Technology, Talent and Tolerance and Internal Migration: Evidence from the 2001 Census of Canada[1]

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Abstract

Florida (2002) argues that a region's ability to attract the creative class in turn encourages knowledge based economic growth. A condition of Florida's argument is that to attract the creative class, a region must have the 3 T's: Technology, Talent and Tolerance. This paper undertakes an exploratory analysis of whether measures of talent, technology and tolerance of a region influence internal migration propensities. In addition, this paper provides insight into the demographic, socioeconomic and residential profile of the creative class in Canada, differentiating between migrants and stayers. The multivariate analysis to some degree corroborates the creative class thesis with higher levels of tolerance and technology in a region attractive to the creative class.

Key Words: Canada, Creative Class, Migration, Region

Introduction

The creative class theory is increasingly cited as a driver of regional development and competitiveness. Florida (2002) argues that a region's ability to attract the creative class in turn encourages innovative development and knowledge based economic growth. Florida (2002) defines the creative class to include people "engage(d) in complex problem solving that involves a great deal of independent judgment and requires high levels of education or human capital" (p. 8). A condition of Florida's argument is that in order to attract the creative class, which in turn increases and diversifies creative capital leading to economic growth, a region must have the 3 T's: technology, talent and tolerance. The ability of a region to both attract and retain talented people is not only the function of the traditional measures of "quality of place" but is also a region's ability to offer a high "quality of life" through the presence of a rich culture and diverse population.

Creative capital builds and expands on the more traditionally used 'human capital' concept and its relationship to economic development. Creative capital attempts to be a better measure of skills and talent than the traditional human capital measure of years of education or highest level of education. Instead, creative capital measures how people utilize their education and skills through occupational analysis. More specifically, the creative class is employed in high autonomy occupations where workers add economic value through the generation of new ideas and forms. Research has found that human capital and creative capital play complementary roles in regional development with similar results between human and creative capital (Florida, Mellander, and Stolarick 2008: forthcoming; Marlet and van Woerkens 2004; Mellander and Florida 2007).

While there is much international migration research in terms of highly-skilled and -educated individuals, there has been less migration research within the creative class theoretical framework (see, for exceptions, Hansen and Niedomysl 2009; Houston, Findlay, Harrison, and Mason 2008; Marlet and van Woerkens 2005; Wojan, Lambert, and McGranahan 2007). There has been mixed support for the creative class

theoretical framework in the context of migration research; specifically, results have found that the migration decision is generally has been motivated by traditional economic variables. Hansen and Niedomsyl (2009) and Houston et al. (2008) found measures of tolerance and talent to be less important than traditional economic opportunities in Sweden and Scotland respectively; in the Netherlands the aesthetic quality of cities is more important (Marlet and van Woerkens 2005). However, there has been corroborating findings from Wojan et al. (2007) who found a larger share of creative class employment has a positive effect on net migration in the United States.

In the Canadian context, the creative class theoretical framework has received much less attention than the United States or Europe (see, for exceptions, Florida 2009; Florida et al. forthcoming; Gertler, Florida, Gates, and Vinodrai 2002; Petrov 2007; Stolarick and Florida 2006). Moreover, in comparison to the United States, Gertler et al. (2002) found that the relation between talent and tolerance and technology intensive economic development are stronger in Canada. The research of the creative class theoretical framework thus far, has been examined primarily on a macro level with less focus on individual behaviours.

Currently, there is much research on the internal migration propensity of the labor force aged in Canada which focuses on the influence of individual and place characteristics (see, for examples, Hou and Bourne 2004; Liaw 1990; Liaw and Ledent 1988; Moore and Rosenberg 1995; Newbold 1994:1996:2002; Newbold and Cicchino 2007; Newbold and Liaw 1994:1995). Generally, the place characteristics used to analyze migration propensity are those that measure economic characteristics such as unemployment rate, employment growth rate, or income levels; and amenity characteristics such as population size or density, weather, or cultural diversity. While there has been some attention to the demographic profile of regions such as ethnicity or immigration in migration research, there has been less specifically of tolerance as measured by Florida's (2002) boho, gay and melting pot (or in the Canadian context mosaic) indices. While the 3Ts measures of talent, tolerance and technology have been used to varying degrees in

migration research, a micro approach to examine the importance of these regional characteristics to attract and retain the creative class has yet to be undertaken. In addition, there is not much known about whom the creative class are in Canada and even less is known about how creative class migrants and stayers differ.

There has been little empirical research on the creative class theoretical framework in the Canadian context. In particular, there has been little empirical analysis of whether higher levels of talent, technology and tolerance do indeed attract the creative class as suggested by the creative class theoretical framework. Therefore, this paper undertakes an exploratory analysis of talent, technology and tolerance of regions and influence internal migration behavior. Specifically, the paper empirically examines whether these measures influence migration propensities of the creative class and overall population. In addition, the paper provides insight into the demographic, socioeconomic and residential profile of the creative class in Canada.

Theory and Concepts

In The Rise of the Creative Class, Florida (2002) introduced the creative class theoretical framework where the creative class consists of individuals employed in occupations whose economic value is the creation of new ideas and forms. The creative class is comprised of two groups: the super-creative core which includes "scientists and engineers, university professors, poets and novelists, artists, entertainers, actors, designers and architects as well as the thought leadership of modern society: nonfiction writers, editors, cultural figures, think-tank researchers, analysts and other opinion makers" and the creative professionals "who work in the range of knowledge-intensive industries such as high-tech sectors, financial services, the legal and health care professionals and business management" (Florida 2002, p.69). The concentration and diversity of the creative class and their creative capital can be translated into innovations which drive economies forward. Therefore, regions that are best able to retain and attract the creative class have the highest potential for economic growth in a knowledge economy.

Creative capital builds and expands on the more traditionally used 'human capital' (Becker 1964; Schultz 1961) and its relationship to economic development. The relationship between human capital and economic development has been advanced by many researchers including Robert Lucas and Jane Jacobs with recent empirical research by Edward Glaeser (see, for examples, Glaeser 1994; Glaeser and Maré 2001, Glaeser, Kolko, and Saiz, 2001; Glaeser and Saiz 2003; Jacobs 1969:1984; Lucas 1988). Barro (1991) found that the growth rate of real per capita gross domestic product was positively related to initial human capital for 98 countries between 1960 to 1985 with similar findings by Benhabib and Spiegel (1994) of the 29 countries of the Summers-Heston (1991) dataset.

