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The rural growth trifecta: outdoor amenities, creative class and entrepreneurial context[§]

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Abstract

Recent work challenges the notion that attracting creative workers to a place is sufficient for generating local economic growth. In this article, we examine the problem of sustaining robust growth in the periphery of the USA, demonstrating the contingent nature of talent as an engine for economic growth. We test the hypothesis that rural growth in the knowledge economy is dependent on the ability to utilize new knowledge, perhaps generated elsewhere, in addressing local economic challenges. Tests confirm that the interaction of entrepreneurial context with the share of the workforce employed in the creative class is strongly associated with growth in the number of new establishments and employment, particularly in those rural counties endowed with attractive outdoor amenities.

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1. Introduction

Rural development in the industrialized world is at crossroads. Primary industries continue to shed employment. Traditional strategies of promoting *exogenous* growth through the recruitment of employers are now much less effective. Routine and low-skill functions are increasingly outsourced to low-wage countries. At the same time, more knowledge-intensive functions tend to agglomerate in cities. Despite these disadvantages, many rural areas have continued to grow. During the 1990s in the USA, over one in every five rural (nonmetropolitan) counties gained jobs at a faster rate than the urban (metropolitan) county average. The ineffectiveness of traditional rural development strategies within this new environment has turned attention to entrepreneurship and endogenous development as more viable approaches (Rowe et al., 1999). Yet, notwithstanding the strong rhetorical appeal of home grown development, the empirical analysis has provided little theory and few clues as to where and when these processes play a role in contemporary rural economic growth.

§ The views expressed here are those of the authors, and may not be attributed to the Economic Research Service, the U.S. Department of Agriculture or the University of Tennessee.

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This article applies the urban economics construct of the 'creative class' to explain how some rural places may be economically dynamic even in a national context where growth depends on the novel combination of knowledge and ideas. The key insight from the urban creative class literature is that workers in occupations specializing in creative tasks demonstrate strong preferences for various amenities and these preferences affect the location of talent (Florida, 2002, 2005). Opportunities for outdoor recreation is one set of amenities that is consistently mentioned in these works but which has not commanded the attention of Florida, other creative class researchers or the popular press the way diversity, tolerance for alternative lifestyles and the distinctiveness of central city amenities has. Our rural variant of the creative class construct re-emphasizes outdoor amenities as an attractor of talent. We posit that some creative workers may choose to forego higher urban earnings in exchange for the quality of life found in places endowed with natural amenities and that where this occurs, it may lead to business formation and economic growth, facilitated in part by the attraction of more creative class members.

We are mindful that recent urban and regional research on the creative class has raised questions about its relevance to economic growth. Empirical results have been decidedly mixed (Donegan, et al. 2008; Boschma and Fritsch, 2009; Hoyman and Faricy 2009). Part of the explanation may be that, as Storper and Scott (2009) and Asheim and Hansen (2009) argue, the location of the creative class is largely shaped by demand, so that industrial structure and change shape the location of both creative class and growth. The demand side receives support from Hansen and Niedomysl (2009) who find that most Swedish creative class people move for jobs rather than local quality of life. For us, this assertion that jobs may come before people does not deny the creative class dynamic but suggests that it may be contingent on local context. This would be consistent with Partridge and Rickman's (2003) analysis of US state growth patterns, which showed that the relative importance of labor supply (versus demand) varies considerably by region and time period.

In this article, we explore two geographic factors that may shape the relationship of creative class to local economic growth. First, the creative class dynamic is likely most relevant in high-amenity contexts. The model assumes a footloose creative class drawn to high amenity areas, thus providing these areas the advantage of an influx of knowledge and creativity. As Boschma and Fritsch (2009) note, the presence and attraction of the creative class in Florida's (2002) model is part of a mechanism through which economies grow where people, not jobs, come first. Low-amenity areas may lack this influx, whatever their level of creative class.

The second contingency is the presence of an entrepreneurial context. The creative class model assumes that the creative class is entrepreneurial by nature and drawn to entrepreneurial contexts envisioned by Jacobs (1965). But if we recognize that the creative class presence may be high in other milieus, such as the one supported by a large government research facility, the presumption of an entrepreneurial creative class seems problematic. Creativity as an economic asset may in some cases be largely contained within a worker's organization with little spillover to the local economy. In sum, this article explores for rural economies whether the relationship between creative class and local growth depends on two local conditions presumed present in Florida's work (2002, 2005): a high level of amenities and an entrepreneurial context.

The rest of the article is organized into four main sections. In the following background section we discuss the creative class and its relationships to rural areas, entrepreneurship and outdoor amenities. Section 3 includes the operationalization of these variables and an empirical analysis of their interrelationships and their relationships to rural county gains in numbers of establishments and jobs during the 1990s. Of particular interest is the extent to which creative class links to growth are conditioned by local entrepreneurial and outdoor-amenity contexts. In Section 4, we extend the growth analysis by incorporating a variety of other growth-related county characteristics such as industry, education, income, commuting and prior growth, and by considering spillover effects of economic growth between rural and urban regions. This provides not only an assessment of the robustness of our results but also a fuller understanding of alternative paths of rural growth. The concluding section provides a summary and discussion of the results.

2. Background

2.1 Creative class and rural areas

Endogenous growth models, originating with Romer (1986, 1990) and Lucas (1988), posit that growth comes from knowledge that, because of its quasi-public nature, spills over into local economies as it is assimilated. For Florida (2002), knowledge and creativity are concentrated in the 'creative class', comprised of people in occupations that produce new knowledge and ideas and understand their use. For our purposes, Florida's central insight is that this class is not fixed in place but geographically fluid, drawn to places that offer interesting lives as well as interesting work. New economic knowledge may thus diffuse out of the localities where it was generated, and localities can gain knowledge and creativity by attracting this class.

The implication is that labor mobility may be an important source of widespread knowledge flows, but one that has been largely disregarded by the empirical focus on localized knowledge spillovers (Breschi and Lissoni, 2001; Faggian and McCann, 2009). Much of the research identifying occupations as principal vectors of knowledge transmission has examined this phenomenon within industrial districts (Saxenian, 1990, 1994; Almeida and Kogut, 1999), in cities (Glaeser et al.,1992) or aspatially (Pack and Paxson, 1999; Zellner, 2003). Recent recognition of the importance of non-local knowledge flows, either in the form of global networking (Fontes, 2005; Gertler and Levitte, 2005) or through labor mobility (Dahl, 2004; Solimano, 2008; Boschma et al., 2009), is consistent with the idea that localities need not be producers of knowledge to have access to it. In their study of interregional migration of college graduates in the UK, Faggian and McCann (2009) provide evidence that high-performing regions are generally those that 'attract learned people' whether or not they qualify as 'learning regions'.

The applicability of knowledge-driven growth processes in rural areas is controversial given their characterization as places toward the end of the regional product cycle (Barkley et al., 1988; Glasmeier 1991). Rural areas are generally not locations of new knowledge production. Few patents go to rural areas (Barkley et al., 2006); research universities in the USA are largely urban, as are industrial R&D activities. However, during the past 20 years, there has been a considerable amount of new knowledge generated with respect to production and information technologies and marketing and management practices, much of it related to microchips and this development has been relevant to rural as well as urban areas (Gale, 1998; Wojan and McGranahan, 2007).

Facilitated in part by these new technologies, markets have changed, becoming more globalized and differentiated. In this context, knowledge of new technologies and practices and creativity in their use would seem critical to rural success—a point explicitly recognized by EU-member reports examining the rural contribution to the 2010 Lisbon goal of becoming 'the most competitive and dynamic knowledge-based economy in the world' (Hepworth et al., 2004; Hepworth and Pickavance, 2004; Fornefeld et al., 2008).

Rural areas in the USA lose much of their prospective talent as young adults leave for urban colleges and city lights (Plane et al., 2005). Many do not return: most rural counties lost in their share of college graduates in 1970–2000 (Artz, 2003). However, there is a countervailing migration flow of young families, mid-life career changers and retirees out of major urban centers. In the 1990s, the number of people who moved from metropolitan to nonmetropolitan areas exceeded the flow in the other direction. Capturing this flow, particularly its productive talent, may be the keystone for rural economic growth in the knowledge economy.

But, is there a rural flow of creative class to capture? Florida (2002, 2005) developed his theory with cities in mind and the ensuing research has focused almost entirely on urban agglomerations or national sets of regions varying in their rural–urban mix, which would suggest that the creative class is an urban phenomenon. However, McGranahan and Wojan (2007), focusing explicitly on the nonmetropolitan USA, found that 20% of 2003 nonmetropolitan employment was in creative class occupations, certainly lower than the 31% in metropolitan USA, but not insubstantial. The rural creative class, comprised mainly of managers, high-end sales positions, scientists, engineers, college professors, artists and designers, was similar in occupational structure to the urban creative class, if somewhat less schooled. McGranahan and Wojan (2007) found many rural counties high in creative class occupations. Some were associated with universities (e.g. Tompkins County, NY, with Cornell University). Others, however, had rich endowments of outdoor amenities, with mountains, lakes and other attractive landscape features (e.g. Pitkin County, CO, Aspen's location). This finding was consistent with earlier research revealing a quality-of-life orientation to the location of producer services in rural areas (Goe, 2002), including those serving outside markets (Beyers and Lindahl, 1996). Finally, while little has been done on the outcomes of rural creative class presence, McGranahan and Wojan (2007) found an association between creative class and rural job growth.

