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**The Correlation Between Local Government Tax Revenues and the
Existence of Federally Designated Wilderness Lands**

By

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Masters of Science

In

Political Science

UTAH STATE UNIVERSITY

Logan, Utah

2011

**The Correlation Between Local Government Tax Revenues and the
Existence of Federally Designated Wilderness Lands**

Sarah Reale
Master's Thesis
November, 2011

"If future generations are to remember us with gratitude rather than contempt, we must leave them something more than the miracles of technology. We must leave them a glimpse of the world as it was in the beginning, not just after we got through with it."
— President Lyndon B. Johnson, on the signing of the Wilderness Act of 1964

Each of the 3,141 counties in the United States is unique, with a variety of physical characteristics. Approximately 287 of these counties have designated Wilderness Land within their boundaries. Many have argued about the benefits and also the burdens of having this designated land within a county. Research has been completed looking at the effects the Wilderness Land has to the local economies, the quality of life of the county citizens, and the county tourism industry. However, there is no research completed on the effects Wilderness Lands has to the local government tax revenue. Examining the revenue in the county will help solidify the Wilderness discussion that continues among multiple parties.

From county citizens, environmentalists, local government officials, to recreationalists, all parties involved in the Wilderness discussion feel they know how the land should best be used. Specifically, a lot of these parties have misconceptions about local government taxes and fees. These misconceptions cause voters, and the parties involved, to react harshly at every tax increase. Many are confused when there is a lack of funding in certain areas. For example, when asked what tax sources pay for police service, 47 percent of Utahans surveyed answered that they did not know, or they answered incorrectly (Abercrombie, Hoffman, Macdonald & Shurtz, 2008). Understanding the local government finance in these counties will be the missing piece between all of the discussions about the Wilderness Land. My research looks at the revenue gained through sales and property tax at the local government level.

The goal of this thesis is to explore the question: Do counties with designated Wilderness areas have more or less property and sales tax compared to counties without Wilderness areas? Evaluating this question helps understand the larger question: do designated wilderness areas increase or decrease government revenue in these counties? I hypothesize that the Federal Wilderness Lands within a county increases that county's government revenue.

The intention behind the creation of the Federal Wilderness Lands was to ensure, regardless of the rampant growth of urban sprawl and population, there would be some land that remained "untouched." It is my assumption that the creators of the Wilderness Act of 1964 had no intention of harming the local government revenue within the county in which the land resides. Wilderness in the United States is land that was defined and designated by the Wilderness Act of 1964, a further definition is as follows:

"An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Since the passage of the Wilderness Act of 1964, 109 million acres have been designated as wilderness.

The literature on the topic of Wilderness Lands and their effects, though vast in its capacity throughout all of the different audiences, lacks an analysis on government revenue specifically. Additionally, there has been no quantitative research completed at a global level looking at each of the counties in the United States and the correlation between the Wilderness Lands with local government tax revenue.

Literature Review

The Wilderness Act of 1964 created a lengthy and at times acrimonious discussion among numerous parties questioning the best course of action for public lands. There are some that would like public lands to receive Wilderness designations because of the natural beauty, ecological services, and recreational opportunities the designation provides. Contrastingly, there are some that question the effect the designation has on the local economies. Analysts on both sides have attempted to provide conclusions on the effect of these Lands, with varying results.

I have broken the literature into four different categories: literature on the protection of Wilderness Lands, but without measurable results; literature by policy analysts who conclude Wilderness Land benefits the economy; and literature by policy analysts who conclude Wilderness Lands has a negative or no economic effects.

Literature on Protecting Wilderness Lands For Amenity Value

For most environmentalists the goal of the Wilderness designation is to keep the land in a natural state. As urbanization, industrialization, and population rise in the United States, many want to ensure that some of the land is protected from

exploitation in all its various forms. The Wilderness Act of 1964 helps further this goal by securing these lands from private ownership and subsequent cultivation; the Act ensures that the federal government secures much of the environmentally unique land in the United States. Their argument is that by allowing this land to be protected, people can use the land for recreation and tourism. Further, they claim that people can “gain spiritual fulfillment and...preserve the intergenerational opportunities in safeguarding ecological integrity” (Morton, 1999).

Environmentalists provide a strong argument about the benefits of the Wilderness designation. They emphasize the importance of preserving the natural land and provide data on the dying extraction industry. However, it is still quite common for areas with large Wilderness areas to rely heavily on resource extraction in their economy. In some instances community members and government officials fight against environmentalists to gain access to these resources.

