Finishing and Fabric Coating Mills	10	18	141	$ 37,720	11%	90%	61%
3141	Textile Furnishings Mills	20	24	128	$ 33,460	3%	16%	87%
3149	Other Textile Product Mills	105	87	278	$ 32,500	11%	53%	65%
3151	Apparel Knitting Mills	0	2	3	$ 28,330	3%	8%	93%
3152	Cut and Sew Apparel Manufacturing	155	159	219	$ 34,530	11%	28%	66%
3159	Apparel Accessories and Other Apparel Manufacturing	55	4	25	$ 32,020	11%	55%	75%
3161	Leather and Hide Tanning and Finishing	0	2	9	$ 34,460	13%	80%	89%
3162	Footwear Manufacturing	30	5	22	$ 36,630	9%	27%	64%
3169	Other Leather and Allied Product Manufacturing	170	6	60	$ 32,590	13%	61%	69%

3211	Sawmills and Wood Preservation	100	35	277	$ 33,970	4%	15%	97%
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	115	15	339	$ 35,860	12%	20%	90%
3219	Other Wood Product Manufacturing	630	496	1103	$ 34,300	7%	67%	90%
3221	Pulp, Paper, and Paperboard Mills	50	12	649	$ 51,320	8%	34%	80%
3222	Converted Paper Product Manufacturing	510	647	1363	$ 42,840	8%	18%	77%
3231	Printing and Related Support Activities	755	883	1995	$ 41,670	14%	22%	53%
3241	Petroleum and Coal Products Manufacturing	115	111	614	$ 69,570	9%	6%	53%
3251	Basic Chemical Manufacturing	150	146	908	$ 62,130	12%	84%	56%
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	25	85	630	$ 57,890	8%	78%	56%
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	20	9	174	$ 50,480	13%	31%	56%
3254	Pharmaceutical and Medicine Manufacturing	585	261	1514	$ 64,030	29%	100%	28%
3255	Paint, Coating, and Adhesive Manufacturing	150	98	315	$ 51,040	15%	19%	49%
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	145	112	561	$ 47,110	14%	38%	49%
3259	Other Chemical Product and Preparation Manufacturing	225	46	388	$ 48,940	12%	73%	56%

3261	Plastics Product Manufacturing	2725	2768	3092	$ 39,510	6%	25%	78%
3262	Rubber Product Manufacturing	330	327	753	$ 41,810	7%	54%	87%
3271	Clay Product and Refractory Manufacturing	60	86	161	$ 40,020	19%	70%	82%
3272	Glass and Glass Product Manufacturing	35	133	565	$ 40,510	7%	49%	82%
3273	Cement and Concrete Product Manufacturing	495	347	662	$ 41,690	3%	3%	82%
3274	Lime and Gypsum Product Manufacturing	0	7	41	$ 44,470	3%	2%	82%
3279	Other Nonmetallic Mineral Product Manufacturing	245	172	363	$ 41,320	10%	47%	82%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	450	36	604	$ 49,150	7%	33%	84%
3312	Steel Product Manufacturing from Purchased Steel	180	133	380	$ 46,130	7%	39%	80%
3313	Alumina and Aluminum Production and Processing	40	76	515	$ 44,620	8%	35%	85%
3314	Nonferrous Metal (except Aluminum) Production and Processing	0	180	547	$ 47,180	6%	72%	72%
3315	Foundries	215	286	717	$ 41,400	1%	56%	87%
3321	Forging and Stamping	230	293	594	$ 43,850	1%	7%	71%
3322	Cutlery and Handtool Manufacturing	195	61	211	$ 45,550	11%	60%	71%
3323	Architectural and Structural Metals Manufacturing	895	1131	1541	$ 42,580	6%	29%	63%

3324	Boiler, Tank, and Shipping Container Manufacturing	315	253	465	$ 46,340	6%	89%	63%
3325	Hardware Manufacturing	280	9	312	$ 45,060	7%	74%	71%
3326	Spring and Wire Product Manufacturing	55	86	185	$ 42,100	7%	37%	71%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	1800	1487	1800	$ 43,310	3%	45%	66%
3328	Coating, Engraving, Heat Treating, and Allied Activities	510	603	716	$ 39,240	5%	N/A	74%
3329	Other Fabricated Metal Product Manufacturing	1065	998	1229	$ 46,700	7%	65%	71%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	975	131	1005	$ 48,450	9%	76%	47%
3332	Industrial Machinery Manufacturing	930	406	566	$ 58,240	15%	92%	47%
3333	Commercial and Service Industry Machinery Manufacturing	565	46	486	$ 55,750	16%	83%	31%
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	200	327	692	$ 43,280	12%	85%	47%
3335	Metalworking Machinery Manufacturing	550	751	837	$ 47,490	7%	97%	58%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	80	68	549	$ 52,590	10%	93%	39%
3339	Other General Purpose Machinery Manufacturing	1205	1188	1370	$ 49,880	15%	88%	47%
3341	Computer and Peripheral Equipment Manufacturing	70	58	228	$ 89,700	41%	75%	10%

