

**The location of artist clusters and the
neighbourhoods they live in: An analysis of where
artists live in Vancouver from 1991 to 2011**

**by
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Abstract

This paper builds on the body of literature led by Ann Markusen in exploring where different types of artists live in urban metropolitan areas. Findings from this paper provide further understanding of where artists live within Vancouver and what factors influence their location choices. Using census and national household survey data from 1991, 2001 and 2011, this paper examines the varying demographic and socio-economic characteristics of the neighbourhoods artists live in across Metro Vancouver. This longitudinal analysis applies the granger causality test to identify what factors attract and displace artists over time. A geo-spatial analysis shows that artist occupations cluster in central neighbourhoods near the downtown core in the City of Vancouver and have tendencies to be drawn towards different types of artist facilities.

Keywords: artists; urban; Vancouver; census; location preference; cluster

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Chapter 1.

Introduction

An artist's ability to create art, practice art or demonstrate an art can have profound impacts on the urban environment. Artists influence cultural development, innovation, politics, and the economic development of communities, cities and regions (Florida, 2002; Markusen, 2006; Markusen & Johnson, 2006; Grodach, 2014; Ley, 2003). The economic benefits of artists go well beyond the production or performance of art through ticket sales to a performance or selling a painting. Artists transcend into various industries exerting influence over the innovation, design and marketing of products and services (Markusen & King, 2003). Artists can have urban transformative impacts as they move into derelict urban areas to benefit from more affordable rent; in turn they develop culture and create a social presence which can turn formerly undesirable urban places to live into desirable ones (Ley, 2003). The benefits that artists bring to a city can be significant; as such, economic development policies have been designed and implemented to attract artists to cities. While cities and regions benefit from artists, "art and artists affect, and benefit from, the political economy of place, while cities provide art's audiences and patronage" (Shrank, 2009: 10). The artist and the city have very important connections that enable their successes. On the other hand, the relationship between artists and cities is often frayed as artists are seemingly in a constant battle against affordability and displacement by the forces of urban gentrification and development pressure. In this unique relationship with cities, "art offers a site for political, ideological, and territorial struggles that have few other spaces in which to play out" (Shrank, 2009: 11). This paper takes a quantitative approach to understanding these struggles in order to develop a deeper understanding of where artists cluster, and what attracts them and displaces them from urban neighbourhoods.

The City of Vancouver hosts a large and growing art scene but is also troubled with affordability issues as the rising cost of living surpasses income growth (City of Vancouver, 2016). Many artists in Vancouver are on the lower end of the income spectrum compared to other occupations; as such, their ability to afford housing, transportation, and access facilities and amenities is limited. The cultural and economic

dividends from artists can be immense to cities and urban regions, which is why cities want to attract artists; however, many cities like Vancouver are challenged to provide artists with affordable housing and workspaces. The City and region of Vancouver present a rich case study in understanding the relationship between where artists live and work that adds insight to the work of Anne Markusen, Carl Grodach, Jill Grant, Tara Vinodrai, Brian Hrac and Kevin Stolarick.

This paper looks to answer the questions: Where do artists cluster in Metro Vancouver between 1991 and 2011, what are the characteristics of the neighbourhoods they live in, and what is their spatial proximity to artist facilities? And how has this changed overtime? The hypothesis presented in this research is that artists cluster in neighbourhoods that have lower cost housing in close proximity to artist facilities in order to benefit from economies of agglomeration. Understanding this premise can help guide the implementation of artistic and cultural development policy and mitigate the displacement of artists and ensure long term sustainable occupational development and social equity for artists.

The research question introduces an examination of where artists live at the neighbourhood level and their spatial relationship to the neighbourhoods they live in and proximity to artist facilities within Vancouver and how this relationship has changed over time. The research presented in this paper provides an in depth understanding of the location preferences of artists within Vancouver, which can be extrapolated to provide a broad understanding of artists within Canadian urban areas. This research also presents a new quantitative method to examine the distribution of artist's facilities in relation to where artists live, which could help inform future arts, culture, and housing policy. The paper focuses on where artists live within Vancouver and provides a detailed analysis of the socio-economic factors that have influenced their locational choices. The literature review provides evidence from both quantitative and qualitative studies that explore the economic development potential of arts and artist, struggles artist face within the urban environment, and the location preference of artists. The literature covers the artist as a member of the creative class in the development of economic development policy and academic research that challenges the notion of the creative class and presents a more detailed approach to researching artistic occupations and their role within economic development.

Over the last 15 years, there has been a growing interest regarding the creative class and its connection to urban economic development. Contrasting theories have emerged during this time that paint a very different picture of the role artists play within the creative class and within cities regarding urban economic development. The narrative of literature that will be presented begins with Richard Florida's notion of the creative class presented in *The Rise of the Creative Class* (2002) and the subsequent research by Ann Markusen and other researchers that challenged Florida's theories pertaining to artists role in the creative class, location choice and the factors at play that attract and displace artists to and from neighbourhoods, cities and metropolitan regions.

Florida's (2002) creative class theory posits an emerging work force with talent, skill, creativity and knowledge that can drive innovation and advance economic development. The literature review covers work from other researchers who refute Florida's notion of the creative class and unpack the shortfalls in his theory. The criticism drawn to Florida's findings on the creative class acted as a catalyst for researchers like Anne Markusen, Jamie Peck, Michael Storper and Allen Scott, among others, to author rebuttals and add to a growing narrative that explores creative occupations and industry through theories pertaining to socio-economic polarization, gentrification, displacement and location preference. Anne Markusen has emerged as one of the fiercest critics of the creative class labelling it as a over simplified approach to researching occupations while providing empirical evidence of the location preferences of artists and the need to look at different occupations separately. The attention has resulted in a thorough review of the creative class and added new dimensions and perspectives to provide a better understanding of location preferences and socio-economic issues surrounding the urban artist. To add to the growing narrative of research on artist occupations and their impacts and influences within cities and regions, this paper presents a quantitative longitudinal analysis that explores the types of neighbourhood's artists live in and the factors attracting and displacing them in Metro Vancouver neighbourhoods between the 1991, 2001 and 2011 census years.

While there is evidence that suggests artists cluster in amenity rich cities with a thick labour market (Florida, 2002), what is missing from these perspectives is a quantitative understanding of the neighbourhood characteristics where artists live, their spatial proximity to artist facilities, and the socio-economic factors that attract and displace artists from neighbourhoods. This paper presents the findings from a series of

regression analysis that explore what types of neighbourhood's artists live in, and their proximity to artist practise, performance and production facilities. Findings are compared to theories regarding the location preference of artists developed by Florida (2002), Markusen (2006 & 2013), and Grodach (2014). Overall, findings show that artists cluster in central neighbourhoods that have a higher proportion of the population that bikes to work, rents their dwelling that are in closer proximity to artist facilities. Between 2001 and 2011, statistical evidence suggests that artists were displaced from neighbourhoods that experienced a higher increase in housing prices in the previous decade.

The research presented in this paper uses a longitudinal statistical method for analyzing artist populations to understand what kind of neighbourhood's artist live in and what factors are attracting or displacing artists. Findings from this analysis can help inform policy making for creating long term affordable and accessible artist housing and facilities for local artists. While this paper focuses on Metro of Vancouver, it is intended to provide a framework and methodology that can be used to help understand the location of artists in other communities, cities and regions across Canada.

The literature review presented in the next chapter explains the notion of the creative class as presented by Richard Florida in his book the *Rise of the Creative Class* (2002), and the criticisms that resulted from it. The creative class and its rebuttal form a comprehensive look at the emerging creative economy, artists role within it and the location preference of artists. The literature review highlights the work of Anne Markusen who focuses on the location preference of artist occupations in Minnesota and Carl Grodach who examines the clustering of the arts industry in United States metro-regions, cities and neighbourhoods. Additional literature is included to provide more depth and understanding of the social economic issues artists are faced with in urban environment that influences their locational choice. The literature presented in the following chapter captures a developing narrative that explores theory regarding the economic development aspects of the arts industry and the location preference artist occupations in a changing urban environment struggling with affordability, displacement and income inequality. This paper is intended to fit within this developing narrative related to artist location preference by presenting a series of linear regressions that explore the location of artists in Vancouver and the neighbourhoods they live in.

Chapter 2.

Literature Review

Artist's role in the urban environment has been studied widely, from their impact on local to global politics to their influence on the gentrification of inner-city neighbourhoods. There is consensus among researchers that the arts and artists provide a valuable social and economic benefit to cities and neighbourhoods (Currid, 2009; Currid and Williams, 2010; Grodach, 2011; Markusen and Gadwa, 2011; Stern and Steinfert, 2010; Markusen and Schrock, 2006b). As a group, artists are also integral to the diversity and vitality of cities and show potential as a political force to lead in social and urban transformation (Markusen, 2005). The creative, social and cultural dividends from artists and the art they produce have the ability to transform neighbourhoods in cities to more desirable locations (Markusen, 2006; Ley, 2003; Cole, 1987). This has lead researchers to examine the role that artists play in regional economic development. Urban researcher Richard Florida coined the term 'creative class' to describe a creative and talented work force that would lead regional economic development (Florida, 2002). His research exploring the importance of developing and attracting a talented, skilled and educated labour force as an economic development strategy rose in popularity as other researchers came to similar conclusions that reinforced Florida's findings (Haisch, 2015). As these theories gained popularity, municipalities and regional governments began to adopt urban policy to reflect the need to attract this emerging work force; however, this movement did not come without criticism. Florida's concept of the creative class was criticized for being simply a grouping of highly educated workers (Markusen, 2006), and fear grew that policy to attract such workers would cause income inequality and more displacement pressure on lower income earning population groups (Storper and Scott, 2009). The literature review provides an overview of the criticism towards the creative class and presents how policy geared towards attracting creative workers for urban economic development can lead to social divide, gentrification and the displacement of local artists.

The body of the literature review begins by presenting Richard Florida's notion of the creative class and its reach to become a part of economic development policy in city

and regions. I then unpack the role artists play within the creative class and how attracting artists to cities has been used as a catalyst for attracting talent and the economic benefits that come along with it. I then turn the focus to present the counter arguments that have materialized criticizing Florida's Creative Class. Particular attention is placed on the work of Anne Markusen who refutes Florida's construct of the creative class and suggests that all creative occupations, particularly artists, should be researched individually in more detail as they have unique location preferences. Next, I expand on theories from various authors pertaining to the location preference of artists at both the regional and neighbourhood scale. Lastly, I present literature that discusses negative externalities, such as income inequality, displacement and the overall process of gentrification that urban artists struggle with.

The Creative Class

The base of the literature review stems from Richard Florida's notion of the Creative Class, which he presents in his book *The Rise of The Creative Class* published in 2002. In this book, Florida (2002) presents the idea that attracting the creative class, an emerging workforce he describes as having talent, skill, creativity and knowledge, to metropolitan regions can drive innovation and attract investment, capital and the formation of new corporate firms. Florida argues that researching occupations provides the most accurate representation of human capital and argues that the essence of human creativity will be the main driver of economic development. For his analyses of the creative class, Florida aggregates occupations including scientists, engineers, university professors, poets, architects, artists and musicians "whose economic function is to create new ideas, new technology and/or creative content" (Florida, 2002: 8). Using this grouping of occupations, he draws from census data to show that the creative class is attracted to metropolitan regions with diversity, high quality amenities, attractive downtowns, high quality of life, openness, and tolerance. As a main component of the creative class, he urges that artistic and cultural occupations are significantly linked to regional development, income and wealth (Florida, 2002). In more detail, Florida suggests that artists "cluster in communities that value open-mindedness and self-expression" and are also attracted to areas abundant in amenities (Florida, 2012: 245). Further, he argues that by instilling these same values in their community, artists are able to attract creative occupations, notably high-tech workers, that seek the same community values; therefore developing policy, infrastructure, and an environment for

artists will, in turn, attract the creative class and the inherent economic benefits that come with them (Florida, 2012). Aware of the negative externalities, Florida (2012) concedes that artists area already used by developers or land speculators to increase the desirability of a place for potential workers, and a place for new business to form.

More recently, Richard Florida has published a book titled *The New Urban Crisis*, which revisits his notion of the creative class and admits that he was overly optimistic to think that the creative class would bring "a better and more inclusive kind of urbanism". Acknowledging, that the "leading creative cities were also the epicentres of economic inequality", Florida concedes that artists are being priced out of certain markets as the flow of tech and professional workers and the wealthy move back into urban centres. For example, the SoHo district of New York, which used to host a healthy diversity of artist, is "giving way to a new kind of wealthy people, high-end restaurants, and luxury shops." In an interview with David Byrne, the lead singer of the new-wave band Talking Heads, Byrne's concedes that Manhattan and Brooklyn have become virtual walled communities, a pleasure dome for rich where "middle-class people can barely afford to live..." (Florida, 2017). Despite the negative outlook, Florida states that the recent increase of wealthy people in urban cores, and the transformation of formerly artistic centres, the creative capacity of these cities has not diminished yet. Artists in major cities in the United States such as New York, LA and San Francisco are taking home on average less money after housing than other occupation such as tech workers and business professionals but are still up to three times better off than service workers. But many artists are still struggling and being priced out of neighbourhoods as they compete to live in the same place as high-tech, business and finance workers. Florida acknowledges that artists are struggling with an "increasingly intense competition for urban space" but adds that global cities like New York and London are still leaders in arts and culture where they are growing in parallel with high-tech, and business and finance sectors (Florida, 2017). Some artist's occupations are being supported through new and growing industries. Florida highlights that arts and creative jobs are merging into other industries, from corporate web design to computer animation for video games (Florida, 2017). But how are artists faring when competing for places to live in the same cities as the growing creative class workforce? In turn, Florida (2017) says that policy makers and planners should focus on things that make cities more desirable, such as walkable neighbourhoods, bike friendly streets, and vibrant art scenes. Florida

highlights the cities of New York, Los Angeles and London as arts and creative superstars. These cities have the largest concentration of artists and creative jobs in their countries and continue to be leaders for employment growth. Embracing the art and music scene in cities is part of making cities great places to live and work (Florida, 2017).

Critics of The Creative Class

Florida's *The Rise of the Creative Class* was written to appeal to a broad audience and was successfully disseminated through a well-orchestrated marketing campaign (Peck, 2003; Markusen, 2006); However, the book's methodology, findings and theory were met with criticism. A few years later, Ann Markusen published *the Urban development and the politics of a creative class: evidence from a study of artists*, where she criticizes Florida's notion of the creative class as being merely a grouping of "people in occupations defined by high levels of higher education" (Markusen, 2006). She argues that "talent, skill, and creativity are not synonymous with higher education", and "artists are differentially distributed among larger cities" as a result of localized artistic development and the location of industry (Markusen, 2006). Markusen (2006) urges that individual occupations need to be looked at more closely rather than grouping them together such as Florida has done with the creative class. In her research, Markusen focuses on artist occupations, their location preference, role in economic development, and how they fit into the creative class concept. She also finds no correlation in an analysis of census data that artists and the high-tech sector are drawn towards one another, contrary to Florida's findings. The strong opposition to Florida's 'creative class' paradigm has not been without benefit. The attention has resulted in a thorough review of the creative class and its relation towards economic development and the location preference of occupations, notably artists. Many have written on the correlation between the creative class and urban economic development, but can these theories also apply for artists, an occupation entrenched within Florida's creative class?

Around the time Florida published his book on the creative class, Clark (2002), made the observations that there was shift in political appetite occurring towards investing in amenities in order to attract workers, rather than economic development plans that focus on job production and luring in new firms through incentives. This is in

line with Florida's theory that the creative class is attracted to amenity rich central areas in regions with a thick labour market (2002). Clark explains that this new political landscape is a result of globalization and the redefinition of economic rules that now highlights culture and amenities (Clark, 2002). New technology is decreasing the reliance on the classic economic variables, such as distance, transportation costs, local labour costs, and proximity to resources and markets. A greater focus and concern have arisen regarding traditional spatial dynamics of cities with particular attention to the arts and aesthetics (Clark, 2002). This shift in priorities has influenced public policy and investment away from providing incentives for job creation and into providing more public goods and local amenities (Clark, 2002).

Also criticizing Florida, Storper and Scott (2009) conclude that focusing too much on a few occupations could put unnecessary focus on highly educated and high-income individuals which could in turn exacerbate the urban economic and social divide. They call for more research to better understand the complex relationship between the movement of labour supply, the location of industry and the effects on urban economic development. Storper and Scott conclude that there is room for research, theorizing and evidence that can be used to harness the complexities of dynamic economies to "generate meaningful advice for policy-makers" (Storper & Scott, 2009).

The following year, Allen Scott followed up on the topic with his article titled *Cultural economy and the creative field of the city* where he discusses the emergence of a new economy; which has taken on a variety of terms, including "flexible specialization, post-fordism, the knowledge economy, or sometimes, simply, the new economy" (Scott, 2010: 115). He explains that the emergence of this new economy brings with it a labour force bestowed with "high levels of human capital for analytical thinking, judgment and decision-making, fluency of ideas, social perceptiveness, capacities for interaction with others, and imaginativeness, as well as in regard to substantive knowledge and expertise" (Scott, 2010: 115). Around the globe, this emerging highly skilled and educated labour force has been intertwined in theory relating to creativity, innovation, human capital, the creative class, and creative cities across the field of social science research. Like Florida, Scott's cultural economy is focused the emergence of a creativity labour force in cities that is able to act as a catalyst for urban economic development. While Scott suggests there is no definitive definition to encapsulate the idea of the cultural economy, he uses eleven occupations to represent its labour force. His

occupations include artists, designers, actors, producers, directors, dancers, choreographers, musicians, singers, editors, writers, authors, photographers and occupations related to television and motions picture production. In the US, he finds 66 metropolitan regions have a location quotient of these cultural occupations of 1.75 or greater, which he deems to be the benchmark for significant clustering of cultural economy activity. Los Angeles and New York are the most prominent centres of the cultural economy with San Francisco a distant third.

Scott claims the cultural economy requires a great deal of interpersonal contact and communication, which echo's the findings from Storper and Venables (2004) who stress the importance of face-to-face contact as an efficient form of communication. This contact, Scott says, is circulated through specialized clusters of cultural economic activity. Scott finds that clustering helps increase the efficiency of inter-firm transaction while rendering the labour force environment more efficient by reducing commuting, localizing job searches and connecting employees to jobs. It also provides the opportunity to bring a diversity of decision making and behavior together which in turn augments the creative capacity of firms and workers while further influencing the formation of clustering; as such, Scott highlights that urban environments are incredibly important places for the creative field whose reach extends globally (Scott, 2010).

Location Preference of Artists in Cities and Regions

In a mixed methods approach using 2000 census data for the United States, over 200 artist interviews, and over 1,200 web-based survey responses, Markusen examines the role of artists within the creative class and critiques Florida's theory regarding their spatial distribution (2006). Markusen (2006) looks at four groups of artists: writers; musicians; visual artists (including film-makers and photographers); and performing artists (including actors, directors, choreographers, dancers); which she says, is a definition artist used widely across social science research. Using these qualitative and quantitative data sources, she finds that artist's spatial distribution is linked to the location of artistic industry, and "conscious locational choice on the part of artists and of local efforts to promote artistic development" (Markusen, 2006); however, she also finds that different types of artists have unique spatial differences. Writers, visual artists and musicians have the highest proportion of workers that are self-employed, which allow them to be more footloose giving them the ability to choose a location of where to live

before making employment related commitments (2006). Because they often work alone, visual artists and writers are often found avoiding “the largest, most expensive, and arts-specialized cities” (Markusen, 2006). Understanding the forces that attract artists to cities and regions are complex. At the regional level, Markusen’s (2006) research suggests that media, industry, affordable housing, recreational and environmental amenities, and a well-developed cultural scene all play a role in attracting artists.

Other studies have looked at specific artist occupation and their location preferences and what attracts them to a certain place. In a study of musicians in Toronto, Hracs (2011) interviews 51 musicians using structured interviews to understand how they go through the process of deciding when and where to move based on expectations and the factors that influence their location preference. In his study, Hracs finds that musicians are attracted by their perceived expectations of amenities and socio-economic conditions in a specific location. Further, a study of musicians in Halifax reveals that affordable housing near the city centre helps foster local networks amongst artists (Grant, Haggett, Morton, 2014).

At the neighbourhood level, Markusen (2006) find that artists move to areas that are centrally located within the metropolitan region and in proximity to artist centers, live/work and studio buildings, and smaller performing arts spaces. Artist centers are described as dedicated gathering spaces that offer a multitude of uses including classes, mentoring, networking, workshop and a place for readings, performances and conversations (Markusen and Johnson, 2006). Artists live/work and studio buildings include older industrial buildings that have been retrofitted into artists’ studios and live/work units. Markusen (2006) draws from examples of old breweries and warehouses in the Minneapolis/St. Paul region where artists or non-profit developers have initiated the conversion into artistic spaces. These converted spaces can host many artists in one location that can provide great opportunity for networking, gaining exposure and hosting public viewings to provide an outlet for sales (Markusen, 2006). Artists are also attracted to smaller scale performing arts venues as arts spaces, such as theaters, dance, and music venues where creators and performers can practice, interact and perform (Markusen, 2006). These venues are unique in the sense that the art produced is meant to be experienced in real-time, such as a play, dance or a musical performance. Altogether these artist spaces identified by Markusen help attract, retain

and home-grow artists. These venues and spaces provide an opportunity for artists to build careers, which in turn increase the quality of artistic output and strengthens both the regional and neighbourhood economies (Markusen, 2006). Establishing arts educational institutions in the Minneapolis/St. Paul metro region resulted in a net growth of artists by attracting them to the area and providing a space and institution to influence and grow local artists (Markusen, 2006). She finds that actors and dancers are more likely to reside within inner-city neighbourhoods than their musician, writer, and visual artist counterparts. As for age, Markusen discovers that younger artists are more likely to live in “very close-in neighbourhoods, where the ratio of men to women artists is higher; and they are more apt to rent than to own” (Markusen, 2006: 1930). While it is often assumed that artists typically have below average incomes, Markusen finds that artists live in neighbourhoods with higher income households. What is not described, is whether the high-income households moved into the neighbourhood before, after, or at the same time as the artists, which could be an indication that artists are influencing gentrification.

In a more recent paper, using 2000 census data, Markusen (2013) explores migration trends of artists in the United States across metropolitan regions and offers theory on the location preference of artists. In this study, she finds artists are attracted toward the centers of metro regions (Markusen, 2013). Taking a closer look at the individual types of artists, it is discovered that performing artists are highly concentrated in areas with large stage and film industries, such as Los Angeles and New York; while writers move to what she calls ‘superartist cities’; which are described as having thick labour forces and with high concentrations of artists, such as New York, San Francisco, and Los Angeles (Markusen, 2013).

Using a regression analysis similar to what is presented in this paper, Grodach (2014) finds that occupations that work in the arts industry are likely to cluster in urban metro regions that have a high proportion of highly educated workers. He also finds that different types of workers in the arts industry have unique location preferences with significant variation at the neighbourhood level (Grodach, 2014). He also finds that artists locate near concentrations of artists venues and institutions. In his paper, Grodach reaffirms the importance of the role artists play in providing social and economic benefits to cities and neighbourhoods (Grodach, 2014).

Grodach (2014) finds that arts industries cluster in innovation districts, which are defined by areas that exhibit a concentration of technology, media and finance alongside higher-education institutions and amenities, such as bars, coffee shops, and restaurants (Grodach, 2014). As many of the other researchers have found, the arts industry is quite dispersed across the United States, but they are most concentrated in major regional centres (Florida, 2002, Markusen, 2006; Andersson, 2014; Grodach, 2014; Haisch, 2015). Arts clustering tends to flourish in urbanized regions with stronger economies, which is somewhat expected as strong economies typically have a larger job market. The research revealed little correlation between the arts and other creative or knowledge intense industries at the regional level, which also aligns with Markusen's (2006) findings. Grodach calls for in depth research into art clusters in relation to the type of art being produced and where. He finds that location characteristics of arts clusters are not easily identified when looking at the neighbourhood level; however, there is strong evidence that arts industries and their respective occupational labour pool cluster in larger dense, diverse and amenity rich regions. Grodach also notes that artists will locate in neighbourhoods depending on the specific needs related to their artistic requirements (Grodach, 2014). Thus, support for the arts should be focused at local development, with complementary support at the regional level.

Artists benefit from agglomeration economies and regional knowledge externalities (Andersson, 2014). Similar to what Scott (2002) discovered with his research on the cultural economy, Andersson (2014) finds that artists learn from each other, as result proximity and face-to-face contact with other artists is important for innovation and learning. Because artists are more likely to be self-employed than any other occupation in the labour force, they are able to “move between cities, within cities, and between cities and rural areas at relatively high rates” (Markusen, 2006: 2928). Andersson (2014) finds that designers and architects, like artists, tend to move around constantly. In 2000, 96,000 artists lived in New York, of which 21% of them had moved there within the previous 5 years (Andersson, 2014). Artists tend to cluster in large cities, but architects and designers have a greater preference for large cities, than others. In cities, artists tend to cluster in dense central urban neighbourhoods that offer access to art schools, performance and exhibition spaces, affordable live/work and studio space, training institutions, artists' centers, and entertainment and recreation related amenities (Markusen, 2006). Andersson (2014) also uses this explanation to

describe the location preferences of artists throughout Sweden. Digging deeper, Markusen discovers that “performing artists are more inner-city centric than are musicians, writers, and visual artists, but all artists are more central-city oriented than are other occupations”; while younger artists are drawn to inner-city neighborhoods with more rental opportunity (Markusen, 2006: 1930). Andersson (2014) also finds that performing artists are much more dependent on immediate accessibility to consumers and other producers than non-performing artists; while actors and dancers tend to locate within the inner-city close to performing venues, while visual arts and writers benefit from knowledge externalities, and some may seek periods of isolation. Andersson (2014) explains that artists want to locate in close proximity to other artists, thus explaining why artists agglomerate in central neighbourhoods within large regions. Meanwhile, Cole (1987) finds that proximity to commuter train service to New York City was a desirable location for artists living in the more affordable cities of Hoboken, Jersey City, and Newark, while still being able to access the cultural hub, New York City; however, artists have been pushed out of New York City because of the loss of affordable housing opportunities.

In the article *Artists Work Everywhere*, author Anne Markusen (2013) explores the location of artists across the United States. Markusen provides a different theory than that proposed by Richard Florida, arguing that “artists work everywhere”, and that there is much more complexity to the common stereotype that artists only live in culturally rich city centres. She discovers that artists, don't just cluster in large fashionable cities, but are spread throughout the country and are more likely to migrate across states than any other occupation. She argues that past research wrongly claims that artists are only concentrated within the major economic and cultural centres and are inherently victims of their effect on gentrification. Markusen finds that the majority of artists actually work outside of the three major United States cities, in medium-size cities and regions, and even small towns and rural areas (Markusen, 2013).

In the paper, *Location Choices of The Creative class: Does Tolerance Make A Difference?*, Haisch and Klöpffer (2015) explores Richard Florida's theory that tolerance and amenities attract the creative class to large urban centres. Through analyzing the results of the Swiss voter data, they discover that the creative class is concentrated, for the most part, in city centres and the urban fringe (Haisch & Klöpffer, 2015). The authors also find that the creative class and high-skilled workers are attracted to places

that have a higher quality of recreation, diversity and tolerance. Consumption patterns were also identified as a key indicator for attractive to a place. Traditional factors, such as good quality schools, jobs and safety, are increasingly becoming prerequisites for those who can choose where they would like to live. The authors also echo the common theme that tolerance has a positive correlation with economic growth. They divide tolerance into two categories: tolerance towards same-sex partnerships, and tolerance of immigration. They find that the populations in the city centres are more tolerant while, those on the urban fringe are less so (Haisch & Klöpffer, 2015). Overall, the results also show a higher share of the creative work force in municipalities where there are increased levels of tolerance (Haisch & Klöpffer, 2015). Once established, creative workers further influence these factors as they instill their values into their community. The authors also find that the creative class are also drawn towards tolerance towards communities that have higher rates of immigration and integration of foreigners (Haisch & Klöpffer, 2015). Next, literature is presented on how artists are effected by urban inequality, gentrification, and displacement.

on issues surrounding attracting the creative class into communities and the resulting

Gentrification, Displacement and Urban Inequality

Early research on the effects of urban gentrification and the role artists play in influencing it provided the initial footings for research on the movement and location preference of artists at the neighbourhood level. In a case study, David Cole (1987) explores the urban change, gentrification process and resulting displacement in the urban cities of Hoboken, Jersey City, and Newark. These cities became convenient places to live for artists after the development the PATH passenger train line that connects to New York City, one of the largest art hubs in the art world. The artists moving into these New Jersey cities are largely displaced from earlier gentrification processes in the SoHo, TriBeCa, and East Village neighbourhoods of Manhattan. Artists that are displaced to seek more affordable rent are often willing to live in older dilapidated industrial areas and surpass boundaries into areas that are racially and ethnically segregated. When the artists moved into the Hoboken, they created a community that was welcoming to others, which in turn increased the demand to live there (Cole, 1987). As many urban economists have been encouraging, cities buy into

the idea that artists can revitalize a rundown area; as a result, artists are often set to repeat this process (Cole,1987). In Hoboken, the process of increased property values and displacement affected, not just artists, but all the low-income working-class groups that also lived there (Cole,1987). Eventually, Hoboken converted to high-rent apartment and attracted working New York City professionals earning higher salaries. In Jersey City, the Heights neighbourhood was envisioned as an institutionalized artist community as part of a planned rehabilitation project that looked to capitalize on the artist's role in revitalizing derelict urban areas (Cole, 1987). Legislation and zoning provisions allowed artists to live and work in studio spaces. Despite this effort to attract and retain artists, real-estate climbed rapidly, and renters were often displaced (Cole, 1987). Census data reveals that just fewer than 25% of the people in the area were under the poverty line, while unemployment was at 14.3% (Cole, 1987). The only means for artists to find stability in this process is to own space; in which case Cole argues the artist can become an agent of gentrification. Another means to curtail the displacement of artists from urban areas is the idea of rent subsidies to help make up the difference in rent that gentrification has caused. The shortfall to this is that other demographics, such as low-income working groups, the elderly and ethnic and immigrant groups are at risk to also be displaced without the help of subsidies (Cole, 1987).

Further to this, Leslie and Hunt (2013) argue that government policy and funding towards arts programs based on the notion of supporting the 'creative class' has been misguided and circumvents the underlying socio-economic issues of marginalization and inequality. These issues can be exacerbated when broad economic development policies are applied that do not address local inequalities (Leslie & Hunt, 2013). Drawing on 60 interviews with artists, arts institutions, government officials, and community organizations, the authors argue that political support for such programs is being influenced by the hopes of creating a perception of tolerant societies that are attractive to new talent, investment and tourism for the city. They look into the approach the City of Toronto has taken to roll out creative city and priority neighbourhood programs in low-income neighbourhoods. Leslie and Hunt explain that the City justifies community arts funding in marginalized neighbourhoods by the contributions they have towards employment creation, community development, and urban security (Leslie & Hunt, 2013); however, the authors express concern regarding who is included and excluded from these programs and how these programs are rationalized through policy planning

and implementation. Arts programs are often funded for their outcomes and neglect to tackle the broader systemic issues related to racism, labour, marginalization, public safety, and other social issues; further, arts program funding is often inequitably distributed, as some groups are privileged over others (Leslie & Hunt, 2013). Struggling artists face trying to “to bridge the gap between participation in community arts and finding any professional artistic success” stems from the failure of arts programs to address these overarching community social issues (Leslie & Hunt, 2013: 1189). Meanwhile, programs and policies that focus on the creative class often favour those who already have the financial ability to gain from the increased real-estate or commercial demand. Leslie and Hunt reveal that long-term low-income residents that are often put in a state of further disadvantage as market capitalization drives up the cost of living. Lastly, the authors acknowledge that arts programs can empower individuals, but they are incapable of tackling “systemic causes of socio-economic inequality—issues that should be the focus of municipal government, whether or not these chime with the interests of the creative class” (Leslie, 2013: 1189).

This literature review provides an overview of the idea of the creative class as presented by Florida (2002) and the rebuttal from authors that lead to a growing narrative about artist occupations, location preference, gentrification, and socio-economic inequalities artists are faced with. This paper seeks to build on the research of Markusen and Grodach by exploring individual artist occupations at both the regional and neighborhood scale, and the socio-economic factors that influence their movement to and from neighbourhoods. To contextualize Vancouver into the narrative that has been presented in the literature review, the next chapter introduces the history of how Vancouver developed as a city and region, and how it became home to the third largest population of artists in Canada. The following chapter provides a background on the rapid development of the city and some of the more recent challenges artists are facing with rising real-estate values, escalating rents and development pressures.

Chapter 3.

The Vancouver Context

Metro Vancouver hosts the third largest population of artists and the highest percent of artists to its labour force across Canadian metropolitan regions. The vibrant art scene that Vancouver bestows today stems from early support for the arts. During a time of rapid growth during the City's infancy key investments propelled into funding for major private and public artist facilities. This chapter provides a historical background of how the city and region built up through rapid change since the late 19th century and how it became a vibrant art scene on the west coast of Canada. The chapter then explores the many civic and regional policy and initiatives over the years that helped create the successful arts community in Vancouver.

The year before the City of Vancouver was incorporated in the 1886, it had just been decided that the western terminus of the Canadian Pacific Railway would come to Coal Harbour where the shipping port to the Pacific was going to be constructed; at the time the City had a population of about 400 people (Davis, 1997). Logging and forestry products were the dominant industry as sawmills began popping up across the region and forests were being cleared to make way for population growth and expansion as (Davis, 1997). In 1887, the City was hooked up to electricity and growth picked up rapidly as new saw mills were constructed. Near the turn of the 19th century, the flood of Europeans into post-colonial Vancouver brought their musical culture which consisted of brass players and Bach music and would establish the initial arts and culture scene in the city (Davis, 1997). In 1888, the CPR commissioned the design and construction of the city's first significant artist facility, the Vancouver Opera House (Luxton, 2003). This facility would form the centre of cultural and arts activities in the city. The City of Vancouver made it's first investment in the arts by awarding a grant to the City Band in 1893. Shortly after, the first Vancouver Symphony was established in 1897. At this point the population of Vancouver was booming and by 1901, the City had reached a population of 29,000 and "growth became almost frenzied" (Davis, 1997). In and out of production, the Vancouver Orchestra revived itself indefinitely in 1930 after the new 3,000 seat Orpheum Theatre was completed in 1927 and would remain a constant

performing arts attraction in the city (Gooch, 2011). The construction of the Vancouver Orpheum in Vancouver's downtown peninsula would form the centre of arts and cultural activities in the City, initially hosting vaudeville acts, it was briefly converted to a movie theatre before finally taking form as a concert hall where it has been a venue for performances by the Vancouver Symphony Orchestra, B.B. King, Frank Sinatra, and Diana Krall (Werb, 2011). The purchase of the Vancouver Orpheum by the City of Vancouver in 1974 gave the financial stability to continue its legacy as the arts and cultural centre piece of the City and region. As growth in the city and region continued, more music venues, theatres, and artist practice and production facilities would be built around the Orpheum. Shortly after the construction of the Orpheum the first Vancouver Art Gallery was built with the help of the City by donating land on Georgia Street (Davis, 1997). Nearby the City of Vancouver built the Queen Elizabeth Theatre in 1959 and with seating for 2,765 it would be the largest dedicated venue for concerts, Broadway shows, opera, dance and ceremonial events in Canada (City of Vancouver, 1997). This was followed by the City of Vancouver building the Playhouse Theatre in 1962, which would become home to a range of dance and musical performances (City of Vancouver, 2017). In 1983, the Vancouver Art Gallery would move to the location of the former Vancouver Law Courts, only two blocks from The Orpheum (Davis, 1997).

Formed in 1968, Metro Vancouver, formerly known as the Greater Vancouver Regional District, currently contains 21 municipalities, one electoral area and one treaty First Nation (Province of BC, 1968). Unlike some of its member municipalities, arts and cultural planning has not been a significant part of regional growth planning for Metro Vancouver. The 1996 Liveable Region Strategic Plan broadly outlined policy direction to build "Complete Communities" which would have a "primary concentrations of jobs, housing, culture and recreation opportunities" (GVRD, 1996). While the regional plans did not have very specific direction on the development of arts and cultural activities, they had a profound impact on the development and growth of population and transportation networks throughout the region. Equipped with a shipping port, railway and Trans-Canada highway, Vancouver had multitude of transportation options that spread through the region acting as a catalyst for rapid urban growth. When the Greater Vancouver Regional District was established in 1968, the region's population was 950,000 and growing rapidly (GVRD, 1996). By 1970, the population of Metro Vancouver had reached one million, and would double over the next forty years to reach

2 million as the City of Vancouver and suburbs quickly matured into the country's third largest metropolitan region (GVRD, 1996). In the early 1970s, the City of Vancouver established its first arts and cultural grants program which continue to operate and has expanded to include cultural infrastructure grants, public art installation, cultural operating grants and cultural grants awarded to non-profit organizations.

In 1986, Vancouver hosted the Expo 86' world fair, with a focus on transportation. As the world turned its attention to Vancouver, an opportunity for urban development and growth was created. Expo 86' was immediately preceded by the only time in the City of Vancouver history where population fell as the dream of suburban living drew people out of the city and in to the surrounding growing suburban region. A new focus on the City helped bring people back in, with new regional light rail transportation, called the Expo Line Skytrain which had just launched the winter before Expo. Population growth created more demand for scarce land, as a result developers cashed in on densifying inner-city neighbourhoods such as the West End, Fairview, Yaletown, and the surrounding False Creek area.

Art and Cultural Policy Development

Into the later portion of the 1980s, the City of Vancouver had made significant investments into building infrastructure for the arts and culture industry and the results showed as more artists moved to the City. In 1987, the City of Vancouver established goals and objectives to guide decision-making related to arts and the development of new cultural policy (City of Vancouver, 1997). The same year, the City amended their Zoning and Development By-Law to "encourage the provision of affordable and appropriate 'livework' studios" (City of Vancouver, 1995). This change allowed artists studios to be built with conditional approval in all industrial zones, most commercial zones, historic zones, and within designated Official Development Plans. Soon after, the first Cultural Facilities Plan for the City of Vancouver was published in 1990, which laid out a 10-year priority plan for establishing new performing and visual arts facilities (City of Vancouver, 2008). Further to investments in infrastructure, the City of Vancouver would launch grants and funding programs for non-profit arts and cultural organizations offering programs and services within the city (City of Vancouver, 1997). Since the zoning by-law amendment to allow artist studios in 1987, 713 artist studios were built by 1995, of which 56% were located within the Mount Pleasant IC-3 district (City of

Vancouver, 1995). In 1995, the City expanded the artist studio use to C-1 zones and added rehearsal studios as an acceptable production use in select zones (City of Vancouver, 1995). A year later, the City launched the 'Artists in Residency Program Studio Award' which provides rent-free housing and works space of a City-owned artist live/work studio to local artists for a period of three years. By 1997, the City had over 200 active non-profit arts groups, which employed over 7,000 people (City of Vancouver, 1997). This complex and interrelated community was growing through large institutions spanning multiple sectors to small neighbourhood groups, service organizations, and arts organizations focused on creating and producing art (City of Vancouver, 1999). The City also plays an advocacy role by supporting cultural events and industries, as well as multidisciplinary activities related to photography design, cultural service associations and arts education (City of Vancouver, 1997).

As the art industry can be precariously balanced within capitalism, funding from local governments has been essential to establishing and maintaining the art industry. When the City of Vancouver released its Arts Review document in 1997, municipalities across the Metro Vancouver region were allocating a combined total of \$22 million annually towards arts and cultural programs and infrastructure (City of Vancouver, 1997). With a defined focus of goals, objectives, and priorities related to arts and cultural funding and infrastructure development, the City of Vancouver continued to expand its grant program. In 2004, The City of Vancouver established the Culture Plan Task Force made up of Councillors, community representatives and City staff that would be responsible for undertaking a strategic planning process to identify goals, directions and priority objectives for the City's role in development of the arts and culture (City of Vancouver, 2008). By 2009 it reached an annual budget of \$10.15 million, up from \$7.4 million in 2004.

As the identified Metropolitan Core of the Region, the City of Vancouver is the focal point of job and population growth. In the new millennium, the City had one of the fastest growing downtown areas in North America (City of Vancouver, 2008). Rapid population growth to the city brought rising property values and an increasing need for affordable housing and affordable workspaces. As development pressure on land gave way to new expensive office spaces and condos, there was a growing demand for "centrally located light industrial "dirty" space" amongst artists (City of Vancouver, 2008). To leverage the land development industry through this period of rapid growth, the City

uses a tool to acquire cash or in-kind contributions in exchange for development rights when rezoning land, known as Community Amenity Contributions (City of Vancouver, 2018a). Community Amenity Contributions are used to expand a variety of different kinds of facilities including arts and cultural facilities Contributions (City of Vancouver, 2018a). By 2008, community amenity contributions had added 17 arts and cultural facilities over the span of 25 years.

New Challenges

Vancouver has experienced a rapid increase in the value of real-estate which has outpaced the growth of incomes across the region. As artists earn below average incomes, they are facing increasing struggles to find affordable accommodation close to studio spaces. Studio space is also becoming more expensive as artists faced being displaced from their homes and place of work. Some of the more affordable artist studio space in Vancouver is located in older dilapidated industrial buildings. In order for landlords to cover costs of rising taxes as a result of increasing property value, costs are passed down to tenants by increasing rent. Diminishing affordability and growing development pressure create an environment where artists are at grave risk of displacement. Adding to the demand for industrial land, the City of Vancouver has added office, breweries and distilleries to the allowable uses to some industrial zoning districts. Artists now compete for a diminishing supply of affordable space as new uses increase demand and development pressure for industrial land across the City.

The change of industrial zoning in the City of Vancouver to allow use by the technology sector and microbreweries inflated the price of land making it less affordable and more challenging for artists to find studio space for production (Meuse, 2017). Growing demand for land has pushed up real-estate values and property taxes, as a result, tenants are often asked to pay more rent. In an interview with CBC, artist studio owner Rob Stewart acknowledges that "as real estate values balloon and other businesses look for cheap places to set up shop, it's getting harder for practice spaces to keep their prices affordable for musicians." (Meuse, 2017). Artists are at risk of being displaced from their homes, but also where they can practise, produce and perform art. As a wave of caution, Stewart warns that, "If you go down this path and you continue to go down this path, what you're going to end up with is a giant city full of glass and steel buildings with no art, and that is a very bleak existence" (Meuse, 2017). Rob Stewart is

less optimistic about the future of artists working in Vancouver if trends continue, he concedes that, “there’s just nothing left that’s reasonable. It’s pretty much done, and I don’t think the trend will ever be reversed.” (Kurucz, 2018).

