Journal of Leisure Research
1997, Vol. 29, No. 2, pp. 201-224

The Effect of State Parks on the County Economies of the West

Kevin T. Duffy-Deno, Ph.D.
Westminster College, Gore School of Business, Salt Lake City, UT 84105

The local economic impact of State Parks is analyzed using a cross-section sample of 250 non-metropolitan counties from the eight-State intermountain west. The analysis consists of the estimation of a disequilibrium, simultaneous econometric model of county economic development. The number of State Parks per acre of county land area is found to have a positive, statistically significant, but relatively small effect on both county population and employment densities. Specifically, 10 percent higher State Park densities are associated with 1.4 and 2.3 percent higher long run population and employment densities, all else constant. These findings are consistent with the hypothesis that households are attracted to high amenity regions and that regional amenities such as State Parks can have both direct and indirect economic development implications.

KEYWORDS: *State parks, economic impact, development, employment, population, county, econometric, disequilibrium*

Introduction

Traditionally, the local economic development implications of State Parks has been analyzed from the point-of-view of economic base theory. Economic base models view the local economy as being driven by demand from outside the region. That is, the recreational opportunities afforded by a State Park are "exported" to non-residents and it these non-resident expenditures that drive the local economy. From a State-wide perspective, however, recreational expenditures are not seen as having an economic effect (unless they are made by non-State residents) if State recreationists simply substitute one in-State activity for another.[1] At the local level, though, economic effects are possible as "outside" dollars are injected into the local economy, even if they are the expenditures of State (non-community) residents.

Quantification of these economic effects (impacts) is usually made through the use of regional input-output (I/O) models (Miller & Blair, 1985). After obtaining data on the expenditures made on a typical recreation

The majority of the analysis reported on in this paper was conducted while the author was Senior Economist with the Utah Office of Energy and Resource Planning (OERP). The database assistance of Thomas Brill at OERP, the comments of Terry Green of the Utah Division of Parks and Recreation, and the comments of three anonymous reviewers are gratefully acknowledged.
Address correspondence to Kevin Duffy-Deno 3216 E. 8510 S., Sandy, UT 84093.

[1]To the extent that residents travel out-of-State for recreational opportunities if these opportunities are not supplied in-State, from a State-wide perspective, recreational expenditures may still have an economic effect.

trip to a State Park, determining where (spatially) these expenditures likely occur (i.e., in or out of the local community), and allocating the intra-community expenditures among the sectors of the community economy, the I/O model then computes the total economic effect of a typical State Park visit.[2] An annual effect can be computed by multiplying the number of visits per year to the State Park by the typical visit impact. Examples of this type of analysis as applied to State Parks are Cordell et al. (1989a, 1989b), Bergstrom et al. (1990), and Cordell et al. (1992).[3]

The national and regional migration literature, however, suggests that local economies may also be driven by supply-side factors. People move for a variety of reasons, some of which include the amenities of a region such as climate, open space, scenic beauty, and, possibly, State Parks (Knapp & Graves, 1989). If State Parks are seen as enhancing the local amenities and serve as an attractant to in-migration, then State Parks can have an *indirect* effect on the local economy as well as a *direct* effect. That is, high-amenity counties attract population, which in turn leads to higher levels of employment. This indirect effect is in addition to the traditional direct effect on employment caused by the exportation of recreational opportunities to non-residents.

The current study of the economic effect of State Parks differs from previous recreational impact studies in two respects. First, quantification of the economic effect is achieved through the estimation of an econometric model. Using cross sectional data from 250 non-metropolitan counties in the eight-State intermountain west, the hypothesis tested is that 1990 county population and employment densities are unrelated to the number of State Parks, measured in terms of density, in the county. The second difference stems from the model of regional economic development upon which the estimating equations are based. In order to capture both the direct and indirect linkages between State Parks and local economic activity, a simultaneous model is used, one that relates population to employment and employment to population at the county level. In additional, the model assumes that regions are not currently in equilibrium with respect to their population and employment and that substantial adjustment costs are incurred as regions move toward equilibrium.

Section II of this paper presents descriptive statistics on State Parks across the 50 States and across the 280 counties that comprise the eight-State intermountain west. The theoretical model supporting the analysis is presented in Section III, while the empirical model is presented in Section IV. The estimated economic effect of State Parks on county population and employment is presented in Section V. Concluding comments are made in Section VI.

[2]The allocation of recreation expenditures across regions and economic sectors is somewhat ad hoc. English and Bergstrom (1994) propose a theoretically based method for this allocation.

[3]An early study of the economic impact of State Parks employed an ad hoc approach to estimating effects rather than an input-output model (Dean et al., 1978).

State Parks in the Intermountain West

Every state of the union has a state park system, albeit some are more extensive than others. Table 1 presents the top 25 States in terms of the share of 1993 State land area dedicated to State Parks. As shown, New Jersey devotes the largest land share to State Parks (6.4 percent) followed by Massachusetts, Connecticut, and Maryland. Only one intermountain state, Colorado, falls in the top 25 in terms of the percentage of acreage devoted to State Parks. Utah ranks 37th; Montana ranks last.

Although there are differences between the States in terms of how State Park visitation is measured, an indication, although imperfect, of intensity of use may be obtained by examining the number of visitors per State population and the number of visitors per State Park acre. The last two columns of Table 1 present these data. Since it is a prime tourist destination, it is not

TABLE 1
Top 25 States: 1993 State Land Acreage in State Parks

	SP Land Acreage		SP Visitors	Population	Visitors	Visitors
	1000 Acres	% of State	1000's	1000's	Per Capita	Per Acre
New Jersey	305	6.40%	11,643	7,820	1.49	38
Massachusetts	292	5.60%	15,139	5,993	2.53	52
Conn	174	5.60%	7,314	3,279	2.23	42
Maryland	242	3.80%	9,666	4,917	1.97	40
New Hampshire	75	1.30%	1,158	1,115	1.04	15
Rhode Island	9	1.30%	3,515	1,001	3.51	391
West Virginia	199	1.30%	7,822	1,809	4.32	39
Calif	1330	1.30%	66,674	30,895	2.16	50
Florida	428	1.20%	11,416	13,483	0.85	27
Vermont	64	1.10%	765	571	1.34	12
Illinois	391	1.10%	35,851	11,613	3.09	92
Delaware	14	1.10%	3,151	691	4.56	225
Pennsylvania	276	1.00%	35,641	11,995	2.97	129
New York	260	0.90%	62,376	18,109	3.44	240
Alaska	3240	0.90%	6,590	588	11.21	2
Michigan	288	0.80%	21,228	9,434	2.25	74
Ohio	209	0.80%	56,908	11,021	5.16	272
Washington	247	0.60%	45,114	5,143	8.77	183
Kansas	324	0.60%	3,930	2,515	1.56	12
Hawaii	25	0.60%	15,178	1,156	13.13	607
Tennessee	133	0.50%	28,701	5,025	5.71	216
Colorado	342	0.50%	10.137	3,465	2.93	30
North Carolina	135	0.40%	11,830	6,836	1.73	88
Maine	75	0.40%	1,842	1,236	1.49	25
Wisconsin	127	0.40%	11,481	4,993	2.30	90
US Average	232	0.88%	14,508	5,070	4	127

surprising that Hawaii leads the states in terms of both indicators. With respect to visitors per acre, State Parks in Rhode Island, New York, and Ohio are used most intensively after those in Hawaii.