2.2 Creative class and entrepreneurship

Endogenous growth models have stimulated theoretical interest in local entrepreneurship, seen as a means through which knowledge once created becomes assimilated in the local economy (Audretsch and Feldman, 2004; Acs et al., 2005; Audretsch and Keilbach, 2005, 2006). Acs et al. (2005) found that OECD countries with relatively high R&D expenditures grew more rapidly in 1981–2000 compared with others only to the extent that they were also characterized by high rates of entrepreneurship. Zucker and Darby (2007) present more concrete evidence of the role of entrepreneurship. Focusing on highly productive 'star' scientists, they find that new knowledge is most likely to generate growth where the scientists involved in its creation are active in entrepreneurial organizations. More generally, Mueller (2006) finds university–industry relations related to regional economic performance. We feel that entrepreneurship may also be the mechanism through which the knowledge and talent of the creative class is assimilated into the local economy.

For Florida (2002), the incorporation of creative class knowledge and talent into the local economy is not problematic: the creative class is entrepreneurial by nature and creative class settings are characterized by diversity, interaction and entrepreneurship in the manner of Jane Jacobs (1965). However, this general characterization of creative class and creative class settings seems questionable at both the individual and area level. Florida's creative class occupations include many who seem unlikely to be or become local entrepreneurs (e.g. teachers, librarians, government agency managers) and others who may or may not be entrepreneurial in the sense of starting new businesses (engineers, sales managers, physical scientists). Places with even very high creative class concentrations need not be entrepreneurial, as Saxenian's (1994) comparison of corporate Route 128 (near Boston) with entrepreneurial Silicon Valley illustrates.

Recent research on entrepreneurship suggests that its strength in the creative class is likely related to context, particularly to the size of local businesses. Scientists and engineers in small firms have much higher rates of transition to self-employment than those in large firms (Elfenbein et al., 2009), a 'small firm effect' also found among business school graduates (Dobrev and Barnett, 2005) and the general work force (e.g. Gompers et al., 2005). These results are consistent with more general studies of local entrepreneurship that have found small firm contexts associated with greater rates of transition to self-employment (Giannetti and Simonov, 2004) and entrepreneurial proclivity (Mueller, 2006).

Experience in a small firm environment may induce entrepreneurship, but Elfenbein et al. (2009) found that scientists and engineers initially expressing an interest in entrepreneurship were more likely to choose small firms as initial work places, so self-selection is involved. This is consistent with Parker's (2009) research on transitions to self-employment in the workforce as a whole. This suggests that places with highly entrepreneurial contexts are apt to draw the more entrepreneurial creative class. Moreover, entrepreneurship seems likely more characteristic of the creative class drawn to high-amenity areas, where people need to create jobs, than of creative class in low-amenity contexts, where the creative class presence is more the outcome of industrial structure—where jobs attract people. Florida's (2002) characterization of the creative class as entrepreneurial may be apt for the Jacobs' (1965) creative class environments envisioned in his study, without being universally or even generally true of the creative class as a whole.

Our study treats entrepreneurial context (small firm size or self-employment rate) as a local attribute distinct from the creative class. We expect that creative class and entrepreneurial context have a synergistic effect on local growth. Creative class talent and innovation is more engaged in the local economy in an entrepreneurial context and entrepreneurial context is more apt to lead to growth with the advantage of creative class talent and innovation. Thus, entrepreneurial settings low in creative class may generate little growth. Studies in the USA have generally found entrepreneurship to have a positive effect on growth, in contrast to the more nuanced, contingent findings in European research (Acs and Storey, 2004). Work in the UK related to a national program to promote local entrepreneurship suggests that in stagnant regions, new establishments may essentially reproduce the existing economy with little net effect on the local economy (Lloyd and Mason, 1984; Van Stel and Storey, 2004). Lloyd and Mason (1984) did find a growing region with high-end migrants-generated new types of establishments. We expect that we might find a similar situation in the rural USA, depending on creative class level.

2.3 Creative class and outdoor amenities

Florida (2002, 2005) distilled his hypotheses about local attributes attractive to the creative class from focus group research conducted with young professionals and university students training for creative class occupations. Opportunities for outdoor recreation were clearly among the most highly valued qualities elicited in these sessions (Florida, 2000, 47; 2002, 173).[1] However, creative class theory and research has tended to focus on other desired local characteristics, such as tolerance for alternative life styles and particular cultural amenities. Even Florida (2002, 240), in laying out his theory wrote of the three necessities of growth: technology, talent and tolerance, with no mention of outdoor amenities. Subsequent research on creative class location has generally followed suit (e.g. Florida, 2005; Asheim and Hansen, 2009; Boschma and Fritsch, 2009). One reason may be that reliable urban measures of access to the outdoors are difficult to obtain.[2]

The USA has a long history of analyses pointing to outdoor amenities as drivers of growth. An analysis comparing place of residence with place of birth using 1930 Census of Population data concluded that, ‘an important part of the migration to California has been of hedonistic rather than primarily economic character and has been motivated more by climate and legend than by superior job opportunities’ (Bright and Thomas, 1941, 778). Ullman (1954) made reference to ‘foot-loose’ workers and businesses in explaining migration to the West coast and Arizona. In a major study of regional growth, Perloff (1960) pointed to climate and other amenities as factors in the growth of California, Arizona and Florida.

Although rarely considered in recent US urban research, outdoor amenities have been central to recent analyses of rural population and employment change. Some rural research has focused on public lands, particularly national parks and wilderness areas (Duffy-Deno, 1998; Lorah and Southwick, 2003; Hand et al., 2008), while other research has considered a broad range of scenic and recreational attributes (e.g. McGranahan, 1999; Deller et al., 2001). Carruthers and Vias (2005) and McGranahan (2008) present simultaneous equation models suggesting that outdoor amenities (e.g. mountains, lakes, forest, pleasant climate) attract people and this leads to job growth. Most pertinent here, McGranahan and Wojan’s (2007) analysis suggests that rural county gains in the creative class in the 1990s were associated with scenic landscapes as well as industry structure.

Our expectation is that outdoor amenities will be related to growth in several ways. High-amenity areas will have relatively high proportions of creative class and,

1 Florida’s 2000 report on ‘Competing in the Age of Talent’, which preceded the usage of ‘creative class’, arguably places outdoor recreation and outdoor amenities as a principal attractor of talent. Indeed, the inclusion of Burlington, VT, and Chattanooga, TN, to complement the case studies of Austin and Seattle reinforces this impression. Florida’s results echo Malecki and Bradbury’s (1992) study of independent R&D establishments and their employees, which found that professional staff weighted environmental quality near or at the top among attributes of ideal locations. Firms, presumably sensitive to employee concerns, also rated environmental quality highly.

2 Although not impossible: Schmidt and Courant (2006) found metropolitan area wages lower depending on proximity to a ‘nice place’ (national land designated as park, seashore, lakeshore or recreation area).

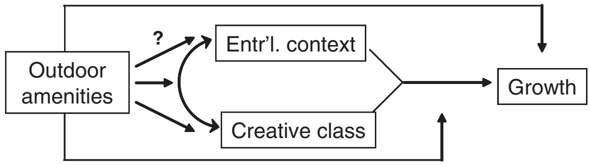

Figure 1. Trifecta model of rural growth.

moreover, the creative class in these areas will be more highly associated with entrepreneurship than in lower amenity areas, where industry demand plays a greater role in shaping creative class location and growth. Moreover, the synergistic effects of entrepreneurship and creative class will be greater in higher amenity areas where it is easier to attract footloose businesses, creative class and skilled labor and where the amenities themselves may be a source of growth. This last, synergistic relationship with growth is the primary focus of the empirical analysis.

Figure 1 summarizes the model assessed in the empirical analysis that follows. All relationships are expected to be positive, except the relationship of outdoor amenities to entrepreneurial context, where the relationship is uncertain. The corresponding model for previous creative class research would relate amenities to creative class and both amenities and creative class to growth. We have relaxed two assumptions inherent in previous research that the creative class is entrepreneurial and that it is located in high amenity areas. Instead, our model makes the relationship of creative class to growth contingent on those conditions.

3. Basic analysis

Our analysis of 1990–2000 growth in nonmetropolitan US counties is carried out in two stages. First, we investigate the basic relationships presented in Figure 1, and then, for the analysis of growth, we explore the robustness of our results by extending the analysis to include a wide range of control variables and considerations of spatial spillovers. For both the basic and extended analysis, the influence of outdoor amenities is captured through a single measure that we construct below. As part of the analysis, we divide counties into three groups (top quarter, middle half and bottom quarter) based on outdoor amenity rank and examine their interrelationships of entrepreneurial context and creative class and their effects on growth within each group. In this section, the focus is on the basic measures and relationships.

3.1 Basic measures

Our study has three county growth measures: the number of single unit start-ups, 1991–2000 divided by 1990 private sector non-farm jobs; the net 1990–2000 gain in total non-farm enterprises with any employees, with the same divisor; and the ratio of 2000 jobs to 1990 jobs. The expectation is that the combination of creative class and entrepreneurial context results in growth primarily through the effective generation and attraction of new small enterprises. The implication is that these synergistic effects should be stronger for net establishment growth than for either enterprise start-ups or job growth. Enterprise start-ups are less likely to yield gains in establishments in the absence of creative class knowledge and creativity. Job growth depends on many factors besides enterprise formation. We also expect that an entrepreneurial creative class setting will attract more creative class, giving growth continuity in these contexts. Table A1 gives the sources of the study measures.

