IHS
Making cities work

IHS is the international institute of urban management
of Erasmus University Rotterdam

MSc Programme in Urban Management and Development

Rotterdam, The Netherlands

September 2017

Creativity as Engine for Regional Growth:
Identification and Interpretation in the Netherlands

Analyzing the relationship between Creative Industries, Creative Class and the Regional Employment Growth in the Netherlands

Name :Dhanya Adista Girana

Supervisor :Prof. Dr. Frank van Oort

Co-Supervisor :Nicola Cortinovis, PhD

Specialization :Urban Competitiveness and Resilience

UMD 13

MASTER'S PROGRAMME IN URBAN MANAGEMENT AND DEVELOPMENT

(October 2016 – September 2017)

Creativity as Engine for Regional Growth: Identification and Interpretation in the Netherlands

Dhanya Adista Girana
Indonesia

Supervisor: Prof. Dr. Frank van Oort
Co-Supervisor: Nicola Cortinovis, PhD

UMD 13 Report number: 1074
Rotterdam, September 2017

Summary

The relationship between creative class and employment growth has been established in numerous studies. In the context of the Netherlands, the impact of the creative class to employment growth is demonstrated as significant and positive. However, the issue of identification robustness daunts the extent of the relationship. The creative class may drive the urban growth, but it is also possible that endogenous effects between the two variables generate unobserved bias, which undermines the robustness of the relationship.

This study aims to make a contribution particularly on the issue of identification robustness between the creative class and urban growth in the context of the Netherlands. In addition, this study has several comparative features in order to gain deeper insight into the causal relationship between creative class and employment growth. Three most important features are namely the comparison with the causal identification for creative industries - being the other aspect of the creative economy, the comparison of three different definitions of the creative class and the typical comparison with human capital. Other than analysing the identification robustness, this study also examines the spatial distribution and the explanatory factors for the creative class and creative industries. These analyses utilize panel data of the 40 COROP regions of the Netherlands over the course of 19 years (1996-2015).

It is concluded that indeed creative class drives employment growth, even with the controlled endogenous effects through instrumental variables. However, regard for the possible consequence of creative class in increasing inequality must be undertaken, as striking balance between the creative class and working class should be the aim rather than to choose one over the other. Improving education, stimulating related variety and providing accessible amenities might aid cities to achieve the positive growth potentials from the creative class.

Keywords

Creativity, regional growth, identification, instrumental variables, amenities, human capital, agglomeration

Acknowledgements

This thesis has been a great journey full of challenges and exploration. Yet, it has also presented me with a great deal of moments to learn and develop, it is an opportunity that I am very much grateful for.

Firstly, I would like to express my deepest gratitude to both my supervisors, Prof. Dr. Frank van Oort and Nicola Cortinovis, PhD. Frank's curiosity and enthusiasm have always inspired me to dig deeper and explore further, it is a great motivation and pleasure for me in finishing this thesis under his guidance. Moreover, I really appreciate Nicola's patience and support in helping me to develop my technical skills, particularly in working with Bartik instrument and in analysing the data. Both of them also gave me insightful remarks, which allow me to further advance my thesis.

I would also like to thank the supportive team of UCR, Prof. Dr Ronald Wall, Dorcas Nyamai, Mahlet Yilema and Rupinder Kaur for introducing me to urban economic geography as well as providing me with the skills foundations for data analytics, of which I discover to enjoy a lot!

In this opportunity, finally, I would like to appreciate the whole IHS lecturers and staff as well as the UMD 13 family. I will always cherish my whole experience at IHS for this past year and am grateful to meet and get to know so many inspiring, admirable and unforgettable people.

Dhanya Girana

Rotterdam, September 2017

Abbreviations

IHS	Institute for Housing and Urban Development
UCR	Urban Competitiveness and Resilience
COROP	*Coördinatiecommissie Regionaal Onderzoeksprogramma* (Coordination Committee Regional Research Programme)
NUTS	Nomenclature of Territorial Units for Statistics
US	United States
SME	Small and Medium-sized Enterprises
sub	Sub-domain
ICT	Information and Communications Technology
IsoCarp	International Society of City and Regional Planners
GDP	Gross Domestic Product
IV	Instrumental Variable
LQ	Location quotient
CLS	Creative Local System
LISA	*Landelijk Informatiesysteem van Arbeidsplaatsen* (National Information System of Workplaces)
CBS	*Centraal Bureau voor de Statistiek* (Central Bureau of Statistics)
SBI	*Standaard Bedrijfsindeling* (Standard Company Classification)
NACE	*Nomenclature statistique des activités économiques dans la Communauté européene* (Statistical Classification of Economic Activities in the European Community)
SOC	Standard Occupational Classification
ISCO	International Standard Classification of Occupations
HHI	Herfindahl-Hirschman Index
GP	General Practioner
HBO	*Hoger Beroeponderwijs* (University of Applied Sciences)
WO	*Wetenschappelijk Onderwijs* (Research University)
GIS	Geographical Information System
OLS	Ordinary Least Squares
2SLS	Two-Stage Least Squares
PCA	Principal Component Analysis

Table of Contents

List of Tables

List of Figures

List of Equations

Chapter 1: Introduction

1.1 Background

Creativity is the engine of economic growth. This is the claim of Richard Florida (2002), notably through his book "The Rise of the Creative Class", wherein it is argued that the prosperity of cities increasingly hinges on its ability to attract, retain and develop the creative class (Florida, 2002a, Florida, 2002b, Florida, 2004).

Distinct from the educational attainment focus, the creative class notion focuses on the actual occupation of the people. The types of occupation are further divided into three categories: the creative core, the creative professionals, and the bohemians. The creative core occupations are ones that "create new ideas, new technology and/or new creative content" (Florida, p.8, 2004). Meanwhile, the creative professionals are the ones who are in "business and finance, law, health care and related fields" (Florida, p.8, 2004). Finally, the bohemians are those that "engage in cultural and artistic occupations" (Boschma and Fritsch, p. 395, 2009).

Since the publication of the "Rise of the Creative Class", policy makers hustled to start implementing the ideas in their cities. To become creative is then the aspiration of cities around the globe. Yet, on the other hand, the thesis gained scrutiny from the academia, as empirical proof to confirm the thesis did not accompany its claim (Glaeser, 2004, Peck, 2005). The relationship between the creative class and cities then gained attention within the academia. Scholars (Florida, 2002a, Boschma and Fritsch, 2009, Qian, 2008, Storper and Scott, 2009a, van Aalst, Atzema, et al., 2014) frequently address two aspects of the notion in their studies: firstly on its locational factors and ultimately on its impact on the regional growth.

In regards to the locational factors, the main debates are: whether people follow jobs, or is it the other way around. In other words, does the spatial distribution of the creative class be better explained by the conventional employment opportunities or increasingly depend on the quality of life factors, such as amenities, aesthetics or even tolerance? (Florida, 2002a, Marlet and van Woerkens, 2005, Qian, 2008, Boschma and Fritsch, 2009) The findings on this debate appear to differ based on the context of which the study is conducted. In the United States, Florida (2002) establishes that diversity and tolerance play a great role in attracting the creative class. This is in contrast with the study in the context of the Netherlands, wherein tolerance fails to explain the spatial distribution of creative class and instead job opportunities and amenities still provide the strongest explanatory power (Marlet and van Woerkens, 2005). Similar outcome is seen in the study that focuses on the wider European regions (Boschma and Fritsch, 2009) and in China (Qian, 2008), wherein the members of creative class still do follow jobs and amenities benefits as their strongest driver, and less to tolerance as has been argued by Florida (2002).

Yet provoking an even greater debate is the second aspect of the notion, the claim that creative class propels growth in cities. An older and more extensively researched human capital theory set forth people with higher educational attainment, instead of the occupation-focused creative class, to drive the urban growth (Lucas, 1988, Black and Henderson, 1999,

Glaeser, 2003). In his review of Florida's (2002) book, Edward Glaeser (2004) performed an analysis of Florida's own US regional data set in creative class to compare it with his human capital theory, it demonstrates that human capital theory prevails in explaining urban growth. However, again, different contexts seem to yield different results. As presented in Boschma and Fritsch's (2009) study, the human capital theory explains the urban growth in Germany, but it is the creative class theory, which triumphs in the Netherlands. Another study in the Dutch context also supports this finding, that creative class shows statistically significant and positive relationship with urban growth (Marlet and van Woerkens, 2007).

However, despite these positive findings, the greatest doubt on the creative class still persists, it is the question of identification robustness between the creative class and urban growth. "When so many causal mechanisms are assumed it is not hard to envisage reverse causality: the creative class may be enabled to grow more easily in a booming economy, rather than be the cause of economic growth" (Stam et al. p. 119, 2008). This indicates that there might be endogenous effects between creative class and employment growth, which will bias the established relationship. Indeed, studies have shown significant, positive effect of the creative class to regional employment growth (Florida, 2002a, Qian, 2008, Stam, de Jong, Jeroen P. J., et al., 2008, Boschma and Fritsch, 2009). Yet most of them have not yet controlled for the endogenous effects of the two variables, hence the sword of Damocles still looms over the causal relationship identification. In recent developments, unexpectedly Florida (2017) withdraws his thesis with the launch of his new book "The New Urban Crisis: How Our Cities Are Increasing Inequality, Deepening Segregation, and Failing the Middle Class". In this book, he essentially renounced the whole creative class notion, actually without properly testing for its possible lasting impact, and states that instead of driving the economy, the creative class will only increase inequality.

This study aims to make a contribution particularly on the issue of identification robustness between the creative class and urban growth in the context of the Netherlands. As other studies have done, it firstly focuses on the spatial distribution and the explanatory factors. The analysis will utilize panel data of the 40 COROP regions of the Netherlands over the course of 19 years. The inclusion of the recent time period may be of interest since most studies are conducted prior to the year 2010 and this study will map the creative class from 1996 to 2015. Moreover, it also contributes to the people follow jobs or jobs follow people debate. In addition, creative industries will also be analysed as the other aspect of the creative economy. Creative industries focus on producing creative *products*, in contrast with creative class with its members working in creative *occupations*. Finally, the main challenge, and hence the greatest significance of this study, is to prove the identification of the causal relationship between the creative class and urban growth using instrumental variables. This causality analysis will also be done for the creative industries.

In addition to contributing to the academic debate, this study can also be used by policy-makers in evaluating whether creativity should be an integral policy focus for driving growth in their respective regions and in identifying factors that attract creative firms and creative people to their regions.

1.2 Problem Statement

In introducing the creative class thinking, Richard Florida's thesis claims that creativity is the solution to our current economic challenges (Florida, 2002b). The thesis resonates with policymakers in cities and creative policies have been implemented widely as the result (Amsterdam Economic Board, 2014, Gemeente Rotterdam, 2007, Provincie Utrecht, 2010, Click NL, 2014, Stimulering Fonds, 2015). However, it is yet unclear whether these policies will indeed aid in creating more opportunities for jobs in the regions. Moreover, the robustness of the creativity effect to employment growth has never been proven, despite repeated call of such analysis. This underpins the many critiques to Florida's work from academia. Without a reliable indication of the causality identification, one will not know whether creativity is the potent solution to the economy as it promises.

Taking the case of the Netherlands, the relationship between the creative class to regional employment growth has been explored by several academics and these works exhibit positive relationship between the two (Marlet and van Woerkens, 2007, Boschma and Fritsch, 2009). Similarly, the relationship between creative industries and growth has also been analysed (Kloosterman, 2004a, Stam, de Jong, Jeroen P. J., et al., 2008). These creative industries literature conclude that only Amsterdam has the necessary endowments to ensure the creative industries improve employment growth and that the creative class performs better as the predictor of employment growth.

However, even for the creative class, the identification robustness issue daunts the extent of the impact. The creative class may drive the urban growth, but it is also possible that endogenous effects between the two variables generate unobserved bias, which undermines the robustness of the relationship (Stam, de Jong, Jeroen P. J., et al., 2008). One study has attempted to control for this effect (Marlet and van Woerkens, 2007), yet other than the study, the amount of literature on the topic is still minimum if not rare. The implication of this issue is the possibility of over- or under-estimation of the extent by which creativity can drive regional growth, and thus if the creative policies that have been implemented will have any effect at all in creating more jobs.

Therefore, the problem being addressed in this study is the urban impact of creative industries and the creative class on regional employment growth, with special attention to the identification robustness between creativity (creative industries and creative class) with growth. Which of the two will be the better predictor of employment growth? Also, is creativity indeed the engine for employment growth, or is it in turn the cause for employment decline instead?

1.3 Research Objective

To identify factors causing growth and creativity to co-evolve in urban regions, and to test the impact of creative class and creative industries on regional employment growth.

1.4 Provisional Research Question(s)

- Main research question: In the Dutch context, to what extent does creativity drive regional employment growth?
- Sub-questions:
    - During the years 1996 to 2016, how is creativity – both in creative industry and creative class form – distributed in the Netherlands?
    - During these years, how does regional employment growth evolve?
    - What regional factors – both market and non-market- attract creative industry and creative class, and cause employment growth, respectively?
    - Does creativity drive the regional employment growth?

1.5 Hypothesis

Creativity, only in the creative class form, drives regional employment growth.

The hypothesis is built mainly from Erik Stam's (2008) findings where creative industries fail to explain employment growth, with an exception of Amsterdam. Instead, the creative class is the better predictor of growth. Gerard Marlet (2007) also theorizes that the creative class generates growth through entrepreneurship and growth in commercial and financial services. His work was also one that addresses the identification robustness issue, with positive findings for the creative class. In this regard, even with controlled endogenous effects, this study hypothesizes that creative class will have significant, positive relationship with the regional employment growth.

1.6 Significance of Study

This study contributes to addressing the identification robustness issue between creativity (creative class and creative industry) and regional employment growth. As has been discussed, causal relationship between the two creative variables respectively and employment growth have been established. Yet, there is still little literature that takes into account the effect of the endogenous effects into the relationship.

Gerard Marlet (2007)'s paper is one of the few studies, which attempts to address the identification robustness issue. Amenities index is utilized as instrumental variable in analysing the causal relationship between creative class and employment growth in 50 largest municipalities of the Netherlands in the period of 1993-2004. In addition, one of his biggest contributions is also the generation of the Dutch creative class definition (Marlet and van Woerkens, 2007).

Building upon his work, this study would like to contribute to the issue in the following manners. Firstly, panel data at COROP/NUTS 3 level and 19 years time period (1996-2015) will be utilized. The selected geographical level is also known as the labour market level, where it is more likely for residents to work and reside in the same COROP region. In addition, the longer and more recent time period will give deeper insight in the development of creative class, creative industries and employment growth. Secondly, this study utilizes multiple Bartik instruments as instrumental variables. One of the advantages of using the Bartik instrument, rather than directly using the variable, is that the Bartik method boosts the validity of the instrumental variable, particularly in ensuring the exogeneity of the instrument. The alternative to ensuring the exogeneity of the instrument is to provide sound theoretical argument, however this can prove to be difficult as the debate can then be subjective. More details on instrumental variables and Bartik instrument will be elaborated further in this

study. Thirdly, this study will compare the different classifications for creative class, namely Marlet's (2007) Dutch creative class and Boschma and Fritsch's (2009) European creative class in both its types, with and without the bohemians. Finally, the study will also control for related variety, which has been established as one of the strongest driver of employment growth.

In terms of the pragmatic regard, the implication of this issue is the possibility of over- or under-estimation of the extent by which creativity can drive regional growth, and hence, policy makers may use the findings in this study to assess whether creativity should be a focal point in generating employment and accordingly, ways to captivate the creative firms and people.

1.7 Scope and Limitations

This study will focus on 40 labour market (NUTS 3/ COROP) regions of the Netherlands, of which host residents both as the place of work and residence. Despite so, there is a possibility that residents still have separated regions as the place of work and residence. Hence, it is a possibility for spatial effects from the neighbouring regions to affect the particular region under study. For this study, these spatial effects will not yet be taken into the models. Further, as the study will be conducted only in the Netherlands, the results of this study may only be relevant to the Dutch context. Although it must be acknowledged that since the Netherlands has been advanced in its progress with the creative economy, other advanced nations, as well as ones that are beginning to enter the economy might gain insights from this study as well.

In terms of the temporal aspect, this study will look at the period 1996-2016, of which the global financial crisis happened in 2007-2008. However, this effect will also not yet be included in the model.

Then, another limitation of the study is that it will not include the Aesthetics as locational factors (Florida 2002), mostly due to data limitation to measure the variable directly in its subjective form, as there is minimum secondary data at the moment. This will not hamper our goal for testing on causality between creativity and growth though. Yet for future research, these limitations might be addressed to explore the topic even further.

Chapter 2: Literature Review / Theory

2.1 State of the Art of the Theories/Concepts of the Study

2.1.1 Creativity and the City

To define creativity is not a trivial process; it includes a broad sense of views, as it is widely used across various subjects. A study offered one definition wherein creativity refers to "thinking a problem afresh and from first principles; experimentation; (…)" (Landry and Bianchini, p.18, 1995). This definition may be accepted in general, but it also shows similarities to learning and innovation, which may be expected, as the three terms are closely interrelated.

Scott (2010) introduced a distinction between them, where "*learning* provides important informational and procedural foundations for creative activity; *creativity* itself is more concerned with thought and action (…) directed to the production of novel insights and perceptions that may or may not eventually have tangible significance; *innovation* derives from these insights and perceptions but is more specifically focused on their implementation in various domains of practical application" (Scott, p.119, 2010).

As one of the early initiators, Charles Landry and Franco Bianchini (1995) proposed the incorporation of the creativity concept into urban context through their book 'The Creative City', which advocates for building the creative milieu for better urban management. Further, in regards to the economical aspect between creativity and the city, scholars have developed the matter deeper (Markusen, Wassall, et al., 2008, Scott, 2006, Scott, 2010). The creative economy is argued to be consisting of the *industries perspective*, comprising of firms which produce creative products, and the *occupational perspective*, comprising of the type of occupation that one does, which may or may not be within the creative industries (Markusen, Wassall, et al., 2008). In this study, the industries perspective will take the form of the creative industries, whereas the occupational perspective will be embodied by the creative class.

Several urban attributes are argued as necessary in supporting the creative economy (Scott, 2010):

- Preservation and transmission to other generations for ideas and cultures through 'sites of memory' such as museums and exhibitions.
- Projections of unique images and spectacle that embodies the city's aspirations for creativity
- Recreation for residents through leisure facilities and urban amenities
- Housing and basic services
- Education and training
- Social network to support interpersonal contacts (also known as the local buzz (Storper and Venables, 2004))

Governance and institutions also play an important role, namely to deal with the market failures, negative spillover effects and lock-in, as well as to ensure for functioning urban dynamics (Scott, 2010).

Overall, the importance of involving firms, people and the institutions are emphasized in building a successful creative economy. However, Bontje and Musterd (2009) observe that path dependence matters; it is more difficult for cities that try to reinvent themselves to build successful creative economy than those with history in the cultural and creative economic activities.

In terms of the resilience of the creative economy, scholars have also delved to see the contribution of creativity in times of the financial crisis. A study has shown that the creative class aided cities to reach the peak unemployment level and recover at a faster rate during financial crisis (Stolarick and Currid-Halkett, 2012). Another shows that the creative industry performance during the crisis diverges across its sectors; those that depend on consumer spending (ie. Film and computer games) appear to be more resilient, while those that rely heavily on governmental support (ie. Arts and Museum) are more susceptible to crisis (Pratt and Hutton, 2012).

2.1.2 Creative Industries

2.1.2.1 History and Definitions

The British Department for Culture, Media, and Sport (DCMS) is one the first institutions, which develops and implements the creative industries concept by establishing its own creative industries task force in the year 1998 (Cunningham, 2002).

Despite so, the notion Creative Industry took time for it to be recognized by the British government. "'Culture', previously seen as a marginal and mainly decorative or prestige expenditure, began to move much closer to the center of policy-making as a potential economic resource" (O'Connor, p.31, 2010). This shift occurred after the 1987 national elections, where the urban space gains importance in economic development and the manufacturing industries began to decline, giving rise to the Post-Fordism era.

At this time, the notion was still called as the Cultural Industry, which focus was to develop new cultural amenities that are linked to attracting visitors, regenerating the old industrial complex and creating employment in the process. In parallel, the small and medium-sized enterprises (SME) have flourished widely in the Western countries, which will become a dominant part of the industry.

In 1997, the 'Cultural Industries' was renamed to the 'Creative Industries'. The reigning party that initiated this change considering that the term 'cultural' was not sufficiently economic, and thus coined the term 'creative' to promote the new industries as the next economy, which intently relates to the digital technologies and the information economy.

A formal task force, namely the Department for Culture, Media and Sport (DCMS) was also formed complementing the taxonomy change. Later, DCMS issued a

mapping document, which enables various actors, including the local government, "to place cultural industry strategies at the heart of local and regional cultural and economic strategies"(O'Connor, 2010). The document also includes the definition of the Creative Industry as follows: "*those activities which have their origin in individual creativity, skill, and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property*" (DCMS, p.3, 1998).

Both academics and policy-makers then use this definition as the reference for defining the creative industries. Yet, this broad definition poses a pragmatic issue of classifying sectors that belong in the creative industry.

O'Connor (2014) elaborates more on the different definitions and hence the sector classifications in a comprehensive manner.