Focusing on the 280 counties in the eight-State intermountain west (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, and Wyoming) reveals a fair degree of variation in terms of State Parks. Table 2 presents the top 25 intermountain counties in terms of the number of State Parks located in each county as of 1990. As shown in Table 2, Missoula county in Montana has the most State Parks at 5. A little over half of the 280 counties have at least 1 State Park located within their borders, and 22 percent have two or more parks. In terms of the percent of county land area devoted to State Parks, Gilpin county, Colorado, leads the intermountain west at 10 percent. The average for those counties that have at least one State Park is 0.33 percent.

TABLE 2
Top 25 Intermountain Counties: 1990 State Parks

		State Parks	SP Land Area		SP Visits	Visits Per Capita	Visits Per Acre
			Acres	% of County			
Missoula	MT	5	367	0.02%	NA	NA	NA
Platte	WY	4	16,788	1.26%	288,950	35.48	17
Salt Lake	UT	4	2,878	0.61%	907,071	1.25	315
Emery	UT	4	4,056	0.14%	232,057	22.46	57
Pinal	AZ	4	4,445	0.13%	153,981	1.32	35
Lincoln	NV	4	6,272	0.09%	188,466	49.92	30
Yavapai	AZ	4	1,036	0.02%	215,575	2.00	208
Sierra	NM	3	29,930	1.12%	2,137,070	215.60	71
Clark	NV	3	54,517	1.08%	764,539	1.03	14
Washington	UT	3	6,137	0.40%	252,360	5.20	41
Kootenai	ID	3	2,900	0.36%	567,081	8.12	196
Fremont	WY	3	20,524	0.35%	246,657	7.33	12
Delta	CO	3	2,401	0.33%	132,663	6.32	55
Jefferson	MT	3	2,897	0.27%	NA	NA	NA
Routt	CO	3	2,540	0.17%	610,825	43.36	240
Larimer	CO	3	2,628	0.16%	504,319	2.71	192
Rich	UT	3	884	0.13%	160,185	92.86	181
Ada	ID	3	875	0.13%	804,187	3.91	919
Big Horn	MT	3	3,889	0.12%	NA	NA	NA
Cascade	MT	3	1,904	0.11%	NA	NA	NA
Mesa	CO	3	1,786	0.08%	361,687	3.88	203
Uintah	UT	3	2,285	0.08%	175,567	7.90	77
San Miguel	NM	3	2,361	0.08%	212,580	8.26	90
Beverhead	MT	3	317	0.01%	NA	NA	NA
San Juan	UT	3	27	0.00%	171,239	13.57	6,342

In terms of intensity of use, Tombstone Courthouse State Historical Park in Cochise county, Arizona, ranks first at 68,194 visitors per acre in 1990. This is a result of its small size (one acre) and close proximity to Interstate 10 and Tucson, Arizona. With respect to visitors per county population, Sierra county, New Mexico, ranks first at 216. There are three State Parks in Sierra county, all in close proximity to Interstate 25. For those 146 counties that have at least one State Park, the average number of visitors per acre is 1,239, while the median number is 107. A summary of sample statistics with respect to State Parks for the 280 counties in the intermountain west is shown in Table 3.

Theoretical Model

The estimation of the effect of State Parks on the county economies of the intermountain west is based on a four equation, simultaneous model. In the spirit of Carlino and Mills (1987) and Clark and Murphy (1996), the point of departure is a linear partial adjustment model for county population and employment densities.[4] In this disequilibrium model of regional growth, households and firms are assumed to be geographically mobile. Households are assumed to migrate in search of higher utility, utility which is derived from the consumption of private goods as well as from nonmarket amenities which may vary by location. The role of amenities such as environmental quality, scenic vistas, and open space in explaining regional population movement has been the subject of increasing interest on the part of regional economists and demographers in recent years (e.g., Roback, 1982; Hoehn, Berger, & Blomquist, 1987; Roback, 1988; Knapp & Graves, 1989).

TABLE 3
Intermountain County Sample Statistics

	280 County Sample	146 Counties with State Parks				
			SP Land Acreage		Visits	
	State Parks	State Parks	% of County	Per Park	Per Capita	Per Acre
Average	0.86	1.65	0.33%	2,577	14	1,239
Median	1	1	0.05%	566	4	107
Maximum	5	5	10.44%	70,708	216	68,194
Minimum	0	1	0.00%	1	0	0

[4]Evans (1990) argues that the existence of migration suggests that a disequilibrium model of regional growth may be more appropriate than an equilibrium model. Recent work in this area includes Evans (1993), Schachter and Althaus (1993), Graves and Mueser (1993), and Harrigan and McGregor (1993).

Competitive, profit-maximizing firms are assumed to migrate in order to lower their cost of production. Hence, such firms may be attracted to regions that offer relatively lower wage rates, a more educated labor force, and lower tax rates, for example. However, as argued by Power (1996) and others, firms may also be, at least partially, attracted to high amenity regions. Some firms may view positively the attractiveness of the region as a place in which to work and do business. In addition, such areas may have a relatively higher-quality and, hence, a more productive (i.e., lower-cost) labor force. This would be the case if educated and trained people were willing to trade a higher quality of life for lower incomes in moving to such areas.

Firms (households) enter and leave regions until profits (utility) are equalized across regions (i.e., when there is no longer a reason to move). Equilibrium population and employment (EMP) are assumed to be simultaneously determined (Steinnes & Fischer, 1974) and depend upon a variety of other factors that affect production costs (S) and utility levels (T) across regions. Moreover, in light of the substantial search and moving costs associated with migration, population and employment likely adjust to their equilibrium values with substantial lags. A distributed adjustment lag is introduced for both population and employment density

$$\text{POP} = \lambda_P \text{POP}^* + (1 - \lambda_P)\ \text{POP}_{-1} \tag{1}$$

$$\text{EMP} = \lambda_E \text{EMP}^* + (1 - \lambda_E)\ \text{EMP}_{-1} \tag{2}$$

where the subscript "-1" indicates a one-period lag, "*" indicates the equilibrium value, and λ_E and λ_P are speed-of-adjustment coefficients with $0 \leq \lambda_E, \lambda_P \leq 1$.[5] Finally, substitution and rearranging terms yield the following structural population and employment equations:

$$\text{POP} = \lambda_P \alpha_0\ \text{EMP} + (1 - \lambda_P)\ \text{POP}_{-1} + \lambda_P \alpha_1\ T \tag{3}$$

$$\text{EMP} = \lambda_E \beta_0\ \text{POP} + (1 - \lambda_E)\ \text{EMP}_{-1} + \lambda_E \beta_1\ S \tag{4}$$

where population and employment densities depend on contemporaneous EMP and POP, their own lagged value, and a set of exogenous variables.