Required building maintenance for older industrial buildings can also present an increased risk of displacement for artists. Building repairs at 339 Railway St, a warehouse building built in 1910 that occupied artists are facing evicting because the property owner would like to conduct renovations and increase rent. The owners say the building is desperately in need of new repairs to bring it up to code and fix leaks in the roof. After repairs are done, the owners plan on doubling the rent from \$1 to \$2 a square foot, but say the artists are welcome to return. Acknowledging the importance of the arts in the city, the owner states “a city needs the vibrancy and creative energy that artists bring to a lot of places,” he says, “[but] we’re pricing them out” (Griffin, 2016a). In the early 20th century the building, addresses 339 Railway St, was originally the Imperial Rice Milling Co warehouse and built for rice processing and outbound shipping. Artists first moved into the space in the 1980s when the area started to become a popular location of artists studios and living spaces. In 1986, the City attempted to evict the artists living in warehouses, but the artists successfully lobbied the City to pass a bylaw allowing for live work arrangements to exist in industrial warehouse buildings (Griffin, 2016b).

According to Ether Rausenberg, there were about 30 artists working out of the 339 Railway, with many of them sharing studio space. Rising rents and a shortage of studio space has exacerbated pressure on artists to work in shared workspaces or risk being left without a place to work. After 32 years, Vancouver artist Alan Storey has been located at 339 Railway St and is now facing eviction without a next location figured out that can handle is large art pieces (Griffin, 2016a). Rausenberg says “what we’re seeing is that the studio spaces are getting smaller and smaller and smaller and artists are going into quite cramped places because it’s about all they can afford,” (Griffin, 2016a). While artists renting space are facing rapidly rising rates, Rausenberg says that “the city has added some studio spaces, but it is nowhere near enough” (Griffin, 2016a). The City of Vancouver is currently developing a music strategy that will explore solutions to support the struggling local music scene as live music venues and rehearsal space becomes unaffordable or inaccessible to local artists.

Rising property values have led to an increase in property taxes which are being passed down to artists in rent increases. Rising rents in Vancouver are making it hard for many arts related business to stay open. A Vancouver Courier article highlights the troubles of many artists and studio owners as they struggle with rapidly rising rents (Kurucz, 2018). Lee Sanger, owner of Art Off Main, was forced to move when rents jumped from \$600 a month to \$1,050 a month for a 400 square foot space (Kurucz, 2018). Art off Main ended up moving to Charles Street near Commercial Drive where about a dozen members share a 500 square foot space for \$2,300 per month. At Beaumont Studio, located on Yukon and 5th Street, property value increased by \$2.9 million between 2016 and 2017, increasing property taxes by \$30,000 (Kurucz, 2018). This drastic increase in rent put an unwanted burden on the owner and the 80 different artists that lease out the studio space at Beaumont Studio. In effort to keep rents lower for the artists, the owner is lobbying the City for a property tax exemption for those in the art sector (Kurucz, 2018). Meanwhile, The Red Gate Arts Society finds itself looking for new space as the property owners go ahead with redevelopment plans (Kurucz, 2018). For many artists, the rapid increase in real-estate values have either pushed them out as rents absorb increasing property taxes, or redevelopment opportunities force tenants to seek leases elsewhere.

The combination of rising rents and increasing development pressure are putting artists in Vancouver at additional risk of displacement from their homes and their studios. Increasing demand for private land has pushed development pressure to the point where artists can no longer afford to keep their studios in industrial areas as more commercial uses compete for the little supply of industrial land throughout the region. The regions limited greenfield development opportunities means population growth is dependant on the densification of existing built-out land. As old residential buildings make way for new ones, residents are being displaced from their homes in search of a new place to live as cost of living increases throughout the region. In a region faced with rising real-estate prices and increasing rents for both residential and commercial space, where do artists live and work and how can they avoid being displaced? This paper explores in detail the types of neighbourhood's artists live in, and the factors that cause them to be displaced.

The next chapter presents the definitions used in the analysis for artist, artist facility, and neighbourhood characteristics. The chapter also presents the data sources for these key variables, and the limitations regarding the data being used.

Chapter 4.

Definitions, Data and Methods

The research method used in this paper is a longitudinal quantitative analysis using primarily Census and NHS data from the years 1991, 2001 and 2011 to provide an understanding of the neighbourhood characteristics of where artist populations cluster, their proximity to artist facilities, and how this has changed over time. Chapter 4 presents how the variables in this paper, such as artists and neighbourhoods, are defined, what the data sources are for the variables used in the analysis, and the methods employed to conduct the analysis. This chapter will also explain data quality issues associated with the voluntary 2011 National Household Survey and what the implications are for conducting analysis using this data. Finally, the *Methods* section presents the univariate, bivariate, and multivariate analysis methods used.

The primary source of data used for artist populations and the demographic and socio-economic variables used to define neighbourhood characteristics is the 1991, 2001 and 2011 Census, and 2011 National Household Survey (NHS). Occupation population data for these census years were obtained from Statistics Canada through a custom data order. The definition of artist will follow the structure of the 1991 Standard Occupational Classification (1991-SOC), the 2001 National Occupational Classification (2001-NOC), and the 2011 National Occupational Classification System (2011-NOC). Artist facilities are represented by an inventory of cultural spaces that published on the City of Vancouver open data website. The cultural spaces location data is used to examine where artists populations live in proximity to artist facilities. Artists, artist facilities and neighbourhood characteristics included in this research will be identified in the following section.

4.1. Definitions

This section will cover definitions for artist, artist facility, neighbourhood and neighbourhood characteristics used for the purpose of analysis in this paper. The primary source of data for artist populations in Metro Vancouver is the 1991 and 2001

Census and 2011 National Household Survey. It is important to note that artist occupation data in the census and NHS does not capture the entire population of people that practise, perform or create art as it only accounts for individuals who fill out the census or NHS as artist for their occupation. Markusen (2006) acknowledges that there are potentially many people that engage in art, but simply do not fill out the census form as artist for their occupation. This is an important aspect to consider as there are many qualified and talented artists that may identify through another means of work when filling out the census and, as a result, are not included in the census occupation data.

4.1.1. Artist

Artist as an occupation is a broad category. Markusen (2006) looks at four groups of artists: writers, musicians, visual artists (including film-makers and photographers), and performing artists (including actors, directors, choreographers, dancers), which she says is a definition artist used widely across social science research. The nine artist occupations types remain consistent across the 1991 Standard Occupational (SOC) Classification the 2011 NOC and will be used to represent the group artists used in this paper. The following table shows the 2011 NOC structure of the artist occupations used (Statistics Canada, 2014a).

Table 4-1 National Occupation Classification (NOC) for Artist Occupations

Occupations in art, culture, recreation and sport (5)	Professional occupations in art and culture (51)	Writing, translating and related communications professionals (512)	Authors and writers (5121)
		Creative and performing artists (513)	Producers, directors, choreographers and related occupations (5131)
			Conductors, composers and arrangers (5132)
			Musicians and singers (5133)
			Dancers (5134)
			Actors and comedians (5135)
			Painters, sculptors and other visual artists (5136)
	Technical occupations in art, culture, recreation and sport (52)	Creative designers and craftspersons (524)	Artisans and craftspersons (5244)

NOC code numbers are displayed within brackets ()

While the majority of individual occupations within the four-digit NOC occupation categories presented in Table 4-1 would fit into the typical definition of 'artist', there are some that do not. For example, the category for authors and writers (5121) includes occupations such as copywriter, manual writer, medical writer and scientific writer which would not be considered artist occupations. This is a limitation to using the four-digit occupation data available for the census. Overall, it is very unlikely that these few non-artist related occupations would change the findings, however it is important to recognize that the artist populations being examined in this paper includes small populations of occupations that are not typically identified as artists.

The artist occupations displayed in Table 4-1 are analyzed at the neighbourhood level across the City of Vancouver and Metro Vancouver, and compared to other metropolitan regions in Canada using Statistics Canada census data for the years 1991 and 2001 and NHS data for the year 2011. The detailed artist occupations identified in Table 4-1 are not published and made available to download at the census tract geography; therefore, a custom data order was obtained from Statistics Canada in order to acquire the population data at the 4-digit NOC categories for the purpose of this research.

4.1.2. Artist Facilities

For the purpose of this research, artist facilities are represented by a 2014 cultural spaces inventory published on the City of Vancouver open data website (City of Vancouver, 2014). This inventory of cultural spaces includes artist facilities in the City broken down by type and primary use. The cultural spaces file contains columns for longitude and latitude coordinates that allow it to be accurately mapped using GIS software. As this inventory is the most comprehensive data set of artist facilities for the City of Vancouver, it will form the base of artist facilities for the purpose of this analysis. The artist facility inventory is broken down into six main categories of facilities.

1. Community Space
2. Educational Institutions,
3. Museum and Galleries,
4. Studio and Rehearsal space,
5. Theatres and performance spaces.
6. Live music venues

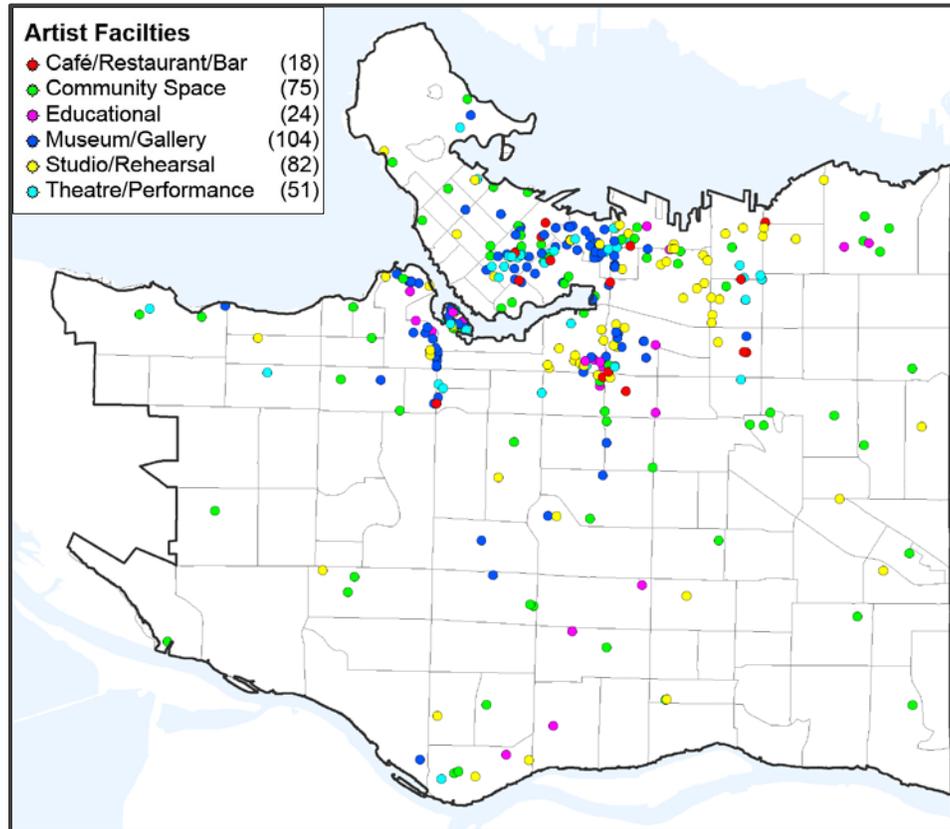
Each category is then broken down further into the primary use of the facility. The full cultural spaces table including type and use can be found in *Appendix A*. The artist facilities included in this inventory align with those identified by Markusen (2006), with the addition of less formal live music venues, such as restaurants, bars, night clubs, and community facilities, including community centres and places of worship. In the analysis results presented in chapters 5 through 8, artist facilities are applied as independent variables in the regression analysis to understand the relationship of where artists live in proximity to artist facilities.

The inventory of cultural spaces retrieved from the City of Vancouver open data website dates back reflects the year 2014. To match the cultural spaces inventory to the 2011 census year, the inventory was back dated by doing a GIS analysis to match the year built of building parcels to each artist facility. After mapping out the artist facilities layer using longitude and latitude coordinates it was compared with the parcel layer to determine if any facilities were located on parcels that were built out after the 2011 census. Through this analysis, it was determined that all artists facilities listed in the 2014 cultural spaces layer were present in 2011. Beyond this inventory of cultural spaces, it is important to note that there are also informal spaces, such as old warehouses, garages or basements that may be used for practice, performance, and production of various art types that are not captured in this analysis as they are not formally tracked or shared publicly.

As a comprehensive inventory of artist facilities is only available for the City of Vancouver, the location of the Orpheum Theatre is used to represent a central location where there is an abundance of artist facilities within the City of Vancouver and Metro Vancouver region. Using the Orpheum Theatre to represent a central location of artist facilities provides the ability to explore the relationship between where artists live in proximity to this concentration of artist facilities for the 1991, 2001 and 2011 census years across Metro Vancouver neighbourhoods. While the location of the Orpheum Theatre presents a good reference point to reflect a historical and central clustering of artist facilities in the Metro Vancouver region, the theatre itself does not necessarily represent an affordable and accessible artist facility available to local artists. In this study, the Orpheum's location may also be interpreted as the geographic core of the urban region for artists. The full inventory of artist facilities is used to analyze the relationship of artist populations within City of Vancouver neighbourhoods for the 2011

census year. Figure 4-1 shows the location of all artist facilities by type in the City of Vancouver.

Figure 4-1 Map of Artist Facilities by Type across the City of Vancouver



4.1.3. Neighbourhood and Neighbourhood Characteristics

This section describes the data used to represent a neighbourhood and neighbourhood characteristics. In a similar regression analysis to the one that is presented in this paper, Grodach (2014) uses zip codes to represent neighbourhoods in analyzing the neighbourhood characteristics of where arts industry workers live within the United States. He acknowledges that administrative boundaries, like zip codes and census tracts, are not a perfect definition of a neighbourhood, but “they are the most consistent geography at which the Census reports...at the micro-level.” (Grodach, 2014). For the purpose of this research, a census tract will be used to represent a neighbourhood unit for spatial analysis.

Neighbourhood characteristics will be developed using census and NHS profile data at the census tract geography to get a better understanding of the neighbourhoods where artists cluster. The full publicly available profile for the 1991, 2001 and 2011 census and the 2011 NHS at the census tract level is available for download directly from the Statistics Canada website. Neighbourhood characteristics will make up a portion of the independent variables used in the regression analysis. For the purpose of this research, neighbourhood characteristics are defined by a selection of twenty-two unique census variables that are calculated into a percentage, average and/or density for a total of 36 different neighbourhood characteristic variables. These variables will be used in linear regression analysis at the census tract geographies across Metro Vancouver and the City of Vancouver. Table 4-2 presents the neighbourhood variables used in the analysis. Not all variables listed are available in each census year; for example, the 1991 census did not publish mode of transportation data. Descriptive statistics for each variable and census year is provided in Chapter 5.3. In the analysis chapters, some neighbourhood variables are omitted from multivariate regression models when there was high levels of collinearity; this is explained further in Chapter 7.

Table 4-2 List of Neighbourhood Characteristic Variables

Neighbourhood Characteristics	
Perc 0 to 14	Avg Population Income
Perc 25 to 39	Avg Household Income
Perc 25 to 44	Distance to Orpheum
Perc 65+	Density Population
Avg Household Size	Density 0to14
Perc Immigrants	Density 25to44
Unemployment rate	Density 25to39
Perc Self-employed	Density 65+
Perc BachelorDeg	Density Immigrants
Perc Worked at home	Density Self-employed
Perc Public transit	Density Worked at home
Perc Walked	Density Public transit
Perc Bicycle	Density Walked
Perc WalkBikeTransit	Density Bicycle
Perc Owner	Density WalkBikeTransit
Perc Renter	Density Owner
Avg Dwelling Value	Density Renter
Avg Monthly Rent	Density Dwellings

4.2. Data Sources

This section provides an overview of the quantitative data analysis methods employed in this research, the data used and its limitations, and how the definitions explained in the previous section relate to the data and analysis. The Section 4.2.1 Census Data Limitations section will provide a detailed look at how the voluntary 2011 National Household Survey presents data quality issues when compared to the mandatory 1991 and 2001 long form censuses and how these issues are addressed in the analysis. In section 4.2.1 Census Tract Descriptive Data, information regarding the number of census tracts in Metro Vancouver and the City of Vancouver is presented, as well as the average population and land area per census tract for the 1991, 2001 and 2011 census years.

Neighbourhood characteristics are compiled using Census and National Household Survey data. These variables, as defined in the section 4.1.3, are analyzed to understand where artists cluster and what factors are correlated with attracting artists to neighbourhoods and which are displacing artists from neighbourhoods across Metro Vancouver. This analysis employs the use of SPSS to conduct univariate, bivariate and multivariate linear regression modelling. Further to this, a longitudinal analysis is conducted using the Granger Causality test. This is conducted using SPSS to perform a multivariate linear regression using longitudinal time series data to test if the change of neighbourhood characteristics over a time period has a significant correlation with the change of artists in the following census years. Finally, this paper also presents a geo-spatial analysis that explores the relationship between where different types of artists cluster within the City of Vancouver in proximity to the location of artist facilities. This analysis is done using only the 2011 Census and National Household Survey data for the City of Vancouver. As mentioned in section 4.1.2, the Orpheum theatre is used as a central location and clustering of artist facilities for the 1991, 2001 and 2011 census years. The next section describes the census data used and the limitations of the voluntary 2011 National Household Survey.

4.2.1. Census Data Limitations

This section describes the data limitations inherent with the data being used in this research. The 2011 NHS, unlike previous census surveys, was a voluntary survey that

had a mixed range of response rates across Canada, as a result it is important to explain its limitation when used in any analysis or simply reporting out data from it. This section also highlights rounding and data suppression issues related to the Census and NHS data and how it may affect the analysis in this research. Lastly, this section presents descriptive data for census tracts in the City of Vancouver and Metro Vancouver.

2011 National Household Survey

Prior to 2011, the Census survey collected data through a mandatory 100% sample short form survey that collects answers for questions related to age, sex, dwelling type, families, households, marital status and language; as well as a mandatory 20% sample long form survey, which collected answer for questions related to immigration, housing, aboriginal peoples, education, labour, journey to work, mobility and migration and others. For the 2011 long form survey, the Canadian Federal Government passed legislation that would make it voluntary (Roman, 2010). The survey response rate dropped from 93.8% in 2006 to 68.6% in 2011 (Statistics Canada, 2015b). As a result, the data quality at smaller geographies, such as census tracts, became less consistent where survey response rates were low. This resulted in more data suppression and a general unreliability expressed by Canadian researchers (Hulchanski, 2013). This is not to say the data is un-useable. The chief statistician at Statistics Canada iterates that, while the data quality has its limitations compared to previous mandatory long form censuses, the 2011 data "is robust and entirely useable" (Oliver, 2015).

Census Tract Data Suppression and Rounding

Statistics Canada uses data suppression and rounding techniques to ensure individuals can not be identified from the published census data. This section will discuss Statistics Canada's method for data suppression and rounding techniques used in the Census and NHS and how it affects the census tract data used in this paper. I present how artist population data quality in the voluntary 2011 NHS compares to the 1991 Census and 2001 Census as a result of data suppression and rounding. My findings show that 2011 NHS individual artist occupation populations at the census tract geography have been largely impacted across Metro Vancouver.

Statistics Canada suppresses data when a population within a geographic area, not including a census block, is less than 40 people. In 1991, there were no census

tracts suppressed within the Vancouver CMA. In 2001, the census tract identified as 9330270.00 was suppressed (Statistics Canada, 2008). For the 2011 Census, two census tracts had data completely suppressed from the publicly available data products. This includes the census tract 9330270.00 and 9330058.00. The voluntary 2011 NHS saw more census tracts suppressed, across the entire long form survey, census tract 9330250.01 was suppressed for data quality issues and 09330270.00 because it did not make the required survey response rate of at least 50% resulting in confidentiality issues (Statistics Canada, 2015c). For place of work and income data, census tract 9330251.00 was suppressed from the 2011 NHS for confidentiality issues (Statistics Canada, 2015d, 2015e).

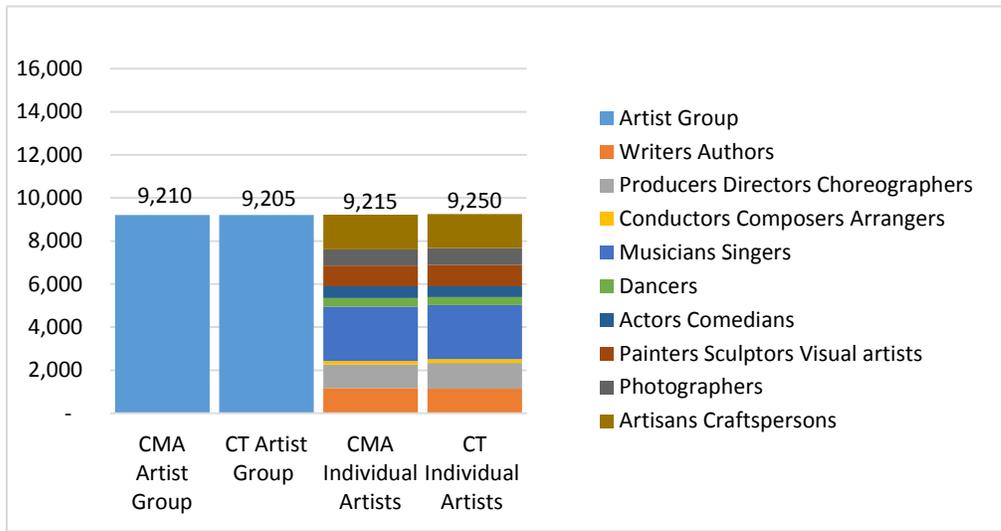
Rounding occurs throughout different census geographies for confidentiality purposes to eliminate the possibility of identifying a person. To maintain confidentiality for all respondents, population figures are rounded to the nearest five at the census tract geography. As a result, census tracts with a population figure ending one through nine, including 5, will be randomly rounded to 5 or 0. Depending on the population size within the census tracts, rounding can potentially have a large impact on the proportion of the population being studied across an area. For individual artist occupations, census tract populations are often less than 10 in a census tract, as result, the rounding can drastically alter the total population across a metropolitan region (Statistics Canada, 2016c).

To demonstrate how much rounding effects the artist population data used in the paper, I present a comparison between the artist group population and the sum of individual artist occupations at both the Vancouver CMA geography, and the sum of census tracts within the Vancouver CMA. To create the artist group population for 1991 and 2001, this research uses the three-digit National Occupational Classification category called 'Creative and Performing Artists', or occupation category 513, and sums it together with three individual occupations that fall outside of the 513 occupation category: writers and authors, photographers, and artisans and craftsperson. For the voluntary 2011 NHS data quality for small artist occupation populations was a concern, as a result I ordered the custom census occupation data to include all the individual artist occupations populated into one occupation group before they conducted the randomization. The following graphs show how the population of artist occupations

compare to the artist group total at both the CMA and CT geographies for the Vancouver CMA.

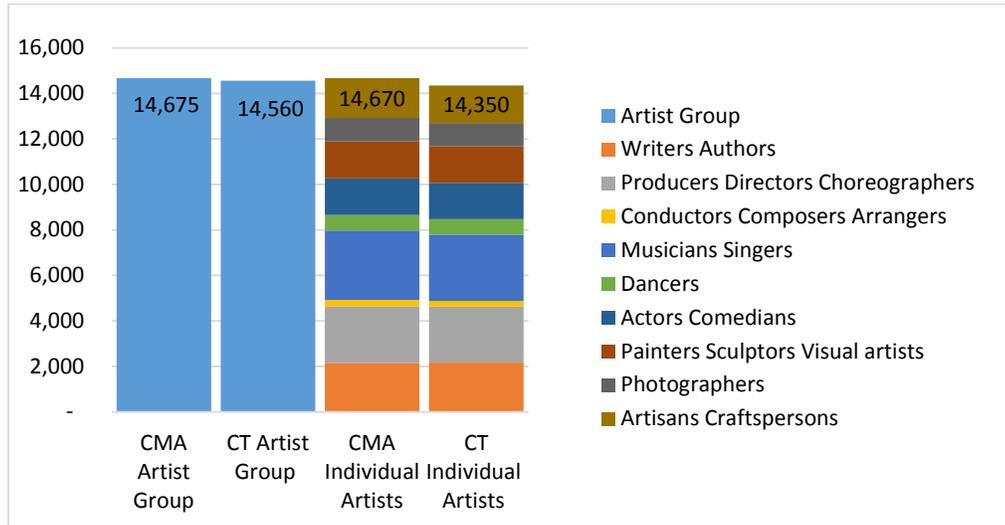
The following three bar graphs represent the 1991 and 2001 census, and the 2011 NHS. For each bar graph, the blue bar represents the total population of the artist group within the CMA, and the green graph represents the total sum of the artist group across all census tract within the CMA. The coloured stacked graphs represent the sum of individual occupations within the CMA, and the sum of all census tracts within the CMA.

Figure 4-2 1991 Artist Occupation Populations in Vancouver CMA and CTs



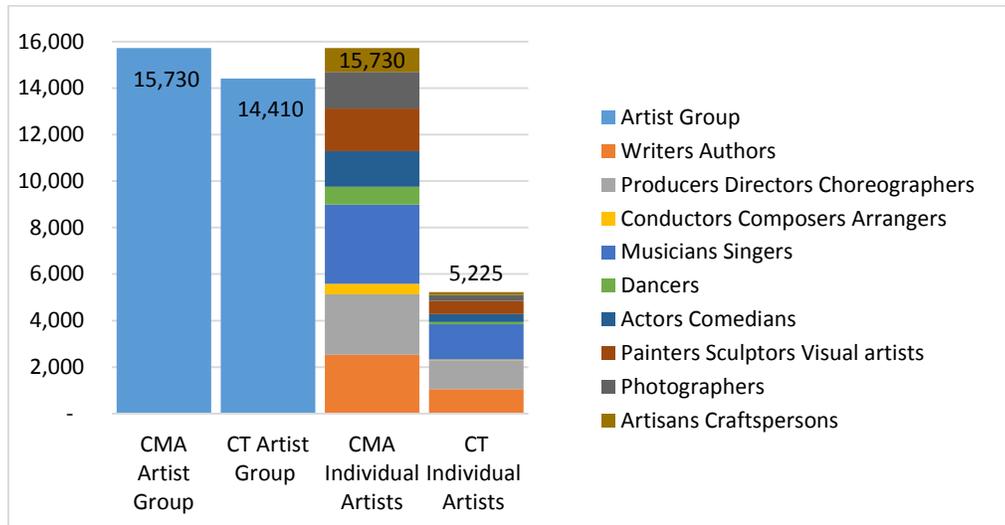
In the 1991 census, there was very little variation across the artist population for the Vancouver CMA and the combined total of census tracts within Metro Vancouver. There was also little variance when comparing the sum of all individual art occupations for the Vancouver CMA and sum of the regions census tracts.

Figure 4-3 2001 Artist Occupation Populations in Vancouver CMA and CTs



In 2001, we see a slight decrease in the artist population totals for the sum of census tracts within the Vancouver CMA compared to the CMA total. This is likely the result of the data suppression of two census tracts as well as rounding at the census tract geographies. Comparing the totals of the Individual Artists, we see a 2% lower population of artists in the summation of CTs compared to the CMA total artist populations.

Figure 4-4 2011 Artist Occupation Populations in Vancouver CMA and CTs

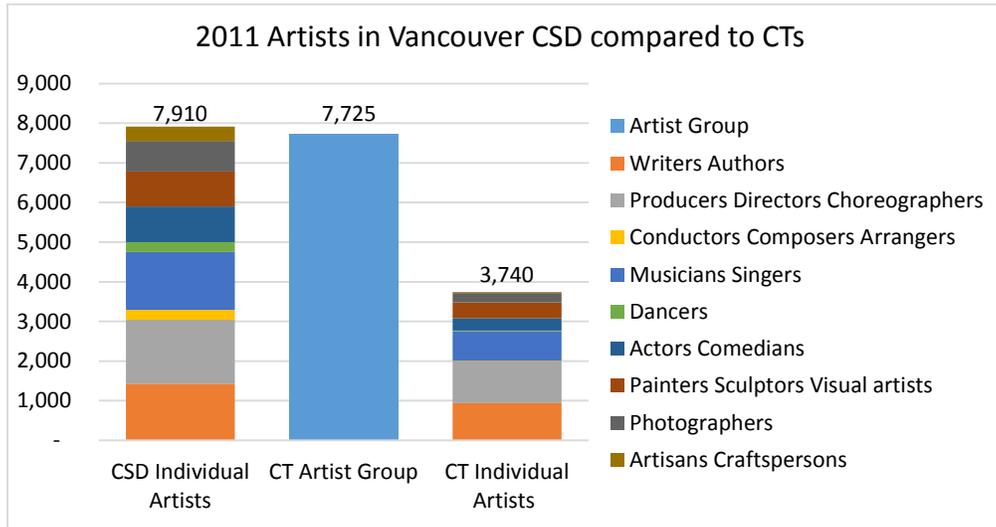


Using the voluntary 2011 National Household Survey, we see a substantial drop in population from the summation of census tracts of individual artists compared to the

CMA total. This is the results of more census track data suppression, rounding, and poor response rates at the census track levels. The result is a 67% smaller population of individual artists published at the census tract geography. The population of the custom artist group category across all census tracts fared much better and returned a population only 8% lower than that of the total CMA. Because of the large population missing from the census tract data of individual occupations, the data cannot be used with confidence to come to any conclusive findings when comparing with other census years. On the other hand, the total artist group data at the census tract level represents 92% of the artist population of the CMA total. This artist group data is used to conduct a longitudinal statistical analysis at the census tract geography with the 1991 and 2001 census years. It is important to note that, despite the data showing a total census tract artist group population decreasing by 150 artists from 2001 to 2011, the artist group population across the region increased by 1,055 over the same time.

This paper also looks at the City of Vancouver within Metro Vancouver. The City of Vancouver will be represented by the Vancouver CSD geography area. Within the Vancouver CSD, we see a similar result using the 2011 NHS data as the individual artist population total at the census tract geography represents only 47% of the combined occupations at the CSD level. The artist group total for the Vancouver CSD was not included, because the NOC 'creative and performing artist' category is not available for download from Statistics Canada at the CSD geography. The artist group population compiled using the custom census tract data represents 98% of the total CSD population.

Figure 4-5 2011 Artist Occupation Populations in Vancouver CSD and CTs



Despite the low representation of the individual artist population at the census tract level, the data still shows where artist populations live within the City of Vancouver. This will still provide evidence to what kind of neighbourhood’s artist live in within the city and their proximity to artist facilities.

Census Tract Descriptive Data

The univariate data presented covers the mean and standard deviation for artist populations and census variables across census tracts in Metro Vancouver for the 1991, 2001 and 2011 census, and the 2011 NHS. Census tract data representing the City of Vancouver data is also presented for the 2011 Census and NHS. The following tables provide an overview of the count, minimum, maximum, mean and standard deviation of the population, area (square kilometres), and artist population of census tracts across the City of Vancouver and Metro Vancouver. As a population grows within a census tract, Statistics Canada will split the census tract geography to keep a population range between 2,500 and 8,000 persons. As a result, the Vancouver CMA has grown from 1,602,502 people represented by 298 census tracts in 1991 to 1,986,965 people represented by 386 census tracts in 2001, and 457 census tracts in 2011 occupied by a population of 2,313,328 people.

Table 4-3 Census Tract Total Population, Area and Artist Population for Vancouver CMA

Census Tract Descriptive Data for Metro Vancouver						
Year	Variables	Census Tracts	Minimum	Maximum	Mean	Std. Deviation
2011	Population	452	788	14,034	5,098.3	1,807.1
	Land Area (Sq.Km)	452	0.1	832	6.2	41.0
	Population Artist Group	452	-	320	31.3	39.1
2001	Population	385	307	11,914	5,160.5	1,830.4
	Land Area (Sq.Km)	385	0.1	834	7.4	44.9
	Population Artist Group	385	-	180	37.8	35.0
1991	Population	298	162	12,215	5,377.5	1,810.5
	Land Area (Sq.Km)	298	0.2	885	9.3	53.4
	Population Artist Group	298	-	165	30.9	28.3

2011 census tract data for the City of Vancouver is also used separately for the purpose of conducting a spatial analysis on the proximity of artists to artists facilities within the City of Vancouver. The City of Vancouver was designated the regional core Metro Vancouver and has the highest population density of any other municipality. The higher population density translates into the City of Vancouver having smaller census tracts on average when compared to the size census tract across the region. In total, the City of Vancouver contains 25% of all census tracts that make up Metro Vancouver's twenty-two municipalities. The Table 4-8 highlights descriptive statistics for census tracts that make up the City of Vancouver for the 2011 census year.

Table 4-4 Census Tract Total Population, Area and Artist Population for Vancouver CSD

Census Tract Descriptive Data for the City of Vancouver						
Year	Variables	Census Tracts	Minimum	Maximum	Mean	Std. Deviation
2011	Population	115	2,726.0	12,513	5,214.9	1481.2
	Land Area (Sq.Km)	115	0.12	4	1.0	0.7
	Population Artist Group	115	-	320	66.5	55.8

The descriptive statistics show there are 115 census tracts across the City of Vancouver in 2011. These census tracts are on average 1 square kilometre in area, have a total population of 5,214 and an artist population of 66.5. The next section presents an overview of the methods of analysis used in this paper.

4.3. Methods

The analysis presented in this paper is separated into different chapters for univariate analysis, bivariate analysis, multivariate analysis and a longitudinal regression analysis that explores the Granger causality test. Each of these chapters will discuss the data analysis methods used in more detail.

To contextualize the importance of conducting research on artists in the City of Vancouver, a combination of statistical and spatial analysis are presented to show that artists are highly clustered within the City of Vancouver from a regional and national context. Artist populations across various geographies are calculated to express population in different ways and change over time. Percentages are calculated to show the proportion of artists within the labour force, artist density expresses concentration over space, location quotient expresses artist clustering, and change of artist populations over time is represented by the percentage change between different census years. These calculations are conducted using excel and are complemented by a series of maps made in MapInfo GIS, which form the majority of the univariate analysis presented in Chapter 5. The bivariate analysis and multivariate analysis methods in Chapters 6 and 7 present a series of regressions conducted using SPSS, and a spatial analysis performed in MapInfo GIS to determine the proximity of artist populations to artist facilities. Together, these methods of analysis make up the quantitative methods used in this paper.

Similar quantitative methods used in this paper have also been used by various researchers to understand the distribution and representation of artist populations within urban metropolitan regions (Grodach, 2013; Grant, 2014; Markusen, 2006). This paper examines the spatial distribution of artist population densities and location quotients across census tracts in Metro Vancouver and the City of Vancouver using the 1991 and 2001 Census, and the 2011 National Household Survey (NHS). To complete this analysis, detailed occupation census data was acquired from Statistics Canada through a custom order. Custom ordered census and NHS occupation data provides population data for artists across Metro Vancouver at the census tract level. Census and NHS data is also used to develop neighbourhood characteristics across Metro Vancouver neighbourhoods. Density and Location Quotient (LQ) are calculated using the custom ordered artist occupation data from Statistics Canada. The statistical results

will be used to make charts and conduct spatial analysis. A LQ is an analytical index that measures the concentration of a geographic unit relative to a larger geographic unit. The location quotient calculation is used to determine if there is an over representation or under-representation of artists within a smaller geographic area in comparison to a larger geographic area. The location quotient of artists identify the concentration of artist occupations at the neighbourhood level (census tract) relative to the proportion of artist in Metro Vancouver as a whole. The location quotient of artists will be calculated and mapped across Vancouver neighbourhoods using the following equation:

$$LQ_{ct,r} = (E_{o,ct} / E_{ct}) / (E_{o,r} / E_r)$$

LQ is the location quotient, while E represents the total employment within a geographic area. The subscript o indicates the artist NOC occupation category, r indicates Metro Vancouver, and ct indicates a census tract. A location quotient that is greater than '1' indicates an overrepresentation of that occupation in the smaller geography (CT) in relation to the larger geography (Metro Vancouver). This analysis helps identify artist clusters and provides location based evidence towards explaining the spatial distribution of artists across Metro Vancouver neighbourhoods.

Using census data, Ann Markusen demonstrates that different types of artists have unique location preferences depending on their expectations (Markusen, 2006). In her data analysis, she looks at self employment, in/out migration, location quotients, and the growth of artist populations to better understand the artists in the cities of Minneapolis and St. Paul, Minnesota (Markusen, 2006). Similar to Markusen's research, this paper analyzes location quotients, artist population growth between 1991 and 2011, and self employment status as identified in the census; in doing so, it provides a case study by examining how existing theories pertaining to the location preference of artists are explain the distribution of artist populations across Metro Vancouver. The analysis explores concepts presented by Markusen that "performing artists actors, dancers are more inner-city centric than are musicians, writers, and visual artists, but all artists are more central-city oriented than are other occupations" (Markusen, 2006). The next section covers the GIS spatial analysis undertaken to calculate the distance from artist populations to artist facilities, and mapping artist populations across Metro Vancouver neighbourhoods.

4.3.1. GIS Spatial Analysis and Mapping

Census and NHS occupation data acquired from Statistics Canada represents the place of resident of the worker in census tracts, in other words, where artists live. The spatial analysis involves calculating the Euclidian distance between census tracts and the location of artist facilities. This distance analysis is conducted in MapInfo GIS and produces a table that contains the census tract identification number and the distance to all artist facilities as separate records. This table is then be imported into Excel to calculate average distance by facility primary use and type. Mapping is also conducted in MapInfo GIS to produce maps showing the location of artist facilities, and the density and location quotient of artists at the census tract level across Metro Vancouver. Density is calculated by taking the artist population and dividing it by the area of the census tract. For this analysis, density is expressed as population per square kilometre throughout this paper.

The data analysis conducted by Grodach (2014) and Markusen (2006) provide the foundation for the univariate, bivariate and multiple regression modeling conducted in this thesis. These papers provide legible and clearly articulated data analysis and graphics that acted as a template for presenting the data results in this paper. The analysis presented in this thesis is intended to add a layer of detail to the existing narrative of where artist chose to live by examining the spatial distribution of where artists live at the census tract level in relation to socio-economic and demographic variables, and their proximity of artist facilities.

The next chapter presents the univariate analysis of artist populations across Canadian census metropolitan regions (CMA), a more detailed look at artist population in the Vancouver CMA, and all census tracts across the region. The univariate analysis for census tracts across the Vancouver CMA consists of descriptive statistics including the mean, maximum and stand deviation of all variables used in this research for the 1991, 2001 and 2011 census years. Results show that Metro Vancouver has the third largest population of Canada CMAs and the second highest location quotient.

Chapter 5. Univariate Analysis

This chapter begins with a statistical representation of how the population of artists in Metro Vancouver compare to the population of artists in regions across Canada. The chapter then presents the results of the univariate analysis which examines artist populations by occupation types and the neighbourhoods characteristics. It examines the population of artists in Metro Vancouver and how artist populations are distributed across the regions neighbourhoods. The proceeding sections examine the maximum, mean and standard deviation of artist populations and neighbourhood characteristics across Metro Vancouver neighbourhoods for the 1991, 2001 and 2011 census years. Artist populations are presented as totals, location quotients, and densities.

5.1. Artist Populations in Canadian CMAs

To provide some context of how artists populations in Metro Vancouver compare to other regions across Canada, this section examines the top 20 artist populated CMAs in Canada for the year 1991, 2001 and 2011. The artist populations presented are based on the artist group used throughout the paper. Artist location quotient is also presented for these regions, which compares the proportion of the artist group population to the labour force of the region, to the nationwide total population of artists to the labour force. This is represented by the following formula:

$$LQ = (Artists_{CMA} / Labour\ Force_{CMA}) / (Artists_{Canada} / Labour\ Force_{Canada})$$

Throughout the three census years examined, Metro Vancouver has remained the third most artist populated region in Canada, behind Toronto first, and Montreal in second. Table 5-1 shows the artist populations for the twenty most artist populated CMA regions in Canada, the total artist population of all CMAs combined, and the total number of artists in Canada for the 1991, 2001 and 2011 census years.

Table 5-1 Top 20 Artist Populated Canadian CMAs

Rank	CMA	1991	Growth 1991-2001	2001	Growth 2001-2011	2011
1	Toronto	20,270	42%	28,810	16%	33,400
2	Montréal	14,335	24%	17,735	5%	18,665
3	Vancouver	9,210	59%	14,675	7%	15,730
4	Ottawa	4,615	17%	5,380	13%	6,065
5	Calgary	3,175	60%	5,075	2%	5,185
6	Edmonton	3,175	20%	3,795	14%	4,315
7	Winnipeg	2,435	25%	3,045	11%	3,365
8	Québec	2,165	10%	2,390	13%	2,705
9	Victoria	1,555	57%	2,440	2%	2,500
10	Hamilton	1,835	31%	2,405	3%	2,475
11	Halifax	1,395	32%	1,835	8%	1,975
12	Kitchener	1,265	26%	1,600	22%	1,955
13	London	1,345	11%	1,495	18%	1,760
14	St. Catharines	870	51%	1,315	4%	1,365
15	Oshawa	545	53%	835	25%	1,040
16	Saskatoon	910	8%	985	0%	985
17	Windsor	535	22%	655	44%	945
18	St. John's	535	56%	835	10%	915
19	Regina	910	-1%	905	-1%	895
20	Kingston	505	39%	700	4%	725
	All CMAs	76,455	37%	104,885	11%	116,225
	Canada	105,920	28%	135,705	3%	139,410

For almost every CMA, the highest percentage gain of artist populations is observed between 1991 and 2001. Between this time, the CMAs listed in Table 5-1 had an average increase of artist population by 37%, for Canada this growth rate is slightly lower at 28%. In the following ten-year period, between 2001 and 2011, the average CMA increased its artist population by 11%, while Canada only experienced a 3% overall increase in artists. This could be the result of artists moving from smaller towns or rural areas into larger metropolitan regions where they can benefit from a thick labour market, more amenities, and networking with other artists.