Author	Year	Definitions
David Throsby	2001; 2007	• **Core creative arts**: Literature, Music, Performing arts, Visual arts • **Other core cultural industries**: Film, Museum and libraries • **Wider cultural industries**: Heritage services, Publishing, Sound recording • **Television and radio**: Video and computer games • **Related industries**: Advertising, Architecture, Design, Fashion
KEA European Affairs	2006	• **Core Arts Fields**: Non industrial activities, copyright may apply but is not always exercised *ie. Visual arts, Performing arts, Heritage (sub: Crafts, Painting, Sculpture, Photography)* • **Cultural Industries:** Industrial sectors aimed at massive reproduction, copyright important *ie. Film & Video, TV & Radio, Video games, Music, Books & Press (sub: Recorded & live music, collecting societies, book & magazine, publishing)* • **Creative Industries and activities:** Sectors described as 'non-cultural' although they employ creative skills and creative people *ie. Design, Architecture, Advertising (sub: Fashion, Graphic, Interior, Product design)*
Work Foundation	2007	• **Core creative fields:** Commercial outputs possess a high degree of expressive value and invoke copyright protection • **Cultural industries:** Activities involve mass reproduction of expressive outputs, which are based on copyright • **Creative industries and activities:** The use of expressive value is essential to the performance of these sectors • **The rest of the economy:** Manufacturing and service sectors benefit from and exploit the expressive outputs generated by the creative industries

Table 1: Definitions of Creative Industry (O'Connor, p. 56-60, 2014)

In general, these definitions comprise 'core' sectors and 'periphery' sectors. However, it is apparent that this tendency is more prone for European researchers rather than the Asian counterpart. "Researchers in Europe tend to divide the definition into two categories – 'core' creative (arts related activities) industries and 'partially' creative industries (advertising, architecture, design as well as media industries)" (Berg and Hassink, p.657, 2014) whereas in East Asia, more sectors are included in the classification ie. "hairdressing, theme parks and furniture manufacturing" (Berg and Hassink, p.657, 2014) and less on the distinct partition between 'core' and 'other' creative sectors.

Regardless of these differing classifications, there are the common characteristics of creative industries, which identify but not necessarily be exclusive to the sector:

1. The creative industries engage in the creation of products with semiotic and aesthetic matter
2. The industries follow the Engels' Law, wherein higher disposable income will increase the consumption of the creative products
3. The high competitive forces advocate for creating an agglomeration together in compact specialized clusters for their survival (Scott, 2004).
4. In relation to the previous point, the creative industries gain advantages from agglomeration economy and urbanization. When the creative industries cluster, they can benefit through the *sharing, matching* and *learning* mechanism between each other (Puga and Duranton, 2004). Yet, the extent to which the industries cluster together varies for each sector. Nonetheless, the more concentrated the creative industries, the more positive externalities can be gained by the particular place. To be specific, these externalities affect the ability of the place to attract the creative class, which will attract the high-technology industries
5. The creative industries and the institutional infrastructure and governance mutually affect each other. "Like manufacturing industries, creative industries engage with a range of institutional frameworks such as those for economic development, local generation, and social inclusion, and therefore, all of these can affect them in return. Creative industries are shaped by public policy and significant public investment" (O'Connor, 2010).

In the context of the Netherlands, the creative industry classification is comprised of three categories, which are *the arts, media and publishing* and the *creative business services*. The arts category as the core industry includes the visual and performing arts, followed by the media and publishing category, which consist of photography, broadcasting, journalism and publishing houses. Lastly, the creative business services are the design and advertising services (Rutten, Manshanden, et al., 2004, Kloosterman, 2004a, Stam, de Jong, Jeroen P. J., et al., 2008).

Domain	Industries	NACE codes	Description
Arts	Visual arts	92.31	Artistic and literary creation and interpretation
		74.81	Photographic activities
		92.5	Library, archives, museums and other cultural activities
	Performing arts	92.32	Operation of arts facilities
		92.34	Other entertainment activities n.e.c.
Media and entertainment	Media	92.11	Motion picture and video production
		92.12	Motion picture and video distribution
		92.13	Motion picture projection
		92.20	Radio and television activities
		92.40	News agency activities
	Publishing	22.11	Book publishing
		22.12	Newspaper publishing
		22.13	Journal and periodical publishing
		22.14	Publishing sound recordings
		22.15	Other types of publishing
Creative business services	Technical design	74.20	Architectural and engineering activities and related technical consultancy
	Advertising and non-technical design	74.40	Advertising
		74.87	Interior and fashion design

Equation 1: Classification of Sectors in The Creative Industries (Stam et al, 2008)

This study will use particularly the classification definition of Erik Stam (2008) of the three main categories. This classification excludes the ICT services sector from the definition and is then selected to control the effects from the digital industries, although to fully isolate ICT from the creative industries might not be possible as they are closely related, under the influence of current technological developments. Yet, these will exclude software development sectors of which their products are more functional than semiotic.

2.1.2.2 Determinants of Creative Industries Clusters

Other than the nomenclature and classification debates, the matter of whether the creative industry agglomeration can occur in urban or rural settings and the impact it will have on regional growth is also the topic of focus. On the geographical debate, research has shown that the creative industry agglomeration tends to materialize in the urban centers. Location quotients are frequently used to measure the creative industries cluster (Kloosterman, 2004a, Evans, 2009). In the study of Evans (2009), cities worldwide are measured on the creative industries location quotients. New York tops the rank with 3.7 location quotient, followed by Rio with 3 and Vienna with 2.8. Meanwhile, for regions in the Netherlands, Amsterdam accounts for 2.3 location quotient and Rotterdam ends the Top 16 list with 1.06-location quotient (Evans, 2009).

Amsterdam and Rotterdam are indeed two of the largest urban centers in the Netherlands. Other than the two, the remaining two largest cities, The Hague and Utrecht also show the highest concentration of the creative industries cluster. Overall, the four Randstad regions have the highest concentration of creative industries (Kourtit, Mohlmann, et al., 2013, Stam, de Jong, Jeroen P. J., et al., 2008, Kloosterman, 2004a).

Other than mapping the spatial distribution of creative industries, scholars have also explored reasons that explain the creative industries clusters. Lazzeretti et al (2012) performed an analysis of the locational decision of creative industries cluster in Italy and Spain. In their analysis, three main determinants are explored. The first determinant is the cultural heritage or historical endowments of the place, which is positively correlated with the creative industries cluster (Kourtit, Mohlmann, et al., 2013, Lazzeretti, Capone, et al., 2012, Kloosterman, 2004a). "Heritage influences the creative industries from two points of view: first, art, culture, beauty, and history affect perceptions and attitudes towards creativity; second, it promotes cultural activities" (Lazzeretti et al., p.1244, 2012). The second determinant for the cluster is the agglomeration economies. As has been discussed, creative industries benefit from agglomeration and hence naturally, it is expected that a place with (external) agglomeration economies will attract the creative industries. The external economies refer to the agglomeration economies outside of the firm, it is further divided into three: localization, urbanization economies, and related variety. Localization economies refer to the concentration of firms that are similar to each other (Frenken, van Oort, et al., 2007). In this regard, the creative industries will be enabled to access the required skilled labors and suppliers, as well as the knowledge spillover from the similar firms. Meanwhile, the urbanization economies occur when the city size is sufficiently large for achieving the economies of scale. This benefits the creative industries from the size of the available local market. Next, another proxy for agglomeration benefits is related variety. This concept is defined as the relation between sectors based on their complementary cognitive abilities. This relation determines the extent of which cross-disciplinary innovations can occur, through effective interaction and knowledge transfer (hence the learning mechanism of the agglomeration economies) (Frenken, van Oort, et al., 2007). Since novelty is such a significant factor in influencing the success of creative products, related variety is important for the creative industries wherein innovation is expected to flourish from the knowledge transfers. The third and last determinant is the people factor, the human capital, and the creative class. It is suggested that today it is jobs that follow people, instead of the other way around as has been believed by the conventional economics. This shift of thinking means that firms' success no longer depends on the supply of raw material but on the educated (human capital) and creative people (creative class).

As an additional determinant, office space is also tested in this study. In their paper for the 41st IsoCarp congress, Modder and Saris (2005) proposed an explanation as to why the creative industries seem to be moving into the periphery: prices in the inner-city of the large urban centres have become too expensive and scarce in quantity. Regions in the periphery can provide the alternative space, such as Zaanstreek and Flevoland (Almere) (Modder and Saris, 2005). The provision of office space and refurbishing of old industrial spaces to become incubators have been a popular creative industries policy, seen in many regions in Europe (Bontje and Musterd, 2009). Hence, including the office space determinant might provide insights as well as a manner to evaluate the policy for attracting the creative industries.

2.1.2.3 Impact on Regional Employment Growth

The potential for generating growth has been the promise and hope of the creative industries, yet it is one that is elusive to prove. This also applies to the Dutch context, as studies have shown that no correlation can be established between creative industries and regional employment growth when Amsterdam is excluded from the equation. Amsterdam is argued to be the only region in the Netherlands that has enough capacity to gain employment growth benefits from the creative industries (Kloosterman, 2004a, Stam, de Jong, Jeroen P. J., et al., 2008).

Kloosterman (2004) suggests that creative industries should not be distinguished as "direct source of employment" (Kloosterman, p.251, 2004a), rather the industries are contributors to the "competitiveness of the local and the national economy by not only bestowing products with aesthetic qualities but also by improving the locational qualities of cities" (Kloosterman, p.251, 2004a). Evans (2009) has even brought forth the question whether creative industries only capable of jobless growth from his observation wherein the number of firms increases, while employment declines from mergers and outsourcing.

However, in a more positive light, several methods have been prescribed for policy-makers to ensure positive effects from the creative industries clusters. It is stated that special focus needs to be attended to three aspects, namely to optimize synergies between firms, to grow high-skilled labour market pool in the region and to promote creativity and innovation in the industrial cluster (Scott, 2006). Moreover, other than the internal mechanism, the success of these industries also relies heavily on the access to the consumers market. Marketing and distribution of creative products are vital to the survival of these industries (Scott, 2004, Evans, 2009). On the more general creative city policy perspective, a study (Bontje and Musterd, 2009) analyses the different creative city policy approaches in a more concrete manner in Amsterdam, Barcelona, Birmingham, Helsinki, Leipzig, Manchester, and Munich. The approaches are diverse, adjusting with the contexts of their own regions; some focuses on ICT (Barcelona and Helsinki), one on technology (Munich), another on knowledge (Manchester) and others on creativity (Amsterdam and Manchester). The progress of policy also varied, with some to be advanced and some lagging behind, of which can be related to whether the region has a history in creativity or is completely starting from the ground. Yet in general, the experts from these cities agree that the key for creative city policy should be education and attracting the creative firms and the creative class (Bontje and Musterd, 2009).

2.1.3 Creative Class

2.1.3.1 History and Definition

In the wide mediatisation of Richard Florida (2002)'s book 'The Rise of Creative Class', the notion is introduced and gained the attention of both the academia and policy-makers. The idea may not be novel, as the creative class notion seems to resonate Jane Jacobs' view in incorporating creativity into the urban dynamics by placing importance in the people values rather than mere order and efficiency (Jacobs, 1961).

The idea of the significant role that human capital plays in urban growth has been explored by various academics, of which presents the conceptual mechanism of the relationship and also empirically supports the concept (Jacobs, 1961, Lucas, 1988, Glaeser, 2003). Richard Florida builds upon this concept with a novel view, that it is the creativity that these labour forces possess, that drives the economic growth. The creative class concept pays minimum attention to whether one attains high education or not, as a creative person does not necessarily complete the higher education. Edward Glaeser (2004) contested this idea by exhibiting that education excels creativity in explaining urban growth, using Florida's very own data set for the US. However, studies have also shown otherwise in the other geographical locations. The creative class is observed to be a better predictor of growth rather than educational attainment in China and Europe (Marlet and van Woerkens, 2007, Qian, 2008, Boschma and Fritsch, 2009).

The creative class focuses on the type of occupation rather than the sector-focused notion of the creative industry (Florida, 2002b). The types of occupation are further divided into three categories: the creative core, the creative professionals, and the bohemians. The creative core occupations are ones that "create new ideas, new technology and/or new creative content" (Florida, p.8, 2004). Next, the creative professionals are the ones who are in "business and finance, law, health care and related fields" (Florida, p.8, 2004). Lastly, the bohemians are those that "engage in cultural and artistic occupations" (Boschma and Fritsch, p. 395, 2009).

A study can either use the broad definition of the creative class, which is also called the *European definition* or the narrow definition alias *Dutch definition*. The European definition is based on the work of Boschma and Fritsch (2009), whereas the Dutch definition is based on Gerard Marlet's (2007) paper in creative class and growth.

The table below summarizes the 'broad' creative class definition; it is the interpretation of Florida's (2002) creative class definition in the European context. In their paper, Boschma and Fritsch (2009) further divided the 'broad' definition into two: creative class A (without bohemians) and creative class B (with Bohemians).

On the other hand, the Dutch definition excludes a number of occupations from Florida's definition. These excluded occupations are ones that are considered to be not sufficiently innovative or creative in nature, to be included in the definition. These are namely accountants, primary and secondary school teachers, transport managers and several other administrative occupations. The selection of the definition to be

used can impact greatly the result of the analysis. In 2002, the Dutch definition comprises 17.6 percent of total employment in the Netherlands, while the European definition includes 47.2 percent (van Aalst, Atzema, et al., 2014).

Groups of Creative People	Occupations (ISCO Code)
Creative Core	Physicists, chemists, and related professionals (211) Mathematicians, statisticians, and related professionals (212) Computing professionals (213) Architects, engineers, and related professionals (214) Life science professionals (221) Health professionals (except nursing) (222) College, university, and higher education teaching professionals (231) Secondary education teaching professionals (232) Primary and preprimary education teaching professionals (233) Special-education teaching professionals (234) Other teaching professionals (235) Archivists, librarians, and related information professionals (243) Social sciences and related professionals (244) Public service administrative professionals (247)
Creative Professionals	Legislators, senior officials, and managers (1) Nursing and midwifery professionals (223) Business professionals (241) Legal professionals (242) Physical and engineering science associate professionals (31) Life science and health associate professionals (32) Finance and sales associate professionals (341) Business services agents and trade brokers (342) Administrative associate professionals (343) Police inspectors and detectives (345) Social work associate professionals (346)
Bohemians	Writers and creative or performing artists (245) Photographers and image and sound recording equipment operators (3131) Artistic, entertainment, and sports associate professionals (347) Fashion and other models (521)

Table 2: Summary of Creative Class Occupation 'Broad' or 'European' definition (Boschma and Fritsch, 2009)

2.1.3.2 Determinants of the Creative Class

Attracting the creative class is argued to be crucial in stimulating regional growth. Hence, scholars have been studying to the locational factors that are attractive to them.

Firstly, in his thesis, Florida (2002) introduced the 3T concept, where Talent, Tolerance, and Technology are argued to be crucial for urban growth. Out of the three, Tolerance is the most controversial factor that is often the subject of debates among scholars, as it is claimed to attract creative class and eventually generate expansion in high technology industries for the growth of the urban economy. Indicators for tolerance involve the presence of bohemians/artists, gays and foreign-

born in the region. The openness for these types of diversity is claimed to be highly attractive to the creative class (Florida, 2002b).

Then, reviewing the empirical analyses, Boschma and Fritsch (2009) investigated the creative class in seven countries in Europe. One of their findings is the determinant for the unequal distribution observed across the regions. Four types of determinants were tested: "regional climate of tolerance and openness, regional facilities, employment opportunities and population density" (Boschma and Fritsch, 2009). The first factor follows Florida's (2004) thesis on the bohemian index and openness index. The bohemian index indicates the share of people whose occupations are in the bohemian field, these are argued to attract the creative core and creative professionals. Meanwhile, the *openness index* refers to the degree of tolerance of cultural diversity in a region, often measured as the share of foreign-born in the region. The second determinant relates to the *facilities and amenities* in the region. Two indexes are used in their study for this determinant: public provision index (labour share in the public healthcare and education sector) and a ratio of amenities and residents (number of amenities per resident). This determinant is similar to the urban amenities that are appealed to attract the creative class (Glaeser, 2003, Florida, 2004, Qian, 2008, Glaeser and Resseger, 2009). The next determinant is in line with the conventional "people follow jobs" idea; it is that the creative class is attracted to a region firstly because of the *employment opportunities*. The determinant is measured through the annual employment growth rate. Lastly, *population density* is also included in factoring in the general regional factors, such as average income and land rates. In addition to these, in the study of Qian (2008) that focused on the creative class in China, two additional variables are added: the *proportion of urban population* to analyse the role of the region itself and the *share of university students* to investigate the presence of university implication.

2.1.3.3 Impact on Regional Employment Growth

How do creative class contribute to regional growth? Three rationales are suggested to explain this relationship: improved productivity of existing firms (through innovation and technology), rise of entrepreneurship, and lifestyle spending (Florida, 2002a, Marlet and van Woerkens, 2007). However, there are also contradicting views that the consequences of creative class will be social polarization, poverty and even radicalism (Peck, 2005, Scott, 2006).

The distribution and effect of the creative class, in particular, have also been explored over cities in the Netherlands. The Randstad cities maintain the highest share of the creative class. Jobs, urban amenities, and aesthetics have been shown to explain these clusters of the creative class. However, there is conflicting evidence for the tolerance factor (Marlet and van Woerkens, 2005, van Aalst, Atzema, et al., 2014).

Also, the concentration of the creative class is also associated with a positive effect on regional growth in the Dutch context. However, the identification robustness issue and role of innovation and entrepreneurship in explaining this relationship were not yet performed due to a limitation of data at the time. Another research supported the

positive effect of the creative class on growth, particularly employment growth. 31 core cities and 50 largest cities and towns are analysed (Marlet and van Woerkens, 2007). The positive effects that were observed across these cities strongly rely on population growth, as it only applies to the core cities but not the surrounding cities and towns. It was proposed that the relationship is an urban working, as there are spatial limitations for knowledge spillovers. The effect was also analysed using 2SLS model using instrumental variables to address the identification robustness issue. In selecting the instrumental variables, two sets of variables linked to amenities are run and the second set is found to be fully exogenous, which covers: "the amount of music performances, proximity to nature, number of students, share of privately owned houses, number of museums, and secondary schools, share of historical buildings, and ethnic diversity" (Marlet and van Woerkens, p. 2610, 2007).

It is concluded that creative class drives regional growth, even to a more significant and higher extent when compared to how education levels drive regional growth. The mechanism of this link was also tested; productivity and entrepreneurship are proven to have a positive significant effect, while the lifestyle spending has not yet been supported. It is indicated that the last reasoning might be correlated to the growth of the creative class, instead of its direct share of employment (Marlet and van Woerkens, 2007, Boschma and Fritsch, 2009, van Aalst, Atzema, et al., 2014)

2.1.4 Human Capital

Human capital has been argued to play an important role in the economic development. The concept typically refers to the level of educational attainment of the city, measured by the share of the population, which has a certain degree of educational qualifications. Human capital has been observed to distribute unequally across regions and is continuously being shaped by the migration of the labour force (Storper and Scott, 2009b). The identification of factors, which determine this labour migration, then become important in order to grow a particular region's stock of human capital. The provision of amenities is one factor that has been argued widely to attract these highly skilled labours (Glaeser, 2003, Clark, Lloyd, et al., 2002). Preference for a certain type of lifestyle is claimed to drive the locational decision of the human capital. Yet, this argument received an important critique that for the labour force to enjoy the lifestyle of choice, they must obtain a steady source of income to afford it. Hence, employment opportunities and the wider economic structures are also crucial for the human capital (Storper and Scott, 2009b).

Edward Glaeser (2003) is one of the advocates for the human capital theory, wherein he demonstrates that "cities with more educated residents have grown faster than comparable cities with less human capital" (Glaeser, 2003). The growth is apparent in terms of population, but also productivity levels (Black and Henderson, 1999, Glaeser, 2003). This effect seems to be essential particularly for cities that have just experience a decline or at a disadvantage, as human capital may provide them the key for reinvention and hence growth (Glaeser, 2003).

2.1.5 Agglomeration Economies

The theory of agglomeration economies states that firms cluster together due to the advantages to be gained from the close proximity to one another (Duranton and Puga, 2004, Frenken, van Oort, et al., 2007). Duranton and Puga (2004) formulate the three micro-foundations of the urban agglomeration economies: *sharing*, *matching*, and *learning*. These are the mechanisms of which firms may benefit in developing clusters or agglomerations (Duranton and Puga, 2004).

Sharing refers to the returns that firms gain by having a 'large indivisible' to be used by the firms in the agglomeration. The concept is similar to economies of scale, wherein a facility used by more users will reduce the individual operational cost for each user. However, as with economies of scale, the number of users should be carefully taken into consideration. There exists a trade-off between the unit cost reduction and capacity as well as proximity constraints, as more users participate. Other than sharing goods or facilities, firms may also share a variety of suppliers, labour pool, and market. Urban specialization may advance this benefit, as the types of facilities, labour, and suppliers would then cater for the specific requirements of the similar firms. The occurrence of agglomeration of similar firms in proximity to each other is also called as *localisation economies.* On the other hand, the size and density of the city also play an important role in this mechanism, as it closely relates to the size of the market, labour but also quantity of users. This source of agglomeration economies is also called as the *urbanization economies.*

Matching is the benefit of which firms gain, wherein the probability between employers and job seekers to find the suitable counterpart is higher due to the increase in the amount and diversity of both job vacancies and applicants. The higher number and diversity of job seekers would allow firms to choose its prospective employee from a selection of applicants. On the other hand, job seekers are able to apply for a number of jobs at the same time, increasing his/her chances of securing employment.