3342	Communications Equipment Manufacturing	260	141	535	$ 74,550	22%	81%	15%
3343	Audio and Video Equipment Manufacturing	10	15	58	$ 52,870	22%	62%	15%
3344	Semiconductor and Other Electronic Component Manufacturing	600	506	1533	$ 64,390	25%	79%	23%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	695	998	2322	$ 70,770	23%	94%	16%
3346	Manufacturing and Reproducing Magnetic and Optical Media	0	3	12	$ 50,400	25%	63%	39%
3351	Electric Lighting Equipment Manufacturing	75	88	170	$ 46,730	13%	57%	26%
3352	Household Appliance Manufacturing	320	10	129	$ 45,420	7%	82%	42%
3353	Electrical Equipment Manufacturing	995	302	597	$ 48,990	13%	66%	31%
3359	Other Electrical Equipment and Component Manufacturing	180	601	775	$ 48,690	13%	58%	45%
3361	Motor Vehicle Manufacturing	5560	991	3881	$ 56,160	9%	64%	55%
3362	Motor Vehicle Body and Trailer Manufacturing	275	335	658	$ 39,100	9%	44%	76%
3363	Motor Vehicle Parts Manufacturing	6875	1506	3419	$ 44,160	9%	71%	65%
3364	Aerospace Product and Parts Manufacturing	775	262	1846	$ 70,620	23%	99%	28%
3365	Railroad Rolling Stock Manufacturing	10	4	143	$ 45,470	31%	96%	67%

3366	Ship and Boat Building	0	8	766	$ 49,980	5%	52%	68%
3369	Other Transportation Equipment Manufacturing	160	49	168	$ 48,940	15%	98%	52%
3372	Office Furniture (including Fixtures) Manufacturing	650	297	428	$ 41,180	7%	30%	85%
3379	Other Furniture Related Product Manufacturing	10	57	167	$ 35,780	7%	21%	65%
3391	Medical Equipment and Supplies Manufacturing	475	589	1372	$ 49,660	21%	87%	36%
3399	Other Miscellaneous Manufacturing	1560	984	1078	$ 42,330	7%	69%	46%
4539	Other Miscellaneous Store Retailers	1230	1105	1212	$ 28,900	9%	N/A	43%
4541	Electronic Shopping and Mail-Order Houses	870	509	1737	$ 43,710	25%	N/A	25%
4811	Scheduled Air Transportation	340	319	1213	$ 58,620	9%	N/A	62%
4812	Nonscheduled Air Transportation	50	52	220	$ 59,220	9%	N/A	40%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	35	4	214	$ 60,780	17%	N/A	57%
4832	Inland Water Transportation	0	2	52	$ 54,320	17%	N/A	79%
4841	General Freight Trucking	4785	2816	5109	$ 41,970	5%	N/A	94%
4842	Specialized Freight Trucking	830	1100	1727	$ 39,950	5%	N/A	94%
4852	Interurban and Rural Bus Transportation	0	1	100	$ 34,570	4%	N/A	46%
4853	Taxi and Limousine Service	865	606	693	$ 30,350	3%	N/A	12%
4855	Charter Bus Industry	25	43	192	$ 32,180	4%	N/A	42%

4859	Other Transit and Ground Passenger Transportation	110	137	391	$ 30,110	4%	N/A	19%
4861	Pipeline Transportation of Crude Oil	0	3	23	$ 74,440	9%	N/A	50%
4862	Pipeline Transportation of Natural Gas	0	2	129	$ 67,180	9%	N/A	48%
4869	Other Pipeline Transportation	0	3	42	$ 67,240	9%	N/A	45%
4871	Scenic and Sightseeing Transportation, Land	0	2	37	$ 32,370	10%	N/A	29%
4872	Scenic and Sightseeing Transportation, Water	0	1	61	$ 35,820	10%	N/A	68%
4879	Scenic and Sightseeing Transportation, Other	0	1	4	$ 49,300	10%	N/A	38%
4881	Support Activities for Air Transportation	455	193	884	$ 42,610	12%	N/A	58%
4882	Support Activities for Rail Transportation	15	25	218	$ 40,320	12%	N/A	97%
4883	Support Activities for Water Transportation	10	32	587	$ 57,220	12%	N/A	97%
4884	Support Activities for Road Transportation	205	313	380	$ 33,700	12%	N/A	80%
4885	Freight Transportation Arrangement	605	404	1099	$ 48,580	12%	N/A	17%
4889	Other Support Activities for Transportation	45	11	50	$ 35,110	12%	N/A	89%
4931	Warehousing and Storage	1305	1119	4213	$ 36,950	2%	N/A	98%
5191	Other Information Services	5360	2101	1969	$ 72,370	37%	N/A	7%
5121	Motion Picture and Video Industries	535	653	820	$ 61,280	29%	N/A	29%
5152	Cable and Other Subscription Programming	0	8	21	$ 56,010	28%	N/A	16%

