Whither the American West? Natural Amenities, Energy and Nonmetropolitan County Growth

Rickman, Dan S. and Wang, Hongbo

16 November 2018

Whither the American West?

Natural Amenities, Energy and Nonmetropolitan County Growth

by

Dan S. Rickman

Oklahoma State University

256 Business College

Stillwater, OK 74078

and

Hongbo Wang

Oklahoma State University

Abstract. The American West has long experienced strong economic growth. The varied economy of the region though has produced a diversity of economic outcomes and trends. In this paper, we assess whether there have been significant relative shifts in economic growth across the nonmetropolitan counties of the region between the periods of 1992-2004 and 2004-2016. We find significant relative downward growth shifts in areas most abundant in natural amenities. Further analysis suggests the downward growth shifts in high amenity counties resulted from the capitalization of the amenities into housing costs, not from diminished quality of life in the counties. Economic growth significantly accelerated in counties where significant oil and gas extractive activity occurred, in which most of the counties were not previously considered as highly dependent on the energy industry. Counties with low levels of natural amenities and an absence of oil and gas resources continued to struggle and are suggested to likely be in need of place-based labor demand policies.

Keywords: Natural amenities; Oil and gas boom; Nonmetropolitan counties

JEL Codes: R11; R12; R23

1. Introduction

With its open spaces, mountains and frontier history the American West has long fascinated both the general public and academics alike. Adding to the interest with the region has been the dramatic shift in economic growth in the nation from the East to the West over the last hundred years (Nash, 2018). Austin et al. (2018) likewise highlight the stronger economic growth in the broader region of the Western Heartland relative to the Eastern Heartland over the past 40 years. The economy of the frontier American West is varied, including farms and ranches, oil, gas and mineral extraction (Felix and Chapman, 2017), manufacturing activity, and activity associated with the natural amenity attractiveness of the region (McGranahan and Beale, 2002). This paper delves into the economic growth of the American West by examining whether there have been recent shifts in economic performance in the nonmetropolitan portions of the eleven contiguous western states. The focus of the analysis is on the potentially changing role of natural amenities and energy development in the states.

Natural amenities have long been associated with strong population and employment growth in the United States (Graves, 1980; McGranahan, 1999; Deller et al., 2001, Rickman and Rickman, 2011). Strong population growth also has been noted in retirement (Green, 2001; Adamy and Overberg, 2018) and recreation-based counties (Beale and Johnson, 1998). But the majority of counties classified as retirement destinations or recreation-based by the Economic Research Service (ERS) of the U.S. Department of Agriculture have been categorized in the top quarter of all counties in terms of natural amenity attractiveness (McGranahan, 1999). Most counties possessing high-levels of natural amenities and strong population growth in recent decades have been in the West (McGranahan, 1999).

Rising incomes and wealth, along with aging of the population fuel amenity-related migration (Graves, 1980; Rappaport, 2007). Rather than migrants responding to regional income differentials, amenity-based migration produces a negative relationship between price-adjusted wages and the presence of natural amenities (Roback, 1982). Rising housing prices have been found to be the primary price response of amenity-based migration (Wu and Gopinath, 2008;

Rickman and Rickman, 2011). But the housing price adjustments and any adverse effects on quality of life that occur from amenity-migration reduce the attractiveness of an area rich in natural amenities, feeding back negatively on growth (McGranahan, 2008; Chen et al., 2009; Rickman and Rickman, 2011). Likewise, rising temperatures, more severe droughts and longer fire seasons may be considered the new normal in the West with climate change (Gustin, 2017), potentially reducing its attractiveness relative to areas elsewhere in the nation.

Many areas in the West also have been affected by the energy cycle in recent decades (Felix and Chapman, 2017). Despite their favorable region of location, counties classified as mining-dependent in the West as a whole lost population during the 1990s (McGranahan and Beale, 2002). After bottoming out at the end of 2003, national employment in the oil and gas sector dramatically increased over the next decade with the advent of horizontal drilling and hydraulic fracturing (Munasib and Rickman, 2015). California, Colorado, Montana, New Mexico, Utah and Wyoming comprised six of the top twelve oil producing states in the nation in 2014 according to the U.S. Energy Information Administration (Hackbarth, 2015). Energy extraction affects regional economies directly through the demand for labor, which can be reflected in changes in employment, earnings and population (Marchand and Weber, 2018). Energy activity can positively spillover to the nonenergy economy through spending multiplier effects, or alternatively possibly crowd out other economic activity through higher input prices or harm to the natural environment (Munasib and Rickman, 2015).

Therefore, we compare growth over the period 2004-2016 with that during 1992-2004 for the nonmetropolitan portions of eleven states in the contiguous West. We focus solely on the West because of both its general natural amenity attractiveness (McGranahan, 1999) and the geographic heterogeneity of labor market effects from the presence of natural amenities (Partridge et al., 2008). The use of these periods smooths over the effects of two national recessions and captures longer term trends. The second period contains both the national oil and gas boom of 2004-2014 and the corresponding bust during 2014-2016. The primary contribution of the paper is that we assess whether growth patterns differed between the two periods across the natural amenity and energy-producing spectrums in the nonmetropolitan West and offer policy recommendations.

Using U.S. Bureau of Economic Analysis aggregate data at the nonmetropolitan county level, we first examine the primary economic indicators of total wage and salary employment, population and per capita income to provide a broad assessment. We then examine the components of personal income to better understand the channels of growth influences. We account for other influences of growth such as manufacturing and farm dependence of the economies and the position of the county along the urban-rural continuum as classified by the U.S. Department of Agriculture's Economic Research Service (ERS). We find that growth slowed in the highest natural amenity counties compared to those in the middle of the natural amenity spectrum and accelerated in oil and gas boom counties. The boost to oil and gas boom economies occurred despite the latter period including the 2014-2016 bust in oil and gas prices. We did not find energy booms in counties to affect the shifts in outcomes of natural amenity attractive counties. The results are robust to empirical model specification, including accounting for spatial autocorrelation in the errors, adding state fixed effects, and controlling for whether the county is classified as a retirement destination or contained a newly designated federal wilderness area during the second period.

We then use the 2012-2016 American Community Survey 5-Year Estimates to assess whether the slowing of growth was attributable to the capitalization of the natural amenities into housing prices or reduced quality of life. Our analysis suggests it was rising housing costs that slowed growth in natural amenity rich counties as quality of life is estimated to be higher the further one moves up the natural amenity spectrum and the differences did not appear to be narrowing. Planners and policy makers should expect continued slower growth in areas with the highest levels of natural amenities and high housing prices and faster growth in areas in the next lower natural amenity tiers. Although the broad region has done well, remote areas in the lowest natural amenity tiers that do not possess developable oil and gas reserves may be candidates for targeted policies to stimulate labor demand along the lines of those suggested by Austin et al. (2018) for the Eastern Heartland.

2. Empirical Approach

We examine whether growth has shifted in nonmetropolitan counties in the eleven contiguous states of the West between the 1992-2004 and 2004-2016 periods.[1] The choice of analysis of the West alone is both because its high natural amenity attractiveness (McGranahan, 1999) and because of the findings of geographic heterogeneity of labor market effects related to natural amenities (Partridge et al., 2008). The use of these periods smooths over the effects of two national recessions and captures longer term trends. The second period contains both the national oil and gas boom of 2004-2014 and the corresponding bust during 2014-2016.

