REGIONAL ECONOMY, CREATIVE CLASS, AND SOCIAL DIVERSITY
A DISCUSSION ABOUT FLORIDA'S CONCEPT OF THE "CREATIVE CLASS"
THROUGH QUANTITATIVE METHODS

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REGIONAL ECONOMY, CREATIVE CLASS, AND SOCIAL DIVERSITY
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ABSTRACT

According to Florida's theory in his book "The Rise of the Creative Class", the creative class can improve a regions' economic growth. In addition, societies with tolerance and diversity attract the creative class. The creative class is made up of nine occupations derived from the Standard Occupational Classification System. However, he did qualitative research in his book without controlling for fixed effects. This may lead to incorrect attribution. Therefore, I test these hypotheses through quantitative methods with fixed effects control for data at both state and metropolitan level. I establish two linear models. One of them aims to test the relationship between economic growth and the number of the creative class. The other aims to test the relationship between the creative class and social diversity. Social diversity is represented by the Gay Index, Innovation Index, Melting Pot Index, and Married Household Proportion.

The regression results indicate that real GDP per capita, the creative class, and social diversity have a significant and positive relationship with each other when not controlling for fixed effects, matching Florida's theory. However, controlling for fixed effects, I find that the creative class only has a significantly positive relationship with economic growth at the metropolitan level. Therefore, the creative class has an observed relationship with city economic growth but social diversity has no direct relationship with it at either level. On the other hand, well-educated people still act as an important role in economic growth and has a close

relationship with the creative class. But we can't say that the creative class is equal to highly educated people.

From the lagged regression, we can see that the industry plays an important role in improving economic growth. Patents and new technologies attract skilled workers in the creative industry which is the creative class. And then the creative class promotes economic growth. Social diversity seems to have a lagged relationship with the creative class but only at the state level. Therefore, urban governments should implement policies that improve the development of the creative industries and cultivate skilled personnel in these industries.

In future research, researchers can combine the characteristics of different cities to further discuss their fit with different creative industries. We can also focus on how to cultivate and attract the creative class to promote the economic development of the city. In addition, further research can find out what consists of the fixed effects which can explain 30% of the economic growth and creative class.

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INTRODUCTION AND RESEARCH QUESTION

In 2003, the United Nations (UN) put forward 17 Sustainable Development Goals and the 11th goal is sustainable cities and communities. In the documents, the UN took culture and diversity as one of the points to maintain a sustainable city. Besides that, The World Bank (2003), for instance, estimated that the combined creative industries represented 7 percent of employment and grew at an annual rate of 10 percent between 2000 and 2005 (UNCTAD, 2004; Wu, 2005). Cities must learn how to direct the development of the culture or creative industry in order to pursue long-term prosperity.

In his book "The Rise of the Creative Class", Richard Florida (2002) asserts that "metropolitan regions with high concentrations of technology workers, artists, musicians, lesbians, gay men, and a group he describes as 'high bohemians', exhibit a higher than average level of influence on economic development". Florida refers to these groups collectively as the "creative class." He states that "the creative class fosters an open, dynamic, personal and professional urban environment. This environment, in turn, attracts more creative people, as well as businesses and capital". He suggests that "attracting and retaining high-quality talent versus a singular focus on projects such as sports stadiums, iconic buildings, and shopping centers, would be a better primary use of a city's regeneration of resources for long-term prosperity". However, some scholars criticized his concept of the creative class, especially in regards to the aspect of sexual orientation. Does the creative class really have a relationship with economic growth? Can a region with more diversity and tolerance do better in the creative industry and attract more people of creative class? In the following discussion, I investigate the relationship among the creative class, the diversity of regions and their economic growth. My hypotheses are:

(1) Creative class can improve a region's economic growth

(2) Societies with tolerance and diversity attract the creative class.

LITERATURE REVIEW

<u>Florida's theory</u>

In 2002, Richard Florida published a book *The Rise of the Creative Class* and created the concept of the creative class. The creative class refers to a group of people who are made up of knowledge workers, intellectuals and various types of artists. The most obvious characteristic of these people is that they are full of innovative ideas. He defined two main groups of the creative classes according to their occupation, derived from the Standard Occupational Classification System codes of Bureau of Labor: the super-creative core and Creative professionals.

The super-creative core is made up of the following five occupations:

- *"Computer and mathematical occupations*
- *Architecture and engineering occupations*
- *Life, physical, and social science occupations*
- *Education, training, and library occupations*
- *Arts, design, entertainment, sports and media occupations"*

The creative professionals are made up of the following five occupations:

- *"Management occupations*
- *Business and financial operations occupations*
- *Legal occupations*
- *Healthcare practitioners and technical occupations*
- *High-end sales and sales management"*

Florida states that "creative professionals have the function of supporting economic growth, whereas the super-creative core is the actual wellspring of innovation and comprises the driving force of economic and technological development". He also defined three other classes which he thought are less creative.

Working Class:

- *"Construction and extraction occupations*
- *Installation, maintenance, and repair occupations*
- *Production occupations*
- *Transportation and material moving occupations"*

Service Class:

- *"Health care support occupations*
- *Food preparation and food-service-related occupations*
- *Building and grounds cleaning and maintenance occupations*
- *Personal care and service occupations*
- *Low-end sales and related occupations*
- *Office and administrative support occupations*
- *Community and social service occupations*
- *Protective service occupations"*

Agriculture:

- *"Farming, Fishing, and Forestry occupations"*

McGranahan and Wojan (2007) then narrowed the definition of creative class by dropping "education, training, and library occupations" and "healthcare practitioners and technical occupations". Their recasting was accepted by Florida.

Florida created these classes because he thought that at that time, the U.S. was undergoing a dramatic economic transformation to a "post-industrial society" or he called "creative economy" (Florida, 2006). The idea of the creative economy is based on intellectual inputs, or human creativity instead of physical inputs. He stated that "creativity has become the driving force of our economy, and the creative sector has exploded, adding more than 20 million jobs" (Florida, 2002 p4). Meanwhile, he assumed that "every human being is creative" (ibid, p5). Therefore, Fordism which ask workers to produce standardized, low-cost goods with mechanical labor and repeated simple actions can no longer drive economic development because it no longer provides an outlet for innovation (Victoria, 2005). In this Post-industrial era, we should establish cities with a more tolerant environment to encourage people to release their innovative ideas, attract more creative talents, and finally drive the development of the city's economy.