This simple framework, however, may not adequately describe the counties of the west which, historically, have depended (and continue to depend in some cases) on extractive resource industries (i.e., agriculture, mining, and lumber). Such firms are unlikely to be very mobile as they are tied to a region by the availability of exploitable resources. In addition, although resource firms do respond to many of the same regional-specific factors as nonresource firms (e.g., taxes, labor supply, public infrastructure), they are likely more sensitive to external forces such as resource prices. In this sense, the resource sector is more of an "exogenous" sector than, for example, manufacturing. Although manufacturing firms are also often dependent upon national or world markets, they are not tied to the geology of a region and

[5]Gujarati (1995) discusses the use of partial adjustment econometric models.

can more easily migrate in search of lower production costs. The simple model given by equations (3) and (4) is expanded by modeling the resource sector as a separate equation and including a measure of resource sector employment in the total employment equation to account for spillover effects from this exogenous sector to the rest of the local economy. This essentially introduces an "export base" component to this simple regional model.[6]

Another sector that is exogenous to the local economy is the government sector. For the most part, government employment decisions are driven by factors external to the forces at play in county economies (e.g., military bases). The government sector is not modeled directly. However, a variable measuring the government sector is included in the total employment equation to account for spillover effects.[7]

The in-migration of households can lead to increased pressure on existing recreational sites. Thus, the number of State Parks in a county may be positively related to population densities. That is, more State Parks may be located in counties characterized by relatively higher demands for recreational opportunities. The simple model given above is further expanded by a fourth equation that seeks to explain the density of State Parks across the counties of the intermountain west in terms of population densities.

Thus, the four equation model of county development that will be estimated is as follows:

$$\text{POP} = \lambda_P \alpha_0 \text{ EMP} + (1 - \lambda_P) \text{ POP}_{-1} + \lambda_P \alpha_1 T + \lambda_P \alpha_2 \text{ ST PARKS} \quad (5)$$

$$\text{EMP} = \lambda_E \beta_0 \text{ POP} + (1 - \lambda_E) \text{ EMP}_{-1} + \lambda_E \beta_1 S_E + \lambda_E \beta_2 \text{ ST PARKS} + \lambda_E \beta_3 \text{ REMP}_{-1} + \lambda_E \beta_4 \text{ GEMP}_{-1} \quad (6)$$

$$\text{REMP} = \lambda_R \delta_0 \text{ POP} + (1 - \lambda_R) \text{ REMP}_{-1} + \lambda_R \delta_1 S_R + \lambda_R \delta_2 \text{ ST PARKS} \quad (7)$$

$$\text{ST PARKS} = \gamma_0 \text{ POP} + \gamma_1 R. \quad (8)$$

where EMP now refers to total private, non-resource employment, REMP and GEMP are resource and government sector employment, and ST PARKS is the number of State Parks per acre of county area.

With respect to the population density equation (5), ST PARKS enters directly as a factor that may affect household location decisions. That is, if

[6]By no means is this a full export base model as each sector of the local economy likely has its own export portion. For example, part of the services sector is export based, that part that is connected with providing service to tourists.

[7]One can argue that some portion of county State and Local government (SLG) employment is endogenous (i.e., related to county population). However, including SLG employment in the dependent variable would cloud the interpretation of the "pure"economic development effect of State Parks as State Park employees are included in SLG employment. The findings of this paper, though, are unaffected by the inclusion of SLG employment in the dependent variable.

the existence of a State Park(s) in a county is considered to be an amenity, then it may contribute positively to the explanation of the variation in population densities across the counties of the intermountain west. Although there has been little empirical analysis of the role that State Parks may play as an amenity variable, there has been some analysis of the role that National Parks and other protected areas may play in local economies (e.g., Jackson & Wall, 1995; Rudzitis, 1994; Rudzitis & Johansen, 1989).

With respect to the total employment equation (6), ST PARKS enters directly as a factor that may affect, positively, firm location decisions. This would be the case if firm location decisions are sensitive to the same types of amenities as are the location decisions of households (Power, 1996). ST PARKS may also capture the employment associated with firms servicing the non-resident recreationists who visit the State Park(s) located in the county as well as the employment induced from the additional income generated from this activity in the recreational sector. Since EMP is *private* employment, ST PARKS does *not* capture the State government workers employed at the State Park(s). Thus, ST PARKS will capture the "pure" economic development effect associated with State Parks.

ST PARKS also enters directly into the resource employment equation (7) where resource employment consists of employment in the agriculture, mining, and wood products industries. Since it is unlikely that the location decisions of extractive resource firms are influenced by local amenities, ST PARKS captures only the constraints that the existence of a State Park(s) in the county may place on extractive resource activity. However, in light of the relatively small size of most State Parks, a priori, ST PARKS likely has no effect on resource employment. For completeness though, ST PARKS is included in the resource employment equation to test this hypothesis.

Finally, the density of State Parks is assumed to be simultaneously related to population density, as shown by equation (8). The existence of a State Park(s) may attract households to the county. At the same time, greater population density represents a greater demand for recreational opportunities and, thus, may place pressure on State governments to locate additional State parks in the county. The full empirical specification of equations (5) through (8), with respect to the factors in S, T, and R, follows in the next section.

Empirical Model

The model outlined above, summarized by equations (5) through (8), is estimated using a cross-section sample of county-level data for the eight intermountain States. The dependent variables represent densities for 1990. Most of the explanatory variables take on beginning-of-period values (i.e., early 1980's) to minimize simultaneity bias. The empirical specification of the model follows (for the production cost, S, utility, T, and R variables) and is based on the empirical literature and judgement.

Population Equation

Population density in 1990 depends on total employment density in 1990, lagged population density, a number of variables hypothesized to affect household utility (T) and, hence, the decision to migrate, and a number of structural variables. These variables in T can be categorized are follows.

Fiscal Factors as those that reflect the public sector costs and benefits associated with moving to a given region (Tiebout, 1954). Households are assumed to be more attracted to counties with relatively lower levels of per capita local taxes as well as counties with smaller shares of those taxes in the form of property taxes. To account for the possible benefits of higher per capita taxes, the number of police officers per capita and the number of primary and secondary teachers per pupil are included.

Households may also be attracted to counties with a transportation system that facilitates accessibility to other areas. This effect may be captured by the miles of highways per acre of county land area. Households may also be attracted to regions with higher than average median incomes.[8] Both these variables fall under the category of *Local Factors.*

A third category is non-market *Amenity Factors.* Climate is captured by the average annual precipitation, the average number of heating and cooling degree days, and the average percentage of sunny days. Recreational opportunities, the surrounding scenic beauty, and the presence of open space may be captured by the share of county land controlled by the following four Federal agencies: the US Forest Service (USFS), the National Park Service (NPS), the Bureau of Land Management (BLM), and the US Fish and Wildlife Service (USFWS).[9] In addition a variable indicating the number of destination ski resorts located in the county is included to capture the pure amenity effect, if any, of living in a "resort" area. Finally, the variable of primary interest, the density of State Parks, is included to capture the amenity effect on household location decisions of the presence of a State Park(s) in the county.