While Barro (1991) and Benhabib and Spiegel (1994) examined human capital and its relation to a country's gross domestic product growth, others have used more refined geographic scales. Glaeser and Saiz (2004) found human capital to predict productivity growth in metropolitan areas while Florida et al. (2008) found human capital to increase overall regional wealth across the 331 metropolitan statistical areas of the United States in 2000. Several studies have found a positive relationship between employment growth and the average level of human capital across United States metropolitan statistical areas (Glaeser et al. 1995; Simon 1998) and English cities (Simon and Nardinelli 1996). Rauch (1993) found that with each additional year of education, on average a metropolitan statistical area increases their total factor productivity by 2.8 percent; this is similar to Dennison's (1961) finding of an increase of 3.2 percent for the total factor productivity of the United States. At the firm level, a 10 percent increase in the average education level within an establishment will result in an 8.5 percent increase in productivity in manufacturing (Black and Lynch 1996).

The creative class theoretical framework and its relation to economic development has faced many criticisms (see, for examples, Glaeser 2004; Markusen 2006; Peck 2005; Scott 2006). The most salient critique for this paper is Glaeser (2004) who argues that the creative capital theory of growth is a version of the human capital theory of growth. However, there are differences between creative capital and human capital as creative capital encompasses a wider range of abilities than the more traditional human

capital as measured by education. While the creative class includes occupations which require higher levels of education it also includes occupations which require talents and skills for innovation and creativity which are likely not accounted for by education measures.

Creative capital attempts to be a better measure of skills and talent than the traditionally used education measures by measuring how people employ their education, talents and skills through their occupations. Florida et al. (2008) found human capital and creative capital are not substitutes of each other but instead play complementary roles in regional development. Creative capital influences regional labor productivity while human capital as measured by education increases regional income (ibid). In the case of the Netherlands, creative class and education measures share similar results although the creative class measure is better at predicting employment growth (Marlet and van Woerkens 2004). The correlation between regional development and technology, and the creative class is higher than their relation to human capital as measured by educational attainment in Sweden (Mellander and Florida 2007).

It is proposed that the creative class is attracted to regions that offer a good 'quality of life' in addition to a good 'quality of place'. Florida (2002) argues that when a region has all of the 3 Ts – talent, tolerance and technology – this will encourage economic development. Florida (2002) found the high-tech index to be strongly associated with the location of the creative class while the melting pot, gay and bohemian indices are strongly associated with the high-tech index for metropolitans in the United States in 2000, with similar findings in the Canadian context (Gertler et al. 2002). Tests of the creative capital theory found that innovation is strongly associated with specialized creative capital and diversity (Florida 2002).

Rausch and Negrey (2006) found tolerance and the melting pot indices, human capital and high technology are strong predictors of gross metropolitan product growth in the United States while the share of creative class is not. However, Florida et al. (2008) found the creative class in addition to human capital is important to regional development with occupations influencing regional development to varying degrees. In particular, computer science, engineering, management and business and financial

operations occupations have relatively large effects on regional development as well as artistic and entertainment occupations (ibid). There is empirical support of a positive correlation of bohemians and regional stock of human capital in the United States (Florida 2002), Germany (Falck, Fritsch, and Heblick 2009; Fritsch 2007) and the Netherlands (Boschma and Frisch 2009). In the German case, one standard deviation increase in the share of bohemians increases the share of employees with a tertiary degree by 1.7 percentage points while one standard deviation increase in the share of employees with a tertiary degree increases GDP per capita growth by 1.5 percentage points (Flack et al. 2009). Ottaviano and Peri (2005a:2005b) found United States born citizens living in metropolitan areas with greater diversity were more productive as measured by increase in their wages.

There is a positive correlation between talent, creative class, and start-up rates at the regional level in Finland, Germany, Norway, and Sweden (Boschma and Fritsch 2009) and a positive statistical relationship between the share of creative employment and new business formation in Germany (Fritsch 2007). Similarly, Lee, Florida, and Acs (2004) found the creativity index – as measured as the bohemian index – is more strongly associated to new firm formation than human capital, and diversity and melting pot indices. Employment growth in Dutch cities is determined more by the presence of the creative class rather than creative industries (Stam, de Jong, and Marlet 2008). Wojan et al. (2007) found that a larger share of creative class employment has a positive effect on both employment growth and net increase in businesses in both non-metropolitan and metropolitan areas in the United States, with the creative class variable performing better than human capital.

There is much international migration research in terms of highly-skilled and -educated individuals in regard to the 'brain gain' and 'brain drain', there is a growing body of research on 'brain circulation' (see, for examples, Borjas 1994:1995; Sassen 1991:2001; Saxenian 2002:2005:2006:2008; and Canadian examples, King and Newbold 2007:2008). However, the mobility of the highly-skilled and -educated and its relationship to regional and national growth has received greater attention in the last decade. In particular, international migration research has examined specific occupations groups such as researchers

and scientists (Finn 2007; Thorn and Holm-Nielsen 2008), entrepreneurs (Desai 2003; Saxenian 2002:2005:2008:2006; Saxenian and Li 2003), technical talent (D'Costa 2006:2008; Docquie and Rapoport 2004; Solimano and Pollack 2004), and health professionals (Bach 2008; ILO 2004; Khadria 2004) and their migration in relation to economic growth and development.

With countries experiencing the return of well-educated former emigrants, countries are able to benefit from the education and experience of their emigrants to foster regional economic development. For example, there is a body of research which focuses on the information and communication technologies sector which has examined the widespread influence of return international migration on regional development (see, for examples, Saxenian 2006; Saxenian and Li 2003). Saxenian (2006) discusses the economic success in Israel, Taiwan, China and India in the information and communication technologies due to the return of highly-skilled and –educated individuals who become entrepreneurs and venture capitalists in their home country.