For a city to attract the creative class, Florida argues, "it must possess the three 'T's: Talent (a highly talented/educated/skilled population), Tolerance (a diverse community, which has a

'live and let live' ethos), and Technology (the technological infrastructure necessary to fuel an entrepreneurial culture)". Hence, he introduced several Indexes to test the relationship between cities' economic growth and the three T's of the cities:

- *"High-tech Index: It ranks metropolitan areas based on a combination of two factors: (1) its high-tech industrial output as a percentage of total U.S. high-tech industrial output; (2) the percentage of the region's own total economic output that comes from high-tech industries compared to the nationwide percentage.*
- *Innovation Index: It is a measure of patented innovations per capita.*
- *Gay Index: It is a measure of the over- or under-representation of coupled gay people who live in a region relative to the United States as a whole.*
- *Bohemian Index: It is a measure of artistically creative people who include authors, designers, musicians, composers, actors, directors, painters, sculptors, artist printmakers, photographers, dancers, artists, and performers.*
- *Talent Index: It is a measure of the human capital in a region, based on a region's share of people with a bachelor's degree and above.*
- *Melting Pot Index: It measures the relative percentage of foreign-born people in a region."*

The High-tech Index and Innovation Index refer to technology; Gay Index, Bohemian Index and Melting Pot Index refer to tolerance; and the Talent Index refers to talent. At the end of his 2002 study, Florida found that except for the Melting Pot Index, these Indexes all have a positive relationship with economic growth. Figure 1 show the relationships between creative class and several indexes.

Large Cities Creativity Rankings

Rankings of 49 metro areas reporting populations over 1 million in the 2000 Census

The Top Ten Cities	Creativity Index	% Creative Workers	Creative Rank	High-Tech Rank	Innovation Rank	Diversity Rank
1. San Francisco	1057	34.8%	5	1	2	1
2. Austin	1028	36.4%	4	11	3	16
3. San Diego	1015	32.1%	15	12	7	3
3. Boston	1015	38.0%	3	2	6	22
5. Seattle	1008	32.7%	9	3	12	8
6. Raleigh—Durham—Chapel Hill	996	38.2%	2	14	4	28
7. Houston	980	32.5%	10	16	16	10
8. Washington—Baltimore	964	38.4%	1	5	30	12
9. New York	962	32.3%	12	13	24	14
10. Dallas	960	30.2%	23	6	17	9
10. Minneapolis	960	33.9%	7	21	5	29

The Bottom Ten Cities	Creativity Index	% Creative Workers	Creative Rank	High-Tech Rank	Innovation Rank	Diversity Rank
49. Memphis	530	24.8%	47	48	42	41
48. Norfolk—Virginia Beach, VA	555	28.4%	36	35	49	47
47. Las Vegas	561	18.5%	49	42	47	5
46. Buffalo	609	28.9%	33	40	27	49
45. Louisville	622	26.5%	46	46	39	36
44. Grand Rapids, MI	639	24.3%	48	43	23	38
43. Oklahoma City	668	29.4%	29	41	43	39
42. New Orleans	668	27.5%	42	45	48	13
41. Greensboro—Winston-Salem	697	27.3%	44	33	35	35
40. Providence, RI	698	27.6%	41	44	34	33

Figure 1: Index ranks of cities

Discussions after the book's publication

The publication of Florida's book caused a heated debate "in the fields of economics, geography, regional studies, urban planning, sociology, applied management and the social sciences. Then the debate has also stretched to journalism, public policy and a huge number of professional communities, from urban development to arts and culture" (2002 p2). Many scholars and policymakers in these fields put forward many different opinions from both positive and negative perspectives.

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Some scholars don't agree with Florida's result and critiqued the notion of "the creative class" from several aspects. As early as 2001, Howkins critiqued "Florida's conception of the creative class ignores the difficulties associated with arriving at an accurate definition of creative activities" (Howkins, 2001). The most essential problem of the definition is that "the vast majority of occupational groups in contemporary industrial society involve a certain degree of creativity" (Krätke, 2012). Ann Markusen (2005) challenged the relationship between the creative class and urban growth. She thought that "in the creative class, occupations that exhibit distinctive spatial and political proclivities are bunched together, purely on the basis of educational attainment and with little demonstrable relationship to creativity". Edward L. Glaeser (2005) agreed that cities' providing lifestyle and advantages to their residents is important. However, he took the idea of Markusen and ran regressions of population growth instead of the creative class. He found that only human capital, which is measured as the percentage of the regional labor force with a bachelor's degree and above, was significantly and positively related to economic growth. Hence, he stated that "there is nothing to this diversity or Bohemianism, once you control for human capital". Peck (2005) combined the creative economy with neoliberalism and attribute the economic growth to interurban competition, gentrification, middle‐class consumption and place‐marketing which attract leftish policy‐makers and urban planners but actually nothing new. Pratt (2008) improved on Peck's idea. He thought that Florida's conceptual "basis of focusing on occupations (creative class) strips out the necessarily embedded relationships with industries and with production and consumption". At the same time, he cannot prove that a particular skill can replace educational attainment since the levels of skills are reduced to a taxonomy of occupations. On this basis, he showed that "the relationship

between the cultural economy and the city, and growth, is misplaced and thus needs to be recast."

Positive perspective

To answer the questions from other scholars and improve the theory, Florida did extend his research. In 2008, he and his colleagues tested the efficacy of educational versus occupational measures (i.e. the creative class) of human capital and the factors that affect its distribution (Florida, Charlotta, Kevin, 2008). Finally, they found that "talent—human capital and the creative class are related but clearly not the same" (see Figure 2). They also discovered that "tolerance is significantly associated with both human capital and the creative class as well as with wages and income." That means we cannot attribute economic growth to only human capital.
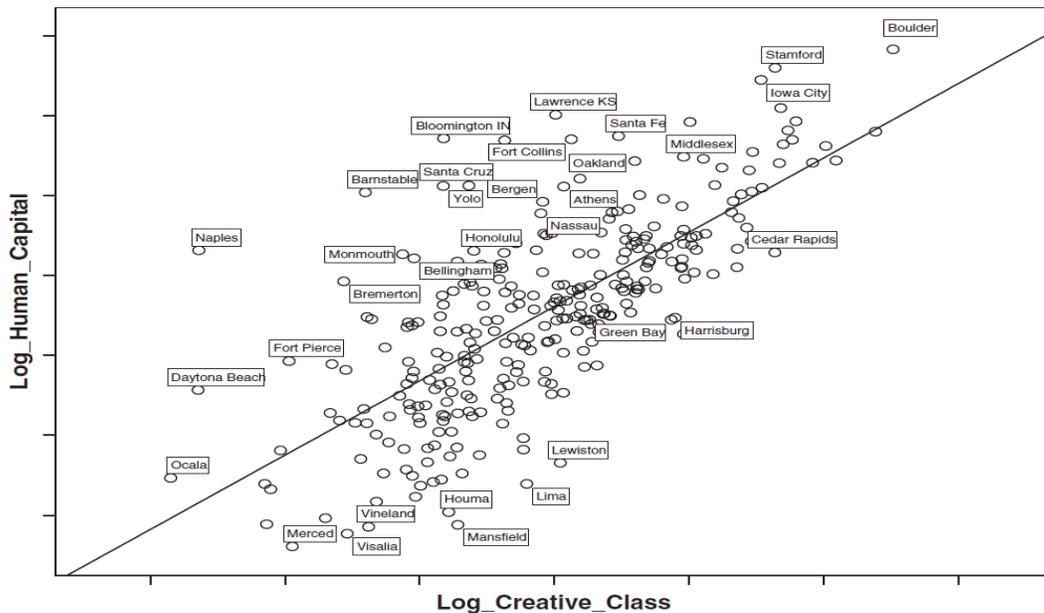

Figure 2: Relationship between human capital and creative class from Florida

McGranahan and Wojan (2007) generalized the theory into rural areas and found that "employment in creative occupations is positively associated with employment growth in both

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metropolitan and nonmetropolitan (rural) counties." Florida's theory also works in economic development in rural areas.