However, environmentalists have countered this discussion with a surplus of literature supporting the proposition that the Wilderness Lands limit economies of the communities that have previously or could potentially use the land for extraction purposes. One argument is that Wilderness areas have remained Wilderness “precisely because they are relatively isolated and unattractive to extractive industries. As a result, the value of the natural resources they contain may be less than the cost of extracting them” (Lorah & Southwick, 2003).

Many also argue that the citizens living closest to the lands are those who are most affected, both positively and negatively, by the lands. “They bear the biggest burden of any environmental harms and dangers such as wildfire, the sight of

massive clearcuts, or sediment-filled creeks. And they reap the most immediate benefits, whether from clean water, developed campsites or harvest or recreation use” (Fretwell, 2004).

Environmentalists also fear that if the local residents have more control over how the land is used and managed they will stop the conservation of the natural ecosystems. However, in some instances government officials have created plans to ensure that the land stays preserved, ensuring that it remains a, “place of solitude and boundless beauty, a place that wildlife can call home and humans only visit” (Fretwell, 2004).

Although many authors in this category project that the Wilderness Lands provide a benefit to the economies of the local communities, no one has proven statistically that this result has occurred within each county that contains Wilderness Lands. Scholars have done survey research showing that residents generally gain a positive utility from living near outdoor resources based on the intrinsic values of natural beauty. They also assume that there has been an increase in people who participate in recreational activities.

Literature by Policy Analysts Who Conclude Wilderness Land Benefits the Local Economies

There are many studies completed to show how the presence of Wilderness actually helps the economies of the neighboring communities; one notable study examined the population growth of these communities from the aesthetic value of the area, and the ability for many to work from any location. Many predicted that by designating these lands as Wilderness has only helped the economies through employment growth from the recreation and tourism opportunities surrounding the

land. There are also studies that believe the role of extractive industries is changing dramatically as the number of people employed in such activities has declined, and is expected to continue to decline (Lorah, 1996; Power, 1995, 1996; Rasker, 1995; Rudzitis, 1993, 1996). Rather than employing loggers, farmers, fisherman, and miners “these landscapes often may generate more new jobs and income by providing the natural resource amenities, water, and air quality, recreational opportunities, scenic beauty and the fish and wildlife that make the . . . [area] an attractive place to live, work, and do business” (Power et al. 1995).

Some research has indicated that Wilderness designation plays a substantial role in attracting new migrants to a place or region (Rudzitis, 2000). One study examined 113 rural counties in the American West, 43 percent of which contained designated Wilderness areas. The study shows that between 1970 to 2000 there is a significant positive correlation between the percent of land in designated Wilderness and population, income, and employment growth (Holmes & Hecox, 2004).

Paul Lorah has done extensive research on the effects of Wilderness Lands to employment growth and the local economies. Lorah used a geographic information system to calculate the proportion of protected lands occurring within 50 miles of the center of each Western county. Lorah’s calculation, in combination with detailed county-level data, “indicates that environmental protection is correlated with relatively rapid income and employment growth” (Lorah & Southwick, 2003). Lorah also took employment growth and disaggregated it into individual sectors, finding, “the biggest differences between growth rates in Wilderness and non-Wilderness

counties appear in those sectors benefiting from a shift to an amenity economy.” Employment in Wilderness counties grew faster in construction (151 percent faster), services (129 percent), finance, insurance, real estate (115 percent) and trade (93 percent) (Lorah, 2000).

Others claim that there are more than economic opportunities drawing people to live near Wilderness. In turn, these activities have a positive effect on the economy through tourism and outdoor recreation. However, this theory is difficult to prove due to the complexity of pinning down exact revenue amounts from these activities. One piece of evidence cited by Rudzitis and Johnson is the fact that after the passage of the Endangered Species Act critics expected a significant downturn in the raw materials industry. In reality, the opposite occurred and most of the West saw economic growth (Rudzitiz & Johnson, 2000).

The literature focuses primarily on the tourism the Wilderness Lands bring to the local economies. Authors agree that tourism not only provides a better way for local economies to gain revenue than does extracting natural resources from the land, but also that tourism is more beneficial for the land itself. Rothman explained that tourism offers the lure of economic prosperity without the environmental costs associated with extractive and manufacturing processes (Rothman, 1998). Rothman also explains that tourism can also promote conservation. There are two types of tourism: heritage tourism and ecotourism. “Heritage tourism increases the profitability of conserving historical resources while ecotourism promotes the preservation of natural resources by turning them into marketable commodities

whose value is based on their preservation rather than their consumption” (Rothman, 1998).

In this category, many studies done by analysts have been conducted to put a quantitative answer to the effects of Wilderness areas on local economies, yet little consensus has been found.

