Creative Occupations, County-Level Earnings and the U.S. Rural-Urban Wage Gap

Todd M. Gabe, Associate Professor
Kristen Colby, Graduate Research Assistant
Kathleen P. Bell, Associate Professor
School of Economics
5782 Winslow Hall, University of Maine
Orono, ME 04469-5782
U.S.A.

Introduction

In his bestselling book *The Rise of the Creative Class*, Richard Florida argues that the attraction of creative workers is a key contributor to regional economic development. One look at Table 1, reproduced from the book, is all the evidence that many people would need to agree. Members of Florida's "creative class" earned an average of $20,000 more per year than individuals in his working (e.g., production operations, transportation) and service (e.g., clerical workers) classes. These figures, and Florida's account of the impressive growth of creative workers in the United States, have regional policymakers searching for ways to attract and retain scientists, writers, engineers and artists – individuals who figure prominently in Florida's creative class. [1]

However, as noted by Florida (2002a: xiv), the growth of the creative economy may lead to "massive tensions and disruptions." A key challenge facing policymakers is the rising inequality in places with a high proportion of workers in the creative economy (Florida 2002a; Peck 2005). This is caused, in part, by the expansion of lower-paying service jobs fueled by the growing demands of creative workers. In addition, although Wojan (2006) and McGranahan and Wojan (forthcoming) have uncovered vibrant artistic and creative economies in some rural

1. Many regions sought to attract these types of workers well before Florida's book as part of a human capital economic development strategy. Glaeser (2004) argues that Florida's ideas are not new, but rather a restatement of the human capital theory of city growth.

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TABLE 1 Wages and Salaries by Broad Occupational Category, 1999

Category	Total Workers	Average Hourly Wage	Average Annual Salary
Creative Class	38,278,110	$23.44	$48,752
Super-Creative Core	14,932,420	$20.54	$42,719
Working Class	33,238,810	$13.36	$27,799
Service Class	55,293,720	$10.61	$22,059
Agriculture	463,360	$8.65	$18,000
Total U.S. Workforce	127,274,000	$15.18	$31,571

Source: Florida (2002a, Table 4.1)

places, the creative economy tends to have its strongest roots in large cities. Thus, along with the growth in intra-regional inequality discussed by Florida (2002a) and Peck (2005), the expansion of the creative economy may also contribute to the wage gap between rural and urban areas.

This paper investigates the relationships among county-level earnings, employment in creative occupations and the U.S. rural-urban wage gap. Our empirical analysis, which uses data on a large sample of U.S. counties, centres around three interrelated topics of inquiry. First, we examine the extent to which the proportion of employment in Florida's "super-creative core" affects county-level earnings.[2] Second, given the diversity of occupations within the super-creative core, we narrow our focus to the relationship between county-level earnings and employment in individual segments of the creative economy. The purpose of this analysis is to determine whether the creative workforce earnings premium is mainly the result of a high proportion of employment in a few select occupations. Third, we use our results to examine how disparities in the relative size of the creative economy between metropolitan and non-metropolitan counties may be contributing to the U.S. rural-urban wage gap.

Literature Review

Much of the previous research conducted on the creative economy has focused on the regional growth and geographic distribution of artists and other creative workers. In a study on the location patterns of artists across U.S. states, Heilbrun (1996) found that artists became more geographically dispersed between 1980 and 1990, after a decade of increased concentration during the 1970s. Regression analysis shows that the amount of tourism activity per capita and the population size of the largest city located within the state have a positive effect on the relative

2. Florida (2002a, Appendix A) includes the following five broad occupational categories in the super-creative core: (1) computer and mathematical occupations; (2) architecture and engineering occupations; (3) life, physical, and social science occupations; (4) education, training, and library occupations; and (5) arts, design, entertainment, sports, and media occupations. This definition of the super-creative core is used throughout the paper.

number of performing artists. Alternatively, states with an ethnically-diverse and highly-educated population have a higher incidence of painters and sculptors (Heilbrun 1996).

Markusen and King (2003) found that artists have become more dispersed across large U.S. metropolitan areas, although certain cities appear to specialize in one or a few types of artists. Artists are characterized as “footloose” because they are not typically attracted to resources that are tied to a place, as is the case with some types of manufacturing firms. Results from a series of focus groups suggest that artists favor areas with high amenities, strong philanthropic and arts organizations, and public sector investments in programs and facilities (e.g., art fairs, parks and recreational spaces, concerts) that support the arts (Markusen and King 2003).