We estimate the following equations for several economic indicators.

$$\%\Delta y_{i,2016\text{-}2004} = \alpha + \boldsymbol{\beta}{*}\mathbf{AMEN}_i + \boldsymbol{\gamma}{*}\mathbf{ENERGY}_i + \psi{*}\mathbf{X}_i + \sigma_{i,2016\text{-}2004}^{s} + e_{i,2016\text{-}2004} \quad (1)$$

$$(\%\Delta y_{2016\text{-}2004,i} - \%\Delta y_{2004\text{-}1992,i}) = \alpha + \beta{*}\mathbf{AMEN}_i + \gamma{*}\mathbf{ENERGY}_i + \psi{*}\mathbf{X}_i + (\sigma_{i,2016\text{-}2004}^{s} - \sigma_{i,2004\text{-}1992}^{s}) + (e_{i,2016\text{-}2004} - e_{i,2004\text{-}1992}) \quad (2)$$

The variable, y, represents the economic indicator examined. We first examine total nonfarm wage and salary employment, population and per capita income, all from the U.S. Bureau of Economic Analysis (BEA). To provide insights into the channels of growth influences, we then examine U.S. BEA total nonfarm wage rates, per capita nonfarm proprietor income and transfer payments. The subscript 2016-2004 denotes the change in the variable from 2004 to 2016, while (2016-2004)-(2004-1992) is the difference in the changes between the two periods, i.e., the shift in growth.

AMEN is a vector of indicator variables for the natural amenity ranking of the county on a 1 to 7 scale according to the Economic Research Service (ERS) of the United States

[1] We use the 2003 definition of a metropolitan area. A metropolitan area in 2003 was defined as consisting of an urban core of 50,000 or more people and contiguous counties where at least 25 percent of the workforce commutes across county lines.

Department of Agriculture, with the counties deemed as most amenity attractive assigned a 7. The ranking is based on an amenity scale derived from the relationships between population growth during the period of 1970 and1996 and six natural amenity indicators (McGranahan, 1999): (1) average January temperature; (2) average January days of sun; (3) a measure of temperate summers; (4) average July humidity; (5) topographic variation; and (6) water area as a proportion of total county area (including coastal waters). Of the twelve indicators of natural amenities examined by McGranahan (1999), these six are the only ones related to population growth during the 1970-1996 period. Topographic variation is found to be the most correlated with population growth over the period, followed by temperate summer and low July humidity (McGranahan, 1999). McGranahan et al. (2011) find forest cover to be related to their measure of natural amenity attractiveness. But Rickman and Rickman (2011) report that the counties with the highest natural amenity ranking also have the largest forest cover in the county.[2] Because forest cover can change because of development, logging, and wildfires, and there is a strong correlation between forest cover and the natural amenity scale, we do attempt to incorporate it into the natural amenity ranking.

ENERGY consists of two variables, ENERGYBOOM and MINE. ENERGYBOOM is an indicator variable based on data from Tsvetkova and Partridge (2016). A value of one is assigned to the county if the change in its oil and gas employment (including mining support employment) during 2003 to 2013 divided by the 2003 level of total employment minus the same for 1993 to 2013 exceeded one percent. Fifty-seven nonmetropolitan counties in the eleven contiguous states in the West fit this category in the sample. The lowest estimate for the variable among these counties is 1.1 percent for Dawson County, Montana, while the largest estimate is 34.7 percent for Duchesne County, Utah. MINE is an indicator variable for whether the ERS classified the county as mining dependent based on mining earnings relative to total earnings exceeding 15 percent during 1998-2000 but did not experience an oil and gas boom post-2003

[2] Rickman and Rickman (2011, footnote 24) report: "The mean percent of the county covered by forests in the amenity rank 7, 6, and 5 counties are, respectively, 61.5, 50.8, and 39.9."

according to the variable ENERGYBOOM. Eighty-seven nonmetropolitan counties in the West are classified as mining dependent in the sample by ERS, thirty of which did not experience an oil and gas boom. Mining earnings include those both from oil and gas activity and from other activity such as coal, metals, sand and gravel, etc.

Other control variables in **X** include several county typology variables from ERS. Indicator variables are included for whether the county was manufacturing dependent or farming dependent. According to ERS, farming dependence is based either reaching a threshold of 15 percent in total earnings from farm operations during 1998-2000 or a threshold of 15 percent of farm occupational employment relative to total occupational employment in 2000. Manufacturing dependence is based on a threshold of 25 percent of total county earnings coming from manufacturing activity during 1998-2000.[3] From the U.S. Bureau of Census, the share of the adult population 25 years and older in 2000 that earned at least a bachelor's degree also is included as a control variable.

Also included in **X** are indicator variables for each of the categories of the ERS year 2003 urban-rural continuum variable. The categories reflect both the population size of the county and its adjacency to a metropolitan area. Categories 1 through 3 are omitted because they pertain to metropolitan counties. Categories 4 through 9 denote whether a county is: (4) a non-metropolitan county with urban population of 20,000 or more, and adjacent to a metropolitan area; (5) a non-metropolitan county with urban population of 20,000 or more, but not adjacent to a metropolitan area; (6) a non-metropolitan county with urban population of 2,500 to 19,999, adjacent to a metropolitan area; (7) a non-metropolitan county with urban population of 2,500 to 19,999, not adjacent to a metropolitan area; (8) a completely rural non-metropolitan county with less than 2,500 urban population, adjacent to metropolitan area; or (9) a completely rural non-metropolitan county with less than 2,500 urban population, not adjacent to metropolitan area.

[3] https://www.ers.usda.gov/data-products/county-typology-codes/

In sensitivity analysis we also include state fixed effects, σ_i, to account for potentially confounding factors such as state policy differences. The error term, e_i, is assumed i.i.d. but potentially heteroscedastic in the baseline regression. We also examine in sensitivity analysis whether potential spatial autocorrelation in the errors is greatly influencing the regression results.

3. Results

The sample includes 285 nonmetropolitan counties in the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. Table 1 displays the descriptive statistics for the dependent and independent variables. Despite positive growth in employment, population and per capita income from 2004 to 2016 across the sample, there was a negative shift in growth for all three variable during the period relative to growth during 1992 to 2004. A similar pattern exists for nonfarm wage rate growth and per capita nonfarm proprietor income growth. Only per capita transfer payment growth accelerated during 2004 to 2016 on average.

Counties with amenity rank 5 comprised 36.8 percent of the sample, with amenity rank 2 counties only comprising only 0.7 percent of the sample. No sample counties have an amenity rank of 1, while 6.7 percent of the sample counties have the highest amenity ranking of 7. Over twenty percent of the sample counties are classified as farm dependent, while twenty percent of the counties are classified as an energy (oil and gas) boom county. Only 4.6 percent of the counties are classified as mining dependent but not an energy boom county. Manufacturing dependent counties only comprise six percent of the sample.

In terms of the urban-rural continuum code, the most common county in the sample is a non-metropolitan county with urban population of 2,500 to 19,999 that is not adjacent to a metropolitan area, comprising 29.1 percent of the sample (urban-rural code 7). Next are completely rural non-metropolitan counties with less than 2,500 urban population that are not adjacent to metropolitan area, comprising 22.1 percent of the sample (urban-rural code 9). Comprising 6.7 percent of sample counties, the least common county is one with urban population of 20,000 or more and not adjacent to a metropolitan area (urban-rural code 5).

Figure 1 shows the shift in population growth across the periods of 1992-2004 and 2004-2016 for nonmetropolitan counties. Metropolitan areas are not shaded because they are not part of the sample. Montana and Nevada contained the greatest number of counties in the top tier for accelerated population growth. Most of Wyoming's nonmetropolitan counties accelerated in growth across the two periods. Nonmetropolitan county population growth in California slowed. Population growth mostly slowed in nonmetropolitan counties of Arizona, Idaho, Oregon and Washington. Utah had a mix of growth-accelerating and decelerating counties.

Figure 2 shows similar patterns for the shift in employment growth across the two periods. The correlation in the shift in employment growth with the shift in population growth across counties is 0.67. The pattern of growth shifts for per capita income in Figure 3 differ more from the population growth shift pattern. To be sure, the correlation between the per capita income shift and the population growth shift is 0. The per capita income shift is somewhat more consistent with the employment growth shift, with the correlation between the two equal to 0.31. The positive correlation between employment and per capita income shift suggests that the employment shift related more to a labor demand shift (Partridge and Rickman, 1999; Wang and Rickman, 2018). To explain the role of the demand for natural amenities and energy in the shifts we estimate Equations (1) and (2).