In the absence of an ideal measure, we use two approximate measures of entrepreneurial context and do separate analyses with each. The first is self-employment, which includes an unknown number of members of limited partnerships, only some of which are employers. The second is the ratio of private non-farm establishments to private non-farm jobs. The data include only establishments and jobs where at least one person is or has recently been officially employed, so it misses some self-employment. With a correlation of $r = 0.64$, these are clearly distinct measures of entrepreneurial context and their use provides separate tests of our hypotheses.

For the creative class, the analysis adopts McGranahan and Wojan's (2007) refinement of Florida's (2002) creative class measure. Taking advantage of their more detailed occupational variable, McGranahan and Wojan (2007) used the 'Thinking Creatively' element of the Bureau of Labor Statistics' 2004 ONET occupational content model to cull the most creative occupations.[3] This creativity element is described as 'developing, designing or creating new applications, ideas, relationships, systems or products, including artistic contributions', which fits the construct. The second difference from Florida's measure was the exclusion of several occupations that provide services to an essentially local population including primary and secondary school teachers, health professionals and magistrates. McGranahan and Wojan (2007) show that this refinement had a more substantial influence on the measurement of rural than urban creative class, apparently because many sparsely populated counties have few central place functions besides healthcare and local primary and secondary schools.

3.2 Outdoor amenities scale

This section serves two purposes: to affirm that aspects of the outdoors—landscape, climate, recreation—are major influences on the amenity values of rural residential locations and to develop a measure that allows us to stratify rural counties by their level of outdoor amenities. Prior research suggests that outdoor amenities are reflected largely in higher local housing values rather than in suppressed earnings (Hand et al., 2008; Wu and Gopinath, 2008), allowing us to use house values to gauge the relative residential amenity value of each rural county.

We carried out our analysis in two steps. First, following Glaeser et al. (2001), we obtained the residual of the regression of 1990 median house value on 1990 median homeowner income to gauge relative amenity value of each rural county. We then regressed this residual on a set of outdoor amenities and a control variable to reflect access to services and jobs, the natural log of population density. The predicted value of the residual based on the amenity measure coefficients but excluding density served as

3 The ONET compendium, previously known as the *Dictionary of Occupational Titles*, is produced by the Employment and Training Administration, Department of Labor, and provides comprehensive information on the functional requirements of more than a thousand detailed occupations. The creativity measure provides a quantitative, though arguably imperfect, reference for assessing the creativity requirements among summary occupations that typically require a high degree of education.

Table 1. Residual housing value regression

	Std. coeff.	Prob(|t|)
Jan sun	0.18	<0.0001
Jan temp	0.20	<0.0001
July hum	−0.11	<0.0001
Temperate	0.19	<0.0001
Topography	0.21	<0.0001
Water	0.14	<0.0001
Forest	0.65	<0.0001
Forest squared	−0.32	<0.0001
Tourism	0.16	<0.0001
Density	0.18	<0.0001
R^2 (adj.)	0.55	

our outdoor amenity measure. More formally, the equations are as follows:

$$HV = a_1 MY + \hat{\varepsilon}, \tag{1}$$

where $HV = \text{Log}_e$ of median value of houses, $MY = \text{Log}_e$ of median income of homeowners and $\hat{\varepsilon} =$ the estimated residual.

$$\hat{\varepsilon} = \sum_i^9 b_i X_i + b_{10} D + \mu, \tag{2}$$

where X_i's represent the amenity measures and D, $\log_e$ of population density.

The outdoor amenity measures were chosen to reflect climate, landscape and recreation appeal. As discussed above, climate has long been considered a factor in the US regional growth. We used the four climate measures found associated with 1969–1996 rural population growth in McGranahan (1999): average January temperature, average January days of sun; low July humidity, and temperate July temperature—the last being the negative residual of the regression of July on January temperature. McGranahan (2008), drawing on landscape preferences literature, found that topographic variation, water area (lakes, ponds, ocean), and a mix of forest and open country have a direct bearing on nonmetropolitan net migration. We included the topography measure, water area and percent forestland and its square from that study. The last term was expected to be negative, as some forest is preferred to no forest—or endless forest. Finally, mindful of the Carlino and Saiz (2008) argument that migrants are drawn by the same qualities as visitors, we included the share of employment in hotels and restaurants. Population density was included as a control measure. More densely settled areas are likely attractive for their higher level of services, but density entails more than amenities. Rural jobs have also been tending to concentrate in more thickly settled areas and density itself suggests a relative shortage of land and higher housing prices (Carruthers and Viaz, 2005).

In an ordinary least squares (OLS) regression, the above measures explain a considerable 55% of the variance in the housing value residual (Table 1). As expected, the coefficient for the quadratic forestland term is negative: people like forest but not pervasive forest. While density and hotel/restaurant employment are both relevant in this analysis, the results are driven largely by the landscape and climate measures, which alone have an R^2(adj.) $= 0.51$ in a regression of the housing value residual. As noted

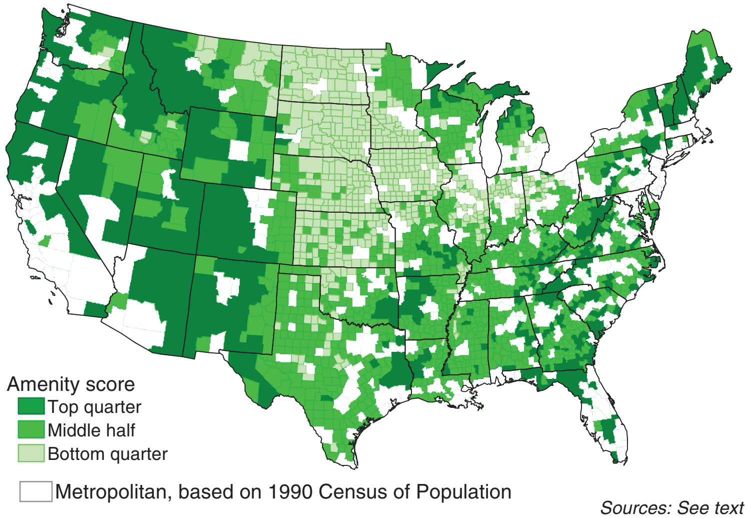

Figure 2. Map of rural counties ranked by outdoor amenities.

above, the coefficients for all but the density measure were used to weight the items in constructing the outdoor amenities scale.

Several considerations support the use of the resulting scale to reflect differences in the attractiveness of rural areas. First, outdoor amenities scale has a strong correlation of $r = 0.72$ with the housing value residual. Second, the scale does not appear to anticipate (be endogenous to) future growth in housing values: the scale's partial correlation with the 2000 median value of housing is only $r = 0.12$ when controlling for the corresponding 1990 value. At the same time, the scale's partial correlation with the 2000 residual housing value is $r = 0.40$ when controlling for the 1990 residual, suggesting that outdoor amenity values were not fully incorporated in housing values in 1990. The substantial correlation of the scale with the natural log of 1990–2000 population change ($r = 0.53$) supports this conjecture. Finally, the scale has a correlation of $r = 0.81$ with the often used 'natural amenity scale' (McGranahan, 1999). If we add forest and its square, neither of which are included in the natural amenity scale, the multiple r with the present study's outdoor amenity scale is $r = 0.96$. Despite different item weights (and a different construction of the topography measure), the principle difference between the scales is the inclusion of the forest items in the outdoor amenity scale.

Counties scoring in the lowest quarter in outdoor amenities are concentrated in the Great Plains in the middle of the USA, but extend east to include the 'corn belt' across Iowa, Illinois and Indiana (Figure 2). Heavily agricultural, these counties average 4% forestland, compared with 41% forestland in counties in the middle half of the amenity vector and 64% in the top quarter. High-amenity counties tend to be associated with mountain chains or the coast.

3.3 Basic results

Table 2 presents variable means both for urban and rural counties and, among rural counties, for the three outdoor-amenity tiers. Statistics on education completed are

Table 2. Variables means by urban–rural and rural outdoor amenity rank classifications

County measures	Urban[a]	Rural	*r*	Rural outdoor amenity tier: Bottom quarter	Middle half	Top quarter	*r*
Outdoor amenity scale (*Z*-score)[b]	−0.18	0.00	0.08	−1.20	−0.04	1.27	0.88
Creative class, 1990 (%)	19.0	12.6	0.56	11.9	12.0	14.5	0.32
Education completed, age 25–64 years (%)							
HS diploma	80.5	75.3	0.23	82.8	71.5	75.3	0.45
BA/BS degree	19.7	13.2	0.41	14.3	11.9	14.8	0.25
Entrepreneurial context, 1990							
Estabs (/1000 jobs)	7.8	11.8	0.33	13.7	10.8	11.7	0.21
Self-employment jobs (%)	17.0	20.8	0.24	22.6	20.0	20.8	0.16
Change 1990–2000							
Startups (/100 1990 jobs)	8.0	11.2	0.18	10.8	10.1	13.7	0.18
Estabs (/1000 1990 jobs)	20.1	16.4	0.04	6.1	12.0	34.6	0.27
Jobs (%)	28.3	19.2	0.15	11.7	18.0	26.6	0.29
Creative class (/100 1990 empl'd)	8.4	4.7	0.31	3.5	4.2	7.1	0.33
N	804	2247		561	1125	561	

[a]Urban counties are those classified as metropolitan by the US Bureau of the Census in 1993, based on 1990 Census of Population. These include counties with urbanized areas of at least 50,000 residents and surrounding counties with both significant commuting to central counties and urban character. All other counties are rural.
[b]Standardized based on rural mean and standard deviation.

included, given the close association between education and creative class (Glaeser, 2005; Boschma et al., 2009). An urban–rural comparison makes clear the urban focus of the US economy. The mean creative class share of 1990 occupations was half-again as large in urban counties compared with rural counties and the simple urban–rural dichotomy had an $r = 0.56$ with creative class share. Urban education levels are also higher, although the smaller correlations indicate a less stark dichotomy. Compared with urban counties, rural counties tend to have more entrepreneurial contexts as defined here, in part owing to establishment size constraints stemming from the smaller sizes of rural consumer and labor markets. Despite a higher rate of rural start-ups in the 1990s, however, rural areas had lower gains in numbers of establishments, jobs and, especially, creative class. At the same time, the *r*'s for the growth measures are relatively low, indicating considerable county variation not accounted for by the rural–urban dichotomy.