In addition, there are still many scholars who applied Florida's research findings for many cities and countries over the world. Fritsch and Stützer (2006) analyzed the regional distribution of different categories of creative individuals in Germany and found that "a high share of creative people in a region can be explained by a high level of public provisions and a high share of the foreign-born population." They also discovered that "regions with a high share of creatives tend to have an above average level of new business formation, a high level of innovation and a relatively high share of employees." Then Fritsch, together with Boschma, (2009) expand the research objects to six other European countries and discovered that "a regional climate of tolerance and openness has a strong and positive effect on a region's share of these people. Regional job opportunities also have a quite large effect on the size of a region's population of the Creative Class". These results proved Florida's theory. Masayuki Sasaki (2010) did the case studies on Kanazawa City and Osaka City. Then he argued that except for the elements mentioned by Florida, cities also need a culture-based production system to attract people of the creative class so that they can achieve the goal of urban prosperity. He introduced a concept of a "socially-inclusive creative city" as well.

DATA AND METHODS

In this thesis, I introduce two models to answer the two questions with data at both the state and metropolitan levels.

<u>First question</u>

The first question is whether the creative class has a positive relationship with economic growth. To answer this question, I build the following models. These are all general linear regression models. "i" represents the state and "t" represents the year. I don't include the High-tech Index because it is published every two years and there are no metropolitan-level data. Besides that, I include Married Household Proportion as another representative of social diversity which is not mentioned by Florida:

Model (1): Real GDP per capita$_{it+n}$= β0 + β1Creative Class$_{it}$ + β2Talent$_{it}$ + β3Melting_pot$_{it}$ + β4Gay$_{it}$ + β5Innovation$_{it}$ +β6Married Household Proportion$_{it}$ + ε$_t$

Taking the lag impact into consideration and to make the calculations more convenient, I lead the dependent variables and the formulas become:

Model (1): Real GDP per capita$_{it+n}$= β0 + β1Creative Class$_{it}$ + β2Talent$_{it}$ + β3Melting_pot$_{it}$ + β4Gay$_{it}$ + β5Innovation$_{it}$ +β6Married Household Proportion$_{it}$ + ε$_t$

Dependent variables:

Real GDP per capita: which is the real GDP Per capita which shows the economic situation of a state. The data come from the U.S. Bureau of economic analysis".

Independent variables:

Creative Class: which is the revised creative class number per 100 jobs in a certain area. The definition for the revised creative class is from McGranahan and Wojan which includes eight occupations. The data come from the U.S. Bureau of Labor. They show the aggregation

degree of the population of the creative class and I take this variable as my dependent variables in the models for the first question.

Gay: which is the "Gay Index" from Florida's book. It is the percentage of same-sex couples among all the couples in a certain area. The data come from the American Community Survey program of U.S. Census Bureau. The survey gives the number of unmarried same-sex partners. I take it as the representative for the total same-sex couples because of the lack of married same-sex partners. It can show the tolerance and diversity level of a state. I expect that it will have a positive relationship with the dependent variables.

Melting Pot: which is the Melting Pot Index from Florida's book. It is the percentage of foreign-born people among all the people in a certain area. The data come from the American Community Survey program of U.S. Census Bureau. I expect that it will have a positive relationship with the dependent variables.

Innovation: which is the Innovation Index from Florida's book. It is the issued patents per 100 people. The data come from the U.S. Patent and Trademark Office. It shows the innovation level of a certain region. I expect that it will have a positive relationship with the dependent variables.

Married Household Proportion: which is the percentage of married households among all the households in a certain area. It is not included by Florida but I think it can also represent social diversity. The data come from the American Community Survey program of U.S. Census Bureau. I expect that it will have a negative relationship with the dependent variables.

Control variable:

Talent: which is the percentage of people over 25 with a bachelor degree among all the people in a certain area. I include it as a control variable in order to test whether it is well-

educated people other than the creative class influence economic growth. The data is from the America Community Survey program of the US Census Bureau, showing the quality of human capital.

The definitions of variables are shown in Table 1.

Second question

After considering the relationship between the creative class and economic growth, we then need to discuss the second question: do diversity and tolerance of a certain region have a relationship with the residence preference of creative class. To answer this question, I build the following models.

Model (2): Creative Class$_{it+n}$ = $\beta 0$ + $\beta 1Talent_{it}$ + $\beta 2Melting\_pot_{it}$ + $\beta 3Gay_{it}$ + $\beta 4Innovation_{it}$ + $\beta 5Married\ Household\ Proportion_{it}$ + ε_t

Taking the lag impact into consideration and to make the calculations more convenient, I lead the dependent variables and the formulas become:

Model (2): Creative Class$_{it+n}$ = $\beta 0$ + $\beta 1Talent_{it}$ + $\beta 2Melting\_pot_{it}$ + $\beta 3Gay_{it}$ + $\beta 4Innovation_{it}$ + $\beta 5Married\ Household\ Proportion_{it}$ + ε_t

In these models, the variables are the same as those in the first question.

EMPIRICAL RESULTS

After I run the regressions, I achieve the following results.

Correlations

According to the finding presented in Table 2, we can find that the economy has high correlation with creative class (0.8728) and the Talent Index (0.7269) from 2008 to 2017. This implies that a state with higher real GDP per capita usually has more highly educated people and more people working in creative industries. In addition, real GDP per capita has a low relationship with the Melting Pot Index (0.2915) and the Innovation Index (0.0998). This suggests that immigrants and the number of patents for a state may have a limited impact on the economic growth of a state. The correlation between real GDP per capita and creative class are higher than the correlation between real GDP per capita and the Talent Index, once again suggesting that the Talent Index cannot explain all of the relationships between real GDP per capita and creative class. The creative class, however, has a high correlation with the Talent Index (0.8189) and the Gay Index (0.6685), suggesting that states with a larger creative class have more well-educated people and more same-sex couples. The proportion of married households in a state, which is not included in Florida's book, has a negative relationship with all the other variables. This finding suggests that a state with a higher proportion of married households usually has a lower real GDP per capita, less creative class, less well-educated people and less social diversity.