Policy Analysts Who Conclude Wilderness Lands has a Negative or No Economic Effects

Three studies found that there was no statistical relationship between Wilderness Lands and local economies that either provides support for the designation. The first study was done on the cost and benefits of these lands. It looked at eight states in the Intermountain West where an average of 47 percent of all land is federally owned (Duffy-Deno, 1998). The study focused on the estimated population and employment growth of 250 nonurban counties from 1980 and 1990. In the end, the study was unable to reject the hypothesis that “Wilderness has had no effect on both population and total employment growth in these counties during the 1980s” (110). However, the author claims that, “certain counties with economies that are very heavily weighted toward resource-extraction industries may still be adversely affected” by Wilderness designation (123). These findings are echoed in “The Role of Amenities and Quality of Life in Rural Economic Growth” where no joint relationship was found between Wilderness designation and employment or income (Deller, Tsai, Marcouiller & English, 2001).

Another study examined the strategy of using recreation to encourage economic development. The study looked specifically at monthly data on nonagricultural employment for the period from 1973 through 1992 for 24 rural

counties in Utah (Fawson, Keith, Chang, 1996). The study found the economies of the tourism-dependent counties are “subject to annual variances which are relatively large and appear to be increasing in absolute value.” Despite this, they also found that “counties whose economic bases are less dependent on the tourism industry appear to have less short-run variation, even though long-run variability may exist” (Fawson, Keith, Chang, 1996).

There are analysts who have also found that there is a negative effect associated with Wilderness Lands and the economies of local neighboring communities. A study looking at the effects of Wilderness on the economies of the counties used a quasi-experimental time series design to evaluate the economic impact of the designation of Wilderness on local economies. This study revealed that the claims that designated Wilderness areas have a positive influence on the local economies are false. In fact, this study found that the presence of Wilderness Lands has negative implications on the economies of the counties (Simmons, Yonk, Steed, 2010).

Literature Conclusions

The literature looks closely at the positive and negative effects of Wilderness Lands on the economies of the local communities. However, there is no quantitative research done on the effects the of Wilderness Lands on local tax revenue. My research will help answer the portion of the literature that is missing by understanding the costs and benefits the Wilderness Lands have on local tax revenue.

Theories

The theory that the presence of Wilderness Lands enhances the county's ability to provide to its residents is the dominant theory throughout the literature on the subject. As mentioned in my literature review, the theory rests on the assumption that the Wilderness Lands are an amenity that can be used by counties to improve the economic environment of the local community. This amenity is used to bring economic activity to the county through recreation, tourism, and population growth.

With beautiful, "untouched" land within a county, both tourism and population growth can occur. The population growth allows for more building within the county and increased property values. Further, tourism brings businesses to the local economy to support the visitors, who in turn increase revenues through paying sales taxes. Whether it is an influx of recreational tourism companies, hotels, souvenir shops, or restaurants, all must be present to support a community that has tourists frequenting the area and adding to the tax base.

My theory that the presence of Wilderness Lands leads to an increase in local government revenue is thus rooted in this approach. If, as other theories claim, the Wilderness Lands provide an increase in economic activity, there should be an accompanying increase in sales and property taxes within the county, the measure I have chosen to examine in my study. The logic of how this occurs is clear: the presence of the Wilderness Lands brings visitors to the county to enjoy the land. There will also be an increase in population growth to this area, by those who seek residence in a beautiful place. These visitors and new residents spend their money on the local economy. Whether this spending is on a hotel in the county, restaurants,

gas, recreation, new land purchases, or shopping, there is an influx of dollars spent by the visitors present and taxed.

Further, the presence of Wilderness Lands can also lead to population growth. There will be a net population increase in counties with Wilderness Lands because potential residents will be drawn to an area with aesthetic beauty, which will lead to more construction and housing developments in the county. This will also result in increases in property taxes. Higher revenues from both the property tax and sales tax within the county with Wilderness Lands will lead to an increase in local government revenue.

A contrasting theory, however, suggests that the presence of Wilderness Lands leads to a decrease in local government revenue because the designation necessarily restricts land use. If my and the larger theory is incorrect, the data will not show an increase in tax revenue in counties with Wilderness Lands. This alternate hypothesis predicts that there is not a relationship between counties with the presence of Wilderness land and an increase in local tax revenue. The alternate hypothesis will show that the presence of Wilderness Lands actually has no effect on local government revenue, or a hindrance in the government revenue.

Thus, my hypothesis is that the Federal Wilderness within a county increases that county's tax revenue. The null hypothesis is that Federal Wilderness within a county has no effect on that county's revenue. Lastly, the alternate hypothesis is that Federal Wilderness within a county decreases the local government revenue.