Total Private, Non-Resource Employment Equation

Total private, non-resource employment density in 1990 depends on population density in 1990, lagged total employment density, *Fiscal, Business,*

[8]Following Clark and Murphy (1996), median income is defined as the portion of household income that does not vary with amenities, local fiscal conditions, and the stock of human capital. This measure of median income is obtained by regressing household median income on these factors and obtaining the residual. Clark and Murphy interpret this measure of "residual income" as capturing compensation over and above that which compensates for amenities, local fiscal conditions, and human capital.

[9]To the extent that the amount of developable land in a county is inversely related to the amount of land owned by the federal and other government agencies, as well as being affected by the topography of the county, this variable may also capture the effect of less developable land on county growth.

Exogenous, *Amenity*, and a number of *Structural Factors*. The variables in S can be categorized as follows.

As with households, firms may be attracted to regions that spend relatively more on public services, all else constant. In addition, firms may be dissuaded from moving to regions that have relatively higher tax burdens, particularly if the higher taxes are not associated with perceived higher quality public services and/or the package of public services funded with the higher taxes is not particularly useful to the private sector. Thus, the same *Fiscal Factors* are included in the employment equation.

Several *Business* and *Local Factors* are hypothesized to be important to private firms. Firms may be attracted to regions which afford a greater access to markets. Total highway mile density may capture this effect. Alternatively, highway mile density may be proxy for road congestion which presumably firms do not prefer. The state of the local labor market may be also important. Firms are assumed to be attracted to regions with a more highly educated population, a relatively greater pool of available labor, and relatively lower labor costs. These factors are taken into account by including the percent of the county population with a high school education, the county unemployment rate, and the average hourly manufacturing wage. In addition, the cost of electricity is included to proxy for the costs of energy, an input to the production function.

Exogenous Factors are captured by three variables. These variables measure exogenous injections into the local economy which, through a multiplier effect, can affect total employment: (i) the percent of total personal income derived from dividend income; (ii) the government share of total county employment; and, (iii) the resource sector share of total county employment.[10]

Whether firms are also sensitive to *Amenity Factors* is an empirical issue. Just as households may be attracted by the amenities offered by a county so too may many types of firms. Hence, the same set of amenity variables are included in the employment equation as in the population equation. Again, these variables reflect climate and land ownership patterns.

Finally, the density of State Parks is also included to capture the direct effect of State Parks on total county employment. Again, since the dependent variable does not include government employment, the State Parks variable will capture the regional development effects associated with the presence of a State Park and not simply pick-up State government employment.

Resource Employment Equation

The specification of the resource employment equation essentially follows that of the total employment equation. Although this sector is modeled

[10]In terms of statistical significance, these "exogenous factors" contribute more to the explanation of employment density when entered as 1980 values. Similarly, dividend income rather than dividend income plus transfer payments contributes more to the explanation of employment density.

as exogenous to the local economy, it is still affected by many of the same factors that affect firms in other sectors. It is also assumed to be subject to a similar partial adjustment process. In addition to the variables included in the total employment equation, three variables are included to capture the mix of the resource sector in 1980. Binary variables for whether or not uranium and hard rock minerals were mined in the county in 1980 are included. The uranium mining industry all but totally collapsed during the 1980's, adversely affecting non-diversified county resource sectors. The hard rock mining industry was also volatile across counties, crashing in some (Colorado) but soaring in others (Nevada). Also included is the percent of resource employment in the agriculture industry in 1980 as a third indicator of the resource sector mix.[11] The *Exogenous Factors* are not included in the resource equation as the sector is assumed to be itself exogenous. In addition, the number of ski resorts is also excluded as it is assumed that resource firms are relatively insensitive to such an amenity factor. However, to the extent that climate affects the agricultural sector, the sunny days, temperature, and precipitation variables are included in the equation. Finally, four separate variables indicating the share of county land controlled by the USFS, NPS, BLM, and USFWS are included since Federal agencies may differ in their land use regulations and, hence, in their potential effect on resource firms.

State Parks Equation

The density of State Parks in 1990 depends on the population density in 1990, a number of variables hypothesized to affect the decision to locate a State Park in a county (R), and a number of structural variables. The variables in R are as follows.

The contemporaneous demand for recreational opportunities is proxied by the population density of the county. However, a history of demand growth is likely required before State officials determine that a State Park is justified. The rate of change in county population in the preceding decade (1970's) is included to capture this effect.

In addition, the placement of a State Park in a county may be less likely if there are other recreational opportunities that already exist in the county. The percent of county land area controlled by the National Park Service (NPS), Bureau of Land Management (BLM), and US Forest Service (USFS) are included to proxy for other recreational opportunities in the county. Since another alternative recreational opportunity is a destination ski resort, the number of ski resorts in the county is also included.

Many State Parks are located on bodies of water controlled by the Bureau of Reclamation (BOR) and Corps of Engineers (COE). Bodies of water

[11]Binary variables indicating whether oil, gas, and coal were mined in the county in 1980 were also included but proved not to be statistically associated with resource employment in 1990. These variables were removed in the final estimation.

are a natural sources of recreational opportunities, especially in the west, and State governments often find it easier to reach agreements with Federal agencies than private land owners. To account for this effect, the percentage of county land area controlled by these two agencies is also included.[12]

Finally, all else constant, the placement of State Parks may be affected by weather patterns. That is, counties that are either hotter or colder than average may have fewer State Parks per acre than counties with milder climates. Hence, the average number of heating and cooling degree days, precipitation, and days of sun are included to account for this effect.

Structural Variables

A number of structural variables are included in all equations. Binary State variables are included to account for unspecified effects that vary among States but not among the counties within a State. A binary variable indicating whether the county is adjacent to an urban county (Adj UC) is included to capture any spillover effects from highly urbanized counties. In both the population and employment density equations a binary variable indicating the presence of a city with a population greater than 25,000 is also included. Such a variable may capture any trend associated with population and employment gains or losses associated with larger cities, preferences for urban vs. rural living, and/or agglomeration economies for both households and firms. Finally, also included in the total employment equation is a variable for the number of destination ski resorts in the county. In addition to any amenity effect associated with locating in a "resort" area, this variable captures the employment effect associated with the presence of an uncommon industry.[13]

Data Sample

The starting population is all 280 counties in the eight intermountain States. Since the economic effect of State Parks is of most interest for nonmetropolitan counties, 25 US Bureau of the Census-designated "urban" counties are excluded from the sample.[14] Two counties, Yuma, Arizona and

---

[12]Data on water acreage by county, perhaps a better determinant of the placement of State Parks than BOR or COE acreage, are not readily available. In addition, the total river mileage in a county, data that are also not readily available, may also better explain the placement of State Parks.

[13]It has been argued that some "amenity" counties in the west are growing because of the presence of a resort and not because of an influx of migrants seeking amenities such as scenic beauty, open space, and high environmental quality.