The relations between the economic growth, creative class and Talent Index at the metropolitan level from 2008 to 2017 in the US

The creative class has a positive relationship with the economic growth (Real GDP per capita). Meanwhile, cities with more well-educated people (Talent Index) show better economic situation. We need to test what actually leads to economic growth.
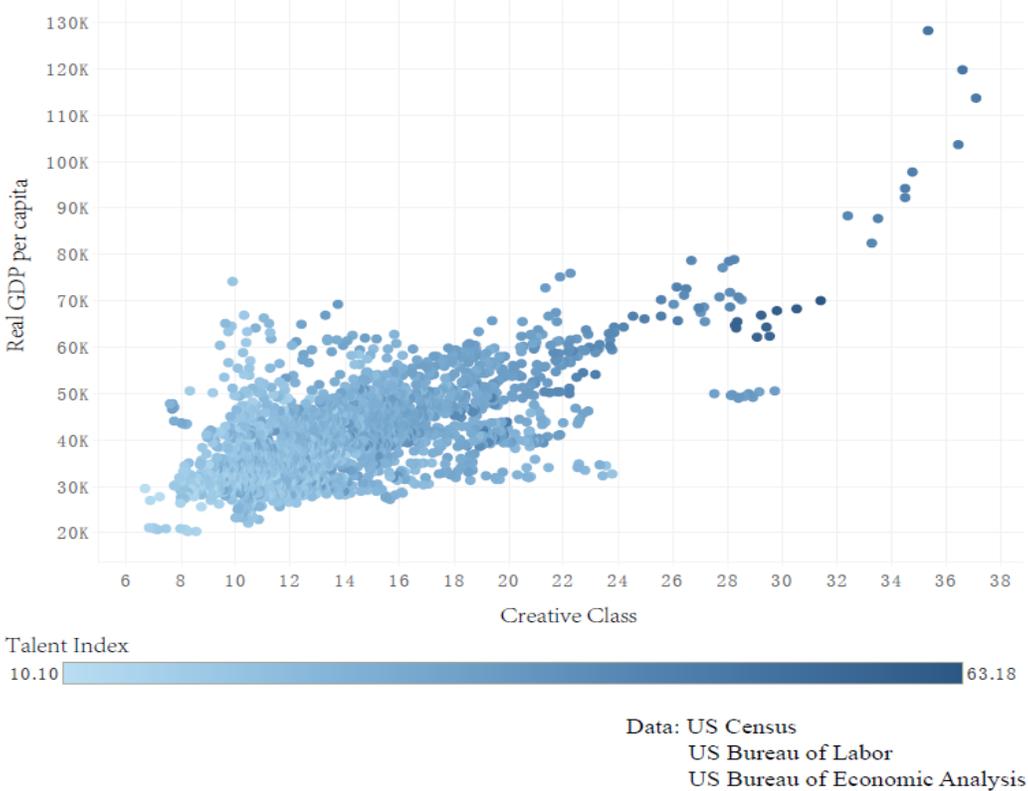
Figure 3: Relationships between economic growth, creative class and Talent Index

At the Metropolitan level (Table 3), we find that the economy still has a high relationship with the creative class (0.6713) and the Talent Index (0.6212) from 2008 to 2017. In addition, real GDP per capita has a low relationship with the Melting Pot Index (0.2915) and the Gay Index (0.1096), suggesting that social diversity may not impact the economic growth and development at the metropolitan level. The correlation between real GDP per capita and creative class are still higher than the correlation between real GDP per capita and the Talent Index. Meanwhile, the creative class corresponds highly with the Talent Index (0.7695). The correlation between the creative class and the Innovation Index is also quite high at the metropolitan level.

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In addition, the proportion of married households in a metropolitan area still has negative

relationships with most variables, especially with variables representing innovation and diversity.

The relations between the economic growth, creative class and social diversity at state level from 2008 to 2017 in the US

States with high proportion of creative class employment (green line) are more tolerant, with more same-sex couples (Gay Index) and foreign-born people (Melting Pot Index). They have more well-educated peope (Talent Index). They also perform better in economy (Real GDP per capita).

Data: US Census
US Bureau of Labor
US Bureau of Economic Analysis

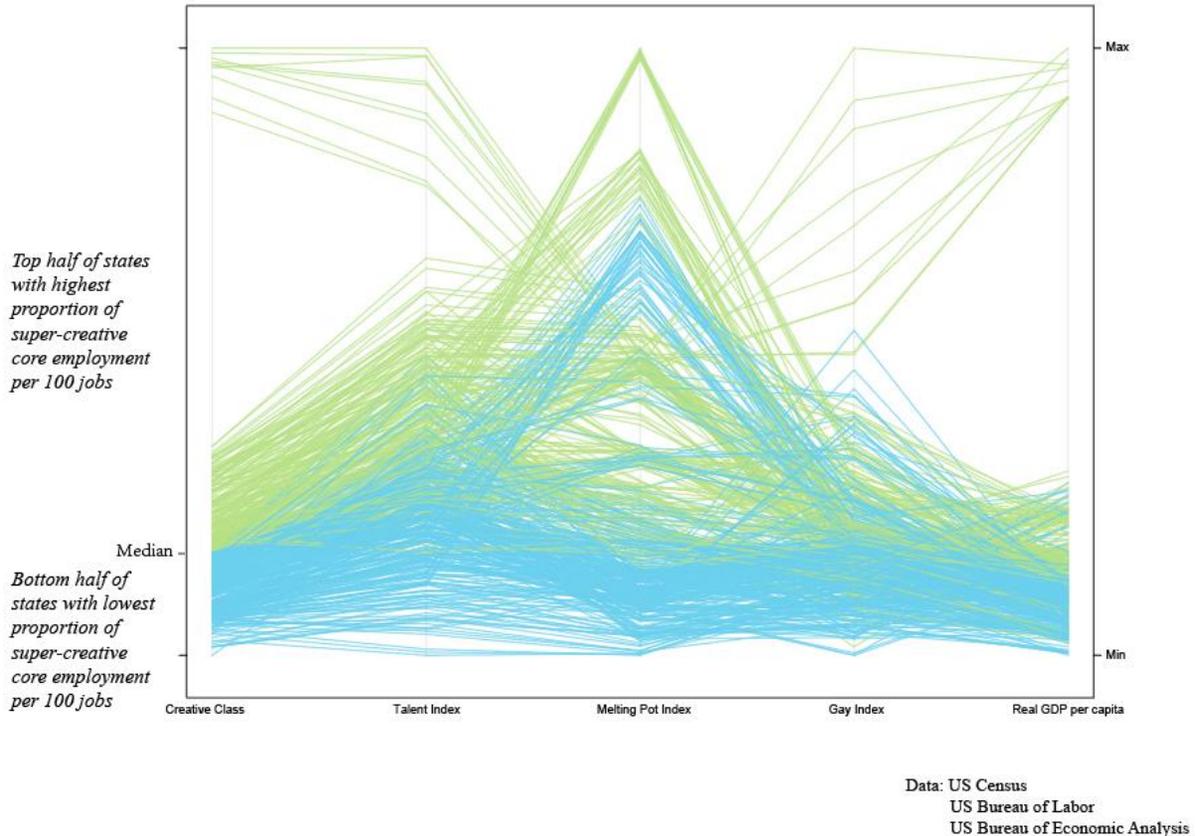**Figure 4: Relationships between economic growth, creative class and social diversity**

Regression results

Initial regression

In Florida's books and essays, he compared various Indexes' ranks of cities and tested the

relationship between the creative class and incomes with the linear model. However, he seems

not to have taken fixed effects into consideration. The fact that a city with a more creative class

is wealthier and more diverse doesn't necessarily mean that the creative class has a causal relationship with economic growth and social diversity. In this extension of Florida's work, fixed effects are considered in the linear regression models at both the state and metropolitan level.