Differences in the creative class share and entrepreneurial context across the three amenity tiers are considerably smaller than the rural–urban differences in these measures and provide little evidence that either were related to the relatively rapid growth in higher amenity counties. Creative class shares are somewhat higher in the high-amenity counties than in the two lower amenity tiers, but mean shares for low- and middle-amenity counties are virtually the same. Part of the explanation may be the relatively high educational levels in the low-amenity counties. Many of these counties are in the Upper Midwest, historically a region with relatively strong beliefs in schooling. Their highly educated workforces appear to have engendered a more creative class–heavy occupational structure than might be expected on the basis of amenities, blunting the creative class–amenities relationship. Thus, the correlation between

Table 3. Rural correlations with creative class, 1990, by outdoor amenity tier

		Outdoor amenity level		
Measures[a]	Total	Bottom quarter	Middle half	Top quarter
Density	0.22	0.53	0.26	0.09
Estabs/emp	−0.11	−0.49	−0.14	0.24
Self-emp	−0.04	−0.33	−0.10	0.26
College attendance pop	0.50	0.57	0.54	0.43
Educ BA/BS+	0.75	0.51	0.76	0.86
Educ HS+	0.46	0.30	0.55	0.72

[a]For a description of measures, see Table A1.

outdoor amenities and creative class share is $r = 0.35$, but the partial correlation, controlling for the table's two education measures, is substantially higher, $r_p = 0.43$. Means for both establishments per job and self-employment indicate that the low-amenity counties rather than high-amenity counties tended to have slightly more entrepreneurial contexts in 1990. Although small *r*'s indicate considerable variation within amenity tiers, mean rates of growth in jobs, creative class numbers and, especially, number of establishments rose sharply across these tiers. If these differential growth rates were related to creative class and entrepreneurial context, it is not apparent from means presented in Table 2.

Our thesis, however, is that it is the creative class and entrepreneurial context in combination that have a relationship with economic growth and that this combination is found more often in high-amenity areas. Correlations presented in Table 3 tend to support this thesis. Where outdoor amenities are scarce, the creative class tended to be concentrated in more thickly settled counties and counties with larger business establishments and little self-employment—one example being college towns. In contrast, the creative class in the high amenities areas had no tendency to concentrate in thickly settled counties and its location was positively associated with smaller businesses and more self-employment. While less associated with college student populations than the creative class in low-amenity areas, the creative class in high-amenity areas was much more associated with high educational attainment in the working age population. To give these findings concreteness, high-amenity counties comprised two-thirds of the 117 counties that were in the top quarter in both creative class and self-employment, while low-amenity counties comprised less than a tenth. Florida's (2002) conceptualization of the creative class as highly talented, entrepreneurial and drawn to locations offering an active life-style seems apt in rural counties rich in outdoor amenities, but this conceptualization does not extend to the low-amenity counties, where the creative class is in the less entrepreneurial contexts and is less associated with educational attainment.

We now turn to the bearing that entrepreneurial context, creative class and, particularly, their combination had on rural county growth in the 1990s. We examine these relationships both generally and as they varied across levels of outdoor local amenities. The analysis focuses on self-employment as a measure of entrepreneurial context as the results for the ratio of establishments to jobs were largely similar. Both measures are fully treated in the extensive analysis presented in Section 4.

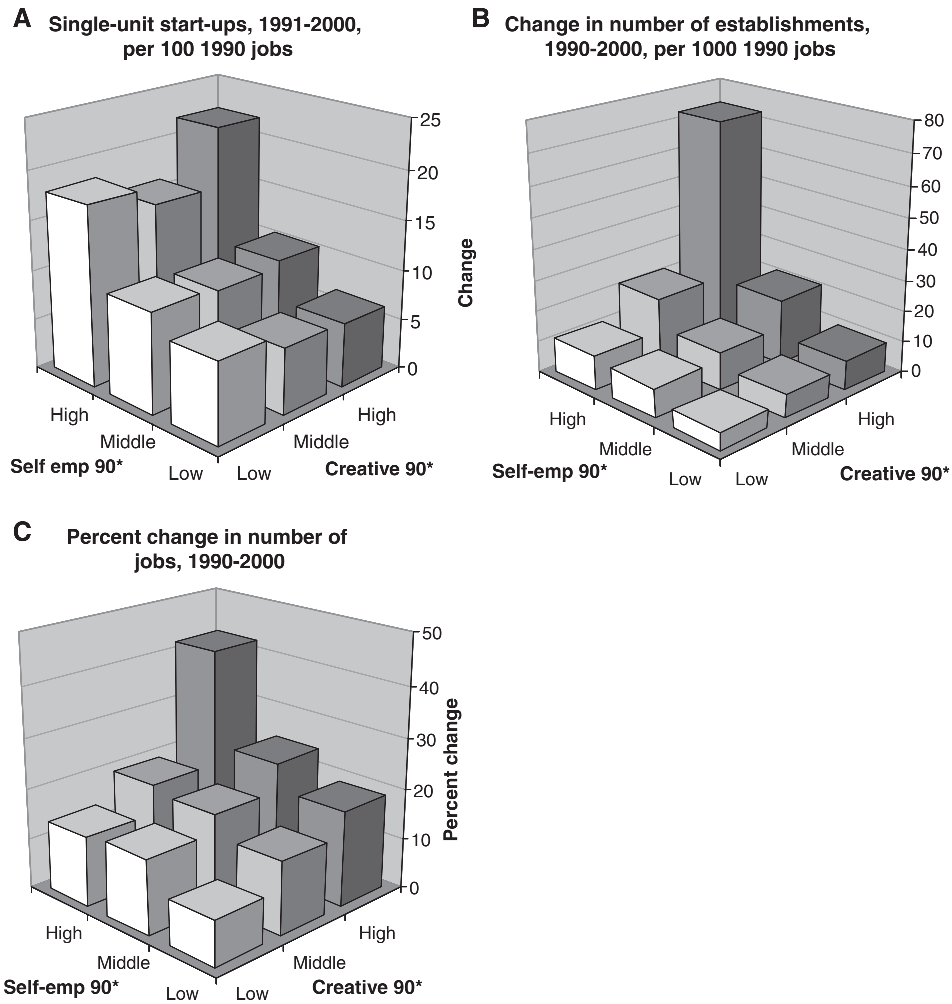

Figure 3. Average start-ups and changes in numbers of establishments and jobs in 1990s, by 1990 self employment rate and creative class share. Asterisk indicates self-employment and creative class share are both divided into top quarter (high), middle half, and bottom quarter (low). See Table A1 for sources.

Figure 3 charts the relationships of self-employment and creative class to the three growth measures for the rural sample as a whole. For single-unit start-ups (Figure 3A), the entrepreneurial context is the dominant factor. The simple correlation between self-employment (Self-emp90) and business start-ups is $r = 0.68$. The relationship is even stronger using the establishments/jobs ratio to reflect the entrepreneurial context ($r = 0.87$). These strong correlations support the validity of the two measures of this concept.

But, while more entrepreneurial contexts may generate more business start-ups, they do not necessarily generate greater gains in number of establishments (Figure 3B). Low levels of creative class were associated with little gain in establishments no matter how entrepreneurial the county setting. At the same time, where self-employment was low, counties had little net gain in establishments, whether creative class was low or high. It is only to the extent that self-employment and creative class were found together that counties had substantial gains in their number of business establishments.

The graph of change in jobs (Figure 3C) resembles the graph of establishment change, but with less contrast across categories. In particular, the spike for counties high in both creative class and self-employment is less pronounced, suggesting that growth through the proliferation of establishments was more typical in these counties than elsewhere. At low levels of self-employment, creative class was associated with job growth even though, as we saw above, it was not associated with establishment change. One possible explanation is that businesses in communities with high shares of creative class are—whatever the local entrepreneurial context—generally more competitive, having adopted more advanced technologies, developed more differentiated products and/or specialized in more competitive, capital-intensive industries. Nevertheless, the fastest job growth tended to be in the counties high in both creative class and self-employment.