3.1 Base Results

As shown in columns (1) and (2) of Table 2 both the employment growth shift regression (16-04)-(04-92) and the employment growth regression (16-04) are statistically significant below the 0.01 level. From column (1), we see that except amenity rank 6 counties, all counties are estimated to have experienced a positive employment shift across the two periods relative to amenity rank 7 counties, the omitted category. Amenity rank 3 counties experienced the largest positive relative employment shift, with the estimated effect statistically significant. The amenity rank variables are jointly significant below the 0.01 level. Column (2) reveals that except amenity rank 2 counties, counties with lower amenity rankings grew faster than amenity rank 7 counties during 2004-2006. The stronger growth in amenity rank 5 counties is statistically significant at the 0.1 level, though the amenity variables as a group are statistically insignificant in column (2).

Employment growth in energy boom counties on average is estimated to have accelerated by over twenty percent across the two periods, all else equal (column 1). On average, employment growth grew nearly ten percent faster during 2004-2016 in energy boom counties (column 2). Employment growth also significantly accelerated in mining dependent counties that were not energy boom counties. Farm dependent counties did not experience a significant employment shift or grow differentially during 2004-2016. Manufacturing counties experienced a significant positive shift in employment in 2004-2016, but their growth did not statistically differ from the earlier period (column 2). The manufacturing growth result fits the findings of Austin et al. (2018) for western inland states, which they attribute to the relative dominance of nondurable goods manufacturing. Counties with larger shares of the population with bachelor's degree grew significantly faster during 2004-2016, but the effect was significantly less than that during 1992-2004. As a group, the urban-rural continuum variables are not statistically significant in either column (1) or column (2), relative to the omitted category of counties with classification code of 4.

With few exceptions, the population growth results in columns (3) and (4) generally follow those of employment growth in columns (1) and (2). The correlation of the shift in population growth with the shift in employment growth is 0.67, while the correlation between employment and population growth during 2004-2016 is 0.63. Amenity rank 2 counties are estimated to have experienced a much larger population growth shift than employment growth shift relative to amenity rank 7 counties. Only amenity rank 6 counties did not experience a statistically significant positive population growth shift compared to amenity rank 7 counties. The relative population shift in mining dependent counties that were not also energy boom counties is not statistically significant as it is for the relative employment shift. The urban-rural continuum code variables are statistically significant as a group in both the column (3) and column (4) regressions. Population grew the slowest in the smallest and most remote counties during 2004-2016 (classification codes 7 and 9). A variable of energy boom counties interacted with the natural amenity scale is highly insignificant and is not included in the reported results.

The employment and population growth shifts to counties further down in natural amenity ranking suggest a possible shift in household preferences towards these counties. A relative supply shift to the counties should dampen relative income growth (Partridge and Rickman, 1999). The results in column (5) suggest this was true for amenity rank 2, 5 and 6 counties, but not for amenity rank (3) and (4) counties. Per capita income growth during 2004-2016 (column 6) did not statistically differ in lower amenity rank counties compared to amenity rank 7 counties. The absence of a downwards relative per capita income shift in amenity rank 3 counties in contrast to their stronger employment and population growth could be a result of sorting of those with higher education and skills (McGranahan et al., 2011; Rickman and Wang, 2017). The result also could be because of a non-labor income shift or from jobs created through increased demand tourism goods and services (Chen et al., 2016)

To further investigate the sources of the per capita income shifts we separately replaced the per capita income variable with nonfarm wage rate growth, per capita nonfarm proprietor income growth and per capita transfer payment growth. The wage rate should more directly reflect labor supply shifts. Transfer payments could reflect both the effect of social security payments associated with retiree migration and reduced transfer payments such as unemployment compensation because of an improving economy. The regression results are shown in Table 3.

From column (1) of Table 3, except for amenity rank 3 counties, the more negative amenity rank coefficients for relative wage rate growth better fits a narrative of a household shift away from the higher amenity rank counties. Energy boom counties also now are shown to have experienced a positive shift in wage rate growth, consistent with a large positive labor demand shock. The large estimated amenity rank coefficients in column (3) suggest that an important reason why per capita income growth across the amenity spectrum less fit the expected negative effects of a labor supply shift is because of positive effects on nonfarm proprietor income. Along with a shift in wage and salary earners to counties further down in the amenity spectrum there also was an increase in nonfarm proprietor income. There also was a negative shift in transfer payments to counties further down in the amenity spectrum. This may have occurred because of improved employment opportunities in the counties, except those with Amenity Rank 2. A relative reduction in retiree migration also could in part underlie the result, but this would not be consistent with the stronger overall employment and population growth in the counties relative to amenity rank 7 counties.

3.2 Sensitivity Analysis

To test the robustness of the results and to provide further insights into the base results, we perform several sensitivity analyses. First, we re-estimate the regressions in Tables 2 and 3 while allowing for spatial autocorrelation in the residuals. Second, we add state fixed effects to the regressions. Third, we add indicator variables for whether a county is classified as a retirement destination county and for whether the county contains a newly designated wilderness area during 2004-2016. Below we discuss the similarity and differences in results.

Re-estimating the models to allow for spatial autocorrelation in the residuals produces comparable results (not shown).[4, 5] The amenity ranking variables are statistically significant below the 0.05 level for the shifts in growth for employment, population and wage rates based on Wald tests, while they are insignificant in the per capita income and the non-wage income component shift equations. The correlation between the coefficients in the growth shift variables (columns 1, 3, 5 in Tables 2 and 3) with the corresponding estimated coefficients when accounting for spatial autocorrelation ranges between 0.81 and 0.996. Except for the shift in

---

[4] We first used the STATA command spmat (Drukker et al., 2013) where we imposed a condition that assumed counties which are more than 200 miles apart would have zero effect on each other to create an inverse-distance row-normalized spatial-weighting matrix that can be used in the spatial-error term of a cross-sectional model with spatial-autogressive disturbances (SARAR model). We then used the STATA command spreg (Drukker et al., 2013) to estimate the parameters by maximum likelihood (ML).

[5] We do not estimate a spatial lag model. Spatial lags would simply represent the correlation among neighboring counties. The correlation can occur because of a factor common to neighboring counties, similar to the “reflection problem” of Manski (1993). The common factor needs to be accounted for to be able to identify causal effects between the counties (Lee, 2007). Because nearby counties may similarly possess high levels of natural amenities, the estimated spatial lag effect may mask the role of natural amenities for the county.

transfer payment growth, paired t-tests between each set of coefficients reveal the differences are insignificant at or below the 0.05 level for all growth shifts. The estimated accelerations in employment and population growth because of the oil and gas boom during 2004-2016 when accounting for potential spatial autocorrelation in errors are about one-half the estimated effects in Table 2 though they remain statistically significant; the corresponding estimated per capita income effects remain statistically significant and approximately the same magnitude.

Because there could be growth differences across states because of policy differences or other omitted factors that might be correlated with natural amenity attractiveness of areas in the state, we rerun the growth shift regressions after including state fixed effects. The fixed effects are jointly significant below the 0.05 level in all regressions (not shown). Consistent with the results shown in Tables 2 and 3,Wald tests reveal that the natural amenity variables in the growth shift variables are statistically significant in growth shift regressions below the 0.05 level, except for per capita income where the natural amenity variables are only significant below the 0.10 level. The patterns of the coefficients in the regressions with state fixed effects are qualitatively similar to those in Tables 2 and 3. The correlations between the coefficients between the each set of growth shift regressions mostly lie between 0.91 and 0.97, except for the transfer growth shift regression where the correlation is 0.76. Paired t-tests between the two sets of coefficients reveal insignificant differences for the employment, per capita income and wage shift regressions, and significant differences between the remaining three sets. In the population growth regression, the primary difference for the natural amenity variable coefficients is much stronger growth in counties with natural amenity ranking 2 when fixed effects are not included.