(1)   Economy and the creative class

From the state level table (Table 4), we can find that if we don't take the fixed effects into consideration, the creative class and the Talent Index have a positive and significant relationships with the real GDP per capita. Besides that, the regression shows a negative relationship between the Innovation Index and the real GDP per capita. The relationship between the proportion of married households and the real GDP per capita is also negative. However, after controlling for the fixed effects, I find that all the variables become insignificant. The impact of accounting for fixed effects at the state level is accounting for the preliminary finding of a significant coefficient associated with the creative class.

At the metropolitan level (Table 5), the creative class, the Talent Index and the Innovation Index have positive and significant relationships with the real GDP per capita without controlling the fixed effects. The Gay Index shows a negative relationship with the real GDP per capita. The results are also similar to Florida's statement. However, after controlling for fixed effects, except for the creative class, all the other variables are insignificant. The result implies that holding other variables constant, one employment's increase in the creative class per 100 jobs in a state is related to $352.46 increase in the real GDP per capita. But the social diversity, innovation and even well-educated people may not have a direct relationship with economic growth.

Comparing the result at the state level and metropolitan level, the regression results suggest that, at the metropolitan area, the existence of a creative class results in economic prosperity, but a similar result was not found at the state level. The relationship between economic growth and

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the creative class is not obvious. This may reflect that the creative class links closely to the industries available in an area and these industries usually develop better and have a larger influence in the Metropolitan area.

(2)   Creative class and social diversity

At the state level (Table 6), only the Innovation Index has a significant relationship with the creative class, controlling the Talent Index and the fixed effects. One can conclude that an increase of one patent every 100 people is related to 27.49 employment's increase in the creative class per 100 jobs. In the multivariate regression, the Talent Index, the Gay Index and the Married Household Proportion have a positive and significant relationship with the creative class. However, after controlling for the fixed effects, only the Talent Index and the Innovation Index have significant relationships with the creative class. This suggests that a one patent increase every 100 people is related to 27.33 employment's increase in the creative class per 100 jobs. One percentage point of people over 25 with a bachelor degree's increase is related to 0.23 employments' increase in the creative class per 1,000 jobs. It seems that social diversity has no obvious relationship with the creative class at the state level.

Focusing the analysis at the metropolitan level (Table 7), almost all the variables show a positive and significant relationships with the creative class in the multivariate regression. The p-value of the Gay Index is 0.051, only slightly above the threshold of the significance (0.05). The result matches Florida's statement. However, if I control the fixed effects, only the Talent Index has a significant relationship with the creative class, suggesting that a one-percent point increase in those people over 25 with a bachelor degree's results in an increase of 0.06 employment in the creative class per 1,000 jobs. It seems that even the Innovation Index has no obvious relationship with the creative class at the state level.

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Lagged regression

Considering that certain lagged independent variables may have an impact on the outcome of the dependent variables, to assess this potential, the following regression models were investigated:

Model (1): Real GDP per capita$_{it+n}$= β0 + β1Creative Class$_{it}$ + β2Talent$_{it}$ + β3Melting_pot$_{it}$ + β4Gay$_{it}$ + β5Innovation$_{it}$ +β6Married Household Proportion$_{it}$ + ε$_t$

Model (2): Creative Class$_{it+n}$ = β0 + β1Talent$_{it}$ + β2Melting_pot$_{it}$ + β3Gay$_{it}$ + β4Innovation$_{it}$ + β5Married Household Proportion$_{it}$ + ε$_t$

The regression results are shown as the following:

(1) Economy and the creative class

From Table 8, we can see that real GDP per capita has no obvious relationships with the creative class at the state level no matter how many years I lead. But the Innovation Index shows a significant relationship if I lead the dependent variable. It seems that the Innovation Index has around 3 years of lagged impact on economic growth.

At the metropolitan level (Table 9), the relationship between real GDP per capita and the creative class becomes obvious if I lead the dependent variable. The creative class has no or little lagged impact on real GDP per capita. As long as the number of the creative class increase in a city, the economy will also grow in this almost immediately. The lagged regression become insignificant because of the fixed effects. In addition, the Innovation Index also show a significant relationship if I lead the dependent variable 3 or 4 years. It seems that the Innovation Index has about 3 or 4 years of lagged impact on economic growth as well.

(2) Creative class and social diversity

In the terms of the creative class and social diversity (Table 10), we can see that the Talent Index, the Innovation Index, the Gay Index and the Married Household Proportion have significant

relationships with the creative class when the lead of the dependent variable is at the state level. As a representative of diversity, the Married Household Proportion has a 1-year lagged impact on the creative class. However, the Gay Index has a negative relationship with the creative class, which is different from the finding of Florida's. Besides that, the creative class has a close correlation with the Talent Index. The Innovation Index has a lagged impact on the creative class.

When it comes to the creative class at the Metropolitan level of analysis (Table 11), the creative class only have relationships with the Talent Index and the Innovation Index. The Innovation Index has about 3 years of lagged impact on the creative class. The lagged impact of the Talent Index on the creative class is no more than 2 years.

DISCUSSION AND CONCLUSION

Discussion

This research tested Richard Florida's theory about the creative class, focusing on two hypotheses: (1) the creative class can improve a region's economic growth; and (2) societies with tolerance and diversity attract the creative class. I reviewed the correlations between all the variables and ran current and lagged regressions at both the state and metropolitan levels with fixed effects controls. When not controlling for fixed effects, the results are similar to Florida's theory. However, when controlling for fixed effects, the results shows that the creative class positively impacted economic growth but only at the metropolitan level. The Talent Index has a significant relationship with the creative class at both the state and metropolitan level. Further, taking the lagged impact into consideration, the Innovation Index has a 3-4 year lagged impact on economic growth and a two-year lagged impact on the creative class, suggesting that creative industries play an important role on attracting the creative class and improve economic growth. Social diversity seems to have a lagged relationship with the creative class but only at the state level.

Correlation

Correlations are used to test Florida's theory. Real GDP per capita has a positive relationship with the creative class and social diversity. The proportion of married households is the independent variable which has a negative relationship with real GDP per capita. This finding suggests that a state with a higher proportion of married households usually has lower real GDP per capita, less creative class, less well-educated people and less social diversity. A higher proportion of married households suggests more stability and less diversity in this area. Hence, the result is also in accordance with Florida's theory.