Do these relationships of creative class and entrepreneurial context to growth hold across outdoor amenity strata? While new enterprise formation was associated with both measures of entrepreneurial context across the three strata, the synergistic effects of creative class and entrepreneurial context on gains in establishments and jobs were highly contingent on the level of local amenities. Figure 4 illustrates the differences for the gain in jobs; similar but stronger differences were found for the gain in business establishments. There is little evidence that self-employment rates and creative class were associated with job growth in low-amenity areas (Figure 4A). We noted earlier that few of the low-amenity counties are high in both creative class and entrepreneurial context. To the extent that these counties do gain jobs, it is not through creative class/entrepreneurial context synergy, but some other mechanism, such as attracting outside employers or expanding health services. The chart actually indicates that more entrepreneurial settings were associated with less job gain in this group of counties. Although somewhat weaker, the pattern of relationships for the middle-amenity counties (Figure 4B) resembles that of all rural counties. Very strong effects are apparent in the high-amenity counties (Figure 4C).

The analysis in this section has shown that rural creative class location was not limited to entrepreneurial, high-amenity counties in 1990, but its presence in such counties in 1990 was associated with unusually strong subsequent local growth in the numbers of local establishments and jobs over the ensuing decade. Although differences were less pronounced, the co-location of creative class and entrepreneurial context was also associated with growth in the middle-amenity counties. In the next section we consider whether these relationships might be spurious, with creative class and entrepreneurship being a reflection of industry structure, for instance, and favorable industry structure being the source of growth.

4. Extended analysis

In formulating our more extensive analysis of growth, we considered a number of additional factors that might have contributed to rural growth during the 1990s, some of which might be considered as representing competing explanations. These are described in the next section. Table A1 contains measure descriptions and data sources for the

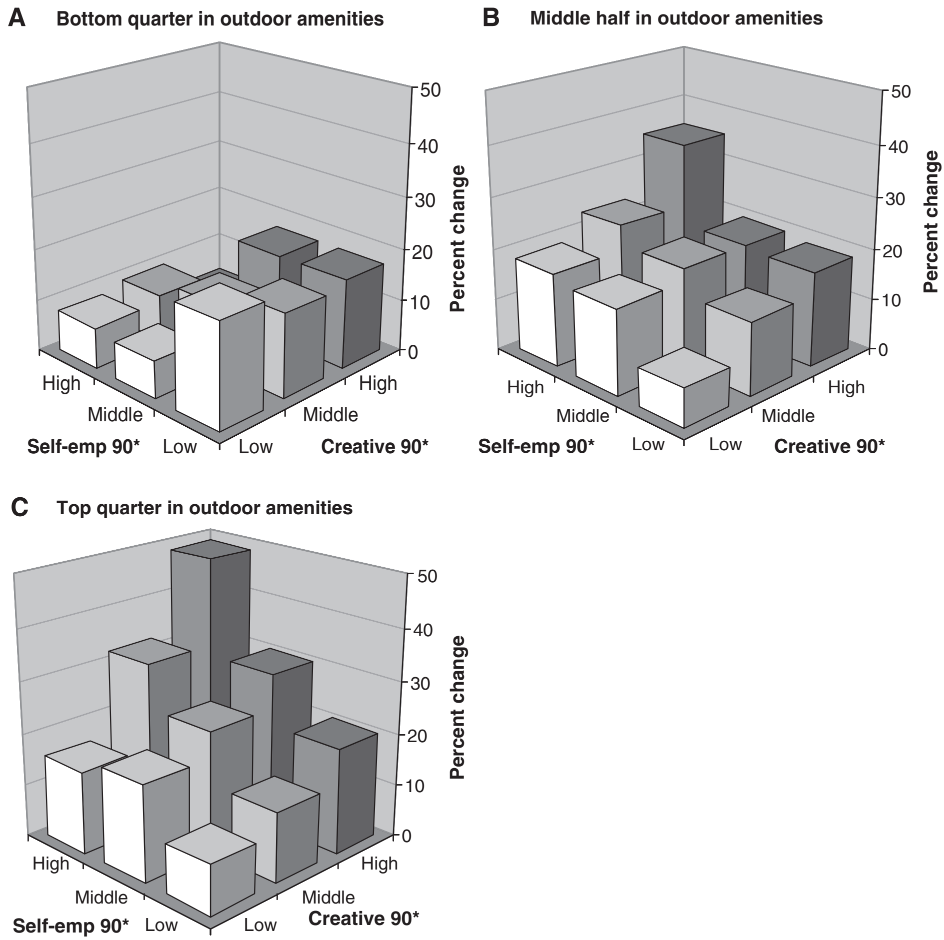

Figure 4. Average change in numbers of jobs in 1990s, by 1990 self employment rate and creative class share, for three levels of outdoor amenities. Asterisk indicates self-employment and creative class share are both divided into top quarter (high), middle half, and bottom quarter (low). See Table A1 for sources.

independent variables. We take into account spatial spillovers both through our choice of measures and spatial econometrics. The latter is described in Section 4.2, which is followed by a description of the econometric model. All of the dependent measures—business start-ups, change in the number of establishments and change in jobs—are transformed into their natural logs for this analysis. In the final section, we report results for both the overall set of rural counties and within the three amenity tiers of counties.

4.1 Additional independent variables

Economic base is measured by the five categories of industry employment. Given trends in the larger economy, we expected counties dependent on resource-based industries (farming and mining) and manufacturing, particularly nondurable manufacturing, would have slower growth while specialization in producer services (business services, finance and professional services) and tourism (accommodations and eating places) would be associated with higher growth.

Labor market supply and demand was expected to be equilibrating. Other things being equal, relatively high proportions of working age population with secondary and college degrees, low employment rates and high proportions of the population aged 8–17 years (who would enter the labor market over the next decade) were expected to be associated with subsequent growth, while high household incomes were expected, as a reflection of local wages, to inhibit growth.

Urban access and spillover, represented by population density and commuting outside the county, was expected to have a positive association with growth, given the continuing advantages of urban proximity (Partridge et al., 2008).

Outdoor amenities attract tourists and new residents. We used both the composite measure developed earlier and the proportion of county land in the public domain, the latter meant to reflect primarily un-built land accessible to the public. The retirement age population was also included here since many of the more attractive rural areas have become retirement destinations and retirees may attract other retirees.

States may have a number of laws and programs affecting growth directly or indirectly, including income and sales tax policies, right to work statutes inhibiting unionization, and direct subsidies to large employers seeking to locate plants, warehouses and other activities in the region. We included state dummy variables to represent these and other possible state-level effects.

Minority populations in rural areas remain disadvantaged, although many Native American tribal areas were able to develop casinos in the 1990s. The analysis includes proportions of Blacks, Hispanics and Native Americans in the population with the general expectation that they are associated with less growth.

Institutions can play a major role in rural county employment. We used military services employment to reflect the influence of military bases, which tended to shrink in the 1990s. While few major research universities are in rural counties, many smaller universities and colleges have rural addresses. Whether the creative class involved in these institutions is active in the local economy or not, these institutions may influence local growth through the provision of graduates as skilled labor, at least to the extent that graduates tend to remain in the area. We measured potential influence by the proportion of the population aged 18–64 enrolled in post-secondary school.

Finally, *prior decade growth* in establishments, jobs and population were added to the analysis. One reason is to see to what extent growth is sustained, whether, for instance, earlier establishment growth led to employment growth in the 1990s as Fritsch and Mueller's (2004) research on growth lags would suggest. A second purpose is to reduce problems of endogeneity. While our model is that creative class presence, particularly in entrepreneurial, high-amenity settings, induces growth, it is possible that relationships are endogenous, that growth attracts an entrepreneurial creative class. Putting in lagged growth results in very conservative estimates of creative class influence, given that prior growth may itself have been induced by creative class presence.

4.2 Spatial econometric considerations

Most studies incorporating spatial dependence in economic growth analyses use a spatial process model due to Whittle (1954) in which an endogenous variable specifies interactions between spatial units plus a disturbance term. Anselin and Florax (1995) term this model a spatial autoregressive (SAR) lag model. The SAR model with autoregressive (AR) disturbance of order (1,1) (SARAR) (Anselin and Florax, 1995) contains a spatially lagged endogenous variable (Wy) and spatial autoregressive disturbances; $y = \rho Wy + X\beta + \varepsilon$, $\varepsilon = \lambda W\varepsilon + u$, u is independently and identically distributed with mean zero and covariance Ω, and W is a matrix defining relationships between spatial units. The reduced form of the SARAR(1,1) is $y = (I - \rho W)^{-1}X\beta + (I - \rho W)^{-1}(I - \lambda W)^{-1}u$. The inverted matrices relay feedback/feed-forward effects of shocks between locations, thereby distinguishing this class of models from other econometric models. When the weights are contiguity matrices or clusters of observations bounded by some metric, local shocks are transmitted to all other locations, with the intensity of the shocks decaying over space.

We hypothesize that new enterprise formation and growth in the number of business establishments and jobs is endogenously determined by growth in neighboring counties. A county with a given change in employment or business establishment growth (y_i) may be surrounded by other counties with similar growth rates, e.g. $\sum_j w_{ij} y_j$. Feedback between spatial units may be significant; meaning that growth in one county is dependent on or explained by growth in surrounding counties. Significant interaction suggests information spillovers, thick labor markets or forward–backward economic linkages across space (Anselin, 2002; Moreno et al., 2004).