We also test the robustness of the results to adding a variable indicating whether the county is classified as a retirement destination by the ERS (see footnote 3). A county is classified as a retirement destination if its population age 60 and older grew by 15 percent or more in the 1990s through net in-migration. Twenty eight percent of the sample counties have retirement destination status. Retirement destination status is positively correlated with natural amenity attractiveness in the sample and its inclusion could capture some of its effect. The remaining effects captured in the natural amenity coefficients then more likely reflect the pattern among pre-retirement households.

A second variable that we add is whether there was a designation of a wilderness area in the county during the second period (2004-2016). Designation as a wilderness area could adversely affect the area economy through reduced extractive activities but benefit the area economy through increased amenity attractiveness (Duffy-Deno, 1998; Chen et al., 2016; Kovacs et al, 2017). These areas often are located in counties classified as high in natural amenities though only seven percent of sample counties possessed a new wilderness declaration post-2004.

When the two variables are included in the regression together, across the six growth shift regressions, the retirement destination variable is only significant in the employment growth shift regression at the 0.10 level. The amenity rank variables remain highly significant as a group and the coefficients are virtually unchanged. The robustness of the natural amenity ranking results is not surprising given that the amenity ranking as an ordinal variable is only modestly correlated with the retirement (r=0.18) and wilderness (r=0.19) variables. The wilderness variable is negative and significant below the 0.05 level in the per capita income and nonfarm proprietor income growth shift regressions and is positive and significant in the transfer payment growth shift regression. The amenity variables become insignificant in the per capita income growth shift equation but remain highly significant in the nonfarm proprietor income and transfer payment growth shift regressions. The results suggest though that income was reduced by wilderness area designation through lower nonfarm proprietor income and was associated with increased transfer payments.

4. Why the Downward Growth Shift in High Amenity Areas?

The growth shift away from the most natural amenity rich areas suggests that household utility was becoming more equal across the amenity spectrum. This could occur from natural amenities becoming capitalized into housing prices and wages (Greenwood et al., 1991, Partridge et al., 2012). As housing-price-adjusted wages fall in high amenity areas from greater in-migration, the combined utility from natural amenities and real compensation becomes more equal across areas, subsequently reducing net in-migration. The growth shift also could occur if the natural amenity rich areas become relatively less attractive. Congestion, pollution and other negative externalities associated with growth could reduce the overall attractiveness of natural amenity areas and negatively feedback onto future growth (Gabriel et al., 2003; Chen et al., 2009; Rickman and Rickman, 2011) as also would adverse impacts of climate change in high-amenity areas.

To assess the source of the growth slowdown, we use median earnings and housing costs from the 2012-2016 American Community Survey 5-Year Estimates. Following the approach of Glaeser et al. (2001), quality of life is measured by the residuals produced from a regression of characteristic-adjusted housing costs on characteristic-adjusted earnings for all counties in the nation.[6] Two sets of residuals are produced for housing costs, one from using housing prices and one from using housing rents as the dependent variable. Each set of residuals is then regressed on the Economic Research Service (ERS) natural amenity ranking for the counties in the West, with the results shown in Table 4.

From columns one and two of Table 4, we see that using either housing prices or rents in the regressions to estimate quality of life, consistent with McGranahan et al. (2011) and Rickman and Rickman (2011) the higher an area is in the natural amenity spectrum the greater is the estimated overall quality of life. Both regressions are statistically significant, with the regression based on residuals produced by using housing rents to estimate quality of life having a higher r-squared. With one exception, the difference between any two successive coefficients in both regressions is statistically significant below the 0.05 level based on a Wald Test (not shown). The sole exception is statistically significant below the 0.07 level, i.e., between amenity ranks 5 and 6 in the regression using housing price residuals as the dependent variable (column (1)).

[6] Characteristics in the earnings regression include several age range shares, several industry employment shares, several occupation employment shares, educational attainment shares, ethnicity shares and the share of households with a disability. Characteristics in the housing cost equations include median number of total rooms, the median number of bedrooms, age shares, share with complete indoor plumbing, share with complete kitchen facilities.

The above results suggest that overall quality of life is higher the further up a county is in the amenity spectrum during 2012-2016. So, the estimated employment and population growth slowdown would not be suggested to be the result of quality of life becoming lower in high amenity areas. But it could be that the differences in quality of life narrowed in the recent period of analysis.

To assess this possibility, we use the Census 2000 data from Rickman and Rickman (2011) and produce results for comparison in the year 2000 for nonmetropolitan counties in the West. Rather than separately examine housing rents and house prices, Rickman and Rickman (2011) calculate a weighted-average of the two measures. From column (3) of Table 4 we see that consistent with columns (1) and (2) the estimated quality of life in 2000 is estimated to be higher for areas richer in natural amenities. But the r-squared is lower and the differences between successive coefficients are smaller than those in columns (1) and (2). To be sure, the difference between successive coefficients are only significant between amenity ranks 3 and 4, and amenity ranks 5 and 6 (not shown).

Therefore, although the two periods (2000 and 2012-2016) do not exactly match those used in the growth analysis in Tables 2 and 3 versus Table 4, there is not any evidence supporting an interpretation of converging overall quality of life across the amenity spectrum in the West. This suggests that it was the capitalization of natural amenities into prices that led to the downward shift in growth. A regression of housing prices on natural amenity attractiveness for the West using the data of Rickman and Rickman (2011), controlling for housing characteristics, reveals stronger housing price growth from 1990 to 2000 for counties with amenity rank 4, 5 and 6, with lower, approximately equal growth in amenity rank 2 and 7 counties (not shown). The natural amenity variables are significant as a group and the differences are statistically significant below the 0.05 level between the coefficients of amenity ranks 2 and 7 and the other three rankings of counties. The lower housing price growth in amenity rank 7 counties fits the results of Rickman and Rickman (2011), which suggested that natural amenities had been relatively capitalized into housing prices in amenity rank 7 counties prior to 1990. The stronger housing price growth during 1990-2000 in amenity rank 4, 5 and 6 counties may have slowed their population growth post-2000.

We further explored whether there were any other patterns across the natural amenity spectrum using the ACS 2012-2016 5-year estimates (not shown). The share of the population that had moved from another county during the last year, the share of the population that had moved from another state during the last year, the percent of houses that are owner occupied, and the percentage of population that was aged 65 and older, all did not statistically differ across the natural amenity spectrum. The share of the adult population with at least a bachelor's degree did statistically differ across the amenity spectrum; the further up a county was in the natural amenity spectrum the higher was its share of adult population with at least a bachelor's degree. Although the amenity ranking variables are statistically significant as a group, the difference between any two successive amenity ranks is only statistically significant between amenity rank 5 and 6 counties for the bachelor's degree population share.

The association between abundance of natural amenities and college degrees might explain the positive relation between the relative gain in per capita income and wage rate growth in amenity rank 3 counties. It might be that the capitalization of amenities into factor prices caused those with unmeasured educational quality and skills to increasingly move to amenity rank 3 counties rather than counties at the top of the natural amenity spectrum.

5. Summary and Conclusion

We show that the nonmetropolitan counties of the eleven contiguous western states experienced significant shifts in economic growth between 1992-2004 and 2004-2016. Economic growth, as measured by U.S. Bureau of Economic Analysis employment, population and income estimates, significantly decelerated in counties at the high end of the natural amenity spectrum relative to those in the middle. Further analysis using data from the 2012-2016 American Community Survey suggested that the downward shift in growth in areas possessing the highest levels of natural amenities was not attributable to reduced quality of life. More likely, relative capitalization of amenities into housing prices reduced growth.

Accompanying the national oil and gas boom, many western counties experienced dramatically increased economic growth post-2004. Most of the counties experiencing the increased growth from the oil and gas boom were not previously classified as mining dependent by the USDA Economic Research Service (ERS). Counties classified as manufacturing dependent by ERS also experienced significantly positive shifts in growth. This is consistent with the findings of Austin et al. (2018) of stronger performance of manufacturing areas in the Western Heartland, which they attributed to greater dependence on production of nondurable goods. Although growth continued to be stronger in counties with greater population shares of the college educated, the growth advantage significantly diminished in the latter period. Despite employment growth not differing or changing across the urban-rural continuum, all else equal, population growth relatively improved in counties not adjacent to metropolitan areas; although relatively improved in the latter period, population growth continued to lag in the smaller, more remote nonmetropolitan counties.