Lastly, *Learning* concerns knowledge generation, diffusion, and accumulation, which are expected to generate knowledge spillovers and innovation through interactions between people in the agglomeration. Other than benefiting firms and workers, the learning mechanism is also argued to contribute to the regional economic development. Three types of sources may generate the learning mechanism, "as a firm can learn from firms in the same industry (localisation economies), from firms in other industries (Jacobs externalities (Jacobs, 1969)), or from a concentration of actors other than firms, including consumers, universities, and governments (urbanisation economies)" (Frenken, van Oort, et al., 2007). From this statement, one main determinant for facilitating the learning process is then whether a region should be more specialized to particular sectors or be diversified instead. It appears that each strategy would generate different types of innovations, where specialization may incur process innovations to increase efficiency, while diversified sectors may generate the more 'creative' innovations as new ideas and knowledge can be produced within a multidisciplinary environment. Focusing on the latter mechanism (Jacobs externalities), the concepts of unrelated variety and related variety emerge to explore further whether it is a set of diversified sectors, which have low or high similarities to

each other that will generate the urban growth. It is evident from the findings that related variety has positive effects on urban growth in terms of employment, yet affects productivity growth negatively. On the other hand, unrelated variety generates resilience towards unemployment (Frenken, van Oort, et al., 2007).

2.2 Conceptual Framework

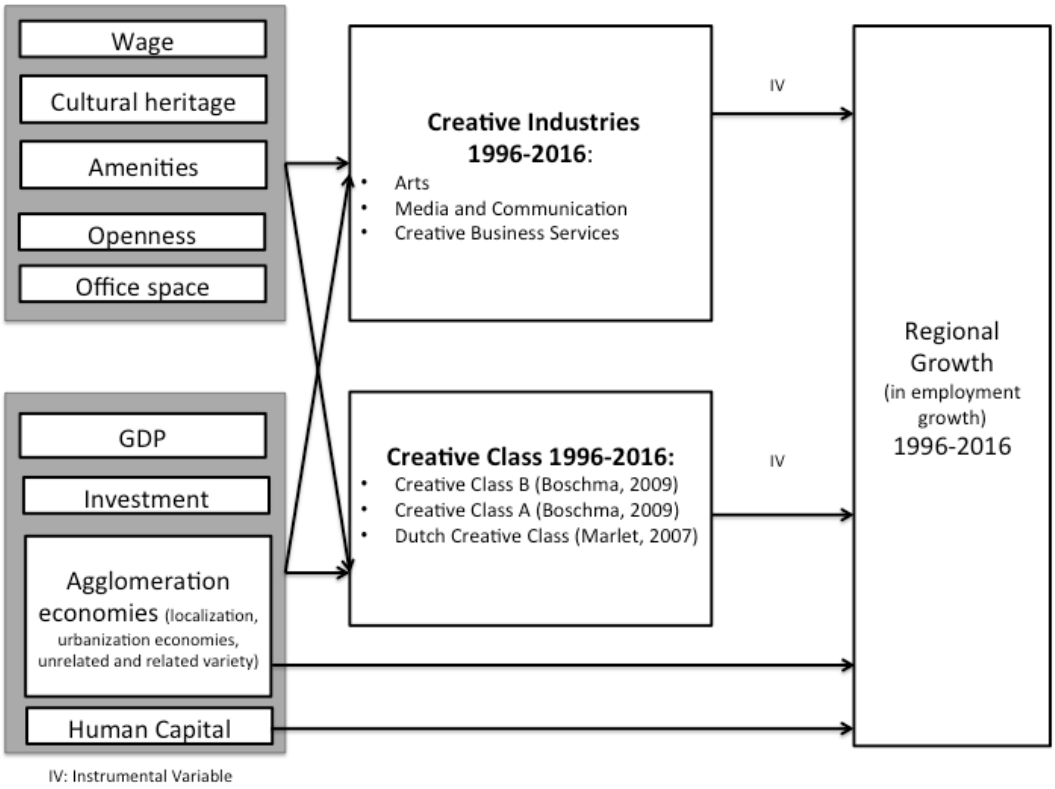


Figure 1: Conceptual Framework

The previous section has discussed the core concepts that will be addressed in this study. In this section, the concepts will be converged into our conceptual framework, which will guide the analyses conducted in the study. The conceptual framework summarized the independent, dependent as well as control variables that will be investigated in this study. Two main models will be analysed: the first being the locational decisions which shape the spatial distribution of the creative industry and creative class and the second being the causal relationship between creativity (creative industries and creative class) and regional growth.

Model 1: Locational Decision of Creative Industries and Creative Class

In the first model, the independent variables are the factors that shape the locational decisions of the creative industry and creative class respectively, while the dependent variable is the clustering of creative industries and creative class present per region.

Each dependent variable will be analysed in three forms: the absolute number of creative industries/creative class in a region, the relative cluster of creative industries/creative class (measured in location quotient), and the growth of creative industries/creative class.

For the second form of the dependent variables, the relative concentration of creative industries/creative class will be measured through the location quotient (LQ).

$$LQ\ Creative\ Industry/Class = \frac{\frac{Region's\ creative\ industry\ /class\ employment}{Region's\ total\ employment}}{\frac{Creative\ industry\ /class\ employment\ in\ the\ Netherlands}{Total\ employment\ in\ the\ Netherlands}}$$

Equation 2: Location quotient creative industry/creative class

Location quotient compares the share of the region's concentration of the particular industry to the average national share. It will aid in establishing the extent of specialization the city has become towards the creative industry and the level of concentration of the industry (Kloosterman, 2004a, Evans, 2009). The location quotient value is interpreted as follows, an above 1 figure signifies that the creative industry cluster in the particular region and time is larger than the average at the national level. This means that the region may be addressed as a Creative Local System (CLS) (Lazzeretti, Capone, et al., 2012). Another perspective in interpreting the location quotient would be the export or import orientation of the region. The higher than the national average share of a particular region would indicate that region may export the goods of the industry, as it has excess supply than the region's demands (Mayer and Pleeter, 1975). This is important, as export means income to the region, other than exclusively being circulated locally.

As for the independent variables, determinants that have been studied to drive each creative industries and creative class have been combined into a set of variables that will be tested for both the dependent variables. Testing both creative class and creative industries with the same set of locational factors will allow for comparison of the determinants. Creative industry may have similar preferences to creative class (Marlet and van Woerkens, 2007), the similar models will demonstrate exactly to what extent is the similarity of preferences between the two creative variables. In this study, the set has been further divided into two groups: the first are urban features, which concerns the market and quality of life and the second are those, which relates with the economic structure of the region.

Model 2: Causal Relationship between Creativity and Regional Growth

The second model seeks to analyse the causal relationship between creativity and regional growth with controlled endogenous effects. Creativity is interpreted as creative industries and creative class in this study, each of these variables will be analysed with employment growth in separate models.

Instrumental variables will be used to control the endogenous effects between the creative variables and regional employment growth. Finally, the control variables that will be included in this model are namely the population growth, sectoral diversity, human capital, related variety, and traffic congestion. According to the literature review, these control variables will have effects to the urban employment growth.

Elaborated details on the variables will be explained in the research design chapter.

Chapter 3: Research Design and Methods

3.1 Revised Research Question(s)

In the Dutch context, to what extent does creativity (creative industries and creative class) drive the regional employment growth?

Sub-questions:

- During the year 1996 to 2016, how is creativity – both in creative industry and creative class form – distributed in the Netherlands?
- During these years, how does the regional employment growth evolve?
- What regional factors explain the spatial distribution of creative industries and creative class respectively?
- To what extent does creative industries drive the regional employment growth?
- To what extent does creative class drive the regional employment growth?

Hypothesis: Attracting creative class, through employment and amenities, drives employment growth even with controlled endogenous effects

3.2 Operationalization: Variables, Indicators

3.2.1 Dependent Variables

3.2.1.1 Model A: Locational Decision

Concept	Definition	Indicators	Scale of Measurement	Source	Values
Creative Industry	Annual concentration of firms in the following sectors: • Arts • Media & Communication • Creative Business Services	• Number of creative jobs • Location quotient (LQ) of the creative industries • Creative industries annual growth rate	Ratio	LISA	• The higher the number, the more employment in creative industries/creative occupations • The higher the LQ, the more concentrated the creative industries/class in the particular region compared to the national average • Positive rate indicates growth, while negative rate indicates decline in creative jobs
Creative Class	Annual share of regional employment in: • Creative core • Creative professionals • Bohemians With variety in definitions using Boschma and Fritsch's (2009) and Marlet's (2007) creative class composition definition.	• Number of creative jobs • Location quotient (LQ) of the creative industries • Creative industries annual growth rate	Ratio	LISA	

Table 3: Overview of Model A's Dependent Variables Operationalization

In the locational decision analysis, the two forms of creativity - creative industry and creative class- will be analysed separately. Yet, the particular industries/occupation (in its standard

classification codes) to be included in each variable still requires to be done. The following is the elaboration of definition that has been chosen for each variable.

Domain	Sub-group	SBI 08 Code
Arts	Visual arts and cultural activities	• 9003 (Artistic and Literary Creation) • 7430 (Artistic interpretation and translation) • 7420 (Photographic activities) • 9101 (Libraries) • 9102 (Museum) • 9103 (Monuments preserve) • 9104 (Nature preserve)
	Performing arts	• 9001 (Performing Arts) • 9002 (Services for Performing Arts) • 9004 (Theaters)
Media & Publishing	Publishing	• 5811 (Book publishers) • 5813 (Newspaper publishers) • 5814 (Magazines publishers) • 5819 (Other publishers, not digital) • 5821 (Computer games) • 5829 (Software media services)
	Media	• 5911 (Film, video, TV) • 5912 (Services film) • 5913 (Distribution film) • 5914 (Cinemas) • 5920 (Sound) • 6010 (Radio companies) • 6020 (Television companies) • 6312 (Web portals and design) • 6391 (Press agencies)
Creative Business Services	Technical design (ie Architecture)	• 7111 (Architects and designers)
	Advertising and non-technical design	• 7311 (Advertisement) • 7312 (Advertising sales) • 7320 (Marketing research) • 7410 (Fashion design)

Table 4: Creative Industries Definition

The Creative Industries variable is one of the focal points of the study. It acts as the dependent variable in the locational decision question and as the explanatory variable for employment growth in the causality question. The table above elaborates the industries that are included in this study's classification in 4-digit SBI code (Dutch standardized industry classification). These are the translation of Erik Stam et al (2008)'s NACE code (European standardized industry classification) definition, along with the additional *Computer games*, *Software media and services*, and *Web portals and design* to also include the more modern creative industries.

Groups of Creative Class	Occupations (SOC 2010 Code)
Creative Core	Physicists, chemists, and related professionals (19-4000) Mathematicians, statisticians, and related professionals (15-2000) Computing professionals (15-1100) Architects, engineers, and related professionals (17-0000) Life science professionals (19-1000) Health professionals (except nursing) (29-1000) College, university, and higher education teaching professionals (25-1000) Secondary education teaching professionals (25-2030) Primary and preprimary education teaching professionals (25-2020) Special-education teaching professionals (25-2050) Other teaching professionals (25-300) Archivists, librarians, and related information professionals (243) Social sciences and related professionals (21-1000) Public service administrative professionals (45-2000)
Creative Professionals	Legislators, senior officials, and managers (11-0000) Nursing and midwifery professionals (29-1100) Business professionals (13-0000) Legal professionals (23-0000) Physical and engineering science associate professionals (33-2000, 53-0000) Life science and health associate professionals (29-9000, 31-9000) Finance and sales associate professionals (43-5000) Business services agents and trade brokers (41-0000) Administrative associate professionals (43-6000) Police inspectors and detectives (33-3020) Social work associate professionals (21-1090)
Bohemians	Writers and creative or performing artists (27-2000, 27-3000) Photographers and image and sound recording equipment operators (27-4000) Artistic, entertainment, and sports associate professionals (27-1000) Fashion and other models (41-9010)

Table 5: Boschma and Fritsch (2009) Creative Class Definition

Generating the creative class variable poses a greater challenge than the creative industries. As the creative class may be present in all sectors, the share of creative occupations in each sector needs to be predicted. A matrix is created that contains the percentage of creative occupations in each sector, of which the sum across sectors will comprise the whole creative class index.

In detail, the creative class variable undertook the following procedure for its generation:

1) In this study, the share of creative class occupation in each sector in the Netherlands is assumed to be similar with the US percentage. Hence, the percentages are taken from the Industry-occupation matrix data of the US Bureau of Labour (https://www.bls.gov/emp/ep_table_109.htm).
2) The creative class classification from Boschma and Fritsch's (2009) paper are translated from ISCO 88 to ISCO 08, and the codes of these creative occupations are matched with the Industry-occupation matrix data.
3) The total percentage of all (previously matched) creative occupations in a sector is calculated. The matching is done for each three definitions of creative class:
   a) Boschma and Fristch's (2009) Creative Class B: creative core, creative professionals, and bohemians

b) Boschma and Fristch's (2009) Creative Class A: creative core and creative professionals
c) Marlet's (2007) Dutch Creative Class: exclusion of non-creative/innovative occupations such as accountants, primary and secondary school teachers and several managerial occupations

4) Each total percentage from the previous step is then multiplied to the Dutch total employment per sector of each COROP regions and in each year in the sample. At this stage, we generate the Dutch creative class per 2-digit SBI code in each COROP region and in each year.
5) The sum of the creative occupations across the sectors in each COROP regions and in each year is calculated, generating the creative class variable.

$$\%creative\ class_{industry} = \sum_{creative\ occupation}^{n} \text{(US percent of industry by occupation)}$$

$$Creative\ class_{corop,t} = \sum_{industry}^{n} (\%\text{creative class}_{\text{industry}} * employment_{industry,corop,t})$$

Equation 3: Creative class variable generation

3.2.1.2 Model B: Identification Robustness

Concept	Definition	Indicators	Scale of Measurement	Source	Values
Regional employment growth	Annual change in employment in a region	Difference of employment between the present and previous years, over the employment in the previous year	Ratio	LISA with calculation	Positive rate indicates growth, while negative rate indicates decline in creative jobs

Table 6: Overview of Model B's Dependent Variables Operationalization

Employment growth is the dependent variable for the causality question. It is calculated by utilizing the growth rate formula:

$$Employment\ Growth_t = \frac{Employment_t - Employment_{t-1}}{Employment_{t-1}}$$

Equation 4: Employment Growth Rate

3.2.2 Independent Variables

Concept	Definition	Indicators	Scale of Measurement	Source	Values
(Lack of) Sectoral diversity	The degree to which a region is specialized to a specific sector	Herfindahl-Hirschman Index (HHI): $\sum_{industry=0}^{n} \left(\frac{\text{employment}_{\text{industry,region}}}{total\ employment_{region}}\right)^2$	Ratio	CBS with calculation	The closer HHI to 0, the more competition is present, indicating sectoral diversity. The closer HHI to 1, the more specialized the region to particular sectors.

Cultural Heritage	The degree to which a region has tangible cultural heritage assets	Density of cultural heritage goods (monuments) by population	Ratio	CBS with calculation	The higher the density in cultural aspects, the higher the cultural heritage index
Amenities	Ratio of urban amenities over population	Average distance to amenities: • Cultural: cinema, museum, etc • Medical: GP, hospital, etc • Natural: park, terrain, etc • Horeca: hotel, restaurant, etc • Education: primary, middle school • Retail: supermarket dept stores • Childcare: daycare, extracurricular, etc • Transport: access to main road, train station, etc	Ratio	CBS	The higher the distance, the lower accessibility the residents have to the amenities
Office space	The availability of space for commercial activities	Number of new office space	Ratio	CBS	The higher the number, the more new business spaces are built in the region
Wage	The employment opportunities in the region	Average standardized income	Ratio	CBS	The higher the numbers, the higher the wage of the region

Table 7: Overview of independent variables

3.2.3 Control Variables

3.2.3.1 Model A: Locational Decision

Concept	Definition	Indicators	Scale of Measurement	Source	Values
Economic growth	The region's economic growth	GDP volume change	Ratio	CBS	Positive value indicates growth, negative value indicates decline in GDP
Investment	The value of investment in fixed assets that the region receive	Received investment in fixed assets (in million euro)	Ratio	CBS	The higher the value, the more investment the region receives
Human Capital	Share of skilled residents in the region	Number of people with a degree from HBO, WO or higher over the population	Ratio	CBS	The higher the number, the more human capital are present in the region
Localization Economies	Concentration of similar firms in the region	Number of creative firms in the region	Ratio	LISA	The higher the sizes, the greater the localization economies
Urbanization Economies	Concentration of total industries in a	• Size of the market (population) • Randstad dummy	Ratio; Categorical	CBS	• The higher the sizes, the greater the

	region				urbanization economies. • 1 means region is one of the 4 Randstad regions
Related Variety	Related sectors to creative industries that is more likely to generate knowledge spillover	Related variety*	Ratio	CBS with calculation	The higher the related variety, the more related are the industries in the region

Table 8: Overview of control variables

*Related variety is calculated with the formula as follows:

$$RV = \sum_{2-digit\ industry=0}^{n} (p2 * H_g)$$

$$H_g = \sum_{4-digit\ industry=0}^{n} \left(\frac{p4}{p2} * \log_2(\frac{1}{\frac{p4}{p2}}) \right)$$

p4= employment in 4-digit industry/total employment in region

p2= employment in 2-digit industry/total employment in region

3.2.3.2 Model B: Identification Robustness

Concept	Definition	Indicators	Scale of Measurement	Source	Values
Population growth	Annual change in population in a region	Average change in population in a region over 1 year	Ratio	CBS	The higher the rate, the higher the population growth
(Lack of) Sectoral diversity	The degree to which a region is not specialized to a specific sector	Herfindahl-Hirschman Index (HHI)	Ratio	CBS with calculation	The closer HHI to 0, the more competition is present, indicating sectoral diversity
Traffic density	The degree to which the commute is congested	Average time spent per commute trip	Ratio	CBS	The longer the time, the more congested is the traffic
Related Variety	Related sectors to creative industries that is more likely to generate knowledge spillover	Related variety industries	Ratio	CBS with calculation	The higher the related variety indicates that the region has more sectors that are related to one another.
Human Capital	Share of skilled residents in the region	Share of people with tertiary education degree	Ratio	CBS	The higher the measure, the larger human capital stock a region possesses.

Table 9: Control Variables for Identification Robustness

3.3 Research Strategy

This study aims to identify factors causing growth and creativity to co-evolve in urban regions, and to test the impact of creative class and creative industries on regional employment growth. The study provides empirical findings to the theories of creative industries and creative class particularly to the two objectives above; hence this research is deductive in nature.

The first objective is explanatory and the second would be testing objective. With the large research units covering 40 COROP regions of over 19 years in the time period 1996-2015, secondary data analysis is relevant for this study. This will allow the researcher to perform the study with minimum time and costs, yet covering the designated geographical and temporal scope.

Five sub-questions are addressed in this study, with the first two being spatial analyses and the remaining three being statistical analyses. The spatial analyses will be conducted using GIS, while the statistical analyses by the STATA software. Further details on the data collection and analysis will be discussed below.

3.4 Data Collection, Sample Size, and Selection

The data used will be panel data, which deals with both cross-sectional data (40 COROP regions in the Netherlands) and time-series data (19 years from 1996 to 2015).

The study will mainly use the data from the Dutch statistical bureau (Centraal Bureau voor de Statistiek/CBS) and GIS shapefile database. The COROP data in CBS can be found through *statline.cbs.nl*, under the regional data theme. The data for independent and control variables are obtained from this source. The exception for this source would be the creative class, creative industries, creative firms, related variety and employment growth data. The five variables require deeper level of the SBI (Dutch Standardized Industry Classification) of 4 digits, whereas CBS only provides up to 2 digits SBI data for the COROP level. Hence, the data for the five variables are obtained through LISA. LISA is a database, which maintains data of all institutes/bodies that provides paid work in the Netherlands. Hence, the data for employment and firm locations in 4-digits SBI, of which are required for the generation of the four variables, are available in LISA. However, the database has restricted access as these deeper level data are categorized as microdata. For this research, the researcher's supervisor provides the access to the LISA database.

Meanwhile, for the COROP shapefile data, it was obtained through *http://www.imergis.nl/asp/47.asp*, a website which lists down topographic maps from various major sites. The shapefile used is the 2015 version, created by CBS and TopGrenzen.

Certainly, there are drawbacks when using the secondary data as opposed to obtaining the data in the first hand. It implies that the data was collected for the purpose of the first author, which then might not be directly suitable for our own research purpose. In such cases, we need to find the data as close as possible to what we want to analyze and check

if the indicators have the units and scope that we intend. If not, we should perform recalculation to transform the data (Thiel, 2014).

In the context of this study, all data for the statistical analyses are available for the intended geographical scope (COROP regions). Only several data needs to be recalculated in order to generate intended variables, such as HHI index for sectoral diversity and related variety. The more difficult challenge was the fact that only a handful data set covers the full extent of the 19 years period. All four variables that are generated from the LISA database covers the 19 years time period. As for the data from CBS, the availability of data varies per variable.