The following table shows the artist group location quotient for the twenty most artist populated regions. As described previously, LQs convey the relative thickness and clustering of artists among metro workers compared to Canada. Grodach (2014) identifies regions with a LQ of 1.2 or higher as having a strong cluster. Of the regions with the twenty highest artist populations, the Victoria CMA had the highest artist location quotient in 2011 at 1.67, followed by Vancouver at 1.58 and Toronto at 1.43.

Between 1991 and 2001, half of the regions had an artist LQ that increased. Between 2001 and 2011, the number of regions that experienced an increase of artist LQ was reduced to seven of the twenty regions. Overall, between the twenty-year span of 1991 to 2011, only nine regions, including Vancouver, experienced an increase in artist LQ.

Table 5-2 Top 20 Canadian CMAs by Artist Location Quotients

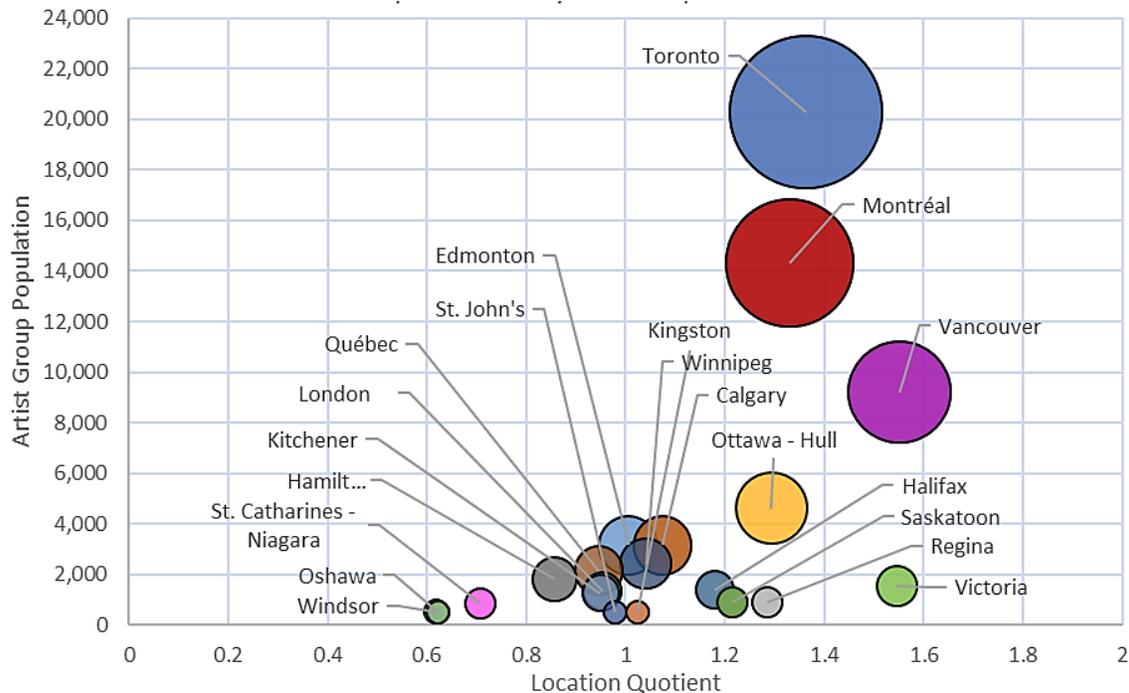
Rank	CMA	1991	2001	2011
1	Victoria	1.55	1.84	1.67
2	Vancouver	1.55	1.73	1.58
3	Toronto	1.36	1.40	1.43
4	Montréal	1.33	1.24	1.17
5	Halifax	1.18	1.18	1.13
6	Kingston	1.02	1.17	1.11
7	Ottawa	1.29	1.12	1.10
8	St. John's	0.98	1.22	1.08
9	Winnipeg	1.04	1.03	1.05
10	Kitchener	0.95	0.85	0.94
11	Regina	1.29	1.06	0.91
12	London	0.95	0.81	0.90
13	Calgary	1.07	1.10	0.90
14	St. Catharines	0.71	0.86	0.89
15	Hamilton	0.86	0.86	0.84
16	Saskatoon	1.21	1.01	0.82
17	Windsor	0.62	0.51	0.81
18	Edmonton	1.01	0.88	0.80
19	Québec	0.95	0.82	0.79
20	Oshawa	0.62	0.65	0.70

The Vancouver CMAs had the highest artist location quotient in 1991, but fell behind Victoria in 2001 and remained second into 2011. For CMAs with a labour force of at least 200,000 workers, the Vancouver CMA had the highest artist occupation location quotient between 1991 and 2011.

As you can see from the Tables 5-1 and 5-2, regions like St John's, Kingston and Victoria have smaller populations of artists, but have a more concentrated artist population as a proportion to their labour force. On the other hand, the Calgary CMA had the fifth highest artist population in 2011 but have the thirteenth highest artist LQ. In all census years presented the Vancouver CMA has retained the highest LQ of actors and comedians than any other CMA, increasing from an LQ of 2.10 in 1991 to 2.75 in 2011.

Next, I present a graduated bubble charts to show how the size of artist populations relates to the location quotient of artists for the top twenty most artist populated regions in Canada. The following diagrams for the 1991, 2001 and 2011 census years show the population of artists on the y-axis and represented as the size of bubble, and the artist group location quotient represented on the x-axis.

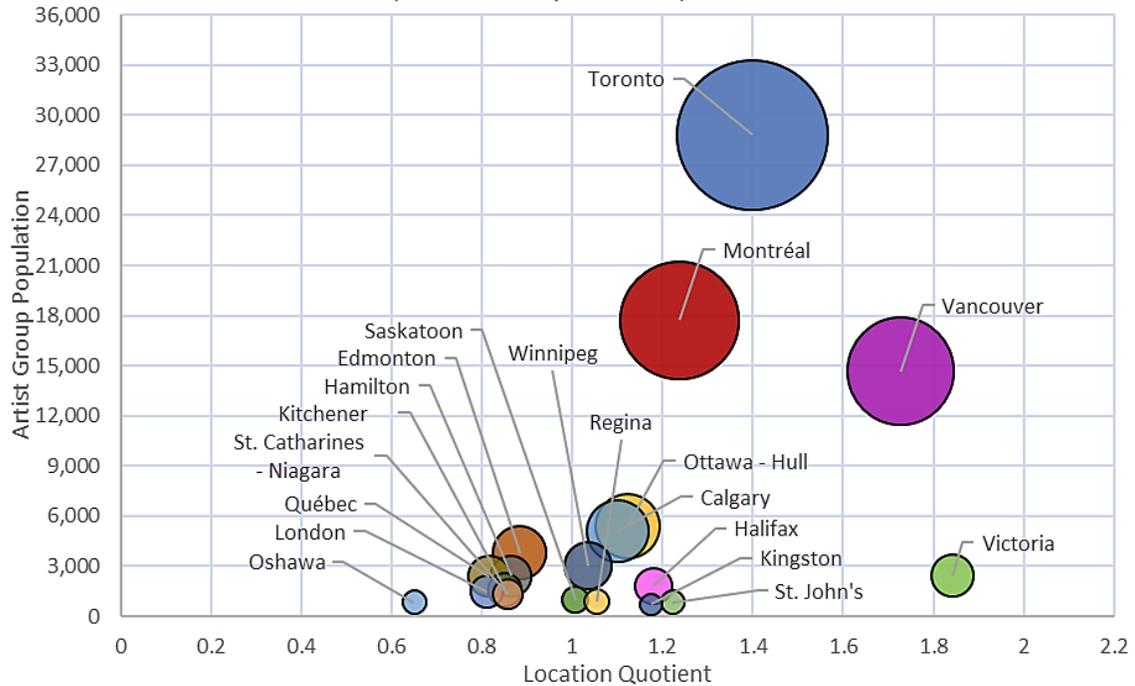
Figure 5-1 1991 Artist Group Population and Location Quotient by CMA



In 1991, Metro Vancouver led CMAs in Canada for having the highest proportion of artists in its labour force, followed very closely by Victoria. At this time, seven CMAs in Canada had a LQ of artists greater than 1.2, which is deemed to be a significant cluster (Grodach, 2014).

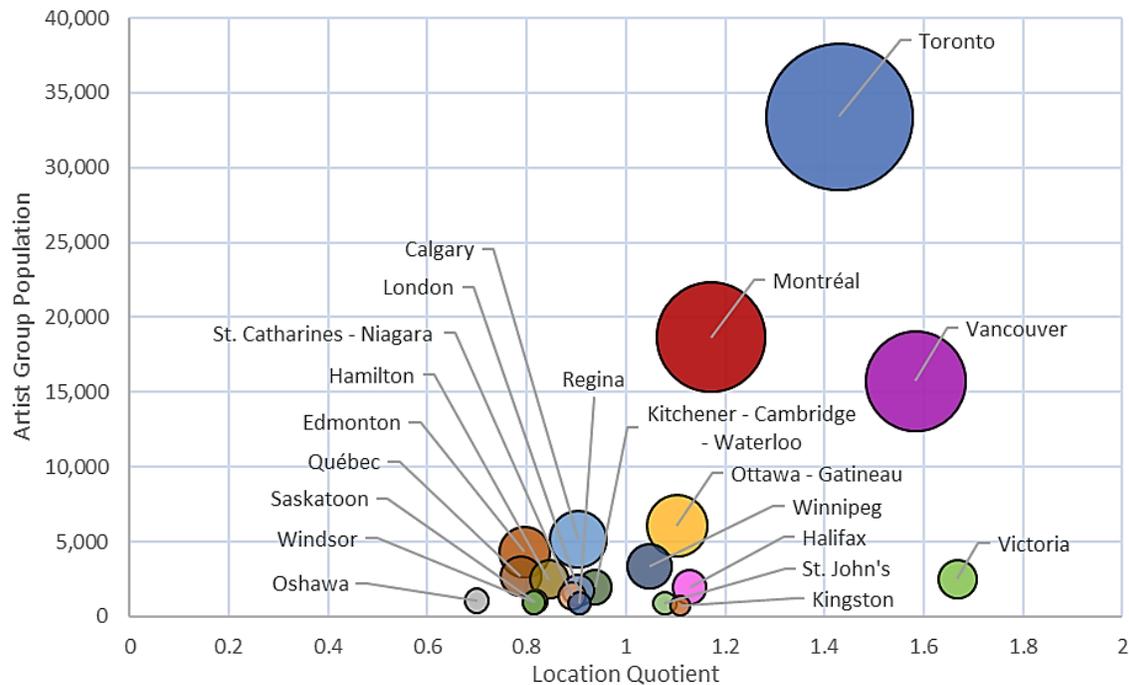
In 2001, the number of CMAs with an artist LQ greater than 1.2 dropped to five; as the Saskatchewan regions of Saskatoon and Regina, as well as Ottawa, dropped below an LQ of 1.2, while St John's moved above. Since 1991, Victoria gained more artists relative to its labour force than any other CMA and became the CMA with the most significant cluster of artists with an LQ of 1.84. Next, Metro Vancouver experienced an increase its cluster of artists as it moved to a LQ of 1.73. Toronto saw a very small increase, while Montreal contracted its proportion of artists relative to its labour force.

Figure 5-2 2001 Artist Group Population and Location Quotient by CMA



From 2001 to 2011, artist populations in CMAs across Canada experienced an 11% gain, while the labour force grew by 17% as more jobs went to other occupations. Over the same time, artist populations across Canada grew by 3%, while the Canadian labour force grew by 5%. As a result of artist populations growing at a slower rate than the total labour force, we see an overall decrease in LQs for many of the CMAs. In 2011, of the top 20 artist populated CMAs, the total number with a LQ of artists greater than 1.2 was reduced to three, as St John's and Montreal fall behind the significant cluster threshold as identified by Grodach.

Figure 5-3 2011 Artist Group Population and Location Quotient by CMA



In the census data presented, we see the population of artists outpace the growth of the overall labour force between 1991 and 2001. This decade accounted for the highest growth of artists in CMAs over the twenty years studied. In the following ten years, a global recession disrupted economic growth and the growth of artist populations. During this time growth of the labour force outpaced growth of artist's occupations.

Between 1991 and 2011, the only region to experience a loss of artists is the Regina CMA, which experienced a 2% loss over the twenty-year time period. During this time, Metro Vancouver's artist population increased by 71%, the third largest increase of artists behind Oshawa (+91%) and Ottawa (+77%). During this time, the Metro Vancouver had the largest increase in artists of any CMA with a LQ over 1.2. These attributes make Vancouver an interesting city to engage research on the spatial distribution of artists, the neighbourhoods they live in and their proximity to artist facilities. Further, the Vancouver CMA represents a good case of a major region in Canada to examine where artists live within the region and what socio-economic and demographic variables are attracting artists to neighbourhoods, or displacing artists from neighbourhoods.

While Toronto, Montreal and Vancouver stand out as having the largest work forces with a high representation of artists, there are a number of smaller towns, cities and regions in Canada that have a very high representation of artists as well. These niche areas, such as Victoria, Nanaimo, Kelowna, and Owen Sound also present interesting studies to further understand how smaller communities can bolster successful artist communities and retain a thriving arts and cultural scene despite lacking some of the benefits that are available in major metropolitan region. Markusen (2006) discovers that some artists, such as writers, are less dependent on the benefits of clustering and access to artist facilities, as such they are more likely to live outside major urban centres than other artists. To understand the location preference of artists in smaller communities across Canada, I recommend further research into how smaller towns and cities first started attracting artists and how they successfully retained them.

5.2. Artist Occupations in Metro Vancouver

To build off the previous section that explores artists populations across Canadian CMAs, this section examines artist populations living in Metro Vancouver in more detailed between 1991, 2001 and 2011. Artist occupation data is broken down into four-digit NAICS codes that provide detailed artist occupations that make up the artist group, as defined in this paper. This section will also provide an overview of the custom order of detailed occupation data at the census tract geography. Artist population data is converted into densities and LQs to get a better understanding of the concentrations and clusters of artists across Metro Vancouver. When looking at census tracts within the Vancouver CMA, LQ compares the proportion of artist occupations in a census tract relative to the proportion of artists in the regions labour force. The formula used to calculate the location quotient for artists living in neighborhoods across the Vancouver CMA is as follows.

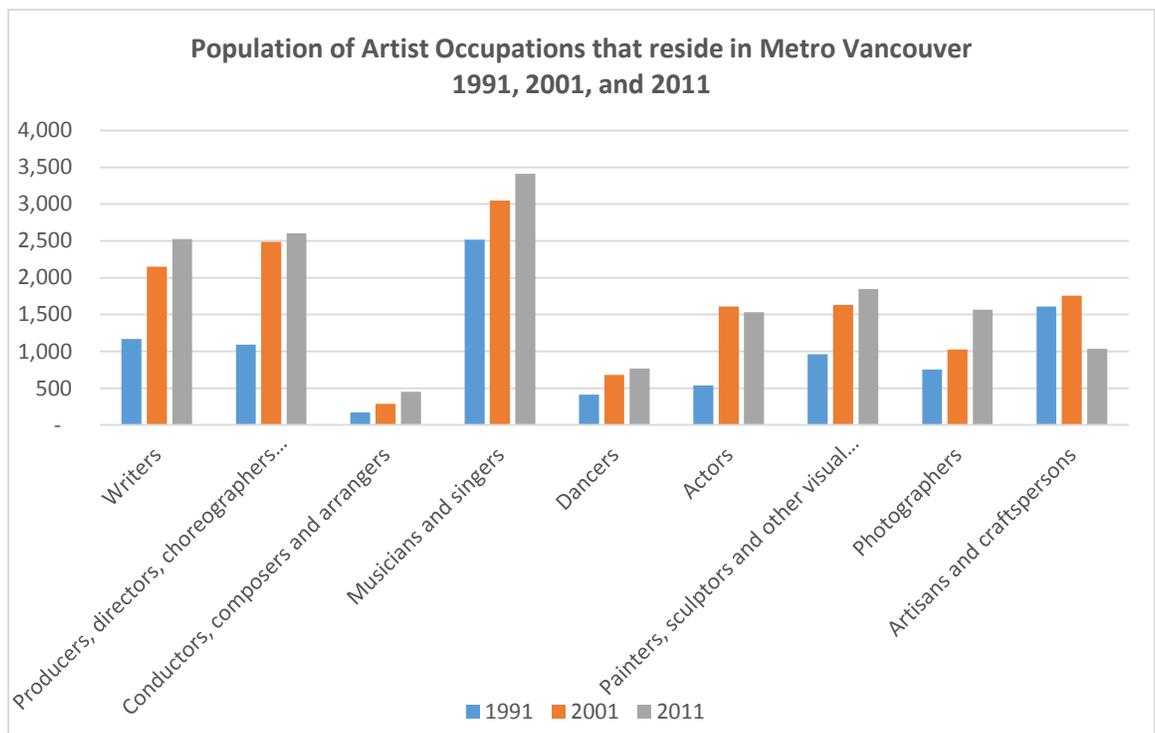
$$LQ = (Artists_{CT} / Labour\ Force_{CT}) / (Artists_{CMA} / Labour\ Force_{CMA})$$

Looking at LQ of artists at the census tract level reveals where in the Vancouver CMA artists are clustering. From this, we can begin to explore in more depth the types of neighbourhoods they live in and their proximity to artist facilities. This section also introduces GIS mapping that explores the distribution of artist populations expressed as densities and LQs in census tracts across Metro Vancouver. These maps show a high

concentration of artist densities and clustering of artists centrally located in inner-city neighborhoods within the Vancouver CMA.

In 1991, the artist group population in the Vancouver CMA was 9,210 and increased to 15,730 by 2011. Over these two decades, the majority of the individual artist occupation populations grew in each year, with the exception of actors and comedians which experienced a slight decrease between 2001 and 2011, and artisans and craftpersons which had a population decrease from 1,755 in 2001 to 1,035 in 2011. The bar graph below illustrates population totals of the individual artist occupations that make up the artist group for the 1991, 2001 and 2011 census years.

Figure 5-4 Population of Artists Occupations in Metro Vancouver by Year

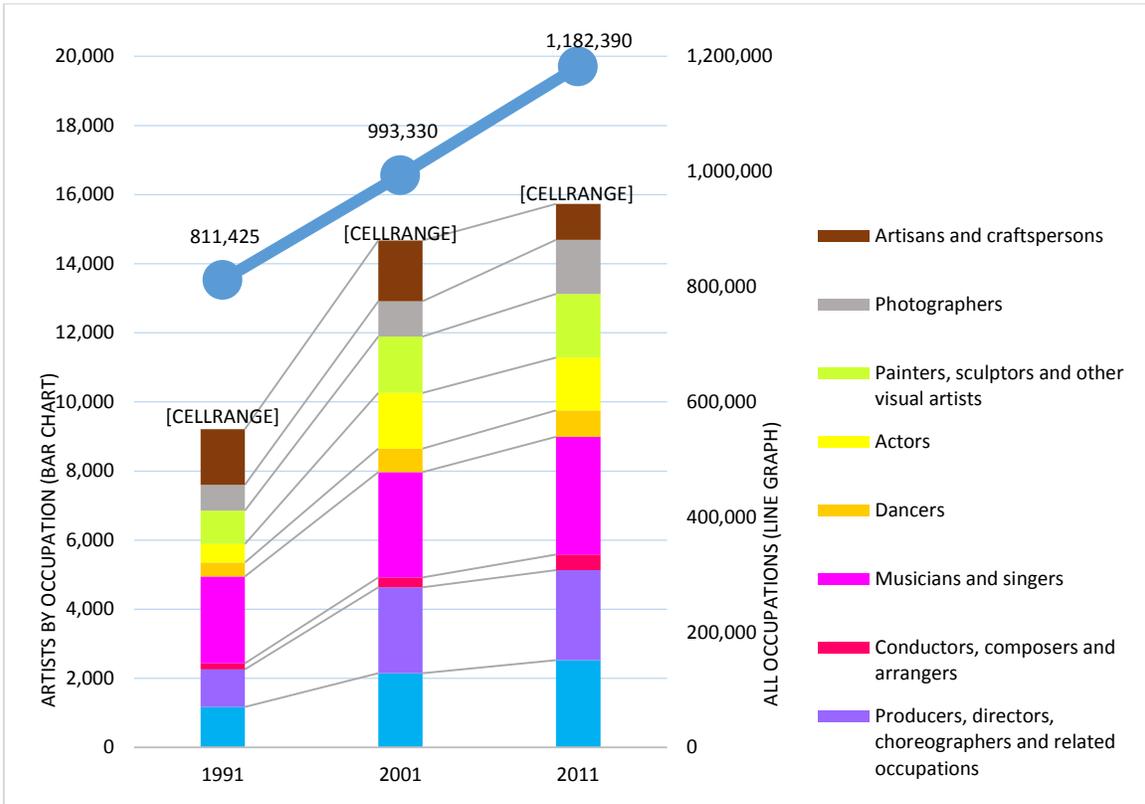


In 1991, musicians and singers made up the highest proportion of artists at 27% of the labour force. Over the next twenty years, other artist populations grew more rapidly, shrinking the proportion of musicians and singers to 22% of the artist population. Between 1991 and 2011, the Vancouver CMA experienced the highest growth in artist population in the first decade of the twenty-year period as writers, producers, directors, choreographers, and actors and comedians increased in population the most. The highest percent change was experienced in artist and comedian occupations which

increased 201% over the ten-year period, followed by producers, directors, choreographers and related occupations which increased by 128%.

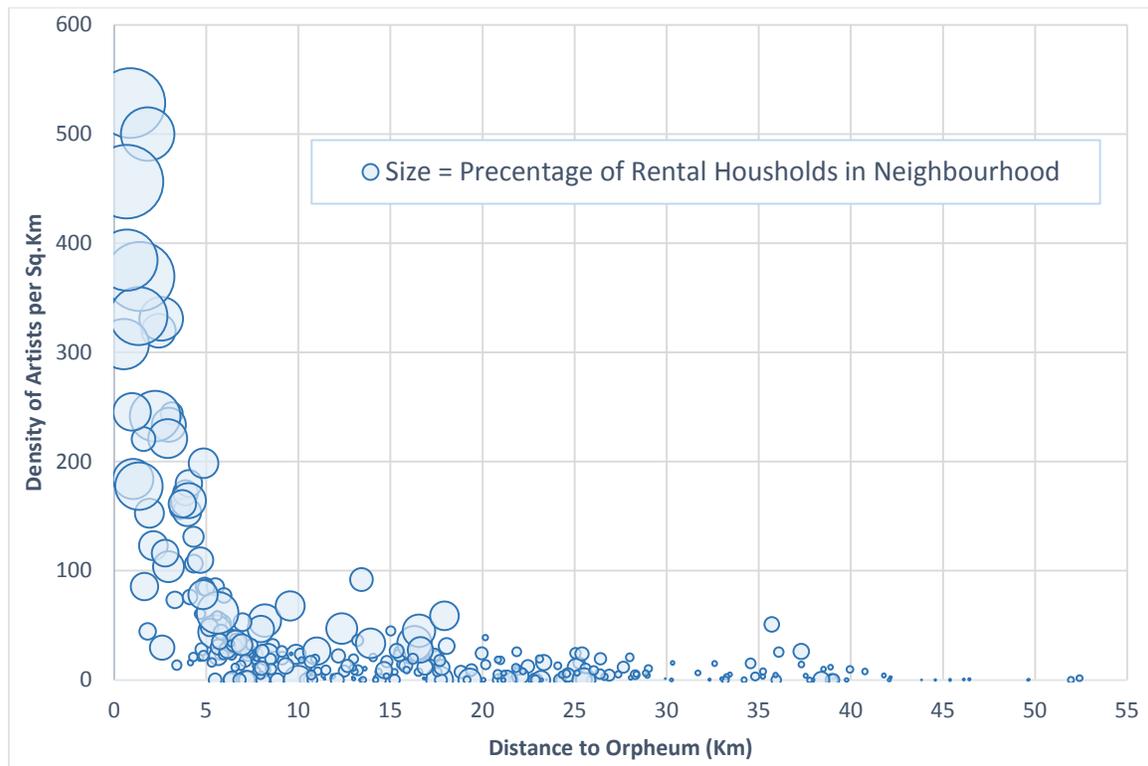
Between 1991 and 2011, the artist population in Metro Vancouver grew from 9,210 artists to 15,730 artists. The largest gain in the twenty-year span was experienced between 1991 and 2001 where the population of artists increased by 5,465, or about 60%. During this decade, producers, directors, choreographers and related occupations grew the most with an additional population of 1,395. This was followed by actors at a gain of 1,075, and an increase of writers by 980. The following decade, between 2001 and 2011, experienced much smaller gains at only 1,055 additional artists being added to the population, or a 7% increase. The largest population gains during this time period was experienced by photographers with an increase of 540, followed by writers at 375, then musicians at 360. Declines were experienced in acting occupations with a loss of 80 and artisans and craftpersons with a loss of 720. Over the twenty-year span, total occupations in the Vancouver CMA grew from 811,425 in 1991 to 1,182,390 in 2011. The rate of growth remained similar between the two-decade periods at 22.4% between 1991 and 2001, and 19.0% between 2001 and 2011. The chart below illustrates the population change in artists and the total population of all occupations living in Metro Vancouver between 1991 and 2011. In 2011, musicians and singers had the largest population of artists within the artist grouping with a population of 3,410 living in Metro Vancouver. The second highest population of artist occupations were producers, directors, choreographers and related occupations at 2,605, followed by authors and writers with a population of 2,525.

Figure 5-5 Total Population of Artist Occupations in Metro Vancouver 1991-2011



In 2011, the artist population living in Metro Vancouver reached a total of 1,182,390, while half of all artists lived within 6km of the Orpheum. The following chart shows three variables at the census tract geography within Metro Vancouver. The density of artists is represented in the y-axis, the distance from the Orpheum in kilometres is represented on the x-axis and the size of the bubble corresponds to the proportion of households that are renting their dwelling unit. As described in section 4.1.2., the location of the Orpheum is used as an indicator of the location of the urban centre of the Metro Vancouver region and a central point of the downtown artist facility cluster within the City of Vancouver.

Figure 5-6 Density of Artists in Relation to the Distance to the Orpheum and Density of Rental Households by 2011 Census Tract



This chart shows that the density of artists increases as the proximity to the Orpheum (City Centre) is reduced. The neighbourhoods with the highest artists densities, all census tracts with over 100 artists per square kilometer, are found within 5km from the Orpheum. The neighbourhoods with the highest artist densities and closest proximity to the Orpheum also have a high proportion of rental households. Chapter 6 presents the bivariate analysis and the correlation between artist densities and rental households.

5.3. Artists in Metro Vancouver Neighbourhoods

This section presents a series of bivariate data analysis results that explain the populations of artists in neighbourhoods across the Vancouver CMA. As defined earlier, neighbourhoods are represented by census tracts which enables a detailed observation and statistical analysis of artist populations and socio economic and demographic variables available through the Census and National Household Survey.

As presented in Chapter 4, census tracts come in all shapes and sizes and vary in population. As such, to perform statistical analysis that is not impacted by varying size of census tracts, it is best practice to apply a calculation to populations within census tracts that applies a common denominator. In this research, density and location quotient are the calculated values to express the population of artists at the neighbourhood level. Calculating density of a population within a census tract normalizes the area of the census tract and can be used to show where concentrations of populations occur. Throughout this paper, density is expressed as population per square kilometre. Location quotients show the proportion of a sub population within a larger population and normalize the population total across census tracts. Location quotient is used to identify clustering or high representation of artist occupations as a proportion to the labour force population for census tracts in the Vancouver CMA.

This section will provide a descriptive statistical overview of the artist occupations and demographic and socio-economic variables that make up the neighbourhoods across the City of Vancouver and Metro Vancouver for the 1991, 2001 and 2011 census years. The three census years studied, 1991, 2001 and 2011 are each separated into the sections that follow. The descriptive statistics presented in the following sections provide a reference of the artist populations and socio-economic and demographic variables in census tracts across Metro Vancouver that are used in bi-variate and multi-variate regressions in the chapters that follow. Descriptive statistics are also presented that show the maximum, mean and standard deviation of artist populations and neighbourhood variables in census tracts across the Vancouver CMA.

5.3.1. 1991 Metro Vancouver

In 1991, there were 298 census tracts that made up the Vancouver CMA. Across these census tracts, the highest population density of artists was 369.57 artists per square kilometre, while the mean artist density across all census tracts was 25.47 artists per square kilometer, and a standard deviation of 52.16 artists per square kilometer. Writers and authors had the highest density in a census tract at 111.11 authors and writers per square kilometer, this was followed closely by musicians and singers who had a density of 108.70 artists per square kilometre. The artist occupation with the lowest maximum density within a census tract was dancers at 29.41 artists per square

kilometre. The following chart shows the descriptive variables for artist densities across Metro Vancouver census tracts.

Table 5-3 1991 Artist Density Descriptive Statistics Across Metro Vancouver Census Tracts

1991 Artist Density across Census Tracts			
Artist Occupation	Maximum	Mean	Std. Deviation
Artist Group	369.57	25.47	52.16
Writers Authors	111.11	4.11	12.68
Producers Directors Choreographers	57.14	3.38	8.69
Conductors Composers Arrangers	55.56	0.71	4.55
Musicians Singers	108.70	6.06	11.38
Dancers	29.41	0.77	3.12
Actors Comedians	86.96	1.83	7.45
Painters Sculptors Visual artists	86.96	3.20	10.28
Photographers	65.22	2.46	7.34
Artisans Craftspersons	65.22	3.20	7.39

In Metro Vancouver, the highest location quotient observed within a census tract for the artist group was 5.68. In 1991, conductor, composers and arrangers had the highest degree of concertation within a census tract with a LQ of 66.60, followed by painters, sculptors and visual artists with a LQ of 44.96. The lowest LQ experienced by musicians and singers with a LQ of 6.94, followed by artisans a craftpersons at 7.03. Table 5-4 shows the LQ for the artist group, and the individual artist occupations by maximum, mean and standard deviation.

Table 5-3 1991 Artist Location Quotient Descriptive Statistics Across Metro Vancouver Census Tracts

1991 Artist Location Quotient across Census Tracts			
Artist Occupation	Maximum	Mean	Std. Deviation
Artist Group	5.68	1.00	0.89
Writers Authors	14.91	1.01	1.96
Producers Directors Choreographers	9.67	1.03	1.88
Conductors Composers Arrangers	66.60	1.13	5.48
Musicians Singers	6.94	1.02	1.20
Dancers	18.41	0.97	2.87
Actors Comedians	32.62	0.93	2.83
Painters Sculptors Visual artists	44.96	1.16	3.26
Photographers	14.02	1.03	2.30
Artisans Craftspersons	7.03	0.96	1.41

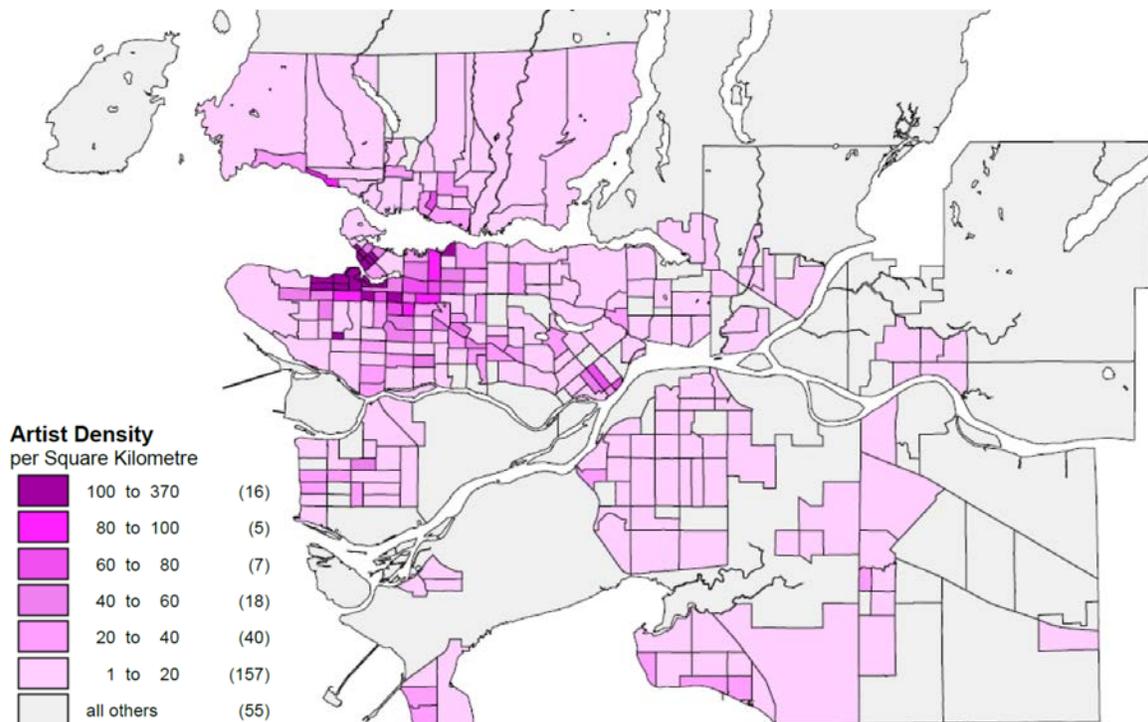
Table 5-5 presents the mean and standard deviation of the census variable used to describe socio-economic and demographic characteristics of neighbourhoods in this research. Variables are expressed in both percentages and densities. For example, in 1991 the average census tract in the Vancouver CMA is made up of 37.5% renter occupied households with an average rent of \$788 per month.

Table 5-4 1991 Neighbourhood Characteristics Descriptive Statistics Across Metro Vancouver Census Tracts

1991 Vancouver CMA Census Tract Descriptive Statistics					
Census Variables	Mean	Std. Deviation	Census Variables	Mean	Std. Deviation
Perc 0 to 14	18.4	6.6	Avg Household Income	\$52,952	\$16,551
Perc 25 to 39	27.3	6.5	Kilometres to Orpheum	16.6	12.0
Perc 25 to 44	35.7	6.3	Density Population	3151.5	3194.3
Perc 65+	12.2	6.5	Density 0to14	459.5	307.5
Perc Living Alone	10.7	11.8	Density 25to44	1221.6	1574.5
Avg Household Size	2.7	0.6	Density 25to39	965.6	1313.5
Perc Immigrants	29.2	10.9	Density 65+	424.8	541.9
Unemployment rate	9.1	4.0	Density Living Alone	542.0	1314.0
Perc Self-employed	10.9	4.9	Density Immigrants	1017.9	1117.1
Perc Bachelor Deg.	14.3	9.5	Density Self employed	174.6	211.2
Perc Worked at home	27.1	24.3	Density Worked at home	103.2	122.0
Perc Owner	62.4	22.7	Density Owner	577.4	396.6
Perc Renter	37.5	22.7	Density Renter	822.7	1848.0
Avg Dwelling Value	\$244,629	\$102,374	Density Dwellings	1400.4	2082.6
Avg Monthly Rent	\$788	\$180			

The following map (Figure 5-7) illustrates the distribution of the artist group densities across Metro Vancouver in 1991.

Figure 5-7 Map of 1991 Artist Densities Across Metro Vancouver Census Tracts



Artist densities over one-hundred artists per square kilometre are highly concentrated within the City of Vancouver West End, Kitsilano and Fairview local areas within the City of Vancouver.

5.3.2. 2001 Metro Vancouver

In 2001, the maximum artist group density in a census tract increased to 678.57, and the mean to 37.72 artists per square kilometre across all census tracts in Metro Vancouver. Since 1991, dancers remain at the lowest maximum density amongst artist occupations. Producers, directors and choreographers move ahead of writers and authors for having the highest density within a census tract at 239 artists per square kilometre. Overall, the census tract with the most artist population density increased from 370 artists per square kilometre to 679 artists per square kilometer. The following table highlights the maximum mean and standard deviation of artist densities in census tracts across the Vancouver CMA.

Table 5-5 2001 Artist Density Descriptive Statistics Across Metro Vancouver Census Tracts

2001 Artist Density Frequency Statistics			
Artist Occupation	Maximum	Mean	Std. Deviation
Artist Group	678.57	37.72	76.73
Writers and Authors	166.67	5.62	15.55
Producers, Directors and Choreographers	239.13	7.71	21.88
Conductors Composers Arrangers	107.14	0.90	7.02
Musicians and Singers	250.00	7.07	17.93
Dancers	50.00	1.57	5.46
Actors and Comedians	142.86	5.57	16.76
Painters, Sculptors and Visual artists	112.90	3.63	9.75
Photographers	54.05	1.86	5.53
Artisans and Craftspersons	83.33	3.66	9.51

Table 5-7 presents artist LQ descriptive statistics in 2001 census tracts across Metro Vancouver. In 2001, we saw lower maximum LQs than in 1991 for six of the nine artist occupations. This could be the result of neighborhoods increasing in population and the proportion of artists to labour force decreasing. The artist occupation to experience the largest LQ decrease was conductors, composers and arrangers which decreased from a LQ of 66.6 to 27.1, and still remained the occupation with the highest degree of clustering within a census tract. Artisans and craftspersons experienced the largest increase of maximum LQ in a census tract as it increased from an LQ of 7.0 to 15.5.

Table 5-6 2001 Artist Location Quotient Descriptive Statistics Across Metro Vancouver Census Tracts

2001 Artist Location Quotient Frequency Statistics			
Artist Occupation	Maximum	Mean	Std. Deviation
Artist Group	5.76	0.99	0.88
Writers Authors	12.64	0.96	1.68
Producers Directors Choreographers	11.20	0.97	1.72
Conductors Composers Arrangers	27.02	0.84	3.59
Musicians Singers	7.08	0.97	1.27
Dancers	14.23	0.89	2.19
Actors Comedians	10.28	0.96	1.76
Painters Sculptors Visual artists	15.63	1.02	1.96
Photographers	21.54	1.00	2.25
Artisans Craftspersons	15.48	1.01	1.88

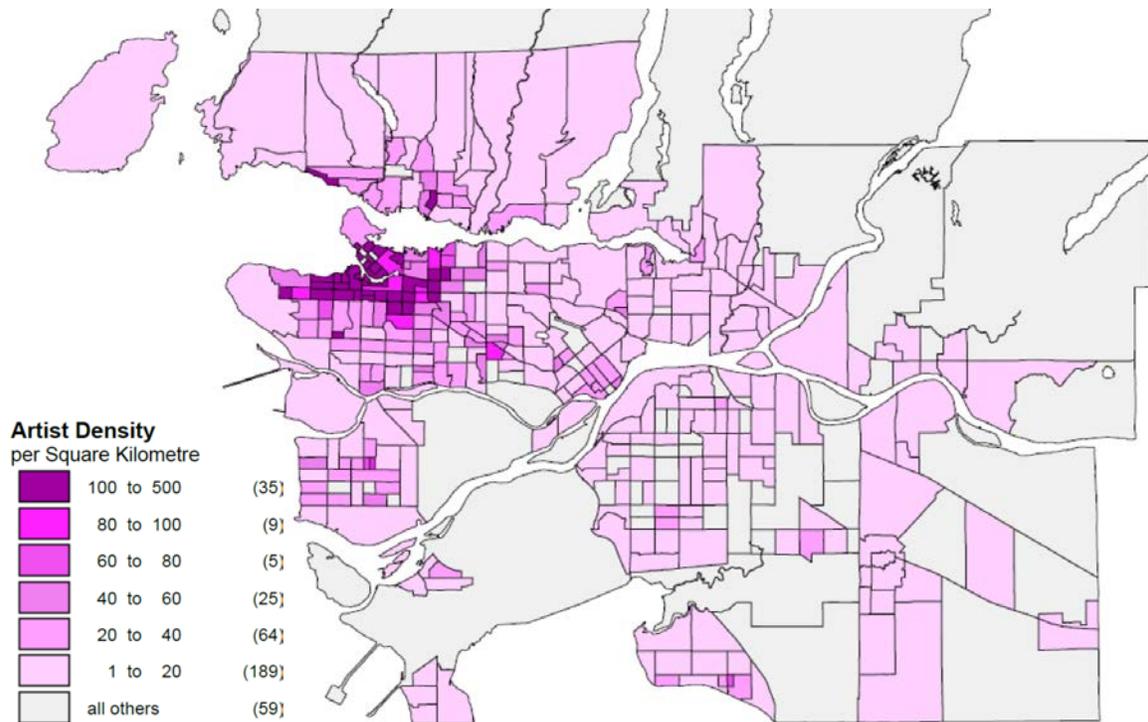
Table 5-8 presents 2001 census tract descriptive statistics for neighbourhood variables across the Vancouver CMA. In 2001, the average neighbourhood across Metro Vancouver saw household income increase at a faster rate than average rent. The proportion of renter households in census tracts remained similar at 37.2% of all households, while average rent per census tract increased by \$99 per month, or 12.6%, to a monthly rent of \$887; meanwhile, average annual household income across census tracts increased by 24.1% to \$65,738.