The creative class theoretical framework has been utilized to some degree in migration research, particularly in the European context (see, for examples, Hansen and Niedomysl 2009; Houston et al. 2008; Marlet and van Woerkens 2005). Marlet and van Woerkens (2005), Hansen and Niedomsyl (2009) and Houston et al. (2008) found that the creative class theoretical framework does not hold in their studies of the Netherlands, Sweden and Scotland respectively. Marlet and van Woerkens (2005) found no positive correlations between their four measures of tolerance used – bohemian index, gay scene, ethnical diversity and pub closing hours – and the share and growth of the creative class. Rather, the aesthetic quality of cities as measured by proximity to nature and the share of historic buildings as well as job opportunities is more important than the tolerance measures (ibid). The Swedish creative class, defined as the highly educated, tend to move to regions with lower 'people climate' or elements that make a region attractive which is contrary to the creative class theory (Hansen and Niedomsyl 2009). The Swedish findings suggest that due to the period of the lifecycle, once individuals have attained their higher education they enter the job market in smaller cities which are ranked lower in 'people climate'

(ibid). Primarily the destination choice was determined by employment opportunities, with the creative class moving after obtaining an employment offer in another region in Scotland (Houston et al. 2008). In the non-metropolitan and metropolitan areas in the United States, the presence of a larger share of creative class employment has a positive effect on net migration (Wojan et al. 2007).

Data and Methodology

Using the Census of Canada 2001 Master Files (20 percent sample), which offers greater flexibility in sample size and geography, the purpose of this paper is to examine whether measures of talent, technology and tolerance of a region influence individual migration propensities. The 2001 Census of Canada Master File provides detailed demographic and socioeconomic information on individuals. Since 1991, the Census of Canada has collected mobility and residential data on place of residence on Census day as well as 5- and 1- year(s) prior to Census; specifically, there is information on whether the respondent lived in the same dwelling/address 5- and 1- years prior to Census. The Census of Canada Master Files provide residential information at a more refined spatial level which is unavailable in the Census of Canada Public Use Microdata Files (PUMFs).

The analysis includes individuals ages 25 years and older in 2001 who were resident in Canada throughout 1996 to 2001. Individuals who are institutionalized were excluded from the sample as were residents of the three northern territories. Migrants are defined as individuals who changed their census metropolitan area (CMA)/region of residence between 1996 and 2001. Due to the nature of the migration data collected it is expected that the number of individuals who migrated between 1996 and 2001 is underestimated. In addition, due to issues with sample size, individuals are not differentiated between those who made single or multiple migrations or the type of migration undertaken.

Unlike the Census of Canada PUMFs, the Master File allows for the examination of non-aggregated industry and occupation classifications. For the occupation data, the National Occupational Classification

Statistics (NOCS) 2001 is used to categorize the occupations in the creative class similar to Florida (2002). Creative occupations are generally high autonomy occupations where workers add economic value through the generation of new ideas and forms. The creative class subsample includes individuals who are aged 25 to 69 years in 2001 who have occupations as defined in the creative class framework.

In addition to the twenty-seven CMAs defined by Statistics Canada in 2001, ten provincial regions are created to cover the residual areas (Figure 1). For example, the province of British Columbia contains three CMAs (Abbotsford, Vancouver and Victoria), with the 'Rest of British Columbia' created containing all other areas in the province outside of these three CMAs. This process is continued for the other nine provinces (excepting Prince Edward Island which does not have a CMA), to create residual provincial regions. While this is a relatively large geographic scale used in the migration definition, it is appropriate in the context of the regional characteristics of talent, tolerance and technology being examined. Generally, these measures have wider spread influences which are embodied in larger geographic regions.

The methodology used within this paper can be divided into two parts. In the first, descriptive statistics are utilized to characterize the creative class subpopulation, and their distribution and migration patterns differentiating between migrants and stayers. The second part of the analysis utilizes binary logistic regression to measure the effect of individual and CMA/region characteristics on an individual's propensity to make an internal migration within Canada, defined as

$$P_i = 1/(1 + e^{\alpha+\beta X_i})$$

where *X* is a vector of explanatory variables, and the dependent variable contrasts the population who has made an internal migration to those who did not have a change in CMA/region. That is, how do these two groups differ in terms of covariates associated with making the choice whether to migrate?

Demographic and socio-economic characteristics which influence internal migration are drawn from existing research (Gurak and Kritz, 2000; Kritz and Nogel, 1994; Newbold, 1996:2002; Robinson and Tomes, 1982). Demographic characteristics include age (25 to 34, 35 to 44, 45 to 54, 55 to 69, or 70 and older); gender (female or male); ethnicity (British Isles, French, Other European (non-British Isles and non-French), Asian or All Other Ethnicities); household language (English only, French only, non-official language, or official and non-official languages); marital status (married, single, or divorced, separated or widowed); and immigration status (Canadian by birth, immigrant). Socio-economic characteristics include highest level of education (less than high school certificate, high school certificate, college, trades or some university, or university degree or higher); household income (less than $20,000, $20,000 to $39,999, $40,000 to $59,999, $60,000 to $79,999, $80,000 to $99,999, or $100,000 and higher), and labor force status (employed, unemployed or not in the labor force).

To examine the creative class theoretical framework, CMA/regional characteristics are created to proximate Florida's measures of technology, talent and tolerance. The indices are defined as the following:

Tech-Pole Index - is defined as the proportion of individuals employed in high technology sectors in 2001 (Table A1). This measurement of the Tech-Pole Index differs from Florida (2002) as he uses high technology industrial output; however this measure is similar to that used in Gertler et al. (2002). It is anticipated that the Tech-Pole index may proxy economic growth as it indirectly measures high-technology intensity and high-technology business formation of a region.

Talent Index - is defined as the proportion of individuals in the population who have a university degree in 2001.

Bohemian Index – is defined as the location quotient of the population employed in artistic and creative occupations in 2001 (Table A2).

Mosaic Index – is defined as the proportion of individuals that are foreign-born in 2001. The mosaic index is the Canadian equivalent to Florida's (2002) melting pot index (Gertler et al. 2002).

Gay Index – is defined as the location quotient of individuals reported to be in a same-sex partnership in 2001.

In addition to examining Florida's framework, a place of residence in 2001 variable is incorporated to capture the hierarchy of regions which in turn indirectly captures other non-measured regional characteristics. This variable is constructed as five categories of Toronto, Vancouver, Montreal, all other CMAs and all non-metropolitan areas.

While more traditional measures may be included to explain internal migration propensities, the scope of this analysis is to empirically examine whether the creative class theoretical framework measures of talent, tolerance and technology influences migration propensities. This paper attempts to test the creative class theoretical framework in the Canadian context; in particular, whether this framework is applicable to only the creative class or if higher levels of talent, tolerance and technology measures are important to attract others beyond the creative class.