5174	Satellite Telecommunications	20	3	20	$ 57,400	37%	N/A	34%
5179	Other Telecommunications	155	128	216	$ 64,960	37%	N/A	34%
5182	Data Processing, Hosting, and Related Services	455	250	2055	$ 67,850	61%	N/A	7%
5211	Monetary Authorities-Central Bank	0	2	6	$ 81,130	31%	N/A	6%
5221	Depository Credit Intermediation	3130	4240	6161	$ 49,540	23%	N/A	5%
5222	Nondepository Credit Intermediation	390	680	1959	$ 57,630	43%	N/A	3%
5223	Activities Related to Credit Intermediation	720	277	944	$ 52,290	43%	N/A	5%
5231	Securities and Commodity Contracts Intermediation and Brokerage	570	582	978	$ 94,760	43%	N/A	1%
5232	Securities and Commodity Exchanges	0	6	3	$ 98,670	43%	N/A	1%
5239	Other FiN/Acial Investment Activities	1115	881	1422	$ 95,190	43%	N/A	1%
5241	Insurance Carriers	9215	5006	8114	$ 63,930	59%	N/A	3%
5242	Agencies, Brokerages, and Other Insurance Related Activities	2575	2936	2950	$ 55,510	50%	N/A	2%
5321	Automotive Equipment Rental and Leasing	290	290	628	$ 35,520	17%	N/A	49%
5322	Consumer Goods Rental	60	84	464	$ 31,050	10%	N/A	54%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	260	201	712	$ 48,650	13%	N/A	54%

5331	Lessors of NonfiN/Acial Intangible Assets (except Copyrighted Works)	0	4	121	$ 67,490	13%	N/A	4%
5411	Legal Services	1555	2180	2986	$ 77,050	30%	N/A	2%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	2880	2525	3270	$ 60,210	41%	N/A	1%
5413	Architectural, Engineering, and Related Services	5565	3604	6129	$ 72,910	28%	N/A	11%
5414	Specialized Design Services	905	679	753	$ 58,780	42%	N/A	14%
5415	Computer Systems Design and Related Services	11200	5656	8383	$ 84,850	58%	N/A	6%
5416	Management, Scientific, and Technical Consulting Services	3085	2705	3634	$ 74,440	52%	N/A	6%
5417	Scientific Research and Development Services	1010	2080	3832	$ 84,730	35%	N/A	9%
5418	Advertising, Public Relations, and Related Services	1305	1017	1611	$ 64,640	52%	N/A	13%
5419	Other Professional, Scientific, and Technical Services	1465	1506	2040	$ 45,860	47%	N/A	25%
5511	Management of Companies and Enterprises	1115	1122	11301	$ 73,320	40%	N/A	9%
5612	Facilities Support Services	25	64	1056	$ 40,770	3%	N/A	85%
5613	Employment Services	1560	2356	7939	$ 34,340	30%	N/A	70%
5614	Business Support Services	1800	1402	4173	$ 34,480	38%	N/A	8%
5615	Travel Arrangement and Reservation Services	385	352	701	$ 43,360	41%	N/A	9%
5619	Other Support Services	475	469	940	$ 39,030	23%	N/A	63%

5621	Waste Collection	485	397	650	$ 39,120	8%	N/A	96%
5622	Waste Treatment and Disposal	270	119	262	$ 50,880	8%	N/A	76%
5629	Remediation and Other Waste Management Services	150	287	502	$ 46,430	8%	N/A	75%
6112	Junior Colleges	1790	1036	1543	$ 55,880	22%	N/A	10%
6113	Colleges, Universities, and Professional Schools	9160	6574	9471	$ 60,760	22%	N/A	11%
6114	Business Schools and Computer and Management Training	40	83	227	$ 58,690	16%	N/A	8%
6115	Technical and Trade Schools	140	204	462	$ 50,130	16%	N/A	19%
6116	Other Schools and Instruction	2030	1145	1750	$ 40,160	23%	N/A	24%
6117	Educational Support Services	290	139	368	$ 52,970	23%	N/A	10%
7111	Performing Arts Companies	325	318	503	$ 48,840	16%	N/A	38%
7112	Spectator Sports	200	120	653	$ 40,550	12%	N/A	54%
7113	Promoters of Performing Arts, Sports, and Similar Events	135	170	779	$ 38,430	28%	N/A	52%
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	15	38	45	$ 67,660	28%	N/A	4%
7115	Independent Artists, Writers, and Performers	695	710	599	$ 63,560	46%	N/A	25%
7121	Museums, Historical Sites, and Similar Institutions	210	327	673	$ 38,300	7%	N/A	30%

7131	Amusement Parks and Arcades	25	59	538	$ 28,620	7%	N/A	64%
7132	Gambling Industries	155	277	1011	$ 29,410	7%	N/A	51%
7139	Other Amusement and Recreation Industries	2210	2927	4221	$ 29,130	7%	N/A	88%
7211	Traveler Accommodation	825	1948	6509	$ 28,150	4%	N/A	80%
7212	RV (Recreational Vehicle) Parks and Recreational Camps	105	48	223	$ 27,800	6%	N/A	60%
7213	Rooming and Boarding Houses	30	22	83	$ 25,890	6%	N/A	86%
8139	Business, Professional, Labor, Political, and Similar Organizations	485	869	1764	$ 55,570	30%	N/A	12%