Hypotheses, Data, and Methods:

Two sets of hypotheses arise from the competing claims about Wilderness. My first set of hypotheses address how county revenues are affected by the presence of Wilderness Lands. These hypotheses are listed below.

- **Hypothesis:** Federal Wilderness within a county increases that county's revenue.
- **Null Hypothesis:** Federal Wilderness within a county has no effect on that county's revenue.
- **Alternate Hypothesis:** Federal Wilderness within a county decreases the local government revenue.

My second set of hypotheses emerges from the first. These hypotheses address how Wilderness changes policy priorities in the counties where it is located. I expect increased expenditures in Wilderness counties across all types particularly if my hypothesis is confirmed as they have more funds available for use. These hypotheses are:

- **Hypothesis:** Federal Wilderness within a county increases that county's expenditures.
- **Null Hypothesis:** Federal Wilderness within a county has no effect on that county's expenditures.

To test these hypotheses I used data from the Simmons, Yonk, and Steed dataset, which is composed of data from the U.S. Census Bureau, and the Bureau of Labor Statistics. These data include the sales and property tax revenue from all 3,144 counties in the United States. The dataset also includes data on the presence of Wilderness area within each county. Using these data I used ordinary least squares regression (OLS) to complete two tests on the effects of Wilderness designation on local tax revenues.

In the first test, my variable of interest is the presence of Wilderness Lands, measured dichotomously. My dependent variable is property and sales tax revenue in dollars. I use several control variables, as indicated by the literature.

Control variables are a necessity in a regression. Control variables are “extraneous variables that you do not wish to examine in your study, and hence you control for it” (Vogt & Johnson, 2011). The purpose of including control variables in a regression is to allow for each county with Wilderness Lands to be measured equally. Without including control variables in the test, the variety within each county would not allow for a proper comparison.

The control variables I chose to include can be broken down into three categories: demographics, extraction, and recreation. The first category, demographics, includes: population, which is chosen to control for the amount of revenue per population in each county; race (white, non-white), to measure the variation between urban and rural lands and the variances between races in each county; also, I use net migration and the number of households within the county to provide support for discussions within the literature on population growth in counties with Wilderness Lands. Lastly, I controlled for household income in each county. This variable was necessary to allow for my regression to measure how much county residents pay in taxes. Controlling for these demographic variables gives the counties, although demographically diverse, to be on an equal ground when completing the regression.

The second category of control variables are those chosen related to extraction. A strong argument was presented within the literature on the effects the

Wilderness Lands have on counties that were previously built around the extraction industry, and also counties that feel they are losing funding because they can no longer extract from the land. Due to the presence of extraction arguments within the literature, I found it necessary to control for extraction related variables that would affect counties with Wilderness Lands. These variables include: earnings in mining and wood product manufacturing, and variables measuring employments in forestry, fishing, hunting, and agricultural support services.

Lastly, I have control variables that are related to recreation. The importance of this category is based off the argument that tourism and recreation increases in counties with Wilderness Lands. Thus, it was necessary to control for tourism and recreation variables in my regression. The control variables include: arts, recreation and entertainment, to confront discussions on tourism and growth to the county; and recreation services to completely analyze the recreation and tourism industry.

Further to demonstrate the impact of Wilderness lands independently I include other federal land holdings that might have confounding or collinear effects when excluded from the analysis. This approach allows me to correctly estimate the independent effect of only wilderness lands.

If the analysis demonstrates that the presence of Wilderness Land within the county increases tax revenue I can reject the null hypothesis of no effect and the alternate hypothesis.

The second set of models looks at expenditures within each county to understand money spent on county-provided services. These expenditure variables included total expenditure within county, expenditures in education, public welfare,

hospitals, health, highways, police, fire and protection, local government payroll, and also the total debt within a county. The same control variables from the first test were also added to this test. If the data shows that the presence of Wilderness Land within the county increases or decreases expenditures in the county I can reject the null hypothesis of no effect.

Also, there were additional land types added to both tests to control for the presence of other Federally owned lands that might also effect revenue. The Bureau of Reclamation, Department of Defense, Forest Service, Fish and Wildlife, National Park Service, other Federal lands, Tribal lands, and Tennessee Valley Authority, were the additional land types added with our dummy Wilderness variable. Lastly, area of the county was included to control for variations in overall size as it is likely that larger counties will face greater costs. These are included in the regression to allow the dummy variable (Wilderness Lands) be exclusively analyzed. It also allows all counties, though diverse in size and amount of federally owned land, be regressed evenly.