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Current regression

(1) GDP

In the regression where the dependent variable is real GDP per capita and fixed effects are not controlled for, we can see that the creative class, the Talent Index and the Innovation Index have statistically significant positive relationships with real GDP per capita at both the state and metropolitan level. These results are similar to Florida's theory. Also, social diversity has a more obviously positive relationship with economic growth at the metropolitan level than the state-level. However, controlling for fixed effects, all the estimated coefficient values become insignificant at the state level, meaning there is no obvious relationship between the creative class and economic growth. But the coefficient of the creative class is significant at the metropolitan level. So, we can say that the creative class leads to more economic growth at the metropolitan level. This may also be explained by the fact that most of the creative class live in or near cities and have more impact on the city's economy.

(2) Creative class

The Talent Index is strongly correlated with the creative class at both levels of geography, suggesting that places with more highly educated people usually also have more of the creative class. This may also be because people who work in the creative industries may also have higher levels of educational attainment. On the other hand, comparing the results for the state and metropolitan levels, we can see that the social diversity and the Innovation Indexes share a closer relationship with the creative class at the metropolitan level than the state level, when not controlling for fixed effects. Nevertheless, controlling for fixed effects, only the Talent Index has a significant relationship with the creative class at both the state and metropolitan levels. The Innovation Index shows a more obvious relation with the creative class at the state level. This

may be because, in the cities, there are various resources attracting the creative class and innovation is only one of them. Therefore, the impact of innovation is not obvious. However, in a wider geographic area, resources are more decentralized. The creative class is willing to gather at the places which are full of innovation but may have no other resources. Hence, the impact of innovation is more obvious at the state level.

Lagged regressions

Lagged regressions are run to see whether lagged independent variables have an impact on the dependent variables.

(1)   GDP

The creative class has no or little lagged impact on real GDP per capita at both levels according to the lagged regression. In addition, the Innovation Index shows a significant relationship at both levels if I lead the dependent variable 3 or 4 years. It seems that innovation has about 3 or 4 years of lagged impact on economic growth. It may be because the Innovation Index represents the number of patents issued. It takes quite a long time for patents to lead to economic returns and finally improve the local economic growth.

From the regression, only the creative class and the Innovation Index have a direct relationship with economic growth, as measured by GDP per capita. Even the Talent Index has no obvious relationship with economic prosperity. The Innovation Index and the creative class are both deeply influenced by industries, especially creative industries. It seems that nowadays, creative industries and people with the capability to work in the creative industries play a more principal and direct role in economic growth than simply well-educated people.

(2) Creative class

The Talent Index shows less than a 2-year lagged impact on the creative class at both levels of geography. This further proves that well-educated people are not equal to the creative class, although places with more well-educated people usually have more in the creative class.

The Innovation Index has about a 2-year lagged impact on creative class, shorter than its lagged impact on economic growth. This may be because companies in the creative industries need skillful workers to put new patents or technologies into practice, which will attract more of the creative class. Then, when the creative class works on these patents and technologies, they will create commercial value and enhance local economic growth.

Social diversity such as the Gay Index and the proportion of married households have a more obvious lagged impact on the creative class at the state level than the metropolitan level. It may be because the social diversity of a suburb or rural area is more important for the creative class than that of the urban area. Urban areas usually have more people of different races and sexual orientation and hence may be less sensitive with the change of social diversity. However, suburban and rural areas may be less tolerant with various races and living habits. Therefore, people living in these areas are more sensitive to the change of social diversity.

Conclusion

In summary, real GDP per capita, the creative class, and social diversity have a significant and positive relationship with each other when not controlling for fixed effects. This is what Florida showed with his city ranks. However, controlling for fixed effects, we find the creative class only has a significantly positive relationship with economic growth at the metropolitan level. Therefore, the creative class has an observed relationship with city economic growth but social diversity has no direct relationship with it at either level. On the other hand, well-educated

people still act as an important role in economic growth and has a close relationship with the creative class. But we can't say that the creative class is equal to highly educated people, which is just the opposite of the findings observed by Glaeser (2005) and Markusen (2005).

When I take the lagged impact into consideration, I find the Innovation Index, which represents the patents and new technologies, are the prior factor. The result is partly consistent with the idea of Pratt (2008) who thinks Florida's conceptual "basis of focusing on occupations (creative class) strips out the necessarily embedded relationships with industries and with production and consumption". The industry surely plays an important role in improving economic growth. However, we should not ignore the role of the creative class because the creative class has different years of lagged impacts with the industry on economic growth. The real story is that patents and new technologies attract skilled workers in the creative industry which is the creative class. And then the creative class promotes economic growth. Social diversity seems to have a lagged relationship with the creative class but only at the state level. Improved social diversity in suburban and/or rural areas benefits the local economic growth.

Data and model limitations

There are several limitations to my data and models. First, I cannot get the High-tech Index and the total same-sex couple number at the Metropolitan level. The High-tech Index mentioned in Florida's book is an Index for technology. Without the High-tech Index, only the Innovation Index is related to technology. I may not control all the elements about the technology and this could lead to the omitted variable bias. In addition, I use the unmarried same-sex couple instead of the total same-sex couple. Although the unmarried same-sex couple can be a proxy of the total same-sex couple, there may be some inaccuracy in the data.

Second, I do not control some variables which change over time such as economic-support policies. Although controlling for fixed effects, there are still some variables which change over time. These variables include such things as the economic support policies. However, these policies are hard to account for since their definition is unclear.

Third, after controlling the fixed effects, the R-Squares of almost all the models are reduced by 0.3. It reduced the power of the models. However, we also know that the fixed effects can explain 30% of the economic growth and creative class. Further study may tell us what is made up of fixed effects.

Suggestions for further research

According to the results discussed above, urban governments should implement policies that improve the development of the creative industries and cultivate skilled personnel in these industries. The policy can be compensation to the companies and skillful workers in these industries. My research has only explored the impact of the creative industries and the creative class on economic development in a broad scope. In future research, combining the characteristics of different cities to further discuss their fit with different creative industries. And how to cultivate and attract the creative class to promote the economic development of the city.

In addition, the fixed effects reduced the R-square value to 0.3 in most models, suggesting that the fixed effects can explain 30% percent of the economic growth and creative class, which is not small. Therefore, the further research can find out what consists of this 30%.