Results

Descriptive Analysis of the Creative Class in Canada

Demographic and Socio-Economic Profile

In the creative class framework, it is theorized that regions with the ability to retain and attract the creative class are also regions that are leaders in regional prosperity and development (Florida 2002). However, while there is much known about the characteristics of the Canadian population, there is less known about the characteristics of Canada's creative class. In particular, there is even less known about how characteristics differ between creative class migrants and stayers.

Examination of the aged 25 years and older and the creative class subpopulations finds that, in general, these two groups have similar demographic profiles (Table 1). There is a lower proportion of females in the creative class while both subpopulations are approximately 80 percent Canadian-born. While the majority of the two subpopulations are married, the creative class has a larger proportion married and fewer divorced, separated or widowed. The largest ethnic groups reported for the two subpopulations are North American, British Isles and Other European with English reported as the major home language with the creative class reporting a higher proportion (67.23 percent versus 63.36 percent).

While the two subpopulations have similar demographic profiles, their socio-economic profiles differ. Approximately half of the 25 years and older subpopulation have a high school diploma or less, of the creative class only 6.29 percent have less than a high school diploma and 13.08 percent have a high school diploma. Close to 45 percent of the creative class have at a minimum a university bachelor's degree in comparison to 16.56 percent of the 25 years and older subpopulation. With these educational attainments, differences in household incomes also vary with over a third of the creative class reporting household incomes of $100,000 or over in comparison to 18.01 percent of the 25 years and older population. More importantly, there are over four times the proportion reporting household incomes of less than $20,000 in the 25 years and older population in comparison to the creative class. Over 90

percent of the creative class is employed as compared to two thirds of the 25 years and older population; however, this is likely due to the difference in age profiles. These socio-economic differences are expected as an outcome of the creative class definition since the definition in large part includes individuals in relatively well paid occupations which require higher education.

The profile of the creative class stayers and migrants echoes findings from the internal migration literature. Creative class migrants are young with the majority between the ages of 25 to 34 years (44.96 percent), more than double the proportion of stayers. More migrants are Canadian-born than stayers, with a larger proportion of migrants being North American while a smaller proportion report Other European or Asian ethnicities. While the majority of stayers and movers are married, there is a higher proportion of migrants who are single than stayers. There is selectivity on education with a larger proportion of migrants with a minimum of a university bachelor's degree (49.89 percent versus 43.49 percent). Both stayers and migrants are largely employed, however, there is a larger proportion of stayers with household incomes $100,000 and higher (37.40 percent versus 28.94 percent). This indicates the possibility that high paying jobs tie the creative class to particular locations.

Region of Residence Profile

Using 2001 region of residence, as expected the creative class are largely residing in the three largest CMAs of Toronto, Montreal and Vancouver (Table 2). However, a smaller proportion of migrants than stayers resided in Toronto in 2001 (16.74 percent versus 19.24 percent), while a larger proportion of migrants resided in Montreal (13.80 percent versus 11.98 percent). Generally, in middle sized CMAs such as Calgary, Edmonton, or Ottawa-Hull, there is a larger proportion of migrants than stayers while the less populated CMAs such as St. Johns, St. Catharines–Niagara, or Regina have larger shares of stayers than migrants. Winnipeg, Sudbury and Thunder Bay have more than double the proportion of stayers than migrants, while there are larger proportions of migrants in Oshawa and Halifax. Surprisingly, the non-metropolitan areas with the exceptions of the non-census metropolitan areas in the Atlantic provinces of

New Brunswick, Nova Scotia, Newfoundland and Prince Edward Island, have larger proportion of migrants than stayers. This is contrary to the idea that migrants typically move to large metropolitan areas seeking economic opportunities unavailable in smaller regions.

Between the period 1996 and 2001, only CMAs/regions in British Columbia, Alberta and Ontario had positive net internal migration of the creative class. The province which gained the largest share of creative class was Alberta with each of its three regions experiencing positive net migration. Calgary had the largest increase with its share of the creative class migrants increasing from 2.35 to 4.27 percent, Ottawa-Hull had the second largest increase while Abbotsford and the Rest of British Columbia had small positive net internal migration of the creative class. In Ontario, besides Ottawa-Hull, only Oshawa, Toronto, Hamilton and the Rest of Ontario have positive net migration of the creative class. Quebec City had the largest decrease between 1996 and 2001, with a decline of 0.74 percentage points of the creative class, followed by London and Winnipeg (0.44 percent and 0.43 percent).

In comparison to the overall 25 years and older population in 2001 (Table 3), there is a larger proportion of creative class in each Canada's three largest CMAs of Toronto, Montreal and Vancouver. Toronto had the largest difference with 14.60 percent of the 25 years and older population in comparison to 18.73 percent of the creative class. The mid-sized CMAs of Calgary, Edmonton, and Ottawa-Hull were the region of residence of a larger proportion of the creative class while the smaller CMAs as well as non-census metropolitan areas have a smaller proportion of the creative class. The Rest of Quebec had a higher proportion of the 25 years and older population (8.53 percent) than the creative class (5.30 percent), followed by Rest of Ontario and Rest of British Columbia.

Multivariate Analysis of Internal Migration Propensity

Three binomial logit models are created: (1) individual characteristics; (2) individual and region characteristics; and (3) individual and region characteristics and region of residence; which are examined on the creative class and 25 years and older subpopulations. Region characteristics of talent, tolerance and technology are measured through a series of indices: talent, gay, mosaic, boho and tech-pole.

Creative Class Models

Similar to existing internal migration literatures, the older creative class individuals are less likely to make an internal migration than their younger counterparts (Table 4). In particular, the creative class individuals in the oldest age range of 55 to 69 years are the least likely (0.185 odds ratio). Females are less likely than their male counterparts to migrate as well as immigrants are less likely than their Canadian-born counterparts. Unexpectedly, individuals who are single are less likely to migrate than their married counterparts while individuals who are divorced, separated or widowed are more likely. From the literature it would be expected that individuals who are non-married would be more likely to migrate due to potentially fewer ties to a region. In comparison to individuals with British Isles ethnicity, individuals who are Other European (non-British Isles or non-French) or Asian are less likely to migrate while All Other Ethnicities are more likely. Individuals reporting non-official languages as their home language are less likely to migrate than their English speaking counterparts, however, unexpectedly those with a French home language are more likely to migrate. Generally, research in the Canadian context finds individuals with French home languages are less mobile than their English speaking counterparts due to the fewer number of French destinations.