Results

| General Revenue – Linear Regression | | | |
|-------------------------------------|-------------|----------------|---------|
| Observations 3144 | | | |
| Pseudo R Sqr .1062 | | | |
| Variable | Coefficient | Standard Error | P Value |
| Wilderness Lands (Dummy) | 92758.47 | 105582.5 | .380 |
| Bureau of Reclamation | 30164.92 | 52667.5 | .567 |
| Dept of Defense | 11333.51 | 6595.773 | .086 |
| Forest Service | -124.4473 | 1776.606 | .944 |
| Fish and Wildlife | -12643.76 | 4217.3 | .003*** |
| National Park Service | 13401.72 | 8542.848 | .117 |
| Other Fed Lands | -17109.69 | 11724.24 | .145 |

| | | | |
|-----------------------|-----------|----------|---------|
| Tribal Lands | -5247.555 | 1725.899 | .002*** |
| Tenn Valley Authority | 540.6521 | 3982.999 | .892 |
| County Area | 1.127 | 3.402 | .740 |
| Population | .464 | .222 | .037** |
| Race | -13004.8 | 2339.669 | .000*** |
| Household Income | 31.99 | 4.077 | .000*** |
| Earnings in Mining | .659 | .164 | .000*** |
| Earning in Wood | .217 | .229 | .342 |
| Earning | .019 | .015 | .202 |
| Construction | | | |
| Arts, Rec, Entertain | .157 | .106 | .138 |
| Net Migration | -53.454 | 63.75 | .402 |
| Forestry, Fish, Hunt | .155 | .143 | .281 |
| Constant | 215089.2 | 180442.3 | .233 |

*P<.10 **P<.05 ***P<.01

As Table 1.1 shows, the presence of Wilderness Lands does not affect general revenue, according to my initial linear regression, and thus I fail to reject the null hypothesis that the presence of Wilderness Lands increases the general revenue within a county. Therefore the presence of Wilderness Lands in a county might have no effect on the county's general revenue.

A number of the included control variables also returned significant coefficients indicating statistically significant effects of those variables. All coefficients of the included variables are reported in the regression tables to aid interpretation and replication of the analysis. Further research into them especially the effect of the other public lands is a productive venue for further research.

The second part of my first test used total tax revenue within a county as the dependent variable. The results are listed in Table 1.2. The first column 'Variable' list each independent variable and if the variable is dichotomous. The next column 'Coefficient' reports the expected value of a one-unit change in the independent

variable. 'Standard Error' reports the standard error of the estimation. The final column 'P Value' reports the level of statistical significance for each estimated coefficient.

Table 1.2
Tax Revenue
Observations 3144
Pseudo R Sqr .1592

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| Wilderness Lands (Dummy) | 58837.84 | 34891.15 | .092* |
| Bureau of Reclamation | 13685.49 | 22000.97 | .534 |
| Dept of Defense | 2654.801 | 2093.105 | .205 |
| Forest Service | -437.8501 | 516.802 | .397 |
| Fish and Wildlife | -4642.12 | 1597.24 | .004*** |
| National Park Service | 3742.477 | 2746.921 | .173 |
| Other Fed Lands | -7442.907 | 5324.125 | .162 |
| Tribal Lands | -1999.136 | 651.4231 | .002*** |
| Tenn Valley Authority | 1074.622 | 1411.622 | .447 |
| County Area | -.305 | .920 | .740 |
| Population | .193 | .092 | .036** |
| Race | -5105.795 | 878.865 | .000*** |
| Household Income | 14.791 | 1.690 | .000*** |
| Earnings in Mining | .360 | .084 | .000*** |
| Earning in Wood | .111 | .098 | .258 |
| Earning Construction | .009 | .006 | .167 |
| Arts, Rec, Entertain | .071 | .046 | .126 |
| Net Migration | -29.612 | 26.007 | .255 |
| Forestry, Fish, Hunt | .0613 | .058 | .295 |
| Constant | 877.964 | 71884.8 | .990 |

*P<.10 **P<.05 ***P<.01

As Table 1.2 shows, for counties with the presence of Wilderness Lands, general revenue P value was significant at the P<.1 level, and I can reject the null hypothesis that the presence of Wilderness Lands has no effect on revenue within a county. Thus, the presence of Wilderness Lands in a county appears to have an effect

on the county's tax revenue. These results show an average increase of almost \$60,000.00 in tax revenue for counties with Wilderness Lands present.