Variable	Data	Time-period
Cultural heritage	Number of monuments; Population	1996-2016
Amenities	Average distance to amenities	Varies per amenities aspect, overall 2006-2016
Office Space	New commercial area added	1996,2000,2003,2006,2008, 2012
Wage	Average standardized income	2005-2014
Economic growth	GDP Volume Change	1996-2016
Investment	Investment fixed assets	1996-2014
Market size	Population	1996-2014
Population growth	Population growth rate	1999-2016
(Lack of) Sectoral diversity	Employment per SBI code	2010-2015
Traffic density	Traffic density index	2011-2015
Human Capital	Graduates from HBO, WO	2000-2014

Table 10: Overview of data availability based on time-period

3.5 Data Analysis Techniques

In the quantitative data preparation and analysis, there are several terms that are associated with the necessary steps in the procedure. The first is the codebook, which is similar to the operationalization table above but is more detailed. The codebook contains information on each variable and its description, and guide on the data value. Next, it is the data matrix; unlike the codebook that is just the overview, the data matrix already contains the data that will serve as the input to the analysis. Since the data used will be panel data, care will be taken for ensuring the data is in longitudinal form. Further, the data matrix needs to be firstly inspected before it is used in the analysis. The inspections in excel usually include a check if data is repeated or incorrectly entered. Then, the

inspection in STATA involves a variety of tests (ie. outlier test) and tools to fix the data. This step is usually done in combination with descriptive analysis to also aid in inspecting and fixing the data. However, the results of the descriptive analysis can be an outcome on its own. As for the remaining tests, 8 tests are performed before the panel regressions are conducted:

1. **Outlier test**: An outlier is a point of observation that falls out from the prevailing group of observations. Cook's distance (d) is used to predict the outliers, and the final model will exclude them by using the rule of thumb d<4/(number of observations)
2. **Normality test**: The normal distribution for the error term is assumed. The Kernel density graph and Shapiro-Wilk test are utilized to test this assumption.
3. **Homoskedasticity test:** Homoskedasticity is an assumption, which refers to the constant variance of the error term. In case of heteroskedasticity, 'robust' syntax should be added to the final model as a solution
4. **Multicollinearity test**: Multicollinearity issue is present when two or more independent variables are highly correlated with each other. VIF test is utilized to inspect this assumption. The rule of thumb is to drop variables that have VIF results higher than 10.
5. **Linearity test:** Linearity is assumed as the relationship between the dependent and independent variables. In order to inspect this, two-way scatterplots, for each dependent and independent variables combination, are visually inspected. In case that the relationship is non-linear, transformation to logarithmic or squareroot forms are undertaken to turn the relationship to linear.
6. **Model specification test:** This assumption looks at if the model is justly specified. Under-specification indicates that variables that are important to the model are omitted, while over-specification indicates that variables that are irrelevant to the model are included. Omitted variables test is used to test this assumption, with the null hypothesis that there is no omitted variable. Link test can also be added to test this assumption.
7. **Serial autocorrelation test**: Serial autocorrelation is an issue when the error terms in the temporal dimension are correlated between one another. Xtserial is the syntax to test this assumption, with the null hypothesis there is no first-order correlation.
8. **Hausman test for fixed and random effects:** Panel data can be analyzed with either fixed or random effects. This test aids the selection for which effect is appropriate. Fixed effects control unobserved influence from entities that may bias

the dependent and independent variables. Meanwhile, random effects regression assumes that these effects are random, hence will not correlate with the variables. Hausman test helps in determining which effects to be used for analyzing the panel data (Wooldridge, 2013)

The next step after assumption tests would be to conduct the inferential analysis. The following are the models that will be used in this study: the panel ordinary least squares (OLS) model will be used for sub-question 3 and the panel two stage least squares (2SLS) model will be used for sub-questions 4 and 5.

The second model is highlighted in this research, of which the instrumental variable (IV) technique will be utilized to analyze the endogenous relationship between employment growth and the creative variables. To begin the process, the first step is to select the valid instrumental variable that satisfies two conditions. The first is that the instrumental variable must be strongly correlated with the endogenous independent variable. The second condition is that it also must not be correlated with any other determinants, and in our case, particularly uncorrelated with the dependent variable. This means that the instrumental variable used in this study must be highly correlated with the creative variables, but uncorrelated with the employment growth.

The selected IV for this study will be generated using the Bartik Instrument, which is based on the shift-share analysis. The Bartik instrument is a method for the instrumental variable, created by Timothy Bartik in his paper (Bartik, 1991). Since then, the method has been implemented in various researches (Ascani and Gagliardi, 2014, Crescenzi, Gagliardi, et al., 2015). In essence, the method adopts the concept wherein regions gain from a portion of the national growth, which is "proportional to its initial share of employment by division taken as a measure of specialization and calculated in 1991" (Ascani and Gagliardi, 2014)

In other words, it predicts the share of employment in one side that is uncorrelated with the shift in time, therefore making the instrument to satisfy both conditions of the instrumental variable, by separating employment growth and the creative variable. Below is the proposed Bartik instrument for this study. The left part is what we call the 'share' aspect, which measures the share of employment in the region in the year before our sample. The right part is called the 'shift' aspect, which shifts the time for creative jobs but excluding the region so that it remains exogenous with the 'share' part.

$$IV = \left[\frac{employment_r, 1999}{employment_{NL}, 1999}\right] x[(creative\ variable_{NL}, t) - (creative\ variable_r, t)]$$

r : particular region in the Netherlands/NUTS 3

NL: whole country

t: each year in sample after 1999

1999: the year before sample

Equation 5: Bartik Instrument

After the instrumental variable selection, 2SLS model will be performed. As it name suggests, the 2SLS model is performed in two steps: the first is a regression between the IV and the endogenous variable, and the second is the regression between the IV, replacing the endogenous variable, and the dependent variable.

For the 2SLS model, particular tests for the model are also performed. These are included as the result of the 2SLS regression; the tests are namely:

- **Weak instrument test:** In relation to the first condition of a valid instrumental variable, the Cragg-Wald F test and the underidentification test are often referred to analyze if the instrumental variable is correlated strongly enough with the endogenous variable. The rule of thumb is the results of these tests should be above 10, for the instrumental variables to satisfy its first condition for validity. Observing the significance between the instrumental variable and the endogenous variable in the first stage may also complement the F test.
- **Sargan-Hansen J Overidentification test**: This test is utilized when more than 1 instrumental variables are used. The test analyses if instrumental variables are exogenous enough to the error term

Other than STATA, another tool to be used in this research is GIS (Geographic Information System). It is useful in relating the data to spatial aspects. The preparation of data for GIS is mainly to insert the latitude and longitude of the neighbourhood, as well as to give the data ID. Then, data is imported to GIS and the spatial distribution of the employment growth, creative industries, and creative class are then displayed across the 40 COROP regions in the form of a map.

Research Question	Data Used*	Method	Tool/Software	Outcome(s)
1. During the year 1996 to 2016, how is creativity – both in creative industry and creative class form – distributed in the Netherlands?	Creative industry and creative class cluster	Join and symbology	GIS	• Creative industries spatial distribution map • Creative class spatial distribution map
2. During these years, how does the regional employment growth evolve?	Regional employment growth	Join and symbology	GIS	• Regional employment growth spatial distribution map
3. What regional factors explain the spatial distribution of creative industries and creative class respectively?	Creative industry and class cluster, determinants	OLS	STATA	• Causal relationship between creative industries and determinants • Causal relationship between creative class and determinants
4. To what extent does creative industries drive employment growth?	Creative industry, regional employment growth and instrumental variable	2SLS Bartik Instrument	STATA	• Identification robustness test and causal relationship between creative class and employment growth
5. To what extent does creative class drive employment growth?	Creative class, regional employment growth and instrumental variable	2SLS Bartik Instrument	STATA	• Identification robustness test and causal relationship between creative industry and employment growth

*All data used are secondary data

Table 11: Overview of Data Analysis

3.6 Validity and Reliability

As a measure for validity, control variables are used in the study. Moreover, the proxies for variables chosen have theoretical base and has been used empirically to ensure its validity. The data used in this study are also collected from credible sources: CBS as the official Dutch statistics institute and LISA as an established Dutch database for labour information. The deep geographical scope of NUTS 3 or COROP regions, combined with 19 years of time period also improves the internal validity of the analyses. However, due to the variance in time period completeness for each variable, this might affect the validity and hence, it is a point for improvement in further research.

In order to improve the robustness of the data, dependent variables are analysed in three different forms: absolute value, relative value to national average and growth rate. Further, the models also employ backward elimination where the control variables are removed in steps in order to further check robustness.

In terms of external validity, this study may only be applicable to the context of Dutch regions. Different contexts in particularly the economic structure of other regions and nations should be taken into account in applying the results of this study.

Finally, as for reliability, steps and tools used in this study have been elaborated above for reproduction should other scholars are interested in the study.

Chapter 4: Research Findings and Analysis

This section presents the results of the data analysis conducted in the study. The section begins with the descriptive analysis (4.1), elaborating on the employment growth, creative industries and creative class trends, as well as the general characteristics of the overall data. The inferential analysis results follow (4.2), presenting the findings for the locational decision factors for creative industries and creative class, and the causality between employment growth and the creative variables.

4.1 Descriptive Analysis

4.1.1 Employment Growth Distribution and Development

The *Employment* data is obtained from LISA for the period 1996-2015 of each 40 COROP regions. The *Employment Growth Rate* varies from negative to positive value, wherein a negative value indicates a decline in employment from the previous year and positive value indicates an increase in employment. The diagram below presents the trend at the national level over the 19 years. It is demonstrated that the growth shows fluctuation, yet overall it is a downward flow. The highest peak is recorded in 1998 with 4.34%, and the lowest valley is in 2013 with -1.11%.

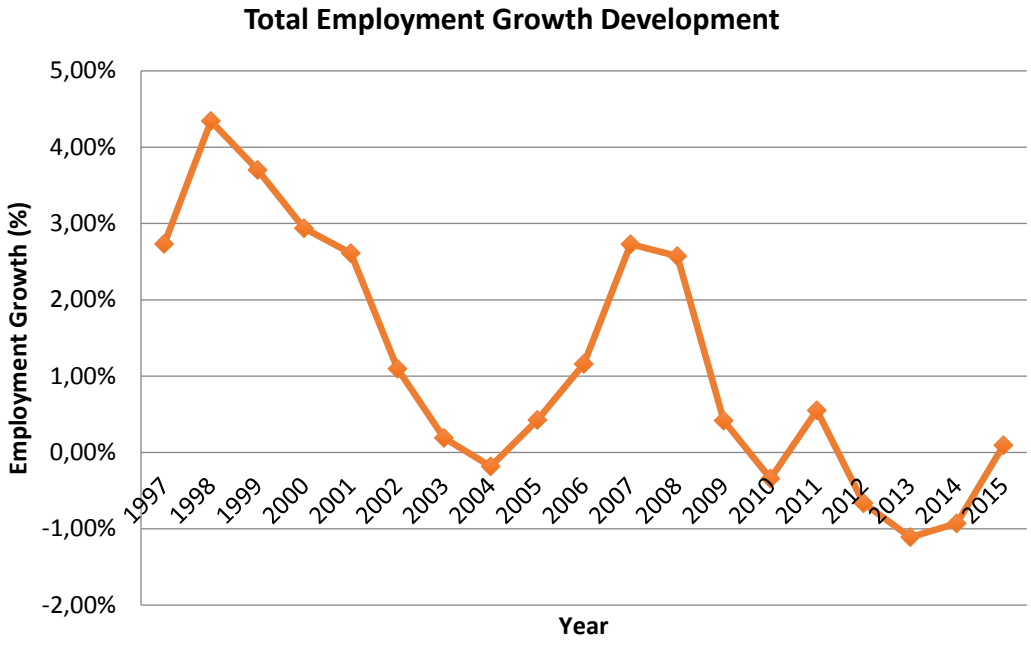


Figure 2: Employment Growth 1997-2015, national level

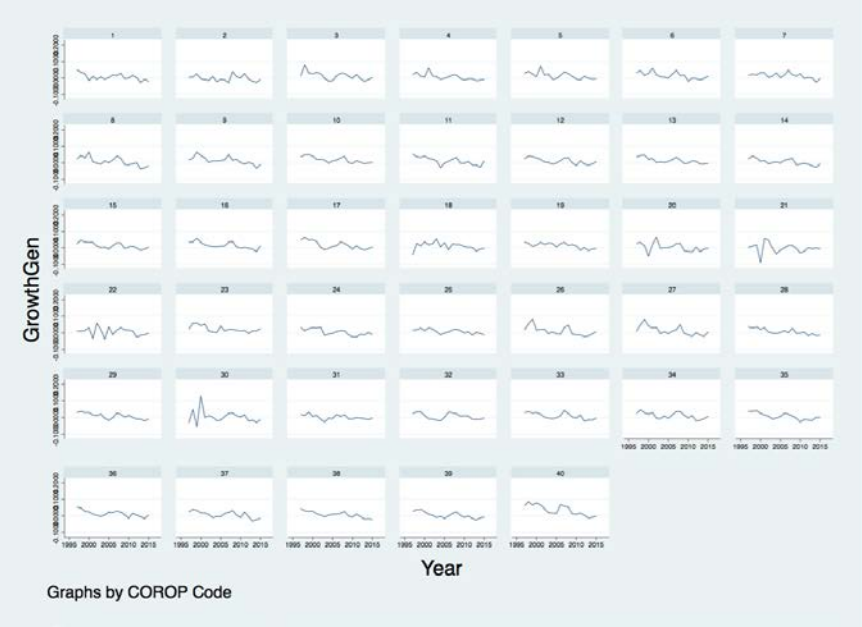


Figure 3: Employment Growth 1997-2015, COROP level

Looking at the employment growth rate development at each COROP region, the overall trend seems to be more stable than the development at national level. However, some regions experienced greater fluctuations than average, such as 21 (Haarlem), 22 (Zaanstreek), and 30 (Zuidoost Zuid-Holland).

Another analysis was performed to inspect the spatial distribution between the COROP regions. Below are the GIS maps of employment growth in the year 1997, 2003 and 2015. We can visually observe the overall decline over the course of time, exhibited by the decreasing overall intensity of colour from the year 1997 to 2003 and 2015. The Randstad areas seem to have the highest employment growth in the three years. In 1997, the Zuidoost Noord-Brabant area, which includes the city Eindhoven, accompanied the Randstad cities for the higher employment growth. In 2003, the southern part of the Netherlands seems to lose the rate, hence the higher growth is seen in the northern part of the country. In 2015, most of the regions have negative employment growth, with only a handful of regions such as Groot-Amsterdam and Zuidoost Noord-Brabant, which maintain positive growths.

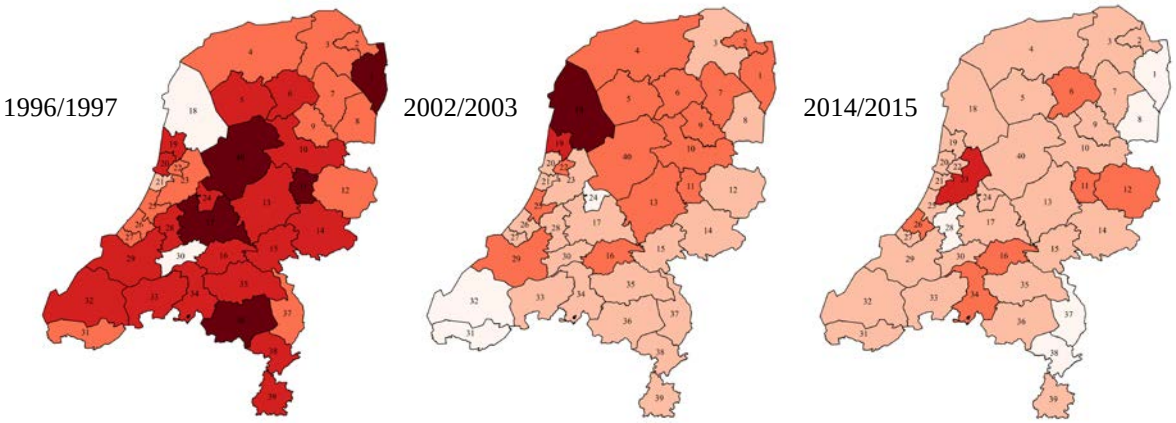


Figure 4: Spatial distribution employment growth 1996/1997, 2002/2003 and 2014/2015

Moving forward to inspect the data from the statistical perspective, the *Employment Growth* data was tested for skewness and normality. The data is slightly skewed to the right (0.49 skewness, 0 pass) and slightly higher peakedness (4.66 kurtosis, 3 pass). The normality tests for the variable also failed by a slight amount as seen from the Kernel Density estimate. However, since the values barely passed the tests, the variable is kept as is and is not transformed into the log form.

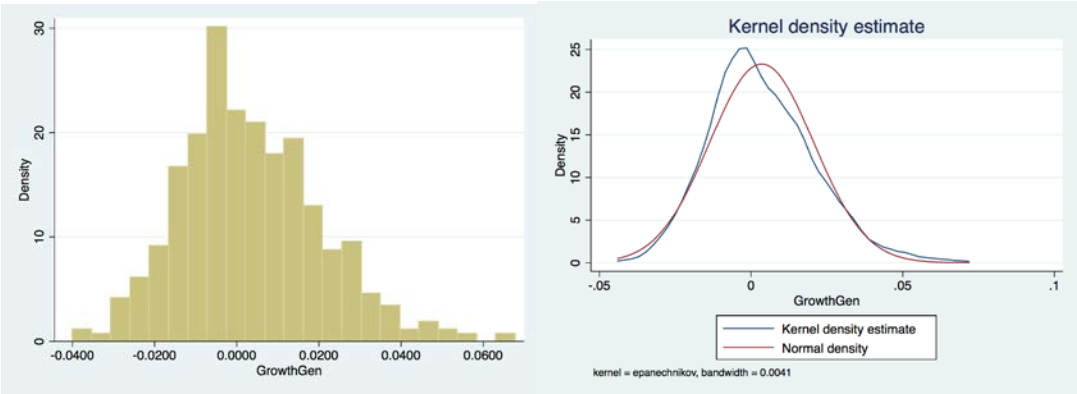


Figure 5: Skewness and normality

4.1.2 Creative Industries Distribution and Development

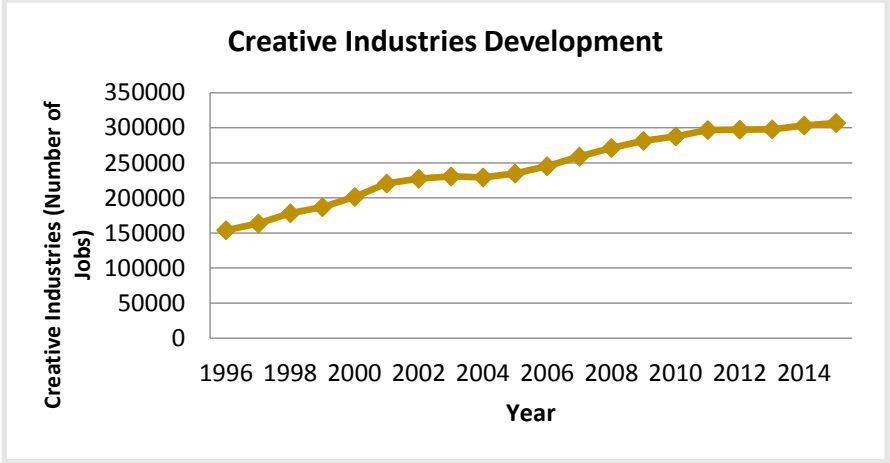


Figure 6: Creative Industries Development 1996-2015

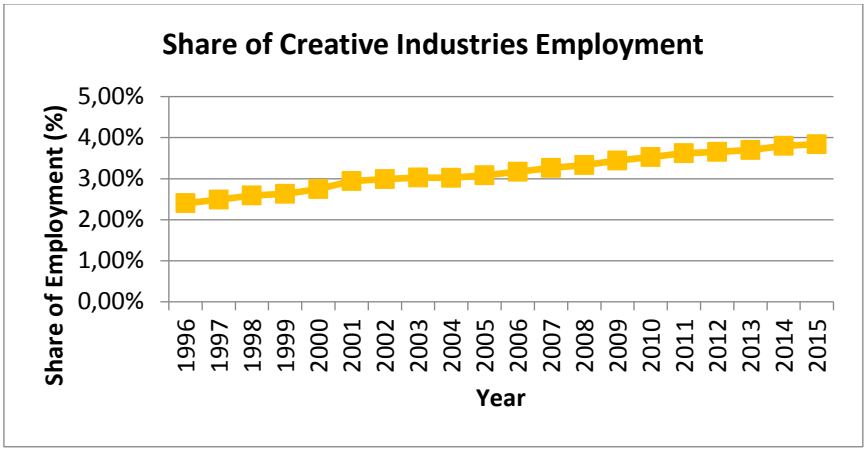


Figure 7: Share of Employment Creative Industries

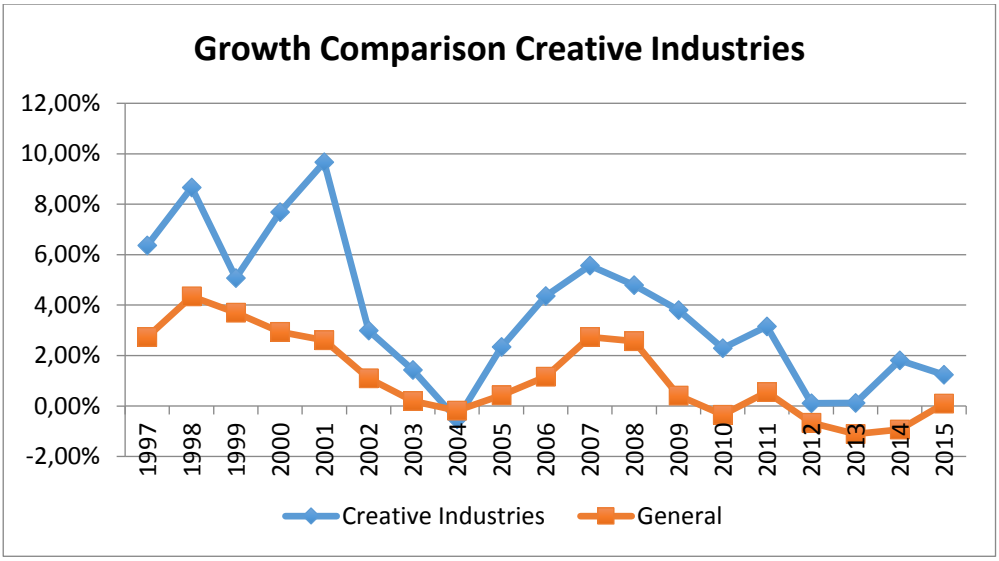


Figure 8: Growth Comparison Creative Industries

Above is an overview of the trends in the creative industries over the period 1996 – 2015. The overall trend exhibits an increasing trajectory over the years, seen in figure 5. However, the share of employment for the creative industries is small; yet continue to increase throughout the years as seen in figure 6. As for the growth rate, in most years the creative industries tend to grow at faster rate than the general employment. We can also see in figure 7 that the growth fluctuates over the period both for creative industries and the general employment. Taking an average annual growth in the period 1996-2015, the creative industries grow at **3.9%** annual average, whereas the general employment grows at **1.23%** annual average.