The findings serve as a basis for local economic development policy in the western region. Accurate diagnoses of economic trends in the counties and where they stand in terms of development are cornerstones in formulating successful local policy (Rodríguez-Pose and Wilkie, 2018). Although western nonmetropolitan counties are part of a broad region that has been characterized as having recently done well economically (Austin et al., 2018), significant relative shifts in growth occurred across the counties. Where growth prospects improved, policy concerns likely should shift from stimulating growth to accommodating the growth. Remote counties lacking natural amenities or energy resources may still be in need of place-based policy to stimulate labor demand. High amenity counties experiencing slower growth should plan on it continuing in the future or on it slowing further.

References

Adamy, Janet and Paul Overberg, 2018. "Retirees Reshape where Americans Live," Wall Street Journal March 22nd. Last accessed August 15, 2018 at https://www.wsj.com/articles/retirees-reshape-where-americans-live-1521691261.

Austin, Benjamin, Edward Glaeser and Lawrence H. Summers, 2018. "Saving the Heartland: Place-based Policies in the 21st Century," *Brookings Papers on Economic Activity*, BPEA Conference Drafts, March 8–9.

Beale, Calvin L. and Kenneth M. Johnson, 1998. "The Identification of Recreation Counties in Nonmetropolitan Areas of the USA," *Population Research and Policy Review* 17, 37-53.

Chen, Yong, Elena Irwin and Ciriyam Jayaprakash, 2009. "Dynamic Modeling of Environmental Amenity-driven Migration with Ecological Feedbacks," *Ecological Economics* 68, 2498-2510.

Chen, Yong, David J. Lewis and Bruce Weber, 2016. "Conservation Land Amenities and Regional Economies: A Postmatching Difference-in-Differences Analysis of the Northwest Forest Plan," *Journal of Regional Science* 56(3), 373-394.

Deller, Steven C., Tsung-Hsiu Tsai, David W. Marcouiller and Donald B.K. English, 2001. "The Role of Amenities and Quality of Life in Rural Economic Growth," *American Journal of Agricultural Economics* 83(2), 352-365.

Duffy-Deno, Kevin T., 1998. "The Effect of Federal Wilderness on County Growth in the Intermountain Western United States," *Journal of Regional Science* 38(1), 109-136.

Drukker, David M., Hua Peng, Ingmar Prucha and Rafal Raciborski, 2013. "Creating and Managing Spatial-Weighting Matrices with the SPMAT Command" *Stata Journal*, 13(2), 242-286.

Drukker, David M., Ingmar Prucha and Rafal Raciborski, 2013. "Maximum Likelihood and Generalized Spatial Two-Stage Least-Squares estimators for a Spatial-Autoregressive Model with Spatial-Autoregressive Disturbances" *Stata Journal*, 13(2), 221-241.

Felix, Alison and Sam Chapman, 2017. "A Look Back at the Rocky Mountain Economy 100 Years Ago," *Main Street Views: Policy Insights from the Kansas City Fed*, December 15. Federal Reserve Bank of Kansas City. Last Accessed August 15, 2018 at https://www.kansascityfed.org/publications/research/rme/articles/2017/rme-4q-2017.

Gabriel, Stuart A., Joe P. Mattey and William L. Wascher. 2003. "Compensating Differentials and Evolution in the Quality of Life among U.S. States," *Regional Science and Urban Economics*, 33, 619-649.

Glaeser, Edward L., Jed Kolko, and Albert Saiz, 2001. "Consumer City," *Journal of Economic Geography* 1, 27–50.

Green, Gary Paul, 2001. "Amenities and Community Economic Development: Strategies for Sustainability," *The Journal of Regional Analysis and Policy* 31(2), 61-75.

Greenwood, Michael J., Gary L. Hunt, Dan S. Rickman, and George I. Treyz, 1991. Migration, Regional Equilibrium, and the Estimation of Compensating Differentials," *American Economic Review* 81, 1382–1390.

Graves, Phillip E., 1980. "Migration and Climate," *Journal of Regional Science* 20(2), 227-237.

Gustin, Georgina, 2017. "Longer, Fiercer Fire Seasons the New Normal with Climate Change," *Inside Climate News*, July 11. Last accessed on August 15, 2018 at https://insideclimatenews.org/news/11072017/wildfire-forest-fire-climate-change-california.

Hackbarth, Sean, 2015. "America's Successful Oil and Natural Gas Boom in 5 Charts," U.S. Chamber of Commerce. https://www.uschamber.com/above-the-fold/americas-successful-oil-and-natural-gas-boom-5-charts

Kovacs, Kent, Robert G. Haight and Grant West, 2017. "Protected Area Designation, Natural Amenities, and Rural Development of Forested Counties in the Continental United States," *Growth and Change* 48(4), 611-639.

Lee Lung-fei, 2007. "Identification and Estimation of Econometric Models with Group Interactions, Contextual Factors and Fixed Effects," *Journal of Econometrics* 140, 333–374.

Manski, Charles, 1993. "Identification of Endogenous Social Effects: The Reflection Problem," *The Review of Economic Studies*, 60(3), 531–542.

Marchand, Joseph and Jeremy Weber, 2018. "Local Labor Markets and Natural Resources: A Synthesis of the Literature," *Journal of Economic Surveys* 32(2), 469-490.

McGranahan, David A., 1999. "Natural Amenities Drive Rural Population Change," AER 781. Washington D.C.: Economic Research Service, U.S. Department of Agriculture.

_____, 2008. "Landscape influence on recent rural migration in the U.S.," *Landscape and Urban Planning* 85, 228–240.

McGranahan, David A. and Calvin L. Beale, 2002. "Understanding Rural Population Loss," *Rural America* 17(4), 2-11.

McGranahan, David A., Timothy R. Wojan, and Dayton M. Lambert. 2011. "The Rural Growth Trifecta: Outdoor Amenities, Creative Class and Entrepreneurial Context," *Journal of Economic Geography* 11(3), 529–557.

Munasib, Abdul and Dan S. Rickman, 2015. "Regional Economic Impacts of the Shale Gas and Tight Oil Boom: A Synthetic Control Analysis," *Regional Science and Urban Economics* 50, 1–17.

Nash, Gerald D., 2018. *Federal Landscape: An American History of the Twentieth-Century West*, University of Arizona Press, Tuscon, AZ.

Partridge, Mark D. and Dan S. Rickman, 1999. "Which Comes First, Jobs or People? An Analysis of the Recent Stylized Facts," *Economics Letters 64* (1), 117-123.

Partridge, Mark D., Dan S. Rickman, Kamar Ali and M. Rose Olfert, 2008. "The Geographic Diversity of U.S. Nonmetropolitan Growth Dynamics: A Geographically Weighted Regression Approach," *Land Economics* 84(2), 241-266.

Partridge, Mark D., Dan S. Rickman, M. Rose Olfert and Kamar Ali, 2012. "Dwindling U.S. Internal Migration: Evidence of Spatial Equilibrium or Structural Shifts in Local Labor Markets?" *Regional Science and Urban Economics, 42* (1-2), 375-388.

Rappaport, Jordan, 2007. "Moving to Nice Weather," Regional Science and Urban Economics 37, 375-398.

Rickman, Dan S. and Shane D. Rickman, 2011. "Population Growth in High-Amenity Nonmetropolitan Areas: What's the Prognosis?" *Journal of Regional Science*, 51(5), 863–879.

Rickman, Dan S. and Hongbo Wang, 2017. "U.S. Regional Population Growth 2000-2010: Natural Amenities or Urban Agglomeration?". *Papers in Regional Science*. *96* (S1), S69-S90.

Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life," *Journal of Political Economy*, 90, 1257–1278.

Rodríguez-Pose, Andrés and Callum Wilkie, 2018. "Strategies of Gain and Strategies of Waste: What Determines the Success of Development Intervention?" *Papers in Evolutionary Economic Geography* 1826, Utrecht University, Department of Human Geography and Spatial Planning, Group Economic Geography.

Tsvetkova, Alexandra and Mark D. Partridge, 2016. "Economics of Modern Energy Boomtowns: Do Oil and Gas Shocks Differ from Shocks in the Rest of the Economy," *Energy Economics* 59, 81-95.

Wang, Hongbo and Dan S. Rickman, 2018. "Regional Growth Differences in China for 1995-2013: An Empirical Integrative Analysis of Their Sources," *Annals of Regional Science* 60 (1), 99-117.

Wu, Jun Jie and Munisamy Gopinath. 2008. "What Causes Spatial Variations in Economic Development in the United States?" *American Journal of Agricultural Economics* 90, 392–408.

Table 1. Descriptive Statistics: Dependent and Independent Variables

Variable	Mean	Standard Deviation
Employment Growth (16-04)	7.23	12.98
Employment Growth (16-04)-(04-92)	-15.14	24.75
Population Growth (16-04)	5.70	10.96
Population Growth (16-04)-(04-92)	-8.19	17.78
Per Capita Income Growth (16-04)	53.33	18.53
Per Capita Income Growth (16-04)-(04-92)	-8.53	28.84
Nonfarm Wage Rate Growth (16-04)	44.27	18.19
Nonfarm Wage Rate Growth (16-04)-(04-92)	-17.19	36.42
Per Capita Nonfarm Proprietor Income Growth (16-04)	53.56	93.22
Per Capita Nonfarm Proprietor Income Growth (16-04)-(04-92)	-44.88	137.87
Per Capita Transfer Payment Growth (16-04)	96.66	27.87
Per Capita Transfer Payment Growth (16-04)-(04-92)	6.40	33.92
Amenity Rank 2	0.007	0.084
Amenity Rank 3	0.077	0.267
Amenity Rank 4	0.281	0.450
Amenity Rank 5	0.368	0.483
Amenity Rank 6	0.200	0.401
Amenity Rank 7	0.067	0.250
Bachelor's Degree	12.76	5.50
Farm Dependence	0.211	0.408
Energy Boom	0.200	0.400
Manufacturing	0.060	0.438
Mining (non-Energy Boom)	0.046	0.209
Urban-Rural Code 4	0.105	0.307
Urban-Rural Code 5	0.067	0.250
Urban-Rural Code 6	0.200	0.401
Urban-Rural Code 7	0.291	0.455
Urban-Rural Code 8	0.116	0.321
Urban-Rural Code 9	0.221	0.416

Table 2. Employment, Population and Per Capita Income Growth OLS Regressions (heteroskedastic-robust standard errors in parentheses)

	Employment Growth		Population Growth		Per Capita Income Growth	
	(2016-2004)-(2004-1992) (1)	2016-2004 (2)	(2016-2004)-(2004-1992) (3)	2016-2004 (4)	(2016-2004)-(2004-1992) (5)	2016-2004 (6)
Constant	-7.73 (5.83)	-6.10 (3.99)	-11.75 (4.83)[b]	-6.37 (3.17)[b]	-0.31 (6.76)	47.97 (5.83)[a]
Amenity Rank 2	1.62 (7.47)	-5.11 (9.57)	18.61 (5.88)[a]	0.94 (7.61)	-7.56 (14.85)	-17.87 (14.0)
Amenity Rank 3	16.96 (6.33)[a]	5.06 (4.20)	20.10 (4.71)[a]	5.74 (3.34)[c]	10.63 (9.64)	-2.21 (6.15)
Amenity Rank 4	4.86 (5.64)	4.29 (3.39)	12.35 (3.96)[a]	6.59 (2.70)[b]	7.10 (7.19)	-1.73 (4.96)
Amenity Rank 5	1.15 (5.17)	5.52 (3.27)[c]	7.72 (3.92)[b]	7.86 (2.60)[a]	-1.50 (6.37)	-6.68 (4.78)
Amenity Rank 6	-8.08 (6.09)	1.09 (3.42)	-1.00 (4.60)	6.77 (2.72)[b]	-3.22 (6.88)	-3.29 (5.0)
Bachelors	-1.20 (0.26)[a]	0.56 (0.14)[a]	-0.55 (0.24)[b]	0.70 (0.11)[a]	-1.29[a] (0.33)	0.10 (0.21)
Farm	5.22 (3.51)	1.09 (1.91)	2.94 (1.86)	-2.15 (1.52)	6.01 (4.67)	6.02 (2.79)[b]
Energy Boom	20.18 (5.57)[a]	9.60 (3.24)[a]	12.75 (4.63)[a]	8.23 (2.58)[a]	-1.54 (4.49)	-0.90 (2.98)
Manufacturing	8.38 (4.61)[c]	2.20 (3.22)	5.78 (2.88)[b]	-0.11 (2.56)	-3.54 (6.74)	-0.34 (4.72)
Mining	11.36 (5.70)[b]	4.56 (2.80)	5.16 (5.07)	4.96 (2.23)[b]	3.52 (6.84)	1.12 (4.10)
Urban-Rural Category 5	1.99 (5.13)	4.58 (3.83)	4.85 (4.60)	2.26 (3.05)	-0.88 (4.37)	2.76 (5.61)
Urban-Rural Category 6	-2.16 (4.37)	3.22 (2.88)	-4.54 (3.35)	-1.35 (2.29)	4.54 (4.18)	5.60 (4.21)
Urban-Rural Category 7	4.68 (4.28)	-0.65 (2.78)	2.91 (3.30)	-5.35 (2.21)[b]	3.28 (3.96)	7.43 (4.07)[c]
Urban-Rural Category 8	-4.09 (6.28)	-3.02 (3.21)	-5.95 (3.83)	-6.71 (2.55)[a]	18.39 (5.91)[a]	13.53 (4.70)[a]
Urban-Rural Category 9	6.69 (4.78)	1.02 (2.97)	1.09 (3.65)	-7.06 (2.36)[a]	7.67 (5.97)	8.28 (4.34)[c]
Sample Size	285	285	285	285	285	285
R-squared	0.27	0.13	0.30	0.23	0.15	0.08
F-statistic	6.51[a]	2.62[a]	7.76[a]	5.24[a]	3.19[a]	1.64[c]
Wald Test (Amenity)	F=5.23[a]	F=1.46	F=7.74[a]	F=2.02[c]	F=2.01[c]	F=1.13
Wald Test (Urban-Rural)	F=1.56	F=1.58	F=3.32[a]	F=4.81[a]	F=2.46[b]	F=1.94[c]

Notes: [a] significant below the 0.01 level; [b] significant below the 0.05 level; [c] significant below the 0.10 level

Table 3. Nonfarm Wage, Nonfarm Proprietor Income and Transfer Payment Growth OLS Regressions (heteroskedastic-robust standard errors in parentheses)