[14]Twenty-three counties are defined as urban if they were part of a Metropolitan Statistical Area (MSA) in 1980: Maricopa and Pima in Arizona; Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Jefferson, Larimer, Pueblo, and Weld in Colorado; Ada in Idaho; Cascade and Yellowstone in Montana; Clark and Washoe in Nevada; Bernalillo and Dona Ana in New Mexico; and Davis, Salt Lake, Utah, and Weber in Utah. Although Natrona, Wyoming was classified as a MSA in 1980, this county is included in the sample since its population density is very low (21 per acre) relative to other urban counties (the median density for MSA counties excluding Natrona is 227 per acre in 1980). Also excluded from the sample are two counties that were not classified as

Valencia, New Mexico, were each split into two counties during the 1980's (forming La Paz, Arizona, and Cibola, New Mexico). These four counties, as is Carson City, Nevada for which there is not consistent data, are excluded from the sample. The final sample used in the estimation consists of 250 non-metropolitan intermountain counties.

The employment data are from the U.S. Bureau of Economic Analysis (BEA), Regional Economic Data Information System. These data measure employment by place of work for all major sectors at the county level. The population data are from the U.S. Bureau of the Census, County and City Data Book. These primary data are supplemented by data from a broad range of other sources.

Empirically, the question arises as to the appropriate measure of "State Parks" to incorporate into the estimation of equations (5) through (8). The existence of a State Park in a county could have little effect on the local economy if it is not a very popular recreation or tourist destination. This suggests that some measure of State Park visitation may be an appropriate variable. Unfortunately, State Park visitation, while itself positively correlated with county employment, is also correlated with county population. This correlation is such that when both population and park visitation are entered as right-hand-side variables, as called for by equations (5) through (8), the independent effect of visitation on employment and population is statistically confounded. An alternative measure of State Parks employed in this paper is simply the number of parks located in the county. The multicollinearity problem is lessened considerably, and Montana counties can be included in the sample for which 1990 State Park visitation data are unavailable. Since larger counties simply have more land, they tend to have a greater number of State Parks located within their boundaries. To reduce this "scale effect," the density of State Parks in a county is employed in the estimation.[15]

For the purposes of this study, a State Park is either a "State Park" or a "State Historical Park" or "Site" as defined by each State's Department of Parks and Recreation. Thus, State Forests, Game Refuges, Fishing Bridges/ Sites are excluded unless they are specifically referred to as a State "Park." There appears to be considerable consistency among the eight intermountain States in terms of what constitutes a "State Park." However, since individual State nomenclature was relied on for the classification, ambiguity and measurement error in the State Park variable is possible. A complete list of the explanatory variables and data sources is presented in the appendix as well as descriptive statistics.

---

part of an MSA in 1980 but whose population densities are very high and place them in the urban county category: Canyon, Idaho (224 per acre) and Los Alamos, New Mexico (252 per acre).

[15]An alternative measure of State Parks is the State Park(s) share of county land area. Use of this variable instead of the density of State Parks yields the same findings in terms of the population effect described below. However, the direct employment effect was not statistically significant. This may indicate that in terms of direct employment impacts, what counts is the *number* of State Parks, or recreational opportunities, rather than the *size*.

Estimation

As specified, the model given by equations (5) through (8) is simultaneous and is estimated using two-stage least-squares (TSLS). The White variance correction procedure is also used to correct for an unknown type of heteroscedasticity (White, 1980). The 95 percent confidence level is used to determine statistical significance unless otherwise noted.[16]

Findings

The TSLS estimates of the population and employment density equations are shown in columns one and two of Table 4. The population and total employment equations explain 97 and 94 percent of the variation in the dependent variable.[17] The estimated coefficients on lagged population and total employment density suggest that population and employment densities pick up approximately 9 and 6 percent of the difference between their equilibrium and actual values per decade.[18]

Among the variables in *T* that are associated significantly with population density in 1990 are employment density in 1990 (+), per capita police officers (−), and per pupil teachers (+). Rather than a proxy for increased security, the negative coefficient on per capita police officers may indicate this variable is capturing higher crime rates. With respect to *Amenity Factors*, population densities are statistically higher in counties characterized by hotter and sunnier than average climates. In addition, as evidenced by the binary State variables, counties in Arizona, Idaho, Montana, and Nevada had, on average, greater population densities than those in Utah, the excluded State category.

The variable of primary interest, also an *Amenity Factor*, has a direct statistical effect on population density. In particular, counties characterized by 10 percent greater State Park densities are also characterized by 1.2 percent

[16]Although only a necessary condition for identification, the order condition is generally adequate to ensure identifiability (Gujarati, 1995) and indicates that each equation is, in fact, overidentified. The estimation technique of two-stage least-squares used in this paper is especially designed for overidentified equations and yields unique estimates of each parameter.

[17]One may suspect that the high adjusted R^2's result from the inclusion of lagged dependent variables. However, excluding the lagged dependent variables reduces the explanatory power only slightly (roughly 90 percent for the population and employment equations and 63 percent for the resource employment equation).

[18]In comparison to other studies that have estimated such adjustment factors, Carlino and Mills (1987) found that population and employment density pick up 13 and 16 percent of the difference between their equilibrium and actual level per decade. Clark and Murphy (1996) found adjustments rates of 4 and 10 percent using a fuller specification than did Carlino and Mills. Both of these studies both used a national sample of counties, however.

TABLE 4
Estimated Equations: 250 Non-Metropolitan Intermountain Counties

	Dependent Variables: 1990 Densities			
	Total Population	Total Private Non-Resource Employment	Resource Employment	State Parks
Population Density 1990		0.066 (1.466)	0.026 (3.343)	1.026E-05 (2.247)
Population Density 1980	0.907 (16.000)			
Employment Density 1990	0.339 (3.548)			
Employment Density 1980		0.945 (7.050)	0.300 (2.209)	
Population Change '70-'80				8.300E-07 (2.706)
Fiscal Factors				
PC Local Taxes 1982	−4.239E-07 (0.723)	6.831E-07 (1.881)	−9.980E-08 (1.000)	
PCT Property Tax 1982	−2.876E-03 (1.208)	−1.290E-03 (0.954)	−8.474E-04 (1.853)	
PC Police Officers 1980	−0.077 (2.216)	−0.044 (1.771)		
PP Teachers 1980	0.002 (3.915)	1.264E-03 (3.008)		
Business/Local Factors				
Highway Density 1981	0.619 (1.263)	−0.447 (1.715)	0.095 (0.866)	
Residual HH Income 1980	−5.112E-08 (1.712)			
PCT HS Education 1980		−5.300E-04 (0.219)	−6.974E-04 (1.099)	
PCT Unemployed 1980		0.013 (3.994)	1.584E-03 (1.523)	
Avg Manufacturing Wage 1980		−3.069E-04 (2.636)	−6.921E-05 (2.423)	
Electricity Price 1980		1.516E-05 (2.018)	−3.792E-06 (1.668)	
Uranium 1980			−2.238E-05 (0.201)	
PCT Agric Employment 1980			6.954E-04 (2.325)	
Hard Rock 1980			−1.563E-04 (1.812)	
Exogenous Factors				
PCT Gov't Employment 1980		2.801E-03 (2.098)		
PCT Res Employment 1980		−1.384E-04 (0.088)		
PCT Dividend Inc 1980		9.923E-03 (3.990)		