Looking at the COROP level, most of Randstad areas have the higher number of employment in the creative industries sectors, as is also demonstrated in other literature (Kourtit, Mohlmann, et al., 2013). However, the growth rate is frequently faster at periphery areas, such as the Friesland areas for the creative industries growth rate 2014-2015. The diagrams below are the creative industries (in employment) spatial distribution maps for the years 1996, 2003 and 2015. In 1996, 23 (Groot-Amsterdam) has the largest creative industries employment, followed by 24 (Het Gooi en Vechtstreek) and 27 (Delft). In 2003, there seems to be a decrease in northern regions but significant increase in 26 (Den Haag) and 29 (Groot-Rijnmond). Finally, in 2015, a decrease is observed in 26 and 29, but a significant increase is seen in 12 (Twente), 14 (Achterhoek), 16 (Zuidwest Gelderland), 35 (Noordoost-Noord Brabant).

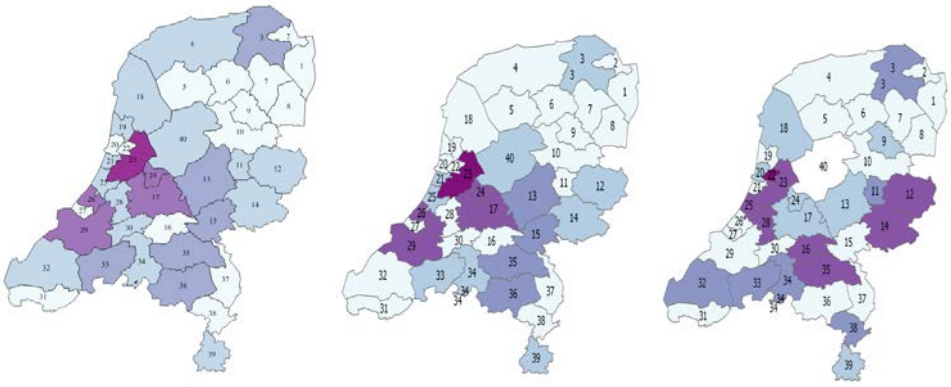


Figure 9: Spatial distribution creative industries 1996, 2003, and 2015

In performing the inferential analysis, the creative industries data are transformed into the location quotients to measure the concentration of the creative industries, as one of the dependent variables. The location quotient value is interpreted as follows, an above 1 figure signifies that the creative industry cluster in the particular region and time is larger than the average at the national level. Hence, the area may be addressed as a creative local system (CLS) (Lazzeretti, Capone, et al., 2012). Observing the LQ values from the data, 13 COROP regions consistently place the top 10 over the year 1996-2015. These are: *Het Gooi en Vechtstreek, Haarlem, Overig Groningen, Utrecht, s-Gravenhage, Alkmaar en omgeving, Veluwe, Arnhem/Nijmegen, Midden Noord Brabant, Zaanstreek, Flevoland, and Zuid-west Overijsel*.

Three of the Randstad regions are observed in these top 13 creative clusters, except for Groot-Rijnmond (Rotterdam). Yet, most of the clusters are located in the less urbanized areas as predicted by Modder and Saris (2005). The explanation is as follows; the prices in the inner city of the large urban centres have become too expensive and scarce in quantity. Regions in the periphery can provide the alternative space, such as Zaanstreek and Flevoland (Almere) (Modder and Saris, 2005).

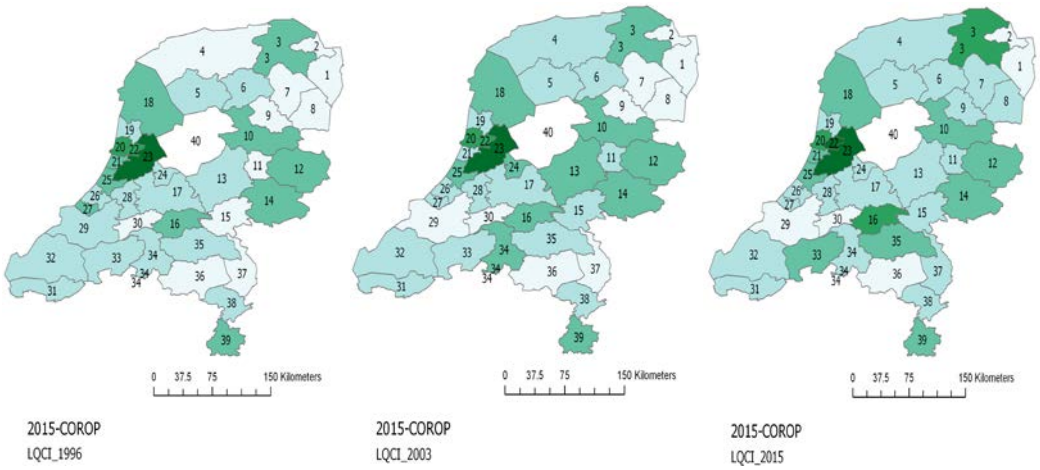


Figure 10: Spatial distribution Location Quotient (LQ) Creative Industries 1996, 2003, and 2015

These diagrams map the creative industries spatial distribution (in location quotient) in the years 1996, 2003 and 2015. Compared to the creative industries in employment, the variance between the years and region seem smaller in terms of location quotient. However, the trends

are similar to the previous set of maps. The Randstad areas, particularly Amsterdam, still consistently have the higher location quotient. In 2003, there seems to be a shift from west to east, 21 (Haarlem), 27 (Delft), 29 (Groot-Rijnmond) loses location quotient and 4 (Noord-Friesland), 13 (Veluwe), 15 (Arnhem/Nijmegen), 34(Midden-Noord-Brabant) gains location quotient. In 2015, an overall increase in creative industries location quotient can be seen.

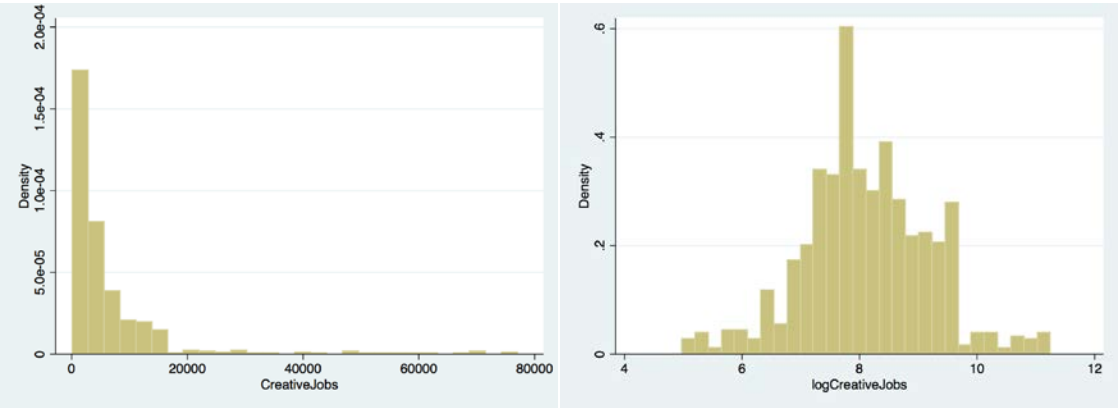


Figure 11: Histogram CreativeJobs and logCreativeJobs

For the skewness and normality test, the data is shown to be highly skewed to the right. Hence, the CreativeJobs is transformed into the log form. The test for the log form shows that the data now have just very light skewness (0.03 skewness, 0 pass) and peakedness (3.5 kurtosis, 3 pass).

In order to improve robustness, the creative jobs will be inspected in three forms: the absolute value, the relative value to the national average (location quotient) and the creative growth. In addition, studies that performed such analysis often disaggregate the variable into its three domains to see whether results will vary (Stam, de Jong, Jeroen P. J., et al., 2008, Kourtit, Mohlmann, et al., 2013). In this study, the three domains of the creative industries will also act as dependent variables for the locational decision regressions.

4.1.3 Creative Class Distribution and Development

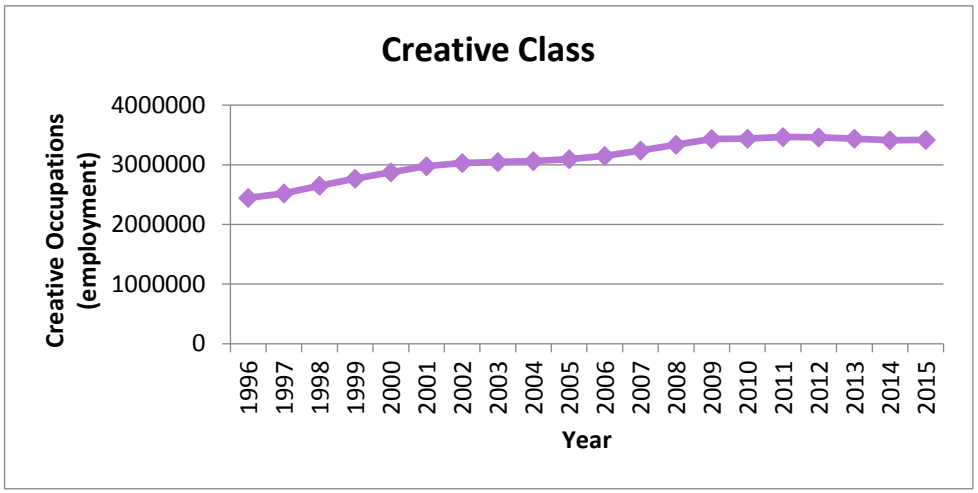


Figure 12: Creative Class Development 1996-2015

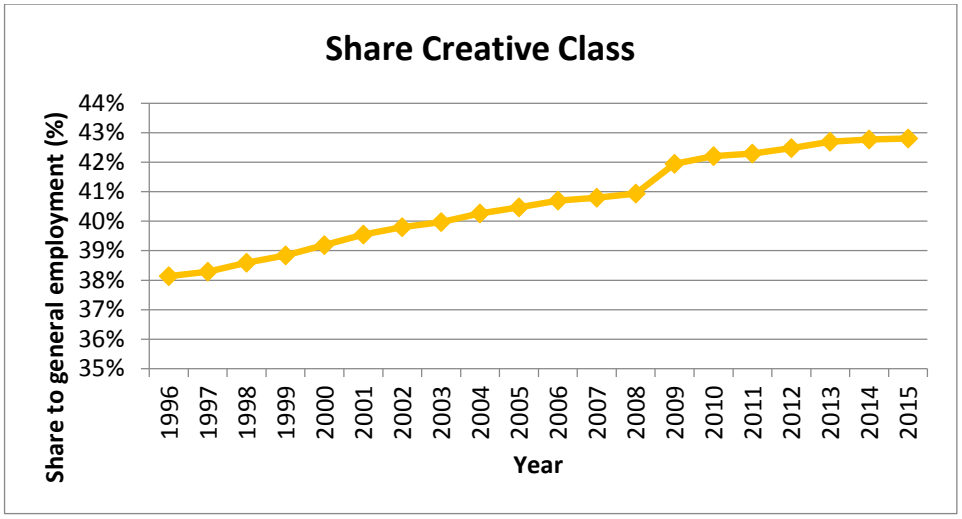


Figure 13: Share of Creative Class

Above is an overview of the trends of the creative class over the period 1996 – 2015. As with the creative industries, the overall trend exhibits positive growth over the years. However, unlike the creative industries, the creative class holds much higher share to the general employment (38%- 43%). As for the growth rate, in all years the creative class grows at slightly faster rate than the general employment. The gap is much closer compared to the growth gap between creative industries and employment growth, with creative class at **1.88%** and general employment at **1.23%** annual growth average.

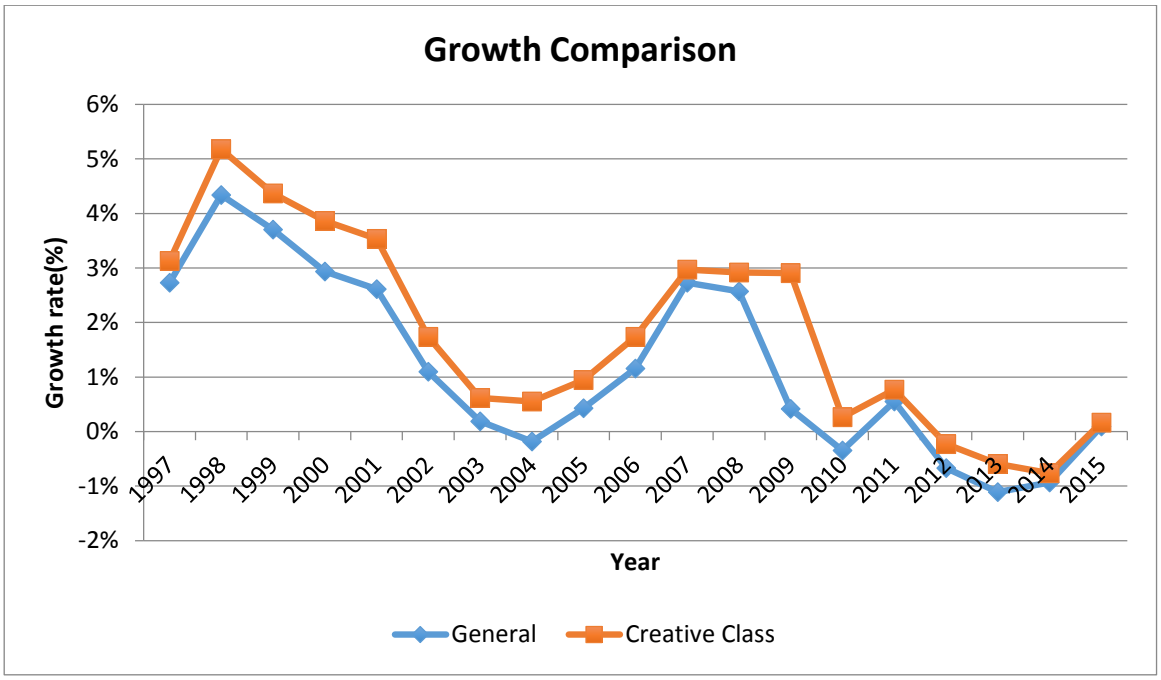


Figure 14: Growth Comparison Creative Class

Looking at the COROP level, the creative class seems to start clustering in the Randstad areas. From 1997 to 2003, the creative class appears to distribute towards the central and southern areas. Since 2003, there appears to be very small variance in terms of spatial

distribution. 23 (Groot-Amsterdam) and 17 (Utrecht) dominate, as the highest creative class clusters since 2003. 13 (Veluwe, which includes Wageningen), 15 (Arnhem/Nijmegen) and 36 (Zuidoost-Zuid-Brabant, which includes Eindhoven) evolve to join 29 (Groot-Rijnmond, which includes Rotterdam) and 26 (‘s-Gravenhage, which includes The Hague) as the higher clusters of creative class.

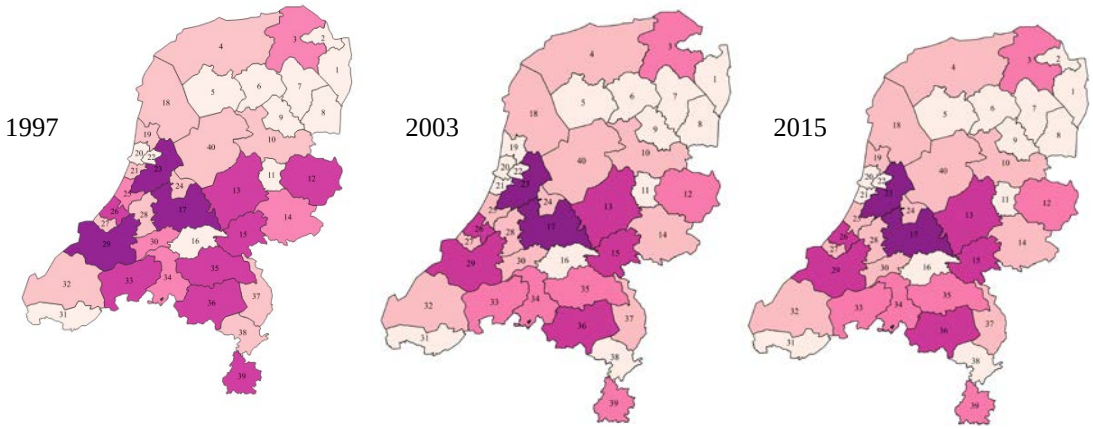


Figure 15: Creative Class Spatial Distribution

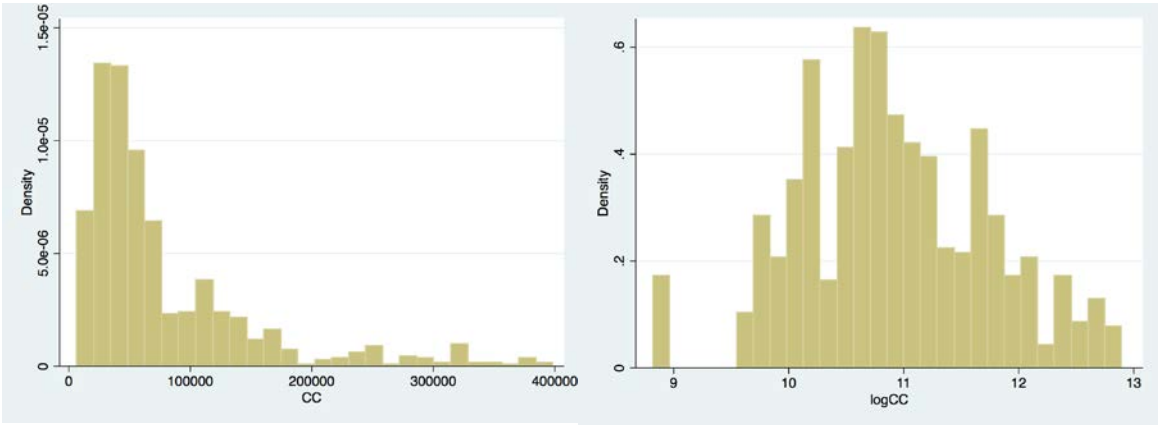


Figure 16: Histogram CreativeClass and logCreativeClass

For the skewness and normality test, the data is shown to be highly skewed to the right. Hence, the Creative Class is transformed into the log form. The test for the log form shows that the data is still lightly skewed to the right (0.11 skewness, 0 pass) and has slightly lower peakedness (2.87 kurtosis, 3 pass).

As with the creative industries, the creative class will be analysed in three forms: the absolute value, the relative value to the national average (location quotient) and the creative class growth.

