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**To Be or Not to Be: The Relationship Between Economic Diversity and
Unemployment Rates in Canadian Cities During the COVID-19 Induced Shock**

By

Yahaya Alphonse

An Internship Paper

Submitted to the Faculty of Graduate Studies
through the Department of Political Science
in Partial Fulfillment of the Requirements for
the Degree of Master of Arts
at the University of Windsor

Windsor, Ontario, Canada

2022

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**To Be or Not to Be: The Relationship Between Economic Diversity and
Unemployment in Canadian Cities During COVID-19**

by

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December 22, 2022

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ABSTRACT

Regional scholars have broadly studied the role of economic structure in shielding a community from economic shocks. This research has generally involved comparing diversity against specialization. This study compares differences within varying degrees of economic diversity in Canadian cities. Canada has received very little attention in this field despite the importance this knowledge could provide in shaping Canadian economic policy. This paper aims to fill in this gap by analyzing the role economic diversity played in acting as a structural buffer to the COVID-19-induced economic shock. This analysis is done utilizing a Herfindahl Hirschman Index to measure economic diversity and explore its relationship with unemployment in 24 Canadian cities between 2019 and 2021. This paper finds that both regions with a high and low degree of economic diversity experienced a similar level of unemployment.

DEDICATION

I would like to dedicate this paper to my lovely parents, Richard Alphonse and Monica Alphonse, who have been my support system, source of motivation and pillar. Special shout out to my brothers (Jesse and Samuel), sister (Lucy), extended family members and YHI brothers.

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INTRODUCTION:

The Impact of Economic Shock and Unemployment

If there is anything that the COVID-19 pandemic has revealed about society, it may be the fragility of the world economy to severe disruptions in mobility and market activity. While we have faced many challenging events over the course of history, ranging from plagues, world wars, the 2008 financial recession, and recent wars in critical energy and food export countries such as Russia and Ukraine, nothing has been as unique and disruptive as the COVID-19 pandemic. It was perhaps the first time a health emergency was able to halt the global supply chain system and restrict much-needed market interactions among people by placing them within “social bubbles” with a stay-at-home order. The impact of this economic shock on the Canadian economy is beyond what many could have imagined, and its understanding is vital to shaping the country’s economic structure.

Literatures analyzing economic structures and shock have generally sought to understand whether economic diversification and specialization play a role in its resistance to economic shocks.¹ This study analyzes whether different degrees of economic diversity amongst Canadian cities was a contributing factor in shielding them from the COVID-19 economic shock between 2019 and 2021. This study also incorporates population size as a control variable to observe changes. This paper can help

¹ Koen Frenken, Frank Van Oort and Thijs Verburg, “Related Variety, Unrelated Variety and Regional Economic Growth,” *Regional Studies* 41, no. 5 (2007): 685-697; Amanda Davies and Matthew Tonts, “Economic Diversity and Regional Socioeconomic Performance: An Empirical Analysis of the Western Australian Grain Belt,” *Geographical Research* 48, no. 3 (July 2020): 223-234; Ron Boschma and Carlo Gianelle, “Regional Branching and Smart Specialisation Policy,” *Publications Office* (2014).

inform policymakers and researchers on the efficiency of different Canadian municipal economic structures (based on their degree of diversity) as shock absorbers during the COVID-19 pandemic. There is a general assumption that higher economic diversity provides higher economic security.² While this may be partly true, the results suggest this relationship is more complex than imagined. There are many questions that still need to be answered—especially in the Canadian context. Very few studies analyze the impact of economic structure on economic stability in Canada (and fewer examine the economic implications of COVID-19).³ This study fills this gap while incorporating the economic impact of the first pandemic in over a decade.

Just how disastrous was the pandemic to the Canadian economy? Statistics Canada showed that the Canadian economy contracted by 11.5% in 2020 compared to its 2019 levels.⁴ The employment losses between February and April of 2020 totalled almost 2 million, and by August 2020, full-time employment was 93.9% of its February value in the same year.⁵ By January 2022, headline consumer inflation was at +5.1% (a 30-year

² Ron Martin, “Regional Economic Resilience, Hysteresis and Recessionary Shocks,” *Journal of Economic Geography* 12, no. 1 (2012): 1–32.; Saheum Hong and Yu Xiao, “The Influence of Multiple Specializations on Economic Performance in U.S. Metropolitan Areas,” *Sustainability* 8, no. 9 (September 2016); Arne Isaksen and James karlsen, “Can Small Regions Construct Regional Advantages? The Case of Four Norwegian Regions,” *European Urban and Regional Studies* 20, no. 2 (March 2012): 243-257.

³ Some Canadian focused studies are: Pierre Desrochers and Samuli Leppala, “Creative Cities and Regions; The Case for Local Economic Diversity,” *Creativity and Innovation Management* 20, no. 1 (February 2011): 59-69; Bollman Ray, Rolland Beshiri, and Verna Mitura, “Northern Ontario’s Communities: Economic Diversification, Specialization and Growth,” *Agriculture and Rural Working Paper Series No. 82* (October 2006).

⁴ “Economic Impacts and Recovery Related to the Pandemic,” Statistics Canada, October 20, 2020. pp 4.

⁵ “Economic Impacts”, 6.

high), with prices of groceries and shelter increasing by 6.5% and 6.2%.⁶ Despite the severe impact, certain sectors of the Canadian economy were impacted more severely than others. For example, output in food services and accommodation in June was 55% of its pre-pandemic level. Data from Statistics Canada also reveal that workers on the bottom of the wage spectrum faced a higher layoff rate—and most of these workers tended to belong to visible minority groups.⁷

A strong economy provides employment, giving people the financial means to obtain needed resources such as food, shelter, and clothing. This connection between economic stability and communal well-being can be seen through measurements developed by researchers—the Misery Index and the Gini Coefficient. The Misery Index is an economic indicator created by Economist Arthur Okun, which adds data on unemployment and inflation to gauge a population’s well-being.⁸ The widely accepted rationale behind the index is that high inflation (higher prices of goods and services) and high unemployment (fewer people have financial capacity) results in higher misery. The second measure, the Gini Coefficient—developed by Corrado Gini—provides an indication of communal well-being disparities (to an atomistic level) by measuring income inequality within a group.⁹ This indicator measures the distribution of economic wealth in a society and has become used by organizations such as the World Bank.

⁶ “Covid-19 in Canada: A Two-year Update on Social and Economic Impacts,” *Statistics Canada*, March 10, 2022, pp 7.

⁷ “Economic Impacts and Recovery,” *Statistics Canada*, pp 12.