As expected, individuals with lower levels of education are less likely to migrate than their better educated counterparts; individuals with less than a high school diploma are the least likely in comparison to individuals with a university bachelor's degree (odds ratio 0.625). However, in comparison to

individuals in the highest household income range of $100,000 or higher, individuals with lower household incomes are more likely to make an internal migration. Possibly, individuals in higher income employment may be tied to their place of employment or individuals in lower paying employment may be migrating for better economic opportunities.

In model 2, region characteristics are statistically significant with the exception of the tech-pole index. Creative class individuals who resided in a region with higher measures of the talent index were slightly less likely to have been a migrant (odds ratio 0.954). This finding is contrary to what would be expected under the creative class theory, while places with higher levels of talent would be attractive to the creative class. However, higher levels of talent may also serve as a retention mechanism or may create more employment competition. If a higher level of talent creates more competition, individuals may choose to reside in places where their talents are more highly valued due to less competition.

Following the creative class theoretical framework, individuals who resided in regions in 2001 which have higher gay, mosaic and boho indices are more likely to have been a migrant than those residing in regions with lower levels. In particular, the gay index has a relatively strong influence (odds ratio 1.319) while the mosaic and boho indices have relatively weak influences (odds ratios 1.006 and 1.056 respectively). The relatively strong influence of the gay index on migration propensity may indicate that this index is a better measure of openness in a region. However, it is surprising that the other two measures of tolerance, the mosaic and boho indices, have relatively weak influences on the likelihood of migration. Specifically, the mosaic index while statistically significant has little influence on migration propensity which is surprising given the concentration of immigrant settlement across Canada. The strength of influence may indicate that each measure captures a different attitude or level of openness; however, the weakness of the mosaic and boho indices may indicate overlap between these three measures. This is supported by the Pearson's correlation coefficient between the three tolerance indices: boho, gay and mosaic, which finds the indices positively correlated. This in part may explain the limited

influence of the mosaic and boho indices in comparison to the gay index. In addition, there may be a hierarchy of tolerance indices such that regions with a higher gay index may inherently be the most tolerant.

The tech-pole index is statistically insignificant and very weakly influences internal migration propensities. This is unexpected as the index measures employment in the high technology industrial sector which may measure to what degree the knowledge economy is entrenched in a region. It would be expected that higher tech-pole index would be attractive to the creative class given their occupation classifications as there would likely be greater and diverse economic opportunities. Canada lags the United States in information and communication technology investment per worker across almost all industries (Sharpe, 2006). In addition, Canada lower research and development expenditures and less developed high-tech sector in comparison to the United States (Sharpe, 2003). This in turn may explain why the tech-pole index does not have the expected effect in Canada as it does in the United States.

Model 3 is the full model which includes all the individual and regional characteristics as well as a region of residence in 2001. The region of residence variable is included to capture a hierarchy of regions as individuals tend to migrate up the urban hierarchy. This hierarchy of regions is formed as regions' characteristics differ widely between regions. From the descriptive analysis it would be expected that the creative class would be drawn primarily to the largest CMAs in Canada – Toronto, Montreal and Vancouver, followed by other CMAs and non-census metropolitan regions. However, the analysis finds that in comparison to Toronto as the reference, individuals in all other regions are more likely to have been a migrant. That is, individuals residing in regions outside of Toronto are more likely to have been a migrant thereby moving to their region of residence in 2001. The strength of the region of residence variable is quite strong ranging from an odds ratio of 1.306 for Vancouver to 2.544 for non-census metropolitan regions. Therefore, individuals who resided in non-census metropolitan regions are over 2.5 times more likely to have been a migrant that their counterparts residing in Toronto. This may in some

way reflect the idea of competition that is faced by the creative class when choosing to reside in the largest CMAs. In addition, this may reflect Toronto's ability to retain the creative class.

With the addition of the region of residence in 2001 variable in model 3, all the region characteristics are statistically significant; however, their magnitude of influence on internal migration propensities has changed. The talent index does not exhibit the expected influence as individuals in regions with higher levels of talent are less likely to have migrated. The boho index exerts a larger influence in model 3 than model 2 (odds ratios 1.462 and 1.056 respectively) while the gay index has a smaller influence (odds ratios 1.166 and 1.319 respectively). It is unclear why the addition of the region of residence variable would alter the magnitude of influence of these indices; however, all three tolerance indices are influential in the internal migration propensity decision.

Unlike in model 2, in model 3 the tech-pole index is statistically significant with a large influence on the migration decision (odds ratio 2.158). Individuals residing in regions with a higher tech-pole index are more likely to have made a migration than those living in regions with lower tech-pole index. That is, for each unit increase in the tech-pole for a region of residence for an individual the individual is more than double as likely to have been a migrant. The result suggests that the presence of a strong high technology industry sector is a strong attractor for the creative class.

Population 25 years and older Models

Examination of model 3 of the 25 years and older subpopulation finds similar results to that of the creative class (Table 5). Focusing on region characteristics, results suggest that the overall population is attracted to regions with high levels of tolerance and technology similarly as the creative class. Individuals who reside in regions with higher levels of talent are less likely to have migrated than individuals residing in regions with lower levels (odds ratio 0.966). Individuals residing in regions with higher levels of tolerance and technology are more likely to have been migrants. Individuals residing in

all regions outside of Toronto in 2001 are more likely to have been migrants than their Toronto counterparts.

Conclusions

The creative class theoretical framework argues that to attract the creative class a region must have the 3 T's: technology, talent and tolerance. The presence of these 3 T's enables a region to offer a high "quality of life" which functions both to attract and retain talented individuals such as the creative class, which in turn assists in furthering regional economic development and growth. While the connection between the presence of the creative class, the 3T's and regional development has been examined, this is only half the story. The creative class resides in regions with 3T's; however, there has been less focus on empirical examination of whether the presence of the 3T's attracts the creative class.

The scope of this analysis is to empirically examine whether the creative class theoretical framework measures of talent, tolerance and technology is statistically significant in explaining migration propensities in the Canadian context. In addition, this paper attempts to examine whether these three measures are statistically significant in the explanation the internal migration propensities of the overall population beyond the creative class. Existing research that has examined talent, tolerance and technology measures has found that there is a strong linkage between these measures and economic growth; however, there is little known about the creative class in Canada. In particular, existing research has not examined the demographic, socio-economic and migration profiles on the creative class. This paper attempts to provide insight into who the creative class are in Canada as well as where they reside.