TABLE 4
(Continued)

	Dependent Variables: 1990 Densities			
	Total Population	Total Private Non-Resource Employment	Resource Employment	State Parks
Amenity Factors				
Heat Days	8.603E-07	4.804E-07	6.830E-08	−2.741E-10
	(2.494)	(1.541)	(0.899)	(2.801)
Cool Days	1.914E-06	1.263E-06	3.790E-07	−7.231E-10
	(1.376)	(1.209)	(1.480)	(2.203)
Average Rainfall	−2.68E-05	−6.264E-05	−6.905E-06	2.551E-08
	(0.705)	(2.194)	(0.847)	(1.786)
PCT Sunny Days	1.880E-04	4.589E-05	−2.350E-06	−4.430E-08
	(3.596)	(1.293)	(0.239)	(2.329)
PCT USFS Land 1990			−4.309E-04	7.086E-08
			(2.091)	(0.179)
PCT NPS Land 1990			−2.130E-04	−1.328E-06
			(0.399)	(1.560)
PCT BLM Land 1990			−1.551E-04	−7.560E-08
			(0.897)	(0.198)
PCT BOR Land 1990				1.576E-06
				(0.303)
PCT COE Land 1990				7.739E-07
				(0.218)
PCT Federal Land 1990	−1.820E-04	−5.090E-05		
	(0.228)	(0.088)		
Structural Factors				
Destination Ski Resort	3.727E-04	3.025E-03		
	(0.563)	(4.654)		
City	−9.749E-04	1.037E-03	−3.270E-04	
	(0.8264)	(0.969)	(1.703)	
Adjacent to Urban County 1980	6.768E-04	−1.198E-04	−1.530E-04	7.802E-08
	(1.454)	(0.427)	(2.496)	(0.513)
Arizona	2.743E-03	9.043E-04	1.280E-04	−8.423E-07
	(2.294)	(1.116)	(0.725)	(2.571)
Colorado	1.003E-03	−3.311E-04	5.090E-05	−7.812E-07
	(1.107)	(0.524)	(0.460)	(1.917)
Idaho	2.690E-03	2.075E-03	5.610E-04	−1.301E-06
	(1.965)	(2.100)	(2.347)	(3.363)
Montana	2.956E-03	7.506E-04	7.830E-05	−1.301E-06
	(2.611)	(0.931)	(0.404)	(2.247)
Nevada	2.436E-03	2.407E-03	4.170E-04	−8.021E-07
	(2.33)	(2.710)	(2.289)	(2.762)
New Mexico	2.045E-03	−1.866E-04	−2.480E-04	−8.290E-07
	(1.654)	(0.271)	(1.764)	(2.801)
Wyoming	1.917E-03	5.905E-04	2.090E-04	−1.048E-06
	(1.698)	(0.708)	(1.223)	(2.521)
Intercept	−0.02	−0.009	0.002	5.303E-06
	(3.576)	(2.301)	(1.825)	(3.227)
Factor of Interest				
State Park Density 1990	2393.4	1716.4	123.09	
	(3.713)	(3.014)	(1.206)	
Adjusted R-Squared	0.977	0.943	0.746	0.149

Notes: Absolute value of *t*-statistics in parentheses.

higher population densities, all else constant.[19] Although the magnitude of this direct effect is quite small, it is none-the-less statistically significant.[20]

Among the variables in S that are significantly associated with employment density in 1990 are per pupil teachers (+), the unemployment rate (+), average manufacturing earnings per hour (−), the typical residential electricity bill (+), the government sector share of total county employment (+), and the percent of total personal income from dividends (+). The counter intuitive finding of a positive relationship between electricity prices and employment density may suggest that this variable is a proxy for some other, unspecified variable that is positively correlated with both employment density and electricity prices.[21] The only *Amenity Factor* that has a statistically significant effect on employment density is average rainfall (−). In addition, employment densities are higher in counties that are home to a destination ski resort. As the dependent variable includes employment in the service sector, this additional employment is comprised of both employment at the resort(s) and the employment induced by resort visitation.[22]

The variable of primary interest has a direct statistical effect on employment density. In particular, counties characterized by 10 percent greater State Park densities are also characterized by 2.2 percent higher employment densities, all else constant. Again the magnitude of the State Park effect is quite small. However, it is roughly twice the size of the effect of State Parks on population densities. In addition, since the dependent variable does not include employment in the government sector, the statistical significance of the State Park effect suggests that State Parks can have a direct effect on local economic development.

The simultaneous nature of this model allows State Parks to have both a *direct* and *indirect* effect on population and employment densities. For example, State Park density directly affects total employment density and indirectly affects population density through the effect of employment on population. The total, or "long run," effect is the sum of the indirect and direct effects. For the estimated equations shown in Table 4, the total effect of State

---

[19]Elasticities are calculated at the means using $\epsilon = (\partial \text{ POP}/\partial \text{ ST PARKS})*(\text{ST PARKS}/\text{POP})$. Based on the estimated direct effect shown in Table 4 (2393.4) and the means of POP and ST PARKS in 1990 shown in Table 2A (0.013 and 6E-07), the short run elasticity is approximately 0.12.

[20]Although the variable ST PARKS has a significant effect on population density, the possibility remains that ST PARKS is a proxy for some other unspecified amenity in the county, such a lakes, reservoirs, and historical sites, that is the true casual factor. Again, data limitations prevent a fuller specification of the population equation.

[21]The negative sign on the highway density variable is consistent with the negative effect of highway congestion on firm location/expansion decisions although the coefficient does not differ statistically from zero. The use of highway miles per capita, perhaps a better measure of road congestion, also did not yield a statistically negative relationship.

[22]As pointed out by an anonymous reviewer, the insignificance of the resource sector employment share in the total employment equation could be interpreted as a rejection of the primary thesis of the export base approach to regional modeling: that western local economies are driven by the exogenous demand for extractive resources.

Park density on employment density is again roughly twice as large as the total effect on population density. Specifically, counties with 10 percent greater State Park densities are characterized by 2.3 percent higher employment densities and 1.4 percent higher population densities, all else constant.[23]

The third column of Table 4 presents the estimated resource employment density equation. The specified equation explains 75 percent of the variation in the dependent variable and suggests that the resource sector adjusts very quickly. Specifically, 70 percent of the difference between actual and equilibrium density levels is picked up over the course of a decade. The relatively high rate of adjustment is indicative of the sector's dependence on the county's resource base. Especially in the mining sector, this resource base can become fully exhausted in a very short period of time leading to a "bust" and a rapid cessation of economic activity.