Florida’s research on the creative economy, defined more broadly than the artistic workers studied by Heilbrun (1996) and Markusen and King (2003), generally focuses on cities. He suggests that members of the creative class are attracted to vibrant places and areas that offer a wide range of (urban) amenities and experiences. In addition, Florida (2002a) deemphasizes the importance of job opportunities as a location factor and, like Markusen and King (2003), points out that creative people select places where they want to live. Florida (2002b) found that a high concentration of bohemians, a subset of the creative class, is associated with high levels of human capital and high technology activity in large cities.

Other studies offer evidence that some rural areas may be attractive to artists and creative workers. Wojan (2006) found that the share of county-level employment in artistic occupations grew faster between 1990 and 2000 in non-metropolitan counties than in metropolitan areas. Logistic regression results suggest that, other things being equal, rural “artistic havens” tend to have a higher proportion of employment in business services, a higher number of entries in the National Register of Historic Places, fewer large retail establishments, a four-year college, an arts organization, and a higher share of employment in recreational industries (Wojan 2006).

McGranahan and Wojan (forthcoming) found that the share and growth of creative workers, broadly defined, raised overall employment growth in rural U.S. counties between 1990 and 2000. The analysis suggests that creative workers favor mountainous areas, and places with a mix of forests and open spaces. In addition, the number of jobs per capita in bicycle and sports stores, the proportion of county-level employment in both business services and recreation, and the proportion of young adults with a college degree enhance the growth of the rural creative economy (McGranahan and Wojan Forthcoming).

These studies provide a good idea of the regional attributes that attract creative people, and provide some insights into the broader effects of the creative economy on employment growth (McGranahan and Wojan Forthcoming), high technology activity (Florida 2002b), and other aspects of local development (Markusen and King 2003). However, the existing literature says very little about the relationship between local earnings and the relative size of the creative economy. This is surely a topic of interest to regional policymakers looking to boost wages and spur economic development.

To motivate our empirical analysis, we draw from past research on artists' earnings as well as the literature on the returns to computer use. These studies are relevant to our work because Florida's "super-creative core" consists of artists, and several categories of technology-based occupations (e.g., computer specialists) that require heavy computer use. Filer (1986) examined the lifetime earnings received by artists, compared to other workers, and uncovered a modest "earnings penalty" of less than 3 %. This finding, considered along with the information shown in Table 1, suggests that the high wages earned by members of the creative class may be attributed to non-artistic workers.

In a study that examined earnings data from the late 1980s, Krueger (1993) found that people who use computers in their daily work make 10 to 15 % higher wages than those who do not. However, in an article motivated by Krueger's research, DiNardo and Pischke (1997) uncovered similar wage premiums associated with the use of other "white-collar" tools such as calculators, telephones, and pens and pencils. These results suggest that "computer users possess unobserved skills which might have little to do with computers but which are rewarded in the labor market" (DiNardo and Pischke 1997: 292).

Previous studies have also examined aspects of the urban earnings premium and the rural-urban income gap. Glaeser and Mare (2001) uncovered a 33 % wage premium in large U.S. cities, and Goetz (2001) reported a 0.685 ratio of rural-to-urban per capita income in northeastern U.S. counties. Some explanations for the urban earnings premium focus on productivity-enhancing agglomeration economies and plant-level economies of scale (Ciccone and Hall 1996; Wheeler 2006; Yankow 2006). These theories predict that workers would receive a wage boost immediately upon moving to an urban area (and a loss upon leaving a city) (Glaeser and Mare 2001).

Other explanations for the urban earnings premium emphasize wage growth in cities through enhanced accumulation of human capital (i.e., learning hypothesis), or better coordination and matching of workers to employers (i.e., coordination hypothesis) (Glaeser 1999; Wheeler 2006; Yankow 2006). Wheeler (2006) found that much of the wage growth associated with city size is the result of changing jobs, which is consistent with the coordination hypothesis that cities provide a "thick market search externality." On the other hand, Wheeler (2006) did not find evidence, to confirm Glaeser's (1999) learning hypothesis, of faster city-induced earnings growth while a worker remained in the same job.

To explain the rural-urban income gap in the northeastern United States, Goetz (2001) estimated a county-level income determination model (similar to the regression equation we present in the next section of the paper). Goetz (2001) found that, among other things, the proportion of county residents 25 years and older with a college degree and population density have a positive effect on county-level per capita income. As discussed in more detail later in the paper, differences in these variables between metropolitan and non-metropolitan counties have substantial effects on the rural-urban wage gap. Our analysis, presented below, expands the geographical scope to (virtually) all U.S. counties, and includes a much larger set of explanatory variables expected to influence county-level earnings.