⁸ Ron Nessen, “The Brookings Institution’s Arthur Okun – Father of the ‘Misery Index’,” *Brookings*, (December 17, 2008).

⁹ “The Gini Coefficient”, *Office for National Statistics, Government of the United Kingdom*, April 26, 2022.

Economic indicators (such as the two mentioned above) and research are vital to city planners and policymakers to aid in developing economically stable societies. Economic downturns can arouse a series of adverse effects. Not only did the pandemic increase unemployment, but there were other adverse effects such as an increase in police-reported hate crimes (up 37% between 2019 and 2020), and selected crimes such as robbery and shoplifting increased by 7% between 2020 and 2021.¹⁰ Economic factors like unemployment can very well transcend into social and health-related issues. For example, unemployment has proven to cause increased poverty levels¹¹; increased crime rate¹²; hunger and nutrients deficiency¹³; and negatively impact mental health.¹⁴ Tackling unemployment can contribute to addressing many of the listed factors. This paper aims to analyze the hypothesis that more economically diversified Canadian cities saw a lower unemployment rate compared to less diversified cities during the 2019-2021 COVID-19 economic shock.

This paper will proceed by providing a literature review consisting of relevant studies conducted on economic structures and stability. This will consist of studies done on the sub-state, state, and at the country-level. These will include arguments in favour

¹⁰ “COVID-19 in Canada: A Two-year Update,” pp 5.

¹¹ Mary Corcoran and Martha S. Hill, “Unemployment and Poverty,” *Social Service Review* 54, no. 3 (1980): 407–13.

¹² Steven Raphael and Rudolf Winter-Ebmer, “Identifying the Effect of Unemployment on Crime,” *The Journal of Law and Economics* 44, no. 1 (2001): 259–83; Denis Fougère, Julien Pouget, and Francis Kramarz, “Youth Unemployment and Crime in France,” *Journal of the European Economic Association* 7, no. 5 (2009): 909–38.

¹³ Barbara Davis and Valerie Tarasuk, “Hunger in Canada,” *Agriculture and Human Values* 11 (September 1994): 50-57.

¹⁴ Simon Øverland, “Unemployment and Mental Health,” *Occupational and Environmental Medicine* 73, no. 11 (2016): 717–18.

and against economic diversification, arguments finding no difference, and proponents of a hybrid model. Also, the paper will touch upon the different measurements of diversity. This paper will then explain the data sources and methodology for testing the proposed hypothesis. This will finish with a description of the results, discussions and conclusion. This paper will contribute to the crucial debate about economic diversity and shocks by analyzing the relationship between economically diversified Canadian cities and unemployment aroused by the COVID-19 economic shock in Canadian cities. It will provide broad foundational knowledge for Canadian city planners and researchers, from which they can build a more specific framework for economic stability.

LITERATURE REVIEW

Analyzing the relationship between economic diversity and economic stability requires careful methodology. Many researchers have arrived at different conclusions on this topic, albeit for different reasons. First, it is difficult to establish an argument for or against the benefit of high economic diversification or specialization that can be uniformly and broadly applied in perpetuity. Market interaction is ever-changing and is often impacted by a myriad of factors. That means that the recommendations by experts may also change. An example of this is the World Bank's earlier advocacy of specialization (the opposite of diversification) in certain manufacturing exports as a propagator of development (drawing support from the rise of the Asian Tigers).¹⁵

¹⁵ World Bank, "The East Asian Miracle: Economic Growth and Public Policy," *World Bank Policy Research Report* No. 12351 (Washington, D.C: 1993): 48, 202.; Sinesipho Siswana and Andrew Phiri, "Is Export Diversification or Export Specialization Responsible for Economic Growth in BRICS Countries?" *The International Trade Journal* 35, no. 3 (November 2020): 243-261.

However, economic diversification is currently stressed more by the World Bank and International Monetary Fund and seen as a shock absorber mechanism.¹⁶ Access to new knowledge provides more insights into the workings of the economy and should be used to augment our approach to solving problems.

Most of the body of work analyzing the impacts of economic diversification and specialization arose out of the works of Marshall, Arrow, Romer, and Jacobs.¹⁷ This is commonly referred to as the MAR vs Jacobs debate and involves the superiority of one structure over the other. The MAR model argues in favour of specialization and claims that firms in the same industry benefit from knowledge spillover when there is concentration, and this eventually benefits the economy—MAR externalities. In contrast, Jacob argues in favour of economic diversity, stating that firms in different sectors benefit from diversity and innovation from inter-firm interactions—Jacob externalities. It can be argued that any preferred approach between economic diversity and specialization is not without its drawbacks, and planners should ensure they do not lean on the end of either. In the meantime, we would begin with some of the literature in favour of economic diversity.

¹⁶ Ollero et al., “Economic Diversification for a Sustainable and Resilient GCC,” *Gulf Economic Update* no. 5, (Washington, D.C.: World Bank Group, December 2019); Cecile Fruman, “Economic diversification: A priority for action, now more than ever,” *World Bank Blogs*, (March 01, 2017); Reda Cherif et al, “Industrial Policy for Growth and Diversification: A Conceptual Framework,” *Departmental Paper No 2022/017* (September 30, 2022).

¹⁷ Jane Jacobs, *The Economy of Cities*, (Vintage, 1970); Kenneth Arrow, “The Economic Implications of Learning by Doing,” *The Review of Economic Studies* 29, no. 3 (June 1962): 155-173.; Paul Romer, “Increasing Returns and Long-Run Growth,” *Journal of Political Economy* 94, no. 5 (October 1986); Alfred Marshall, *Principles of Economics*, (London: Macmillan, 1890).

Studies in Support and Opposition to Economic Diversification

Several researchers have focused on the benefits of economic diversity to regional economies and developments. These analyses have involved economies of different regional sizes and various measurements of diversity. On a sub-national level, Korten and Elburz examined regions in Turkey between 2009-2014,¹⁸ and Goschin examined regions in Romania between 2008-2017.¹⁹ Economic diversity has also been studied at the country level. For example, Aleksandra Parteka extracts industrial employment data from the United Nations Industrial Statistics Database and the United Nations Commodity Trade Statistics Database for 32 countries.²⁰ This was used to analyze the relationship of economic development to economic specialization and diversity. The measurement of diversity has involved the use of trade data, i.e., diversity of exported goods by Haddad et al. and Hnatkovska and Loayza;²¹ diversity of trade partners by Onder and Yilmazkuday;²² employment proportion of industrial sectors by Korten and Elburz;²³

¹⁸ Ferhan Korten and Zeynep Elburz, "Looking for Diversified Specialization in the Regions of Turkey," *Megaron* 13, no. 4 (September 2018).

