Is the relationship between the amenity scale and population growth simply another way of capturing the broad movement of population out of the Northeast and Midwest to the South and West over the past 25 years, a movement that could be ascribed to a number of factors—such as a desire on the part of industry for lower labor costs and less unionization—in addition to natural amenities? To address this question, the four census regions (Northeast, Midwest, South, and West) were introduced into the analyses of population change.

The results showed that the amenity scale captures far more than the simple broad population movement from north to south and west. Introducing region into the analysis (as a set of dummy variables) added substantially to the variance explained by the base model and raised the (adjusted) R^2 from 19 to 33 percent (table 8). But this was far short of the net additional contribution of the amenity scale to the base model, which raised the R^2 to 42 percent. Moreover, when both the regions and the amenity scale were included, the region variables added little beyond what was explained by the amenity scale alone. Thus, the natural amenity scale alone captures much of the interregional variation in population change.

These relationships between the amenity scale and regional population change are evident in figure 9. Average population growth during 1970-96 was about the same across all the regions with counties at the same level on the amenity scale, with one exception—the high-amenity counties in the South. The rural West had the highest amenity scores, and the Midwest had the lowest. Population growth during 1970-96 was correspondingly much higher in the rural West (65 percent) than in the rural Midwest (5 percent). Differences in rural population growth among regions are almost entirely accounted for by differences in their levels on the amenity scale.

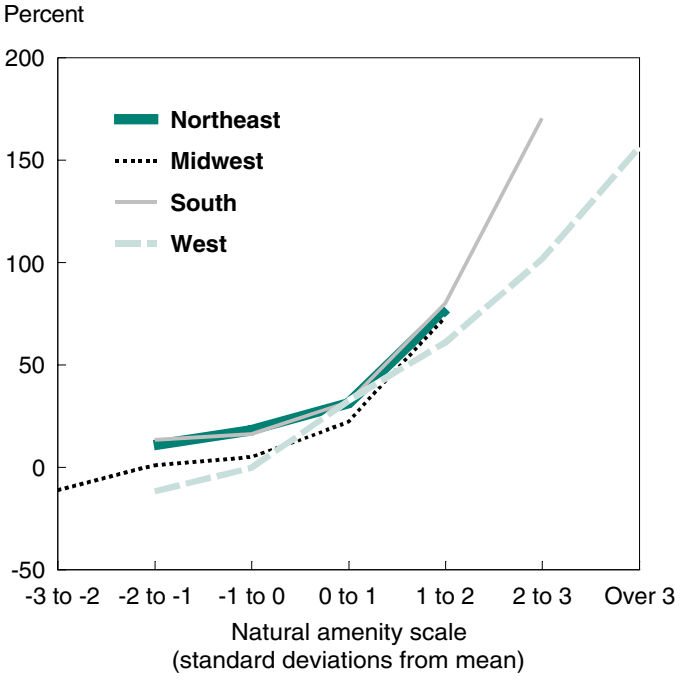
The amenity scale is not as strongly related to population growth *within* regions as it is to growth *between* regions. Even when the measures are treated separately, the net additions to the variance in county population change "explained" (R^2) for the individual regions, while substantial, are still much lower than for the country as a whole (table 9).

Some reduction in the strength of the association between amenities and population growth is to be expected. Natural amenities differ across the country as a whole more than across any individual region, except the West. In the rural Northeast, an extreme case, over 95 percent of the counties are less than one standard deviation unit above or below the national average amenity score. This range is not only narrow, but it is at a point in the scale where it has relatively little relationship with population growth even at the national level. At the same time, other factors influencing population change, such as urban proximity or specialization in manufacturing, are often more influential within regions than across the country as a

Table 8–Results of regression analyses of population change, 1970-96 (log_e), on base variables, natural amenity scale, and four census regions

Analysis	Adjusted R^2
Base measures only	0.193
Base and region	0.329
Base and amenity scale	0.416
Base, region, and amenity scale	0.424

Figure 9
Mean nonmetro population change, by natural amenity level and region



whole. As a result, although still quite relevant to population change, the amenity measures are generally less dominating within regions than absolutely and relative to other factors.

But this is not the whole story. In the Northeast and Midwest, the overall amenity scale does not adequately reflect differences in the relative attractiveness of areas within these regions, at least to the extent that population change in the regions is sensitive to attractiveness. In each case, about 40 percent of the additional variance in population change explained by the individual measures is lost when the overall scale is substituted for the individual measures. In the Northeast, analysis of the individual measures shows that winter sun and water area are highly related to 1970-96 population change, but that winter temperature, temperate summers, and low summer humidity have little net bearing on population change across the region (table 9).

These last measures vary less in the Northeast than in other regions, perhaps so little as not to affect the relative attractiveness of Northeast counties as places to live.

In the Midwest, winter temperature, temperate climate, and water area are the only amenity measures fairly highly associated with population growth. As an experiment, these three measures were combined into an abbreviated amenity scale for the Midwest. This abbreviated measure has a stronger correlation with 1970-96 population growth in the region than the larger scale ($r = 0.53$ vs. $r = 0.26$). This measure is also more highly correlated with status as a recreation county than is the full scale ($r = 0.34$ vs. $r = 0.20$). In the Midwest, it is the lakes, not hills or mountains, that tend to attract vacationers.

However, despite the short scale's relevance to the Midwest, the levels of population growth in the high-

Table 9–Nonmetro county population change, 1970-96 (log_e): Descriptive statistics and regression results by region

		Region			
Statistic	Formula	Northeast	Midwest	South	West
A. Adjusted R^2:					
1 Base measures only [1]		0.284	0.343	0.193	0.259
2 Six amenity items added to base		0.392	0.427	0.371	0.379
3 Amenity scale added to base		0.352	0.391	0.345	0.352
B. Addition to adjusted R^2:					
1 Amenity items individually	(A2-A1)	0.108	0.084	0.179	0.120
2 Amenity scale	(A3-A1)	0.068	0.048	0.153	0.093
3 Difference	(B1-B2)	0.040	0.036	0.026	0.027
C. Percent loss in additional variance explained when scale is used, rather than individual items	(100xB3/B1)	37.2	42.6	14.6	22.4
D. Standardized coefficients:					
Warm winter		0.08	0.15	0.35	0.13
Winter sun		0.27	0.06	0.15	0.23
Temperate summer		0.03	0.26	0.26	0.23
Low summer humidity		-0.07	0.02	0.25	0.26
Water area		0.18	0.20	0.21	0.13
Topographic variation		0.12	0.09	0.34	0.11
E. Amenity statistics:					
Mean		-0.11	-1.76	0.26	3.22
Standard deviation		1.07	1.45	1.37	2.33
F. Population statistics (not log transformed):					
Mean population change		25.2	5.4	30.2	64.5
Standard deviation		31.1	27.9	52.9	86.1

[1] In addition to the amenity measures, the analyses include county economic type, high poverty, population density and its square, and the urban influence code.

amenity counties in the region according to the short scale are far below the levels shown for the country as a whole with the overall scale.

The analysis suggests a two-tiered influence of natural amenities on population movement: a national level of influence, affecting the movement of people across States and regions for both residence and recreation; and a more regional influence, affecting migration and recreation patterns within regions. The qualities of attractive areas within regions appear to vary from one region to another, depending on the regional endowments. Thus, within the Midwest, much of which is relatively flat compared with the West and parts of the Northeast and South, lake areas are the primary attraction.