We model this hypothetical situation by constructing a matrix (W) identified by the population interaction potential between counties, discounted by the border in common between counties, and the physical distance between them. The ijth element of W is, $w_{ij} = b_{ij}(POP_i.^{1990} POP_j^{1990})/D_{ij}$, with POP_i being the total 1990 population in county i, b_{ij} the percent of county i's border that is in common with its jth neighbor and D_{ij} the road distance (in miles) between county seats i and j. The interaction between this matrix and the growth proxies measures the feedback effects in economic growth in terms of the market potential between counties (cf. Harris, 1954; see also Fujita et al. (1999), Schabenberger and Pierce (2002) and Fingleton (2008) for similar 'gravity' weighting constructs). We render the spatial weights scale-neutral by row-standardizing W (Anselin, 1988). Partialling out growth effects attributable to neighboring counties provides a more accurate measure of the systematic relationship between entrepreneurs, the creative class and the direct effects these variables have on local economic growth.

4.3 Econometric model

The model we estimate is

$$y_i = \rho \sum_j^n w_{ij} y_j + \sum_g \sum_k \beta_k^g d_i^g x_{ik} + \alpha^s + \varepsilon_i, \quad (3)$$

where y_i is one of the economic growth measures; β^g a k-dimensional vector of reduced form parameters corresponding with counties in one of six groups (g): nonmetropolitan counties in the bottom, middle or high amenity resource groups, and metropolitan counties in the bottom, middle or high amenity resource groups; $d^g = 1$ if a county is in one of the six groups (zero, otherwise); X is a matrix of exogenous local attributes; α are state fixed effects; and ε a disturbance term that may be correlated with its neighbors.

This design matrix belongs to the broad class of spatial regime models (Anselin, 1988). Slopes and intercepts are allowed to vary across each regime (metropolitan or nonmetropolitan corresponding to bottom, middle or high outdoor amenity strata). The specification relaxes the assumption that the levels and rates of the local factors explaining growth are homogeneous in metro and nonmetropolitan counties, and across the bottom, middle and high amenity counties.

Assuming growth in one county has no bearing on growth in neighboring counties; OLS could be used to estimate each amenity level group in the nonmetropolitan and metropolitan counties separately. However, such an approach would not accommodate growth interaction potential between counties, and potential neighborhood structure between counties. We estimate nonmetropolitan and metropolitan models simultaneously, assuming that growth in metropolitan counties is correlated with growth in nonmetropolitan counties and vice versa. Similar reasoning applies to estimating the amenity groups simultaneously, allowing correlation between neighbors belonging to different groups.

Spatial process models are typically estimated using maximum likelihood or instrumental variable (IV) procedures (Anselin, 1988; Kelejian and Prucha, 1999). An IV approach is used here because we have no reason to believe that the errors generated by our models follow any particular distribution. When $\rho \neq 0$ (i.e. growth in one county influences growth in neighboring counties), the corresponding marginal effects are estimated as $\partial y/\partial x_k = (1-\rho)^{-1}\beta_k$ (Anselin and Lozano-Gracia, 2008). Standard errors are estimated using the delta method.

Spatial error occurs when omitted variables follow a spatial structure such that $\Omega \neq \sigma_{\mathrm{u}}^2 \mathrm{I}$ (Anselin, 1988). Non-spherical errors may be simultaneously caused by heteroskedasticity or autocorrelated error processes, and are usually linked to heterogeneity associated with cross-sectional spatial units (Kelejian and Prucha, 2008). We relax the parametric and structural assumptions about the error process, and use a non-parametric approach to estimate a spatial heteroskedastic-spatial autocorrelation robust (spatial HAC) covariance matrices (Conley, 1999; Kelejian and Prucha, 2008). Recent empirical applications have used similar nonparametric approaches toward estimating the SAR(1) covariance terms (e.g. Pinkse et al., 2002; Lambert et al., 2007, 2009; Anselin and Lozano-Gracia, 2008). We use the Epanechnikov kernel as the spatial decay function in the covariance function, with a kernel bandwidth of $n^{1/3}$ (see Conley, 1999). Among other admissible kernel functions (see Kelejian and Prucha (2008) for details), the Epanechnikov function performs consistently well with respect to minimizing the asymptotic integrated mean squared error (Mittelhammer et al., 2002).

4.4 Results

Regression results for all rural counties indicate that the creative class/entrepreneurial context relationships shown above in Figure 3 were not spurious (Table 4). Creative class, entrepreneurial context and their interaction terms are all positively related to the growth for all three dependent measures. The strongest interaction coefficients are in the ΔEstabs90s equations, suggesting that the formation of successful new enterprises was a principal means through which the creative class/entrepreneurial synergy led to growth. We highlight only some of the other results.

Three additional county attributes are consistently related to growth: commuting outside the county, outdoor amenities and population change in the prior decade. Together, these results suggest that migration was a primary driver of rural growth in the 1990s, both through ex-urbanization and movement to scenic areas. The other consistency across growth equations, however, is a negative effect of Blacks as a proportion of the population, which does not augur well for areas with substantial Black populations.

Greater concentrations in farming, lower density and lower employment rates were all associated with greater rates of start-ups but, if anything, lower gains in jobs. There appear to be situations in the USA, as in England, where entrepreneurship is less an answer to economic stagnation than a symptom.

Labor market attributes had surprisingly little role in rural economic growth. Educational attainment, generally a strong predictor of urban growth (Glaeser, 2005), has little net effect here even controlling for income. Counties where high school completion rates are high may have had greater net gain in establishments (one coefficient is significant and the other nearly so), but this did not carry over to greater gains in jobs. The only measure substantially related to jobs is a negative effect of household income. The effect is not apparent for business start-ups or net change in establishments, suggesting that it is larger employers that most eschew high-income areas.

Prior growth in establishments led to greater gain in jobs during the 1990s, an indication that entrepreneurship can drive rural growth. Evidence is weaker that employment growth is sustained through new enterprise formation.

In Table 5, we present extracts of the analyses distinguishing effects across the three outdoor amenity tiers. Among the low-amenity counties, there is an indication that, despite the dearth of counties high in both attributes, the creative class/entrepreneurial context combination has some bearing on change in establishments. The interaction term coefficients are not significant, but are roughly the same size as the statistically significant coefficients found in the middle-amenity tier analysis (this tier includes twice as many counties as the other tiers). Nevertheless, consistent with Figure 4A, creative class, entrepreneurial context and their combination have no apparent bearing on change in jobs. Also notable is that change in establishments in the 1980s had no net effect on job growth in the 1990s (their 0-order correlation is only $r = 0.05$). With an $R^2 = 0.29$, our model is relatively ineffective in explaining differences in the rate of job growth across low-amenity counties. The 1990s were a period of rural prison construction, new large meat processing plants and Native American casino construction. These activities, which tend to be absentee owned or managed, may have accounted for much of the variation in job growth in low amenity areas.

Among counties mid-range in outdoor amenities, the regression results are consistent with a creative class/entrepreneurial context synergy, though not as definitively as suggested by the earlier graphical analysis (Figure 4B). Growth in establishments was greater the higher the level of creative class, the greater the entrepreneurial context, and much greater in counties combining these two attributes. For job growth, however, this pattern is weaker. Although only significant at the $P < 0.10$ level, the middle-range outdoor-amenity counties, unlike the bottom quarter, do show an association of previous change in establishments with 1990s job growth (their 0-order correlation is $r = 0.30$).

Table 4. Regressions of growth on creative class, entrepreneurial context, their interaction and other county characteristics for all rural counties