The last test in this set was a linear regression looking at property tax revenue within a county, regressed against the presence of Wilderness Lands. It included the control variables and the additional land types. The results are listed in

Table 1.3:

Table 1.3
Property Tax Revenue
Observations 3144
Pseudo R Sqr .2231

| Variable | Coefficient | Standard Error | P Value |
|---------------------------|--------------------|-----------------------|----------------|
| Wilderness Lands (Dummy) | 38895.38 | 21903.24 | .076*** |
| Bureau of Reclamation | 7018.712 | 14000.72 | .616 |
| Dept of Defense | 1172.342 | 1359.097 | .388 |
| Forest Service | -395.276 | 318.247 | .214 |
| Fish and Wildlife Service | -3089.789 | 980.565 | .002*** |
| National Park | 1937.594 | 1749.286 | .268 |
| Other Fed Lands | -5532.91 | 4083.815 | .176 |
| Tribal Lands | -1148.829 | 370.198 | .002*** |
| Tenn Valley Authority | 583.051 | 892.257 | .514 |
| County Area | -.185 | .578 | .748 |
| Population | .128 | .058 | .028** |
| Race | -3202.547 | 412.8525 | .000*** |
| Household Income | 11.330 | 1.241 | .000*** |
| Earnings in Mining | .286 | .066 | .000*** |
| Earning in Wood | .064 | .060 | .281 |
| Earning Construction | .006 | .004 | .153 |
| Arts, Rec, Entertain | .044 | .028 | .122 |
| Net Migration | -14.902 | 15.597 | .339 |
| Forestry, Fish, Hunt | .039 | .041 | .333 |
| Constant | -63151.58 | 41112.52 | .125 |

*P<.10 **P<.05 ***P<.01

As Table 1.3 shows, for counties with the presence of Wilderness Lands, property tax revenue P value was significant at the $P < .10$ level. Thus, the presence of Wilderness Lands in a county appears to have an effect on the county's property tax revenue. These results show an average increase of almost \$40,000.00 in property tax revenue to counties with Wilderness Lands.

The results of the models from the first test, looking at general revenue, total tax revenue, and property tax revenue within a county found no significance between Wilderness Lands and the county's general revenue. However, there was an association between the presence of Wilderness Lands and a county's property tax and overall tax revenue. Consequently, I can reject the null hypothesis that Wilderness Lands have no effect on revenue. I can also reject the alternate hypothesis that Wilderness Lands have a negative effect on revenue within the county, because both the property tax and overall tax revenue were significant with positive coefficients.

Test #2 - County Expenditures

The second hypothesis test addresses how county expenditures are affected by the presence of Wilderness Lands. To test my second hypothesis, I regressed my dummy variable of wilderness presence on several measures of county expenditures. These measures include total expenditures, expenditures in education, public welfare, hospitals and health, highways, police services, fire and protection, the county's total debt, and the local government payroll expenditures.

The variable total expenditures is the sum of all of the expenses the local government spends within their county. Education expenditures reflect the costs

the government bears to fund the local county school districts and other education related expenses. Public welfare expenditure includes expenses the county covers to provide funding for the welfare of the county. Hospitals and health expenditures are the expenses the county bears to fund the local hospital and its services, including ambulances and facilities. The health portion is all other health related expenses within a county, which can include medical care, prevention, promotion, rehabilitation, community health activities, health administration and regulation. Highway variable is the money the county spends to maintain, develop, and manage all highways that run through the county. The police services variable is the county's cost to maintain police and protection services to the county residences. This includes cars, salaries, and other expenses to running a police department(s) within a county. Fire and protection variable is especially important in a county with Wilderness Lands. This is the expenditure the county bears for maintaining a fire service for the county, which includes trucks, buildings, and salaries of the fire services in the county. The county's total debt variable is the reoccurring negative balance, which measures the county's long-term debt. This shows if the county is able to maintain a positive budget or if they fell below, or have borrowed more than, their revenue amount. Lastly, local government payroll expenditure is the cost of the salaries for all of the county employees and representatives.