	Nonfarm Wage Rate Growth		Per Capita Nonfarm Proprietor Income Growth		Per Capita Transfer Payment Growth	
	(2016-2004)-(2004-1992) (1)	2016-2004 (2)	(2016-2004)-(2004-1992) (3)	2016-2004 (4)	(2016-2004)-(2004-1992) (5)	2016-2004 (6)
Constant	6.82 (7.12)	33.51 (5.47)[a]	-68.02 (42.09)	45.30 (29.41)	1.15 (10.08)	87.46 (7.62)[a]
Amenity Rank 2	-3.04 (8.0)	6.45 (13.13)	200.91 (32.21)[a]	91.53 (70.62)	-27.36 (9.05)[a]	-32.58 (18.29)[c]
Amenity Rank 3	9.83 (9.55)	11.40 (5.77)[b]	149.23 (33.22)[a]	69.37 (31.03)[b]	-29.12 (8.76)[a]	-34.84 (8.03)[a]
Amenity Rank 4	-3.84 (7.23)	1.60 (4.65)	111.38 (25.58)[a]	50.88 (25.02)[b]	-22.06 (6.56)[a]	-12.13 (6.48)[c]
Amenity Rank 5	-11.14 (6.14)[c]	-0.68 (4.49)	76.52 (28.1)[a]	27.78 (24.13)	-13.89 (6.5)[b]	-6.08 (6.25)
Amenity Rank 6	-19.82 (7.27)[a]	-4.06 (4.69)	74.62 (26.59)[a]	28.39 (25.23)	-15.67 (7.65)[b]	-1.71 (6.53)
Bachelors	-1.88 (0.36)[a]	0.12 (0.20)	-2.64 (1.63)	-0.66 (1.06)	1.49 (0.46)[a]	1.48 (0.27)[a]
Farm	1.86 (5.87)	1.18 (2.62)	0.64 (19.19)	5.75 (14.08)	1.47 (4.89)	-7.06 (3.65)[c]
Energy Boom	20.88 (7.78)[a]	13.72 (4.45)[a]	-7.19 (35.1)	10.09 (23.93)	-22.91 (9.46)[b]	-14.87 (6.2)[a]
Manufacturing	7.96 (7.27)	4.59 (4.42)	-55.14 (36.99)	0.18 (23.78)	3.56 (4.82)	9.86 (6.16)
Mining	7.84 (7.07)	2.51 (3.85)	-25.36 (31.59)	-2.61 (20.68)	-15.29 (9.3)	-4.69 (5.35)
Urban-Rural Category 5	4.27 (6.7)	6.30 (5.26)	-19.26 (43.75)	-5.60 (28.26)	17.27 (9.2)[c]	10.86 (7.32)
Urban-Rural Category 6	5.70 (5.05)	7.35 (3.95)[c]	-34.20 (38.9)	-46.94 (21.23)[b]	4.86 (7.28)	2.41 (5.5)
Urban-Rural Category 7	6.87 (4.59)	4.77 (3.81)	-42.72 (40.89)	-27.01 (20.51)	3.23 (6.26)	3.65 (5.31)
Urban-Rural Category 8	3.71 (8.29)	6.75 (4.41)	-36.78 (37.71)	-33.53 (23.7)	12.38 (7.59)	4.57 (6.14)
Urban-Rural Category 9	1.48 (7.55)	8.40 (4.07)[b]	-17.81 (41.3)	-6.83 (21.9)	4.51 (6.71)	-1.22 (5.67)
Sample Size	285	285	285	285	285	285
R-squared	0.19	0.16	0.10	0.08	0.18	0.31
F-statistic	4.11[a]	3.5[a]	2.03[b]	1.55[c]	3.83[a]	8.04[a]
Wald Test (Amenity)	3.12[a]	2.47[b]	11.49[a]	1.66	3.25[a]	6.61[a]
Wald Test (Urban-Rural)	0.55	1.06	0.44	1.72	1.13	0.9

Notes: [a] significant below the 0.01 level; [b] significant below the 0.05 level; [c] significant below the 0.10 level

Table 4. Quality-of-Life Estimates and Natural Amenity Ranking
(heteroskedastic-robust standard errors in parentheses)

Variable	Housing Price Residuals (1)	Housing Rent Residuals (2)	Year 2000 Estimates (3)
Constant	-0.09 (0.03)[a]	-0.29 (0.23)	-0.11 (0.18)
Amenity Rank 3	0.11 (0.06)[c]	0.18 (0.23)	0.07 (0.19)
Amenity Rank 4	0.35 (0.05)[a]	0.30 (0.23)	0.25 (0.18)
Amenity Rank 5	0.46 (0.05)[a]	0.36 (0.23)	0.31 (0.18)[c]
Amenity Rank 6	0.58 (0.06)[a]	0.44 (0.23)[c]	0.40 (0.18)[b]
Amenity Rank 7	0.84 (0.08)[a]	0.62 (0.23)[a]	0.48 (0.19)[b]
Sample Size	285	285	285
R-squared	0.16	0.24	0.13
F-statistic	10.97[a]	17.44[a]	8.29[a]

Notes: [a] significant below the 0.01 level; [b] significant below the 0.05 level; [c] significant below the 0.10 level

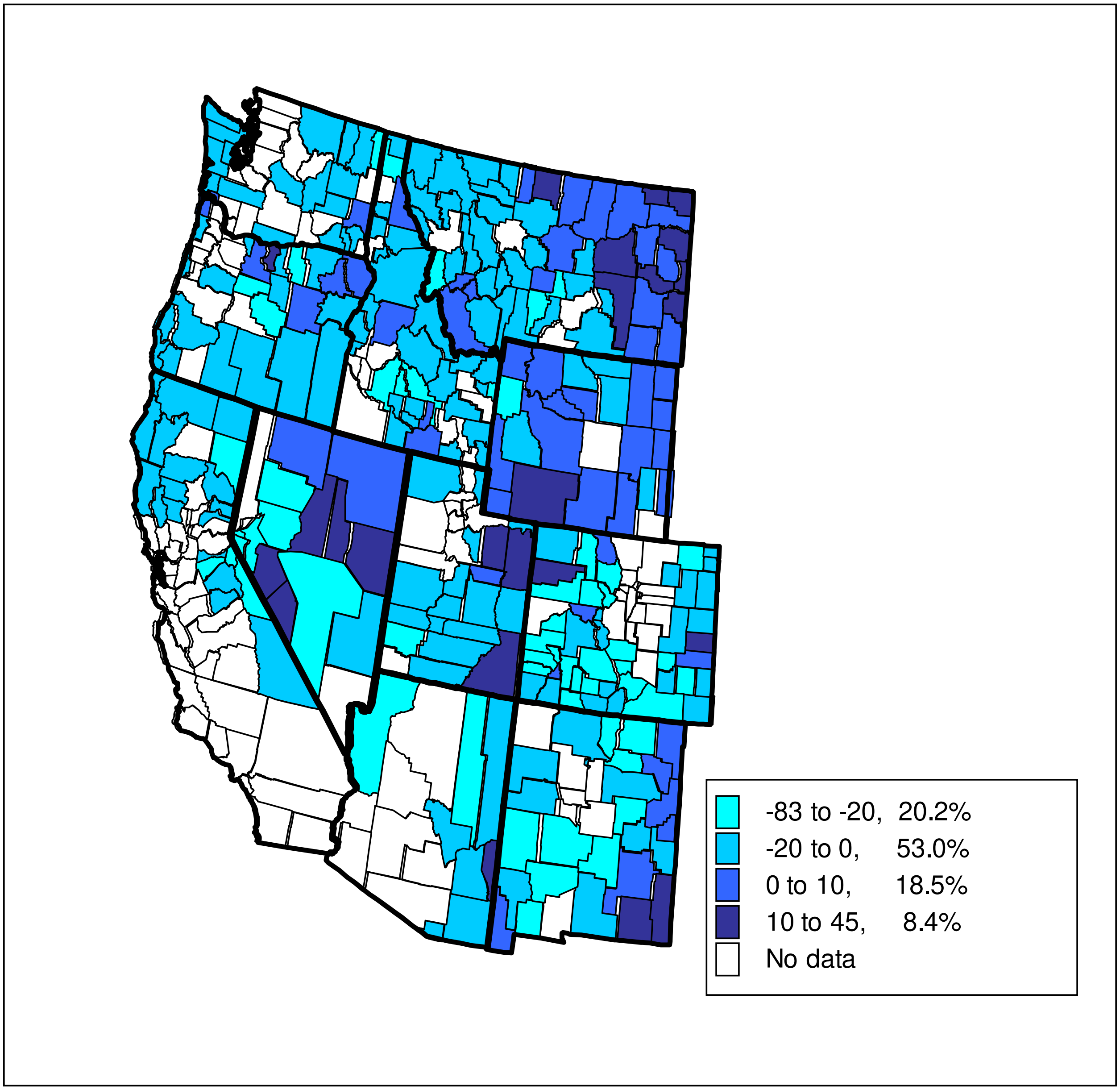

Figure 1. Population Growth: (2004-2016)-(1992-2004)