The variable of primary interest, the density of State Parks, is not statistically associated with resource employment density in 1990. In light of the small size of most State Parks relative to total county land area it is not surprising to be unable to statistically validate the hypothesis that State Parks place constraints on activity in the resource sector.[24]

Finally, the estimates of the State Park density equation are shown in the last column of Table 4. In light of the many unspecified factors that may affect the placement of a State Park in a particular county, such as State budgets and local geographic and historical characteristics, it is not surprising to find that the specified equation explains only 15 percent of the variation in the density of State Parks. However, of interest are the findings that the density of State Parks appears to be affected by population growth (+), and several climate variables: average heating degree days (−), average cooling degree days (−), and average share of sunny days (−). None of the land ownership variables are statistically related to State Park density. In addition, as evidenced by the binary State variables, counties in the other seven intermountain States had, on average, smaller State Park densities than counties in Utah.

Moreover, the estimated coefficient on population density does suggest that population density affects the State Park placement decision. Specifically, counties with 10 percent greater population densities are characterized by 2.2 percent higher State Park densities, all else constant. As shown in

[23]The total, or long run effect, of State Parks on population density is found by substituting the estimated coefficients from Table 4 into the following total derivative: $(d\,\mathrm{POP}/d\,\mathrm{ST\ PARKS}) = (\partial\,\mathrm{POP}/\partial\,\mathrm{EMP})(d\,\mathrm{EMP}/d\,\mathrm{ST\ PARKS}) + (\partial\,\mathrm{POP}/\partial\,\mathrm{ST\ PARKS})$. The result is then used to calculate the long run elasticity as shown in footnote 19.

[24]Although the presence of a State Park(s) in a county does not have a statistical effect on resource sector employment, less may be invested in State Parks in counties that are dependent on resource extraction. This hypothesis was tested by including the resource sector share of total employment in the State Park density equation. However, the estimated coefficient did not statistically differ from zero. Hence, there appears to be no statistical relationship between State Park and resource employment densities in either direction.

column two, the relationship between State Park and population densities is bi-directional. The relative magnitudes of the long run effects, however, suggest that population density has roughly 1.5 times the effect on the density of State Parks than the effect State Park density has on population density (i.e, an elasticity of 0.22 vs. 0.14).

Summary

The local economic impact of State Parks is analyzed using a cross-section sample of 250 non-metropolitan counties from the eight-State intermountain west. The study differs from previous recreational impact studies in two respects. First, quantification of the economic effect is achieved through the estimation of an econometric model. The second difference stems from the model of regional economic development upon which the estimating equations are based. In order to capture both the direct and indirect linkages between State Parks and local economic activity, a simultaneous model is used, one that relates population to employment and employment to population at the county level. In additional, the model assumes that regions are not currently in equilibrium with respect to their population and employment and that substantial adjustment costs are incurred as regions move toward equilibrium.

The number of State Parks per acre of county land area is found to have a positive, statistically significant, but relatively small effect on both county population and employment densities. Specifically, 10 percent higher State Park densities are associated with 1.4 and 2.3 percent higher long run population and employment densities, all else constant. These findings are consistent with the hypothesis that households are attracted to high amenity regions and that regional amenities such as State Parks can have both direct and indirect economic development implications.

The estimation of an equation explaining State Park density across counties suggests that State Parks are placed in high population density counties. The relationship between State Park and population densities is bi-directional with the magnitudes of the estimated effects suggesting that population density has a larger effect on the placement of State Parks than the effect State Parks have on population densities.

Finally, the empirical investigation into the economic effect of State Parks is not closed. Avenues of future inquiry include expanding the analysis to include more States and, thus, incorporate more variation between counties and State Parks. Also, this study does not take into account differences between State Parks. An expanded study might examine whether, for example, recreational State Parks have a different effect on county employment and population growth than State Parks that are essentially museums or historical sites. Also, an expanded study might control for, assuming consistent data could be obtained, the number of different activities in which one can partake at a State Park (e.g., hiking, boating, fishing, camping, etc). The current study suggests that such inquiries may be fruitful in terms of helping policy makers to understand the reasons for regional economic development.

References

Bergstrom, J. C., Cordell, H. K., Watson, A. E., & Ashley, G. A. (1990). Economic impacts of state parks in the South. *Southern Journal of Agricultural Economics, 22,* 69-78.

Carlino, G. A., & Mills, E. S. (1987). The determinants of county growth. *Journal of Regional Science, 27,* 39-54.

Clark, D. E., & Murphy, C. A. (1996). Countywide employment and population growth: An analysis of the 1980's. *Journal of Regional Science, 36,* 235-256.

Cordell, H. K., Bergstrom, J. C., English, D. B. K., Ashley, G. A., & Klinko, D. K. (1989a) *Economic effects of state parks on local and state economies: State of Indiana,* unpublished report, (Asheville, NC: USDA Forest Service, Southeastern Forest Experiment Station).

Cordell, H. K., Bergstrom, J. C., English, D. B. K., Ashley, G. A., & Klinko, D. K. (1989b). *Economic effects of state parks on local and state economies: State of North Carolina,* unpublished report, (Asheville, NC: USDA Forest Service, Southeastern Forest Experiment Station).

Cordell, H. K., Bergstrom, J. C., & Watson, A. E. (1992). Economic growth and interdependence effects of state park visitation in local and state economies. *Journal of Leisure Research, 24,* 253-268.

Dean, G., Getz, M., Nelson, L., & Siegfried, J. (1978). The local economic impact of state parks. *Journal of Leisure Research, 13,* 98-112.

English, D. B. K., & Bergstrom, J. C. (1994). The conceptual links between recreation site development and regional economic impacts. *Journal of Regional Science, 34,* 599-611.

Evans, A. H. (1990). The assumption of equilibrium in the analysis of migration and interregional differences: A review of some recent research. *Journal of Regional Science, 30,* 515-531.

Evans, A. H. (1993). Interregional equilibrium: A transatlantic view. *Journal of Regional Science, 33,* 89-97.

Graves, P. E., & Mueser, P. R. (1993). The role of equilibrium and disequilibrium in modeling regional growth and decline: A critical reassessment. *Journal of Regional Science, 33,* 69-84.

Gujarati, D. N. (1995). *Basic econometrics.* New York: McGraw-Hill, Inc.

Harrigan, F. J., & McGregor, P. G. (1933). Equilibrium and disequilibrium perspectives on regional labor migration. *Journal of Regional Science, 33,* 49-67.

Hoehn, J. P., Berger, M. C., & Blomquist, G. C. (1987). A hedonic model of interregional wages, rent, and amenity values. *Journal of Regional Science, 27,* 605-620.

Jackson, D. H., & Kenneth W. (1995). Mapping and modeling real estate development in rural Western Montana. Discussion Paper No. 2, The Bolle Center for People and Forests, The School of Forestry, University of Montana.

Knapp, T. A., & Graves, P. E. (1989). On the role of amenities in models of migration and regional development. *Journal of Regional Science, 29,* 71-87.

Miller, R. E., & Blair, P. D. (1985). *Input-output analysis: Foundations and extensions.* Englewood Cliffs, NJ: Prentice-Hall.

Power, T. M. (1996). *Lost landscapes and failed economies: The search for a value of place.* Washington, DC: Island Press.

Roback, J. (1982). Wages, rents, and the quality of life. *Journal of Political Economy, 90,* 1257-1278.

Roback, J. (1988). Wages, rents, and amenities: Differences among workers and regions. *Economic Inquiry, 26,* 23-41.