Table 3.1
Area Total Expenditures¹
Observations 3144

| Variable | Total Expend | Education | Public Welfare | Highways | Police | Fire and Protection | Total Debt | Gov't Payroll | Health and Hospitals |
|--------------------------|--------------|--------------|----------------|--------------|----------|---------------------|------------|---------------|----------------------|
| General Revenue | .952*** | .320*** | .0817*** | .032*** | .0648*** | .026*** | 1.158*** | .036*** | .089*** |
| Wilderness Lands (Dummy) | 9640.17* | 939.59 | -16155.52*** | 2480.50* | 1474.77 | 1295.27** | 89013.73** | 147.08 | -6627.28** |
| Bureau of Reclamation | -95.28 | -5465.61 | -2479.15 | 1206.45 | 469.84 | 369.32 | 60185.24 | -875 | 520.47 |
| Dept of Defense | 300.51 | 816.73 | -245.63 | -79.48 | -11.34 | -14.95 | -2198.10 | 30.05* | 111.73 |
| Forest Service | -185.14** | -168.58** | 137.44*** | -13.73 | -13.23 | -7.34 | -1205.33** | -5.83** | 58.65* |
| Fish and Wildlife | -341.89* | -1118.32*** | 334.40* | 30.50 | 51.18 | 19.88 | 1323.48 | -16.57 | 111.45 |
| National Park Service | -51.11* | -871.51*** | -93.82 | -166.22 | 108.28 | -3.62 | -2722.69 | -24.50* | 526.03* |
| Other Fed Lands | -1795.54 | -1352.51 | 225.70 | -320.95* | -106.80 | -22.68 | 33012.42 | 9.49 | -103.96 |
| Tribal Lands | -78.20 | -45.92 | 133.77* | 46.59* | 14.90 | -16.87** | -890.99 | .648 | -43.80 |
| Tenn Valley Authority | 125.86 | -637.30 | -347.29* | -34.09 | 33.82** | 16.41 | 2375.09 | 2.95 | -826.60 |
| County Area | -.145 | .113 | .117* | .015 | -.022 | -.029* | -1.304 | -.009 | -.031 |
| Population | .021* | .022* | -.0197** | .004* | .001 | .001* | .080 | .000 | -.006 |
| Race | -280.45* | -525.51*** | 386.75*** | 13.30 | 8.84 | -40.01*** | -239.82 | -1.079 | 48.29 |
| Household Income | 1.479*** | 3.66*** | -1.33*** | .434*** | -.215*** | .076** | -3.30 | .032** | -.87*** |
| Earnings in Mining | .096*** | .103*** | -.055*** | .014*** | -.006*** | -.001 | .622*** | .002*** | .004 |
| Earning in Wood | .010 | .006 | -.014 | .001 | -.001 | .001 | .150* | .000 | -.003 |
| Earning Construction | .001 | .001 | -.001 | .000 | -.0003* | .000 | .017* | .000 | -.000 |
| Arts, Rec, Entertain | .001 | .000 | -.003 | -.0008 | -.0003 | -.000 | .026 | -.0003 | .001 |
| Net Migration | -3.66 | 7.19* | .023 | -.663 | -.365 | -.181 | -2.534 | -.215 | -1.245 |
| Forestry, Fish, Hunt | .006 | .000 | -.014 | .003 | .0005 | .000 | .64 | .000 | -.004 |
| Constant | -20010.62** | -56156.82*** | 5782.64 | -13650.78*** | 4001.95* | 588.34 | 75970.51 | -821.00 | 25018.08*** |

*P<.10 **P<.05 ***P<.01

¹ Full tables from each of the regressions are available in the appendix in tables 2.1-2.12.

The results of these tests provided mixed results amongst the different expenditure variables. The expenditures that were significant are: total expenditures, public welfare, highways, fire and protection, total debt, and health and hospitals.

The total expenditure variable was significant at the $P < .10$ level with a coefficient of \$9640.17. This test shows that with the presence of Wilderness Lands there is an increase in total expenditures for the county.

The public welfare expenditure variable was significant at the $P < .01$ level. However, there was a negative -\$16155.00 coefficient, suggesting that the presence of Wilderness Lands shows the counties spending less on public welfare than counties without Wilderness Lands.

The highways expenditure variable was significant at the $P < .10$ with a coefficient of \$2480.00 in net costs. The significance shows that counties with Wilderness Lands are spending more on highways than counties without Wilderness Lands.

The fire and protection expenditure variable was significant at the $P < .05$ level with a coefficient of 1295.27. This shows that counties with Wilderness Lands are spending more on fire and protection for their county.

The health and hospital expenditure test was significant at the $P < .05$ level with a coefficient of -\$6627.28. This shows that counties with Wilderness Lands are paying less for health and hospital related expenditures than counties without Wilderness Lands.

The last expenditure variable that was significant was the total debt variable. This test was significant at the $P < .05$ level with a coefficient of \$89013.73. This test shows that counties with Wilderness Lands are more in debt than counties without Wilderness Lands.

The expenditure variables that were not significant are education, police, and local government payroll. The lack of significance for these variables shows that counties with Wilderness Lands are not spending in education, police, and local government payroll.

Implications

In the first set of models, which examined the effects of Wilderness Lands on a county's revenue, I was able to reject the null hypotheses in the test for overall tax revenue and property tax revenue. However, I was unable to reject the null on the test looking at general revenue.