	Start-ups90s				ΔEstabs90s				ΔJobs90s			
	S^a		E^b		E^b		S^a		S^a		E^b	
Dependent variables	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)
Creative and entrepreneurial												
Creative90s	**0.089**	**0.0213**	**0.061**	**0.0048**	**0.177**	**0.0087**	0.153	0.0501	**0.131**	**0.0087**	**0.147**	**0.0033**
Entre context	**0.432**	**<0.0001**	**0.874**	**<0.0001**	**0.286**	**<0.0001**	**0.372**	**0.0007**	**0.216**	**<0.0001**	0.050	0.3225
Creative × Context	**0.040**	**0.0021**	**0.022**	**0.0061**	**0.246**	**0.0013**	**0.306**	**0.0003**	**0.064**	**0.0013**	**0.055**	**0.0142**
Industry												
Farm	**0.161**	**0.0007**	**0.073**	**0.0031**	0.044	0.5871	**0.163**	**0.0089**	**−0.112**	**0.0154**	-0.068	0.1993
Mining	**−0.104**	**0.0019**	−0.027	0.0551	**−0.114**	**0.0044**	−0.051	0.1612	**−0.251**	**<0.0001**	**−0.240**	**<0.0001**
Mfg Dur	**−0.165**	**<0.0001**	0.012	0.3420	−0.060	0.0925	0.037	0.2662	**−0.086**	**0.0063**	**−0.083**	**0.0165**
Mfg Nondur	**−0.177**	**<0.0001**	0.005	0.7364	−0.003	0.9349	0.071	0.0971	**−0.153**	**0.0001**	**−0.157**	**<0.0001**
Prod Serv	−0.024	0.2670	−0.007	0.5193	−0.037	0.4937	0.002	0.9744	−0.038	0.1550	−0.031	0.2791
Tourism	−0.042	0.0862	−0.017	0.2175	−0.061	0.4114	−0.009	0.8608	0.029	0.3555	0.032	0.3132
Labor market												
Educ HS+	0.021	0.5740	0.016	0.5119	0.129	0.1016	**0.137**	**0.0363**	0.012	0.8149	0.024	0.6485
Educ BA/BS+	0.016	0.6654	0.035	0.1068	0.019	0.8382	0.095	0.2421	−0.063	0.1513	−0.019	0.6617
Emp rate	**−0.125**	**0.0003**	**−0.064**	**0.0040**	−0.092	0.1365	−0.101	0.0717	0.083	0.0614	0.063	0.1688
Median Inc	−0.026	0.4955	−0.045	0.0942	−0.019	0.7847	−0.029	0.6218	**−0.133**	**0.0038**	**−0.162**	**0.0005**
Pop 8–17	0.046	0.2062	0.029	0.1502	0.054	0.5038	0.040	0.5422	0.038	0.3308	0.040	0.3004
Urban influence												
Density	**−0.280**	**<0.0001**	−0.034	0.1297	−0.085	0.3427	0.057	0.3925	**0.155**	**0.0010**	**0.138**	**0.0042**
Commuting	**0.190**	**<0.0001**	**0.143**	**<0.0001**	**0.142**	**0.0037**	**0.174**	**<0.0001**	**0.080**	**0.0099**	**0.162**	**<0.0001**
Local amenities												
Outdoor Amen	**0.211**	**<0.0001**	**0.167**	**<0.0001**	**0.214**	**0.0001**	**0.191**	**0.0004**	**0.139**	**0.0037**	**0.136**	**0.0030**
Pub land	0.031	0.1330	0.014	0.3045	0.053	0.2832	0.050	0.2468	−0.002	0.9462	−0.001	0.9835
Pop 62+	−0.008	0.8004	**−0.048**	**0.0061**	−0.117	0.2452	−0.132	0.1079	**−0.099**	**0.0127**	−0.064	0.0907
Demography												
Black	**−0.068**	**0.0075**	**−0.111**	**<0.0001**	−0.081	0.0796	**−0.080**	**0.0449**	**−0.161**	**<0.0001**	**−0.212**	**<0.0001**
NativeAm	**−0.045**	**0.0244**	−0.028	0.1028	−0.075	0.1132	−0.048	0.2549	0.053	0.0515	0.037	0.1720
Hispanic	−0.011	0.6312	**−0.063**	**<0.0001**	−0.042	0.2973	−0.071	0.0609	0.009	0.8045	−0.025	0.4734
Institutions												
Military	**0.050**	**0.0006**	0.002	0.8232	0.007	0.7523	−0.038	0.0626	**−0.092**	**0.0001**	**−0.106**	**<0.0001**
CollegePop	−0.023	0.4202	**−0.041**	**0.0051**	−0.025	0.7546	−0.089	0.1643	0.023	0.4796	−0.025	0.4233
Change 1980–1990												
ΔEstabs80s	0.050	0.1412	−0.021	0.3548	−0.09	0.1855	−0.098	0.1655	**0.075**	**0.0130**	**0.088**	**0.0082**
ΔJobs80s	**−0.080**	**0.0348**	**0.072**	**<0.0001**	0.0808	0.1168	**0.136**	**0.0190**	−0.008	0.8375	0.012	0.7595
ΔPop80s	**0.135**	**<0.0001**	**0.135**	**<0.0001**	**0.221**	**0.0040**	**0.244**	**0.0005**	**0.323**	**<0.0001**	**0.339**	**<0.0001**
Rho	**0.048**	**0.0447**	**0.029**	**0.0382**	0.211	0.0761	0.170	0.0644	0.043	0.2187	0.042	0.2437
Constant	−0.083	0.7889	0.170	0.2954	−0.250	0.7281	−0.029	0.9575	0.092	0.8045	0.130	0.7343
R^{2c}		0.76		0.90		0.44		0.47		0.48		0.46

All models include state fixed effects. $N = 3043$, $k = 104$. Coefficients significant at the 5% are in bold.

[a]Equations with Self-emp as the measure of entrepreneurial context.

[b]Equations with Estabs/emp as the measure of entrepreneurial context.

[c]Because spatial regimes were estimated simultaneously with metropolitan counties, separate R^2 were not available for the nonmetropolitan counties. These are R^2 estimated prior to adding spatial analysis.

Table 5. Extracts from regressions of growth measures on creative class, entrepreneurial context, their interaction, and other county measures

	Start-ups90s				ΔEstabs90s				ΔJobs90s			
	S^a		E^b		S^a		E^b		S^a		E^b	
Amenity rank and dependent variables	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)	β	Prob(|t|)
A. Bottom quarter												
Creative90	0.074	0.3050	0.093	0.0718	0.158	0.2824	0.128	0.2888	0.021	0.7997	0.028	0.7409
Entre context	**0.337**	**<0.0001**	**0.811**	**<0.0001**	−0.030	0.8210	−0.094	0.3834	0.057	0.3403	−0.017	0.7919
Creative × Context	0.013	0.7476	−0.023	0.3379	0.101	0.3062	0.122	0.0816	−0.018	0.6596	−0.024	0.5956
Change 1980–1990												
ΔEstabs80s	−0.011	0.8613	−0.020	0.7275	−0.153	0.2599	−0.020	0.7275	0.020	0.5913	0.016	0.6715
ΔJobs80s	**−0.141**	**0.0153**	**0.079**	**0.0356**	0.058	0.392	**0.079**	**0.0356**	0.017	0.8085	0.024	0.7315
ΔPop80s	**0.166**	**0.0214**	**0.129**	**0.0098**	**0.457**	**0.0034**	**0.129**	**0.0098**	**0.291**	**0.0013**	**0.296**	**0.0015**
R^{2c}	0.79		0.90		0.22		0.23		0.29		0.29	
B. Middle half												
Creative90	0.096	0.0586	**0.065**	**0.0201**	**0.197**	**0.0198**	**0.204**	**0.0123**	0.135	0.0512	**0.152**	**0.039**
Entre context	**0.407**	**<0.0001**	0.910	<0.0001	**0.157**	**0.0061**	**0.254**	**0.0005**	**0.258**	**<0.0001**	0.089	0.2745
Creative × Context	0.007	0.6578	0.0055	0.6987	**0.116**	**0.0001**	**0.109**	**0.0073**	**0.071**	**0.0415**	0.037	0.3266
Change 1980–1990												
ΔEstabs80s	0.052	0.3272	**−0.045**	**0.0319**	**−0.171**	**0.0227**	**−0.173**	**0.0221**	0.084	0.0714	0.088	0.0722
ΔJobs80s	−0.091	0.098	**0.079**	**0.0001**	0.061	0.2065	**0.097**	**0.0447**	−0.021	0.7064	0.002	0.9724
ΔPop80s	**0.113**	**0.0147**	**0.150**	**<0.0001**	**0.263**	**0.0002**	**0.285**	**<0.0001**	**0.352**	**<0.0001**	**0.382**	**<0.0001**
R^{2c}	0.73		0.89		0.33		0.33		0.40		0.38	
C. Top quarter												
Creative90	0.091	0.1842	0.04	0.2915	0.026	0.9032	−0.049	0.7809	0.1934	0.0978	0.216	0.0595
Entre context	**0.491**	**<0.0001**	**0.846**	**<0.0001**	**0.557**	**0.0038**	**0.659**	**0.0003**	**0.303**	**0.0018**	−0.112	0.3902
Creative × Context	0.035	0.0873	**0.039**	**0.0268**	**0.243**	**0.0012**	**0.385**	**0.0003**	**0.088**	**0.0118**	**0.112**	**0.0146**
Change 1980–1990												
ΔEstabs80s	**0.113**	**0.0116**	0.008	0.7715	0.089	0.4593	−0.082	0.5158	0.12	0.0643	**0.197**	**0.0032**
ΔJobs80s	−0.067	0.2281	**0.06**	**0.0094**	0.116	0.3349	**0.278**	**0.0296**	−0.008	0.907	0.006	0.9328
ΔPop80s	**0.125**	**0.0095**	**0.12**	**<0.0001**	0.04	0.797	0.104	0.4735	**0.237**	**0.002**	**0.258**	**0.0011**
R^{2c}	0.80		0.92		0.52		0.59		0.57		0.56	

All models include state fixed effects. $N = 3043$; $k = 216$. Coefficients significant at the 5% level are in bold.

[a] Equations with Self-emp as the measure of entrepreneurial context.

[b] Equations with Estabs/emp as the measure of entrepreneurial context.

[c] Because spatial regimes were estimated simultaneously with metropolitan counties, separate R^2 were not available for the nonmetropolitan counties. These are nonmetropolitan R^2 estimated prior to spatial analysis.

The creative class/entrepreneurial context synergy appears to play a major role in the counties high in outdoor amenities. For all of the growth measures, Creative90, Selfemp and their interaction are all highly significant and the results are about as strong when Estabs/emp is used as the measure of entrepreneurial context. In general, our analysis is much more effective in accounting for growth in the top-quarter amenity counties than in the other tiers. One reason is that the creative class/entrepreneurial context combination is most effective in this tier of counties. With self-employment as the measure of entrepreneurial context, these measures alone have an $R^2 = 0.38$ with establishment growth and an $R^2 = 0.32$ with jobs change, which exceeds half of the R^2s explained by the full model.