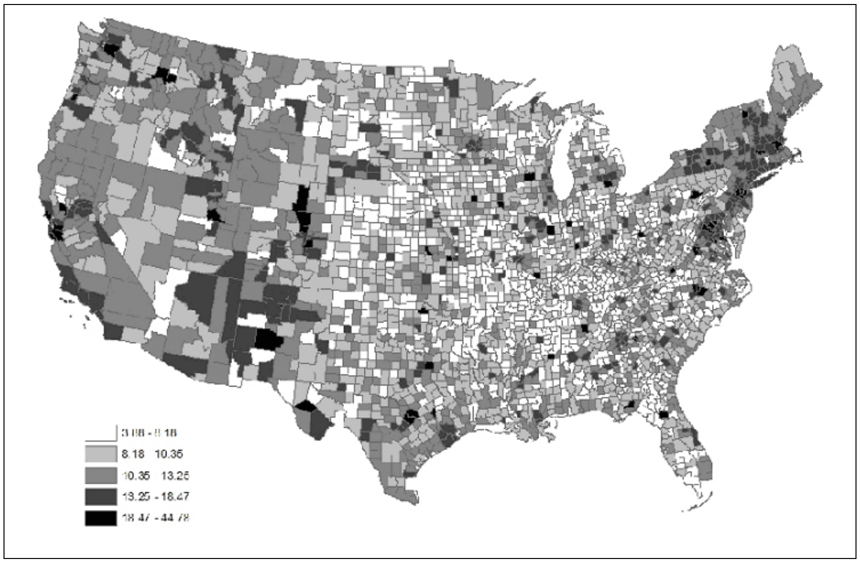

FIGURE 1 Proportion of County Employment in the Super-Creative Core

Analytical Framework and Data

We use the following regression equation to investigate the relationship between county-level earnings and the proportion of employment in the creative economy:

$$\text{Payroll Per Worker} = \alpha_0 + \beta_1 \text{ Super-Creative Core} + \beta_2 \text{ Education} + \beta_3 \text{ Population Density} + \beta_4 \text{ Melting Pot} + \beta_5 \text{ January Temperature} + \beta_6 \text{ January Sunlight} + \beta_7 \text{ July Humidity} + \beta_8 \text{ Water Coverage} + \beta_9 \text{ Museums Per Capita} + \beta_{10} \text{ Crime Rate} + \beta_{11} \text{ Manufacturing} + \beta_{12} \text{ Tourism} + \beta_{13} \text{ Business Services} + \beta_{14} \text{ Agriculture} + \beta_{15} \text{ Information} + \mu$$

In Table 2, we define the variables used in equation 1 and present summary statistics. The dependent variable, constructed using *County Business Patterns* data, is the average annual compensation per employee working in the county.[3] The key explanatory variable of interest, labeled *Super-Creative Core*, is the proportion of county employment (i.e., employed civilian population 16 years and older) in occupations that fall within Florida's "super-creative core." These include computer and mathematical occupations; architecture and engineering occupations; life, physical, and social science occupations; education, training, and library occupations; and a category of arts, design, entertainment, sports, and media occupations.

Figure 1 is a map of the United States that shows the proportion of employ-

3. The dependent variable measures the "aggregate returns" to creativity, made up of the earnings received by members of the super-creative core and the wages earned by individuals in other (non-creative) occupations. A high proportion of creative workers may enhance productivity and earnings in other occupations through information spillovers and collaborative efforts (Markusen 2004).

TABLE 2 Summary Statistics

Variable Name	Definition	Source	Mean	Standard Dev.
Payroll Per Worker	Annual compensation per full- and part-time employee in county, 2000	*County Business Patterns*, U.S. Census Bureau	23,752	5,872
Super-Creative Core	Percentage of county employment in the occupations that comprise Florida's super-creative core, 2000	Author's calculations using county-level occupational data from the U.S. Census Bureau (SF-4)	9.98	3.08
Computer and Mathematical Occupations	Percentage of county employment in computer and mathematical occupations, 2000	Author's calculations using county-level occupational data from the U.S. Census Bureau (SF-4)	1.00	1.10
Architecture and Engineering Occupations	Percentage of county employment in architecture and engineering occupations, 2000	Author's calculations using county-level occupational data from the U.S. Census Bureau (SF-4)	1.33	0.84
Life, Physical, and Social Science Occupations	Percentage of county employment in life, physical, and social science occupations, 2000	Author's calculations using county-level occupational data from the U.S. Census Bureau (SF-4)	0.67	0.60
Education, Training, and Library Occupations	Percentage of county employment in education, training, and library occupations, 2000	Author's calculations using county-level occupational data from the U.S. Census Bureau (SF-4)	5.84	1.53
Arts, Design, Entertainment, Sports, and Media Occupations	Percentage of county employment in arts, design, entertainment, sports, and media occupations, 2000	Author's calculations using county-level occupational data from the U.S. Census Bureau (SF-4)	1.14	0.68
Population Density	County population per square mile, 2000	U.S. Census Bureau	222.4	1,687
Education	Percentage of county population aged 25 and older with a college degree, 2000	U.S. Census Bureau	16.50	7.70
Melting Pot	Percentage of county residents who were not U.S. citizens at birth, 2000	U.S. Census Bureau	3.40	4.79
January Temperature	Mean county temperature for January, 1941-1970	McGranahan (1999)	32.89	12.03
January Sunlight	Mean hrs of sunlight in county for Jan., 1941-1970	McGranahan (1999)150.4	32.80	