4.1.4 Spatial Distribution of Employment Growth, Creative Industries and Creative Class Overview*

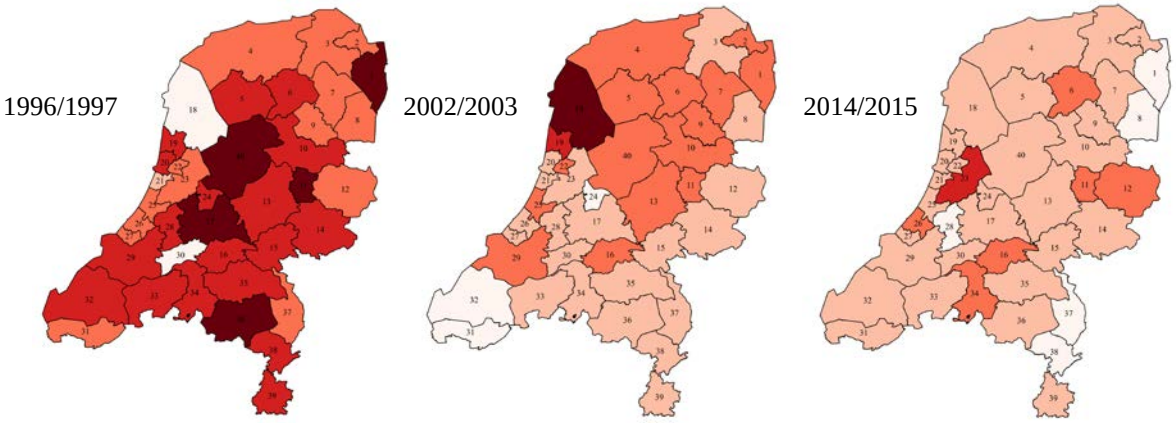


Figure 17: Spatial Distribution Employment Growth

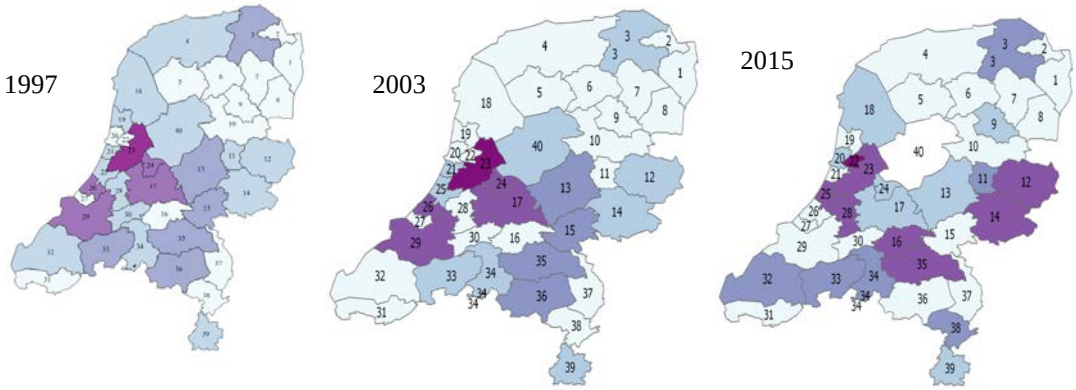


Figure 18: Spatial Distribution Creative Industries

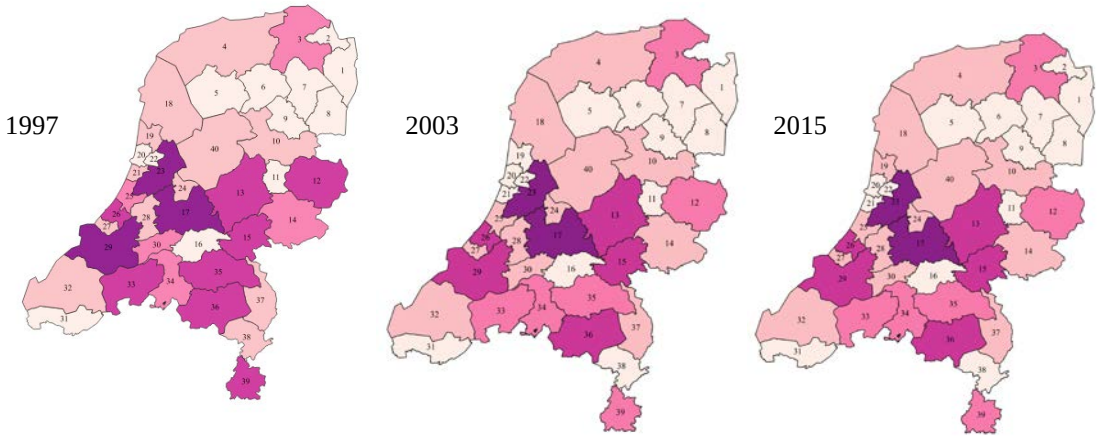


Figure 19: Creative Class Spatial Distribution

Looking at the spatial distribution development of employment growth, creative industries and creative class, we may predict the outcome of the analysis. Firstly, in comparing the similarity of preferences of creative industries and creative class, we may compare the spatial distribution development between the two creative variables. We can observe that in 1997

and 2003, similar pattern appears, wherein the creative variables both cluster in the west and central areas of the Netherlands. This may predict that indeed there is similarity between the preferences of creative industries and creative class. However, in 2015, when creative industries in the central Netherlands have dispersed to the East, the creative class maintain its distribution pattern. Hence, we will look further in the inferential analyses on the factors that may contribute to similarity and differences of the two creative variables' spatial distribution. Secondly, we may try to predict the outcome for the identification robustness. Employment growth appears to have the highest variance throughout the years, followed by creative industries, and lastly creative class appears to be quite stable in its distribution. Further, employment growth shows overall decline in its trend, while creative industries continue to grow and creative class is almost indifferent, with slight decline from 1997 to 2003. From these observations, it is difficult to predict the outcome of this study. However, in regard for the similarity of developments in each region, creative industries seem to be more alike with the development of employment growth. In particular, from 2003 to 2015, both shows increase in Twente (12). Yet, this similarity only represents very small of the variation and unobserved forces are not yet controlled, hence we should proceed further to the analyses to discover the findings.

*enlarged maps of employment growth, creative industries and creative class may be found in annex

4.1.5 Data Characteristics

In this section, the results of the statistical descriptive analyses in STATA will be elaborated. The analyses are divided into the sub research questions that each model set aims to answer. Each contains the summary and the correlation tables for the data used.

4.1.5.1 Model A: Locational Decision

Variable	Obs	Mean	Std. Dev.	Min	Max
logCC	800	10.91753	.8248345	8.822801	12.8959
logCreativ~s	800	8.119787	1.069898	4.983607	11.25286
HumanCapital	600	.0115552	.0072357	.0028555	.0502479
Wage	400	23.47025	2.08176	17.9	31.5
URBANINV	760	6.90e-10	1.398535	-1.487597	5.431892
CulturalDe~2	840	.0053818	.0086342	0	.0536974
logGDP	612	.8988122	.8781165	-2.302585	3.152736
Amenities2	160	1.02e-08	3.864108	-6.576978	7.615055
RelatedVar~y	800	1.959578	.1872023	1.216026	2.505697
SectoralDi~y	240	.0956382	.015699	.0403635	.1345653
CRfirmsINT	800	3.92e-10	1.316344	-.9139605	10.71019

Figure 20: Summary of Variables Locational Decision

Above is the summary of variables that are analysed with both the creative class and creative industries. As seen from the table, several variables have been aggregated to create indexes, using the Principal Component Analysis (PCA). This is due to high correlation observed between variables, particularly the various types of amenities (Amenities2), Randstad dummy, market size and investment (URBANINV) and creative firms and international share (CRfirmsINT). The Business Area variable is dropped because of multicollinearity issue.

	Log Creative Jobs	Human Capital	Wage	URBAN INV	Cultural Density2	logGDP	Amenities2	Related Variety	Sectoral Diversity	CRfirms INT
logCreativeJobs	1.00									
HumanCapital	0.50	1.00								
Wage	0.35	0.03	1.00							
URBANINV	0.76	0.35	0.14	1.00						
CulturalDensity2	0.03	-0.02	-0.06	0.02	1.00					
logGDP	-0.08	-0.02	-0.19	-0.02	0.03	1.00				
Amenities2	-0.66	-0.50	-0.56	-0.48	0.07	0.34	1.00			
rev2_ch	0.51	0.10	0.33	0.29	0.04	-0.19	0.00	1.00		
SectoralDiversity	0.11	0.17	0.24	0.14	-0.15	-0.11	-0.43	0.03	1.00	
CRfirmsINT	0.73	0.41	0.19	0.87	0.01	-0.04	-0.48	0.22	0.07	1.00

Table 12: Correlation Locational Decision Model

4.1.5.2 Model B: Identification robustness

Variable	Obs	Mean	Std. Dev.	Min	Max
GrowthGen	760	.010165	.0220167	-.0886527	.1317121
logCC	800	10.91753	.8248345	8.822801	12.8959
logCreativ~s	800	8.119787	1.069898	4.983607	11.25286
PopGrowth	720	1835.114	2927.695	-6023	15813
SectoralDi~y	240	.0956382	.015699	.0403635	.1345653
HumanCapital	600	.0115552	.0072357	.0028555	.0502479
RelatedVar~y	800	1.959578	.1872023	1.216026	2.505697
TrafficDen~y	240	1995.396	1031.401	0	4286
IV	800	74385.04	59938	6824.138	287352.7

Figure 21: Summary of Variables

	GrowthGen	logCC	Log CreativeJobs	PopGrowth	Sectoral Diversity	Human Capital	Related Variety	Traffic Density	IV
GrowthGen	1.00								
logCC	0.04	1.00							
logCreativeJobs	0.00	0.93	1.00						
PopGrowth	0.24	0.62	0.60	1.00					
SectoralDiversity	-0.09	0.15	0.11	0.09	1.00				
HumanCapital	-0.07	0.50	0.50	0.30	0.17	1.00			
RelatedVariety	-0.28	0.51	0.51	0.09	0.03	0.10	1.00		
TrafficDensity	0.02	0.57	0.61	0.60	0.36	0.44	0.04	1.00	
IV	**0.02**	**0.92**	**0.84**	0.70	0.11	0.42	0.38	0.51	1.00

Table 13: Correlation Identification Robustness Model

In the correlation, we can observe the correlation between the instrumental variable (employment growth) and each of endogenous variables. There appears to be high correlations with both creative jobs (0.84) and creative class (0.92), this signals for strong instruments although further tests would be necessary to confirm it. On the other hand, the instrumental variable has very low correlation with the dependent variable. This may indicate sufficient exclusion restriction, which is the second condition for a valid instrumental variable.

4.2 Inferential Analysis

4.2.1 Locational Decision

The locational decision will be performed for creative industries and creative class. Each dependent variable will undertake backward elimination process and inspected in three forms: the absolute value, the relative value to the national average (location quotient) and the growth rate. Inclusion and exclusion of Amsterdam will also be conducted to observe the effects of one of the highest clusters of creativity in the Netherlands. The inferential analyses are performed with random effects, which is in accordance with the Hausman test results.

4.2.1.1 Creative Industries

VARIABLES	(1) Creative Jobs	(2) Creative Jobs	(3) Creative Jobs	(4) Creative Jobs	(5) Creative Jobs	(6) Creative Jobs	(7) Creative Jobs
Amenities2	-0.0335	-0.0587*	-0.0936**	-0.0923***	-0.0837**	-0.0712*	-0.0773**
	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)
CulturalDensity2	0.529	0.309	0.703	0.790	0.138	-0.176	0.132
	(0.33)	(0.37)	(0.49)	(2.18)	(1.68)	(1.50)	(1.50)
Wage	0.00476	0.0328***	0.0229***	0.0214**	0.0221**	0.0175**	0.0121
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
CRfirmsINT	0.266***						
	(0.06)						
URBANINV	0.110***	0.261***					
	(0.03)	(0.06)					
logGDP	-0.00424	-0.0108	-0.00694				
	(0.01)	(0.01)	(0.01)				
SectoralDiversity	-0.147	-0.597	-0.621	-0.776			
	(0.75)	(0.82)	(0.87)	(1.15)			
RelatedVariety	0.270**	0.322	0.346**	0.557***	0.510***		
	(0.13)	(0.20)	(0.16)	(0.16)	(0.15)		
HumanCapital	27.41***	30.47**	31.73**	26.77**	24.65**	16.01	
	(7.02)	(13.02)	(14.06)	(11.19)	(11.35)	(11.03)	
Constant	7.212***	6.499***	6.715***	6.340***	6.372***	7.647***	7.987***
	(0.43)	(0.57)	(0.53)	(0.53)	(0.52)	(0.31)	(0.21)
Observations	68	68	68	64	64	64	64
R-squared	0.764	0.788	0.409	0.588	0.579	0.524	0.429
Number of CoropCode	37	37	37	36	36	36	36

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 14: Creative Industries backward elimination

To improve the robustness of the results, backward elimination is utilized. The removal of CRfirmsINT compels the model to pass the serial autocorrelation test. This change drives wage and amenities as the explanatory variables to be significant, also with the expected sign of coefficient. Further, URBANINV seems to be irrelevant as its removal causes the model to pass the model specification test. This change results in the consistent significance of Wage and Amenities2 throughout the eliminations, although it also results in the drastic decrease in the overall R-squared. Yet, this may be expected because the models are analysed using random effects. The removal of the population variable excludes the differentiating characteristic between the regions. However, these results correspond better to the hypothesis, wherein Amenities and Wage play crucial roles in attracting the creative industries.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Creative Jobs	All	No Amsterdam	LQ	CIGrowth
Amenities2	-0.0936**	-0.0890***	-0.0857***	-0.0365**	-0.000478
	(0.04)	(0.03)	(0.03)	(0.01)	(0.00)
logGDP	-0.00694	-0.00405	-0.00200	-0.00232	0.0132**
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
SectoralDiversity	-0.621	-0.328	-0.336	-0.280	-0.0330
	(0.87)	(0.60)	(0.61)	(0.66)	(0.36)
RelatedVariety	0.346**	0.172*	0.218*	0.118	0.0540
	(0.16)	(0.09)	(0.12)	(0.11)	(0.04)
CulturalDensity2	0.703	0.685	0.530	0.537*	0.0229
	(0.49)	(0.46)	(0.48)	(0.31)	(0.58)
Wage	0.0229***	0.0200**	0.0191**	0.00314	-0.00584*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
HumanCapital	31.73**	18.03*	19.38*	13.84**	1.146
	(14.06)	(9.21)	(11.18)	(5.45)	(1.06)
Constant	6.715***	7.281***	7.137***	-0.778***	0.0245
	(0.53)	(0.37)	(0.46)	(0.27)	(0.10)
Observations	68	79	75	68	68
R-squared	0.409	0.434	0.364	0.355	0.260
Number of CoropCode	37	40	39	37	37

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 15: Creative industries locational decision regression

The table above presents the results for creative industries. The first three models inspect creative jobs with the exclusion of the outliers predicted by Cook's distance, with all observations including Amsterdam and lastly, without Amsterdam. Human Capital, Wage, Related Variety, and Amenities appear to be consistently significant. This consistency is unexpected, as the findings of other studies clearly emphasize the distinct effects from Amsterdam (Kloosterman, 2004a, Stam, de Jong, Jeroen P. J., et al., 2008). Yet further, two of the three variables are our explanatory variables. This confirms our expectation wherein quality of life and wage figures would be dominant in attracting the creative industries. The Amenities2 index is seen to have negative coefficients, which is expected. Each type of amenity, which comprises the Amenities2 index, is measured by its proximity or the average

distance from the residence area to the particular amenity. Hence, the negative coefficient is expected, as the further the average distance, the less number of amenities provision in the region. Therefore, when the higher number of amenities is predicted to attract creativity, the less provision of amenities will have a negative effect on creative industries. As agglomeration economies attract creative industries (Lazzeretti, Capone, et al., 2012), the positive coefficient of Related Variety is expected. The similar outcome is also expected for Human Capital. Lastly, in comparing the first three models in terms of the goodness of fit, the model which excludes the outliers has the highest R-squared of 0.511 among the three models.

Advancing to the other two forms of creative industries, we observe that LQCreative Industries and Creative Industries growth have differing results with the first three models. Cultural density becomes significant in explaining the creative industries location quotient. Location quotient measures the local importance of the region in a particular industry, which is the creative industry in this case. Literature supports the positive relationship between cultural density (ratio of monuments to population) and the LQCreative Industries (Kloosterman, 2004b, Lazzeretti, Capone, et al., 2012). It is argued that cultural heritage promotes cultural activities and shapes perceptions towards creativity, which are important for the creative industries (Lazzeretti, Capone, et al., 2012). As for the creative industries growth, GDP volume change and Wage appears to be significant. The positive effect from GDP growth shows that the growth of the creative industries still depends on the economic growth of the region as a whole.

	(1)	(2)	(3)	(4)
VARIABLES	LQCreative	LQArts	LQMedia	LQCBS
HumanCapital	7.030	4.978	-10.45	4.327
	(8.16)	(5.48)	(19.64)	(5.75)
Wage	0.00255	-0.0239	-0.0399	-0.0226
	(0.01)	(0.02)	(0.07)	(0.02)
CulturalDensity2	0.0266	3.186	20.01	3.480
	(1.23)	(5.69)	(16.70)	(5.59)
Amenities2	-0.0397**	-0.0267*	-0.143***	-0.0261
	(0.02)	(0.02)	(0.04)	(0.02)
RelatedVariety	0.0724	-0.145	-0.294	-0.129
	(0.09)	(0.29)	(1.05)	(0.34)
logGDP	0.00176	-0.106***	-0.397***	-0.130***
	(0.01)	(0.04)	(0.13)	(0.04)
SectoralDiversity	-0.0860	-3.228	-4.941	-2.666
	(0.77)	(2.33)	(7.37)	(2.35)
Constant	-0.616*	1.386	-0.203	1.300
	(0.34)	(0.92)	(3.05)	(1.05)
Observations	72	72	72	72
R-squared	0.355	0.277	0.432	0.261
Number of CoropCode	37	37	37	37

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 16: Creative industries and its sub-domains

As an additional analysis, the sub-domains for creative industries are analysed. Except for the creative business services, Amenities2 seems to be consistently significant in the overall creative industries location quotient as well as the sub-domain location quotients. The sub-domain location quotients also have GDP to be significant, although unexpectedly with negative effects on the creative industries sub-domain.

4.2.1.2 Creative Class

VARIABLES	(1) Creative Class	(2) Creative Class	(3) Creative Class	(4) Creative Class	(5) Creative Class	(6) Creative Class	(7) Creative Class
Wage	-0.0135***	-0.00270	-0.0101***	-0.00907**	-0.00821**	-0.00945***	-0.0103***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CulturalDensity2	-0.0562	-0.0921	0.192	0.366	-0.0573	-0.263	-0.0824
	(0.19)	(0.20)	(0.17)	(0.81)	(0.66)	(0.58)	(0.64)
Amenities2	-0.0269	-0.0396*	-0.0164	-0.0245	-0.0168	-0.00440	-0.0136
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
SectoralDiversity	-0.495**	-0.473	-0.474**	-0.445			
	(0.25)	(0.33)	(0.22)	(0.27)			
CRfirmsINT	0.0740**						
	(0.03)						
URBANINV	0.0903***	0.163***					
	(0.02)	(0.03)					
logGDP	-0.00395	-0.00436	-0.000605				
	(0.00)	(0.00)	(0.00)				
RelatedVariety	0.119**	0.208**	0.0666*	0.0910**	0.0843**		
	(0.06)	(0.10)	(0.04)	(0.04)	(0.04)		
HumanCapital	9.135**	7.399	7.255**	8.848***	9.324***	7.789***	
	(3.97)	(7.11)	(3.03)	(2.58)	(2.74)	(1.95)	
Constant	11.03***	10.62***	11.11***	11.01***	10.95***	11.18***	11.31***
	(0.21)	(0.28)	(0.17)	(0.16)	(0.16)	(0.13)	(0.13)
Observations	73	73	73	66	66	66	66
R-squared	0.773	0.844	0.368	0.368	0.360	0.305	0.254
Number of COROP	38	38	38	34	34	34	34

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 17: Backward elimination Creative Class

Above are the results of the creative class regression in determining factors that explain its spatial distribution. Unlike the creative industries, the full set of determinants pass the serial autocorrelation. However, it takes the removal of CRfirmsINT and URBANINV for the model to pass the model specification test. We observe that once again the R-squared value declines drastically, yet model 3 and beyond pass all assumption tests. Wage is consistently significant, however, the negative coefficient sign contradicts the literature (Qian, 2008). Human Capital and related variety are also observed to be significant, with positive coefficient. This is expected, as related variety is a proxy for agglomeration economies, which attracts creativity.

VARIABLES	(1) Creative Class	(2) All	(3) No Amsterdam	(4) LQ	(5) CCGrowth
HumanCapital	7.255**	7.104**	7.744**	2.007**	-0.359
	(3.03)	(3.04)	(3.90)	(0.82)	(0.29)
Wage	-0.0101***	-0.00941***	-0.0119***	0.00203**	-0.00460***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CulturalDensity2	0.192	0.186	0.0990	0.0715	0.0158
	(0.17)	(0.18)	(0.17)	(0.09)	(0.19)
Amenities2	-0.0164	-0.0244	-0.0150	-0.00735***	-0.00224**
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)
RelatedVariety	0.0666*	0.0852***	0.0764**	-0.00166	0.00843
	(0.04)	(0.03)	(0.03)	(0.01)	(0.01)
logGDP	-0.000605	-0.000525	-0.00119	-0.000289	0.00396**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SectoralDiversity	-0.474**	-0.401**	-0.442**	0.0637	-0.183*
	(0.22)	(0.20)	(0.19)	(0.08)	(0.11)
Constant	11.11***	11.02***	11.05***	0.889***	0.112**
	(0.17)	(0.18)	(0.21)	(0.05)	(0.05)
Observations	73	79	75	73	73
R-squared	0.368	0.390	0.279	0.515	0.199
Number of COROP	38	40	39	38	38

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 18: Creative Class Determinants

In the first three models, Creative Class is inspected without Cook's distance outliers, with all observations and finally, with the exclusion of Amsterdam. Human Capital, Wage, Related Variety and Sectoral Diversity appear to be significant across the first three models. As has been discussed previously, the negative coefficient seems to contradict the literature. However, looking at the creative class as location quotient, wage has significant, positive influence on the creative class, as has been predicted. Human Capital remained significant, while Related Variety and Sectoral Diversity do not. Amenities2 becomes significant, with the predicted negative coefficient, as the Amenities variable in this study is measured by the average distance to the amenities. Finally, the creative class growth seems to be driven by wage, amenities, sectoral diversity and the GDP volume change.

VARIABLES	(1) Creative Class	(2) CC_A	(3) CCMarlet
HumanCapital	7.255**	7.777**	6.722**
	(3.03)	(3.26)	(3.17)
Wage	-0.0101***	-0.00993**	-0.00540
	(0.00)	(0.00)	(0.00)
CulturalDensity2	0.192	0.200	0.214
	(0.17)	(0.17)	(0.17)
Amenities2	-0.0164	-0.000357	-0.000956
	(0.02)	(0.00)	(0.00)
RelatedVariety	0.0666*	-0.0280	-0.0311*
	(0.04)	(0.02)	(0.02)
logGDP	-0.000605	0.0906**	0.0771*
	(0.00)	(0.04)	(0.04)
SectoralDiversity	-0.474**	-0.409*	-0.362
	(0.22)	(0.24)	(0.24)
Constant	11.11***	10.98***	10.70***
	(0.17)	(0.21)	(0.21)
Observations	73	72	72
R-squared	0.457	0.482	0.475
Number of COROP	38	38	38

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 19: 'Broad' and 'Narrow' Creative Class Comparison

As an additional analysis, the three different definitions of creative class are compared in terms of the locational decision. It appears that human capital is the only determinant, which consistently become significant in the three definitions. In terms of R-squared, the three definitions have similar values ranging from 0.457 to 0.482. This indicates that the current model specification is able to explain almost 50% of the creative class distribution. More detailed results on the locational decision of the two other creative class definitions can be found in the annex.