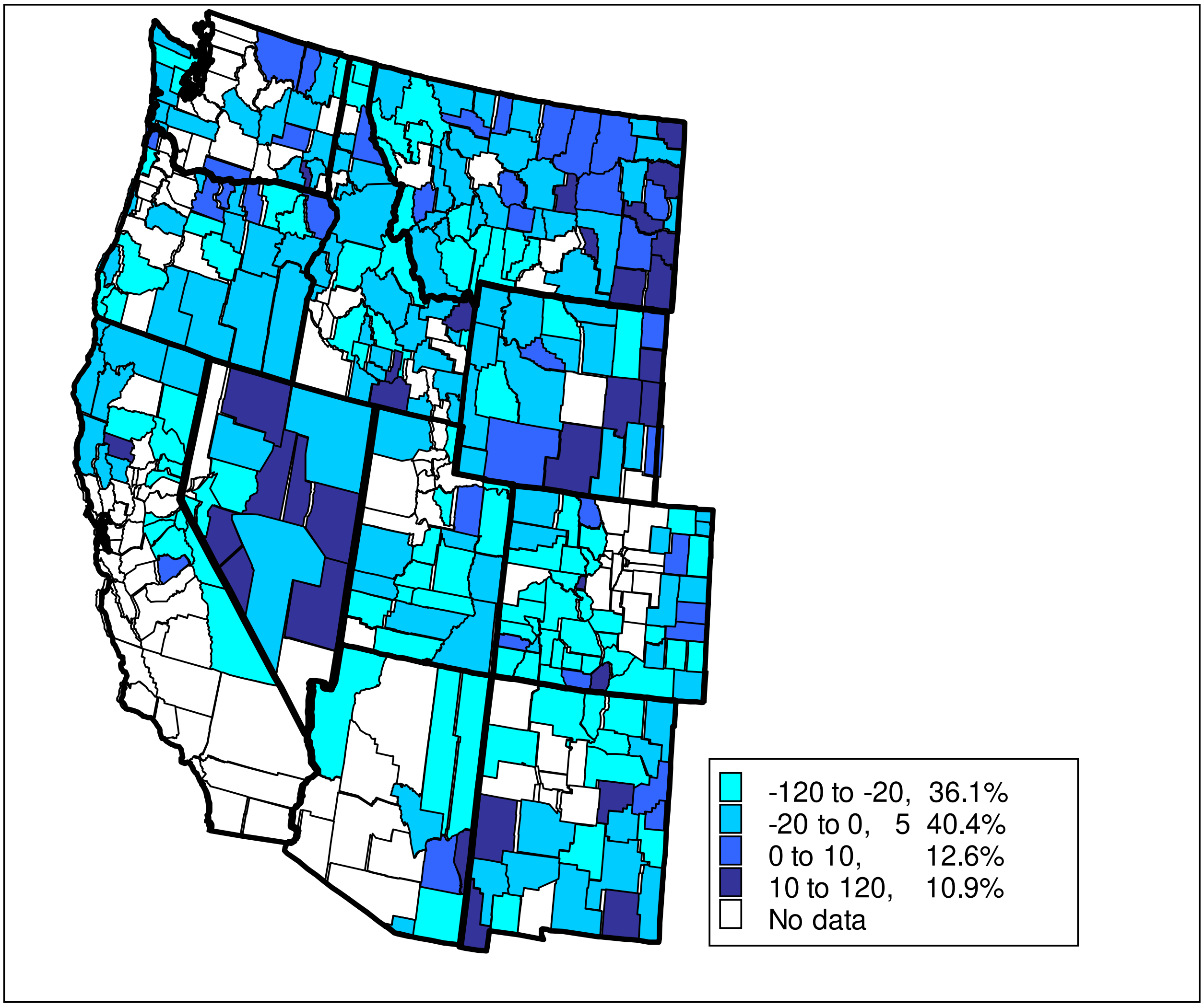

Figure 2. Employment Growth: (2004-2016)-(1992-2004)

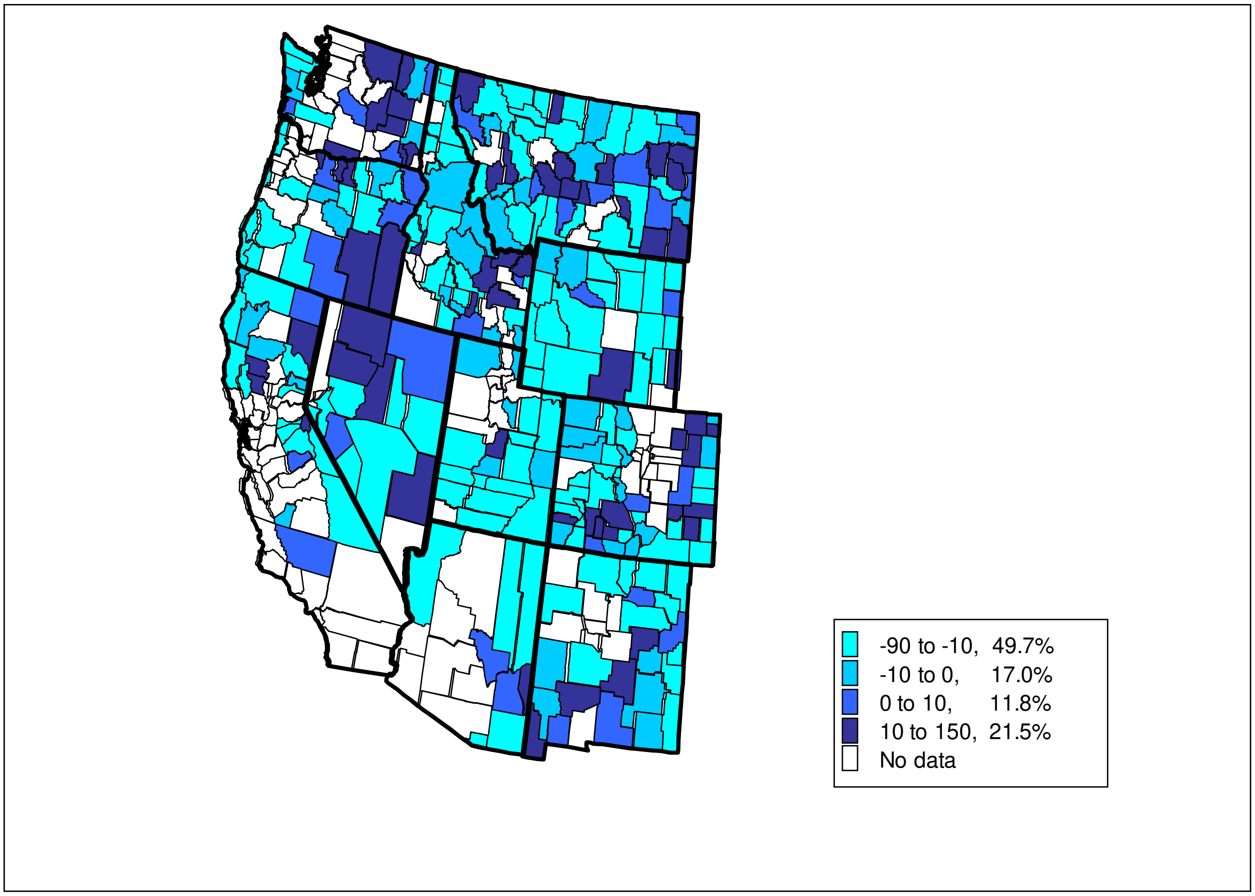

Figure 3. Per Capita Income Growth: (2004-2016)-(1992-2004)