Table 5-7 2001 Neighbourhood Characteristics Descriptive Statistics Across Metro Vancouver Census Tracts

2001 Vancouver CMA Census Tract Descriptive Statistics					
Census Variables	Mean	Std. Deviation	Census Variables	Mean	Std. Deviation
Perc 0 to 14	17.3	5.4	Avg Population Income	\$31,547	\$9,553
Perc 25 to 39	23.7	7.7	Avg Household Income	\$65,738	\$22,622
Perc 25 to 44	32.5	7.8	Kilometres to Orpheum	17.3	11.8
Perc 65+	12.2	6.0	Density Population	3867.3	3858.0
Avg Household Size	2.7	0.6	Density 0to14	545.6	382.2
Perc Immigrants	36.7	14.4	Density 25to44	1438.6	1917.6
Unemployment rate	7.3	3.0	Density 25to39	1106.6	1610.0
Perc Self-employed	13.5	5.6	Density 65+	492.0	601.8
Perc BachelorDeg	21.9	11.5	Density Immigrants	1543.9	1663.5
Perc Worked at home	8.3	4.5	Density Self-employed	0.3	0.2
Perc Public transit	11.4	7.5	Density Worked at home	145.3	191.9
Perc Walked	6.3	8.6	Density Public transit	277.3	418.2
Perc Bicycle	1.8	2.3	Density Walked	238.6	817.2
Perc WalkBikeTransit	19.5	14.0	Density Bicycle	50.9	109.6
Perc Owner	64.8	20.3	Density WalkBikeTransit	566.8	1227.5
Perc Renter	35.2	20.3	Density Owner	779.1	636.5
Avg Dwelling Value	\$292,894	\$122,775	Density Renter	953.1	1999.7
Avg Monthly Rent	\$887	\$233	Density Dwellings	1732.1	2451.7

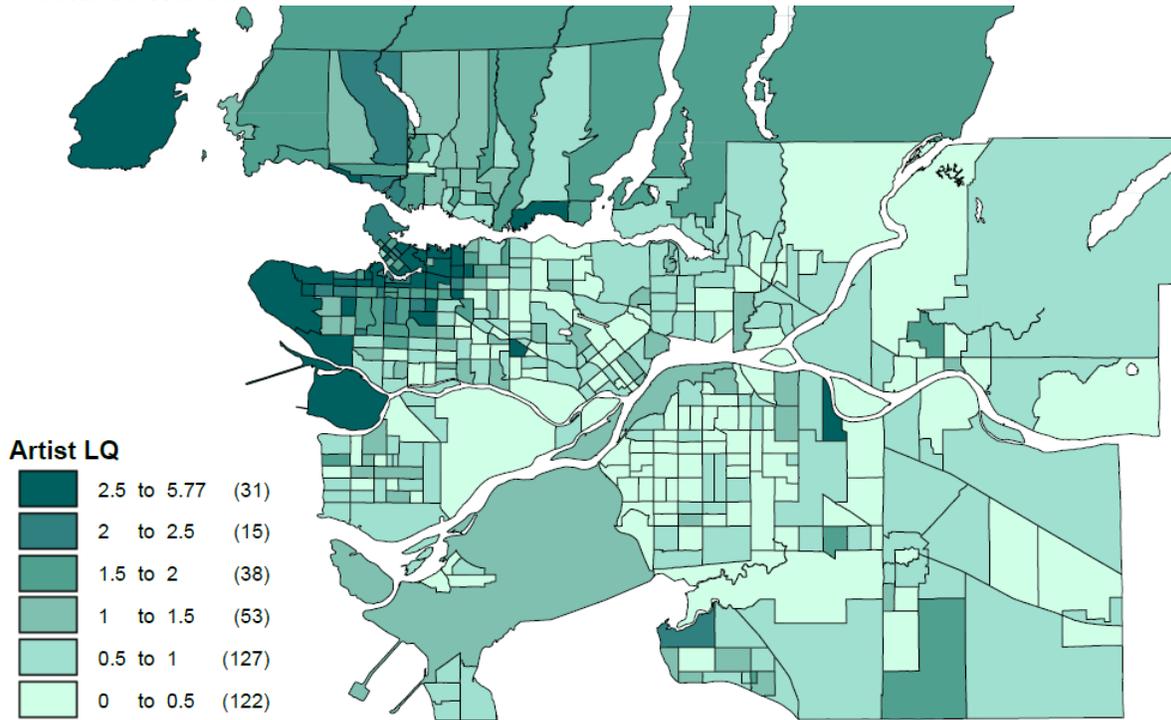
By the 2001 census, artist densities over one-hundred artist per square kilometer began spreading east within the City of Vancouver towards the Mount Pleasant and Grandview-Woodland communities. Figure 5-8 shows the distribution of artist densities in 2001 across Metro Vancouver neighbourhoods.

Figure 5-8 Map of 2001 Artist Densities Across Metro Vancouver Census Tracts



In 2001, the distribution of artist location quotients is also very centralized in the Metro Vancouver region as we see artist LQs above 2.5 in areas of the region from UBC to Grandview-Woodland, and Downtown. Bowen Island and the community of Burkeville on Seas Island in Richmond also have high levels of artist clustering. The following map (Figure 5-9) shows the distribution of artist location quotients across Metro Vancouver neighbourhoods in 2001.

Figure 5-9 Map of 2001 Artist Location Quotients Across Metro Vancouver Census Tracts



5.3.3. 2011 Metro Vancouver

In Metro Vancouver, the 2011 National Household Survey recorded the highest density of artists at 733 artists per square kilometre across the region, up from 679 artists per square kilometre ten years prior. Between 2001 and 2011 Vancouver CMA experienced a slowdown in the growth of artists with two artist occupations, artists and comedians, and artisans and craftpersons losing population. Interestingly, the maximum density for actors in a census tract increased significantly from 142.9 to 291.67 artists per square kilometre. All but type artist occupations experienced a reduced maximum census tract density between 2001 and 2011. As described earlier, it is important to add caution when comparing the voluntary 2011 National Household Survey to mandatory census years.

Table 5-8 2011 Artist Density Descriptive Statistics Across Metro Vancouver Census Tracts

2011 Artist Density Frequency Statistics			
Artist Occupation	Maximum	Mean	Std. Deviation
Artist Group	733.33	38.40	85.36
Writers Authors	147.89	3.41	15.80
Producers Directors Choreographers	205.88	4.15	18.71
Conductors Composers Arrangers	15.50	0.03	0.73
Musicians Singers	118.64	3.07	11.20
Dancers	33.33	0.13	1.71
Actors Comedians	291.67	1.15	14.10
Painters Sculptors Visual artists	205.88	1.39	12.08
Photographers	54.79	0.51	3.70
Artisans Craftspersons	23.18	0.14	1.40

Table 5-10 chart shows descriptive statistics for the LQ of artist occupations in census tracts across the Vancouver CMA. For the most part, the maximum LQs remain similar since 2001, with a notable increase in the maximum LQ of photographers. With good quality representative data, the mean LQ for census tracts should be close to 1. The lower mean LQs is reflective of the poor-quality of data available for detailed occupations in census tracts across Metro Vancouver from the 2011 National Household Survey.

Table 5-9 2011 Artist Location Quotient Descriptive Statistics Across Metro Vancouver Census Tracts

2011 Artist Location Quotient Frequency Statistics			
Artist Occupation	Maximum	Mean	Std. Deviation
Artist Group	5.26	0.83	0.93
Writers Authors	11.95	0.33	1.29
Producers Directors Choreographers	15.05	0.38	1.44
Conductors Composers Arrangers	15.64	0.03	0.74
Musicians Singers	6.73	0.37	1.04
Dancers	11.74	0.09	0.84
Actors Comedians	21.99	0.17	1.35
Painters Sculptors Visual artists	19.28	0.24	1.47
Photographers	8.88	0.13	0.82
Artisans Craftspersons	15.37	0.11	1.01

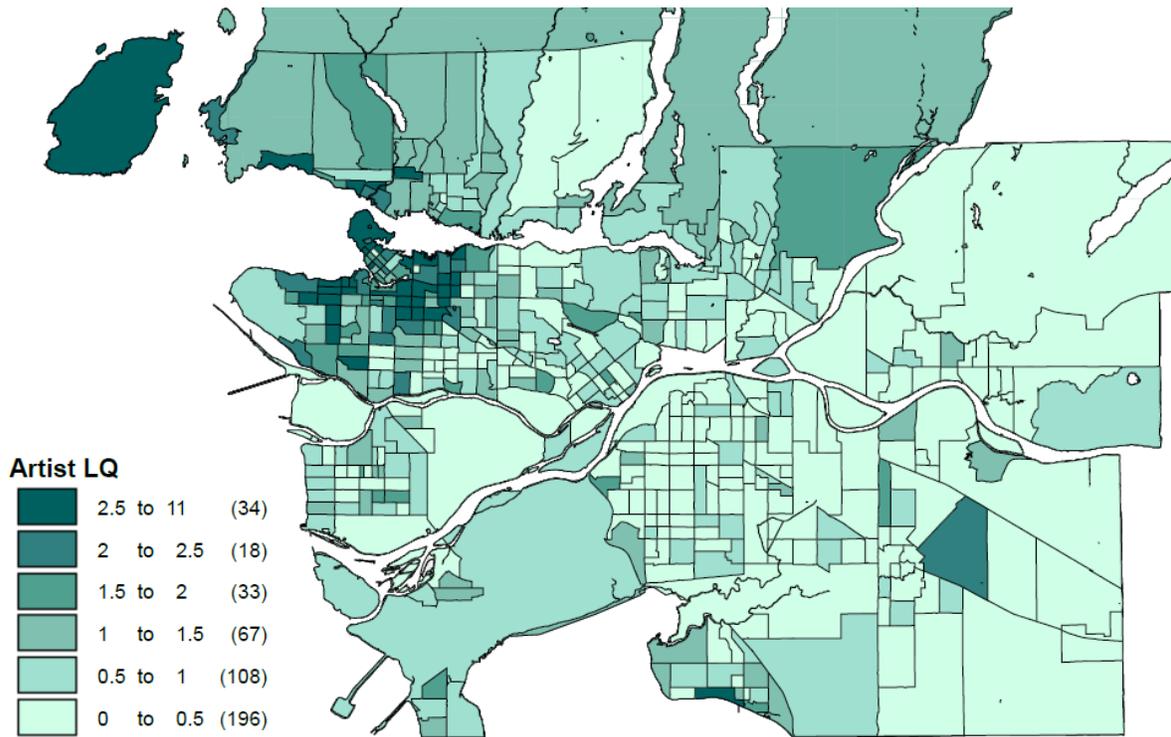
In 2011, the average census tract in the Vancouver CMA decreased slightly to a renter household proportion at 31.2% while average rent per census tract increased by \$201 per month, or 22.7% to a monthly rent of \$1,088; meanwhile, average annual household income across census tracts increased by 31.8% to \$86,657

Table 5-10 2011 Neighbourhood Characteristics Descriptive Statistics Across Metro Vancouver Census Tracts

2011 Vancouver CMA Census Tract Descriptive Statistics					
Census Variables	Mean	Std. Deviation	Census Variables	Mean	Std. Deviation
Perc 0 to 14	15.2	4.4	Avg Household Income	\$86,657	\$32,260
Perc 25 to 44	28.6	8.1	Kilometres to Orpheum	18.0	12.1
Perc 65+	13.8	5.6	Density Population	4506.2	4579.0
Perc Living Alone	11.2	9.8	Density 0to14	571.2	422.8
Avg Household Size	2.7	0.6	Density 25to44	1519.6	2147.0
Perc Immigrants	39.6	15.3	Density 25to39	1162.5	1785.2
Unemployment rate	7.2	2.3	Density 65+	606.6	638.6
Perc Self-employed	12.5	5.3	Density Living Alone	767.7	1576.7
Perc Bachelor Deg.	17.2	6.8	Density Immigrants	1901.5	2172.4
Perc Worked at home	7.6	4.1	Density Self-employed	2593.7	3022.9
Perc Public transit	19.2	10.4	Density Bachelor	783.9	1,191.3
Perc Walked	5.7	7.7	Density Worked at home	166.5	226.2
Perc Bicycle	1.5	2.5	Density Public transit	559.3	881.8
Perc Walk Bike Transit	26.5	15.9	Density Walked	260.1	850.9
Perc Owner	68.8	19.1	Density Bicycle	50.3	119.1
Perc Renter	31.2	19.0	Density Walk Bike Transit	869.7	1672.7
Avg Dwelling Value	\$691,819	\$339,894	Density Owner	1048.0	1062.9
Avg Monthly Rent	\$1,088	\$259	Density Renter	959.4	1975.3
Avg Population Income	\$41,039	\$13855	Density Dwellings	2006.2	2758.6

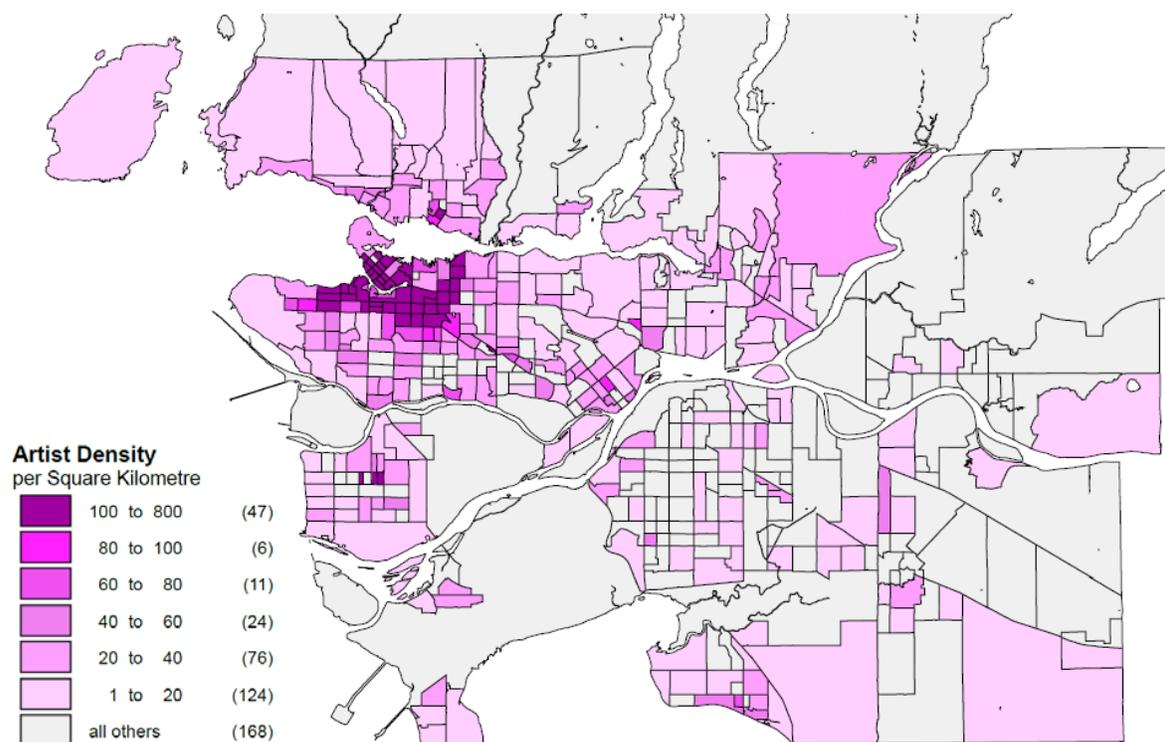
In 2011, the clustering of artists became more centralized within the City of Vancouver as less census tracts had a LQ of 2.5 or greater. The following map shows the distribution of artist location quotients in 2011.

Figure 5-8 Map of 2011 Artist Location Quotients Across Metro Vancouver Census Tracts



In 2011, the densities of artists continue to intensify in inner city neighbourhoods in and around the downtown peninsula of the City of Vancouver as we see the number of census tract with over one-hundred artists per square kilometre increase from 16 in 1991 to 47 in 2011.

Figure 5-9 Map of 2011 Artist Densities Across Metro Vancouver Census Tracts



5.3.4. 2011 City of Vancouver

In addition to Metro Vancouver census tract data, Census and National Household Survey data is also presented for census tracts that make up the City of Vancouver for the 2011 census year. City of Vancouver census tract data will be examined for the 2011 census year because of the limitations to the artist facilities data, which is only available for the City of Vancouver. Using the artists facility data which extends across the City of Vancouver, 2011 census tract data is used to conduct bivariate and multivariate regression analysis.

This section presents descriptive statistics for the census tracts and artist facilities within the Vancouver CSD. Table 5-12 highlights artists densities and location quotients across census tracts in the Vancouver CSD. Across the City of Vancouver, the average neighbourhood has an artist group density of 140.1 artists per square kilometre, this is up significantly from 38.4 artists per square kilometre across all Metro Vancouver neighbourhoods. This clearly shows that neighbourhoods in the City of Vancouver are significantly more densely populated with artist than in the rest of the region.

Table 5-11 2011 Neighbourhood Characteristics Descriptive Statistics Across City of Vancouver Census Tracts

2011 City of Vancouver Census Tract Descriptive Statistics					
Artist Densities	Mean	Std. Deviation	Artist Location Quotient	Mean	Std. Deviation
Artist Group	115.3	140.1	Artist Group	1.7	1.2
Writers Authors	12.5	29.1	Writers Authors	1.2	2.3
Producers Directors Choreographers	15.1	34.6	Producers Directors Choreographers	1.2	2.5
Conductors Composers Arrangers	0.1	1.4	Conductors Composers Arrangers	0.1	1.5
Musicians Singers	8.7	20.0	Musicians Singers	0.7	1.5
Dancers	0.1	0.9	Dancers	0.1	0.6
Actors Comedians	4.4	27.8	Actors Comedians	0.6	2.6
Painters Sculptors Visual artists	5.0	23.5	Painters Sculptors Visual artists	0.7	2.6
Photographers	1.9	7.1	Photographers	0.4	1.5
Artisans Craftspersons	0.2	1.3	Artisans Craftspersons	0.1	0.7

When looking at the individual artist occupations, we also find that all are more densely represented in the City than the Metro region, except for dancers, who have the same observed density in the City and region, at 0.1 dancers per square kilometer. In the city, actors and comedians are the artist occupation with most significant increase in density when compared across region. In the city, actors and comedians are on average 3.8 times more densely populated in neighborhoods than across the regions neighbourhoods. Overall, the entire artists group is three times more densely populated in City of Vancouver neighbourhoods than the regions neighbourhoods.

Table 5-13 outlines the average distance in meters between the locations facility types to every census tract within the Vancouver CSD. Distance is measured from the centroid of census tracts to the location point of an artist facility. As census tracts are aimed to represent a set range of population, smaller census tracts are an indication of higher density. Areas with higher density will have more and smaller census tracts, than areas of the city of less population density. As such, facility types with a lower average distance to census tracts could indicate that the location of the facilities could be in closer proximity to higher population density neighborhoods. Lower average distance from census tracts to facilities could also be an indicator that the facilities are more evenly distributed across the City, resulted in a smaller average distance from a neighbourhood to a type of facility. A higher standard deviation of artist facility distance to census tract indicates that the type of artist facility is more centralized in a certain location, opposed to a lower standard deviation of distance between artist facilities and

census tract which indicates that a facility type that is more spread out across the distribution of census tracts.

Table 5-12 2011 Distance from Artist Facility Descriptive Statistics Across City of Vancouver Census Tracts

Distance between Artist Facilities and 2011 Census Tracts in Vancouver CSD		
Artist Facilities	Mean Distance (Metres)	Std. Deviation
Bar Lounge Cabaret	4712.7	2037.8
Café Restaurant	4574.0	1728.5
Total Café Restaurant Bar	4651.1	1878.8
Arena Stadium	6264.0	1596.2
Community-Centre Hall	5297.6	1016.5
Place of Worship	4895.1	1887.8
Plaza Park Band Shell	5275.4	2145.3
Total Community Space	5318.8	1281.2
Total Educational	5008.3	1404.6
Garden Aquarium Science Centre	4937.7	1845.3
Library Archives	4829.3	2487.7
Museum Gallery	4949.4	1977.3
Total Museum Gallery	4944.0	1985.4
Artist Housing	5668.5	2793.0
Artist Studio	5021.3	1504.4
Artist Studio w/ Residence	4587.4	1941.5
Film Recording Studio	4625.7	1846.8
Rehearsal Studio	4917.7	1403.5
Workshop	4585.3	1860.6
Total Studio Rehearsal	4886.2	1580.0
Cinema	4697.5	1993.8
Performance Space	5010.2	1964.1
Theatre	5851.7	1853.6
Total Theatre Performance	5447.7	1874.2
Total Artist Facility	5072.0	1640.0

The distance between artist facilities and neighbourhoods provides valuable data to analyze correlations between the location of neighbourhoods where artists cluster and the location of artist facilities.

Next, we look at the mean and standard deviation of census variables in census tract across the City of Vancouver for the 2011 Census and National Household Survey. the City of Vancouver has an average neighbourhood population density that is almost twice as high as neighbourhoods across the region. The average population density

across City of Vancouver census tracts is 8,121.8 people per kilometres, compared to 4,506.2 people per square kilometre across all Metro Vancouver census tracts.

Table 5-13 2011 Neighbourhood Characteristics Descriptive Statistics Across the City of Vancouver Census Tracts

2011 City of Vancouver Census Tract Descriptive Statistics					
Census Variables	Mean	Std. Deviation	Census Variables	Mean	Std. Deviation
Perc 0 to 14	34.3	10.7	Avg Household Income	\$84,270.5	\$40,082.9
Perc 25 to 44	11.8	4.4	Kilometres to Orpheum	4.8	2.5
Perc 65+	13.8	4.5	Density Population	8121.8	6445.2
Perc Living Alone	17.5	13.3	Density 0to14	779.9	468.5
Avg Household Size	2.4	0.6	Density 25to44	3191.6	3379.9
Perc Immigrants	43.5	13.5	Density 25to39	2535.7	2872.8
Unemployment rate	7.1	2.2	Density 65+	1029.5	777.6
Perc Self employed	13.7	5.7	Density Living Alone	1867.9	2622.4
Perc Bachelor Deg.	22.8	6.9	Density Immigrants	3247.3	2716.7
Perc Worked at home	8.3	4.0	Density Self employed	4994.0	4543.0
Perc Public transit	29.5	6.9	Density Bachelor	1037.7	494.7
Perc Walked	11.2	12.6	Density Worked at home	363.2	355.7
Perc Bicycle	4.1	3.7	Density Public transit	1293.8	1310.2
Perc Walk Bike Transit	44.7	14.6	Density Walked	807.4	1549.7
Perc Owner	52.4	19.3	Density Bicycle	170.2	187.8
Perc Renter	47.6	19.3	Density Walk Bike Transit	2271.4	2717.0
Avg Dwelling Value	\$899,303.2	\$467,745.1	Density Owner	1632.3	1470.7
Avg Monthly Rent	1103.6	265.5	Density Renter	2440.7	3263.7
Avg Population Income	\$43,230.4	\$17,633.4	Density Dwellings	4068.1	4285.8

In 2011, the average census tract in the City of Vancouver had 47.6% renter households, this is up from 31.2% renter households across Metro Vancouver census tracts. The average rent across City of Vancouver census tracts was \$1,103.6 per month, while the average rent per census tract across the region was similar at \$1,088 per month; meanwhile, average annual household income across census tracts in the city was \$84,270, also comparable to the regions average of \$86,657 in 2011.

Building on the univariate data, the following chapter presents the results from the bivariate regressions that explore the relationship between artists and the neighbourhood characteristics.

Chapter 6. Bivariate Analysis

This chapter presents bivariate regression data analysis results. To keep the same structure as the previous chapter, the bivariate data analysis results for Metro Vancouver are presented in sections for each census year. For the 2011 census year, City of Vancouver census tract data is also presented with the addition of artist facilities proximity data. The bivariate regression results are presented in tables, with cells that are highlighted green to identify positive correlations with a significance value of at least 95%; while cells highlighted red identify negative correlations with a significance value of at least 95% significance. A regression with a significance value of 95% is identified by one asterisk within data cell, while a significance of 99% is identified with two asterisks.

Each section will present bivariate regression analysis in tables that compares the correlation between the location quotient and the density of artist group and individual artists. For 2011, a bivariate regression analysis for the location quotient and density of artists with artist facilities will also be presented using census tracts for the City of Vancouver.

6.1.1. 1991 Metro Vancouver

This section will present and discuss the results for the 1991 bivariate regressions with artists and neighbourhood characteristics. Analysis is presented in multiple tables that show the relationship between location quotient and densities of artists, followed by results for artists and neighborhoods characteristics broken out by density and location quotient. Overall, the location quotient of the artist group in Metro Vancouver is highly correlated with all artist occupation densities. All significant correlations between location quotients and densities of artists are also positive, implying that most artist occupations cluster in areas where there is a density of other artist. The location quotient of dancers, and artisan and craftpersons experienced the least amount of correlation with other artist occupations; while the location of other artists had significant positive correlations with multiple artist counterparts, and the location quotient and density of artists to the census variables. The following tables show how the results of a bivariate regression analysis for the location quotient of artists and the densities of artists in Metro Vancouver neighbourhoods in 1991.

Table 6-1 1991 Metro Vancouver Location Quotient of Artists and Density of Artists Pearson Coefficient Table

Pearson Correlation		Location Quotient									
		Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Density	Artist Group	.571**	.233**	.325**	.233**	.231**	0.06	.302**	.222**	.324**	.122*
	Authors Writer	.422**	.233**	.234**	.274**	0.11	0.01	.208**	0.10	.230**	-0.03
	Producer Director Choreographer	.453**	.219**	.666**	.144*	.142*	-0.07	.155**	.126*	.222**	0.09
	Conductor Composer Arranger	.259**	.120*	0.11	.793**	0.05	.199**	0.03	0.10	.138*	-0.05
	Musician Singer	.490**	.248**	.237**	.122*	.529**	0.05	.247**	.149*	.177**	0.08
	Dancer	.263**	0.11	-0.03	.414**	.116*	.776**	0.01	0.11	.155**	-0.02
	Actor Comedian	.320**	.155**	0.11	0.03	.114*	-0.03	.574**	.114*	.155**	0.01
	Painter Sculptor Visual Artist	.418**	.115*	.171**	.167**	.126*	0.05	.201**	.470**	.169**	0.05
	Photographer	.441**	.147*	.213**	.171**	0.09	0.05	.200**	.120*	.627**	0.03
	Artisans Craftsperson	.402**	.131*	.226**	0.00	.147*	-0.03	.128*	0.11	.141*	.582**

The following table shows the results of the bivariate analysis that explores the relationship between location quotient of artists and the neighbourhood characteristics across census tracts in Metro Vancouver for 1991. The location quotient, or clustering of artists, is significantly and positively correlated with neighbourhoods that have a higher proportion of the population between 25 to 44 years old and over 65 years old. There is a significant positive correlation with the proportion of households that live alone, as well as a significant negative correlation with average household size. The clustering of artists is also correlated with immigrants, unemployment, self-employment, and the percent of the labour force that has at least a bachelor's degree. For individual occupations, musicians, singers, painters, sculptors, visual artists, and photographers were the only artist occupations that had significant positive correlations with unemployment. Artists also cluster in neighbourhoods that have a higher proportion of rental dwellings and a higher average dwelling value; however, there is no significant correlation with household income or monthly rent costs. The analysis also reveals that artist clustering occurs closer to the centrally located Orpheum in downtown Vancouver.

Average rent, household income and the density of kids under 15 years old did not have any significant correlations with the neighbourhoods that artists are clustering in. Dancers and artisans and craftpersons were the only artist's occupations that did not have significant correlations with any of the neighbourhood characteristics. This could be an indication that they live more dispersed throughout Metro Vancouver in different types of neighbourhoods. Journey to work data was not available at the census tract geographies for the 1991 census.

Table 6-2 1991 Metro Vancouver Location Quotient of Artists and Neighbourhood Characteristics Pearson Coefficient Table

Pearson Correlation	Location Quotient									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.522**	-.263**	-.305**	-.184**	-.280**	-0.07	-.278**	-.234**	-.306**	-0.08
Perc 25 to 39	.197**	.183**	.139*	0.08	0.08	0.06	.249**	-0.02	.143*	-0.02
Perc 25 to 44	.219**	.196**	.152**	0.07	0.08	0.06	.268**	-0.01	.159**	-0.03
Perc 65+	.282**	0.08	.128*	.215**	.143*	0.03	-0.01	.210**	.180**	0.09
Perc Living Alone	.494**	.176**	.220**	.182**	.237**	0.08	.243**	.357**	.347**	0.09
Avg Household Size	-.451**	-.235**	-.247**	-.188**	-.206**	-0.07	-.253**	-.218**	-.267**	-0.07
Perc Immigrants	.150**	0.06	.222**	0.03	0.11	-0.02	0.05	0.11	0.09	0.04
Unemploymentrate	.163**	-0.02	0.07	-0.01	.126*	-0.05	0.05	.313**	.131*	0.09
Perc Selfemployed	.226**	.128*	.152**	0.01	0.08	-0.05	0.08	0.05	0.05	0.05
Perc BachelorDeg	.436**	.441**	.341**	.146*	.132*	0.11	.182**	.131*	.177**	0.03
Perc Workedathome	-0.02	-0.03	0.01	-0.07	-0.07	-0.05	-0.06	-0.02	-0.07	0.08
Perc Owner	-.401**	-.228**	-.272**	-.152**	-.165**	-0.07	-.248**	-.212**	-.249**	-0.04
Perc Renter	.401**	.229**	.275**	.151**	.165**	0.07	.247**	.213**	.249**	0.04
Avg DwellingValue	.262**	.217**	.219**	0.02	0.10	0.00	0.05	.196**	0.04	0.00
Avg Monthly Rent	-0.02	0.03	-0.05	-0.04	0.02	-0.07	0.04	-.121*	-0.08	-0.03
Avg Family Size	-.436**	-.248**	-.222**	-.175**	-.228**	-0.08	-.264**	-.152**	-.261**	-0.06
Avg Hshld Income	-0.06	0.01	0.04	-0.10	-0.07	-0.02	-0.09	-0.09	-0.11	0.01
Distance to Orpheum	-.410**	-.266**	-.391**	-.126*	-.206**	-0.03	-.210**	-.189**	-.233**	-0.04
Density Population	.335**	.171**	.220**	.152**	.126*	-0.02	.200**	.157**	.207**	0.02
Density 0to14	0.00	0.03	0.09	0.05	0.01	-0.08	0.01	-0.01	0.01	-0.03
Density 25to44	.325**	.177**	.214**	.137*	0.11	-0.02	.223**	.131*	.202**	0.01
Density 25to39	.320**	.175**	.210**	.133*	0.11	-0.02	.226**	.126*	.197**	0.01
Density 65+	.415**	.156**	.205**	.237**	.158**	0.04	.156**	.239**	.265**	0.06
Density Living Alone	.368**	.152**	.175**	.148*	.125*	0.01	.223**	.206**	.241**	0.04
Density Immigrants	.317**	.157**	.249**	.143*	.131*	-0.03	.172**	.170**	.184**	0.04

Density Self-employed	.443**	.237**	.298**	.163**	.163**	-0.03	.236**	.148*	.271**	0.04
Density Worked at home	.451**	.201**	.282**	.175**	.165**	-0.03	.232**	.158**	.266**	0.06
Density Owner	.266**	.159**	.192**	.170**	.127*	-0.02	0.11	0.09	.166**	-0.01
Density Renter	.348**	.156**	.185**	.139*	0.11	0.00	.223**	.181**	.221**	0.03
Density Dwellings	.360**	.169**	.200**	.156**	.125*	0.00	.219**	.177**	.228**	0.03

The following table presents the results from the bivariate analysis that explores the relationship between artist densities and neighbourhood characteristics. In 1991, artists concentrated in neighbourhoods that had a higher proportion of the residents aged 25 to 44 years old and over 65 years old. On the other hand, artists were less likely to be found in neighbourhoods where there was a higher proportion of kids under the age of 15 years old. There were positive and significant correlations with the percent of the labour force that had a bachelor's degree. Artist densities were also more likely to be found in neighbourhoods that had a higher percentage of rental households that had lower monthly rental rates. Higher artist densities were also more likely to be found in neighbourhoods with smaller households that had lower incomes. The density of all neighbourhood characteristics had positive and significant correlations with the artist group, and most of the individual artist occupations. The density of dancers had the least amount of significant correlations with the density of neighbourhood characteristics. Comparing to the previous table that presented the location quotient of artists, densities were not significantly correlated with the proportion of the population that was self-employed or immigrants. Both the location quotient and densities of the artist group were significantly and positively correlated with all neighbourhood characteristics expressed as densities. The population of dancers were the least correlated with the neighbourhood characteristics but saw more significant correlations when expressed as a density, opposed to a location quotient.

Table 6-3 1991 Metro Vancouver Density Quotient of Artists and Neighbourhood Characteristics Pearson Coefficient Table

Pearson Correlation	Density									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.591**	-.489**	-.453**	-.218**	-.511**	-.224**	-.379**	-.417**	-.465**	-.351**
Perc 25 to 39	.498**	.442**	.412**	.173**	.428**	.160**	.398**	.273**	.377**	.272**
Perc 25 to 44	.506**	.465**	.426**	.178**	.423**	.146*	.405**	.271**	.391**	.256**
Perc 65+	.185**	.146*	0.10	.129*	.142*	.134*	0.04	.192**	.174**	.141*
Perc Living Alone	.613**	.499**	.428**	.228**	.504**	.212**	.420**	.476**	.512**	.363**
Avg Household Size	-.549**	-.472**	-.414**	-.222**	-.447**	-.201**	-.366**	-.391**	-.438**	-.314**
Perc Immigrants	0.11	0.02	.139*	0.04	.135*	0.03	0.03	.116*	0.07	.140*
Unemploymentrate	.144*	0.05	.137*	0.05	.152**	0.00	0.09	.174**	0.08	.165**
Perc Selfemployed	-0.04	0.01	-0.01	-0.02	-0.08	-0.08	-0.05	-0.05	-0.01	-0.07
Perc BachelorDeg	.304**	.329**	.275**	.155**	.222**	0.11	.179**	.154**	.242**	.118*
Perc Workedathome	-.238**	-.170**	-.204**	-0.10	-.237**	-.114*	-.147*	-.156**	-.175**	-.171**
Perc Owner	-.546**	-.429**	-.443**	-.206**	-.460**	-.195**	-.369**	-.385**	-.426**	-.346**
Perc Renter	.547**	.430**	.444**	.205**	.461**	.194**	.369**	.386**	.427**	.347**
Avg DwellingValue	-0.01	0.01	0.00	-0.01	-0.02	-0.03	-0.03	0.00	-0.01	-0.05
Avg Monthly Rent	-.129*	-0.06	-.133*	-0.06	-.120*	-0.09	-0.09	-.130*	-0.10	-0.09
Avg Family Size	-.573**	-.494**	-.419**	-.209**	-.482**	-.215**	-.387**	-.401**	-.452**	-.322**
Avg Hshld Income	-.268**	-.175**	-.198**	-.117*	-.255**	-.125*	-.196**	-.209**	-.202**	-.198**
Distance to Orpheum	-.407**	-.314**	-.382**	-.155**	-.364**	-.118*	-.246**	-.281**	-.305**	-.272**
Density Population	.873**	.684**	.678**	.304**	.765**	0.11	.579**	.694**	.614**	.569**
Density 0to14	.195**	0.11	.238**	.117*	.218**	0.01	0.07	.151**	0.08	.196**
Density 25to44	.890**	.734**	.692**	.314**	.764**	0.09	.622**	.671**	.633**	.548**
Density 25to39	.886**	.729**	.687**	.307**	.762**	0.10	.629**	.666**	.627**	.548**
Density 65+	.819**	.623**	.574**	.295**	.700**	.185**	.481**	.724**	.625**	.555**
Density Living Alone	.913**	.734**	.637**	.297**	.763**	0.11	.657**	.744**	.695**	.549**
Density Immigrants	.753**	.563**	.604**	.281**	.670**	0.09	.470**	.629**	.527**	.516**
Density Self-employed	.929**	.773**	.748**	.305**	.786**	0.08	.573**	.718**	.693**	.580**
Density Worked at home	.915**	.803**	.727**	.333**	.754**	0.08	.527**	.684**	.699**	.575**
Density Owner	.621**	.544**	.528**	.276**	.552**	.131*	.290**	.506**	.437**	.376**
Density Renter	.901**	.715**	.649**	.294**	.761**	0.10	.650**	.718**	.666**	.557**
Density Dwellings	.918**	.739**	.677**	.315**	.781**	.115*	.632**	.734**	.675**	.566**

6.1.2. 2001 Metro Vancouver

As in 1991, most correlations between the location quotient and density of artist occupation populations are significant and positive. The location quotient of photographers saw all significant correlations with other artist occupations disappear. This could be the result of the emergence of digital cameras and the change in studio space needs and location preference for photographers; meanwhile, the distribution of actors and comedians clustering in neighbourhoods was positively correlated with the densities of all individual artist occupations.

Table 6-4 2001 Metro Vancouver Location Quotient of Artists and Density of Artists Pearson Coefficient Table

Pearson Correlation		Location Quotient									
		Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Density	Artist Group	.555**	.347**	.463**	.242**	.281**	.136**	.503**	.154**	0.08	.137**
	Authors Writer	.462**	.561**	.334**	.129*	.163**	0.06	.375**	0.06	0.05	.114*
	Producer Director Choreographer	.460**	.248**	.621**	.141**	.166**	.124*	.337**	.116*	-0.02	0.10
	Conductor Composer Arranger	.164**	0.06	0.09	.593**	.128*	0.00	.169**	0.00	-0.01	0.00
	Musician Singer	.399**	.182**	.261**	.244**	.554**	0.07	.345**	0.04	0.02	0.02
	Dancer	.222**	0.08	.212**	0.03	0.08	.628**	.208**	0.00	0.00	0.05
	Actor Comedian	.400**	.225**	.272**	.199**	.184**	0.09	.681**	0.06	0.05	0.07
	Painter Sculptor Visual Artist	.378**	.131*	.293**	0.06	0.09	0.03	.241**	.688**	0.04	0.03
	Photographer	.357**	.184**	.102*	0.05	.128*	0.06	.313**	0.08	.663**	0.07
	Artisans Craftsperson	.394**	.239**	.298**	0.07	0.07	.106*	.290**	0.05	0.04	.440**

In 2001, we continue to see strong correlations between artists clustering in neighbourhoods with a higher proportion and density of rental housing. Changing from 1991, artist clustering is correlated with higher household incomes, rents and dwelling values. Between 1991 and 2001, monthly rent increased from \$788 to \$887 per month,

household incomes increased from \$52,952 to \$65,738, while the average value of dwellings by neighbourhood increased from \$244,629 to \$292,894. The location quotient of artists was mostly correlated with all neighbourhood characteristics expressed as densities, as artists experienced a positive and significant correlation with overall population density. Most artists clustered in neighbourhoods that were closer to the Orpheum theatre. Conductors, composer and arranger, dancers, and artisans and craftpersons did not have a significant correlation with where they resided and their proximity to the Orpheum.

Table 6-5 2001 Metro Vancouver Location Quotient of Artists and Neighbourhood Characteristics Pearson Coefficient Table

Pearson Correlation	Location Quotient									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.484**	-.340**	-.390**	-.177**	-.153**	-0.01	-.498**	-.254**	-0.05	-0.09
Perc 25 to 39	.286**	.172**	.270**	0.08	0.07	.104*	.351**	0.10	0.04	0.05
Perc 25 to 44	.287**	.159**	.276**	0.06	0.07	.111*	.325**	0.09	0.06	0.07
Perc 65+	.138**	.133**	0.06	0.06	0.06	-0.07	.159**	.148**	-0.06	0.04
Avg Household Size	-.489**	-.338**	-.397**	-.145**	-.128*	-0.05	-.406**	-.280**	-0.04	-.186**
Perc Immigrants	-0.04	-0.01	-0.02	-0.07	0.02	-0.03	-0.02	0.02	-0.04	-.130*
Unemploymentrate	.108*	0.03	0.05	-0.04	0.03	-0.05	0.08	.197**	-0.08	0.06
Perc Self-employed	.387**	.308**	.322**	0.10	.101*	-0.01	.123*	.141**	.141**	.234**
Perc BachelorDeg	.548**	.481**	.480**	.141**	.150**	.111*	.367**	.206**	.198**	0.06
Perc Workedathome	.295**	.255**	.243**	0.03	0.01	-0.03	0.05	.126*	.124*	.198**
Perc Publictransit	.191**	.139**	.205**	-0.01	0.08	0.03	.194**	.132**	-0.06	0.01
Perc Walked	.496**	.385**	.395**	.176**	.102*	0.03	.422**	.277**	0.00	.154**
Perc Bicycle	.614**	.416**	.454**	0.09	.196**	.206**	.423**	.329**	.264**	.142**
Perc WalkBikeTransit	.509**	.380**	.428**	.119*	.137**	0.07	.434**	.296**	0.01	.124*
Perc Owner	-.368**	-.269**	-.304**	-.104*	-.108*	-0.04	-.319**	-.211**	0.02	-0.10
Perc Renter	.368**	.269**	.304**	.104*	.108*	0.04	.319**	.211**	-0.02	0.10
Avg DwellingValue	.236**	.273**	.212**	0.06	0.02	0.02	0.07	0.08	.114*	0.03
Avg MonthlyRent	.135**	0.10	.164**	0.08	0.05	0.00	0.05	0.01	.128*	-0.03
Avg Popn Income	.301**	.284**	.308**	.107*	0.06	0.04	.136**	0.06	.139**	.112*
Avg Hshld Income	0.07	.104*	.123*	0.03	0.00	0.01	-0.04	-0.05	.109*	0.03
Distance to Orpheum	-.456**	-.334**	-.424**	-0.06	-.163**	-0.08	-.340**	-.226**	-.117*	-0.06
Density Population	.248**	.156**	.262**	.142**	.106*	0.08	.339**	0.05	-0.06	0.00
Density 0to14	-0.07	-0.07	-0.01	-0.05	0.02	0.07	0.00	-0.04	-0.06	-.121*
Density 25to44	.284**	.168**	.301**	.158**	.106*	0.09	.372**	0.05	-0.04	0.03
Density 25to39	.289**	.172**	.302**	.163**	.104*	0.09	.379**	0.05	-0.04	0.03
Density 65+	.217**	.187**	.198**	.134**	0.09	0.02	.292**	0.10	-0.09	0.02
Density Immigrants	.143**	0.10	.173**	0.08	0.06	0.05	.207**	0.04	-0.06	-0.04
Density Selfemployed	.228**	.178**	.167**	.105*	0.03	-0.01	0.05	0.03	.115*	.244**
Density Workedathome	.396**	.278**	.348**	.184**	.147**	.113*	.407**	.109*	0.04	0.07

Density Publictransit	.241**	.137**	.284**	.114*	0.09	0.08	.322**	0.06	-0.06	0.01
Density Walked	.278**	.199**	.273**	.216**	0.08	0.08	.331**	0.02	-0.04	0.07
Density Bicycle	.497**	.296**	.435**	.218**	.219**	.160**	.469**	.141**	0.10	0.10
Density Walk Bike Transit	.312**	.205**	.317**	.202**	.101*	0.09	.372**	0.05	-0.04	0.06
Density Owner	.197**	.111*	.183**	0.10	.122*	0.07	.325**	0.07	-0.04	-0.04
Density Renter	.312**	.209**	.317**	.192**	0.10	0.07	.371**	0.07	-0.06	0.07
Density Dwellings	.306**	.200**	.306**	.181**	.112*	0.07	.387**	0.08	-0.06	0.05

For journey to work artists clustered in neighbourhoods that had a higher percentage of the population that got to work by walking, bicycling or taking transit; while, cycling to work had the highest degree correlation with artist clustering in Metro Vancouver neighbourhoods. Artists also clustered in neighbourhoods where there was both a high proportion and density of the labour force that worked from home and was self-employed. This could be a reflection of artists living amongst each other in live-work studios. In 1991, the location quotient of the artist group had a positive and significant correlation with the percentage of immigrants in a neighbourhood. In 2001, there was no longer a significant or positive correlation between the two. Clustering among most of the artist occupations was observed in neighbourhoods that had a higher percentage of that cycled to work, had at least a bachelor's degree and formed smaller households. The density of artists in 2001 had more significant correlations among all artist occupations.