Table 1: Definition of variables in models

Dependent variables	Definition	Function
Real GDP per capita	The real GDP per capita	Show the economic situation of an area
Creative Class	The employment percentage of the revised creative class per 100 jobs	Show the aggregation degree of the whole revised creative class in an area
Independent variables		
Gay	The percentage of same-sex couples among all the couples in a certain area	Show the tolerance and diversity level of an area
Melting Pot Index	The percentage of foreign-born people among all the people in a certain area	Show the tolerance and diversity level of an area
Innovation	Issued patents per 100 people in a certain area	Show the innovation level of an area
Married HH proportion	The percentage of married households among all the households in a certain area	Show the tolerance and diversity level of an area
Control variable		
Talent	The percent of people over 25 with a bachelor degree among all the people in a certain area	Show the quality of human capital in an area

Table 2: State-level correlation

	Real GDP per capita	Creative Class	Talent Index	Melting Pot Index	Gay Index	Innovation Index	Married HH proportion
Real GDP per capita	1.0000	0.8728	0.7269	0.2915	0.5989	0.0998	-0.1864
Creative Class		1.0000	0.8445	0.3973	0.6685	0.3081	-0.1490
Talent Index			1.0000	0.4619	0.5012	0.4894	-0.2243
Melting Pot Index				1.0000	0.3672	0.3986	-0.0845
Gay Index					1.0000	0.1609	-0.3007
Innovation Index						1.0000	-0.3173
Married HH proportion							1.0000

Table 3: Metropolitan-level correlation

	Real GDP per capita	Creative Class	Talent Index	Melting Pot Index	Gay Index	Innovation Index	Married HH proportion
Real GDP per capita	1.0000	0.6713	0.6212	0.2155	0.1096	0.4646	0.0013
Creative Class		1.0000	0.7695	0.2759	0.2062	0.5415	0.0009
Talent Index			1.0000	0.2245	0.2237	0.5001	-0.0018
Melting Pot Index				1.0000	0.2027	0.3478	-0.1567
Gay Index					1.0000	0.1275	-0.2269
Innovation Index						1.0000	-0.0812
Married HH proportion							1.0000

Table 4: State-level regression for model 1

Independent variables	Dependent variable: Real GDP per capita			
	（1）	（2）	（3）	（4）
Creative Class	3083.84***	3190.01***	2988.31***	185.12^{ns}
	(147.30)	(256.71)	(203.33)	(255.52)
Talent Index		-107.36^{ns}	368.42*	-581.72^{ns}
		(147.17)	(144.48)	(665.56)
Melting Pot Index			-4.15^{ns}	420.81^{ns}
			(60.51)	(423.21)
Gay Index			-1916.3^{ns}	551.92^{ns}
			(2879.65)	(1260.97)
Innovation Index			-204016***	35503.1^{ns}
			(18308.32)	(31921.41)
Marriage Rate			-2114.57***	-984.89^{ns}
			(427.51)	(792.16)
Fixed Effects				√
The number of observations	510	510	510	510
R^2	0.76	0.76	0.81	0.81
Prob > F	0.00	0.00	0.00	0.00

Notes: P > 0.05: ns; P ≤ 0.05: *; P ≤ 0.01: **; P ≤ 0.001: ***

Table 5: Metropolitan-level regression for model 1

Independent variables	Dependent variable: Real GDP per capita			
	（1）	（2）	（3）	（4）
Creative Class	1650.33***	1165.17***	1061.16***	352.46*
	(63.48)	(93.66)	(76.98)	(155.68)
Talent Index		391.17***	367.84***	58.81^{ns}
		(42.58)	(44.02)	(137.50)
Melting Pot Index			24.47^{ns}	54.28^{ns}
			(32.10)	(152.88)
Gay Index			-2361.95**	30.79^{ns}
			(783.01)	(283.24)
Innovation Index			22533.19**	2746.14^{ns}
			(7389.62)	(8827.11)
Married HH proportion			8.83^{ns}	41.47^{ns}
			(116.78)	(55.89)
Fixed Effects				√
The number of observations	2,180	2,180	2,180	2,180
R^2	0.45	0.48	0.49	0.18
Prob > F	0.00	0.00	0.00	0.00

Notes: $P > 0.05$: ns; $P \leq 0.05$: *; $P \leq 0.01$: **; $P \leq 0.001$: ***

Table 6: State-level regression for model 2

Independent variables	Dependent variables: Creative Class									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Talent Index	0.72*** (0.006)	0.27*** (0.06)	0.58*** (0.03)	0.27*** (0.06)	0.78*** (0.07)	0.23** (0.02)	0.73*** (0.06)	0.27*** (0.06)	0.63*** (0.04)	0.23** (0.02)
Melting Pot Index	0.008^{ns} (0.03)	0.03^{ns} (0.17)							-0.03^{ns} (0.02)	-0.04^{ns} (0.03)
Gay Index			7.89*** (1.04)	-0.37^{ns} (0.39)					8.50*** (0.95)	-0.16^{ns} (0.10)
Innovation Index					-31.35** (11.96)	27.49* (1.97)			-14.23^{ns} (8.89)	27.33* (1.96)
Married HH proportion							0.21^{ns} (0.12)	-0.06^{ns} (0.09)	0.49*** (0.11)	-0.06^{ns} (0.02)
Fixed Effects		√		√		√		√		√
The number of observations	510	510	510	510	510	510	510	510	510	510
R²	0.71	0.47	0.79	0.47	0.72	0.47	0.73	0.49	0.81	0.49
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: $P > 0.05$: ns; $P \leq 0.05$: *; $P \leq 0.01$: **; $P \leq 0.001$: ***

Table 7: Metropolitan-level regression for model 2

Independent variables	Dependent variables: Creative Class									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Talent Index	0.46*** (0.009)	0.06** (0.02)	0.47*** (0.01)	0.06** (0.02)	0.41*** (0.01)	0.06** (0.02)	0.48*** (0.01)	0.07** (0.02)	0.40*** (0.01)	0.06** (0.02)
Melting Pot Index	0.08*** (0.01)	0.05^{ns} (0.03)							0.04*** (0.01)	0.05^{ns} (0.03)
Gay Index			0.69* (0.30)	-0.09^{ns} (0.10)					0.60^{ns} (0.30)	-0.11^{ns} (0.10)
Innovation Index					17.11*** (1.44)	2.00^{ns} (1.97)			15.78*** (1.38)	1.88^{ns} (1.96)
Marriage Rate							0.007^{ns} (0.05)	-0.02^{ns} (0.02)	0.10* (0.05)	-0.02^{ns} (0.02)
Fixed Effects		√		√		√		√		√
The number of observations	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180
R^2	0.60	0.22	0.59	0.21	0.59	0.21	0.63	0.22	0.63	0.22
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*Notes: $P > 0.05$: ns; $P \leq 0.05$: *; $P \leq 0.01$: **; $P \leq 0.001$: ****