4.2.2 Creativity and Employment Growth Identification

This section will elaborate the results of the identification robustness question. Creativity will be analysed in three different forms: creative industries, creative class and the creativity index, which combines the two creative variables. Bartik instrument is used for the instrumental variable, with the adjustment in the shift part of the formula, following the endogenous variable being tested. However, during implementation, the proposed Bartik instrument is not yet strongly correlated with each of the creative variables. Hence, overidentification (the use of multiple instrumental variables) is utilized. For creative industries, other than the Bartik with employment share, another Bartik instrument with the share of the young population of 20 – 30 years old is also generated.

$$IV = \left[\frac{young\ population_r, 2002}{employment_{NL}, 1999}\right] x\ [(creative\ industries_{NL}, t) - (creative\ industries_r, t)]$$

Equation 6: Additional Bartik instrument for Creative Industries

On the other hand, an additional Bartik instrument with cultural amenities share is generated for the creative class.

$$IV = \left[\frac{cultural\ amenities_r, 2002}{employment_{NL}, 1999}\right] x\ [(creative\ class_{NL}, t) - (creative\ class_r, t)]$$

Equation 7: Additional Bartik instrument for Creative Class

4.2.2.1Creative Industries

	(1)	(2)	(3)	(4)
VARIABLES	OLS	2SLS	OLS	2SLS
PopGrowth	3.64e-07	-4.58e-07	2.26e-06**	2.52e-06**
	(0.00)	(0.00)	(0.00)	(0.00)
RelatedVariety	0.0270**	0.0208	0.0206*	0.0256**
	(0.01)	(0.01)	(0.01)	(0.01)
SectoralDiversity	-0.150	-0.101	-0.00440	-0.0410
	(0.13)	(0.14)	(0.11)	(0.11)
HumanCapital	5.382***	5.443***	3.999***	4.253***
	(1.41)	(1.35)	(1.28)	(1.16)
logCreativeJobs	0.0989**	0.233**	0.0187	-0.0490
	(0.05)	(0.11)	(0.02)	(0.06)
TrafficDensity	-3.04e-05**	-3.99e-05***		
	(0.00)	(0.00)		
Constant	-0.887**		-0.262	
	(0.39)		(0.20)	
First stage F statisctics (P value)		5,29 (0,005, 0,003)		8,84 (0,031, 0,078)
Cragg-Donald Wald F test		5,12		11,2
Sargan-Hansen J test		2,628 (0,105)		3,513 (0,061)
Observations	160	160	200	200
R-squared	0.222	0.148	0.113	0.076
Number of COROP	40	40	40	40

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 20: Creative Industries and Employment Growth 2SLS

As has been discussed in the introduction of this section, two Bartik instruments are utilized for the creative industries and employment growth model: the first with the employment share and the second with the young population share. This combination appears to have the best results for testing both assumptions of the instrumental variable. However, it is observed that this combination is not strong and exogenous enough. The instruments show significant results in the first stage regression. However, the F tests in both the first stage regression and the Cragg-Donald Wald test are still below 10, being the rule of thumb to pass the tests. Further, the model barely passes the Sargan-Hansen J test in the first model specification and failed the J test in the second model specification, by rejecting the null hypothesis wherein the instruments are exogenous to the error term. In these circumstances, we see that for the

endogenous variable, creative industries, the significance level and sign of coefficient are not yet constant, confirming that the model is not yet robust. Hence, the results for the creative industries are still inconclusive and require further research on finding better instrumental variables.

4.2.2.2 Creative Class

	(1)	(2)	(3)	(4)
VARIABLES	OLS	2SLS	OLS	2SLS
PopGrowth	6.99e-07	6.22e-07	2.07e-06**	1.91e-06*
	(0.00)	(0.00)	(0.00)	(0.00)
RelatedVariety	0.00884	0.00241	0.00727	-0.00216
	(0.01)	(0.01)	(0.01)	(0.01)
SectoralDiversity	-0.116	-0.0968	0.0574	0.103
	(0.12)	(0.12)	(0.11)	(0.13)
HumanCapital	4.009***	3.634***	3.200***	2.644***
	(1.22)	(1.21)	(1.04)	(1.02)
logCC	0.548***	0.703***	0.394***	0.646***
	(0.07)	(0.18)	(0.08)	(0.16)
TrafficDensity	5.82e-06	1.40e-05		
	(0.00)	(0.00)		
Constant	-6.120***		-4.417***	
	(0.75)		(0.84)	
First stage F statisctics (P value)		19,01 (0,000, 0,000)		18,61 (0,000, 0,000)
Cragg-Donald Wald F test		17,8		20,0
Sargan-Hansen J test		0,097 (0,7558)		0,280 (0,5969)
Observations	160	160	200	200
R-squared	0.438	0.417	0.290	0.216
Number of COROP	40	40	40	40

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 21: Creative Class and Employment Growth 2SLS

In analysing the creative class and employment growth, two Bartik instruments are also utilised namely the Bartik instrument with the employment share and another with the cultural amenities share. This combination appears to be strong and exogenous enough to pass the series of tests to prove the two assumptions for a valid instrumental variable. In the first stage regression, the instruments appear to be strongly significant to the endogenous variable, the creative class. Moreover, both F tests also exceed 10, the rule of thumb value for a strong instrument. In addition, the null hypothesis stands for the Sargan-Hansen J test, indicating that the instruments are exogenous to the error term.

In this regard, we may proceed in interpreting the 2SLS results for creative class and employment growth. Across the OLS and 2SLS models, creative class and human capital are observed to be consistently significant and positive. Both of these variables are often the subject of debate in determining which people variable drives employment growth. Florida (2002) supports for creative class as the driver for growth, while several other scholars support for human capital (Black and Henderson, 1999, Glaeser, 2004). From the statistical results, it is evident that human capital has stronger explanatory power compared to the creative class in driving the employment growth in the Netherlands. Although the positive coefficient of the creative class indicates that it drives the employment growth nonetheless and confirms our hypothesis. This positive relationship is also seen in other findings (Marlet and van Woerkens, 2007, Boschma and Fritsch, 2009). On the other hand, the stronger human capital variable in determining employment growth initially seems to contradict the study of Boschma and Fritsch (2009) wherein creative class is the stronger variable. However, it is important to note that it is the creative class type A (creative core and creative professionals) which appears to be stronger than human capital, wherein the creative class type B, which includes all creative class classifications and the type that is used in this study, appear to be insignificant in their study.

	(1)	(2)	(3)
VARIABLES	Creative Class B 2SLS	Creative Class A 2SLS	Creative Class Marlet 2SLS
PopGrowth	6.22e-07	8.69e-07	4.69e-07
	(0.00)	(0.00)	(0.00)
RelatedVariety	0.00241	-0.101	-0.0769
	(0.01)	(0.12)	(0.14)
SectoralDiversity	-0.0968	1.56e-05	1.38e-05
	(0.12)	(0.00)	(0.00)
HumanCapital	3.634***	0.00223	-0.00165
	(1.21)	(0.01)	(0.01)
logCC	0.703***	3.353***	3.947***
	(0.18)	(1.26)	(1.20)
TrafficDensity	1.40e-05	0.675***	0.855***
	(0.00)	(0.16)	(0.24)
Constant			
First stage F statisctics (P value)	19,01 (0,000, 0,000)	15.3 (0.000, 0.000)	14.63 (0.000, 0.000)
Cragg-Donald Wald F test	17,8	20.097	12.311
Sargan-Hansen J test	0,097 (0,7558)	0.058 (0.8100)	0.446 (0.5042)
Observations	160	160	160
R-squared	0.417	0.420	0.325
Number of COROP	40	40	40

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 22: Creative Class B, Creative Class A, Dutch Creative Class Comparison

In order to gain better insight in the effect of definition of creative class in its ability to explain employment growth, three different definitions are used for comparison. It appears that only creative class B has weaker explanatory power to human capital in determining employment growth. On the other hand, human capital is even observed as statistically insignificant in creative class A and the Dutch creative class. The latter two definitions are ones that have been used to establish the causal relationship in respectively the studies of Boschma and Fristsch (2009) and Marlet (2007). This finding supports their results, of which in these definitions, creative class has significant, positive effect to employment growth and it overcomes human capital in explaining the regional employment growth.

Hence, for creative class and employment growth, we may conclude that creative class drives employment growth even with the endogenous effects taken into account. Further, the exclusion of bohemians and particular non-creative occupations cause the creative class to have stronger explanatory power than human capital in determining employment growth.

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

As introduced in the first chapter, this study aims to identify factors causing growth and creativity to co-evolve in urban regions, and to test the impact of creative class and creative industries on regional employment growth. In achieving these aims, three aspects of the creative industries and the creative class have been analysed in this study, namely the spatial distribution, locational decision and impact to employment growth.

In terms of spatial distribution, three trends emerge in this study. Firstly, at the national average, employment in both creative industries and creative class has increased in the period of 1996 - 2015. The average growth rate appears to be faster than the general employment for both the creative industries and creative class. In contrast, employment growth rate seems to decline over the years from 2.73% in 1996 to 0.09% in 2015. Secondly, there is an unequal spatial distribution of creative industries and creative class between the COROP regions. To illustrate, in 2015, Groot-Amsterdam has reached 771,000 employments in creative industries and 398,675 employments in the creative class. This is in comparison with Deflzijl region, which hosts only 291 employments in creative industries and 7,413 employments in the creative class. The higher growth rate is then expected from the periphery regions, as the large variance affects the relative growth rate in the respective regions. However, Amsterdam emerges as an exception, as other than having the largest cluster, its cluster growth rate is one of the fastest for both creative industries and creative class. Finally, in general, the highest concentration of creative industries and creative class are found in the Randstad regions. However, for the creative industries, the higher concentrations are also found in the periphery regions, such as Alkmaar, Zaanstrek, and Haarlem. It is suspected that the increasing prices and decreasing availability of office spaces in the urban centers may contribute to this observation.

In determining the factors that explain the spatial distribution for both creative industries and creative class, panel OLS regressions were conducted accordingly. As discussed in the introduction, the debate in this aspect of the study is mainly if it is employment opportunities or quality of life, which drive the locational decision of the creative firms and creative people. This study employs three forms of dependent variables for each of the creative industries and creative class: the absolute value, the relative value to the national average and the growth rate, to observe the effects of the explanatory variables further.

In terms of the absolute value of creative industries, the presence of human capital, wage, cultural density, and amenities are evident in attracting the employment in creative industries. Human Capital holds the strongest explanatory power with 17.3 coefficient, followed with Cultural Density with 0.821 coefficient, Amenities with 0.071 and Wage with only 0.019. Even more, Amenities also appear to be significant in explaining the creative industries location quotient. Yet, for creative industries growth, related variety and economic growth in GDP emerge as the drivers for creative industries locational decision. Overall, in attracting creative industries, these results support the notion that today it is jobs that follow people for creative industries in the Netherlands, and hence policies that focus on the quality of life and learning of people are recommended in order to attract the creative industries. Nevertheless,

in order for the creative industries cluster to remain growing, the economic structure, such as the related variety and economic growth, requires necessary attention from policy makers.

Similar results are also seen for the creative class, particularly that the presence of human capital, wage, and related variety also drives the locational decision of the creative class. Yet, wage has the negative coefficient in the creative class regression, as opposed to the variable being positive in explaining the creative industries.

Additionally, the sectoral diversity is also statistically significant for the creative class regression. Since it is measured in HHI index, the negative coefficient is logical. As higher HHI index refers to more specialization or less sectoral diversity. In regards to the explanatory power, human capital is the strongest yet again, with 7.255, followed by sectoral diversity with 0.474, the related variety with 0.067 and lastly, wage with 0.01. In the context of creative class, human capital, which measures the share of the population with a tertiary degree, may capture the effect of universities. As elaborated by Qian (2008), universities supply the highly skilled labour. Looking at creative class composition, particularly the creative core, the majority of the listed occupations require the high skills, which often can only be acquired at a university level. In terms of location quotient, human capital and wage maintain their significance, accompanied by amenities. Lastly, the growth of the creative class seems to be driven by GDP, other than wage and amenities. In essence, the foundations of education, related variety, and sectoral diversity are important in attracting the creative class. Moreover, added with good provision of amenities, the growth of the creative class can be maintained for the region.

In comparing the preferences of creative industries and creative class, it appears that indeed the two creative variables do have similar preferences. It is evident that amenities play an important role in attracting creative industries and creative class, unexpectedly even more so for the creative industries, wherein the variable is significant in both absolute and relative value, compared to only driving the growth for the creative class. Education and related variety are also observed to be crucial for attracting both the creative industries and creative class. However, it must be noted that the current locational factor models have moderate R-squared values. Hence, the model specification still has room for improvement, as will be discussed further in the limitations of the research.

Finally as for the ultimate question in this study, in regards to the identification robustness question, the analysis for the creative industries is not yet successful, as the instrumental variables used do not yet pass the validity tests. However, the instrumental variables for the creative class appear to be valid and hence its results can form a conclusion. The creative class is significant and has a positive relationship to employment growth. This shows that Florida's (2002) initial claim of creative class and its ability to drive urban growth may prove true after all, and that cities that aspire to create employment opportunities may then look to develop, attract and retain the creative class. However, this does not mean that cities should forget the lower-skilled working class at all, for the working class is the other half of creating a viable production system, which will in turn also sustain creative class in the long-term. Without balanced attention between the creative class and working class, over-gentrification and growing gap in inequality will undermine the employment growth potentials of creative class. Hence, it is not that we choose one over another, but it is to find the balance between the two in order to create positive development for our cities.

5.2 Policy Recommendation

Current policies for creativity focus on subsidies and regeneration of old spaces (Bontje and Musterd, 2009). These seem to focus more on creative industries rather than creative class, while in fact according to our and Erik Stam et al's (2008) findings, it is the creative class that has been proven to have a positive effect on employment growth.

As evident from our findings, education, amenities, related variety and sectoral diversity play important roles in attracting the creative class. Out of the four, education appears to be the strongest determinant for the creative class. Hence, one of the highest priorities for cities that would like to attract creative class should be the improvement of its education. Yet, in regards to creating a balance between the creative and working class, cities should not focus only on its higher education, but also to put investments in the basic education. Basic education may aid the working class and the poor members of the creative class to find employment opportunities. Short training programmes and online courses may also aid in developing skills that are in demand without the need for expensive tuition fees and high barriers for admission.

Other than education, the positive findings for related variety and sectoral diversity advocate Jane Jacobs' (1969) recommendation for having a diversity of sectors, yet with sufficient relatedness to each other. Policies that stimulate spin-off and niche creation may be undertaken to increase the related variety in the region (Frenken, van Oort, et al., 2007).

Lastly, as the most common factor that is associated with attracting the creative class, the provision of amenities is crucial. Higher quality of life is often the driving motivation for people to migrate to another region, and the provision of amenities is one of the most important urban features that determine the quality of life for a region's residents. However, yet again in consideration for inequality, the provision of amenities should not only be focused towards having the highest quality or convenience. Cities should also consider equal access for the amenities, namely in terms of affordability and equal proximity access.

5.3 Limitations and Future Research

As with other studies, this study is not exempt from limitations. Several have been discussed in the scope and limitations sections, namely the spatial effects from the neighbouring regions, effects from the financial crisis period and aesthetics determinant that have not been included in the current study. For further research, spatial error model and time lag model might be utilized to include the spatial and temporal effects, whereas aesthetics might be measured as an index for natural and historical amenities (Marlet and van Woerkens, 2005). However, as aesthetics is a subjective matter, it might be useful to directly deal with the perception of aesthetics instead of the objective measure.

During implementation, several more limitations came to light. Firstly, two other determinants were dropped due to multicollinearity issues. These are the *international* variable, which proxies for the tolerance concept in terms of ethnical diversity, and *office*

space variable, which is intended to test the creative industries policy that focuses on providing more office space to attract the creative firms and people. Alternative proxies may be used to measure these variables, such as voting behaviour for tolerance and office rent prices for office availability.

Secondly, a principal limitation was that the instrumental variables for creative industries have not yet passed the tests for their validity. This failure might be caused by the fact that the instruments relate stronger to the creative *people*, instead of the creative *firms*. Therefore, the instruments failed the weak instrument test to the creative industries. Should the rent prices strongly determines the creative industries spatial distribution, it might be beneficial to test it as the alternative instrumental variable.

Thirdly, in regards of heterogeneity between creative class (people) and creative industries (firms), the identical set of factors might give an initial overview of the similarity of preferences. However, in order to improve the extent of explanation of the model (R-squared) and to gain deeper insights into factors that attract the respective creative variable, two separate sets should be used that is customized to the differing nature and focus of creative class and creative industries respectively. The debate of whether people follow jobs or jobs follow people may be more relevant for the creative class, rather than the creative industries, as the debate is centered on the labour market and less on the production system. Hence further research may focus on motivations for migration, such as employment opportunities, housing availability, and improved quality of life for residents, families, or children, in explaining the creative class locational decision, while business incentives (eg tax or subsidy), availability of office space and rent affordability and the general macroeconomic forces might be more suitable in explaining the locational decisions of the creative industries. In this regard, active creative policies can also be included in the analysis to evaluate their effectiveness.

Fourthly, due to incomplete data for independent variables, a smaller number of observations is used for the analyses although the panel data for the dependent variable is available for 19 years (1996-2015). Direct contact with CBS to request the full data of the time period may be performed in the future to solve this issue.

Finally, the findings reported in this study are based on the 40 COROP regions in the Netherlands. Concerning the differential findings in different countries, the conclusion reported in this study may only be generalized for the Netherlands. Further, policymakers in The Netherlands who wish to implement the results of this study must also note that definitions of both creative industries and creative class play an important role in determining the results. Further research on specific occupation definition for creative class and creative industries may be beneficial. For the creative industries, the comparison of inclusion and exclusion of software industries might be beneficial to gain more insights on the extent of boundaries of the creative industries with other sectors. In the meanwhile, for the creative class, criteria that make an occupation ‘creative’ or ‘innovative’ can be explored further to avoid subjective approach in defining the creative class. With Gerard Marlet’s (2007) definition specifically for the Netherlands that is distinct from the original American definition, one might wonder if it is better to have a specific definition customized for a particular country or a universal creative class definition. Hence, the researcher also

encouraged others to take on the causal identification issue of the creative class and employment growth in different country contexts, to provide insight in varying creative class definitions but also in the conditional forces that will enable the positive impact ie. political, social, demographics, economic forces and various modern technological advances.

Bibliography

Policy Documents:

Amsterdam Economic Board (2014): *Clusterstrategie Creatieve Industrie 2014-2020*

Click NL (2014): *Designing A Country, Creative Industries in the Netherlands*

Department for Culture, Media & Sport UK (1998): *Creative Mapping Industries Document 1998*

Gemeente Rotterdam (2007): *Stadsvisie Rotterdam: Ruimtelijke Ontwikkelingsstrategie 2030*

Provincie Utrecht (2010): *Focus op Kennis en Creativiteit: Concept Economische Visie provincie Utrecht 2020*

Stimulerings Fonds (2015): *Jaarverslag 2015*

Academic Literature:

Ascani, A. and Gagliardi, L. 2014. Inward FDI and local innovative performance. An empirical investigation on Italian provinces.

Bartik, T. J., 1991. Boon or Boondoggle? The Debate Over State and Local Economic Developmental Policies.

Black, D. and Henderson, V. 1999. A Theory of Urban Growth.

Bontje, M. and Musterd, S. 2009. Creative industries, creative class and competitiveness: Expert opinions critically appraised.

Boschma, R. A. and Fritsch, M. 2009. Creative Class and Regional Growth: Empirical Evidence from Seven European Countries.

Clark, T. N., Lloyd, R., Wong, K. K. and Jain, P. 2002. Amenities drive urban growth.

Crescenzi, R., Gagliardi, L. and Iammarino, S. 2015. Foreign multinationals and domestic innovation: Intra-industry effects and firm heterogeneity.

Cunningham, S., 2002. From cultural to creative industries: theory, industry and policy implications.

Duranton, G. and Puga, D. 2004. Micro-foundations of urban agglomeration economies.

Evans, G., 2009. Creative Cities, Creative Spaces and Urban Policy.

Florida, R., 2002a. The Economic Geography of Talent.

Florida, R., 2002b. The Rise of The Creative Class.

Florida, R., 2004. Cities and The Creative Class.

Frenken, K., van Oort, F. and Verburg, T. 2007. Related variety, unrelated variety and regional urban growth.

Glaeser, E., 2003. The Rise of Skilled Cities.

Glaeser, E., 2004. Review of Richard Florida's *The Rise of the Creative Class*.

Glaeser, E. and Resseger, M. 2009. THE COMPLEMENTARITY BETWEEN CITIES AND SKILLS.

Jacobs, J., 1961. The Death and Life of Great American Cities.

Jacobs, J., 1969. The economy of cities.

Kloosterman, R. C., 2004a. Recent employment trends in the cultural industries in Amsterdam, Rotterdam, The Hague and Utrecht; a first exploratin.

Kloosterman, R., 2004b. Recent employment trends in the cultural industries in Amsterdam, Rotterdam, The Hague and Utrecht; a first exploration.

Kourtit, K., Mohlmann, J., Nijkamp, P. and Rouwendal, J. 2013. The Spatial Distribution of Creative Industries and Cultural Heritage in the Netherlands.

Lazzeretti, L., Capone, F. and Boix, R. 2012. Reasons for Clustering of Creative Industries in Italy and Spain.

Lucas, R. E., 1988. On the mechanics of economic development.