In 2001, artists concentrated in neighbourhoods with a higher proportion of working aged individuals and rental households, and households are closer to the Orpheum. The artist densities were highly correlated with neighbourhoods where there were more inhabitants between the age of 25 to 44 years old, and fewer under the age of 15 years old. Neighbourhoods where there was a higher proportion of the labour force that rode a bike, took transit or walked to work was also an indicator for higher artist densities. Artist's dentists were also found in neighbourhoods that had smaller household size, with lower household incomes. In the previous tables, clustering of authors, writers, and producers, composers and arranges, and photographers had positive and significant correlations with household income; however, when expressed as a density the correlations for authors and writers turns negative. Overall, the density of all artist occupations was positively correlated with population density.

Table 6-6 2001 Metro Vancouver Density of Artists and Neighbourhood Characteristics Pearson Coefficient Table, Metro Vancouver.

Pearson Correlation	Density									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.621**	-.520**	-.535**	-.249**	-.387**	-.259**	-.558**	-.366**	-.207**	-.426**
Perc 25 to 39	.657**	.501**	.577**	.227**	.425**	.329**	.591**	.355**	.302**	.440**
Perc 25 to 44	.629**	.475**	.558**	.213**	.411**	.319**	.560**	.341**	.287**	.425**
Perc 65+	-0.01	0.03	-0.02	0.01	-0.02	-0.05	-0.01	0.07	-.105*	0.02
Avg Household Size	-.573**	-.480**	-.499**	-.211**	-.349**	-.241**	-.498**	-.374**	-.165**	-.419**
Perc Immigrants	-0.01	-0.02	-0.02	-0.03	0.01	0.01	-0.06	0.05	0.01	-0.01
Unemploymentrate	0.07	0.06	0.05	-0.02	0.01	0.01	0.05	.129*	0.00	.109*
Perc Selfemployed	0.00	0.04	0.01	0.00	-0.04	-0.04	-0.02	0.02	0.08	-0.02
Perc BachelorDeg	.411**	.358**	.357**	.147**	.234**	.184**	.333**	.277**	.312**	.192**
Perc Workedathome	-0.01	0.04	0.00	-0.01	-0.06	-0.04	-0.02	0.02	0.05	0.00
Perc Publictransit	.270**	.192**	.247**	0.05	.185**	.147**	.199**	.245**	0.08	.197**
Perc Walked	.712**	.632**	.634**	.340**	.389**	.345**	.626**	.317**	.133**	.555**
Perc Bicycle	.514**	.405**	.431**	.148**	.336**	.272**	.377**	.365**	.416**	.324**
Perc WalkBikeTransit	.668**	.559**	.594**	.258**	.394**	.336**	.554**	.386**	.196**	.501**
Perc Owner	-.578**	-.467**	-.509**	-.216**	-.368**	-.284**	-.476**	-.335**	-.186**	-.427**
Perc Renter	.578**	.467**	.509**	.216**	.368**	.284**	.476**	.335**	.186**	.427**
Avg DwellingValue	-0.10	-0.03	-0.08	-0.05	-.116*	-0.06	-.106*	-0.04	0.08	-.111*
Avg MonthlyRent	-0.07	-0.04	-0.06	-0.01	-0.05	-0.05	-0.07	-0.04	0.05	-.107*
Avg Popn Income	0.05	0.09	0.06	0.03	-0.01	-0.01	0.06	0.02	0.09	-0.02
Avg Hshld Income	-.218**	-.148**	-.179**	-0.08	-.169**	-.118**	-.180**	-.147**	0.00	-.204**
Distance to Orpheum	-.449**	-.378**	-.394**	-.144**	-.279**	-.221**	-.343**	-.296**	-.223**	-.302**
Density Population	.793**	.622**	.720**	.390**	.539**	.498**	.675**	.303**	.170**	.582**
Density 0to14	.240**	.149**	.208**	0.05	.225**	.201**	.124*	.152**	.123*	.183**
Density 25to44	.854**	.660**	.780**	.407**	.582**	.528**	.750**	.313**	.200**	.603**
Density 25to39	.862**	.666**	.790**	.410**	.584**	.532**	.766**	.310**	.206**	.603**
Density 65+	.559**	.478**	.511**	.329**	.330**	.323**	.464**	.266**	0.03	.453**
Density Immigrants	.571**	.431**	.520**	.269**	.395**	.383**	.453**	.259**	.108*	.429**
Density Selfemployed	0.03	0.05	0.03	0.02	-0.01	-0.02	0.05	-0.01	0.09	0.00
Density Workedathome	.876**	.749**	.745**	.398**	.556**	.519**	.756**	.325**	.284**	.695**
Density Publictransit	.695**	.513**	.655**	.319**	.481**	.434**	.595**	.319**	.128*	.470**
Density Walked	.829**	.684**	.774**	.483**	.522**	.561**	.747**	.156**	0.09	.628**
Density Bicycle	.889**	.686**	.772**	.464**	.686**	.450**	.744**	.360**	.357**	.535**
Density WalkBikeTransit	.868**	.691**	.807**	.472**	.572**	.561**	.767**	.245**	.133**	.626**
Density Owner	.632**	.511**	.524**	.260**	.441**	.319**	.542**	.328**	.207**	.498**
Density Renter	.835**	.668**	.771**	.464**	.542**	.519**	.739**	.273**	.123*	.606**
Density Dwellings	.845**	.677**	.765**	.446**	.557**	.506**	.743**	.308**	.154**	.624**

6.1.3. 2011 Metro Vancouver

Overall, the density of the artist group is highly correlated with the location quotient of the artist group. All individual artists have significant positive correlations between their density and location quotients across census tracts in Metro Vancouver. The location quotient of the artist group has significant and positive correlations with the density of individual occupations, with the exceptions of dancers, and artisan and craftpersons which turned up non-significant results. The results are similar when looking at the correlation between the density of the artist group and location quotient of individual artists. Only the occupations of producer, director and choreographer, dancer, and artisan and craftpersons had non-significant results. They also have the lowest average densities across Metro Vancouver census tracts. The following table presents the results of a bivariate regression between the location quotient of artists and the density of artists.

Table 6-7 2011 Metro Vancouver Location Quotient of Artists and Density of Artists Pearson Coefficient Table

Pearson Correlation		Location Quotient									
		Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Density	Artist Group	.664**	.389**	.457**	0.04	.194**	-0.01	.241**	.248**	.145**	-0.01
	Authors Writer	.410**	.857**	.273**	0.04	.177**	0.01	0.01	0.05	.110*	-0.02
	Producer Director Choreographer	.474**	.265**	.797**	0.03	.165**	-0.02	0.09	.302**	.203**	-0.01
	Conductor Composer Arranger	.111*	0.09	0.08	1.000**	0.05	0.00	-0.01	.115*	.314**	0.00
	Musician Singer	.412**	.322**	.316**	0.04	.754**	-0.01	0.09	.108*	.156**	0.00
	Dancer	0.02	0.05	-0.02	0.00	-0.01	.776**	-0.01	-0.01	0.00	-0.01
	Actor Comedian	.181**	0.00	0.06	0.00	0.03	-0.01	.855**	0.01	0.03	-0.01
	Painter Sculptor Visual Artist	.318**	0.06	.347**	0.06	0.07	-0.01	0.02	.799**	0.05	0.00
	Photographer	.309**	.207**	.375**	.241**	.168**	0.00	0.08	0.08	.948**	0.03
	Artisans Craftsperson	0.08	0.00	0.01	0.00	0.04	-0.01	-0.01	0.04	0.07	.862**

Next, we look at the correlation results from a bivariate regression analysis between the location quotient of artists and neighbourhood characteristics across Metro Vancouver. The artist group and most individual artist occupations cluster in neighbourhoods that have a higher percentage of its population in prime working age between 25 to 44 years old. Artists also cluster in neighbourhoods where there are a higher proportion of people that live alone, are self-employed, have at least a bachelor's degree, work from home, cycle, walk or bike to work, and live in a rented dwelling. There is also a significant positive correlation between the location quotient of artist and higher values of dwellings, higher rents, and higher individual and household incomes. Clustering of artists in neighbourhoods is also positively correlated with all demographic variables when expressed as densities. On the other hand, artists clustering is negatively correlated with neighbourhoods that have a high proportion of kids aged younger than 15 years old, immigrants, a higher unemployment rate, owner occupied households, and smaller family sizes. The occupations with the least amount of significant correlations to the neighbourhood characteristic, conductor composer arranger, dancer and artisan craftsperson also have the lowest populations amongst the artist occupations in 2011. All other artists are significantly negatively correlated with distance to the Orpheum Theatre. Across the bivariate regression results, there is no neighbourhood characteristic that has both a negative and positive significant correlation with any of the artist occupations.

Table 6-8 2011 Metro Vancouver Location Quotient of Artists and Neighbourhood Characteristics Pearson Coefficient Table

Pearson Correlation	Location Quotient									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.442**	-.308**	-.295**	-0.09	-.125**	-0.02	-.169**	-.187**	-0.06	-0.05
Perc 25 to 39	.309**	.347**	.330**	.135**	0.07	0.00	.175**	.113*	.132**	0.01
Perc 25 to 44	.320**	.347**	.338**	.134**	0.08	-0.01	.178**	.119*	.144**	0.01
Perc 65+	0.08	-0.03	-0.06	-0.05	0.02	0.08	-0.05	0.07	-0.08	0.02
Perc Living Alone	.436**	.346**	.334**	.126**	0.08	0.02	.170**	.231**	0.07	0.04
Avg Household Size	-.447**	-.310**	-.329**	-0.09	-.101*	-0.05	-.167**	-.186**	-0.09	-0.05
Perc Immigrants	-.126**	-.100*	-.138**	-0.04	0.01	0.00	-0.02	-0.06	-0.05	0.02
Unemploymentrate	-.186**	-0.09	-0.04	0.02	-0.07	-0.07	-0.03	0.01	-0.08	0.06

Perc Selfemployed	.343**	.113'	.188**	0.02	.132**	0.04	0.08	.116'	0.08	-0.02
Perc BachelorDeg	.572**	.362**	.326**	0.07	.254**	0.04	.170**	.169**	.179**	-0.01
Perc Workedathome	.358**	.109'	.190**	0.00	.142**	0.03	.108'	.135**	0.08	0.01
Perc Publictransit	.322**	.252**	.222**	0.07	.127**	-0.03	.099'	.115'	.133**	0.08
Perc Walked	.397**	.262**	.310**	0.06	0.07	0.02	.273**	.211**	0.05	0.05
Perc Bicycle	.689**	.522**	.549**	.150**	.287**	0.02	.148**	.319**	.380**	0.07
Perc WalkBikeTransit	.511**	.374**	.382**	.097'	.162**	0.00	.220**	.228**	.172**	0.09
Perc Owner	-.346**	-.304**	-.292**	-0.07	-0.08	0.03	-.188**	-.207**	-0.08	-.131**
Perc Renter	.345**	.305**	.293**	0.07	0.08	-0.03	.189**	.200**	0.08	.109'
Avg DwellingValue	.306**	.130**	0.09	-0.04	.168**	-0.02	0.06	0.05	.097'	-0.01
Avg MonthlyRent	.263**	0.06	.121'	-0.03	0.08	.135**	0.08	0.00	0.06	-0.03
Avg Popn Income	.342**	.169**	.210**	-0.02	.115'	0.02	0.06	0.03	0.09	-0.07
Avg Family Size	-.446**	-.286**	-.315**	-0.08	-.103'	-0.06	-.154**	-.160**	-0.08	-0.02
Avg Hshld Income	.119'	-0.01	0.04	-0.05	0.06	-0.01	-0.03	-0.06	0.04	-0.07
Distance to Orpheum	-.498**	-.266**	-.297**	-0.06	-.191**	0.04	-.154**	-.190**	-.152**	-0.07
Density Population	.284**	.193**	.196**	-0.01	0.04	0.01	.129**	0.08	0.02	-0.03
Density 0to14	0.05	0.07	0.05	-0.03	0.02	0.00	0.08	-0.01	0.03	-0.03
Density 25to44	.314**	.224**	.226**	0.01	0.05	0.00	.123**	0.07	0.03	-0.03
Density 25to39	.314**	.225**	.226**	0.01	0.05	0.00	.122**	0.06	0.03	-0.03
Density 65+	.243**	.158**	.157**	-0.02	0.03	0.04	0.09	.130**	-0.02	-0.03
Density Living Alone	.338**	.218**	.240**	0.02	0.04	0.00	.094'	.110'	0.01	-0.02
Density Immigrants	.128**	0.09	0.07	-0.02	-0.01	0.04	.102'	0.00	-0.02	-0.03
Density Selfemployed	.324**	.222**	.238**	0.00	0.06	0.00	.129**	0.07	0.03	-0.03
Density Bachelor	.368**	.262**	.253**	0.01	0.08	0.01	.151**	0.09	0.05	-0.03
Density Workedathome	.487**	.302**	.362**	0.00	.114'	0.00	.291**	.201**	0.09	-0.02
Density Publictransit	.320**	.235**	.223**	0.01	0.06	-0.01	0.08	0.06	0.04	-0.02
Density Walked	.292**	.154**	.207**	0.01	0.03	0.00	.144**	0.06	0.00	-0.02
Density Bicycle	.605**	.495**	.493**	0.07	.242**	-0.01	.114'	.223**	.236**	0.00
Density WalkBikeTransit	.360**	.237**	.258**	0.02	0.06	-0.01	.124**	0.08	0.04	-0.02
Density Owner	.224**	.166**	.153**	0.00	0.03	0.04	0.09	0.04	0.02	-0.04
Density Renter	.334**	.213**	.243**	0.01	0.04	-0.01	.125**	.100'	0.01	-0.02
Density Dwellings	.326**	.217**	.233**	0.01	0.04	0.01	.123**	0.09	0.02	-0.03

In 2011, the percentage of immigrants living in a neighbourhood was negatively correlated with artist clustering. The previous decade showed no significant correlation between the two variables. In 2011, the artist group was also observed to be clustering in neighbourhoods with a lower unemployment, which is the opposite of 2001 when artist clusters had a positive and significant correlation the unemployment rate of neighbourhoods.

Table 6-9 presents the results from a bivariate regression analysis that explores the correlations between the density of artists and neighbourhood characteristics in neighbourhoods across Metro Vancouver. With only a few differences, results for densities of artists in neighbourhoods are similar to the location quotient analysis presented previously. In difference, the artist group was not significantly correlated with the proportion of the population that are immigrants. In neighbourhoods across metro Vancouver, there is no significant correlation observed between artist densities and the portion of the labour force that is self-employed or working from home. Artist densities are negatively correlated with children and seniors, while positively correlated with people aged 25 to 44 years old. As found in 1991 and 2001, artist densities were more likely to be found in neighbourhoods where the labour force had a higher percentage that commuted to work by walking, bicycling or taking transit.

Table 6-9 2011 Metro Vancouver Density of Artists and Neighbourhood Characteristics Pearson Coefficient Table

Pearson Correlation	Density									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.578**	-.334**	-.366**	-0.09	-.245**	-0.06	-.115*	-.182**	-0.08	-0.02
Perc 25 to 39	.619**	.409**	.397**	.135**	.293**	0.02	.121*	.115*	.155**	0.01
Perc 25 to 44	.612**	.406**	.396**	.134**	.300**	0.01	.117*	.116*	.165**	0.02
Perc 65+	-.098*	-0.07	-0.06	-0.05	-0.06	0.04	-0.03	0.06	-0.09	0.00
Perc Living Alone	.623**	.366**	.395**	.126**	.250**	0.03	0.09	.220**	0.09	0.01
Avg Household Size	-.523**	-.314**	-.349**	-0.09	-.227**	-0.05	-.106*	-.164**	-.105*	-0.02
Perc Immigrants	-0.09	-.098*	-.122**	-0.04	-0.06	0.08	0.00	-0.06	-0.06	0.02
Unemploymentrate	-.116*	-0.06	-0.07	0.02	-0.06	-0.05	0.01	-0.06	-0.06	0.03
Perc Selfemployed	0.06	0.06	0.08	0.02	0.04	0.02	0.07	0.09	0.07	-0.03
Perc BachelorDeg	.485**	.353**	.321**	0.07	.290**	0.05	.118*	.145**	.184**	-0.01
Perc Workedathome	0.09	0.07	.108*	0.00	0.05	-0.01	.109*	.122**	0.08	0.00
Perc Publictransit	.369**	.245**	.215**	0.07	.212**	0.03	0.04	0.09	.138**	0.07
Perc Walked	.675**	.337**	.436**	0.06	.244**	0.05	.239**	.188**	0.06	0.02
Perc Bicycle	.474**	.413**	.411**	.150**	.383**	0.01	0.06	.231**	.389**	0.09
Perc WalkBikeTransit	.642**	.388**	.416**	.097*	.318**	0.04	.152**	.186**	.181**	0.07
Perc Owner	-.534**	-.320**	-.346**	-0.07	-.252**	-0.01	-.128**	-.168**	-.103*	-0.08
Perc Renter	.536**	.321**	.348**	0.07	.254**	0.01	.130**	.167**	.103*	0.08
Avg DwellingValue	-0.02	0.02	-0.01	-0.04	0.05	-0.03	0.05	0.01	0.08	0.00
Avg MonthlyRent	.103*	0.06	0.09	-0.03	0.02	0.06	0.08	0.02	0.05	-0.03
Avg Popn Income	0.09	.119*	.109*	-0.02	0.06	-0.03	0.04	0.04	0.08	-0.06

Avg Family Size	-.510**	-.302**	-.343**	-0.08	-.219**	-0.05	-.099*	-.156**	-0.09	0.00
Avg Hshld Income	-.166**	-0.05	-0.07	-0.05	-0.05	-0.05	-0.02	-0.04	0.02	-0.05
Distance to Orpheum	-.438**	-.253**	-.278**	-0.06	-.240**	-0.01	-.107*	-.143**	-.147**	-0.06
Density Population	.739**	.318**	.389**	-0.01	.226**	0.07	.169**	.158**	0.03	-0.02
Density 0to14	.314**	.132**	.107**	-0.03	.096*	0.06	.115*	0.01	0.04	0.00
Density 25to44	.792**	.361**	.417**	0.01	.255**	0.04	.150**	.131**	0.04	-0.02
Density 25to39	.796**	.364**	.419**	0.01	.254**	0.04	.148**	.126**	0.04	-0.02
Density 65+	.569**	.244**	.359**	-0.02	.159**	0.09	.130**	.264**	-0.01	-0.02
Density Living Alone	.801**	.339**	.458**	0.02	.239**	0.03	.113*	.215**	0.02	-0.02
Density Immigrants	.498**	.173**	.202**	-0.02	.097*	.143**	.148**	0.06	-0.01	-0.01
Density Selfemployed	.797**	.351**	.437**	0.00	.259**	0.04	.159**	.157**	0.05	-0.02
Density Bachelor	.807**	.402**	.460**	0.01	.275**	0.06	.179**	.166**	0.06	-0.02
Density Workedathome	.844**	.423**	.529**	0.00	.266**	0.02	.348**	.327**	.108*	-0.01
Density Publictransit	.743**	.348**	.387**	0.01	.258**	0.03	0.09	.128**	0.06	-0.01
Density Walked	.755**	.309**	.442**	0.01	.234**	0.02	.181**	.117*	0.00	-0.02
Density Bicycle	.773**	.545**	.569**	0.07	.498**	-0.01	0.08	.262**	.269**	0.01
Density WalkBikeTransit	.831**	.379**	.470**	0.02	.291**	0.03	.144**	.146**	0.05	-0.01
Density Owner	.579**	.250**	.276**	0.00	.140**	.102*	.118*	.116*	0.04	-0.03
Density Renter	.801**	.346**	.472**	0.01	.260**	0.02	.152**	.196**	0.02	-0.02
Density Dwellings	.798**	.344**	.445**	0.01	.240**	0.05	.154**	.186**	0.03	-0.02

As with artist clustering, artist density is negatively correlated with neighbourhoods that have a higher proportion of immigrants. This is a change from no correlation observed in 2001. Artists clustered in neighbourhoods that had lower household income, higher rents and a higher tendency for individuals in the labour to work from home. Overall, the artist group was correlated with all neighbourhood characteristics expressed as densities.

6.1.4. 2011 City of Vancouver

Using the City of Vancouver census tract data for the 2011 census year, this section presents the relationship between artists, census variables and proximity to artist facilities through bivariate regressions. As presented in Chapter 5, the 2011 census detailed occupation data at the census tract level across the City and Metro Vancouver were found to be not fully representative of the total population of individual artist occupations; however, the data still shows where these artists' populations live. What is more likely to be missing from this data set are small populations of individual artist

within a census tract. This data analysis for the individual artist occupations presented in this section should be interpreted with this data limitation in mind. The artist facility data presented in this section represents the average distance from each census tract to an artist facility; therefore, a negative correlation would imply closer proximity. This section presents bivariate regressions results in order starting with the location quotient and densities of artists, the location quotient of artists and the neighbourhood characteristics, the density of artists and the neighbourhood characteristics, lastly this section also includes the bivariate results for the relationship between the location quotients and densities of artists and the proximity to artist facilities in the City of Vancouver.

Table 6-10 shows the relationship between artists expressed as densities and location quotients in census tracts across the City of Vancouver. Comparing these results to the 2011 Metro Vancouver, we see less significant correlations between different artists. Overall, the location quotient of the artist group is much correlated with the density of the artist group. The occupations with smaller populations have less significant correlations with other artists, except for the musicians and singers who didn't have any significant correlation with other artist occupation but have the highest population amongst the artist occupations. In 2011, across the Metro Vancouver region, musicians and singers had significant correlations with authors and writers, producers, directors and choreographers, and photographers, but this is not true for the Vancouver CSD data results. Photographers also had fewer correlations with other artists when compared to Metro-wide.

Table 6-10 2011 City of Vancouver Location Quotient of Artists and Density of Artists Pearson Coefficient Table

Pearson Correlation		Location Quotient									
		Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Density	Artist Group	.610**	.244**	.376**	-0.01	0.12	-0.03	0.18	.195*	0.03	-0.05
	Authors Writer	.378**	.839**	.199*	0.01	0.18	0.07	-0.07	-0.02	0.04	-0.04
	Producer Director Choreographer	.481**	0.17	.808**	0.00	0.16	-0.04	0.03	.294**	0.15	-0.03
	Conductor Composer Arranger	0.11	0.07	0.06	1.000**	0.05	-0.01	-0.02	0.11	.316**	-0.01
	Musician Singer	.359**	.268**	.277**	0.01	.799**	0.01	0.04	0.08	0.10	0.01
	Dancer	0.05	.221*	-0.05	-0.01	0.05	1.000**	-0.02	-0.03	-0.03	-0.01

Actor Comedian	0.17	-0.06	0.02	-0.02	0.00	-0.02	.862**	-0.02	0.00	-0.02
Painter Sculptor Visual Artist	.338**	-0.01	.341**	0.04	0.05	-0.02	-0.02	.838**	0.01	-0.03
Photographer	.316**	0.15	.364**	.233*	0.17	-0.03	0.04	0.05	.949**	0.09
Artisans Craftsperson	0.07	0.00	0.02	-0.01	0.08	-0.01	-0.03	-0.04	0.16	.992**

Overall, we see less correlation between the densities and location quotients of artist occupations within the City of Vancouver when compared to Metro Vancouver. This could be due to the fact that artist populations are more concentrated within the City of Vancouver compared to other parts of the region; therefore, at a region wide level bivariate regression results reflect a more distinct contrast of artist populations across census tracts. When focused on the City where there is the higher average artist population per census tract, we see the bivariate regression results produce less correlation between artist occupations as there is a higher proportion of census tracts where artists cluster across the smaller geographic area.

Next, we look at the relationship between the densities and location quotients of artists and the neighbourhood characteristics. Table 6-11 shows the bivariate regression results from the location quotient of artists and the neighbourhood characteristics.

Table 6-11 2011 City of Vancouver Location Quotient of Artists and Neighbourhood Characteristics Pearson Coefficient Table

Pearson Correlation	Location Quotient									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.354**	-.215*	-.286**	-0.11	0.02	0.07	-0.16	-0.14	0.06	0.05
Perc 25 to 39	.429**	.324**	.342**	0.15	0.09	0.01	0.14	0.10	0.07	0.01
Perc 25 to 44	.459**	.335**	.362**	0.15	0.11	0.01	0.15	0.11	0.09	0.02
Perc 65+	-.313**	-.210*	-.235*	-0.13	-0.14	-0.01	-0.11	0.00	-0.17	-0.07
Perc Living Alone	.439**	.273**	.320**	0.14	0.02	-0.03	0.14	.197*	0.00	0.02
Avg Household Size	-.541**	-.326**	-.407**	-0.12	-0.09	0.00	-.191*	-.186*	-0.06	-0.05
Perc Immigrants	-.686**	-.397**	-.466**	-0.11	-.243**	-0.08	-0.11	-.251**	-.200*	-0.13
Unemploymentrate	-.272**	-.193*	-0.05	0.04	-0.16	-0.10	-0.03	-0.05	-0.13	0.10
Perc Selfemployed	.329**	0.12	0.16	0.01	0.09	0.07	0.11	0.14	0.11	-0.07
Perc BachelorDeg	.459**	.386**	.249**	0.07	.192*	0.10	0.16	0.14	0.13	-0.03
Perc Workedathome	.379**	0.13	.251**	-0.03	0.08	0.08	.189*	.222*	0.10	-0.01
PercPublictransit	-0.01	0.10	0.07	0.08	-0.02	-0.01	-0.05	-0.04	0.02	0.03

PercWalked	.274**	0.11	.222*	0.03	-0.03	0.01	.237*	0.15	-0.06	-0.03
PercBicycle	.665**	.455**	.537**	0.14	.290**	0.17	0.04	.284**	.362**	.256**
PercWalkBikeTransit	.399**	.255**	.359**	0.09	0.04	0.04	.195*	0.18	0.05	0.06
Perc Owner	-.322**	-.206*	-.298**	-0.06	0.00	0.02	-0.17	-0.15	0.04	-0.09
Perc Renter	.321**	.206*	.298**	0.06	0.00	-0.02	0.18	0.15	-0.04	0.09
Avg Family Size	-.485**	-.290**	-.385**	-0.11	-0.04	0.04	-.193*	-0.18	-0.02	-0.02
Avg DwellingValue	-0.04	0.00	-0.16	-0.11	0.07	0.04	-0.01	-0.06	0.03	-0.05
Avg MonthlyRent	.203*	0.09	0.05	-0.06	0.05	0.07	0.14	-0.04	0.08	-0.08
Avg Popn Income	.307**	.238*	0.12	-0.04	0.14	0.06	0.06	0.03	0.09	-0.05
Avg Hshld Income	0.06	0.05	-0.08	-0.08	0.08	0.04	-0.04	-0.06	0.06	-0.05
Distance to Orpheum	-.495**	-.295**	-.369**	-0.08	-0.12	-0.05	-.211*	-.219*	-0.08	-0.05
Density Population	0.08	0.00	0.06	-0.06	-0.09	-0.06	0.06	0.00	-0.12	-0.09
Density 0to14	-0.17	-0.08	-0.09	-0.10	-0.07	-0.02	0.05	-0.09	-0.06	-0.07
Density 25to44	0.17	0.06	0.10	-0.03	-0.05	-0.05	0.05	-0.01	-0.10	-0.07
Density 25to39	0.17	0.07	0.10	-0.03	-0.05	-0.04	0.05	-0.01	-0.10	-0.07
Density 65+	-0.03	-0.07	0.04	-0.09	-0.14	-0.05	0.03	0.09	-0.17	-0.10
Density Living Alone	.206*	0.06	0.13	-0.02	-0.06	-0.05	0.02	0.05	-0.10	-0.06
Density Immigrants	-0.16	-0.12	-0.09	-0.08	-0.17	-0.07	0.06	-0.10	-0.16	-0.10
Density Selfemployed	0.16	0.05	0.11	-0.05	-0.05	-0.05	0.06	-0.01	-0.10	-0.08
Density Bachelor	.284**	.333**	.278**	0.05	0.17	0.10	0.17	0.12	0.16	-0.04
Density Workedathome	.363**	0.13	.262**	-0.05	-0.02	-0.02	.255**	0.15	-0.04	-0.07
Density Publictransit	0.13	0.06	0.08	-0.03	-0.04	-0.05	-0.02	-0.04	-0.09	-0.07
Density Walked	0.15	0.01	0.10	-0.03	-0.06	-0.03	0.08	-0.01	-0.10	-0.06
Density Bicycle	.548**	.388**	.415**	0.03	.226*	0.03	0.00	0.16	0.14	0.02
Density WalkBikeTransit	.186*	0.06	0.12	-0.03	-0.04	-0.04	0.04	-0.01	-0.09	-0.07
Density Owner	0.07	0.03	0.06	-0.04	-0.07	-0.04	0.04	-0.01	-0.07	-0.09
Density Renter	.191*	0.04	0.13	-0.03	-0.06	-0.05	0.05	0.03	-0.11	-0.06
Density Dwellings	0.17	0.04	0.12	-0.04	-0.07	-0.05	0.05	0.02	-0.11	-0.07

The City of Vancouver 2011 bivariate regression results for the LQ of artists and the neighbourhood characteristics show similar findings as observed in the Metro-wide results. There is a negative correlation with kids under the age of 15 years old, and a positive correlation with working aged adults 25 to 44 years old. In the City we see a negative and significant correlation between artists clustering and the proportion of the population aged 65 years old over, which was non-significant metro-wide. The proportion of immigrants living within a census tract had increasingly negative relationship with the clustering of artists when compared to the region. Between the City and region, there are similar results showing a negative correlation between household size, indicating that artists live in areas that have a high proportion of households with one occupant. In the bivariate data presented above, we see the location quotient of artists have a positive, but not significant correlation with average household income;

however, there is a strong positive correlation with artists clustering and higher individual incomes. There are also similar positive correlations with the proportion of the labour force that is self-employed, works from home, and has obtained a bachelor degree. For journey to work, we see the same overall positive correlation between artists clustering the cycling and walking to work, but there is no longer a significant correlation between taking public transit to work and artist clustering. This could be explained by more centralized locations where artists live in the City of Vancouver to their place of work where there is less demand for public transit because more people chose to walk or bike. In the City, artist clustering was no longer significantly correlated with the average value of dwellings, individual income or household income. Population density is also not significantly correlated with artists clustering within the City. Overall, there was significantly less correlation with all neighbourhood characteristics expressed as densities. Overall, the location quotient of the artist group had similar correlations as authors and writers, and producers, directors and choreographer occupations. The remaining individual artist occupations also had less significant correlations across all neighbourhood characteristics.

Table 6-12 presents the results of a bivariate regression analysis that explores the relationship between the density of artist occupations and neighbourhood characteristics. Looking at the correlations between the density of the artist group and the neighborhood characteristics, we see that artists do not concentrate in neighbourhoods with kids or seniors, as they are mostly correlated with neighbourhoods that have a higher proportion of working aged population 25 to 44 years old. Artist densities are more likely to be found in neighbourhoods with a lower proportion of immigrants. More artists live in areas that have a high proportion of the population that live alone, have a bachelor's degree, rent, and walk or ride a bike to work. The density of artists was not significantly correlated with public transit use to work, as was observed in metro-wide data. Artists also live in neighbourhoods that are closer to the Orpheum, with a lower average household income. Artist's densities are also very positively correlated with population density in general, as well as with the population density of the various neighbourhood characteristics.

Table 6-12 2011 City of Vancouver Density of Artists and Neighbourhood Characteristics Pearson Coefficient Table

	Density									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Perc 0 to 14	-.687**	-.334**	-.413**	-0.11	-.192*	0.07	-0.10	-.191*	0.02	0.06
Perc 25 to 39	.699**	.432**	.390**	0.15	.303**	0.01	0.10	0.07	0.11	0.00
Perc 25 to 44	.697**	.435**	.395**	0.15	.321**	0.01	0.09	0.08	0.13	0.02
Perc 65+	-.396**	-.250**	-0.17	-0.13	-.250**	-0.01	-0.08	0.11	-.205*	-0.07
Perc Living Alone	.672**	.344**	.390**	0.14	.213*	-0.03	0.05	.218*	0.02	0.01
Avg Household Size	-.686**	-.375**	-.440**	-0.12	-.257**	0.00	-0.12	-.194*	-0.08	-0.03
Perc Immigrants	-.571**	-.379**	-.417**	-0.11	-.339**	-0.08	-0.04	-.212*	-.219*	-0.11
Unemployment rate	-.244**	-0.12	-0.12	0.04	-0.12	-0.10	0.03	-0.12	-0.09	0.08
Perc Self-employed	0.00	0.02	0.07	0.01	-0.03	0.07	0.09	0.12	0.09	-0.07
Perc Bachelor Deg	.455**	.395**	.307**	0.07	.249**	0.10	0.11	0.11	0.15	-0.03
Perc Worked at home	0.09	0.07	0.16	-0.03	0.00	0.08	.197*	.210*	0.11	-0.01
Perc Public transit	0.08	0.12	0.02	0.08	0.07	-0.01	-0.11	-0.05	0.05	0.01
Perc Walked	.639**	.241**	.368**	0.03	0.16	0.01	.221*	0.14	-0.04	-0.03
Perc Bicycle	.251**	.319**	.298**	0.14	.307**	0.17	-0.03	0.17	.372**	.238*
Perc WalkBikeTransit	.653**	.344**	.404**	0.09	.251**	0.04	0.13	0.14	0.08	0.04
Perc Owner	-.581**	-.287**	-.349**	-0.06	-.221*	0.02	-0.12	-0.15	0.00	-0.07
Perc Renter	.581**	.287**	.350**	0.06	.222*	-0.02	0.12	0.14	0.00	0.07
Avg Family Size	-.731**	-.379**	-.453**	-0.11	-.240**	0.04	-0.12	-.201*	-0.05	0.00
Avg DwellingValue	-.354**	-0.14	-.203*	-0.11	-0.11	0.04	0.01	-0.08	0.00	-0.04
Avg MonthlyRent	0.17	0.11	0.14	-0.06	0.01	0.07	0.15	0.03	0.08	-0.07
Avg Popn Income	0.09	0.16	0.11	-0.04	0.06	0.06	0.04	0.04	0.09	-0.04
Avg Hshld Income	-.222*	-0.05	-0.10	-0.08	-0.06	0.04	-0.02	-0.05	0.04	-0.04
Distance to Orpheum	-.637**	-.370**	-.424**	-0.08	-.259**	-0.05	-0.17	-.197*	-0.09	-0.05
Density Population	.742**	.218*	.327**	-0.06	0.12	-0.06	0.15	0.11	-0.10	-0.09
Density 0to14	.215*	0.04	0.00	-0.10	0.00	-0.02	0.14	-0.06	-0.04	-0.06
Density 25to44	.782**	.266**	.335**	-0.03	0.17	-0.05	0.11	0.07	-0.07	-0.07
Density 25to39	.782**	.269**	.334**	-0.03	0.17	-0.04	0.11	0.06	-0.07	-0.07
Density 65+	.562**	0.14	.370**	-0.09	0.03	-0.05	0.13	.324**	-0.15	-0.10
Density Living Alone	.791**	.240**	.386**	-0.02	0.15	-0.05	0.07	0.18	-0.08	-0.06
Density Immigrants	.442**	0.05	0.11	-0.08	-0.04	-0.07	0.16	0.00	-0.14	-0.10
Density Selfemployed	.799**	.257**	.371**	-0.05	0.17	-0.05	0.13	0.11	-0.07	-0.08
Density Bachelor	.316**	.380**	.346**	0.05	.226*	0.10	0.11	0.09	.197*	-0.03
Density Workedathome	.821**	.324**	.466**	-0.05	0.14	-0.02	.356**	.308**	0.00	-0.07
Density Publictransit	.713**	.239*	.293**	-0.03	0.16	-0.05	0.03	0.06	-0.06	-0.07
Density Walked	.719**	.207*	.358**	-0.03	0.15	-0.03	0.14	0.06	-0.09	-0.06
Density Bicycle	.681**	.472**	.481**	0.03	.452**	0.03	-0.01	.204*	.187*	0.02
Density WalkBikeTransit	.801**	.266**	.379**	-0.03	.196*	-0.04	0.10	0.08	-0.07	-0.07
Density Owner	.574**	.186*	.227*	-0.04	0.05	-0.04	0.11	0.09	-0.05	-0.08
Density Renter	.786**	.239*	.399**	-0.03	0.17	-0.05	0.11	0.15	-0.09	-0.06

Density Dwellings	.797**	.246**	.382**	-0.04	0.15	-0.05	0.12	0.14	-0.08	-0.07
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Next, the results from a bivariate regression that explores the relationship between the location quotient and densities of artists is presented. This regression analysis explores the correlation between the linear distances to artist's facilities and artist clustering in census tracts. The location quotient of all artists has a significant negative correlation with every facility type. Only community-centre halls had a confidence interval lower than 99%, but still above 95%. Artist clustering had the most significant degree of negative correlation with the proximity to theatre facilities, as authors and writers, producers, directors and choreographers, actors and comedians, and painters, sculptors and visual artists all had very strong negative correlations with distance to theatres. The clustering of conductors, composers and arrangers, musicians and singers, photographers, and artisans and craftpersons had no significant correlation with any artist facility type.

Table 6-13 2011 City of Vancouver Location Quotient of Artists and Distance to Artist Facilities Pearson Coefficient Table

Pearson Correlation	Location Quotient									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Artist Facilities Type/ Primary Use										
Bar Lounge Cabaret	-.475**	-.270**	-.383**	-0.13	-0.11	-0.06	-0.17	-.235*	-0.09	-0.09
Café Restaurant	-.405**	-.231*	-.345**	-0.15	-0.10	-0.07	-0.10	-.217*	-0.08	-0.12
Total Café Restaurant Bar	-.452**	-.257**	-.372**	-0.14	-0.11	-0.06	-0.14	-.231*	-0.09	-0.10
Arena Stadium	-.470**	-.242**	-.393**	-0.12	-0.11	-0.04	-0.14	-.221*	-0.09	-0.11
Community-Centre Hall	-.232*	-.189*	-0.18	-0.13	-0.11	-0.12	0.01	-0.16	-0.07	-0.11
Place of Worship	-.500**	-.329**	-.333**	-0.10	-0.17	-0.08	-0.18	-.209*	-0.10	-0.05
Plaza Park Band Shell	-.521**	-.312**	-.382**	-0.09	-0.14	-0.05	-.216*	-.222*	-0.10	-0.06
Total Community Space	-.437**	-.286**	-.324**	-0.12	-0.14	-0.09	-0.12	-.216*	-0.10	-0.09
Total Educational	-.439**	-.300**	-.322**	-0.13	-0.16	-0.10	-0.11	-.211*	-0.11	-0.09
Garden Aquarium Science Centre	-.495**	-.335**	-.328**	-0.09	-0.17	-0.10	-0.18	-.209*	-0.11	-0.06
Library Archives	-.505**	-.313**	-.356**	-0.08	-0.13	-0.05	-.214*	-.205*	-0.09	-0.04
Museum Gallery	-.514**	-.331**	-.363**	-0.11	-0.16	-0.07	-0.18	-.219*	-0.11	-0.06

Total Museum Gallery	-.513**	-.331**	-.361**	-0.10	-0.16	-0.08	-.185*	-.218*	-0.11	-0.06
Artist Housing	-.518**	-.290**	-.374**	-0.07	-0.12	-0.03	-.288**	-.219*	-0.08	-0.04
Artist Studio	-.401**	-.223*	-.350**	-0.15	-0.10	-0.07	-0.10	-.221*	-0.08	-0.13
Artist Studio w/ Residence	-.444**	-.253**	-.376**	-0.15	-0.11	-0.07	-0.13	-.241**	-0.09	-0.12
Film Recording Studio	-.452**	-.264**	-.369**	-0.14	-0.12	-0.08	-0.13	-.237*	-0.09	-0.11
Rehearsal Studio	-.406**	-.266**	-.322**	-0.13	-0.12	-0.09	-0.11	-.210*	-0.08	-0.09
Workshop	-.459**	-.269**	-.377**	-0.15	-0.12	-0.07	-0.13	-.230*	-0.10	-0.11
Total Studio Rehearsal	-.427**	-.250**	-.357**	-0.15	-0.11	-0.08	-0.12	-.226*	-0.09	-0.11
Cinema	-.467**	-.265**	-.370**	-0.12	-0.10	-0.06	-0.17	-.226*	-0.08	-0.08
Performance Space	-.513**	-.310**	-.385**	-0.12	-0.14	-0.07	-0.18	-.231*	-0.11	-0.08
Theatre	-.533**	-.349**	-.352**	-0.08	-0.18	-0.07	-.195*	-.201*	-0.13	-0.05
Total Theatre Performance	-.528**	-.333**	-.372**	-0.10	-0.16	-0.07	-.190*	-.218*	-0.12	-0.06
Total Artist Facility	-.489**	-.308**	-.363**	-0.12	-0.15	-0.08	-0.16	-.225*	-0.11	-0.08

The clustering of authors and writers is observed to be most correlated with theatre and performance venues, followed by museums and galleries and educational institutions and facilities. Clusters of producers, directors and choreographers is predominantly correlated with proximity to cafés, restaurants, and bars, followed by theatre and performance venues, museum and gallery, and studio and rehearsal space. Clustering of actors and comedians had significant correlations with only two overall artist facility categories, and four facility types. Clustering of actors and comedians were not correlated with the location of all facilities combined, but had the most significant level of correlation with the proximity to artist housing followed by parks and band shell locations. They were also correlated with the theatre and performance category, and the museum and gallery category of facilities. Almost all facilities were correlated with the clustering of painters, sculptors and visual artists, but their proximity to artist studios with residences had the most significant correlation.