¹⁹ Zizi Goschin, "Specialisation vs Diversification. Which One Better Upholds Regional Resilience to Economic Crises," *Journal of Social and Economic Statistics* 8, no. 2 (Winter 2019).

²⁰ Aleksandra Parteka, "Employment and export specialisation along the development path: some robust evidence," *Review of World Economics* 145 (November 2009): 615-640.

²¹ Haddad et al., "Trade openness reduces growth volatility when countries are well diversified," *Canadian Journal of Economics* 46, no. 2 (May 2013); Norman Loayza and Viktoria Hnatkovska, "Volatility and Growth" *World Bank Policy Research Working Paper Series* 3184 (April 2016).

²² Ali Onder and Hakan Yilmazkuday, "Trade Partner Diversification and Growth: How Trade Links Matter," *Journal of Macroeconomics* 50, (December 2016): 241-258.

²³ Korten and Elburz, "Diversified Specialization," *Megaron* 13, 626.

production location quotient by Dzemydaite;²⁴ and the proportion of GDP contribution of industrial sectors by Gamidullaeva et al.²⁵

In a comparative study on low-income countries, Koren and Tenreyro utilize sectoral data from the United Nations Industrial Development Organization (UNIDO) and OECD's STAN Industrial Structure Analysis to investigate the causes of higher economic volatility. They reveal that low-income countries experience higher volatility due to lower diversity and higher specialization (notably in volatile sectors).²⁶ This conclusion is widely accepted (especially at the country level) as one of the general consensus amongst advocates is that economic diversification reduces vulnerability and enhances business opportunities. This could be through encouraging innovations and economic growth through its business climate or by creating multiple sources of revenue, as argued earlier.²⁷

Advocates of diversification are not limited to large-scale regions such as countries. Brown and Greenbaum, 2017, conducted a study on counties in the state of

²⁴ Giedre Dzemydaite, "The Impact of Economic Specialization on Regional Development in the European Union: Insight for Formation of Smart Specialization Strategy," *Economies* 9, no. 76 (May 2021): 4.

²⁵ Leyla Gamidullaeva, Elena Korostyshevskaya, Alexey Myamlin and Olga Podkorytova, "Exploring Regional Industrial Growth: Does Specialization Explain it?" *Economies* 10, no. 172 (July 2022): 172.

²⁶ Miklós Koren and Silvana Tenreyro, "Volatility and Development," *CEPR Discussion Paper No. 5307*, (October 2005). Available at SSRN: <https://ssrn.com/abstract=872859>

²⁷ Dissart, J. C. (2003). Regional Economic Diversity and Regional Economic Stability: Research Results and Agenda. *International Regional Science Review*, 26(4), 423–446.; Anne Knott, "Persistent Heterogeneity and Sustainable Innovation," *Strategic Management Journal* 24, no. 8 (2003): 687–705.; Valerien Pedé, "Diversity and Regional Economic Growth: Evidence from US Counties," *Journal of economic development* 38, no. 3 (2013): 111-127.; Carolyn Wilkins, "Canadian Economic Update: Strength in Diversity," *Bank of Canada*, (June 12, 2017).

Ohio between 1977 to 2011 to examine the role of industrial diversity in fostering economic resilience. Utilizing employment data, their study revealed that the more diverse counties were better able to withstand both local and national economic shocks — although the specialized economies fared better during good times.²⁸ It should also be noted that when analyzing economic specialization, the sector in which an economy specializes is just as important. Research has shown that countries that are heavily reliant on oil (or mineral resources) are at a higher risk of experiencing greater exchange rate volatility and economic instability than more diverse economies.²⁹

Diverse economies benefit from their ability to grow in a stable manner and be shielded from economic shocks aroused by the collapse of one sector. Some examples of these weaknesses of specialized economies can be seen in Feyrer et al. study on U.S. rust belt states such as Michigan, Ohio and Indiana, which flourished when its specialized sectors experienced high economic activity but eventually plummeted with a decline in industry performance.³⁰ Due to such instances, studies from scholars such as Pede have proposed a diverse model as a safeguard against economic shock and for stable economic growth.³¹ Another study on 170 U.S. cities across a 31-year period by Glaeser et al.,

²⁸ Lathania Brown and Robert Greenbaum, “The Role of Industrial Diversity in Economic Resilience: An Empirical Examination Across 25 Years,” *Urban Studies* 54, no. 6, (January 2016): 1347-66.

²⁹ Michael Ross, *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*, (Princeton, NJ: Princeton University Press, 2012).

³⁰ James Feyrer, Bruce Sacerdote, and Ariel Stern, “Did the Rust Belt Become Shiny? A Study of Cities and Counties That Lost Steel and Auto Jobs in the 1980s,” *Brookings-Wharton Papers on Urban Affairs* (2007) :47-60.

³¹ Valerien Pede, “DIVERSITY AND REGIONAL ECONOMIC GROWTH: EVIDENCE FROM US COUNTIES,” *Journal of economic development* 38, no. 3 (2013): 111-127.

found that economic diversity encouraged employment growth. Many of the studies listed above continue to buttress the importance of economic diversity for growth and stability.³²

However, there have been others in favour of lower economic diversification who advocate economic specialization as an instigator for growth by allowing the efficient use of resources.³³ For example, a study by Cuadrado Roura and Maroto on Spain showed that higher economic specialization in a region was well able to ignite rapid economic growth.³⁴ Likewise, a study by Henderson also pointed to a positive impact of industry specialization on economic growth on a region.³⁵ Many of these arguments in favour of economic diversification have evolved from David Ricardo's theory of comparative advantage. This theory argues that economies are most efficient when they specialize in the sector in which they can produce goods at the lowest opportunity cost.³⁶ This

³² Glaeser et al, "Growth in Cities," *Journal of Political Economy* 100, no. 6 (1992): 1126-52.

³³ Thomas Kemeny and Michael Storper, "Is Specialization Good for Regional Economic Development?," *Regional Studies* 49, no. 6 (May 2014): 1003-18.; Shuai Xiaobing, "Will Specialization Continue Forever? A Case Study of Interactions Between Industry Specialization and Diversity," *Annual Region Science* 50, no. 1 (February 2013): 1-24.

³⁴ Juan Cuadrado-Roura and Andres Maroto, "Unbalanced Regional Impact of the Crisis in Spain. An Explorative Analysis Through Structural Changes, Sectorial Specialization and Productivity," *Cambridge Journal of Regions, Economy and Society* 9, no. 1 (January 2016): 168-169.

³⁵ Vernon Henderson, "Medium size cities," *Regional Science and Urban Economics* 27, no. 6, (1997): 583-612.