Some findings from the analyses of all rural counties also hold up across amenity groups. Measures of entrepreneurial context, particularly Estabs/emp, are everywhere strongly related to Start-ups. Population change in the previous decade was consistently related to 1990s growth at all three levels of amenities. Another consistency (not shown) was the employment rate's negative association with start-ups and net change in establishments, but lack of association with change in jobs. Entrepreneurship appears to be moderated in tight labor markets.

5. Conclusion

Drawing on recent urban growth theory, we developed a contingent model of nonmetropolitan county growth based on outdoor amenities, creative class and entrepreneurial context, arguing that these may have had a synergistic effect on US rural (nonmetropolitan) county growth in the 1990s. Creative capital provides the knowledge and ideas required for growth, but the incorporation of these assets into the local economy is contingent on local entrepreneurial context. For understanding growth differences across rural counties in general, the model appears highly relevant. Counties with both higher proportions of creative class and richer entrepreneurial contexts, as measured by either the rate of self-employment or the number establishments per job, tended to have greater gains in establishments and jobs during the 1990s than counties with less of this combination. The relevance of this synergy was not pervasive across rural areas, however, but contingent on the level of local outdoor amenities. It was highly salient in counties ranking high on our outdoor amenity measure, both because of the relatively large proportion of these counties characterized by both high creative class shares and very entrepreneurial contexts and because of the strong relationship with growth, particularly growth in numbers of establishments in these counties. This synergy was largely absent in low-amenity counties, but somewhat evident in the middle-amenity counties.

The analysis suggests the presence of two growth regimes in rural regions. One regime, dominant in areas of high amenities, is based on entrepreneurship and creative class. The second regime, more pronounced where amenities are low, relies on outside employers—often the target of 'smokestack chasing'—and is likely dependent on urban proximity, low-cost labor and natural resource endowments. With few smokestacks to chase, many rural areas appear to be looking to entrepreneurship as an alternative avenue for growth. The results here suggest that this path may be limited where opportunities to attract talented entrepreneurs are few.

However, for the majority of rural areas, the findings suggest a much larger role for the rural outdoors in rural development strategies going forward. Of particular interest is the role that the rural outdoors plays when the amenities are not spectacular. Does the natural capital of a pleasant or quaint rural environment serve as a resource for growth even if it is unlikely to support destination tourism? Our findings suggest that the creative class/entrepreneurial context growth regime is operative in those counties ranking in the middle 50% of our amenity scale, though less dramatic than in high-amenity counties. Rural places pursuing entrepreneurship as a development strategy need to consider the potential contribution of the outdoors as a means to attract the creative class and recharge knowledge. In this light, the 'valorisation of rural amenities' central to the OECD's (2006) 'new rural paradigm' for development takes on the broad function of promoting continuity of rural growth in a knowledge economy.

At the very highest end of our amenity scale, the results for the intermediate amenity counties also confirm a range of options available to spectacular rural places beyond development as compelling tourism destinations. The ability of high-amenity places to attract the creative class as long-term residents combined with rapid innovation in telecommunications make the attraction of 'learned people' a viable substitute to attracting fee-paying tourists. The Methow Valley in Washington's Northern Cascades provides a striking example of these alternatives. Plans for a world-class mega-resort developed by the Aspen Skiing Corporation in the 1970s mobilized a grassroots response that eventually brought the battle to the Supreme Court. The victors in the 25-year 'ski war' included the Methow Valley Citizens' Council and Methow Valley Sports Trails Association, developing 200 kilometers of multi-use trails as an alternative to ski lifts as a means to access the highly valued natural capital of the area. Fiber optic cable resolved the remaining bottleneck to attracting talent, ensuring easy access to teleworkers and some pioneer dot coms despite winter closure of the North Cascades Highway, the most direct overland route to Seattle (Bock 2006).

The analysis leaves a number of questions unanswered. One question is whether the talent and knowledge embodied in the creative class should always be considered a source of job growth. If the creative class is drawn to higher amenity areas, then it seems plausible that the creative class might be associated with effectiveness in limiting growth in order to preserve landscape and other qualities that drew them in the first place. Glaeser and Tobio (2007) suggest that land use regulations have been a major shaper of recent urban regional growth. This seems likely to spread to high-amenity rural areas as well. Indeed, there is some evidence that growth in the highest amenity counties slowed in the first half of the present decade (McGranahan, 2008).

A second question relates to the empirical model. It is not clear whether the extent to which the interaction of entrepreneurial context with creative class represents the degree to which the creative class occupations are also entrepreneurial occupations or, alternatively, it represents a community level phenomenon, a co-location of entrepreneurs or entrepreneurial proclivity and the creative class. Research on transitions to self-employment and entrepreneurship noted earlier suggests that entrepreneurial settings draw the more entrepreneurial members of the creative class, but this is an issue that can be addressed only with more detailed data than are currently available or qualitative studies.

The third question is the dependence of this model on broader economic and technological contexts. The 1990s were a period of broad technological change, economic optimism and growth. Rural as well as urban areas participated in this growth. The spread of broadband during the current decade appears to have facilitated movement out of cities. A 2005 survey in high-amenity Routt County (Colorado) estimated that up to 10% of the households did telework as business owners or employees, with a quarter of these households new to the county since 2000 (Moore and Ford, 2006). But the economy has since become more uncertain and immediate prospects do not suggest an imminent return to 1990s optimism. It is not yet clear whether the creative class and entrepreneurship mix are providing resilience to local economies such as Methow Valley or Routt County, or whether the more certain economic opportunities of urban economic environments have displaced quality-of-life considerations for the relatively mobile creative class.

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Table A1. Variable names, measures and sources

Change, 1990–2000 (Independent variable, measured in natural logs in regression equations)		
Start-ups90s	Single-unit start-ups, 1991–2000/ Priv. sector non-farm jobs, 1990	Bur. of Census, Statistics of U.S. Businesses, special tabs
ΔEstabs90s	Change in no. of establishments, 1990–2000/Private sector non-farm jobs, 1990	Bur. of Census County Business Patterns
ΔJobs90s	Change in no. of jobs/Total jobs 1990	Bureau of Economic Analysis (BEA) Regional Economic Information System (REIS) data files
Change, 1980–1990	Correspond to 1990s measures for establishments and jobs, but 1980s measure of Start-ups unavailable. Change in population (ΔPop80s), calculated as the establishment and job growth variables is included.	
Creative90	Creative class employment/Total employment, 1990	Equal Employment Opportunity Commission (EEOC) special tabs, 1990 Census of Population; see the text for occupations included.
Entrepreneurial context, 1990 (Entre context)		
Self-emp	Ave. non-farm self-employment jobs/Total non-farm jobs, 1988–1990	Bur. of Econ. Anal. Regional Economic Information System data files
Estabs/emp	No. of establishments 1990/ Private sector non-farm jobs, 1990 ($\log_e$)	Bur. of Cens. County Business Patterns files
Industry, 1990 (Other is omitted category)		Cens. of Population, 1990, STF4 data file
Farm	% of employed in farm production	
Mining	% in mining	
Mfg Nondur	% in nondurable manufacturing	
Mfg Dur	% in durable manufacturing	
Prod Serv.	% in business services, finance, etc.	
Visitor	% in accommodation and restaurant industries	
Labor market, 1990		
EducHS+	% of population age 25–64 with secondary school diploma or equivalent	Cens. of Population, 1990, STF4 data file
EducBA/BS+	% of population age 25–64 with 4-year college degree	Cens. of Population, 1990, STF4 data file
		Cens. of Population, 1990, STF3 data file
EmpRate	% of pop. age 16–64 employed	
Median Inc	Median household income ($\log_e$)	
Pop 8–17	% of population age 8–17	
Urban influence, 1990		
Density	Population/land area ($\log_e$)	Cens. of Population, 1990, STF1 data file
Commuting	% of employed working out of county	Cens. of Population, 1990, STF3 data file
Local amenities		
Outdoor amen.	See the text	
Pub land	% of land in public domain	US Forest Service, St. Paul, MN

Pop 62+	% of population age 62 and over	Cens. of Population, 1990, STF3 data file
Demography, 1990		Cens. of Population, 1990, STF3 data file
Black	Black % of population	
Native Am	Native American % of population	
Hispanic	Hispanic % of population	
Institutions, 1990		Census of Population, 1990, STF3 data file
Military	% of population 18–24 in the Armed Forces	
College Pop	% of population 18–64 enrolled in college or university	
Natural amenities (used in housing value analysis)		
Forest	% of land with forest (assessed 1990–1996)	US Forest Service, St. Paul, MN, forest inventory
Water	Log_e of ratio of water area (including lakes, ponds and ocean to 3 mile limit) to total county area (max at 25%), 1990	Economic Research Service, USDA http://www.ers.usda.gov/Data/NaturalAmenities/
Topography	Scale based on 1937 topographic map (see McGranahan, 2008)	
Jan temp	Average January temperature, 1941–1970 (*Z*-score)	Climate measures are on Area Resource Files, 2002, US Department of Health, Bureau of Health Professions. See also, Economic Research Service, USDA http://www.ers.usda.gov/Data/NaturalAmenities/
Jan sun	Average January days with sun, 1941–1970 (*Z*-score)	
Jul hum	Average July humidity, 1941–1990 (*Z*-score)	
Temperate	Negative residual of regression of July temp on Jan temp (*Z*-score)	