Table 6-14 presents the results of a bivariate analysis showing regressions between the density of artists across census tracts and the location of artist facilities in the City of Vancouver. The results show a significant negative correlation between the distance of all artist facility types and the density of the artist group population.

Table 6-14 2011 City of Vancouver Density of Artists and Distance to Artist Facilities Pearson Coefficient Table

Pearson Correlation Artist Facilities Type/ Primary Use	Density									
	Artist Group	Author Writer	Producer Director Choreographer	Conductor Composer Arranger	Musician Singer	Dancer	Actor Comedian	Painter Sculptor Visual Artist	Photographer	Artisan Craftsperson
Bar Lounge Cabaret	-.566**	-.344**	-.389**	-0.13	-.258**	-0.06	-0.14	-.188*	-0.09	-0.09
Café Restaurant	-.444**	-.300**	-.306**	-0.15	-.233*	-0.07	-0.09	-0.15	-0.08	-0.11
Total Café Restaurant Bar	-.523**	-.330**	-.359**	-0.14	-.251**	-0.06	-0.12	-0.18	-0.09	-0.10
Arena Stadium	-.498**	-.300**	-.361**	-0.12	-.234*	-0.04	-0.12	-0.17	-0.10	-0.10
Community-Centre Hall	-.242**	-.251**	-0.14	-0.13	-.196*	-0.12	-0.01	-0.08	-0.06	-0.12
Place of Worship	-.566**	-.384**	-.371**	-0.10	-.280**	-0.08	-0.14	-0.18	-0.11	-0.06
Plaza Park Band Shell	-.628**	-.375**	-.427**	-0.09	-.273**	-0.05	-0.17	-.201*	-0.11	-0.05
Total Community Space	-.498**	-.354**	-.326**	-0.12	-.265**	-0.09	-0.10	-0.16	-0.10	-0.09
Total Educational	-.484**	-.361**	-.315**	-0.13	-.272**	-0.10	-0.09	-0.15	-0.10	-0.09
Garden Aquarium Science Centre	-.567**	-.385**	-.371**	-0.09	-.279**	-0.10	-0.14	-0.18	-0.11	-0.06
Library Archives	-.640**	-.380**	-.421**	-0.08	-.267**	-0.05	-0.17	-.192*	-0.10	-0.04
Museum Gallery	-.585**	-.388**	-.390**	-0.11	-.282**	-0.07	-0.14	-.184*	-0.12	-0.06
Total Museum Gallery	-.588**	-.387**	-.391**	-0.10	-.281**	-0.08	-0.14	-.184*	-0.12	-0.06
Artist Housing	-.664**	-.350**	-.455**	-0.07	-.260**	-0.03	-.229*	-.220*	-0.09	-0.03
Artist Studio	-.437**	-.293**	-.307**	-0.15	-.230*	-0.07	-0.09	-0.15	-0.08	-0.12
Artist Studio w/ Residence	-.492**	-.320**	-.346**	-0.15	-.245**	-0.07	-0.11	-0.18	-0.09	-0.11
Film Recording Studio	-.506**	-.332**	-.349**	-0.14	-.253**	-0.08	-0.11	-0.18	-0.09	-0.11
Rehearsal Studio	-.500**	-.348**	-.321**	-0.13	-.254**	-0.09	-0.10	-0.15	-0.08	-0.09
Workshop	-.509**	-.336**	-.351**	-0.15	-.257**	-0.07	-0.11	-0.17	-0.10	-0.11
Total Studio Rehearsal	-.483**	-.322**	-.331**	-0.15	-.246**	-0.08	-0.10	-0.16	-0.09	-0.11
Cinema	-.585**	-.345**	-.391**	-0.12	-.250**	-0.06	-0.14	-.185*	-0.09	-0.08
Performance Space	-.585**	-.371**	-.399**	-0.12	-.274**	-0.07	-0.14	-.190*	-0.12	-0.08
Theatre	-.572**	-.381**	-.384**	-0.08	-.279**	-0.07	-0.15	-0.18	-0.14	-0.05
Total Theatre Performance	-.588**	-.381**	-.397**	-0.10	-.280**	-0.07	-0.15	-.185*	-0.13	-0.06
Total Artist Facility	-.555**	-.371**	-.372**	-0.12	-.275**	-0.08	-0.13	-0.18	-0.11	-0.08

The clustering of all artists combined had significant correlations with the proximity of all types of facilities. The most significantly correlated facility types with artists are theatre and performance venues, museums and galleries, followed by cafés,

restaurants and bars. When looking at artist facilities by primary use, library archives, plazas, parks and band shells, performance spaces, cinemas, and museum galleries had the highest levels of significant correlation with the density of artists. The density of authors and writers significantly correlated with all artist facility types but is most significantly correlated with proximity to museum and galleries, followed by garden, aquarium and science centres, places of worship, and theatres. Clusters of producers, directors and choreographers are most significantly correlated with proximity to artist housing, plazas, parks and band shells, library archives, performance spaces, and theatres. The location of musician and singer population densities were most correlated with museums and galleries, followed by places of worship, and theatres. Densities of painters, sculptors and visual artists were significantly correlated with artist housing, plazas, parks and band shells, library archives and performance spaces. Actor and comedian densities were only significantly correlated with the location of artist housing. Densities of conductors, composers and arrangers, dancers, photographers, and artisans and craftpersons had no significant correlation with any artist facilities. Building on the analysis presented, the Chapter 7 presents the results from the multivariate analysis using artist population and neighbourhood characteristic data across Metro Vancouver and City of Vancouver census tracts. In this following chapter, theories pertaining to the location preference of artists are compared to the distribution of artist populations in Vancouver.

Chapter 7. Multivariate Regression

The previous chapter highlighted the relationship between artists and neighbourhood characteristics by analysing correlations between two variables at a time. This section provides the results of the multivariate analysis which explores the relationship between artists and multiple neighbourhood characteristics together. Following the same format as the previous univariate and bivariate analysis, this chapter presents the findings of the multivariate linear regression analysis by organizing sections by each census year. Each section includes results for multivariate regressions using all the census variables for neighbourhood characteristics, as well as more customized regressions using select variables which test specific correlations, as well as theories presented by Grodach (2014), Markusen (2006), and Florida (2002). Multivariate regression results for the City of Vancouver using artist facility proximity data with 2011 Census and NHS data are also included.

The multivariate analysis uses a similar technique and style as presented by Grodach (2014) in the paper titled *The location patterns of artists clusters: A metro- and neighbourhood-level analysis*. Grodach (2014) performs a multivariate regression analysis to understand the relationship between where arts industry workers cluster and a set of socio-economic and demographic variables at both the regional and neighbourhood level. In total Grodach assesses the population, density and location quotient of arts industry workers as the dependent variables with a set of thirty-three independent variables.

The multivariate regressions presented in this chapter have been customized to exclude independent variables that show evidence of high collinearity. In a multivariate regression model high collinearity is the result of high correlation between two or more independent variables. To detect independent variables that have high collinearity, the variance inflation factor (VIF) is used when producing the regression results in SPSS. Depending on the data used, a VIF above 5 or 10 may be deemed to have high correlation that may be problematic. In the multivariate regressions presented in this chapter, a VIF under 10 was the goal to achieve; however, there are instances where the VIF increases up to 13. Using census population data, it is likely that some of the variables that describe demographic or socio-economic factors will have collinearity as

they are all describing the different parts of the same population. Variables that were expressed as densities had the most instances of high collinearity, as it is likely that the density itself was the most significant factor leading to high levels of collinearity. While most density variables were removed from the multivariate regression models, some variables with a VIF over 10 were not removed as they provide a support role to regression model, such as household income, and proportion of the population that lives alone. The multivariate regression tables without any variables removed as a result of high collinearity for the years 1991, 2001 and 2011 are displayed in Appendix D, E and F.

7.1.1. 1991 Metro Vancouver

This section begins by presenting the results from the multivariate regression analysis whereas the location quotient of the artist group is the dependant variable, and all the neighbourhood characteristics. This is followed by a multivariate regression where the independent variables are the same, but with artist densities as the dependant variable. Journey to work population data was not available for the 1991 census tract profile.

In 1991, the clustering of artists, as calculated by location quotient, was predicted by only three of the seventeen census variables used in this multivariate regression model and produced an adjusted R-squared value of .414. Table 7-1 presents the results from a multivariate regression analysis where the location quotient of artists is the dependent variable and select census variables with lower levels of collinearity represent the independent variables. The results show a positive and significant correlation between artists clustering in neighbourhoods that had higher proportions of the labour force that was self-employed and the percent of the population with a bachelor's degree; meanwhile, increasing average monthly rent had a negative influence on artist clustering as every \$100 increase in rent resulted in 0.1 LQ less for the artist population living in census tracts.

Table 7-1 1991 Multivariate Regression for Neighbourhood Characteristics predicting Location Quotient of Artists in Metro Vancouver Census Tracts

Dependent Variable: Artist Group Location Quotient Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.182	1.184		-0.154	0.878		
Perc 0 to 14	-0.002	0.018	-0.018	-0.137	0.891	.115	8.7
Perc 25 to 44	0.014	0.017	0.097	0.807	0.421	.137	7.3
Perc 65+	0.012	0.015	0.087	0.764	0.445	.153	6.5
Perc Living Alone	0.020	0.011	0.265	1.821	0.070	.093	10.7
Perc Immigrants	0.005	0.009	0.062	0.585	0.559	.179	5.6
Unemploymentrate	0.035	0.018	0.158	1.929	0.055	.294	3.4
Perc Self-employed	0.065	0.018	0.344	3.592	0.000	.216	4.6
Perc Bachelor Deg.	0.029	0.010	0.306	2.915	0.004	.179	5.6
Perc Worked at home	0.001	0.002	0.021	0.331	0.741	.484	2.1
Perc Renter	-0.005	0.005	-0.135	-1.053	0.293	.120	8.4
Avg Dwelling Value	0.000	0.000	-0.126	-1.051	0.294	.138	7.3
Avg Monthly Rent	-0.0010	0.000	-0.210	-2.695	0.007	.327	3.1
Avg Hshld Income	0.000	0.000	0.034	0.211	0.833	.077	13.0
Kilometres to Orpheum	-0.007	0.007	-0.095	-0.938	0.349	.194	5.1
Density Immigrants	0.000	0.000	0.003	0.026	0.979	.116	8.6
Density Worked at home	0.001	0.001	0.115	0.964	0.336	.139	7.2
R ²			.446				
Adjusted R ²			.414				
N			298				

While location quotient of artists was not predicted by many of the neighbourhood characteristics, artist densities as the dependant variable present more significant correlations. This suggests that the distribution of artist densities is more sensitive to changing neighbourhood characteristics than is the proportion of artists of all labour force living in a neighbourhood. Overall, the multivariate regression presented in table 7-2 is very representative of the distribution of artist densities across Metro Vancouver with an adjusted R-squared value of 0.873. The results show that artist densities are found in neighbourhoods that have a higher proportion of the population that lives alone, has on average cheaper monthly housing rent, and a lower proportion of immigrants; however, artist densities have a positive and significant correlation with immigrants when expressed as a density. This may just be the result of artist densities being positively correlated with overall population densities, as presented in table 6-3 of the bivariate regression results. Artist densities are also positively correlated with the density of people that worked from home.

Table 7-2 1991 Multivariate Regression for Neighbourhood Characteristics predicting Density of Artists in Metro Vancouver Census Tracts

a. Dependent Variable: Artist Group Density	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-15.451	32.446		-0.476	0.634		
Perc 0 to 14	-0.188	0.489	-0.024	-0.385	0.700	.115	8.7
Perc 25 to 44	0.855	0.460	0.104	1.859	0.064	.137	7.3
Perc 65+	-0.022	0.422	-0.003	-0.052	0.959	.153	6.5
Perc Living Alone	0.6311	0.300	0.142	2.102	0.036	.093	10.7
Perc Immigrants	-0.5604	0.235	-0.117	-2.380	0.018	.179	5.6
Unemploymentrate	-0.610	0.504	-0.046	-1.210	0.227	.294	3.4
Perc Self-employed	0.802	0.492	0.073	1.629	0.104	.216	4.6
Perc Bachelor Deg.	0.117	0.269	0.021	0.435	0.664	.179	5.6
Perc Worked at home	0.036	0.064	0.017	0.566	0.572	.484	2.1
Perc Renter	-0.150	0.138	-0.065	-1.088	0.277	.120	8.4
Avg Dwelling Value	0.000	0.000	-0.034	-0.618	0.537	.138	7.3
Avg Monthly Rent	-0.0323	0.011	-0.111	-3.062	0.002	.327	3.1
Avg Hshld Income	0.000	0.000	0.061	0.822	0.412	.077	13.0
Kilometres to Orpheum	0.053	0.204	0.012	0.257	0.797	.194	5.1
Density Immigrants	0.0164	0.003	0.352	5.785	0.000	.116	8.6
Density Worked at home	0.2448	0.024	0.572	10.286	0.000	.139	7.2
R ²			.880				
Adjusted R ²			.873				
N			298				

Next, we look at the most significant results from a stepwise regression using the location quotient of the artist group as the dependent variable and all census variables as possible independent variables. The results show positive correlations with the clustering of artists and the proportion of the population that lives alone, is self-employed and has a bachelor's degree. Artist clustering is diminished in neighbourhoods that have higher monthly rents. The density of kids under the age of fifteen is positively correlated with artist clustering. The regression shows low levels of collinearity with a VIF under 3 for all variables.

Table 7-3 1991 Multivariate Regression for Select Neighbourhood Characteristics predicting Location Quotient of Artists in Metro Vancouver Census Tracts

a. Dependent Variable: Artist Group Location Quotient	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.164	.255		.642	.521		
Perc Living Alone	0.033	.004	0.437	8.205	0.000	.705	1.419
Perc Selfemployed	0.049	.012	0.270	4.088	0.000	.459	2.180
Perc BachelorDeg	0.029	.006	0.311	4.831	0.000	.482	2.074
Avg MonthlyRent	-0.001	.000	-0.169	-2.730	0.007	.521	1.920
Density 0to14	0.000	.000	0.148	2.874	0.004	.757	1.320
R Square			.415				
Adjusted R Square			.405				
N			298				

In the next multivariate linear regression, the previous independent variables are used with the exception of density of kids under the age of fifteen which is substituted for distance to the Orpheum. Distance to the Orpheum produces a negative and significant correlation which indicates that artists cluster in neighbourhoods closer to the central location of the Orpheum Theatre.

Table 7-4 1991 Multivariate Regression for Select Neighbourhood Characteristics predicting Location Quotient of Artists in Metro Vancouver Census Tracts

a. Dependent Variable: Location Quotient Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Variables							
(Constant)	0.745	0.236		3.157	.002		
Perc Living Alone	0.028	0.004	0.371	6.867	0.000	0.69	1.44
Perc Selfemployed	0.042	0.011	0.231	3.694	0.000	0.52	1.94
Perc BachelorDeg	0.025	0.007	0.263	3.540	0.000	0.37	2.73
Avg MonthlyRent	-0.001	0.000	-0.174	-2.803	0.005	0.52	1.92
Kilometres to Orpheum	-0.010	0.004	-0.138	-2.326	0.021	0.57	1.75
R ²			.410				
Adjusted R ²			.400				
N			298				

This regression analysis represents 40% of artists in 1991 and shows that census tracts with a higher proportion of the population living alone, are self-employed

workers, have a bachelor's degree as the highest obtained level of education, and a lower average monthly rent and live closer to the Orpheum are more like to have a higher proportion of artists than other neighbourhoods the Metro Vancouver region. These results are in line with Markusens (2006) findings where she discovered that, at the neighbourhood scale, artists move in to dense areas that are centrally located within the metropolitan region.

7.1.2. 2001 Metro Vancouver

In this section we explore the results from the multivariate regression analysis using 2001 census data. In addition to the independent variables included in the 1991 analysis, the analysis using 2001 census data includes journey to work by mode of transportation. The results of the multivariate regression where artist location quotient is the independent variable and the select variables with lower levels of collinearity are presented in table 7-6; the multivariate regression where density of artists is the independent variables is presented in table 7-7. For the 2001 multivariate regressions, the independent variables will include 'Avg Household Size', which replaces 'Per Living Alone' from the 1991 analysis.

In 2001, clustering of artists occurred in neighbourhoods that had lower average dwelling values that are closer to the Orpheum Theatre. Artist clustering is also significantly correlated with a higher proportion of residents that bike or walk to work from these more centrally located neighbourhoods. There are also significant and positive correlations with the proportion of the labour force that is unemployed, self-employed. Artists were more likely to be found in neighbourhoods that have a higher proportion of the population aged less than 15 or 65 and over. Higher proportion of the population over 15 years old with a bachelor's degree was also an indicator of more artists.

Table 7-5 2001 Multivariate Regression for Neighbourhood Characteristics predicting Location Quotient of Artists in Metro Vancouver Census Tracts

a. Dependent Variable: Artist Group Location Quotient	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.741	0.793		-0.934	0.351		
Perc 0 to 14	0.027	0.014	0.168	2.008	0.045	.146	6.865
Perc 25 to 44	0.016	0.010	0.139	1.513	0.131	.121	8.277
Perc 65+	0.021	0.010	0.140	1.980	0.048	.206	4.844
Avg Household Size	-0.060	0.171	-0.039	-0.349	0.727	.083	12.035
Perc Immigrants	-0.008	0.004	-0.128	-1.785	0.075	.198	5.047
Unemploymentrate	0.035	0.014	0.119	2.410	0.016	.420	2.384
Perc Selfemployed	0.088	0.013	0.555	7.026	0.000	.164	6.092
Perc BachelorDeg	0.012	0.006	0.157	1.973	0.049	.162	6.178
Perc Workedathome	-0.005	0.012	-0.028	-0.440	0.660	.256	3.908
Perc Publictransit	0.007	0.007	0.062	1.110	0.268	.329	3.042
Perc Walked	0.021	0.006	0.202	3.372	0.001	.286	3.491
Perc Bicycle	0.125	0.018	0.327	6.761	0.000	.438	2.283
Perc Renter	-0.006	0.004	-0.129	-1.407	0.160	.122	8.182
Avg DwellingValue	0.000	0.000	-0.241	-2.625	0.009	.121	8.246
Avg MonthlyRent	0.000	0.000	-0.031	-0.583	0.560	.371	2.693
Avg Hshld Income	0.000	0.000	-0.010	-0.099	0.921	.105	9.557
Distance to Orpheum	-0.018	0.005	-0.245	-3.491	0.001	.209	4.787
R Square			.623				
Adjusted R Square			.606				
N			385				

Next, the dependant variable is changed to density of artists with the same group of independent variables. This multivariate regression presented in table 7-7 produced an adjusted R-squared value of .675. In this model we see that the density of artists in neighbourhoods is correlated with the majority of the independent variables. The results show that higher densities of artists are found in neighbourhoods that have a higher percentage of the population aged 25 to 44 years old, and where the average size of households is greater. Higher artist densities are correlated with neighbourhoods that have a higher proportion of households that rent and dwelling prices are lower. Artist densities are also positively correlated with a higher proportion of the population over 15 that has a bachelor's degree. For labour force characteristics, artist densities are found in neighbourhoods where there's a greater percentage that is self-employed and walks or bikes to work. The percent of unemployment and immigrant population was negatively correlated with artist densities.

Table 7-6 2001 Multivariate Regression for Neighbourhood Characteristics predicting Density of Artists in Metro Vancouver Census Tracts

a. Dependent Variable: Artist Group Density	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-172.20	62.855		-2.740	0.006		
Perc 0 to 14	-4.841	1.080	-0.341	-4.482	0.000	.146	6.865
Perc 25 to 44	3.207	0.820	0.327	3.912	0.000	.121	8.277
Perc 65+	1.181	0.821	0.092	1.438	0.151	.206	4.844
Avg Household Size	66.969	13.538	0.499	4.947	0.000	.083	12.035
Perc Immigrants	-0.927	0.348	-0.174	-2.660	0.008	.198	5.047
Unemploymentrate	-3.996	1.140	-0.157	-3.507	0.001	.420	2.384
Perc Selfemployed	2.235	0.991	0.162	2.257	0.025	.164	6.092
Perc BachelorDeg	1.038	0.480	0.156	2.161	0.031	.162	6.178
Perc Workedathome	-0.789	0.976	-0.046	-0.808	0.419	.256	3.908
Perc Publictransit	-0.367	0.518	-0.036	-0.707	0.480	.329	3.042
Perc Walked	3.264	0.483	0.367	6.762	0.000	.286	3.491
Perc Bicycle	4.161	1.461	0.125	2.847	0.005	.438	2.283
Perc Renter	0.841	0.314	0.223	2.682	0.008	.122	8.182
Avg DwellingValue	0.000	0.000	-0.237	-2.840	0.005	.121	8.246
Avg MonthlyRent	0.014	0.016	0.043	0.901	0.368	.371	2.693
Avg Hshld Income	0.000	0.000	-0.021	-0.238	0.812	.105	9.557
Distance to Orpheum	-0.482	0.414	-0.074	-1.165	0.245	.209	4.787
R Square			.690				
Adjusted R Square			.675				
N			385				

The change in significant correlations in the multivariate regression results help paint a picture of what types of neighbourhood's artist live in across Metro Vancouver. Between 1991 and 2001, we see different independent variables with significant correlations with the density and location quotient of artists. For the multivariate regression where the location quotient of artists is the dependent variable, the proportion of the population that has a bachelor's degree and are self-employed remain as significant and positive correlations from 1991 to 2001. For density of artists as the dependent variable, the only independent variables to remain consistent between the two census years are a negative and significant correlation with the percentage of population that are immigrants. To get a better understanding of how variables effect the change in artist densities and location quotients over time, a longitudinal time series analysis is presented in chapter 8. In the next section, multivariate regression results are presented using 2011 Census and NHS data.

7.1.3. 2011 Metro Vancouver

This section presents multivariate regressions using artist occupation data and long form census data from the 2011 National Household Survey. Census short form data is used for age related variables. The multivariate regression models in this section present the relationship of artist densities and artist location quotients as dependent variables, and neighbourhood characteristics with lower levels of collinearity as independent variables. There is a wide degree of strong and weak correlations throughout the independent variables. As observed in the multivariate regressions using 1991 and 2001 data, results for 2011 show that the density of artists in neighbourhoods generally has a more significant correlation with neighbourhood characteristics when also expressed as densities.

Table 7-10 shows the results of a multivariate regression where the location quotient of artists across neighbourhoods is the dependent variable, and neighbourhood characteristics are the independent variables. Independent variables with high levels of collinearity, which is determined by a VIF over 15, are removed from the multivariate regression. The results of this analysis show significant correlations with artists clustering and the proportion of the population aged twenty-five to forty-four, and sixty-five and older. Neighbourhoods that are closer to the Orpheum and have a greater proportion of the population that commute to work by bicycle are also significantly correlated with artist clusters.

Table 7-7 2011 Multivariate Regression for Neighbourhood Characteristics predicting Location Quotient of Artists in Metro Vancouver Census Tracts

Dependent Variable: Artist Group Location Quotient	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.763	.561		-1.36	.174		
Perc 0 to 14	.002	.016	0.009	.12	.906	.170	5.890
Perc 25 to 44	.020	.009	0.175	2.16	.031	.140	7.131
Perc 65+	.020	.010	0.122	2.01	.045	.248	4.028
Perc Living Alone	.003	.010	0.033	.33	.745	.087	11.529
Perc Immigrants	-.006	.003	-0.094	-1.64	.102	.280	3.568
Unemploymentrate	-.014	.016	-0.033	-.87	.384	.647	1.545
Perc Selfemployed	.019	.012	0.107	1.55	.122	.194	5.159
Perc BachelorDeg	.014	.009	0.105	1.55	.122	.199	5.026
Perc Workedathome	.021	.014	0.092	1.44	.150	.224	4.464
Perc Publictransit	-.005	.007	-0.041	-.75	.453	.303	3.305

Perc Walked	-.005	.007	-0.041	-.75	.453	.303	3.305
Perc Bicycle	.158	.017	0.430	9.05	.000	.405	2.468
Perc Renter	.002	.004	0.043	.54	.591	.142	7.026
Avg DwellingValue	.000	.000	-0.050	-.67	.502	.164	6.083
Avg MonthlyRent	.000	.000	0.064	1.39	.166	.431	2.320
Avg Hshld Income	.000	.000	0.043	.57	.570	.158	6.337
Kilometres to Orpheum	-.011	.006	-0.144	-2.00	.046	.177	5.638
R ²			.604				
Adjusted R ²			.588				
N			452				

*Removed Variables: Avg Household Size, Density Self-employed, Density 25 to 44, Density of Households Living alone, Avg Popn Income, Density Bachelor, Density Renter, Density Immigrants, Density Public transit, Density Walked, Density Bicycle.

As in previous years, the density of artists is significantly correlated with more neighbourhood characteristics than artists expressed as a location quotient. The following table presents the results from the multivariate regression where artist density is the dependent variable and the neighbourhood characteristics represent the independent variables. The results show that artist densities are negatively correlated where the percentage and density of the population under the age of fifteen, and positively correlated with the percent of the population aged twenty-five to forty-four. Higher artist densities are found in neighbourhoods with a higher proportion of households that rent; meanwhile, artists are more likely to be found in neighbourhoods with a lower proportion of the population that are immigrants, live alone, and work from home. There is a positive correlation with artist densities and the proportion of the labour force that bikes to work. Results from the multivariate regression show higher artist densities in neighbourhoods where there are higher densities of the labour force that works from home.

Table 7-8 2011 Multivariate Regression for Neighbourhood Characteristics predicting Density of Artists in Metro Vancouver Census Tracts

Dependent Variable: Density Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	36.582	39.679		0.922	.357		
Perc 0 to 14	-2.843	1.135	-0.147	-2.505	.013	.148	6.762
Perc 25 to 44	1.850	.668	0.176	2.769	.006	.125	8.000
Perc 65+	-1.134	.736	-0.075	-1.541	.124	.215	4.658
Perc Living Alone	-1.918	.724	-0.220	-2.651	.008	.074	13.578
Perc Immigrants	-.543	.256	-0.097	-2.117	.035	.240	4.158
Unemploymentrate	-1.038	1.075	-0.027	-.966	.335	.632	1.582
Perc Selfemployed	1.134	.825	0.070	1.374	.170	.193	5.189
Perc BachelorDeg	-.282	.641	-0.023	-.439	.661	.192	5.202
Perc Workedathome	-2.253	1.046	-0.109	-2.153	.032	.198	5.056

Perc Publictransit	-.298	.439	-0.036	-.679	.497	.176	5.692
Perc Walked	-.541	.493	-0.048	-1.097	.273	.259	3.856
Perc Bicycle	5.677	1.196	0.168	4.749	.000	.402	2.486
Perc Renter	.532	.271	0.118	1.965	.050	.140	7.123
Avg DwellingValue	.000	.000	-0.029	-.521	.603	.163	6.141
Avg MonthlyRent	-.001	.011	-0.004	-.108	.914	.428	2.334
Avg Hshld Income	.000	.000	0.050	.888	.375	.157	6.366
Kilometres to Orpheum	.084	.382	0.012	.219	.827	.173	5.766
Density 0to14	-.030	.009	-0.148	-3.474	.001	.280	3.568
Density 65+	.030	.008	0.227	3.714	.000	.135	7.388
Density Workedathome	.249	.021	0.660	11.708	.000	.159	6.281
R ²			.782				
Adjusted R ²			.772				
N			452				

*Removed Variables: Avg Household Size, Density Self-employed, Density 25 to 44, Density of Households Living alone, Avg Popn Income, Density Bachelor, Density Renter, Density Immigrants, Density Public transit, Density Walked, Density Bicycle.

Looking back to the results from the previous census years, density of artists remained negatively correlated with the proportion of immigrant populations and kids under fifteen years old. Similar to the 2001 results, artist's densities in 2011 were also located in neighbourhoods that had a higher percent of the population that was aged twenty-five to forty-four, biked to work and lived in rental dwellings.

The next section presents the multivariate regression results for the City of Vancouver using 2011 census and NHS data. In addition to the variables used in the previous multivariate regression models, data for distance from neighbourhoods to artist facilities data is also incorporated into the model as independent variables. The addition of this layer to the multivariate regression will provide further depth to the model that will show the relationship between the neighbourhood's artists live in and their proximity to the location of artists facilities across the City.

7.1.4. 2011 City Vancouver

This section presents the results from multivariate regressions using the census tracts only within the City of Vancouver boundaries for the year 2011. The data used in this analysis also includes the proximity analysis to artist facilities, which is only available for the City of Vancouver. The regression results from this section reveal that different types of artist occupations live in different types of neighbourhoods within the City of Vancouver. Overall artists cluster in closer proximity to all artist facilities, but the

different artist's occupations have different clustering tendencies in proximity to different artist facility types.

Table 7-9 shows the results of a multivariate regression with the location quotient of the artist group as the dependent variables and all other neighbourhood characteristics, including proximity to artist facilities by type as the independent variables. In the City of Vancouver, we see one fewer independent variable with significant correlation as compared to the metro region in 2011. In the city, artist clustering is significantly correlated with a higher proportion of the labour force living in neighbourhoods that are self-employed, and bike to work; while the proportion of the population over sixty-five years old had a negative influence on the density of artists in neighbourhoods within the city. Unlike the very significant bivariate results between artists and artist facilities, the average distance to all artist facilities was not significantly correlated in this multivariate regression.

Table 7-9 2011 Multivariate Regression for Neighbourhood Characteristics predicting Location Quotient of Artists in City of Vancouver Census Tracts

a. Dependent Variable: Location Quotient Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Independent Variables							
(Constant)	2.682	1.566		1.713	.090		
Perc 0 to 14	-0.033	0.041	-0.126	-0.817	.416	.152	6.597
Perc 65+	-0.045	.021	-0.176	-2.179	.032	.557	1.796
Perc Immigrants	-.016	.014	-.182	-1.142	.256	.143	7.008
Unemploymentrate	-.068	.040	-0.131	-1.685	.095	.603	1.659
Perc Selfemployed	0.114	.036	0.561	3.187	.002	.117	8.539
Perc BachelorDeg	-.024	.023	-0.144	-1.044	.299	.191	5.241
Perc Workedathome	0.001	.042	.002	0.015	.988	.172	5.809
Perc Publictransit	-0.001	.019	-0.004	-0.032	.975	.288	3.475
Perc Walked	-0.015	.014	-0.160	-1.036	.303	.152	6.573
Perc Bicycle	0.116	.040	0.366	2.897	.005	.228	4.386
Perc Renter	.008	.009	.127	.849	.398	.161	6.218
Avg DwellingValue	-.0000007	.000	-0.298	-1.600	.113	.105	9.537
Avg MonthlyRent	.000	.001	0.039	.301	.764	.218	4.589
Avg Hshld Income	.0000001	.000	.002	.012	.991	.125	8.009
Avg Distance to All Artist Facilities	.000	.000	-0.004	-0.032	.975	.293	3.413
R ²			0.641				
Adjusted R ²			0.586				
N			115				

Comparing the city multivariate regression results to the metro-wide results, the only independent variable that remained significant at the city level is the percentage of the labour force that bikes to work. The change in significance of independent variables could be related to the addition of the distance to artist facility variable, and also the change in demographic and socio-economic landscape from Metro Vancouver to the City of Vancouver. Next, the results from a stepwise regression are presented to highlight a more fitted regression model and the resulting significant correlations.

To produce a better fitted multivariate regression model, the stepwise regression tool in SPSS is used. Table 7-11 presents the final results from a stepwise regression with the most significantly correlated variables, and the highest adjusted R-squared value when using all neighbourhood characteristics in the City of Vancouver.

Table 7-10 2011 Multivariate Regression for Select Neighbourhood Characteristics predicting Location Quotient of Artists in City of Vancouver Census Tracts

Dependent Variable: Location Quotient Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.662	.489		3.400	.001		
Perc Immigrants	-.024	.008	-0.278	-2.962	.004	.408	2.452
Perc Bicycle	.120	.027	0.378	4.439	.000	.495	2.021
Perc Selfemployed	.094	.022	0.462	4.343	.000	.317	3.151
Avg DwellingValue	-.000001	.000	-0.318	-3.013	.003	.322	3.102
R ²			.606				
Adjusted R ²			.591				
N			115				

From this stepwise multi-variate linear regression, we find that artist clustering occurs within neighbourhoods that have a higher proportion of residents in the labour force that bike to work and are self-employed. These neighbourhoods have a lower proportion of immigrants and lower than average dwelling values. Overall, this explains the situation of about 60% of the distribution of all artists expressed as location quotients in neighbourhoods across the City of Vancouver.

Next, table 7-11 presents the results from a multivariate regression where the density of artists is the dependent variable with the same independent variables used in the multivariate regression presented in table 7-9. The results show only one

independent variable with a significant correlation. Artist's densities are significantly correlated with neighbourhoods with lower unemployment rates. In this regression, the proximity to artist facilities was not a significant correlation with artist densities despite the strong correlation in the bivariate analysis presented in chapter 6. Just outside the 95% confidence level threshold for determining a significant correlation in this study, average monthly rent was positively correlated at a 94.9% confidence level, and percentage of the population sixty-five and over was negatively correlated with a 94.6% confidence level.

Table 7-11 2011 Multivariate Regression for Neighbourhood Characteristics predicting Density of Artists in City of Vancouver Census Tracts

a. Dependent Variable: Artist Group Density		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Independent Variables	B	Std. Error	Beta				Tolerance	VIF
(Constant)	283.030	195.036		1.451	.150			
Perc 0 to 14	-7.933	5.071	-0.251	-1.565	.121	.152	6.597	
Perc 65+	-5.039	2.579	-0.164	-1.954	.054	.557	1.796	
Perc Immigrants	-1.445	1.711	-.140	-0.845	.400	.143	7.008	
Unemploymentrate	-12.815	5.035	-0.205	-2.545	.012	.603	1.659	
Perc Selfemployed	2.459	4.472	0.100	0.550	.584	.117	8.539	
Perc BachelorDeg	-4.013	2.890	-0.199	-1.389	.168	.191	5.241	
Perc Workedathome	1.356	5.278	.039	0.257	.798	.172	5.809	
Perc Publictransit	-0.136	2.377	-0.007	-0.057	.955	.288	3.475	
Perc Walked	0.990	1.776	0.089	0.557	.578	.152	6.573	
Perc Bicycle	-0.883	4.982	-0.023	-0.177	.860	.228	4.386	
Perc Renter	2.029	1.132	.279	1.792	.076	.161	6.218	
Avg DwellingValue	-.0000686	.000	-0.229	-1.188	.238	.105	9.537	
Avg MonthlyRent	.140	.071	0.265	1.977	.051	.218	4.589	
Avg Hshld Income	-.0000130	.001	-.004	-.021	.983	.125	8.009	
Avg Distance to All Artist Facilities	.001	.010	0.012	0.107	.915	.293	3.413	
R ²			0.614					
Adjusted R ²			0.555					
N			115					

Overall, the multivariate regression at the city level produced fewer significant correlations between the dependent and the independent variables when compared to the same analysis using metro-wide data. When artist's populations are examined within the city we see less distinct correlations, which could be the result of the different demographic and socio-economic make-up of the city when compared to the region. Across the region, the neighborhood characteristic variables may be more distinct from neighbourhood to neighbourhood. Within the City of Vancouver, the neighbourhood

characteristics used in the regression might be more homogenous and less distinct across neighbourhoods resulting in fewer significant variables.

As follow up to the previous multivariate regression table that showed few significant variables, table 7-12 presents the results from a regression where artist density is the dependent variable. The multivariate regression shows a high correlation with a labour force that works from home or takes public transit to work. The density of immigrants is also negatively correlated with the density of artists. The independent variables in table 7-12 all produce a VIF under 8. The regression is 79% representative of the density of artists in neighbourhoods across the City of Vancouver.

Table 7-12 2011 Multivariate Regression for Select Neighbourhood Characteristics predicting Density of Artists in City of Vancouver Census Tracts

Dependent Variable: Density Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-7.581	11.739		-0.646	.520		
DensityWorkedathome	.223	.024	0.566	9.149	.000	.481	2.078
DensityBicycle	.103	.054	0.139	1.900	.060	.345	2.898
DensityPublictransit	.054	.012	0.501	4.498	.000	.149	6.730
DensityImmigrants	-.014	.005	-0.268	-2.661	.009	.181	5.517
R ²			.798				
Adjusted R ²			.790				
N			115				

When incorporating proximity to artist facilities into multi-variate regression, there were few significant results produced. Table 7-13 presents significant results of a multivariate regression where distance to artist studios with residents is an independent variable and the artist's density is the dependent variable. The results show that artist densities are predicted by a closer proximity to the location of artist studios with residents, and the density of the labour force that works from home and is self-employed. Artists living in live-work studios arrangements are often self-employed and as the live-work housing type suggests, they work from home.

Table 7-13 2011 Multivariate Regression for Select Neighbourhood Characteristics predicting Density of Artists in City of Vancouver Census Tracts

Dependent Variable: Density Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	31.539	24.386		1.293	.199		
Density Work at home	.179	.034	0.455	5.327	.000	.323	3.098
Density Self-employed	.012	.003	0.382	4.614	.000	.345	2.900
Distance to Artist Studio with Residence	-.009	.004	-0.121	-2.196	.030	.775	1.290
R ²			.738				
Adjusted R ²			.731				
N			115				

The data quality issues inherent with the 2011 NHS make any analysis using individual artist occupations difficult to interpret. To mitigate the data quality loss, the next section presents multivariate regression results that use a subset of the 2011 NHS and census data where populations of individual artists make up at least 50% of the artist group population in each census tract.

2011 NHS Census Tracts with 50% Individual Artist Occupation Population

To mitigate the data quality issues inherent with individual artist populations in the 2011 NHS, as discussed in Chapter 4.2, a sub-set of data was compiled for the 2011 census and NHS. This data set only includes census tracts where the combined population of individual artist occupations make up at least 50% of the artist group population across all census tracts. Census tracts where there was no artist group population were retained. The remaining census tracts where the total individual artist populations fell below 50% of the artist group population were removed; as a result, the total number of census tracts is reduced from 115 to 52. This subset of data is used to conduct multi-variate analysis using the individual artist occupations as the dependent variable.

Table 7-14 shows the multi-variate linear regression result for producers, directors and choreographers as the dependent variable. Clustering of Producers, directors and choreographers happens in city neighbourhoods that are closer to performance spaces and have a higher proportion of the population the works from

home and has on average less expensive dwellings. There is also a negative correlation with the proportion of the population that are immigrants.

Table 7-14 2011 Multivariate Regression for Select Neighbourhood Characteristics predicting Location Quotient of Producers Directors & Choreographers in City of Vancouver Census Tracts

Dependent Variable: Location Quotient Producers Directors & Choreographers	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	4.411	1.550		2.846	.007		
Perc Immigrants	-.130	.033	-0.575	-3.987	.000	.480	2.083
Perc Worked at home	.525	.130	0.654	4.024	.000	.377	2.650
Avg Value of Dwelling	-.00001	.000	-0.577	-3.401	.001	.346	2.887
Distance to Performance Space	.001	.000	0.416	2.263	.028	.295	3.392
R ²			.531				
Adjusted R ²			.491				
N			52				

Table 7-15 presents the final results from a stepwise multivariate regression where the density of authors and writers is the dependent variable. The results show that higher densities of authors and writers are found in neighbourhoods that have a higher proportion of the labour force that is self-employed. Authors and writers and a positive correlation with higher densities of people aged twenty-five to forty-four, and a negative correlation with those aged sixty-five and older. Neighbourhoods where there is a greater density of actors and comedians had a negative correlation with the density of authors and writers.

Table 7-15 2011 Multivariate Regression for Select Neighbourhood Characteristics predicting Density of Autors and Writers in City of Vancouver Census Tracts

Dependent Variable: Density of Autors and Writers	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-17.74981	11.582		-1.533	.132		
Perc Selfemployed	1.46365	.714	0.216	2.050	.046	.953	1.050
Density 25to44	.011839	.002	0.918	6.467	.000	.523	1.911
Density 65+	-.015870	.005	-0.414	-2.969	.005	.541	1.848
Density Actors and Comedians	-.244719	.090	-0.291	-2.708	.009	.913	1.095
R ²			.505				
Adjusted R ²			.462				
N			52				

In the tables above, we begin to see how different artist occupations have unique correlations with different neighbourhood characteristics, and even are drawn away from certain artist occupations. Next, chapter 8 presents a series of bivariate, multivariate and granger causality tests that show what demographic and socio-economic factors are influencing the attraction and displacement of artists from neighbourhoods across Vancouver.

Chapter 8. Longitudinal Analysis

This chapter provides the analysis and results for the longitudinal time series analysis of artist populations and their relationship with census demographic and socio-economic variables over time. Across the census tracts in Metro Vancouver there are a number of instances where artists increase from a population of 0, or decrease to a population of 0 between 1991, 2001 and 2011; as a result, it was not possible to calculate percentage changes for artist populations. To normalize the artist population across the varying sizes of census tracts, artist densities per square kilometer are used to calculate change over time. Change in the census demographic and socio-economic variables over time is calculated by both percentages and densities to measure to changes in the intensity and proportion in relation to change in artist densities. Over years, definitions of some census variables change and are no longer suitable for comparison over time. For example, the 1991 census released the profile with educational attainment of the population over 15 years of age, in 2001 this was changed to 20 years and older. In the 2011 NHS profile, educational attainment was provided for the population 15 years and older, as well as 25 to 64 years old.

As a population grows within a census tract, Statistics Canada splits the census tract geographies to keep it within a preferred population range. To account for these splits when doing a time series analysis, calculations of percentage and density change of census variables must be aggregated to the census tracts from the earliest census year. For this research, the 2011 and 2001 census tracts must be aggregated to the 1991 census tracts. Where variables are represented by a population figure in a census tract, the populations from 2001 or 2011 census tracts that form a 1991 census tract were added together. Where averages are used to express income, dwelling value or rent, a weighted average is used based on the value of that variables total. For example, average household income is summed using the total number households in census tract as the weighted value for aggregating census tracts.