Markusen, A., Wassall, G. H., DeNatale, D. and Cohen, R. 2008. Defining the Creative Economy: Industry and Occupational Approaches.

Marlet, G. and van Woerkens, C. 2005. Tolerance, aesthetics, amenities or jobs? Dutch city attraction to the creative class.

Marlet, G. and van Woerkens, C. 2007. The Dutch Creative Class and How It Fosters Urban Employment Growth.

Mayer, W. and Pleeter, S. 1975. A Theoretical Justification for Using Location Quotients.

Modder, J. and Saris, J. 2005. Creative Spaces in the Netherlands.

O'Connor, J., 2010. The cultural and creative industries: a literature review.

Peck, J., 2005. Struggling with the Creative Class.

Pratt, A. C. and Hutton, T. A. 2012. Reconceptualizing the relationship between the creative economy and the city: Learning from the financial crisis.

Puga, D. and Duranton, G. 2004. Micro foundations of urban agglomeration economies.

Qian, H., 2008. Talent, Creativity, and Regional Economic Performance: The Case of China.

Rutten, P., Manshanden, W., Muskens, J. and Koops, O. 2004. De creatieve industrie in Amsterdam en de regio.

Scott, A., 2006. Creative cities: conceptual issues and policy questions.

Scott, A. J., 2004. Cultural-Products Industries and Urban Economic Development.

Scott, A. J., 2010. Cultural economy and the creative field of the city.

Stam, E., de Jong, Jeroen P. J. and Marlet, G. 2008. Creative industries in the Netherlands: structure, development, innovativeness and effects on urban growth.

Stolarick, K. and Currid-Halkett, E. 2012. Creativity and the crisis: The impact of creative workers on regional unemployment.

Storper, M. and Scott, A. 2009a. Rethinking human capital, creativity and urban growth.

Storper, M. and Scott, A. J. 2009b. Rethinking human capital, creativity and urban growth.

Storper, M. and Venables, A. J. 2004. Buzz: face to face contact and the urban economy.

van Aalst, I., Atzema, O., Boschma, R. A. and van Oort, F. 2014. The creative class, related variety and economic growth in Dutch city-regions.

Wooldridge, J. M., 2013. Introductory Econometrics: A Modern Approach. Fifth Edition. South-Western, Cengage Learning.

Annex 1: Research Instruments and Time schedule

Research instruments

The data used in this study is secondary data, of which the indicators and sources of data have been elaborated in the research design section.

Time Schedule

Time Period	Activities	Deliverables
12 June 2017	Submission full research proposal	Research proposal (chapters 1-3)
12-19 June 2017	Training for GIS, STATA models and R-programming. Data collection and preparation	Prepared Data
19-26 June 2017	GIS Mapping RQ1 & RQ2	3 GIS Maps
26 June-3 July 2017	STATA RQ3 & RQ4	2 STATA OLS Models results
3- 17 July 2017	STATA RQ5	1 STATA Model TSLS Result
17-31 July 2017	STATA RQ6	1 STATA Model TSLS Results
31 July -4 August 2017	Colloquium 4	Colloquium 4 presentation
31 July – 7 August 2017	Draft 1 Thesis: Chapter 1-3 (revision), Chapter 4-5	Thesis Chapter 1-5 v1
7 August – 18 August 2017	Draft 2 Thesis: Finalization	Thesis Chapter 1-5 v2
18 August 2017	Submission draft thesis	Thesis Chapter 1-5 v3
7 September 2017	Submission of final thesis	Thesis Chapter 1-5 vFinal

Annex 2: IHS copyright form

In order to allow the IHS Research Committee to select and publish the best UMD theses, participants need to sign and hand in this copy right form to the course bureau together with their final thesis.

Criteria for publishing:

A summary of 300 to 500 words should be included in the thesis.

The number of pages for the thesis is about 60.

The thesis should be edited.

Please be aware of the length restrictions of the thesis. The Research Committee may choose not to publish very long and badly written theses.

By signing this form you are indicating that you are the sole author(s) of the work and that you have the right to transfer copyright to IHS, except for items cited or quoted in your work that are clearly indicated.

I grant IHS, or its successors, all copyrights to the work listed above, so that IHS may publish the work in *The IHS thesis series*, on the IHS web site, in an electronic publication or in any other medium.

IHS is granted the right to approve reprinting.

The author(s) retain the rights to create derivative works and to distribute the work cited above within the institution that employs the author.

Please note that IHS copyrighted material from *The IHS thesis series* may be reproduced, up to ten copies for educational (excluding course packs purchased by students), non-commercial purposes, providing full acknowledgements and a copyright notice appear on all reproductions.

Thank you for your contribution to IHS.

Date : _____

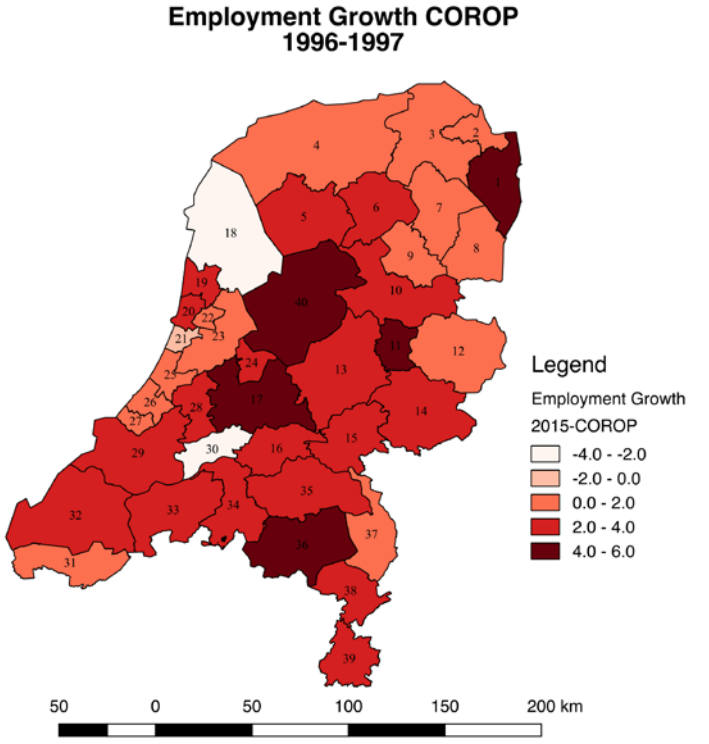
Your Name(s) : _____

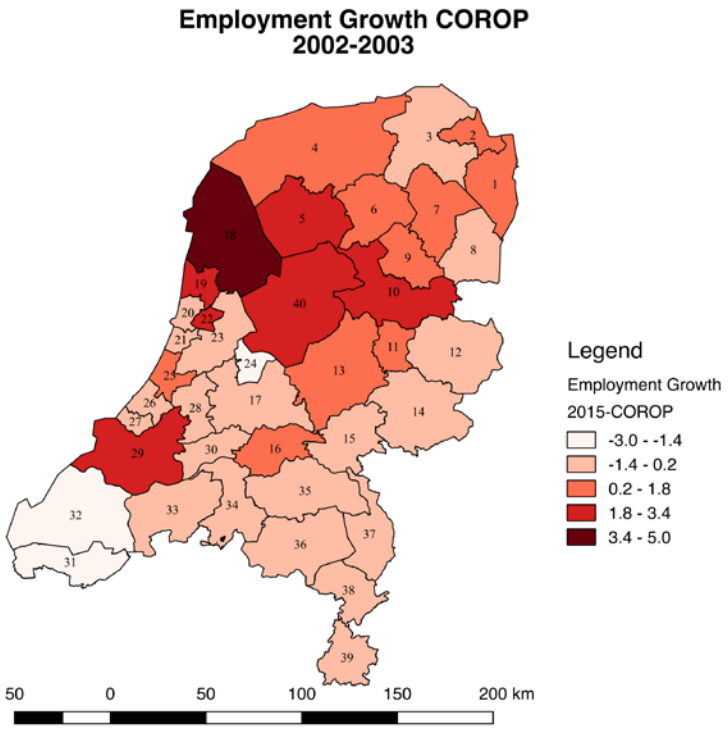
Your Signature(s) : _____

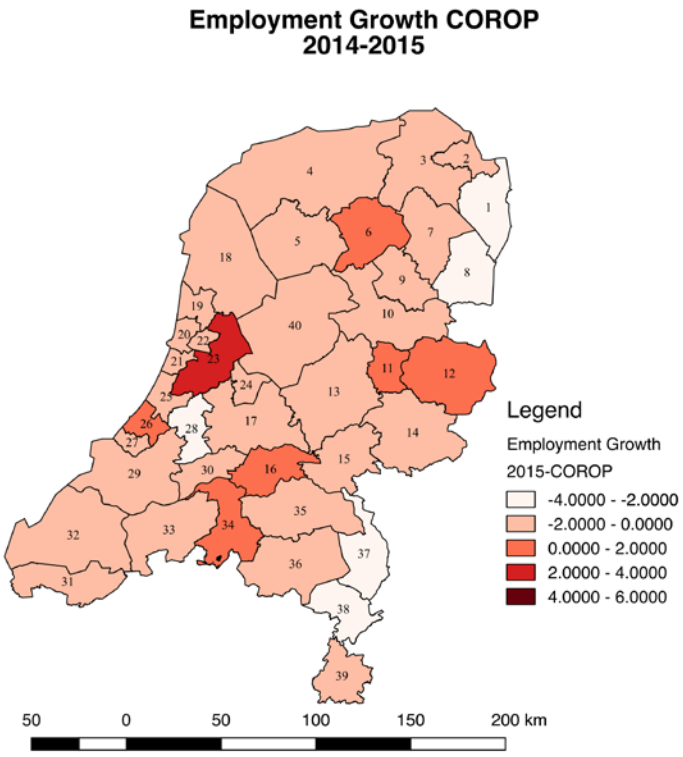
Please direct this form and all questions regarding this form or IHS copyright policy to:

The Chairman, IHS Research Committee Burg. Oudlaan 50, T-Building 14th floor, 3062 PA Rotterdam, The Netherlands	j.edelenbos@ihs.nl Tel. +31 10 4089851

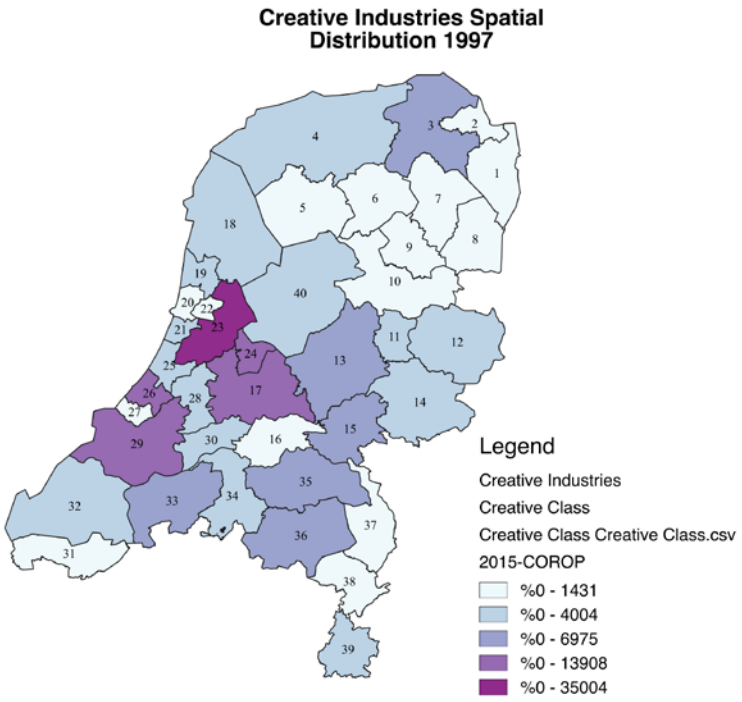
Annex 3: Employment Growth Maps



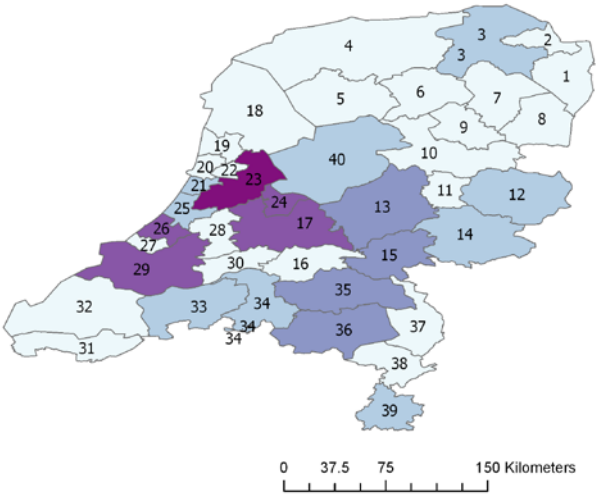




Annex 4: Creative Industries Maps



Creative Industries Spatial Distribution 2003

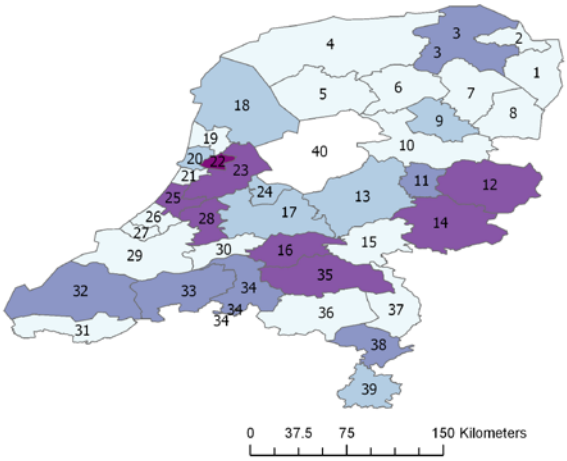


2015-COROP

CI_2003

- ≤3144.000000
- ≤6261.000000
- ≤10594.000000
- ≤20610.000000
- ≤49388.000000

Creative Industries Spatial Distribution 2015

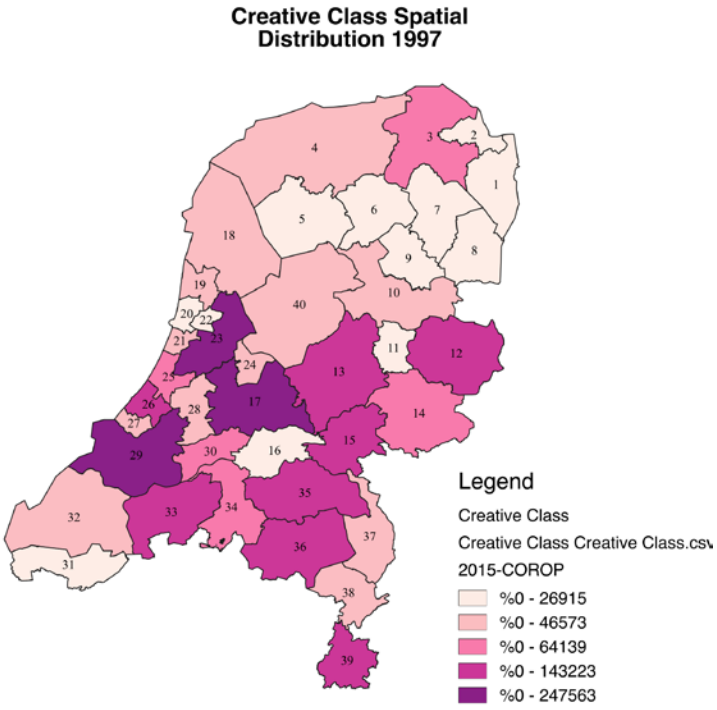


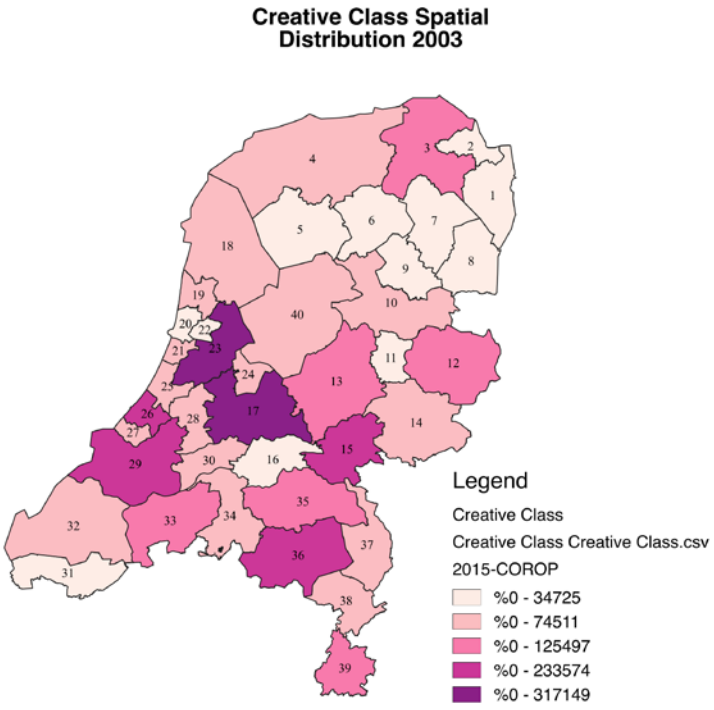
2015-COROP

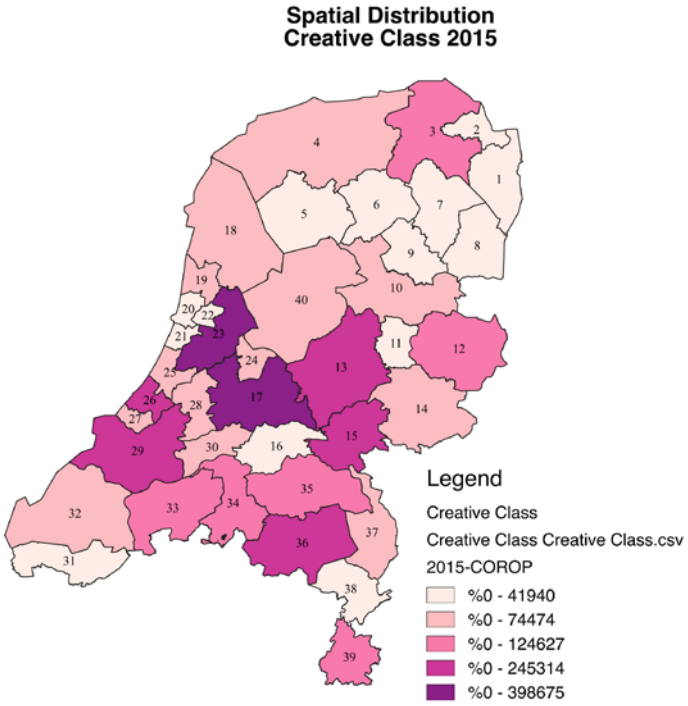
CI_2015

- ≤2964
- ≤5925
- ≤9344
- ≤29079
- ≤77100

Annex 5: Creative Class Maps







Annex 6: Creative Class A Locational Decision Results

VARIABLES	(1) CC_A	(2) All	(3) No Amsterdam	(4) LQ	(5) CCGrowth
HumanCapital	7.777**	7.245**	8.129**	2.003**	0.0711
	(3.26)	(2.96)	(3.80)	(0.85)	(0.39)
Wage	-0.00993**	-0.0110***	-0.0132***	0.00213**	-0.00361**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CulturalDensity2	0.200	0.155	0.0697	0.0315	-0.0797
	(0.17)	(0.17)	(0.17)	(0.09)	(0.26)
logGDP	-0.000357	-0.000397	-0.000969	0.000251	0.00412**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Amenities2	-0.0280	-0.0230	-0.0141	-0.00642***	-0.00130
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)
RelatedVariety	0.0906**	0.0878***	0.0828***	0.00788	0.0145*
	(0.04)	(0.02)	(0.03)	(0.01)	(0.01)
SectoralDiversity	-0.409*	-0.409**	-0.445**	0.0494	-0.133
	(0.24)	(0.20)	(0.19)	(0.07)	(0.12)
Constant	10.98***	11.01***	11.03***	0.871***	0.0642
	(0.21)	(0.18)	(0.20)	(0.05)	(0.05)
Observations	72	79	75	72	72
R-squared	0.4817	0.3847	0.2721	0.4728	0.1947
Number of COROP	38	40	39	38	38

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Annex 7: Dutch Creative Class (Marlet) Locational Decision Results

VARIABLES	(1) CCMarlet	(2) All	(3) No Amsterdam	(4) LQ	(5) CCGrowth
HumanCapital	6.722**	6.613**	7.048*	1.535	0.00103
	(3.17)	(2.94)	(3.74)	(1.15)	(0.38)
Wage	-0.00540	-0.00621*	-0.00880***	0.00245***	-0.00402**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CulturalDensity2	0.214	0.159	0.0832	0.0517	-0.103
	(0.17)	(0.17)	(0.16)	(0.10)	(0.24)
logGDP	-0.000956	-0.000567	-0.00148	0.000489	0.00431**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Amenities2	-0.0311*	-0.0259	-0.0162	-0.0105***	-0.00150
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)
RelatedVariety	0.0771*	0.0786***	0.0650**	-0.000442	0.0101
	(0.04)	(0.03)	(0.03)	(0.01)	(0.01)
SectoralDiversity	-0.362	-0.357*	-0.402**	0.0801	-0.150
	(0.24)	(0.20)	(0.19)	(0.09)	(0.12)
Constant	10.70***	10.71***	10.76***	-0.129***	0.0884*
	(0.21)	(0.18)	(0.20)	(0.05)	(0.05)
Observations	72	79	75	72	72
R-squared	0.4752	0.3922	0.2880	0.4406	0.2059
Number of COROP	38	40	39	38	38

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1