Rudzitis, G. (1994). Protected landscapes and local economic vitality. In *Nature Knows No Borders.* Seattle, WA: National Parks and Conservation Association.

Rudzitis, G., & Johansen, H. E. (1989). Amenities, migration, and nonmetropolitan regional development, a report to the National Science Foundation, Department of Geography, University of Idaho.

Schachter, J., & Althaus, P. G. (1993). The assumption of equilibrium in models of migration. *Journal of Regional Science, 33,* 85-88.

Steinnes, D. N., & Fisher, W. D. (1974). An econometric model of intraurban location. *Journal of Regional Science, 14,* 65-80.

Tiebout, C. (1956). A pure theory of local expenditures. *Journal of Political Economy, 64,* 416-424.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica, 48,* 817-838.

TABLE A1
Variable Definitions and Data Sources

Variable	Definition	Source
Population Density 1980, 1990	Total county population per acre.	1, 2
Employment Density	Private, non-resource employment per acre.	1, 2
Resource Employment Density	Agriculture + mining + wood products employment per acre.	1, 2
Pop Change 1970-1980	Ratio of 1980 to 1970 county population.	1
Fiscal Factors		
PC Local Tax 1982	Per capita total local government taxes.	2
PCT Property Tax 1982	Property tax share of total local gov't taxes.	2
PC Police Officers 1980	Police officers per capita.	2, 4
PP Teachers 1980	Elementary and high school teachers per student.	2, 6
Business/Local Factors		
Highway Density 1981	Total highway miles per acre.	3
Residual HH Income 1980	Residual per household income.	derived
Business Factors		
PCT HS Education 1980	Percent of county population with a high school diploma.	2
PCT Unemployed 1980	Civilian unemployment rate.	2
Avg Manufacturing Wage 1980	Manufacturing earnings per worker.	1
Electricity Price 1980	Typical residential sector electricity bill.	9
Uranium 1980	Binary variable indicating uranium mining in county in 1980.	12
PCT Agric Employment 1980	Agriculture sector share of total employment.	1
Hard Rock 1980	Binary variable indicating hard rock mining in county in 1980.	8
Exogenous Factors		
PCT Gov't Employment 1980	Government sector share of total employment.	1
PCT Res Employment 1980	Resource sector share of total employment.	1
PCT Dividend Inc 1980	Dividend share of total personal income.	1
Amenity Factors		
Heat Days	30-year average of heating degree days.	10
Cool Days	30-year average of cooling degree days.	10
Average Rainfall	30 year average annual precipitation.	10
PCT Sunny Days	30 year average percentage of sunny days.	5
PCT USFS Land 1990	US Forest Service share of total county land.	7
PCT NPS Land 1990	National Park Service share of total county land.	7
PCT BLM Land 1990	Bureau of Land Management share of total county land.	7
PCT BOR Land 1990	Bureau of Reclamation share of total county land.	7
PCT COE Land 1990	Corps of Engineers share of total county land.	7
PCT Federal Land 1990	USFS + NPS + BLM + USFWS share of total county land.	7

TABLE A1
(Continued)

Variable	Definition	Source
Structural Factors		
Destination Ski Resort	Number of destination ski resorts in county.	13
City	Binary variable indicating presence of city with pop > 25,000.	2
Adjacent to Urban County 1980	Binary variable indicating county adjacent to urban county in 1980.	2
State Variables	Binary variables indicating county located in the State.	2
Factor of Interest		
State Park Density 1990	Number of State Parks per acre of county area.	11

Data Source Code	Data Source
1	US Bureau of Economic Analysis, Regional Information System.
2	US Bureau of Census, County and City Data Book: 1984, 1988.
3	US Federal Highway Administration
4	US Federal Bureau of Investigation, Uniform Crime Reports For the US.
5	US Bureau of Census, Statistical Abstract.
6	US Bureau of Census, Census of Population, 1990.
7	US Bureau of Land Management, Payments in Lieu of Taxes, 1990.
8	US Bureau of Mines, Minerals Yearbook.
9	Energy Information Administration, Typical Electric Bills, 1980.
10	National Climatic Data Center.
11	Individual State Departments of Parks and Recreation.
12	Individual State energy and mineral reports.
13	Individual State tourism offices.

TABLE A2

Variable Statistics: 250 Non-Metropolitan Intermountain Counties

Variable	Mean	St. Dev	Minimum	Maximum
Total Emp Density 1990	0.005	0.007	4.912E-05	0.049
Total Emp Density 1980	0.004	0.006	6.431E-05	0.038
Population Density 1990	0.013	0.017	4.903E-04	0.094
Population Density 1980	0.012	0.015	3.385E-04	0.092
Resource Emp Density 1990	0.001	0.001	3.320E-05	0.007
Resource Emp Density 1980	0.001	0.001	3.363E-05	0.015
Pop Change 1970-1980	1.289	0.348	0.786	3.214
Fiscal Factors				
PC Local Tax 1982	522.060	385.080	38.000	2242.000
PCT Property Tax 1982	0.876	0.123	0.462	0.993
PC Police Officers 1980	0.006	0.005	0.001	0.050
PP Teachers 1980	0.091	0.152	0.036	2.454
Business/Local Factors				
Highway Density 1981	0.001	4.831E-04	2.683E-04	0.003
Residual HH Income 1980	0.000	4464.400	−14002.000	29231.000
PCT HS Education 1980	0.709	0.086	0.441	0.953
PCT Unemployed 1980	0.065	0.040	0.005	0.275
Avg Manufacturing Wage 1980	6.175	1.429	2.000	9.710
Electricity Price 1980	86.001	27.355	31.500	159.340
Uranium 1980	0.060	0.238	0.000	1.000
PCT Agric Employment 1980	0.160	0.124	0.000	0.542
Hard Rock 1980	0.216	0.412	0.000	1.000
Exogenous Factors				
PCT Gov't Emp 1980	0.193	0.077	0.052	0.587
PCT Res Emp 1980	0.256	0.138	0.011	0.619
PCT Dividend 1980	0.175	0.068	0.051	0.410
Amenity Factors				
Heat Days	7241.700	1781.000	1882.000	12991.000
Cool Days	494.720	413.680	0.000	3052.000
Average Rainfall	14.652	5.127	5.380	42.760
PCT Sunny Days	68.396	7.789	52.000	86.000
PCT USFS Land 1990	0.212	0.230	0.000	0.937
PCT NPS Land 1990	0.010	0.043	0.000	0.477
PCT BLM Land 1990	0.184	0.216	0.000	0.950
PCT BOR Land 1990	0.003	0.007	0.000	0.052
PCT COE Land 1990	0.001	0.007	0.000	0.083
PCT Federal Land 1990	0.184	0.216	0.000	0.950
Structural Factors				
Destination Ski Resort	0.116	0.464	0.000	4.000
City	0.072	0.259	0.000	1.000
Adjacent to Urban County 1980	0.268	0.444	0.000	1.000
Factor of Interest				
State Park Density 1990	6E-07	1.120E-06	0.000	1.042E-05