The creative class has similar demographic profiles as the 25 years and older population. Generally individuals are married; Canadian-born; North American or British Isles in ethnicity; and have English as their home language. The main differences between these two subpopulations are their socio-economic

profiles. The creative class is better educated and have higher household incomes than the overall population. While there is a large difference in the upper household income bracket, there is even larger difference in the lowest income bracket; only 3.63 percent of the creative class have incomes of less than $20,000 (versus for the 12.94 percent of the overall population).

In addition, the profile of the creative class stayers and migrants echoes findings from the internal migration literature. A larger proportion of creative class migrants tend to be younger, Canadian-born, North American ethnicity, and single in comparison to creative class stayers. In addition, creative class migrants are more educated with a higher proportion with a university bachelor's degree (49.89 percent versus 43.49 percent); however, there is a larger proportion of creative class stayers with $100,000 household incomes than migrants (37.40 percent versus 28.94 percent).

In 2001, the creative class is largely residing in the three largest CMAs of Toronto, Montreal and Vancouver. However, there is a smaller proportion of creative class migrants than stayers in Toronto while more stayers than migrants in Montreal. Generally, in mid and small sized CMAs there are a larger proportion of stayers while the non-census metropolitan regions, with the exceptions of the Atlantic provinces. Between the period 1996 and 2001, only CMAs/regions in British Columbia, Alberta and Ontario had a positive net internal migration of the creative class. Alberta gained the largest share of the creative class with Calgary experiencing the largest increase from 2.35 percent to 4.27 in the five year period.

The multivariate analysis to some degree corroborates the creative class thesis which finds that creative class individuals are attracted by regions where there are high levels of talent, tolerance and technology. While the talent results do not support the creative class thesis, the measures of tolerance and technology yield results consistent with the thesis. Creative class individuals who are residing in regions in 2001 with higher levels of tolerance and technology are more likely to have been a migrant than individuals

residing in regions with lower levels. This result suggests that the presence of tolerance and technology in a region are attractors to the creative class. Not only does this analysis corroborate the creative class thesis, the findings suggest these three measures are similarly statistically significant in explaining migration propensities of the overall population; therefore, the presence of tolerance and technology in a region is not only attractive to the creative class. It is not surprising that the overall population would be attracted to regions that are able to provide a good 'quality of life'. However, what is surprising is that the odds ratios for these measures between the two subpopulations are very similar. That is, the measures of talent, tolerance and technology influence the likelihood of migration to a similar degree for the creative class and the overall population.

While it may be expected that the level of tolerance, and even talent, may be as influential in the migration decision of the overall population similar to the creative class, the similar magnitude of influence of technology is unanticipated. Although the ability to attract and retain technology intensive employment is important to a region's economic development and growth, it is also a signal of a region's potential economic future. Therefore, overall technology intensity may be important to the overall population; however, it would have been expected given the occupational structure of the creative class that the presence of technology intensity would be more influential. Given the potential migration destinations within Canada, it may be such that only a few regions possess the majority of regional and 'quality of life' characteristics that are of interest to migrants.

The studies which have used the creative class theoretical framework in migration research have found limited support for the framework particularly in the European context (Marlet and van Woerkens 2005; Hansen and Niedomsyl 2009; Houston et al. 2008). However, Wojan et al. (2007) found that a larger share of creative class employment has a positive effect on net migration among non-metropolitan and metropolitan areas in the United States. This research adds to the existing knowledge on the migration propensity of the creative class migration and how it compares to the overall population. In addition, the

findings suggest that the creative class theoretical framework has broader implications on the overall population. That is, talent, tolerance and technology measures are not only important in the migration decision of the creative class but are influential in the overall population. This research highlights how in the Canadian context the measures of talent, tolerance and technology can be important to the individual migration decision after controlling for individual characteristics. In particular, the research highlights the need for further research of the creative class theoretical framework in migration studies.

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Figure 1: Census Metropolitan Areas in Canada in 2001

Table 1
Demographic and Socio-Economic Profile
Creative Class and Population Aged 25 Years and Older in Canada in 2001

	Creative Class Only			Aged 25 years and Older		
	Stayer	Mover	Total	Stayer	Mover	Total
	Percent			Percent		
Age						
25 to 34	19.66	44.96	24.82	16.01	36.87	19.38
35 to 44	32.64	30.91	32.29	25.21	27.87	25.64
45 to 54	32.51	17.16	29.38	24.01	16.48	22.79
55 to 69	15.20	6.97	13.52	22.34	12.96	20.82
70 Plus				14.67	5.82	13.24
Gender						
Female	49.33	47.82	49.02	53.20	50.70	52.79
Male	50.67	52.18	50.98	49.03	49.30	49.07
Immigration Status						
Canadian-Born	79.69	85.57	80.89	79.75	84.58	80.53
Immigrant	20.31	14.43	19.11	22.48	15.42	21.34
Marital Status						
Married	74.95	70.13	73.97	71.26	67.35	70.63
Divorced, Separated, Widowed	9.91	9.58	9.84	16.82	14.94	16.51
Single	15.14	20.29	16.19	14.14	17.72	14.72
Ethnicity						
Aboriginal	1.26	1.46	1.30	1.94	2.37	2.01
North American	30.08	33.48	30.78	33.46	35.33	33.77
Asian	7.65	5.71	7.26	7.39	5.30	7.05
British Isles	26.69	26.66	26.68	24.69	25.35	24.80
French	8.58	9.76	8.82	9.41	10.03	9.51
Other European	22.86	20.49	22.37	22.42	19.15	21.89
All Other Ethnicities	2.88	2.44	2.79	2.91	2.45	2.84
Home Language						
English	67.45	66.39	67.23	63.16	64.44	63.36
French	17.58	20.62	18.20	21.22	22.12	21.37
English or French and Other	12.59	11.46	12.36	12.39	10.65	12.11
Other Languages	2.39	1.53	2.21	5.46	2.79	5.03
Education						
Less than High School Diploma	6.72	4.61	6.29	34.08	22.26	32.17
High School Diploma	13.61	10.99	13.08	21.51	20.04	21.27
Other Non-university Postsecondary	36.28	34.52	35.92	31.12	35.77	31.87
Bachelor's Degree or Higher	43.39	49.89	44.71	15.53	21.94	16.56
Household income						
0 to $19,999	3.37	4.64	3.63	13.07	12.25	12.94
$20,000 to $39,999	8.56	11.55	9.17	21.38	19.54	21.08
$40,000 to $59,999	15.48	18.43	16.08	20.65	21.47	20.78
$60,000 to $79,999	18.49	20.06	18.81	17.15	17.97	17.28
$80,000 to $99,999	16.70	16.37	16.63	11.74	11.91	11.77