³⁶ Ronald Findlay, (1991). "Comparative Advantage," in *The World of Economics*, e.d John Eatwell, Murray Milgate, and Peter Newman, (London: The New Palgrave, Palgrave Macmillan, 1991): 99-100.

efficiency could come by guiding the allocation of skills, input, and market access.³⁷ By focusing on key sectors, resource allocation could create growth, and this can allow regional economies to benefit from economies of scale.

Scholarly research attesting to the beneficial economic impact of specialization has also spanned various regional levels, from studies on metropolitan areas to comparisons between countries. For example, Attran analyzed 50 US states over a 10-year period focusing on the impact of economic diversity and resistance to economic cycles.³⁸ Unlike the earlier studies, he discovered that economic diversity did not have a positive impact on the per capita income growth in the U.S. states and stability. In contrast, Shuai's examination of employment growth in Virginia's counties found that specialization positively affected employment growth by driving intra-industry competition.³⁹ Similarly, Lee's 2010 analysis of 71 countries from 1970 to 2004 found that the countries experienced higher growth when they specialized (particularly in high-technology goods).⁴⁰ These studies support the notion that comparative advantage creates specialization and allows the economy to function at peak efficiency through proper allocation of resources.

³⁷ Ann Markusen, "Sticky Places in Slippery Space: A Typology of Industrial Districts," *Economic Geography* 72, no. 3 (July 1996): 308–10.; Michael Porter, "The Economic Performance of Regions," *Regional Studies* 37, no. 7 (October 2003): 562-566.

³⁸ Mohsen Attran, "Industrial Diversity and Economic Performance in US Areas," *The Annals of Regional Science* 20, (1986): 44-54.

³⁹ Shuai, "Will specialization continue forever," 1-24.

⁴⁰ Jim Lee, "Export Specialization and Economic Growth Around the World," *Economic Systems* 35, no.1 (2011): 55-59.

Studies have also proposed that smaller regions (as measured by population) should specialize in certain economic sectors because of their limited resources, inability to benefit from numerous economies of scale and the benefits of clusters.⁴¹ This means the size of human capital may be a relevant factor when considering whether to specialize or diversify. Another essential factor to take into consideration is the resource endowment—this could determine the sector where it has a comparative advantage.⁴² For example, an economy endowed with a large reserve of mineral deposits may be best served (tying in its comparative advantage and opportunity costs) by utilizing those resources in its economic structure. However, the earlier section on diversity has shown that specialization (especially in volatile sectors) is not without its weaknesses.

Case Studies Advocating for a Hybrid Model

Recognizing this dilemma—between spreading out too thin (diversifying) and putting all eggs in one basket (specialization)—certain policies have evolved, opting for what is described as “smart specialization.”⁴³ This concept has gained popularity, particularly in the European Union, through a policy by the Commission known as the Regional Innovation System for Smart Specialization (RIS3).⁴⁴ This is a policy of economic diversification where research and development in a region are primarily

⁴¹ Bjørn Asheim and Lars Coenen, “Knowledge Bases and Regional Innovation Systems: Comparing Nordic Clusters,” *Research Policy* 34, no. 8 (October 2005): 1181-88.; Combes et al, “The Productivity Advantages of Large Cities: Distinguishing Agglomeration from Firm Selection,” *IZA Discussion Paper No. 6502* (April 2012): 31-32.

⁴² Bertin Ohlin, *Interregional and International Trade*, (Cambridge: Harvard University Press, 1933).

⁴³ “What is Smart Specialisation,” *Smart Specialization Platform*, European Commission.

⁴⁴ Philip McCann, “The Early Experience of Smart Specialization Implementation in EU Cohesion Policy,” *European Planning Studies* 24, no. 8 (March 2016): 1408.

focused on creating specialization in sectors with a comparative advantage with the backing of extensive government influence. This policy emphasizes that “(1) regions cannot be good in all fields of science, technology and innovation; and (2) they must promote their unique knowledge base and be better in it than others.”⁴⁵

The smart specialization policy implemented in places like the European Union combines “industrial, educational and innovation policies to suggest that countries or regions identify and select a limited number of priority areas for knowledge-based investments, focusing on their strengths and comparative advantages.”⁴⁶ This specialization can either be vertical, “where countries specialize in individual stages of the value chain,” or horizontal, “where a country produces a specific product a given product from beginning to end.”⁴⁷ An example of its implementation was in Poland under the Regional Innovation Strategies of the European Union (EU). The government focused on developing four key sectors in the province of Podkarpackie voivodeship: aviation and space, automotive, quality of life (a broad term signifying wellbeing), and information communication technology (ICT).⁴⁸ These sectors were selected as the government believed they were interlinked and were areas of comparative advantage.

⁴⁵ Elzbieta Wojnicka-Sycz, “Theory-Based Evaluation Criteria For Regional Smart Specializations and their Application in the Podkarpackie Voivodeship in Poland,” *Regional Studies* 54, no. 11, (August 2020): 1612-1614.

⁴⁶ “Smart specialization”, Organization for Economic Cooperation and Development. Accessed November 18, 2022.

⁴⁷ Wojnicka-Sycz, “Regional Smart Specializations,” 1613.; Małgorzata Markowska and Bartłomiej Jefmański, “Fuzzy Classification of European Regions in the Evaluation of Smart Growth,” *Statistical Review* 59, no. 1 (2012): 79.

⁴⁸ Wojnicka-Sycz, “Regional Smart Specialization,” 1618.

Another concept similar (if not the same as) smart specialization is “diversified-specialization” or “multiple-specialization”. While smart specialization is an innovation policy concept driven by a central body like the EU or the government, this is merely the condition of a regional economy that has specialization in multiple sectors with or without such smart policy. It is argued that multiple economic specializations play a significant role in regional economic growth and sustenance, as regions reap the benefits of diversified and specialized economies.⁴⁹ A few other scholars have supported this view and propose this approach as a superior economic structure for a region compared to being either specialized or diversified.⁵⁰ Hong and Xiao present the example of Houston, Texas, a thriving metropolitan economy which consists of multiple specializations in sectors such as healthcare, transportation, oil and gas, and research and technology, and yet maintains a robust economic structure.⁵¹ These ensure the resources in a region are not spread out thinly nor is it prone to disruptions aroused by shock to one sector. It could be seen as the best of both worlds.

Case Studies of Measurements of Diversification and Specialization

Regional studies analyzing economic stability have utilized numerous economic diversification and specialization measurements. There is a general consensus on the effectiveness of measurement such as the Herfindahl Index, Theil Index or Location

⁴⁹ Emil Malizia and Shanzi Ke, “THE INFLUENCE OF ECONOMIC DIVERSITY ON UNEMPLOYMENT AND STABILITY,” *Journal of Regional Science* 33, no. 2 (May 1993): 221-235.