TABLE 2 Summary Statistics (continued)

Variable Name	Definition	Source	Mean	Standard Dev.
July Humidity	Mean relative humidity for July in county, 1941-1970	McGranahan (1999)	56.38	14.30
Water Coverage	Percent county water area	McGranahan (1999)	4.65	11.31
Museums Per Capita	Number of "arts, entertainment and recreation" (NAICS 71--) establishments per 1,000 county residents, 2000	*County Business Patterns*, U.S. Census Bureau	0.39	0.33
Crime Rate	Number of serious crimes reported to police per county resident, 1999	U.S. Federal Bureau of Investigation	0.027	0.017
Manufacturing	Percentage of county establishments in the manufacturing sector (NAICS 31--), 2000	*County Business Patterns*, U.S. Census Bureau	5.11	2.39
Tourism	Percentage of county establishments in accommodation and food services (NAICS 72--), 2000	*County Business Patterns*, U.S. Census Bureau	8.32	2.83
Business Services	Percentage of county establishments in professional, scientific, and technical services (NAICS 54--), 2000	*County Business Patterns*, U.S. Census Bureau	6.44	2.48
Agriculture	Percentage of county establishments in agriculture, forestry, fishing and hunting (NAICS 11--), 2000	*County Business Patterns*, U.S. Census Bureau	1.38	2.08
Information	Percentage of county establishments in information sector (NAICS 51--), 2000	*County Business Patterns*, U.S. Census Bureau	1.75	0.82

ment in Florida's super-creative core.[4] It generally reveals higher proportions of creative economy employment on both coasts relative to areas located in the Midwest and Great Plains. Los Alamos County, New Mexico, home to large U.S. government laboratories, has the highest proportion of employment in this occupational category, followed by Tompkins County, New York (location of Cornell University), and Whitman County, Washington (Washington State University).

4. The map classification is five classes separated by natural breaks (Jenks) in the data. Natural breaks reflect clusters in the data.

Rounding out the top ten counties with the highest proportions of employment in the super-creative core are Benton County, Oregon (Oregon State University); Orange County, North Carolina (Research Triangle and home of University of North Carolina, Chapel Hill); Boulder County, Colorado; Story County, Iowa (Iowa State University); and Arlington County, Virginia (Virginia Polytechnic Institute). The top 10 list, which includes Tompkins County as the only non-metropolitan area, is dominated by places with major universities.

Other explanatory variables included in the model control for the effects of educational attainment, urbanization, diversity, local amenities and industrial structure on earnings. The percentage of county residents aged 25 and older with a college degree is used to measure education, which allows us to isolate the effects of creativity from the influence of human capital on earnings.[5] Although there is some debate as to whether educational attainment itself contributes to higher earnings, or whether it serves as a proxy for other underlying abilities, past studies generally find a positive association between earnings and education (Boissiere et al 1985; Card 1999). Population density is used to control for the effects of urbanization on wages (Segal 1976; Moomaw 1981; Yankow 2006). Explanations for the urban wage premium (see others discussed above) are that workers must be compensated to live in big cities, or that information flows easier in areas with a high density of economic activity (Glaeser and Mare 2001; Jacobs 1968; Hoch 1972).

Along with a highly creative workforce, Florida (2002a) argues that a diverse population is a key contributor to economic vitality. Focusing on large metropolitan areas, Florida (2002a) finds a high correlation between high technology and his "Composite Diversity Index", made up of the so-called "Gay Index", "Melting Pot Index", and the "Bohemian Index." We use the proportion of foreign-born people in a county (i.e., Florida's Melting Pot Index) to account for the effects of ethnic diversity on earnings.

The next six variables used in the analysis (*January Temperature*, *January Sunlight*, *July Humidity*, *Water Coverage*, *Museums Per Capita* and *Crime Rate*) control for amenities that may influence labor earnings. If a local attribute is viewed as an amenity (e.g., comfortable climate), people may accept lower wages to work in the area. Alternatively, individuals may have to be compensated to work near attributes (e.g., crime) viewed as disamenities. McGranahan (1999) used the climate and water coverage variables, along with measures of topography, to construct a natural amenity rating that he found to encourage population growth in rural counties.