$100,000 and higher	37.40	28.94	35.68	18.23	16.87	18.01
Labor Force Status						
Employed	92.80	91.93	92.62	62.70	70.39	63.94
Unemployed	2.27	3.19	2.46	3.80	5.16	4.02
Not in Labor Force	4.93	4.88	4.92	33.50	24.45	32.03
Weighted Sample Size	3,607,210	923,575	4,530,785	15,662,225	3,019,635	18,681,860

Source. Author's analysis of 2001 Census of Canada Master Files.

Table 2
Residential Profile of the Creative Class in Canada in 2001

Region of Residence	Stayer	Migrant	
		1996 Origin	2001 Destination
		Percent	
Abbotsford	0.36	0.38	0.43
Vancouver	7.49	7.90	7.68
Victoria	1.30	1.37	1.33
Rest of BC	3.81	4.60	4.83
Calgary	4.43	2.35	4.27
Edmonton	3.57	3.15	3.20
Rest of AB	2.59	3.40	3.78
Regina	0.80	0.76	0.51
Saskatoon	0.83	0.98	0.59
Rest of Saskatchewan	1.12	1.44	1.32
Winnipeg	2.58	1.64	1.20
Rest of MB	0.94	1.16	1.02
Ottawa-Hull	5.63	3.86	4.98
Kingston	0.51	0.89	0.62
Oshawa	0.89	0.99	1.42
Toronto	19.24	15.87	16.74
Hamilton	2.30	1.87	2.16
St. Catharines-Niagara	1.03	0.92	0.85
Kitchener	1.42	1.64	1.50
London	1.54	1.66	1.22
Windsor	0.86	0.72	0.71
Sudbury	0.52	0.47	0.23
Thunder Bay	0.43	0.39	0.22
Rest of ON	7.80	8.42	8.98
Chicoutimi-Jonquiere	0.43	0.49	0.36
Quebec City	2.57	3.73	2.99
Sherbrooke	0.47	0.91	0.60
Trois-Rivieres	0.39	0.54	0.41
Montreal	11.98	14.16	13.90
Rest of QC	5.21	5.80	5.62
Saint John	0.38	0.40	0.38
Rest of NB	1.65	1.77	1.55
Halifax	1.52	1.25	1.24
Rest of NS	1.28	1.27	1.10
PEI	0.37	0.38	0.35
St. Johns	0.71	0.93	0.61
Rest of NFLD	0.67	0.93	0.57
North	0.33	0.62	0.54
Weighted Sample Size	3,607,215	923,575	923,585

Source. Author's analysis of 2001 Census of Canada Master Files.

Table 3
Residential Profile of the Population Aged 25 Years and Older in Canada in 2001

Region of Residence	Stayer	Migrant	
		1996 Origin Percent	2001 Destination
Abbotsford	0.44	0.51	0.59
Vancouver	6.27	7.51	6.76
Victoria	1.10	1.23	1.20
Rest of BC	4.83	6.07	6.38
Calgary	3.02	2.22	3.30
Edmonton	3.01	2.76	3.17
Rest of AB	3.14	4.17	5.05
Regina	0.66	0.64	0.46
Saskatoon	0.72	0.81	0.64
Rest of Saskatchewan	1.85	1.90	1.79
Winnipeg	2.46	1.46	1.16
Rest of MB	1.43	1.54	1.42
Ottawa-Hull	3.55	2.91	3.24
Kingston	0.47	0.62	0.58
Oshawa	0.89	1.03	1.45
Toronto	14.97	14.03	12.66
Hamilton	2.30	1.57	1.90
St. Catharines-Niagara	1.36	1.03	1.13
Kitchener	1.33	1.30	1.39
London	1.48	1.32	1.20
Windsor	1.04	0.71	0.77
Sudbury	0.60	0.44	0.25
Thunder Bay	0.47	0.32	0.21
Rest of ON	10.07	10.06	11.60
Chicoutimi-Jonquiere	0.58	0.45	0.37
Quebec City	2.40	3.17	2.67
Sherbrooke	0.49	0.75	0.66
Trois-Rivieres	0.49	0.54	0.49
Montreal	11.39	13.55	12.71
Rest of QC	8.58	7.97	8.24
Saint John	0.44	0.38	0.34
Rest of NB	2.21	1.88	1.78
Halifax	1.28	0.95	0.99
Rest of NS	2.06	1.44	1.40
Prince Edward Island	0.47	0.38	0.40
St. Johns	0.61	0.68	0.51
Rest of NFLD	1.30	1.16	0.75
North	0.25	0.52	0.38
Weighted Sample Size	16,010,490	3,019,635	3,020,210

Source. Author's Analysis of 2001 Census of Canada Master Files.

Table 4
Internal Migration Propensity of the Creative Class in Canada between 1996 and 2001