Table 8: Lagged state-level regression for model 1

Independent variables	Dependent variable: Real GDP per capita					
	(1)	(2)	(3)	(4)	(5)	(6)
	current	1-year lead	2-years lead	3-years lead	4-years lead	5-years lead
Creative Class	185.12^{ns}	181.51^{ns}	31.21^{ns}	-30.88^{ns}	-11.95^{ns}	-14.98^{ns}
	(255.52)	(252.06)	(205.15)	(162.18)	(143.94)	(101.17)
Talent Index	-581.72^{ns}	-847.25^{ns}	-611.69^{ns}	-389.95^{ns}	30.40^{ns}	52.91^{ns}
	(665.56)	(597.61)	(531.57)	(388.98)	(315.06)	(215.88)
Melting Pot Index	420.81^{ns}	-267.34^{ns}	-628.47^{ns}	-546.40^{ns}	-378.56^{ns}	-100.67^{ns}
	(423.21)	(308.36)	(322.77)	(275.61)	(264.93)	(229.10)
Gay Index	551.92^{ns}	-1990.91^{ns}	-2344.31^{ns}	-1670.43^{ns}	-1001.71^{ns}	1107.03^{ns}
	(1260.97)	(1919.01)	(1483.88)	(971.23)	(636.60)	(1091.00)
Innovation Index	35503.1^{ns}	56340.35^{*}	73489.32^{**}	93005.98^{***}	90965.09^{**}	81221.17^{*}
	(31921.41)	(27428.22)	(23668.87)	(22990.12)	(30853.98)	(31436.53)
Married HH proportion	-984.89^{ns}	-816.47^{ns}	-576.08^{ns}	-117.31^{ns}	-102.20^{ns}	97.61^{ns}
	(792.16)	(651.86)	(447.01)	(189.42)	(458.55)	(392.31)
Fixed Effects	√	√	√	√	√	√
The number of observations	510	459	408	357	306	255
R^2	0.26	0.34	0.35	0.40	0.44	0.50
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

*Notes: $P > 0.05$: ns; $P \leq 0.05$: *; $P \leq 0.01$: **; $P \leq 0.001$: ***

Table 9: Lagged metropolitan-level regression for model 1

Independent variables	Dependent variable: Real GDP per capita					
	(1)	(2)	(3)	(4)	(5)	(6)
	current	1-year lead	2-years lead	3-years lead	4-years lead	5-years lead
Creative Class	352.46*	366.60^{ns}	171.73^{ns}	72.99^{ns}	-25.36^{ns}	47.14^{ns}
	(155.68)	(208.31)	(185.82)	(175.56)	(154.80)	(147.26)
Talent Index	58.81^{ns}	57.58^{ns}	36.77^{ns}	-26.98^{ns}	34.69^{ns}	92.32^{ns}
	(137.50)	(53.62)	(46.33)	(45.20)	(44.55)	(49.77)
Melting Pot Index	54.28^{ns}	79.36^{ns}	-0.67^{ns}	24.64^{ns}	-1.84^{ns}	26.99^{ns}
	(152.88)	(119.84)	(96.45)	(86.72)	(91.98)	(88.61)
Gay Index	30.79^{ns}	-262.46^{ns}	-177.79^{ns}	80.32^{ns}	52.99^{ns}	293.27^{ns}
	(283.24)	(318.78)	(254.53)	(249.38)	(226.07)	(263.25)
Innovation Index	2746.14^{ns}	14198.24^{ns}	47460.23^{ns}	51747.13*	59732.48*	61802.78^{ns}
	(8827.11)	(15417.75)	(26372.21)	(25533.94)	(29096.13)	(31413.77)
Married HH proportion	41.47^{ns}	25.66^{ns}	-27.03^{ns}	-33.75^{ns}	35.20^{ns}	111.21^{ns}
	(55.89)	(62.37)	(63.83)	(61.19)	(52.03)	(57.75)
Fixed Effects	√	√	√	√	√	√
The number of observations	2,180	1,962	1,744	1,526	1,308	1,090
R²	0.18	0.21	0.26	0.30	0.31	0.32
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

*Notes: $P > 0.05$: ns; $P \leq 0.05$: *; $P \leq 0.01$: **; $P \leq 0.001$: ***.*

Table 10: Lagged state-level regression for model 2

Independent variables	Dependent variable: Creative Class					
	(1)	(2)	(3)	(4)	(5)	(6)
	current	1-year lead	2-years lead	3-years lead	4-years lead	5-years lead
Talent Index	0.23**	0.13**	0.01^{ns}	-0.05^{ns}	0.0007^{ns}	0.07^{ns}
	(0.02)	(0.03)	(0.04)	(0.05)	(0.04)	(0.05)
Melting Pot Index	-0.04^{ns}	-0.12^{ns}	-0.12^{ns}	-0.08^{ns}	-0.03^{ns}	-0.1^{ns}
	(0.03)	(0.10)	(0.12)	(0.12)	(0.11)	(0.09)
Gay Index	-0.16^{ns}	0.07^{ns}	-0.54*	-0.25^{ns}	-0.27^{ns}	-0.001^{ns}
	(0.10)	(0.24)	(0.25)	（0.25）	(0.18)	(0.31)
Innovation Index	27.33*	20.54*	16.33*	11.29^{ns}	2.12^{ns}	-2.96^{ns}
	(1.96)	(8.27)	(7.92)	(7.50)	(6.65)	(6.47)
Married HH proportion	-0.06^{ns}	-0.24**	-0.10^{ns}	-0.12^{ns}	0.001^{ns}	0.01^{ns}
	(0.02)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)
Fixed Effects	√	√	√	√	√	√
The number of observations	510	459	408	357	306	255
R²	0.49	0.55	0.53	0.48	0.40	0.41
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

Notes: P > 0.05: ns; P ≤ 0.05: *; P ≤ 0.01: **; P ≤ 0.001: ***

Table 11: Lagged metropolitan-level regression for model 2

Independent variables	Dependent variable: Creative Class					
	(1)	(2)	(3)	(4)	(5)	(6)
	current	1-year lead	2-years lead	3-years lead	4-years lead	5-years lead
Talent Index	0.06**	0.05**	0.05**	0.02^{ns}	0.006^{ns}	0.02^{ns}
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Melting Pot Index	0.05^{ns}	0.03^{ns}	0.05^{ns}	0.03^{ns}	-0.009^{ns}	0.007^{ns}
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Gay Index	-0.11^{ns}	0.07^{ns}	-0.04^{ns}	0.06^{ns}	-0.08^{ns}	-0.13^{ns}
	(0.10)	(0.10)	(0.11)	(0.13)	(0.13)	(0.09)
Innovation Index	1.88^{ns}	3.92*	6.37***	3.88*	3.00^{ns}	2.19^{ns}
	(1.96)	(1.91)	(1.77)	(1.79)	(1.91)	(2.02)
Married HH proportion	-0.02^{ns}	-0.03^{ns}	-0.04^{ns}	-0.02^{ns}	0.005^{ns}	-0.01^{ns}
	(0.02)	(0.03)	(0.02)	(0.22)	(0.02)	(0.03)
Fixed Effects	√	√	√	√	√	√
The number of observations	2180	2180	2180	2180	2180	2180
R^2	0.60	0.22	0.59	0.21	0.59	0.21
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

*Notes: $P > 0.05$: ns; $P \leq 0.05$: *; $P \leq 0.01$: **; $P \leq 0.001$: ****

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