We use a variable labeled *Museums Per Capita* (i.e., number of arts, entertainment and recreation establishments per 1,000 county residents) and the county-level crime rate to capture attributes that may be particularly important wage determinants in urban areas. Roback (1982) found that crime had a positive effect on wages in large cities, consistent with people viewing it as a disamenity. Glaeser

5. The educational attainment and super-creative core variables have a high correlation of around 0.80.

et al (2001) found that the number of live performance venues per capita encouraged population growth, but that the number of art museums per capita did not have a significant effect on population growth across U.S. cities.

Finally, the empirical model includes variables (*Manufacturing*, *Tourism*, *Business Services*, *Agriculture*, and *Information*) to represent the structure of the local economy.[6] We focus on the proportions of county-level employment in these industries because of the traditional and emerging roles that these sectors have played in regional economic development. In addition, researchers have noted the connection between the creative economy and tourism: tourists are drawn by arts and cultural activities, and the amenities valued by creative workers are also often desired by tourists (Heilbrun 1996; Markusen and King 2003).

Empirical Results

Table 3 presents empirical results on the relationship between county-level earnings and the proportion of employment in the super-creative core. Estimates shown in the left-hand column of results are from a regression model (referred to as the OLS model with "limited observations") that uses all of the variables included in equation 1. In order to account for these factors expected to influence county-level earnings, we had to omit from the analysis a sizable number of counties with missing values for one or more of the explanatory variables.[7] The other two columns of results, the OLS model with "omitted variables" and the spatial error model, show estimates from regressions that omit three variables (*Museums Per Capita*, *Crime Rate* and *Agriculture*) included in equation 1. This is done to minimize the number of counties that are dropped from the analysis. A (nearly) complete coverage of the United States is preferred in our empirical analysis, presented in the right-hand column, that controls for spatial dependence.

Spatial error dependence, which may be caused by spatial correlation of omitted variables or spatial mismatch in data measurement, violates the standard assumptions of the linear regression model (e.g., the assumption of independent, homoskedastic residuals). In our empirical work, the spatial error dependence is likely to be influenced by both data measurement (i.e., county-level observations) and omitted variable problems. Spatially correlated residuals cause ordinary least-squares estimates to be inefficient. Our spatial error model incorporates spatial error dependence using the conventional spatial auto-regressive structure (Anselin 1988, 2002).

We conducted tests for spatial dependence based on the results of the OLS model, shown in the centre column of Table 3 (see Anselin 2005, 2002, 1988).

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6. The Agriculture variable is an imprecise measure of farming activity because the County Business Patterns data exclude agricultural production operations and employment.
7. From the initial sample of 2,903 counties, there were 405 missing values for the Agriculture variable, 178 for Museums Per Capita, and 435 for Crime Rate. After removing the observations with a missing value for one or more of these variables, we arrived at a sample size of 2,219 variables.

TABLE 3 Regression Results: Determinants of County-Level Earnings

Variable	Estimated Coefficients		
Constant	17,335***	15,829***	18,178***
	(18.23)	(17.75)	(17.29)
Super-Creative Core	124.1**	286.6***	174.0***
	(2.274)	(5.847)	(3.604)
Population Density	0.422***	0.638***	0.459***
	(4.186)	(12.33)	(8.675)
Education	78.20***	77.28***	86.11***
	(3.153)	(3.470)	(3.928)
Melting Pot	239.6***	8.084*	256.1***
	(10.44)	(1.817)	(10.44)
January Temperature	-57.32***	-3.389	-24.71**
	(-5.920)	(-0.396)	(-2.045)
January Sunlight	-25.51***	-20.79***	-25.54***
	(-8.515)	(-7.127)	(-6.368)
July Humidity	45.04***	15.90**	38.25***
	(6.474)	(2.319)	(3.949)
Water Coverage	17.51**	26.68***	20.10**
	(2.266)	(3.278)	(2.351)
Museums Per Capita	-1,174***	--	--
	(-3.192)		
Crime Rate	25,573***	--	--
	(4.174)		
Manufacturing	328.5***	350.8***	240.8***
	(7.801)	(8.982)	(5.871)
Tourism	-96.65**	-58.43*	-121.1***
	(-2.447)	(-1.706)	(-3.528)
Business Services	824.3***	810.0***	594.7***
	(14.15)	(15.26)	(11.47)
Agriculture	-45.12	--	--
	(-0.972)		
Information	-87.67	-389.7***	-102.3
	(-0.625)	(-3.589)	(-0.996)
Lambda	--	--	0.402***
			(16.40)
R-squared	0.488	0.404	0.493
Number of Observations	2,219	2,903	2,902

Note: Figures shown in parentheses are t-statistics. ***, ** and * indicate statistical significance at the 1, 5, and 10 % levels, respectively.