Does the increase in density of artists within a neighbourhood attract more artists? The following Pearson bivariate table shows the change in artist densities of the artist group between 1991 and 2011. The results show a very significant negative correlation between the increase in artist's densities at the neighbourhood level between

1991 and 2011 and the change of artist densities between 2001 and 2011; which means we saw a decrease of artists densities over ten years in neighbourhoods that had previously experienced an increase in artist densities in the ten years preceding. Over the twenty-year time period (1991-2011) we see a significant positive correlation between the increase of artist densities with both ten-year intervals. This can be interpreted to mean that overall artists attract other artists to neighbourhoods in the long term, but there may be variances when looking at shorter time frames.

Table 8-1 Change in Density of Artists in Metro Vancouver Census Tracts

Artist Group Change in Density	1991-2001	2001-2011
1991-2001	1.00	
2001-2011	-.338**	1.00
1991-2011	.636**	.512**

Next, we look at the results from a bivariate regression analysis that examines the correlations of the change of artist densities between 1991 and 2011 and the select neighbourhood characteristics during the same period. This analysis will help explain how the change in neighbourhood characteristics over time leads to the increase or decrease in artist densities.

Table 8-2 1991-2011 Change in Neighbourhood Characteristics Predicting Change in Artist Densities in Metro Vancouver Pearson Coefficient Table

Bivariate Regression Analysis		1991-2011 Artist Density Change									
		Artist Group	Authors Writers	Producers Directors Choreographers	Conductors Composers Arrangers	Musicians Singers	Dancers	Actors Comedians	Painters Sculptors Visual Artist	Photographers	Artisans Craftpersons
1991-2011 % Change	Population	.287**	.174**	.158**	0.05	0.09	0.06	0.02	0.08	0.06	0.09
	Occupied Dwellings	.280**	.178**	.132*	0.06	0.10	0.07	0.02	0.07	0.08	0.09
	0-4 years	.480**	.223**	.267**	0.00	0.01	0.00	-0.03	0.05	-0.04	-0.05
	5-9 years	.429**	.164**	0.11	0.01	-0.04	0.00	0.01	0.04	-0.02	-0.06
	10-14 years	.411**	.191**	.221**	-0.02	0.04	-0.02	-0.01	0.07	-0.01	0.01
	Married with Children	.466**	.172**	.202**	0.00	-0.01	0.01	0.04	.115*	-0.04	-0.05
	Immigrants	.186**	.147*	0.10	0.05	0.08	0.07	0.01	0.07	0.06	.126*
	Labour force	.319**	.175**	.173**	0.06	0.10	0.05	0.04	0.11	0.05	0.08
	Employed Labour Force	.358**	.174**	.193**	0.05	0.09	0.05	0.05	.133*	0.04	0.06
	Owned Dwellings	.408**	.166**	.242**	0.02	0.04	0.02	0.05	.153**	-0.03	-0.03
	Rented Dwellings	.142*	.126*	0.08	0.06	0.08	0.06	0.02	0.05	0.08	0.11
	Avg Monthly Rent	.265**	0.03	.153**	-0.10	0.02	-0.08	0.03	0.02	-0.07	-0.11
	Avg Household Income	.342**	.140*	.177**	-0.02	0.11	0.04	0.10	.146*	0.00	-0.06
	Avg Dwelling Value	0.02	0.02	-0.08	-0.04	0.11	0.08	.174**	0.10	.117*	0.06
		DistOrpheumKM	-.339**	-0.03	-.167**	.143*	0.06	0.11	0.06	0.07	.190**
1991-2011 Density Change	Population	.481**	.185**	.200**	0.01	-0.04	0.03	0.04	-0.01	-0.07	-0.10
	Occupied Dwellings	.564**	.215**	.211**	0.03	-0.01	0.03	0.05	0.00	-0.07	-.126*
	0-4 years	.394**	.160**	.286**	-0.05	-.115*	0.01	-0.08	-0.08	-.199**	-.185**
	5-9 years	.186**	0.07	0.07	0.03	-0.09	0.00	-0.02	0.00	-0.08	-0.01
	10-14 years	0.09	-0.04	0.01	-0.11	-0.02	-0.08	0.07	0.05	-0.04	.119*
	Married with Children	.283**	0.07	.125*	-0.09	-0.08	0.01	0.00	-0.06	-.118*	-0.06
	Immigrants	.190**	0.09	0.01	0.01	-0.05	0.07	0.04	-0.02	-0.04	0.05
	Labour force	.547**	.212**	.236**	0.04	0.02	0.02	0.06	0.05	-0.05	-0.08
	Employed Labour Force	.599**	.181**	.267**	0.00	-0.01	0.02	0.03	0.00	-0.11	-.134*
	Owned Dwellings	.536**	.166**	.204**	-0.06	-0.06	0.01	-0.01	-0.09	-0.10	-.226**
	Rented Dwellings	.461**	.232**	.168**	.145*	0.06	0.05	.114*	.120*	0.00	0.05

Figure 8-1 illustrates the change in percentage points of artist as the proportion of the total labour force from 1991 to 2011. Over this period, 160 census tracts experienced an increase in the proportion of artists that make of the labour force, while 118 census tracts saw a lower proportion of artists. Twenty-one census tracts had no change over the twenty-year period.

Figure 8-1 1991-2011 Change in Artist as Percent of Labour Force Across Metro Vancouver Census Tracts

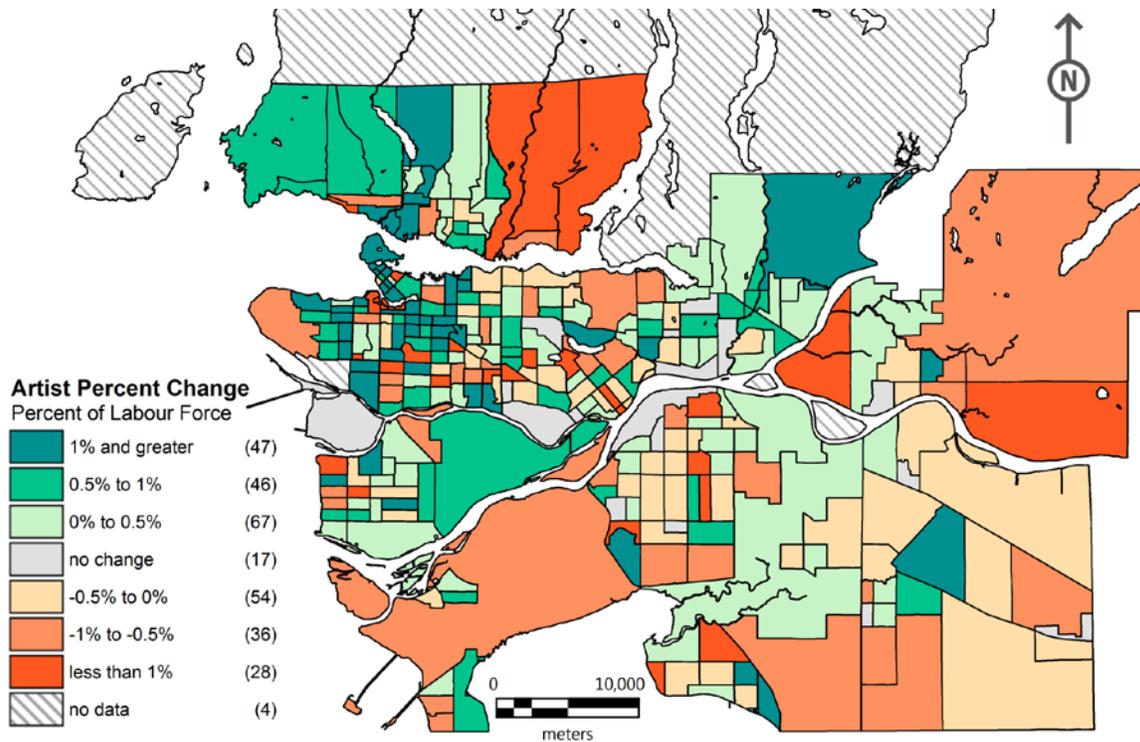
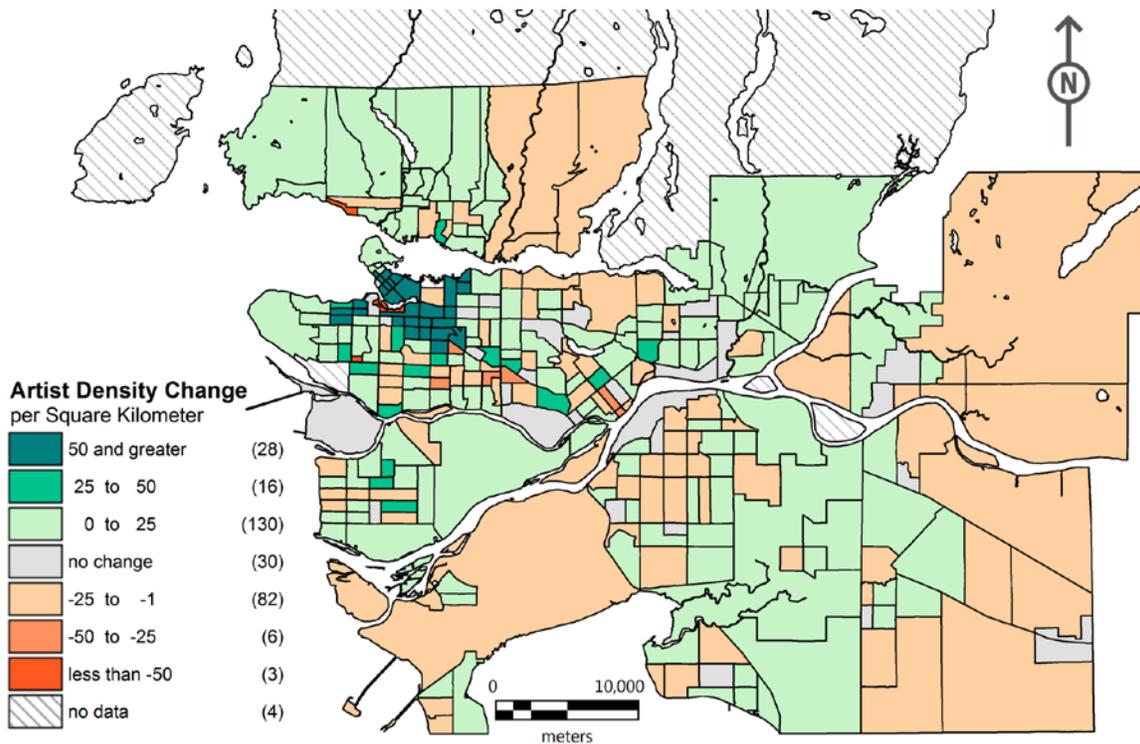


Figure 8-2 illustrates the distribution of change in artist densities from 1991 to 2011 across Metro Vancouver census tracts. This clearly shows that artist density growth is occurring in very centralized areas within City and Region. With the exception of False Creek South, Kerrisdale and Joyce Collingwood which saw density loses of over fifty artists per square kilometer.

Figure 8-2 1991-2011 Change of Artist Density Across Metro Vancouver Census Tracts



The next analysis explores other census variables to determine what factors preceded the attraction and displacement of artists across neighbourhoods. Table 8-3 is set up with the change in artist densities from 2001 to 2011 across the columns and the change in demographic and socio-economic variables between 1991 and 2001 expressed as densities and location quotients down the rows. This Pearson coefficient table highlights what factors may have influenced the attraction or displacement of artists from neighbourhoods.

Table 8-3 2001-2011 Change in Neighbourhood Characteristics Predicting Change in 2001-2011 Artist Densities in Metro Vancouver Pearson Coefficient Table

		2001-2011 Artist Density Change									
		Artist Group	Authors Writers	Producers Directors Choreographers	Conductors Composers Arrangers	Musicians Singers	Dancers	Actors Comedians	Painters Sculptors Visual Artist	Photographers	Artisans Craftpersons
1991-2001 % Change	Population	0.04	0.09	0.07	-0.05	0.04	0.00	-0.09	-.144*	-0.06	-0.03
	Occupied Dwellings	0.04	0.09	0.07	-0.04	0.03	-0.01	-0.11	-.138*	-0.07	-0.05
	0-4 years	0.10	0.05	-0.05	-.150*	-0.04	-.136*	-.300**	-.146*	-.167**	-.272**
	5-9 years	0.01	-0.01	-.145*	-0.03	-0.10	-0.10	-.245**	-0.05	-.184**	-.275**
	10-14 years	0.03	0.00	-0.06	-0.06	-0.08	-0.05	-.214**	-0.08	-.141*	-.182**
	Married with Children	0.03	-0.01	-0.10	-0.05	-0.10	-0.11	-.280**	-0.04	-.193**	-.294**
	Immigrants	0.01	0.09	0.05	-0.03	0.04	0.05	-0.07	-.179**	-0.06	0.01
	Employed Labour Force	0.07	0.09	0.07	-0.04	0.03	-0.02	-.128*	-0.10	-0.08	-0.10
	Owned Dwellings	0.11	0.05	0.07	-0.08	0.01	-0.05	-.221**	-0.07	-0.11	-.220**
	Rented Dwellings	0.02	0.08	0.06	0.01	0.05	0.02	-0.01	-0.07	-0.02	0.05
	Avg Monthly Rent	-0.01	-0.03	-0.03	-0.03	-0.02	0.00	0.00	-0.01	-0.04	-0.06
	Avg Household Income	0.10	0.01	-0.08	-0.04	0.03	-0.08	-.174**	-0.02	-.151**	-.230**
	Avg Dwelling Value	-.177**	0.03	-0.04	.206**	0.03	.211**	.264**	0.02	0.04	.133*
	Dist. to Orpheum	-.123*	0.07	.117*	.166**	0.06	.217**	.245**	0.05	0.10	.290**
1991-2001 Density Change	Population	0.05	0.04	-.123*	-.119*	-.135*	-.214**	-.310**	-.147*	-.159**	-.261**
	Occupied Dwellings	0.05	0.03	-0.11	-.120*	-.148*	-.233**	-.367**	-.141*	-.181**	-.332**
	0-4 years	0.11	0.03	-.168**	-.218**	-.131*	-.227**	-.332**	-0.09	-.120*	-.255**
	5-9 years	0.06	0.06	-0.04	-0.08	-0.04	-0.04	-0.08	-0.10	-0.06	-0.06
	10-14 years	-0.04	-0.08	-0.10	-0.03	-.147*	0.00	-0.07	-0.06	-0.07	-0.03
	Married with Children	-0.01	-0.03	-.177**	-0.10	-.175**	-.147*	-.218**	-.126*	-.119*	-.172**
	Immigrants	0.00	0.05	-.153**	-0.06	-.140*	-0.11	-.239**	-.182**	-.117*	-.125*
	Employed Labour Force	0.08	0.06	-0.10	-.147*	-.122*	-.237**	-.348**	-.145*	-.186**	-.300**
	Owned Dwellings	-0.06	-0.11	-.241**	-.139*	-.227**	-.316**	-.498**	-.122*	-.138*	-.512**
	Rented Dwellings	.143*	.175**	0.07	-0.06	-0.02	-0.07	-0.11	-.121*	-.171**	-0.03

Between 2001 and 2011 there were more census tracts that experienced a decrease in the proportion of artists than increased. Figure 8-3 shows the distribution of the percentage point change of the proportion of artists in the labour force between 2001 and 2011. Figure 8-4 shows the change of artist densities across Metro Vancouver census tracts.

Figure 8-3 2001-2011 Change in Artist as Percent of Labour Force Across Metro Vancouver Census Tracts

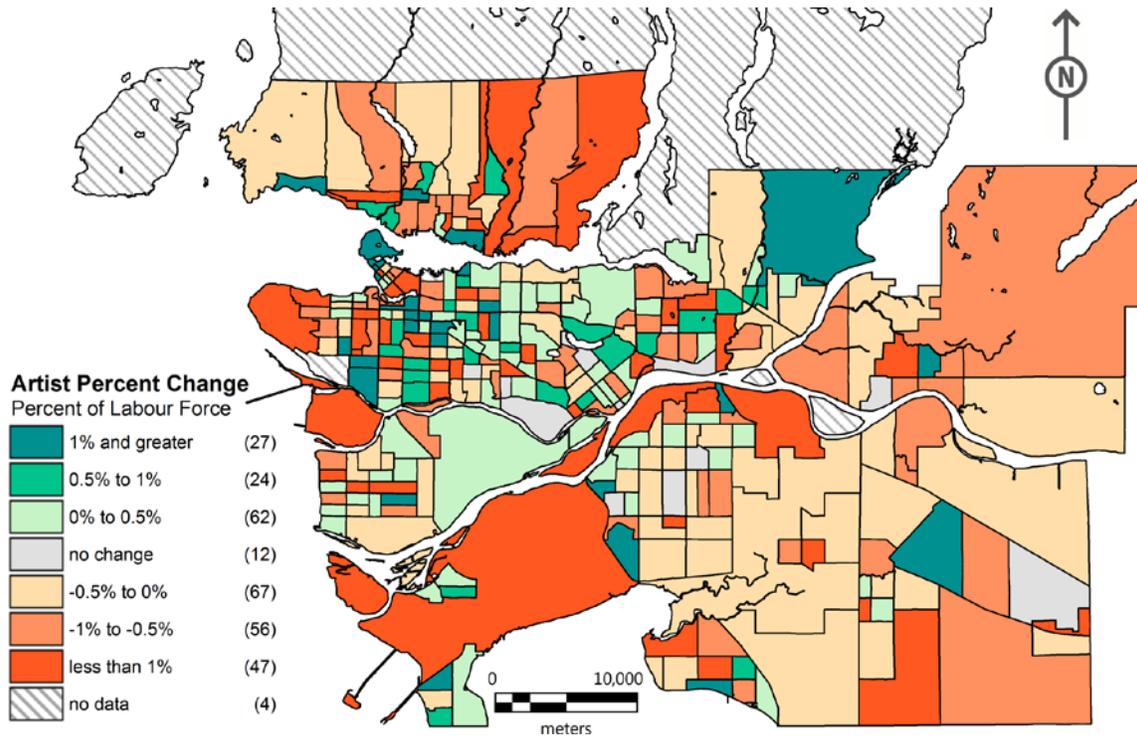


Figure 8-4 2001-2011 Change of Artist Density Across Metro Vancouver Census Tracts

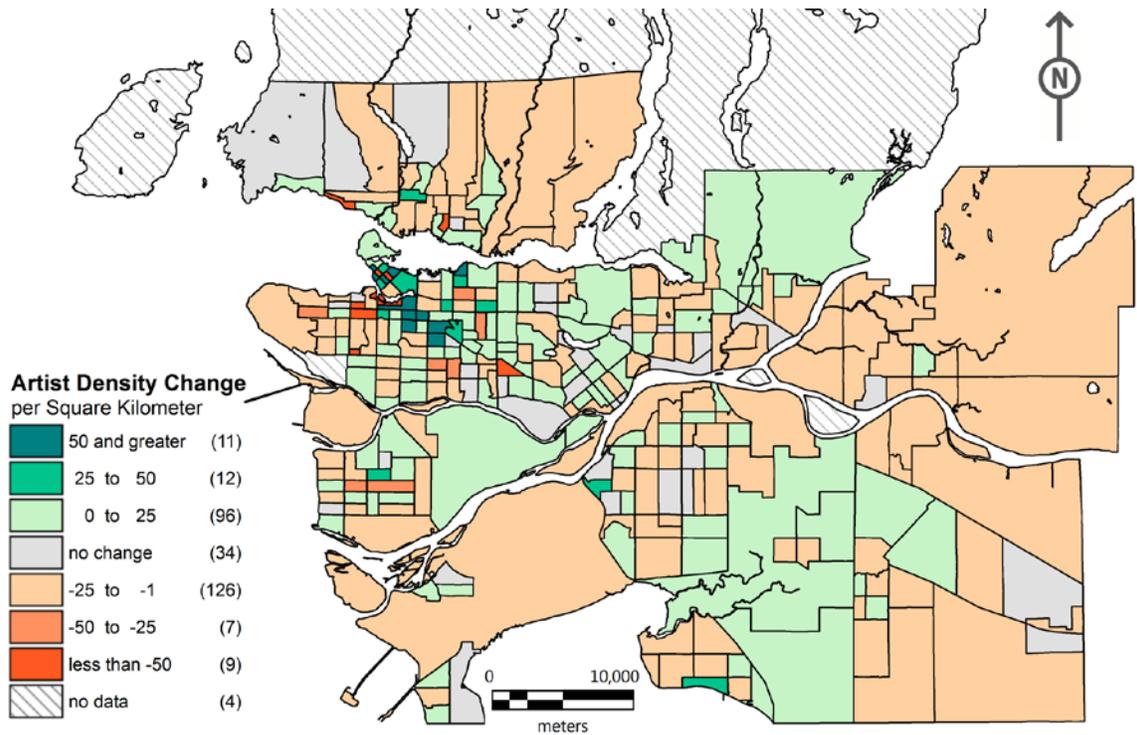


Table 8-4 shows the results of a bivariate regression analysis that explores the correlations between the change in artist densities from 1991 to 2001 and the change of neighbourhood characteristics from 2001 to 2011.

Table 8-4 Change in Neighbourhood Characteristics Predicting Change in 1991-2001 Artist Densities in Metro Vancouver Pearson Coefficient Table, 1991 – 2001.

		1991-2001 Artist Density Change									
		Artist Group	Authors Writers	Producers Directors Choreographers	Conductors Composers Arrangers	Musicians Singers	Dancers	Actors Comedians	Painters Sculptors Visual Artist	Photographers	Artisans Craftspersons
2001-2011 % Change	Population	0.04	0.04	-0.02	0.02	-0.02	-0.03	0.01	0.09	0.02	0.04
	Occupied Dwellings	0.01	0.02	-0.04	0.02	-0.01	-0.03	-0.03	0.07	0.02	0.02
	0-4 years	0.08	0.08	0.06	0.03	-0.05	0.01	0.06	0.05	-0.02	0.03
	5-9 years	0.11	0.10	.125*	0.05	-0.03	0.02	0.09	.123*	-0.05	0.02
	10-14 years	0.11	0.03	0.02	0.10	-0.07	-0.05	0.05	.273**	-0.03	0.06
	Married with Children	0.09	0.09	0.07	0.04	-0.06	-0.05	0.07	0.08	-0.04	0.05
	Immigrants	-0.05	-0.02	-0.08	-0.01	-0.01	-0.07	-0.07	0.07	0.03	0.01
	Employed Labour Force	0.06	0.06	0.00	0.03	-0.04	-0.01	0.02	0.08	0.00	0.07
	Owned Dwellings	0.09	0.05	0.03	0.02	0.02	-0.02	0.06	0.10	0.01	0.05
	Rented Dwellings	-0.01	0.01	-0.02	0.03	-0.05	-0.02	-0.03	0.03	-0.01	0.03
	Avg Monthly Rent	.186**	.125*	.170**	0.04	0.02	0.08	.139*	0.01	-0.08	0.09
	Avg Household Income	.138*	0.09	0.03	-0.01	0.00	0.09	0.07	.121*	0.07	0.06
	Avg Dwelling Value	.127*	0.08	0.09	0.01	0.02	0.04	0.03	0.10	0.00	0.06
	DistOrpheumKM	-.261**	-.151**	-.276**	-0.02	-0.02	-.121*	-.239**	0.02	.127*	-0.08
2001-2011 Density Change	Population	.383**	.253**	.232**	0.06	0.00	0.07	.263**	.179**	0.02	.198*
	Occupied Dwellings	.426**	.278**	.276**	0.11	0.00	.135*	.287**	.178**	0.00	.202*
	0-4 years	.313**	.261**	.309**	0.06	-0.10	.141*	.207**	0.03	0.00	0.09
	5-9 years	.141*	0.09	.129*	0.09	-0.04	0.00	.128*	.140*	-0.02	-0.01
	10-14 years	0.04	-0.02	-0.03	0.03	-0.02	-.115*	0.03	.210**	-0.01	0.05
	Married with Children	.220**	.173**	.181**	0.02	-0.07	-0.02	.157**	0.11	0.00	0.10
	Immigrants	0.07	0.02	-0.06	-0.05	0.02	-.150**	-0.02	.239**	0.06	0.10
	Employed Labour Force	.398**	.287**	.340**	.116*	-0.07	.173**	.266**	0.05	-0.09	.257*
	Owned Dwellings	.458**	.212**	.263**	0.05	0.11	.139*	.367**	.173**	0.04	.193*
	Rented Dwellings	.230**	.291**	.206**	.145*	-.174**	0.08	0.06	.119*	-0.07	.148*

Between 1991 and 2001 we see the majority of census tract increase in the proportion of artists. Many census tracts across all part of the region experienced an increase in the proportion of artists as growth was not solely occurring within the City of Vancouver. Figure 8-5 shows the change in proportion of artists across Metro Vancouver census tracts. Figure 8-6 shows the change in artist densities from 1991 to 2001 across Metro Vancouver census tracts.

Figure 8-5 1991-2001 Change in Artist as Percent of Labour Force Across Metro Vancouver Census Tracts

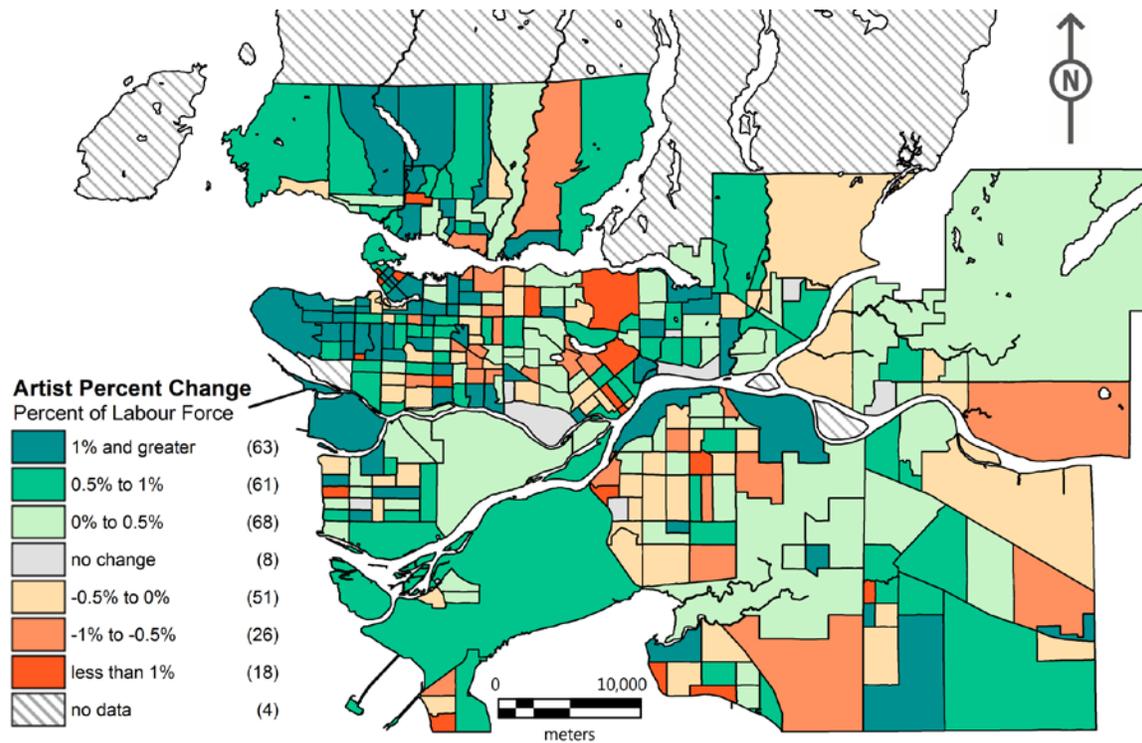
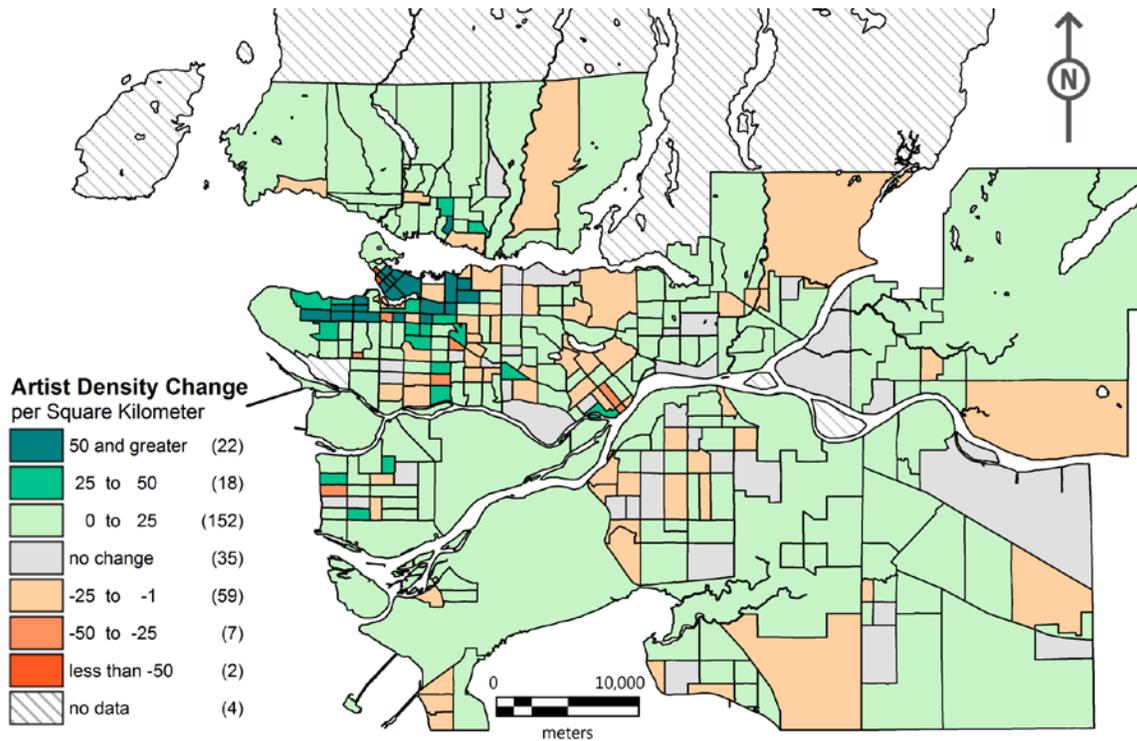


Figure 8-6 1991-2001 Change of Artist Density Across Metro Vancouver Census Tracts



The change in artist density between 2001 and 2011 did not have many significant correlations with the change in percent of demographic and socio-economic variables from 1991 to 2001; however, we see more significant correlations when comparing the change in artist densities to the change of demographic and socio-economic variable densities.

Across the individual artist occupations most artist types experienced a negative correlation with the increase in density of population, families with children, the age group 0 to 4 years old, immigrants, employed labour force, and owner occupied dwellings; meanwhile, change in the density of the artist group between 2001 and 2011 has a significant negative correlation with the average value of dwellings and the distance to the Orpheum, but about half of the individual artist occupation have a positive correlation with the distance to the Orpheum and the percent change of the average value of dwellings, which reinforces Markusen's (2006) argument that different artist occupations have different living arrangements.

Actors and comedians experienced the greatest amount of displacement from neighbourhoods where there was an increase in the proportion and density of children

under the age of fourteen, families that were married with children, employed labour force, owner occupied dwellings, and average household income. This led a positive correlation with distance from the Orpheum as they moved away from the city centre. To see if geography may have been a factor leading to the displacement of actors and comedian, the following table shows the Pearson coefficient results for the same census variables that had a negative correlation with the majority of the artist occupations. For the same time series, an increase in density and proportion of married couples with children, and children aged 0 to 4 years old had a significant negative correlation from the distance to the Orpheum. There are also negative correlations for the change in densities of immigrants, employed labour force, owner occupied dwellings, and population.

Vancouver CMA Change 1991-2011	Distance to Orpheum
Percent Change	
0-4 years	-.157**
Married with Children	-.136*
Density Change	
0-4 years	-.127*
Married with Children	-.232**
Immigrants	-.259**
Employed Labour Force	-.154**
Owned Dwellings	-.230**
Population	-.189**

For the same time series, an increase in density and proportion of married couples with children, and children aged 0 to 4 years old had a significant negative correlation from the distance to the Orpheum. There are also negative correlations for the change in densities of immigrants, employed labour force, owner occupied dwellings, and population. Young families, immigrants and employed workers are moving closer the urban centre of Vancouver where we are also seeing an increase in owner occupied dwellings and overall population density. The increase in density of these demographic variables preceded the displacement of producers, directors and choreographers, conductors, composers and arrangers, musicians and singers, dancers, actors and comedians, painters, sculptors and visual artists, photographers, and artisans and craftsperson’s away from the city centre. Authors and writers did not seem to share the

same fate as there were no significant correlations with the same variables. In the next section, multivariate regressions are presented that show which changing combination of neighbourhood characteristics predict the increase or decrease in artist populations over time.

8.1. Multivariate Regressions

This section presents the results from multivariate regressions that illustrate how the change of multiple variables over time predicts the change in artist populations over time. These regressions help understand the relationship between the change in artist densities across Metro Vancouver neighbourhoods over time and which neighbourhood characteristics are correlated with these changes. The results show that, between 1991 and 2001, neighbourhoods that saw an increase in artist density were more likely to see rising dwelling values and lower densities of married couples with children and children aged five to nine. Over this same time period artist densities were positively correlated with more household owned dwellings. Between 1991 and 2011, there is a negative correlation between the percent of immigrant and artist densities. Overall, these regressions help to understand what changing neighbourhood characteristics happen alongside changing artist populations in Metro Vancouver neighbourhoods.

Table 8-5 presents the results from a multivariate regression that explore the change in artist densities from 1991 to 2001 and the relationship with the change in owned dwelling density, dwelling value, and the density of married couples with children and children between the age of five and nine years old. The results show that an increase in artist density is predicted by an increase in owned dwelling densities and dwelling values, and a decrease in kids aged five to nine years old and couples that are married with children. This might indicate that neighbourhoods where we see higher artists densities are also seeing more strata condominium developments being built, while families with kids are leaving these.

Table 8-5 Multivariate Regression for Change in Select Neighbourhood Characteristics (1991-2001) predicting Change in Density of Artists (1991-2001) in Metro Vancouver Census Tracts

Dependent Variable: Artist Group Density 91-01	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-11.387	3.509		-3.245	.001		
Owned Dwelling Density 91-01	.121	.008	0.986	15.350	.000	.411	2.432
Dwell Value % 91-01	.432	.108	0.181	4.009	.000	.832	1.203
Density 5-9 years old 91-01	-.153	.047	-0.228	-3.262	.001	.349	2.865
Density Married with Children 91-01	-.070	.026	-0.238	-2.727	.007	.223	4.476
R ²			.509				
Adjusted R ²			.502				
N			294				

Using the same independent variables to test the relationship on artist density change from 2001 to 2011, Table 8-6 presents the multivariate results which show no significant correlations and a very small representation with an adjusted r-squared value of only 0.005. This could suggest that this decade presented different factors that effected the change in artist densities throughout the regions neighbourhoods.

Table 8-6 Multivariate Regression for Change in Select Neighbourhood Characteristics (2001-2011) predicting Change in Density of Artists (1991-2001) in Metro Vancouver Census Tracts

Dependent Variable: Artist Group Density 91-01	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-7.577	6.490		-1.167	.244		
Owner Density 01-11	.007	.009	0.070	.856	.393	.506	1.977
Dwell Value % 01-11	.051	.042	0.070	1.192	.234	.983	1.017
Density 5-9 years old 01-11	-.049	.055	-0.065	-.895	.371	.647	1.547
Density Married with Children 01-11	.028	.035	0.073	.795	.427	.399	2.505
R ²			0.019				
Adjusted R ²			0.005				
N			294				

Between 1991 and 2011, the density of the artist group increased in neighbourhoods where there was an increase in the proportion of households that are married couples with children, and an increase in density of children under the age of five. Increasing monthly rent was also a predictor of increasing artist densities. On the

other hand, the proportional increase in immigrants in neighbourhoods had a negative correlation with the increase in artist densities over the same period. Kids aged five to nine were also negatively correlated with artist densities. Overall the multivariate regression model produced an R-square value of .297.

Table 8-7 Multivariate Regression for Change in Select Neighbourhood Characteristics (1991-2011) predicting Change in Density of Artists (1991-2011) in Metro Vancouver Census Tracts

Dependent Variable: Artist Group Density 91-11	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	5.932	4.270		1.389	.166		
Monthly Rent % 91-11	.178	.083	0.110	2.130	.034	.906	1.104
Immigrant % 91-11	-.036	.017	-0.143	-2.128	.034	.530	1.886
Married with Children % 91-11	.044	.009	0.353	4.786	.000	.442	2.265
Density 0-4 years old 91-11	.225	.046	0.536	4.901	.000	.201	4.987
Density 5-9 years old 91-11	-.221	.057	-0.373	-3.880	.000	.259	3.856
R ²			.309				
Adjusted R ²			.297				
N			294				

The multivariate time-series analysis presented in this section provides evidence that artist densities can be predicted by changing neighbourhood characteristics. Over this time series analysis, we still see immigrants as a negative influence on where artists live. The next section introduces the granger causality test into the analysis which provides a statistical measure of causality to predict what changing variables could be influencing the change of artist populations in the following years. From this analysis we can infer causality on the attraction and displacement of artists to and from neighbourhoods across Metro Vancouver.

8.2. Granger Causality Test

In this chapter, the granger causality test is introduced into the analysis. The granger causality test examines if the change in an independent variable in an earlier time period will predicate the change of the dependent variable in a later time period. The Granger causality test is done by conducting two multi-variate regressions, one of which has the variable you are testing to cause the dependent variable to change, and the second which flips the independent variable that is being tested for causality, with the dependant variable which is being affected by the causality. The first step to prove granger causality is to conduct a multivariate analysis that shows significant correlation

with the causing independent variable, and other variables also included in the multivariate regression. The next step takes the first multivariate model and reverses the independent variable being tested for causality with the dependant variable using the same time range as the dependant variable of the first step; this is meant to find if the reverse is also true, which would not prove that the independent variable has granger causality on the dependent variable.

The first granger test analysis tests the causality of the increasing number of families and kids in neighborhoods causing a decrease in the density of artists in the following ten years. This will let us know if families are moving into neighbourhoods and displacing artists. The following tables present the results of the Granger causality test using two multivariate regressions. First, the Granger causality is tested on the change of density of children aged 0 to 4 years old from 1991 to 2001 on the change of artist's densities between 2001 and 2011. The density of married couples with children between 1991 and 2001, and the change in artist densities over the same period are also included in the causality test as independent variables. From the first multivariate regression, we find that an increase in artist densities from 2001 to 2011 was predicted by the decrease in artist densities from 1991 to 2001, an increase in density of children aged less than five years old and a decrease in density of married couples with children between 1991 and 2001.

Table 8-8 Granger Causality Test Step 1: Change in Select Neighbourhood Characteristics (1991-2001) predicting Change in Density of Artists (2001-2011) in Metro Vancouver Census Tracts

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	40.758	8.723		4.672	.000		
Density Artist Group 91-01	-0.445	0.087	-0.494	-5.103	0.000	0.87	1.15
Density 0-4 years 91-01	0.497	0.107	0.685	4.660	0.000	0.38	2.65
Density Married with Children 91-01	-0.196	0.070	-0.409	-2.802	0.006	0.38	2.61
R Square			0.342				
Adjusted R Square			0.317				
N			294				

Table 8-9 Granger Causality Test Step 2: Change in Select Neighbourhood Characteristics and Artist Density (1991-2001) predicting Change in Density of Kids 0 to 4 (2001-2011) in Metro Vancouver Census Tracts

a. Dependent Variable: Density 0 to 4 Years Old 2001-2011		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Variables	B	Std. Error	Beta				Tolerance	VIF
(Constant)	-9.552	12.625		-.757	.452			
Density Artist Group 91-01	0.294	0.126	0.225	2.330	0.022	0.69	1.44	
Density 0-4 years old91-01	0.362	0.154	0.344	2.345	0.021	0.52	1.94	
Density Married with Children 91-01	0.099	0.101	0.143	0.980	0.330	0.37	2.73	
R Square			0.342					
Adjusted R Square			0.317					
N			294					

In the second step of the granger causality, the results show a positive and significant correlation between kids under five years old and artists. As a result, there is no granger casualty proven in this test as the step 2 of the analysis was also significant and positively correlated.

The next Granger casualty test examines the causality of the change in labour force densities from 1991 to 2001 on the density of artist in the preceding decade from 2001 to 2011. Also included in this analysis are five-year age groups expressed as percentage change of population, percentage change on immigration, and the density of the labour force from 1991 to 2001.

Table 8-10 Granger Causality Test Step 1: Change in Select Neighbourhood Characteristics (1991-2001) predicting Change in Density of Artists (2001-2011) in Metro Vancouver Census Tracts

a. Dependent Variable: Density Artist Group 2001- 2011		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Variables	B	Std. Error	Beta				Tolerance	VIF
(Constant)	43.284	7.471		5.793	.000			
Density Artist Group 91-01	-0.573	0.089	-0.636	-6.466	0.000	0.75	1.33	
0-4 years % 91-01	0.870	0.170	2.683	5.120	0.000	0.03	37.72	
5-9 years % 91-01	-0.336	0.104	-1.280	-3.235	0.002	0.05	21.51	
10-14 years % 91-01	-0.162	0.183	-0.378	-0.881	0.381	0.04	25.31	
Immigrant % 91-01	-0.840	0.189	-1.498	-4.444	0.000	0.06	15.60	
Density Labour Force 91-01	0.036	0.013	0.607	2.749	0.007	0.15	6.70	
R Square			.432					
Adjusted R Square			.388					
N			294					

The first step reveals significant negative correlations with the percentage change in population of kids aged five to nine years old, and a positive correlation for kids aged under five. a decrease in in the percent of immigrants in a neighbourhood was correlated with increase artist densities. Lastly, increasing densities of the labour force had a positive correlation with increase artist densities in the following ten years. In the next step of the granger causality test, the dependent variable is switched to change in density of the labour force from 2001 to 2011. The multi-variate regression results show that change in artist density from 1991 to 2001 was not significantly correlated with the change in labour force density from 2001 to 2011. This proves that the change in labour force from 1991 to 2001 has Granger-causality on the change of artist densities between 2001 and 2011.