⁵⁰ Oliver Farhauer and Alexander Kröll, “Diversified specialisation—going one step beyond regional economics’ specialisation-diversification concept,” *Jahrbuch Fur Regionalwissenschaft* 32, (January 2012): 63–84.; Hong and Xiao, “U.S. Metropolitan Areas,” 1-16.

⁵¹ Hong and Xiao, “U.S. Metropolitan Areas,” 2.

Quotient, with the measurement used dependent on the available data as well as the relationship being studied. Researchers have sourced data from numerous bodies, such as the national or local census directories or the database of intergovernmental institutions like the United Nations. In a study on 26 regions in Turkey, the researchers analyzed the economic impact of diversity and specialization by utilizing data from the TurkStat, Business and Annual Industry and Service Statistics.⁵² The data sorted economic activity into 24 sectors and measured diversification/specialization using a relative specialization and relative diversity index. The former of the two indexes measured the share of an industry in a region as a fraction of its share of the national population. The relative diversity index, which—to put it in simple terms—is the inverse of the Herfindahl Hirschman Index and was used to measure the level of diversity. The analysis involved the use of data on employment shares of each sector and unemployment rates.⁵³

Another study analyzed 48 U.S. states from 1998 to 2010 to see the impact of economic structure on the speed and stability of economic growth.⁵⁴ Employment and wage growth were the key indicators of economic performance in this study (although the study does include many control variables such as education levels and population size). Diversity and specialization were measured using the Entropy and Multiple Specialization Index. The Multiple Specialization Index was obtained “by dividing the total number of specialized sectors by the total number of sectors with non-zero employment in the region” while the Entropy index is the total sum of the logarithm of

⁵² Ferhan Korten and Zeynep Elburz, “Looking for Diversified Specialization in the Regions of Turkey,” *Megaron* 13, no. 4 (September 2018): 626.

⁵³ Korten and Elburz, “Regions of Turkey,” 625-627.

⁵⁴ Hong and Xiao, “U.S. Metropolitan Areas,” 7-9.

one divided by the absolute employment share of each industry.⁵⁵ The economic sector data classification in this paper followed the North American Industry Classification System (NAICS).

A study by Zenka et al. analyzed economic diversity and specialization in 203 microregions in the Czech Republic (excluding the three biggest metropolitan regions).⁵⁶ Utilizing raw data obtained from sources such as the Czech Statistical Office, numerous indicators of economic performance were utilized such as changes in the unemployment rate as well the per capita added value. The researchers adopted the Herfindahl Index (measuring the share of employment of each industry) to determine the degree of economic diversity in the regions. However, there was a data constraint resulting in their model not including all non-manufacturing industries in the observed region.⁵⁷ This challenge of data availability was also faced in this paper and led to a slight reduction in the sample size.

In a study on Finland's economy, Simonen et al. analyzed 70 sub-regions between 1994-2008 to test the impact of economic structural diversity on economic growth.⁵⁸ This analysis was done using multiple indexes, employment and gross regional product data.⁵⁹ First the Herfindahl-Hirschman Index is used specifically to assess the impact of

⁵⁵ Hong and Xiao, "U.S. Metropolitan Areas," 4-5.

⁵⁶ Zenka et al., "Industrial Specialization and Economic Performance: A Case of Czech Microregions," *Norwegian Journal of Geography* 69, no. 2 (March 2015).

⁵⁷ Zenka et. al, "Industrial Specialization," 71.

⁵⁸ Jaakko Simonen, Rauli Svento and Artti Juutinen, "Specialization and diversity as drivers of economic growth: Evidence from High-Tech industries," *Papers in Regional Science* 94 (2015): 229-247.

⁵⁹ Simonen et. al, "Drivers of Economic Growth," 223-235.

technological diversity and specialization on regional growth. The authors also use the Shannon Index—another popular measurement of entropy—to capture the richness and evenness (equal employment distribution) of diversity. Lastly, the Kullback-Liebler divergence (KLD) was used to measure the difference in the distribution of high technology employment across the sample. Data on high-technology was sorted into nine sectors, while the combined database for accessing overall diversity consisted of 19 industrial sectors.

Observing the impact of economic diversification (or specialization) is so complex that most studies are performed with an assumption that the impact of some of the confounding variables across different regions is uniform (or not significant enough to be included in the study). Often, vital factors such as age, population size, and education level, are included in the methodology. However, the inclusion of many factors can erode the parsimony of the research, and as such, they are selected carefully. In line with this, this paper's population size is a controlling factor. However, deducing the ideal economic model for a city from general studies such as this one should be avoided. This is because the role of economic structure is incredibly complex. Each city would need a specific study analyzing its economic structure. Instead, this study provides a vital overview which Canadian cities can utilize as a starting point for gauging the role of economic structure on a city's resistance to the COVID-19 economic shock before considering more specific factors like the impact of age, and immigration.

The Canadian cities included in this sample were generally diverse; this means this study does not measure the impact of unemployment on highly specialized Canadian cities given there was none in the sample. Therefore, rather than assessing the

relationship between economic diversity and specialization and unemployment, this research analyzes the impact of varying degrees of economic diversity and its role as a shock absorber. This study tests the hypothesis that Canadian cities with higher economic diversity would have experienced a lower unemployment rate between 2019 and 2021.

DATA AND METHODOLOGY

This paper uses a Herfindahl-Hirschman Index in order to test this hypothesis. Preference is given to this method due to its simplicity in interpreting a region's degree of diversity as well as its wide use and acceptability amongst researchers. Due to the page limit, other measurements could not be incorporated and used side by side. In this empirical analysis, a regression analysis will be utilized to assess the relationship between economic diversity and unemployment while incorporating population size as a control variable. The Herfindahl Index for each city was computed, where:

$$\text{Herfindahl Index} = (\text{employment share of sector 1})^2 + (\text{employment share of sector 2})^2 + (\text{employment share of sector 3})^2 \dots + (\text{employment share of sector 14})^2.$$

$$\text{Transformed Index} = \text{Index of Perfecto (0.0828402)} / \text{Index of Canadian city } x$$

Where *Perfecto* is a hypothetical city with perfect employment equality in its 14 sectors, therefore, each of the 14 sectors in *Perfecto* employs approximately 7.69231% of the total population. By comparing each city against *Perfecto*, we are able to construct an index ranging from 0, highly specialized, to 1, highly diversified.