Completion of these tests required the specification of a spatial weight matrix. The spatial weight matrix designates neighbouring sets for each observation, specifying which observations are potentially related over space. We employ a first-order queen contiguity matrix which allows for dependence among neighboring counties. Binary weights are used, the spatial weight matrix is row-standardized, and all observations have at least one neighbor. Test statistics revealed the presence of spatial error dependence, leading to our use of the spatial error model.[8]

Empirical results from all three models uncover a positive relationship between average county-level earnings and the percentage of employment in the super-creative core.[9] Other things being equal, a one percentage point increase in the proportion of employment in the super-creative core is associated with a $124 (OLS model with limited observations) to $287 (OLS model with omitted variables) increase in average county-level earnings. Using results from the spatial error model, we find that a 10 % increase in the proportion of employment in the super-creative core results in a 0.73 % increase in average earnings.

The educational attainment, population density and melting pot variables have a positive effect on earnings in all three models. These results suggest, as expected, that human capital, urbanization and ethnic diversity contribute to county-level earnings. Looking at the results from the OLS model with limited observations, we find that the crime rate has a positive effect on earnings. This suggests that, other things being equal, individuals require compensation to work in areas with high crime. Likewise, the results from all three models indicate that summertime humidity is viewed as a disamenity

Our results show that (January) temperature (two of the three models) and sunlight (all three models), and the number of museums per capita (only included in the OLS model with limited observations) have a negative effect on earnings. These results imply that people will accept lower monetary compensation to work in places with nice winter weather and a high incidence of museums and recreational establishments per capita. Surprisingly, the percentage of county area covered by water has a positive effect on earnings in all three models, which suggests that people view lakes and other bodies of water as disamenities.

Finally, we find that the industrial structure of the local economy affects county-level earnings. In all three models, the proportion of local businesses in manufacturing and business services has a positive effect on earnings, while earnings are negatively related to the relative importance of tourism to the local economy. Lambda, an additional parameter estimated in the spatial error model, is positive and significant, indicating positively spatially correlated residuals among neighbouring counties.

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8. Diagnostic tests show a Moran's I value of 22.72 (p-value = 0.001), Lagrange Multiplier (LM) Lag value of 226.5 (p-value = 0.001), Robust LM Lag value of 9.351 (p-value = 0.002), LM Error value of 505.1 (p-value = 0.001), and a Robust LM error value of 288.0 (p-value = 0.001).
9. We also estimated the three models, not shown in the paper, with a set of dummy variables to control for the U.S. Census region where the county is located. For the OLS model with limited observations, the R2 increased slightly from 0.488 to 0.515. The inclusion of the regional dummy variables did not result in any substantive changes to the estimated coefficients shown in Table 2.

TABLE 4 Segments of the Super-Creative Core and Earnings in U.S. Counties

Proportion of County Employment in:	Estimated Coefficient
Computer and Mathematical Occupations	1,757*** (13.73)
Rest of the Super-Creative Core	-90.08* (-1.765)
Architecture and Engineering Occupations	2,172*** (17.55)
Rest of the Super-Creative Core	-200.9*** (-3.939)
Life, Physical, and Social Science Occupations	488.9*** (2.872)
Rest of the Super-Creative Core	122.0** (2.209)
Education, Training, and Library Occupations	-519.5*** (-8.661)
Rest of the Super-Creative Core	937.7*** (15.16)
Arts, Design, Entertainment, Sports, and Media Occupations	-329.2* (-1.653)
Rest of the Super-Creative Core	191.1*** (3.926)

Note: Results are summarized from five separate regression models. Figures shown in parentheses are t-statistics. ***, ** and * indicate statistical significance at the 1, 5, and 10 % levels, respectively.

Segments of the Super-Creative Core

Our empirical results reveal a modest positive relationship between county-level earnings and the proportion of employment in the super-creative core. In an extension of the analysis, we examine whether this "creativity earnings premium" applies to all segments of the creative core, or whether it is driven by a few select occupations. Table 4 summarizes regression results on the relationship between average county-level earnings and the proportion of employment in the five broad occupational categories that make up Florida's super-creative core. In each of the five regression models, we isolate the effect of the occupational category of interest on earnings and control for the combined proportion of county employment in the other four components of the super-creative core. The regression models shown in Table 4 account for spatial dependence, and we use the explanatory variables shown in the right-hand column of Table 3.