	Model 1		Model 2		Model 3	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Intercept	-0.327		0.038		-1.201	
Age (25 to 34 Reference)						
35 to 44 years	-0.895	0.409	-0.903	0.405	-0.905	0.404
45 to 54 years	-1.497	0.224	-1.515	0.220	-1.518	0.219
55 to 69 years	-1.663	0.190	-1.686	0.185	-1.690	0.185
Gender (Male Reference)						
Female	-0.173	0.841	-0.179	0.836	-0.180	0.835
Immigrant Status (Canadian by Birth Reference)						
Immigrant	-0.104	0.901	-0.091	0.913	-0.092	0.912
Marital Status (Married Reference)						
Divorced, Separated, Widowed	0.197	1.218	0.213	1.237	0.213	1.238
Single	-0.229	0.795	-0.213	0.808	-0.211	0.810
Ethnicity (British Isles Reference)						
French	0.00786*	1.008*	0.0158*	1.016	0.020	1.020
Other European	-0.214	0.808	-0.216	0.806	-0.208	0.812
Asian	-0.160	0.852	-0.154	0.857	-0.164	0.849
All Other Ethnicities	0.131	1.140	0.134	1.143	0.132	1.141
Home Language (English Reference)						
French	0.081	1.084	0.00399*	1.004	0.112	1.118
Other Non-Official	-0.203	0.816	-0.209	0.811	-0.188	0.829
Combination of Official and Non-Official Languages	-0.033	0.968	-0.044	0.957	-0.0138*	0.986
Highest Level of Education (University Degree Reference)						
Less than High School	-0.435	0.648	-0.460	0.631	-0.470	0.625
High School Diploma	-0.343	0.710	-0.357	0.700	-0.362	0.696
College, Trades or Some University	-0.225	0.798	-0.242	0.785	-0.245	0.783
Household income ($100,000 or Higher Reference)						
Less than $20,000	0.508	1.661	0.472	1.602	0.474	1.606
$20,000 to $39,9999	0.429	1.536	0.395	1.484	0.399	1.491
$40,000 to $59,999	0.297	1.346	0.270	1.310	0.273	1.313
$60,000 to $79,999	0.196	1.217	0.175	1.192	0.177	1.193
$80,000 to $99,9999	0.129	1.137	0.114	1.121	0.115	1.122
Region Characteristics						
Talent index			-0.047	0.954	-0.034	0.967
Gay index			0.277	1.319	0.154	1.166
Mosaic index			0.006	1.006	0.012	1.012
Boho index			0.054	1.056	0.380	1.462
Tech-Pole index			-0.0309*	0.970	0.769	2.158
Region of Residence 2001 (Toronto Reference)						
Vancouver					0.267	1.306
Other Census Metropolitan Areas					0.634	1.885
Montreal					0.277	1.319
Non-Census Metropolitan Areas					0.934	2.544
ρ	0.0706		0.0729		0.07387	

Source. Author's analysis of 2001 Census of Canada Master Files. Notes. Weighted Sample Size Migrants = 923,575; Stayers 3,607,210. All estimates significant at p =.0001 with the exception of *.

Table 5
Internal Migration Propensity of Population 25 years and Older in Canada between 1996 and 2001

	Model 1		Model 2		Model 3	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Intercept	-0.440		-0.165		-1.665	
Age (25 to 34 Reference)						
35 to 44 years	-0.763	0.466	-0.769	0.463	-0.770	0.463
45 to 54 years	-1.264	0.283	-1.275	0.28	-1.275	0.279
55 to 69 years	-1.464	0.231	-1.476	0.229	-1.478	0.228
70 years and older	-1.900	0.15	-1.912	0.148	-1.915	0.147
Gender (Male Reference)						
Female	-0.081	0.922	-0.080	0.924	-0.079	0.924
Immigrant Status (Canadian by Birth Reference)						
Immigrant	-0.107	0.898	-0.100	0.905	-0.100	0.905
Marital Status (Married Reference)						
Divorced, Separated, Widowed	0.276	1.318	0.283	1.328	0.283	1.327
Single	-0.229	0.795	-0.222	0.801	-0.218	0.804
Ethnicity (British Isles Reference)						
French	-0.009	0.991	0.00129*	1.001	0.00353*	1.004
Other European	-0.195	0.823	-0.195	0.823	-0.191	0.826
Asian	-0.119	0.888	-0.124	0.883	-0.124	0.883
All Other Ethnicities	0.082	1.086	0.087	1.091	0.090	1.094
Home Language (English Reference)						
French	0.050	1.051	-0.034	0.967	0.095	1.1
Other Non-Official	-0.264	0.768	-0.274	0.76	-0.243	0.785
Combination of Official and Non-Official Languages	-0.090	0.914	-0.106	0.899	-0.073	0.93
Highest Level of Education (University Degree Reference)						
Less than High School Diploma	-0.576	0.562	-0.598	0.55	-0.605	0.546
High School Diploma	-0.443	0.642	-0.463	0.629	-0.467	0.627
College, Trades or Some University	-0.248	0.78	-0.268	0.765	-0.271	0.763
Household income ($100,000 or Higher Reference)						
Less than $20,000	0.259	1.296	0.232	1.261	0.240	1.271
$20,000 to $39,9999	0.212	1.236	0.187	1.206	0.193	1.213
$40,000 to $59,999	0.159	1.172	0.139	1.149	0.143	1.154
$60,000 to $79,999	0.108	1.114	0.093	1.098	0.095	1.1
$80,000 to $99,9999	0.073	1.075	0.062	1.064	0.063	1.065
Region Characteristics						
Talent index			-0.051	0.95	-0.035	0.966
Gay index			0.341	1.406	0.138	1.147
Mosaic index			0.006	1.006	0.015	1.015
Boho index			0.136	1.145	0.431	1.539
Tech-Pole index			-0.098	0.906	1.130	3.097
Region of Residence 2001 (Toronto Reference)						

Vancouver			0.433	1.541
Other Census Metropolitan Areas			0.894	2.444
Montreal			0.460	1.584
Non-Census Metropolitan Areas			1.174	3.236
ρ	0.0623	0.0646	0.0657	

Source. Author's analysis of 2001 Census of Canada Master Files. Notes. Weighted Sample Size Migrants = 3,019,635; Stayers 15,662,225. All estimates significant at p =.0001 with the exception of *.

Appendix A

Table A1
Definition of High Technology Industries in Canada 2001

SIC (3-digit)	Industry Description
321	Aircraft and aircraft parts industry
335	Electronic equipment industries
374	Pharmaceutical and medicine industry
391	Scientific and professional equipment
482	Telecommunication carriers industry
483	Other telecommunication industries
772	Computer and related services
775	Architectural, Engineering and other scientific and technical services
868	Medical and other health laboratories
961	Motion picture audio and video production and distribution

Source. Gertler et al (2002).

Table A2
Definition of Bohemian Occupations in Canada in 2001

SOC (4-digit)	Occupation Description
F021	Writers
F031	Producers, directors, choreographers, and related occupations
F032	Conductors, composers and arrangers
F033	Musicians and singers
F034	Dancers
F035	Actors
F036	Painters, sculptors and other visual artists
F121	Photographers
F141	Graphic designers and illustrating artists
F142	Interior designers
F143	Theatre, fashion, exhibit and other creative designers
F144	Artisans and craftspersons
F145	Patternmakers

Source. Gertler et al (2002).