This study's independent variable is economic diversity, measured using Herfindahl-Hirschman Index. The index is computed using city employment data which

is broken down into 16 economic sectors. The list of all sectors in this breakdown can be seen in Appendix 1. This employment data is obtained through the StatsCan.⁶⁰ Additional data came from the Conference Board of Canada's Major City Insights, which provided data on unreported sectoral numbers in the StatsCan database. The classification follows the sectoral classification of the North American Industry Classification System (NAICS).⁶¹ However, sectoral data is consolidated, reducing the sectors from 16 to 14. The breakdown of this sectoral data can be seen in Appendix 1, and the city sample can be seen in Appendix 2.

The dependent variable in this analysis is the unemployment rate, with unemployment data extracted from StatsCan.⁶² This would be the indicator of the economic impact of the COVID-19 shock on Canadian cities. As mentioned earlier, unemployment is able to arouse a series of negative effects; hence, its mitigation is essential. Population size is controlled in analyzing this relationship between the degree of economic diversity and unemployment. This control variable is sorted based on three population size classes: 3= cities pop< 200k; 2= 200k>cities pop<550k; and 1= cities pop >500k. Controlling for this variable, the sample of 24 cities is further sectioned: 9 are in

⁶⁰ Table 14-10-0384-01 Employment by industry, census metropolitan areas, annual (x 1,000), *Statistics Canada*.

⁶¹ "North American Industry Classification System (NAICS)" *United States Census Bureau*.

⁶² Table 14-10-0385-01 Labour force characteristics, annual," *Statistics Canada*. DOI:

group 1, 7 in group 2, and 8 in group 3. Population size data is extracted from the Statistics Canada Census of Population for each census metropolitan area.⁶³

Using these data, this analysis aims to understand whether higher economic diversity has a positive relationship with lower unemployment through the COVID-19 pandemic in Canadian cities. The paper's hypothesis is that there is a positive relationship between higher economically diverse Canadian cities and lower unemployment rates between 2019 and 2021. The null hypothesis is that there is no relationship between the degree of economic diversity and unemployment rate in the Canadian cities in the sample.

RESULTS

A linear regression was conducted comparing the relationship between unemployment rates in Canadian cities and their degree of economic specialization—for further analysis, population size was also controlled. The results show that there was no statistically significant relationship between the degree of economic diversity and changes in unemployment across the 3-year period. It also shows that we cannot ascertain that population size impacts the relationship between the degree of economic diversity and unemployment. The average index amongst Canadian cities across the three years was 0.822, ranging from a low of 0.702 (Ottawa-Gatineau) to a high of 0.918 (Calgary); with a variance of 0.216. The average unemployment change during this period (2019-2021) was 1.85%, from a low of 0.1% (St. John's) to a high of 4.0% (St. Catherine-

⁶³ 2022. (table). *Census Profile*. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001." *Statistics Canada*, Ottawa. Released October 26, 2022. (accessed November 16, 2022).

Niagara). Most of this occurred between 2019 and 2020, where the unemployment rate increased by an average of 3.69%. By 2021, unemployment had reduced across the Canadian cities by an average of 1.84%. Across the 3-year period, the correlation coefficient between various degrees of economic diversity and unemployment was 0.035, with an R-square of 0.001 and a P-value of 0.871. This indicates a very weak or no correlation in the observed period.

Beginning with 2019, the correlation coefficient between the diversity index and unemployment was 0.123, indicating a very weak or no relationship. In this period, the average unemployment rate was 5.525%, and the average index score was 0.832. The R-square was 0.015 with a P-value of 0.566, way above 0.05, which means the null hypothesis cannot be rejected. In 2020, the correlation coefficient was 0.011 (an R-squared of 0.0001) with a P-value of 0.959. In 2021, the coefficient was 0.043, and the R-squared was 0.002. In all these cases, the correlation coefficient figures are very close to zero, indicating a very weak relationship between the variables. The R-squared value has been near zero as well, indicating the independent variable in our study (economic diversity) does not sufficiently explain the dependent variable (unemployment rates). The P-value has also been extremely high, greatly reducing the likelihood that the null hypothesis is rejected. The null hypothesis is that there is no relationship between a city's degree of economic diversity and its unemployment in the observed period.

When we include our control variable (population size), the results reveal a slightly different pattern between groups (although not enough to reject the null hypothesis). Across the three year-period, group 1 (cities with a population > 500k)

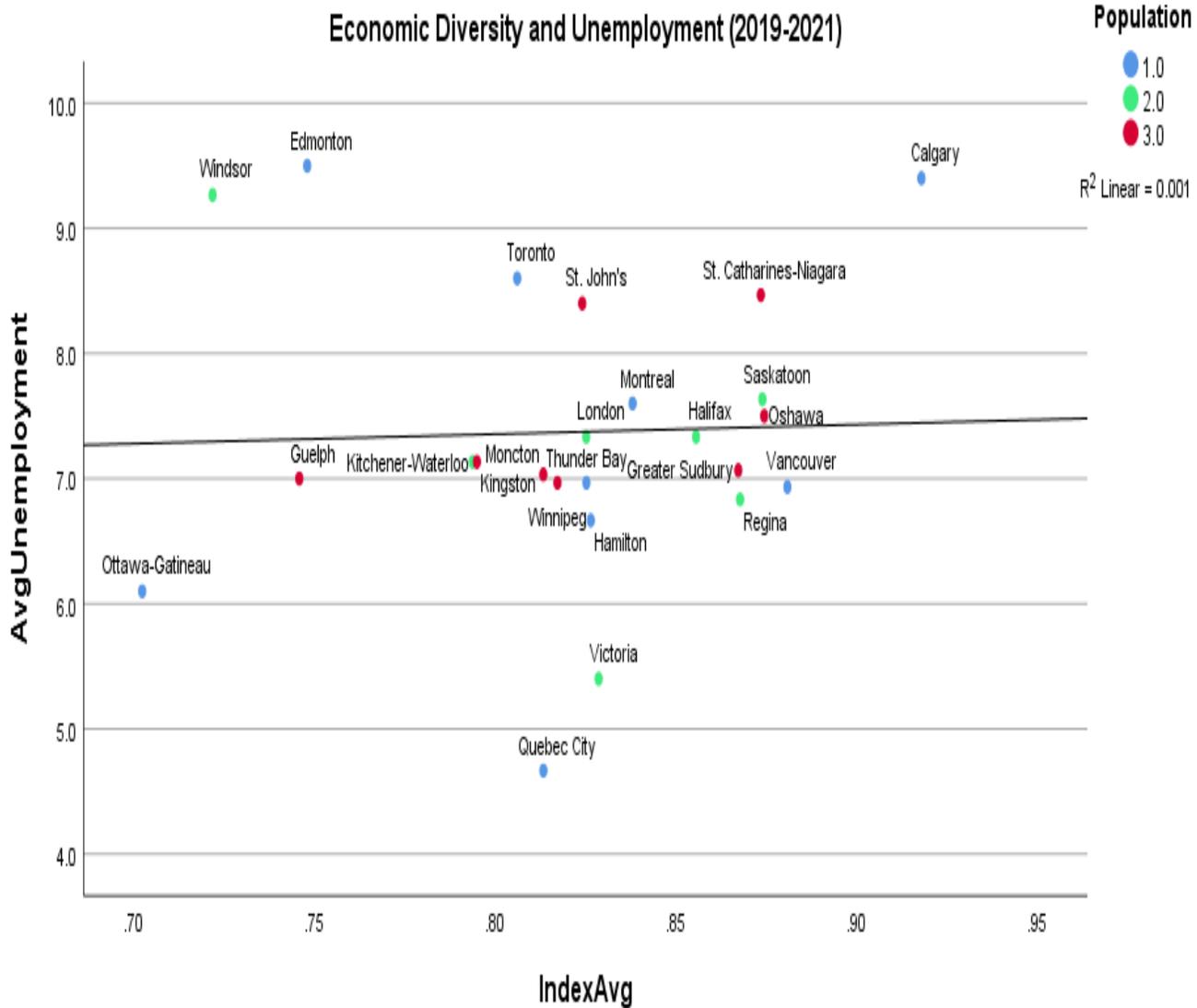
yielded an R-square of 0.042; group 2 (250k to 500k): 0.327; and group 3 (less than 250k): 0.201. The result shows a similar pattern when the data is analyzed annually, i.e., yielding higher R square values for groups 2 and 3 than group 1. In 2019, the R square for groups 1, 2 and 3 were 0.015, 0.107 and 0.280, respectively. In 2020, following the same order, these figures were 0.102, 0.548 and 0.090. Finally, in 2021, the figures were 0.003, 0.275, and 0.408. While these figures vary, in none of these cases should the null hypothesis be rejected (view Table 1). Meaning there still need to be more confidence to be certain of a relationship when controlling for population. It should also be noted that due to the smaller sample size and therefore, the increased influence of outliers, it is not advisable to draw an inference on the impact of population on the relationship between the degree of economic diversity and unemployment. However, it does spark some curiosity about whether there may be changes should more data on Canadian cities become available.