We find that, other things being equal, the proportion of county employment in computer and mathematical; architecture and engineering; and life, physical, and social science occupations have a positive effect on average county-level earnings. A one-percentage point increase in the proportion of county employment in these occupational categories is associated with a $1,757, $2,172 and $489 increase in average earnings, respectively. Controlling for the percentage of workers in the computer and mathematical, and architecture and engineering occupations, we find that the combined proportions of county employment in the other four segments of the super-creative core have a negative effect on earnings.

Other results shown in Table 4 reveal a negative relationship between county-level earnings and the proportion of employment in education, training, and library occupations. A one-percentage point increase in the proportion of county employment in these jobs is associated with a $519 decrease in average earnings, while a similar increase in the rest of the super-creative core leads to a $938 increase in earnings. Likewise, our results suggest that the proportion of employment in arts, design, entertainment, sports, and media occupations has a negative effect on county-level earnings.

Empirical results presented above address two of our three research questions related to the effects of creative economy employment on county-level earnings. First, we find that the proportion of employment in Florida's super-creative core has a positive effect on earnings, although the magnitude of this impact is small. Second, our analysis uncovered some key differences, across broad occupations categories in the super-creative core, in the relationship between earnings and creative economy employment.

The positive relationship between county-level earnings and the proportion of employment in Florida's super-creative core appears to be driven by employment in the technology-based segments of computer and mathematical occupations; architecture and engineering occupations; and life, physical, and social science occupations. On the other hand, the proportion of employment in the broad categories of education, training and library occupations; and arts, design, entertainment, sports, and media occupations have a negative effect on county-level earnings. These results, considered along with the fact that educators made up a large part of the super-creative core in many places, provide additional context to our original finding of a modest impact of super-creative core employment on earnings.

It should be noted that our result of a negative relationship between county-level earnings and the proportion of employment in education, training, and library occupations does not diminish the key role that education plays in regional economic development. In all three regressions shown in Table 3, the proportion of county residents with a college degree has a positive effect on earnings. However, our results show that, holding constant the educational attainment of county residents, average earnings are lower in areas with a relative abundance of educators. McGranahan and Wojan (forthcoming) point out that many declining rural areas, with a lack of employment opportunities in other occupations, have a relatively high proportion of educators that reside in the area to serve the local population. This may be contributing to our result.

Creative Economy and the Rural-Urban Wage Gap

As discussed above, Florida's research shows that workers in creative occupations earn substantially higher wages than individuals in working and service occupations. These earning differentials, combined with the expansion of employment in service jobs driven by the growth of the creative economy, may lead to an increase in income inequality within some cities (Florida 2002a; Peck 2005). In this section of the paper, we use our regression results to see if differences in the creative economy across metropolitan and non-metropolitan counties may be contributing to the rural-urban wage gap as well.

Table 5 reproduces the estimated coefficients from the right-hand column of Table 3, and shows average values of the explanatory variables for 798 metropolitan counties and 2,105 non-metropolitan counties. The counties are classified based on Urban Influence Codes from the U.S. Department of Agriculture.[10] Using information shown in the table, we estimate that average earnings in metropolitan counties exceed average earnings in non-metropolitan areas by $4,321. (This estimated rural-urban wage gap is smaller than the actual difference between average earnings in metropolitan and non-metropolitan counties of $6,135.)

Our analysis, presented in the table, suggests that 11.5 % of the estimated rural-urban wage gap is attributed to differences in the proportion of county employment in the super-creative core. This amount is larger than the wage gap associated with differences in population density, but considerably smaller than the disparities resulting from differences in education, the percentage of foreign-born county residents, and the proportion of county establishments in business services. In an similar type of analysis focusing on counties in the northeastern United States, Goetz (2001) found that 75.5 % of the estimated wage gap is attributed to differences in the proportion of residents with a college education, 17.1 % is due to differences in the proportion of private sector jobs relative to total county population, and 7.0 % is associated with differences in population densities.

We also examined the proportion of the estimated rural-urban wage gap that can be explained by differences in the percentages of county employment within segments of the super-creative core. Our results, which should be viewed independently because they are generated by five separate models, suggest that 49.4 % of the estimated rural-urban wage gap is attributed to differences in the propor-

10. We used the 1993 Urban Influence Codes to define metropolitan and non-metropolitan counties. These codes, developed by the U.S. Department of Agriculture, separate U.S. counties into nine groups. The first two groups, classified as metropolitan counties, include counties that are in a metropolitan area with one million or more residents (Code 1, "large metropolitan areas") and counties that are in a metropolitan area with fewer than one million residents (Code 2, "small metropolitan areas"). The remaining seven groups are classified as non-metropolitan counties. They range from counties that are adjacent to a large metropolitan area and contain a city of at least 10,000 residents (Code 3) to counties that are not adjacent to a metropolitan area and do not contain a town of at least 2,500 residents (Code 9).