Table 8-11 Granger Causality Test Step 2 (1): Change in Select Neighbourhood Characteristics and Artist Density (1991-2001) predicting Change in Density of Labour Force (2001-2011) in Metro Vancouver Census Tracts

a. Dependent Variable: Density Labour Force 2001-2011							
Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	330.983	102.572		3.227	.002		
Density Artist Group 91-01	0.815	1.217	0.052	0.669	0.505	0.75	1.33
0-4 years % 91-01	5.269	2.333	0.936	2.258	0.027	0.03	37.72
5-9 years % 91-01	-1.099	1.425	-0.241	-0.771	0.443	0.05	21.51
10-14 years % 91-01	0.748	2.516	0.101	0.297	0.767	0.04	25.31
Immigrant % 91-01	-0.746	2.596	-0.077	-0.287	0.775	0.06	15.60
Density Labour Force 91-01	0.027	0.179	0.027	0.153	0.879	0.15	6.70
R Square			.645				
Adjusted R Square			.617				
N			294				

In the first step of the granger causality descend above, the percent change in immigration between 1991 and 2001 had a significant negative correlation with the change in artist densities between 2001 and 2011. The following table applies step two to the granger causality test using the percent change of immigration between 2001 and 2011 as the dependent variable. The test reveals that change in artist's densities is not significantly correlated with the change in immigration in the following decade. This also proves that proportional change in immigration has granger causality on the negative change of artist densities from 2001 to 2011. From this we can infer that immigrants displace artist's populations.

Table 8-12 Granger Causality Test Step 2 (2): Change in Select Neighbourhood Characteristics and Artist Density (1991-2001) predicting percent Change in Immigrants (2001-2011) in Metro Vancouver Census Tracts

a. Dependent Variable: Immigrant % 2001-2011	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Variables							
(Constant)	-2.609	2.673		-.976	.332		
Density Artist Group 91-01	-0.033	0.032	-0.092	-1.052	0.296	0.75	1.33
0-4 years % 91-01	-0.021	0.061	-0.158	-0.339	0.736	0.03	37.72
5-9 years % 91-01	-0.125	0.037	-1.185	-3.374	0.001	0.05	21.51
10-14 years % 91-01	0.284	0.066	1.648	4.324	0.000	0.04	25.31
Immigrant % 91-01	0.057	0.068	0.253	0.846	0.400	0.06	15.60
Density Labour Force 91-01	0.000	0.005	-0.008	-0.041	0.967	0.15	6.70
R Square			.645				
Adjusted R Square			.617				
N			294				

The following table presents the results from a Granger Causality test that examines if average dwelling value change from 1991 to 2001 causes the change of artist group density from 2001 to 2011. In this Granger test, the independent variable is artist group density from 2001 to 2011, while the independent variables are percent change in average dwelling value, change in the density of artists from 1991 to 2001, and distance to the Orpheum theatre. Increasing average dwelling values and artist group densities between 1991 to 2001, as well as increasing distance to the Orpheum are significant and negatively correlated with the change in artist group densities in following decade between 2001 and 2011.

Table 8-13 Granger Causality Test Step 1: Change in Select Neighbourhood Characteristics (1991-2001) predicting Change in Density of Artists (2001-2011) in Metro Vancouver Census Tracts

a. Dependent Variable: Density Artist Group 2001-2011	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Variables							
(Constant)	90.785	14.361		6.322	.000		
Avg Dwelling Value % 1991-2001	-0.658	0.316	-0.190	-2.081	0.041	0.93	1.07
Density Artist Group 1991-2001	-0.520	0.088	-0.578	-5.894	0.000	0.81	1.23
Distance to the Orpheum	-10.470	2.522	-0.420	-4.152	0.000	0.76	1.31
R Square			0.369				
Adjusted R Square			0.346				
N			294				

The next step examines the correlation between the percentage change in dwelling values between 2001 and 2011, and the change in artist densities between

1991 and 2002 with the same independent variables. This multivariate regression reveals that none of the variables in this test are significantly correlated, which concludes that the percent change of average dwelling value between 1991 and 2001 has granger causality on the change of artist densities from 2001 to 2011.

Table 8-14 Granger Causality Test Step 2: Change in Select Neighbourhood Characteristics and Artist Density (1991-2001) Predicting Percent Change in Dwelling Value (2001-2011) in Metro Vancouver Census Tracts

a. Dependent Variable: Avg Dwelling Value % 2001-2011	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Variables (Constant)	186.363	10.446		17.841	.000		
Avg Dwelling Value 1991-2001 %	-0.201	0.230	-0.097	-0.874	0.385	0.93	1.07
Density Artist Group 1991-2001	-0.043	0.064	-0.080	-0.668	0.506	0.81	1.23
Distance to the Orpheum	-3.371	1.834	-0.226	-1.838	0.070	0.76	1.31
R Square			0.062				
Adjusted R Square			0.027				
N			294				

Incorporating the Granger causality test into this research provides statistical evidence towards understanding the demographic and socio-economic pressures that push and pull artists in neighbourhoods in Metro Vancouver. The Granger causality test offers a new layer to the ongoing research on the location preference of artists in urban regions. The next chapter opens the discussion on how the analysis presented in this paper fits in to the existing narrative of artist's role in economic development and the location preference of artists in urban regions.

Chapter 9. Discussion

This paper presents the results from a quantitative analysis that explores the location of artists in Metro Vancouver in relation to the demographics and socio economics of the neighbourhoods they live in, and their proximity to artist facilities in the City of Vancouver. As the literature reveals, there has been numerous research studies that explore clustering of creative occupations in cities and regions through an economic development lens, but there is a lesser amount of research dedicated to the location preferences of artists at the neighborhood level across the metropolitan regions in which they cluster and the factors that lead to their displacement. This paper seeks to build on the research on artist clusters in American cities and metropolitan regions published by Anne Markusen and Carl Grodach by offering a Canadian metro region as a case study. By applying the Granger causality test this paper also presents a new method that has not been previously applied in understanding the factors that attract artists to and from certain neighbourhoods. Within Canada, Metro Vancouver has the third largest artist population and the second highest location quotient of artists across metropolitan regions making it an ideal candidate for a case study exploring where artists live and the factors that displace them from neighborhoods. This chapter provides an overview of how the analysis results fit into the existing body of literature on the location preference of artists, and where these findings align or differ from existing theories.

The analysis presented in this paper reveals that artists cluster in Metro Vancouver neighbourhoods that are closer to the centrally located Orpheum theatre in downtown Vancouver. This coincides with previous findings that artists are attracted to central areas of urban metro regions (Florida, 2002; Clark, 2002; Markusen, 2013; Andersson, 2014; Grant, 2014; Grodach, 2014; Haisch, 2015). In more detail, Markusen (2006) finds that artists move to neighbourhoods where there are artist's centers, live/work and studio buildings, and smaller performing arts spaces. Similarly, in Metro Vancouver artists cluster in closer proximity to artist studios with and without housing associated with the studio, and all types of performance venues. In the Minneapolis and St. Paul region, Markusen (2006) also finds arts educational institutions attract artists to the surrounding area in the Minneapolis/St. Paul metro region. Evidence of this is also

present in Metro Vancouver as artists cluster in neighbourhoods that are closer to art educational institutions.

When looking at individual artist occupations, authors and writers, producers, directors and choreographers, and painters, sculptors and visual artists cluster in neighbourhoods that are closer to all types of artist facilities; while actors and comedians cluster near theatre and performance, and museums and gallery types of facilities. Other individual artist occupations did not have any correlation with clustering near facilities. This falls in line with Markusen's (2006) findings that different artist occupations have different location preferences. Her findings show that writers, visual artists and musicians are more likely to be self-employed, which allows them to be less restricted from committing to a particular location (2006). In Metro Vancouver, the bivariate regression analysis using artist occupations and distance to the Orpheum shows that writers, visual artists and musicians are located closer to the central location of the Orpheum in neighbourhoods. This is contrary to Markusen's (2006) findings that they often live away from large, expensive and art specialized cities. For 2011, clustering of musicians and singers were no longer significantly correlated with the proximity to any artist facilities within the City of Vancouver.

Artists in Metro Vancouver are also more likely to live in neighbourhoods that have a high proportion and density of rental households, which aligns with Markusen's (2006) findings that artists are more likely to rent than own. Markusen (2006) also finds there is a conscious effort among artists to locate in proximity to artist industries. The bivariate regression analysis reveals a similar finding as artists lived in neighbourhoods that were on average closer to all types of artist facilities where art can be educated, created, practiced and performed. Theories that artists also cluster in closer proximity to areas with entertainment including bars, restaurants and cafes was also found to be true in Metro Vancouver (Florida, 2002; Markusen, 2006; Grodach, 2014).

Understanding the forces that attract artists to cities and regions are complex. At the regional level, Markusen's (2006) research suggests that media, industry, affordable housing, recreational and environmental amenities, and a well-developed cultural scene all play a role in attracting artists. While, this paper doesn't quantify access to environmental or incorporate industry data, the analysis presented in this paper shows that in 1991, 2001 and 2011 artists in Metro Vancouver are attracted to neighbourhoods

that have a higher proportion of renters, and cheaper average dwelling values. We also see artists locating in neighbourhoods where there are more people that live alone, have bachelor's degrees and bike to work. The results suggest that artists are making decisions to locate in central neighbourhoods where there is rental and more affordable housing in central neighbourhoods where it is common to bike to work. In short, artists are choosing to locate in neighbourhoods that provide access to more affordability.

While artists typically have below average incomes, Markusens' research finds that artists often live in neighbourhoods with higher incomes. What is not included in the research by Markusen is whether higher-income earners moved into the neighbourhoods after artists had already established themselves. This would further reinforce the notion that artists make neighbourhoods more attractive, which can allow the process of gentrification to unfold within neighbourhoods. In the book, the *New Urban Crisis*, author Richard Florida (2017) presents a follow up to his previous work, *The Rise of the Creative Class*, by shedding some light on the negative aspects that have emerged alongside the emergence of the high income earning and educated creative class work force. Florida (2017) finds that cities that have had the most success in growing their creative class work force have also faced worse economic inequality. He also finds that these high-income earners are flowing back into central urban formerly artist neighbourhoods. The increased competition for central urban space increases rents and has resulted in the displacement of artists as they search for more affordable living.

Florida (2017) provides interesting insight into the negative effect of the creative class on artists. Using the Granger causality test, this paper provides statistical evidence that shows there are other factors at play causing the displacement of artists in Vancouver. The granger causality test shows that increasing average prices of dwellings caused the displacement of artist densities in the following years. The test also shows that an increase in the proportion of immigrants in a neighbourhood also results in the displacement of artist densities in the years that follow. On the other hand, artists are attracted to neighbourhoods where there has been an increasing density of population that is in the labour force. The granger causality test provides a new method of examining the cause of displacement and attraction for artists. Further application of this method could reveal more information about the displacement of artists or other vulnerable populations.

Looking at the individual artist occupations in the bivariate regression analysis builds on Markusen's (2006) findings that different artists have different location preferences. Further, the Granger causality test provides a new method of statistical research to this topic. Using the Granger test, this research is able to apply statistical causality to artist displacement resulting from a changing demographic and socio-economic landscape. Overall, the analysis presented in this paper offers new quantitative findings that help inform the location preference of artists in Metro Vancouver. Evidence presented mostly supports many of the existing theories on location preference of artists in urban regions.

Chapter 10. Conclusions

Artists create and perform works that inspire, innovate and provide economic dividends. Artists provide an integral role in economic and cultural development that by establishing vibrant cultural scenes, and attractive and inclusive cities and regions. The benefits of artists to cities and urban regions are well documented (Florida, 2002; Currid, 2009; Currid and Williams, 2010; Grodach, 2011; Markusen and Gadwa, 2011; Stern and Steinfert, 2010; Markusen and Schrock, 2006b). Despite their positive role on urban economic development, artists are often faced with pressures of gentrification and displacement (Florida, 2017, Markusen, 2006; Ley, 2003; Cole, 1987). This paper looks to add to the literature on the location preference of artists and the many factors that influence their movement in neighborhoods, cities, and regions. Understanding this premise can help guide the implementation of artistic and cultural development policy and mitigate the displacement of artists and ensure long term sustainable occupational development and social equity for artists.

In this paper, I present a literature review that explores Richard Florida's creative class and the research that followed that explored the artist location preference and the inequality and displacement pressures they are faced with. Previous authors on that have researched the location preference of artists have explored the populations of artists in neighbourhoods, cities and regions using interviews and regression analysis. The results from the two styles of analysis presented similar results that showed artists prefer to be centrally located around an abundance of amenities and are more likely to rent their home. To build on these works by Anne Markusen and Carl Grodach, the series of univariate, bivariate, and multivariate regression analysis presented in this paper shows that artists in Vancouver are highly clustered around Downtown Vancouver, in neighbourhoods that are closer to artist facilities. We also learned that an increase in immigrants and residential property values between 1991 and 2001 resulted in a decreased in artist densities the following ten years. The results also show that artists are more likely to live in closer proximity to central downtown neighbourhoods with an abundance of the population that lives alone in rental housing units. Artists are more likely to live amongst people that have a bachelor's degree and walk or bike to

work, and they live in neighbourhoods with less kids and more working aged individuals between 25 and 44 years old, generally with lower unemployment rates.

The findings presented in this paper provide evidence that artists are being displaced as a result of demographic and socio-economic changes occurring across neighbourhoods in the City of Vancouver and the Metro Vancouver region. Understanding the displacement and location preference of artists can be a valuable addition to the development of new policy at the local and regional government level. The City of Vancouver has recently launched the Creative City Strategy, which “aims to develop a comprehensive plan and vision for culture and creativity in Vancouver” that will “develop strategies that focus on arts and culture” (City of Vancouver, 2018b). In developing this strategy, I recommend four areas of focus to help guide the development of policy to help prevent the displacement artists:

1. Examine the displacement of artists and artist facilities across the City of Vancouver to understand which neighbourhoods they are being displaced from.
2. Explore non-conventional venues and places that can be used as artist facilities, including underutilized private and public spaces.
3. Explore ways to secure long-term affordable artist facilities, and social, co-op and rental housing for artists.
4. Support and organize local arts programming in all city-owned artist facilities.

Further to the research and analysis presented in this paper, there is plenty of more exploration in to the factors leading to the displacement of artists from urban neighborhoods with the longitudinal and quantitative methodology used in this paper. There are many different combinations of demographic and socio-economic variables from census data and other data sources that can be incorporated into regressions and granger causality tests that will provide more insight on the displacement of artists. Florida’s findings that the creative class is displacing artists can be re-evaluated in different regions over time. More types of facilities and amenities can be included in the proximity analysis of where artist clusters. Further analysis could also explore the relationship between artist’s place of work and their place of residents using additional custom census data. To expand on the quantitative analysis, interviews with artists and arts industry stakeholders would complement and provide further evidence towards why artist chose to locate in certain neighbourhoods and what factors are perceived to cause

displacement. I invite future researchers to continue to explore the influential factors that attract and displace artist populations from neighbourhoods using these methods and others. This growing body of research provides valuable information that can be used to develop policy and plans around the development of housing and artist facilities to minimize displacement.

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Appendix A. Artist Group – Detailed Occupations

Source: (Statistics Canada, 2011)

5121 Authors and writers

Authors and writers plan, research and write books, scripts, storyboards, plays, essays, speeches, manuals, specifications and other non-journalistic articles for publication or presentation. They are employed by advertising agencies, governments, large corporations, private consulting firms, publishing firms, multimedia/new-media companies and other establishments, or they may be self-employed.

5131 Producers, directors, choreographers and related occupations

This unit group includes producers, directors, choreographers and others who oversee and control the technical and artistic aspects of film, television, radio, dance and theatre productions. They are employed by film production companies, radio and television stations, broadcast departments, advertising companies, sound recording studios, record production companies and dance companies. They may also be self-employed.

5132 Conductors, composers and arrangers

This unit group includes those who conduct bands and orchestras, compose musical works and arrange instrumental and vocal compositions. They are employed by symphony and chamber orchestras, bands, choirs, sound recording companies, and orchestras for ballet and opera performances, or they may be self-employed.

5133 Musicians and singers

This unit group includes musicians, singers and teachers of vocal and instrumental music. Musicians and singers perform with orchestras, choirs, opera companies and popular bands in establishments such as concert halls, lounges and theatres and in film, television and recording studios. Music teachers teach in conservatories, academies and private homes.

5134 Dancers

This unit group includes dancers and dance teachers. Dancers are employed by ballet and dance companies, television and film productions and night clubs and similar establishments. Dance teachers are employed by dance academies and dance schools.

5135 Actors and comedians

Actors and comedians perform roles in motion picture, television, theatre and radio productions to entertain a variety of audiences. They are employed by motion picture, television, theatre and other production companies. This unit group includes acting teachers employed by private acting schools.

5136 Painters, sculptors and other visual artists

Painters, sculptors and other visual artists create original paintings, drawings, sculptures, engravings and other artistic works. They are usually self-employed. This group also includes art instructors and teachers, who are usually employed by art schools.

5221 Photographers

Photographers operate still cameras to photograph people, events, scenes, materials, products and other subjects. Photographers are employed by photographic studios, newspapers, magazines, museums and government, or they may be self-employed.

5244 Artisans and craftspersons

This unit group includes those who use manual and artistic skills to design and make ornamental objects, pottery, stained glass, jewellery, rugs, blankets, other handicrafts and artistic floral arrangements. Makers of musical instruments are also included in this unit group. Most craftspersons are self-employed. Artistic floral arrangers are usually employed in florist shops and floral departments of retail establishments, or may be self-employed. Craft instructors are also included in this unit group and are employed by artisan guilds, colleges, private studios and recreational organizations.

Appendix B. Cultural Spaces Table and Definitions (2014)

This table of cultural spaces was created from the Cultural Spaces inventory retrieved from the City of Vancouver open data website (City of Vancouver, 2014). Total count of facilities by type is displayed in (#).

Type (Total)	Primary Uses
Community Space (75)	Arena/Stadium Community Centre/Hall Place of Worship Plaza/Park/Band Shell
Educational (24)	Educational Institution
Museum/Gallery (104)	Garden/Aquarium/Science Centre Library/Archives Museum/Gallery
Studio/Rehearsal (82)	Artist Housing Artist Studio Artist Studio w/Residence Film/Recording Studio Rehearsal Studio Workshop
Theatre/Performance (51)	Cinema Performance Space Theatre

This list of Cultural Space Definitions was created by the City of Vancouver and retrieved from the City of Vancouver open data website (City of Vancouver, 2014).

TYPE

Six larger groupings of primary use; for purpose of map legend only

PRIMARY USE

Description of type of use of the cultural space or facility; where there is more than one use, the most significant cultural use is indicated

Arena/Stadium

Facility or space used for cultural programs

Artist Housing

Facility primarily providing artist housing with no studio or production facilities

Artist Studio

Facility with four or more individual studios; may have multiple artists; does not have employees

Artist Studio with Residence

Facility with one or more individual studios; may have multiple artists; incorporates living area for the artist(s)

Bar/Lounge/Cabaret

Facility or space with well-defined curated cultural program

Cafe/Restaurant

Facility or space with well-defined curated cultural program

Cinema

Screen-based facility or space

Community Centre/Hall

Community Centre, Community Hall or Neighbourhood House used for cultural programs

Educational Institution

Facility or space focused on arts and cultural education

Film/Recording Studio

Film, video or sound production facility or space

Garden/Aquarium/Science Centre

Includes planetariums

Library/ Archives

Facility or space used for cultural programs

Museum/Gallery

Exhibition-based facility or space; includes collecting and non-collecting institutions

Other

Facility or space used for cultural programs which falls outside defined primary use categories

Performance Space

Performance facility or space other than theatres

Place Of Worship

Facility or space used for cultural programs

Plaza/Park/Band Shell

Facility or space used for cultural programs

Rehearsal Studio

Primarily used for performing arts (dance, music, theatre, etc.)

Retail

Retail space dedicated to cultural products or used for cultural programs

Theatre

Purpose-built theatre facility or space; with seats (permanent or temporary); including proscenium or black box

Workshop

Facility or space used for large-scale production; may have employees

Appendix C. 1991 Metro Vancouver Multivariate Linear Regression with all variable

a. Dependent Variable: Location Quotient Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-1.211	1.528		-0.793	0.429		
Perc 0 to 14	-0.036	0.026	-0.267	-1.370	0.172	.050	19.9
Perc 25 to 44	0.039	0.022	0.279	1.779	0.076	.078	12.9
Perc 65+	0.005	0.021	0.034	0.216	0.829	.076	13.2
Perc Living Alone	0.023	0.017	0.307	1.381	0.168	.038	26.0
Avg Household Size	0.390	0.344	0.246	1.133	0.258	.040	24.7
Perc Immigrants	-0.011	0.012	-0.137	-0.928	0.354	.088	11.4
Unemploymentrate	0.035	0.019	0.157	1.821	0.070	.258	3.9
Perc Self-employed	0.060	0.021	0.319	2.850	0.005	.153	6.6
Perc Bachelor Deg.	0.031	0.010	0.335	3.016	0.003	.155	6.5
Perc Worked at home	0.002	0.002	0.056	0.829	0.408	.415	2.4
Perc Renter	-0.005	0.007	-0.139	-0.769	0.442	.059	17.0
Avg Dwelling Value	0.000	0.000	-0.103	-0.829	0.408	.123	8.1
Avg Monthly Rent	-0.010	0.000	-0.200	-2.512	0.013	.301	3.3
Avg Hshld Income	0.000	0.000	0.016	0.101	0.920	.075	13.3
Kilometres to Orpheum	-0.004	0.008	-0.055	-0.532	0.595	.176	5.7
Density 0to14	0.000	0.001	0.138	0.693	0.489	.048	20.9
Density 25to44	-0.001	0.000	-0.932	-1.547	0.123	.005	190.4
Density 65+	0.000	0.000	0.200	0.873	0.383	.036	27.5
Density Living Alone	0.000	0.001	-0.367	-0.424	0.672	.003	393.1
Density Immigrants	0.000	0.000	0.317	1.151	0.251	.025	39.8
Density Self employed	0.000	0.001	0.061	0.236	0.814	.028	35.3
Density Worked at home	0.001	0.001	0.167	0.810	0.419	.045	22.2
Density Renter	0.000	0.000	0.597	0.735	0.463	.003	346.2
R ²			.480				
Adjusted R ²			.436				
N			298				

a. Dependent Variable: Artist Group Density	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-89.24	34.19		-2.610	0.010		
Perc 0 to 14	-1.240	0.591	-0.155	-2.098	0.037	.050	19.9
Perc 25 to 44	1.694	0.490	0.206	3.460	0.001	.078	12.9
Perc 65+	0.964	0.480	0.121	2.007	0.046	.076	13.2
Perc Living Alone	-0.949	0.375	-0.214	-2.531	0.012	.038	26.0
Avg Household Size	18.679	7.694	0.200	2.428	0.016	.040	24.7
Perc Immigrants	-0.237	0.269	-0.049	-0.878	0.381	.088	11.4
Unemploymentrate	0.625	0.431	0.047	1.451	0.148	.258	3.9
Perc Self-employed	0.550	0.469	0.050	1.173	0.242	.153	6.6
Perc Bachelor Deg.	0.659	0.232	0.120	2.837	0.005	.155	6.5
Perc Worked at home	0.033	0.055	0.015	0.597	0.551	.415	2.4
Perc Renter	0.167	0.157	0.073	1.062	0.289	.059	17.0
Avg Dwelling Value	0.000	0.000	-0.115	-2.421	0.016	.123	8.1
Avg Monthly Rent	-0.026	0.009	-0.088	-2.907	0.004	.301	3.3
Avg Hshld Income	0.000	0.000	0.043	0.718	0.473	.075	13.3
Kilometres to Orpheum	0.081	0.172	0.019	0.473	0.636	.176	5.7
Density 0to14	0.008	0.013	0.046	0.604	0.546	.048	20.9
Density 25to44	-0.014	0.008	-0.428	-1.867	0.063	.005	190.4
Density 65+	-0.005	0.008	-0.048	-0.556	0.578	.036	27.5
Density Living Alone	0.043	0.013	1.094	3.324	0.001	.003	393.1
Density Immigrants	0.006	0.005	0.129	1.231	0.219	.025	39.8
Density Self employed	0.098	0.024	0.397	4.026	0.000	.028	35.3
Density Worked at home	0.053	0.033	0.123	1.580	0.115	.045	22.2
Density Renter	-0.009	0.009	-0.315	-1.022	0.308	.003	346.2
R ²			.925				
Adjusted R ²			.918				
N			298				

Appendix D. 2001 Metro Vancouver Multivariate Linear Regression with all variable

a. Dependent Variable: Artist Group Location Quotient	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.736	0.860		-0.856	0.392		
Perc 0 to 14	0.036	0.019	0.224	1.895	0.059	.072	13.943
Perc 25 to 44	0.004	0.015	0.032	0.245	0.806	.057	17.511
Perc 65+	0.016	0.014	0.112	1.187	0.236	.113	8.841
Avg Household Size	-0.116	0.263	-0.075	-0.440	0.660	.034	29.223
Perc Immigrants	-0.004	0.008	-0.059	-0.435	0.664	.055	18.196
Unemploymentrate	0.039	0.016	0.133	2.372	0.018	.319	3.137
Perc Selfemployed	0.076	0.015	0.477	4.883	0.000	.105	9.542
Perc BachelorDeg	0.013	0.007	0.167	1.853	0.065	.123	8.104
Perc Workedathome	-0.011	0.013	-0.055	-0.821	0.412	.227	4.415
Perc Publictransit	0.014	0.011	0.120	1.290	0.198	.115	8.666
Perc Walked	0.035	0.009	0.339	3.734	0.000	.122	8.230
Perc Bicycle	0.075	0.030	0.196	2.501	0.013	.164	6.102
Perc Renter	0.001	0.005	0.026	0.231	0.818	.080	12.440
Avg DwellingValue	0.000	0.000	-0.284	-3.001	0.003	.112	8.951
Avg MonthlyRent	0.000	0.000	-0.010	-0.178	0.859	.340	2.940
Avg Popn Income	0.000	0.000	-0.034	-0.115	0.909	.012	85.208
Avg Hshld Income	0.000	0.000	0.075	0.233	0.816	.010	103.547
Distance to Orpheum	-0.018	0.006	-0.235	-3.172	0.002	.182	5.484
Density 0to14	0.000	0.000	-0.121	-0.951	0.342	.062	16.225
Density 25to44	0.000	0.000	0.182	0.480	0.632	.007	142.992
Density 65+	0.000	0.000	0.033	0.304	0.761	.085	11.708
Density Immigrants	0.000	0.000	0.002	0.012	0.991	.030	33.119
Density Selfemployed	0.476	0.451	0.098	1.056	0.292	.117	8.517
Density Workedathome	0.000	0.001	0.071	0.606	0.545	.072	13.853
Density Publictransit	0.000	0.000	-0.009	-0.054	0.957	.034	29.314
Density Walked	0.000	0.000	0.013	0.067	0.947	.028	35.388
Density Bicycle	0.002	0.001	0.218	2.089	0.037	.092	10.865
Density Renter	0.000	0.000	-0.545	-1.977	0.049	.013	75.891
R Square			.643				
Adjusted R Square			.615				
N			385				

a. Dependent Variable: Density Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-18.694	0.860		-0.507	0.613		
Perc 0 to 14	0.158	0.019	0.011	0.192	0.848	.072	13.943
Perc 25 to 44	-0.335	0.015	-0.034	-0.525	0.600	.057	17.511
Perc 65+	-0.098	0.014	-0.008	-0.165	0.869	.113	8.841
Avg Household Size	4.605	0.263	0.034	0.408	0.684	.034	29.223
Perc Immigrants	-0.130	0.008	-0.024	-0.367	0.714	.055	18.196
Unemployment rate	1.127	0.016	0.044	1.610	0.108	.319	3.137
Perc Self-employed	1.387	0.015	0.101	2.090	0.037	.105	9.542
Perc BachelorDeg	0.195	0.007	0.029	0.663	0.508	.123	8.104
Perc Worked at home	-0.296	0.013	-0.017	-0.534	0.594	.227	4.415
Perc Public transit	0.429	0.011	0.042	0.916	0.361	.115	8.666
Perc Walked	1.224	0.009	0.138	3.085	0.002	.122	8.230
Perc Bicycle	-5.942	0.030	-0.179	-4.645	0.000	.164	6.102
Perc Renter	0.289	0.005	0.077	1.394	0.164	.080	12.440
Avg Dwelling Value	0.000	0.000	-0.080	-1.718	0.087	.112	8.951
Avg Monthly Rent	-0.002	0.000	-0.006	-0.235	0.814	.340	2.940
Avg Population Income	0.000	0.000	-0.035	-0.242	0.809	.012	85.208
Avg Household Income	0.000	0.000	0.045	0.287	0.775	.010	103.547
Distance to Orpheum	-0.275	0.006	-0.042	-1.160	0.247	.182	5.484
Density 0to14	-0.016	0.000	-0.080	-1.271	0.205	.062	16.225
Density 25to44	0.019	0.000	0.476	2.559	0.011	.007	142.992
Density 65+	0.017	0.000	0.136	2.545	0.011	.085	11.708
Density Immigrants	-0.005	0.000	-0.116	-1.290	0.198	.030	33.119
Density Selfemployed	2.691	0.451	0.006	0.139	0.889	.117	8.517
Density Workedathome	0.078	0.001	0.194	3.356	0.001	.072	13.853
Density Publictransit	-0.001	0.000	-0.007	-0.087	0.931	.034	29.314
Density Walked	0.030	0.000	0.315	3.402	0.001	.028	35.388
Density Bicycle	0.489	0.001	0.698	13.610	0.000	.092	10.865
Density Renter	-0.026	0.000	-0.689	-5.084	0.000	.013	75.891
R Square			.914				
Adjusted R Square			.907				
N			385				

Appendix E. 2011 Metro Vancouver Multivariate Linear Regression with all variables

This table shows the results from a multivariate regression using 2011 artist location quotients as the dependent variable and all neighbourhood characteristics as the independent variables.

Dependent Variable: Artist Group Location Quotient	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-1.861	.825		-2.257	.025		
Perc 0 to 14	.049	.025	0.232	1.941	.053	.060	16.803
Perc 25 to 44	-.004	.013	-0.031	-.286	.775	.071	14.082
Perc 65+	.021	.013	0.125	1.552	.122	.131	7.615
Perc Living Alone	.054	.018	0.571	2.948	.003	.023	44.070
Avg Household Size	.195	.221	0.121	.883	.378	.046	21.942
Perc Immigrants	-.006	.006	-0.103	-1.130	.259	.102	9.779
Unemploymentrate	-.008	.016	-0.020	-.537	.591	.586	1.707
Perc Selfemployed	.021	.012	0.119	1.761	.079	.185	5.403
Perc BachelorDeg	.031	.012	0.230	2.566	.011	.106	9.437
Perc Workedathome	.001	.015	0.005	.070	.944	.183	5.458
Perc Publictransit	-.018	.012	-0.151	-1.536	.125	.088	11.408
Perc Walked	.126	.028	0.344	4.531	.000	.148	6.767
Perc Bicycle	-.004	.009	-0.048	-.459	.647	.077	12.964
Perc Renter	-.001	.005	-0.025	-.252	.801	.087	11.470
Avg DwellingValue	.000	.000	-0.004	-.050	.960	.158	6.348
Avg MonthlyRent	.000	.000	0.066	1.406	.160	.387	2.585
Avg Popn Income	.000	.000	0.020	.079	.937	.013	76.905
Avg Hshld Income	.000	.000	-0.039	-.149	.882	.013	79.499
Kilometres to Orpheum	-.009	.006	-0.118	-1.591	.112	.155	6.439
Density 0to14	-.001	.000	-0.415	-2.485	.013	.030	32.863
Density 25to44	.000	.000	0.388	1.023	.307	.006	169.391
Density 65+	.000	.000	0.053	.397	.692	.048	20.751
Density Living Alone	-.001	.000	-1.252	-3.212	.001	.006	178.739
Density Immigrants	.000	.000	0.236	1.378	.169	.029	34.404
Density Selfemployed	.000	.000	0.797	1.760	.079	.004	241.185
DensityBachelor	-.001	.000	-0.819	-3.104	.002	.012	81.909
Density Workedathome	.002	.000	0.392	3.862	.000	.083	12.110
Density Publictransit	.000	.000	0.223	.909	.364	.014	70.866
Density Walked	.000	.000	0.168	.860	.390	.022	44.685
Density Bicycle	.001	.001	0.134	1.407	.160	.094	10.676
Density Renter	.000	.000	0.178	.681	.496	.012	80.259
R ²			.644				
Adjusted R ²			.617				
N			452				

This table shows the results from a multivariate regression using 2011 artist density as the dependent variable and all neighbourhood characteristics as the independent variables.

a. Dependent Variable: Density Artist Group	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-86.543	48.207		-1.795	.073		
Perc 0 to 14	4.493	1.475	0.232	3.045	.002	.060	16.803
Perc 25 to 44	-1.133	.731	-0.108	-1.550	.122	.071	14.082
Perc 65+	-.484	.776	-0.032	-.623	.533	.131	7.615
Perc Living Alone	2.676	1.075	0.307	2.490	.013	.023	44.070
Avg Household Size	15.146	12.919	0.102	1.172	.242	.046	21.942
Perc Immigrants	.319	.324	0.057	.985	.325	.102	9.779
Unemploymentrate	-.670	.921	-0.018	-.728	.467	.586	1.707
Perc Selfemployed	.719	.694	0.045	1.036	.301	.185	5.403
Perc BachelorDeg	1.129	.712	0.090	1.587	.113	.106	9.437
Perc Workedathome	-1.986	.896	-0.096	-2.216	.027	.183	5.458
Perc Publictransit	-1.821	.547	-0.222	-3.330	.001	.077	12.964
Perc Walked	-1.684	.699	-0.151	-2.408	.016	.088	11.408
Perc Bicycle	4.699	1.627	0.139	2.889	.004	.148	6.767
Perc Renter	.087	.283	0.019	.307	.759	.087	11.470
Avg Dwelling Value	.000	.000	0.015	.313	.754	.158	6.348
Avg Monthly Rent	.004	.010	0.012	.397	.692	.387	2.585
Avg Popn Income	.001	.001	0.167	1.027	.305	.013	76.905
Avg Hshld Income	-.001	.000	-0.226	-1.364	.173	.013	79.499
Kilometres to Orpheum	-.063	.333	-0.009	-.188	.851	.155	6.439
Density 0to14	-.154	.021	-0.762	-7.165	.000	.030	32.863
Density 25to44	.030	.010	0.748	3.099	.002	.006	169.391
Density 65+	.041	.011	0.307	3.628	.000	.048	20.751
Density Living Alone	-.076	.013	-1.410	-5.684	.000	.006	178.739
Density Immigrants	.003	.004	0.069	.636	.525	.029	34.404
Density Self-employed	.026	.008	0.904	3.137	.002	.004	241.185
Density Bachelor	-.060	.012	-0.832	-4.953	.000	.012	81.909
Density Worked at home	.249	.024	0.659	10.208	.000	.083	12.110
Density Public transit	.058	.015	0.595	3.807	.000	.014	70.866
Density Walked	.017	.012	0.174	1.405	.161	.022	44.685
Density Bicycle	.105	.043	0.146	2.411	.016	.094	10.676
Density Renter	.011	.007	0.257	1.549	.122	.012	80.259
R ²			.856				
Adjusted R ²			.845				
N			452				

Appendix F. 2011 City of Vancouver Multivariate Linear Regressions with all variables

This table shows the results from a multivariate regression using 2011 artist location quotients as the dependent variable and all neighbourhood characteristics as the independent variables.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
a. Dependent Variable: Location Quotient Artist Group							
(Constant)	0.786	5.181		0.152	.880		
Perc 0 to 14	0.170	0.111	0.646	1.523	.132	.019	53.181
Perc 25 to 44	0.023	0.048	.213	0.487	.628	.018	56.777
Perc 65+	.063	.056	0.247	1.133	.261	.071	14.034
Perc Living Alone	0.068	0.047	0.774	1.445	.153	.012	84.932
Avg Household Size	0.085	0.835	.046	.102	.919	.017	60.482
Perc Immigrants	-.050	.029	-.578	-1.688	.095	.029	34.715
Unemploymentrate	-.015	.048	-0.029	-.317	.752	.399	2.504
Perc Selfemployed	0.165	.043	0.808	3.803	.000	.075	13.362
Perc BachelorDeg	-.003	.035	-0.020	-0.095	.925	.077	13.032
Perc Workedathome	-0.153	.064	-.524	-2.400	.019	.071	14.090
Perc Publictransit	-0.003	.033	-0.015	-0.076	.939	.087	11.444
Perc Walked	-0.002	.044	-0.025	-0.053	.958	.015	66.186
Perc Bicycle	0.098	0.079	.310	1.238	.219	.054	18.515
Perc Renter	-.008	.018	-.132	-.442	.660	.038	26.482
Avg DwellingValue	-0.0000001	.000	-0.045	-.138	.890	.032	31.478
Avg MonthlyRent	.000	.001	-0.052	-.323	.747	.129	7.729
Avg Popn Income	.000	.000	0.455	.647	.519	.007	146.364
Avg Hshld Income	-0.0000146	.000	-.501	-.758	.451	.008	129.185
Distance to Orpheum	-.477	.673	-1.014	-.709	.480	.002	604.293
Density 0to14	-.002	.001	-.962	-1.930	.057	.014	73.603
Density 25to44	.000	.000	.603	0.760	.450	.005	186.073
Density 65+	.000	.000	-0.269	-.955	.342	.042	23.538
Density Living Alone	-.001	.000	-2.613	-2.694	.009	.004	278.344
Density Immigrants	.000	.000	1.049	1.450	.151	.006	154.843
Density Selfemployed	.000	.000	-0.133	-0.089	.929	.002	656.478
Density Bachelor	.000	.000	-0.057	-0.499	.619	.260	3.853
Density Workedathome	.002	.001	0.749	2.635	.010	.042	23.914
Density Publictransit	.000	.001	.171	0.236	.814	.006	155.997
Density Walked	.000	.001	-.272	-.408	.684	.008	130.887
Density Bicycle	.001	.002	0.209	0.765	.447	.045	22.091
Density Renter	.001	.000	1.423	1.767	.081	.005	191.784
Café Restaurant Bar	-.003	.002	-4.237	-1.152	.253	.000	4006.613
Community Space	-.003	.002	-2.994	-1.624	.108	.001	1005.749
Educational	-.001	.001	-1.213	-0.809	.421	.002	665.561
Museum Gallery	.003	.002	5.585	1.821	.073	.000	2785.297
Studio Rehearsal	.004	.003	5.873	1.449	.151	.000	4858.783
Theatre Performance	-.001	.002	-1.631	-0.636	.526	.001	1944.264
R ²			0.740				
Adjusted R ²			0.615				
N			115				

This table shows the results from a multivariate regression using 2011 artist densities as the dependent variable and all neighbourhood characteristics and distance to artist facilities as the independent variables.

a. Dependent Variable: Artist Group Density		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Independent Variables	B	Std. Error	Beta				Tolerance	VIF
(Constant)	23.856	409.869		0.058	.954			
Perc 0 to 14	19.519	8.820	0.618	2.213	.030	.019	53.181	
Perc 25 to 44	-2.732	3.760	-.209	-0.726	.470	.018	56.777	
Perc 65+	-1.686	4.417	-0.055	-.382	.704	.071	14.034	
Perc Living Alone	6.866	3.705	0.654	1.853	.068	.012	84.932	
Avg Household Size	12.825	66.017	.058	.194	.846	.017	60.482	
Perc Immigrants	-2.868	2.333	-.277	-1.229	.223	.029	34.715	
Unemploymentrate	-4.331	3.790	-0.069	-1.143	.257	.399	2.504	
Perc Selfemployed	6.329	3.427	0.258	1.847	.069	.075	13.362	
Perc BachelorDeg	-3.639	2.792	-0.180	-1.304	.196	.077	13.032	
Perc Workedathome	-10.465	5.036	-.299	-2.078	.041	.071	14.090	
Perc Publictransit	-1.846	2.643	-0.090	-0.699	.487	.087	11.444	
Perc Walked	-1.574	3.452	-0.142	-0.456	.650	.015	66.186	
Perc Bicycle	5.052	6.272	.133	0.806	.423	.054	18.515	
Perc Renter	-.236	1.432	-.033	-.165	.869	.038	26.482	
Avg DwellingValue	0.0000207	.000	0.069	.321	.749	.032	31.478	
Avg MonthlyRent	.033	.056	0.062	.579	.564	.129	7.729	
Avg Popn Income	.003	.004	0.345	.745	.458	.007	146.364	
Avg Hshld Income	-0.0016960	.002	-.485	-1.116	.268	.008	129.185	
Kilometres to Orpheum	-32.914	53.224	-0.582	-.618	.538	.002	604.293	
Density 0to14	-0.410	.098	-1.372	-4.178	.000	.014	73.603	
Density 25to44	0.054	.022	1.293	2.476	.015	.005	186.073	
Density 65+	.047	.033	0.259	1.395	.167	.042	23.538	
Density Living Alone	-.165	.034	-3.090	-4.840	.000	.004	278.344	
Density Immigrants	.041	.025	.801	1.682	.097	.006	154.843	
Density Selfemployed	.001	.030	0.042	0.042	.966	.002	656.478	
Density Bachelor	-.028	.021	-0.100	-1.337	.185	.260	3.853	
Density Workedathome	.339	.074	0.860	4.594	.000	.042	23.914	
Density Publictransit	.085	.051	.792	1.656	.102	.006	155.997	
Density Walked	-.001	.040	-.012	-.026	.979	.008	130.887	
Density Bicycle	.142	.134	0.191	1.060	.292	.045	22.091	
Density Renter	.043	.023	0.991	1.869	.065	.005	191.784	
Café Restaurant Bar	-.093	.181	-1.241	-0.512	.610	.000	4006.613	
Community Space	-.049	.133	-0.448	-0.369	.713	.001	1005.749	
Educational	-.076	.098	-0.757	-0.767	.445	.002	665.561	
Museum Gallery	.040	.143	0.572	0.283	.778	.000	2785.297	
Studio Rehearsal	.156	.237	1.765	0.662	.510	.000	4858.783	
Theatre Performance	.055	.126	0.737	0.437	.664	.001	1944.264	
R ²			0.887					
Adjusted R ²			0.833					
N			115					