Table 1 : Correlation Coefficient with Population Group Control

| | 2019 | 2020 | 2021 |
|---------|-------------------|------------------|-------------------|
| Group 1 | 0.122 (0.755) | 0.320 (0.673) | 0.056 (0.886) |
| Group 2 | -0.327 (0.474) | -0.740 (.057) | -0.525 (0.277) |
| Group 3 | 0.529 (0.177) | 0.300 (0.470) | 0.639 (0.088) |

Note: The values in the parentheses indicate the *p*-values.

Table 2: Diversity Index and Unemployment 2019-2021



DISCUSSION

The analysis of the relationship between economic diversity and other factors of economic stability, such as unemployment, can be quite valuable as it has the potential to reveal the impact of an economic structure on the economy. The results indicate that there is no significant relationship between the different degrees of economic diversity and unemployment rates in Canadian cities. Even including the control variable does not change this fact, although it does show that cities could be impacted differently.

However, even this minute impact when the cities were controlled by population size cannot be seen as conclusive due to outliers like Windsor and Ottawa in small group sizes. Potential future research (should sectoral data be available for more Canadian cities) can be the further expansion of the sample size to improve confidence and better analyze the impact population size has on economic diversity and unemployment. That being said, the cities included in this research amount to about 15 million people of Canada's 36 million population, making these results vital in telling an important story about the impact of COVID-19's economic shock on Canadian cities.

Canadian cities were generally economically diverse, with most of them in the sample scoring above 0.80 on a scale of 0 to 1 during the pandemic's duration. But even this was not able to shield many Canadian cities from the massive spike in unemployment rates experienced in this period. The shock-absorbing benefits many researchers have attributed to a more diverse economy were not found in this study.⁶⁴ And not that putting all eggs in one basket—a basket which the pandemic-induced shock would have likely broken—would have been much beneficial either. But perhaps, it is important to consider that different economic shocks would (and can) affect different sectors differently. This concept of a differential impact is not far-fetched amongst researchers and has been proven to exist even at the market firm level.⁶⁵ Fourteen of the 24 Canadian cities in our

⁶⁴ Lathania Brown and Robert Greenbaum, "The role of Industrial Diversity in Economic Resilience: An Empirical Examination Across 25 Years," *Urban Studies* 54, no. 6 (May 2017): 1347-66; Ferhan Korten and Zeynep Elburz, "Looking for Diversified Specialization in the Regions of Turkey," *Megaron* 13, no. 4 (September 2018); Goschin, "Specialisation vs Diversification," 21.

⁶⁵ Ron Martin, "Regional Economic Resilience, Hysteresis and Recessionary Shocks," *Journal of Economic Geography* 12, no. 1 (2012): 13.; Riccardo Crescenzi, David Luca

study experienced an employment increase in the professional, scientific, and technical sector of their economy despite a reduction in total employment. However, 14 cities experienced a decline in employment numbers in the manufacturing sectors. This scenario of differential impact, and the uncertainty in forecasting the sectors most likely to face a severe shock in the long term, has been a major point amongst the proponents of diversification.

The positive relationship between economic diversity and resistance to economic shocks in some of the earlier literatures are not found in this paper. Let us begin this analysis with the city of Windsor, which outside of Ottawa, had the lowest degree of economic diversity. Ottawa is unique, being the country's capital and home to most government activities; hence, it benefits from a high representation in the public administration sector without facing the economic backlash another "non-capital" city faces for a similar level of specialization. Windsor, which is a more fitting case study for lower economic diversification, had about 22% of its workforce employed in the manufacturing sector. Over the pandemic (2019-2021), Windsor had the third-highest average unemployment rate (9.3%) and the highest unemployment rise between 2019 and 2020 (+5.3%). On the opposite end of the index, Calgary had the highest degree of economic diversity and yet did not come out unscathed, as it topped Windsor with the highest average unemployment rate between 2019-2021 (9.5%). Calgary also had the

and Simona Milio, "The geography of the economic crisis in Europe: National Macroeconomic Conditions, Regional Structural Factors and Short-Term Economic Performance," *Cambridge Journal of Regions, Economy and Society* 9, no. (January 2016): 20.; Salvatore Galbo, "The Impact of an Economic Recession on ETF Sectors: Which ETF Sectors Are Most Recession-Proof?," *Empirical Economic Bulletin, An Undergraduate Journal* 3, no. 1 (2010): 5.

third-highest unemployment increase between 2019 and 2020 (+4.7%)—this was on par with Toronto (+4.8%) and Vancouver (+4.6%), which both had an average diversity/specialization index of 0.81 and 0.88, respectively. Essentially, presented here are four cities (Windsor, Toronto, Vancouver and Calgary) with diversity index scores in the 0.70s, early to late 0.80s, and 0.90s, and yet, these were the cities that were most severely impacted by unemployment.