TABLE 5 Factors Influencing the Rural-Urban Wage Gap

Variable	Coefficient	Metropolitan Average	Non-Metro Average	Effect on Income Gap	% of Total Income Gap
Super-Creative Core	174.0	12.06	9.189	499.2	11.5%
Population Density	0.459	698.3	41.99	301.3	7.0%
Education	86.11	21.85	14.48	634.6	14.7%
Melting Pot	256.1	5.646	2.550	792.9	18.4%
Jan. Temperature	-24.71	35.29	31.99	-81.6	-1.9%
Jan. Sunlight	-25.54	147.5	151.6	103.4	2.4%
July Humidity	38.25	59.93	55.03	187.5	4.3%
Water Coverage	20.10	7.503	3.570	79.1	1.8%
Manufacturing	240.8	5.132	5.099	7.95	0.2%
Tourism	-121.1	7.711	8.553	101.9	2.4%
Business Services	594.7	8.470	5.674	1,662	38.5%
Information	-102.3	1.521	1.838	32.4	0.7%
			Total	4,321	100%

tions of county employment in computer and mathematical occupations. Similarly, we find that differences in the proportions of workers in architecture and engineering occupations account for an estimated 40.1 % of the wage gap. In both cases, the wage gaps associated with the segments of the super-creative core are considerably larger than the earnings disparities related to differences in education. Metropolitan versus non-metropolitan differences in the proportions of county employment in the other three segments of the super-creative core account for less than five percent of the estimated rural-urban wage gap.

The results presented in this section address our third research question about the extent to which differences in the proportions of employment in Florida's super-creative core between metropolitan and non-metropolitan counties are contributing to the U.S. rural-urban wage gap. We find that differences in the proportions of county-level employment in the super-creative core account for 11.5 % of the U.S. rural-urban wage gap. This is a relatively modest effect compared to other factors described above. However, further analysis focusing on segments of the super-creative core reveals that differences in the proportions of employment in computer and mathematical, and architecture and engineering occupations contribute substantially to the U.S. rural-urban wage gap. This finding is consistent with our earlier result that much of the creativity earnings premium is driven by technology-based segments of the super-creative core.

Concluding Thoughts

This paper sought to examine the relationships among county-level earnings, employment in creative occupations and the U.S. rural-urban wage gap. We found that, other things being equal, the proportion of U.S. county employment in Florida's super-creative core is associated with an increase in average earnings. This result is robust across three regression models that differ in terms of the number of observations, inclusion of other explanatory variables, and the treatment of spatial dependence.

With this result in hand, we then examined the extent to which the proportion of county employment in individual segments of the super-creative core contributes to earnings. Our results show that the proportions of workers in computer and mathematical, architecture and engineering, and scientific occupations have a positive effect on earnings. These findings suggest that the "positive creativity effect" on county-level earnings is largely attributed to employment in technology-based creative occupations. This may be capturing the individual wage premium associated with on-the-job use of computers and other "white-collar" tools (Krueger 1993; DiNardo and Pischke 1997), as well as an externality effect in which a high proportion of these creative workers raises the productivity of others.

These findings suggest to policymakers that creative economy initiatives and other development strategies should recognize the contributions of technology-based occupations to regional economies. The results also imply that policymakers should have realistic expectations about the extent to which programs used to attract and support artists will spur economic development. Our analysis revealed a negative relationship between county-level earnings and the proportion of employment in artistic occupations. This result may be capturing, in part, the slight artists' "earnings penalty" uncovered by Filer (1986). However, we did find evidence that individuals may view museums and other recreational establishments as amenities. Thus, although our analysis did not examine this possibility, a strong arts scene might contribute to regional economic development indirectly through the attraction and retention of scientific and technology-based workers.

Perhaps a greater challenge for regional development policy uncovered in our analysis is the extent to which differences in the relative size of the creative economy contribute to the rural-urban wage gap. Focusing on the super-creative core as a whole, we find that differences in the proportions of workers between metropolitan and non-metropolitan counties contribute to a $499 wage gap, which is equivalent to 11.5 % of the estimated wage differential of $4,321. Florida (2002a) and Peck (2005) note that the growth of the creative economy may lead to an increase in income inequality within metropolitan areas; our results suggest that the creative economy may be partially responsible for the rural-urban wage gap, too.

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