This analysis does not diminish the relevance of an economic structure in protecting from economic shocks. But instead, in the context of Canadian cities, it shows that having higher economic diversity (defined by diverse sectoral employment) was not (and may not be) sufficient to provide protection from COVID-19's economic shock. This information is particularly significant for Canadian economic developers and city planners seeking to develop ways to shield their economy from shocks and prevent some of the earlier listed consequences, such as an increase in crime. Equally important in the result was the realization that the economic performance of different sectors amongst Canadian cities was not uniform. For example, this analysis shows St. Johns experiencing an overall increase in workers in the educational services industrial sector while Guelph experienced a decrease. While this difference is not further explored in this paper, it is apparent that employment numbers or proportions will not always represent the depth of industries in a sector and their resistance to shocks. These are all testaments to a consistently disseminated point across this paper—that is that the complexity of the relationship between economic diversity and resistance to economic shocks may go beyond factors such as economic structure.

A limitation of this paper is its use of only one measure of diversity—the Herfindahl index. This measurement is still one of the most widely used measurements and researchers have often combined it with other measurements such as the Theil index, Location Quotient, Multiple Specialization Index, etc., in order to account for more factors. Unfortunately, this paper is unable to do that due to page limitations. However, this does not invalidate the results. Its application is somewhat limited compared to research utilizing measurements that incorporate export and trade data. It does not consider the diversity of export (produce), productivity, or output. This research is also limited in its analysis of the true impact of the control variable, population size, on Canadian cities due to a small group sample size. Therefore, it is not advisable to draw a conclusive remark on the impact of population size on unemployment in cities with different degrees of economic diversity. Addressing this weakness would require access to sectoral data of more Canadian cities.

Further studies could also incorporate more controls which may not require grouping. For example, researchers such as Jacobs and Porter have asserted the importance of competition in promoting and steering economic activity.⁶⁶ Incorporating this control would require the inclusion of a competition indicator as done by Glaeser et al. and Hong and Xiao and could yield interesting results in the Canadian sample.⁶⁷ Another possible control for inclusion in future research is the impact of educational

⁶⁶ Jane Jacobs, *The Economy of Cities*, (Vintage Books: New York, NY, 1969); Michael Porter, *The Competitive Advantage of Nations*, (Macmillan: New York, NY, 1990).

⁶⁷ Glaeser et al., “Growth in Cities,” *Journal of Political Economics* 100, (1992): 1126-1152; Hong and Xiao, “U.S. Metropolitan Areas,” 8.

levels in the population and the presence of educational institutions.⁶⁸ As more researchers analyze the impacts of economic diversity in the Canadian context, then Canadian policymakers and city planners can have more confidence in making decisions by relying on knowledge tailored to the region.

CONCLUSION

The aim of this paper was to contribute to research focused on the impact of economic diversity on economic stability in Canada. Numerous studies which have contributed to broadening our knowledge of the general role economic structure plays in economic stability have been discussed. These arguments have either advocated for or against economic diversity—with some advocating a hybrid model. Using the Herfindahl Index to measure economic diversity, this analysis reveals no significant relationship between a city's degree of economic diversity and its unemployment rate, even when population size is controlled.

The result raises the question about the possibility of a uniform (or similar) protection from economic shock amongst diverse cities once a certain degree of economic diversity is attained. While economic stability is measured through the unemployment rate, this is due to its wide use in related scholarship and its impact on society which was earlier discussed. In relation to this, the result would mean that a city's quest to improve economic stability must factor in other impacting factors. These factors (such as education level) could be control variables in future studies analyzing Canadian

⁶⁸ Ching-Fu Changho, Ping Wang, and Jin-Tan Liu, "Knowledge spillovers, human capital and productivity," *Journal of Macroeconomics* 47, (2016): 224-225.

economic structures. There is still more to uncover about the role Canada's economic structure plays in contributing to stability.

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APPENDICES

Appendix 1: Employment Industrial Sectoral

1. Manufacturing
2. Construction
3. Primary and Utilities
4. Wholesale and Retail Trade
5. Transportation and Warehousing
6. Information and Cultural Industries
7. Business, Building, and Other Support Services
8. Professional, Scientific and Technical Services
9. Educational Services
10. Healthcare and Social Assistance
11. Arts, Entertainment, and Recreation
12. Accommodation and Food Services
13. Other Services (Except Public Administration)
14. Public Administration

Appendix 2: Canadian Cities Economic Diversity Ranking

| CMA Cities | Index (2019) | Index (2020) | Index (2021) |
|------------------------------|--------------|--------------|--------------|
| St. John's | 0.87 | 0.83 | 0.78 |
| Quebec City | 0.82 | 0.79 | 0.83 |
| Ottawa-Gatineau | 0.73 | 0.68 | 0.69 |
| Saskatoon | 0.89 | 0.88 | 0.85 |
| Montreal | 0.85 | 0.83 | 0.83 |
| Kitchener-Cambridge-Waterloo | 0.82 | 0.77 | 0.79 |
| Thunder Bay | 0.84 | 0.81 | 0.80 |
| Regina | 0.90 | 0.88 | 0.82 |
| Edmonton | 0.77 | 0.74 | 0.74 |
| Victoria | 0.85 | 0.81 | 0.82 |
| Winnipeg | 0.76 | 0.86 | 0.86 |
| Halifax | 0.85 | 0.86 | 0.86 |
| Moncton | 0.85 | 0.80 | 0.79 |
| Calgary | 0.94 | 0.93 | 0.88 |
| Greater Sudbury | 0.86 | 0.86 | 0.89 |
| London | 0.81 | 0.85 | 0.82 |
| Kingston | 0.77 | 0.79 | 0.82 |
| Hamilton | 0.84 | 0.81 | 0.83 |
| Guelph | 0.72 | 0.77 | 0.75 |
| Oshawa | 0.88 | 0.89 | 0.86 |
| Vancouver | 0.89 | 0.88 | 0.87 |
| Toronto | 0.82 | 0.79 | 0.80 |
| Windsor | 0.75 | 0.69 | 0.73 |
| St. Catharines-Niagara | 0.87 | 0.87 | 0.88 |

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