These results indicate that the presence of Wilderness Lands in a county has a statistically significant effect on both overall tax revenue and property tax revenue collected by counties. The total tax revenue, which includes all taxes levied and collected, is an aggregated measure that explores how overall exactions are affected by the presence of wilderness. As an aggregate measure, it is clear, given our other results that this increase is partially due to the property taxes in the county. Because the effect on overall revenue is nearly \$20,000.00 greater than the effect of property tax, however, it seems likely that the effect on most tax categories including sales tax, for which I have no data available, would be positive.

At least two potential explanations for these increases in tax revenue emerge from the way taxes, particularly property taxes, are calculated. Because property taxes are a function of both the property value and the tax rate set by the local elected officials, changes in either part lead to changes in the aggregate tax receipts. Ultimately, the answers to my research questions might be rooted in the county's tax rates, because counties with higher property tax rates will generate more revenue. However, because I don't have the data to measure this, I cannot make any conclusions to answer my assumption.

My first explanation is derived from the claims by some that Wilderness increases property values and the Wilderness land provides value to the county. In short, property located next to Wilderness Lands is worth more than those in counties without Wilderness Lands. As explained in many of the claims in the literature, Wilderness could potentially act as a resource for the county to gain revenue. This is done through property values within the county. If there is a high demand for land that is adjacent to the Wilderness Lands, one would expect the property values to increase and therefore, the property tax revenue would also increase. If this were the case, there would also be a relationship of increased spending in all county expenditures.

The second explanation for the results of my data is that the Wilderness land is a cost to the county. The presence of Wilderness Lands in a county requires the county to provide extra services, and bear extra costs than counties without Wilderness Lands. Proof of this explanation could be exhibited in higher spending in county expenditures that relate to services the county has to provide with the

presence of Wilderness Lands. To determine which explanation more accurately reflected the results from my tests, I took a closer look at the spending within these counties.

The revenue the county generates from taxes, both property and others, is what pays for the county services. These services include education, health, hospitals, fire, police, county employees, highways, and public welfare. In order to determine which explanation is correct, I asked if there is an increase in tax revenue in a county with Wilderness Lands, are there additional costs burdening the county in order to manage the county due to the presence of these lands or is the county simply able to spend more because of the increase in property values due to Wilderness Lands. Each model provided different results. In summary, counties with Wilderness Lands are spending more on total expenditures, highways, fire and protection, and health.

The expenditures in highways, fire and protection, hospitals and health are all costs that can be related to Wilderness Lands. For example, a county with Wilderness Lands might have more visitors to the area, thus they must spend more money on their highways to manage the amount of traffic to that county. Fire and protection might also be more expensive in a county with Wilderness Lands. Droughts, campfire accidents, and other visitor mishaps within the lands could increase fire danger in Wilderness Lands. This means the county is responsible for protecting the county from the fires that occur within the lands. As a result, the county has to spend more money on fire and protection because they are at a greater risk to fire damage than counties without Wilderness Lands.

Counties with Wilderness Lands are also spending more on the health of their county. Hospital and health expenditures are defined on the “basis of their primary or predominant purpose of improving health, regardless of the primary function or activity of the entity providing or paying for the associated health services.” The hospital portion of this expenditure includes costs the county bears to pay for hospitals. The hospital expenditure could include infrastructure, research funding, and facilities. Generally, when populations are bordering a Wilderness Land, they are more likely to enjoy the outdoors and the amenity the land provides through recreation. It is my assumption that communities that are generally more likely to explore the outdoors are also more likely to be injured or need health related services, which, could result in higher costs to maintain the county health and hospital resources. In summary, all of the expenditures that showed a positive significant result from the regression test could be related to the additional cost to run a county with Wilderness Lands.

More evidence of the costs a county bears with Wilderness Lands is the lack of spending in other areas. For example, my test showed no significant increase in the spending on education, police, and government payroll. The public welfare model showed a significant but lower spending. This lack of increase led me to ask, if counties are truly benefiting from an increase in tax revenue, why are they using the revenue to spend more money on highways and not education? Alternatively, why are they spending on hospitals and health and not their own payroll? If there is a county that is profiting in such a way my test showed, why are their expenses so unevenly distributed?

Additionally, my test showed that counties with Wilderness Lands have more debt than counties without Wilderness Lands. Even though there is no way to identify from the data if there are large scale transfers to the county, or other revenue sources, this result is especially disconcerting. If counties are gaining more tax revenue but having to spend more to manage their county, and also having to borrow more than counties without Wilderness Lands, the land that I initially thought to be an amenity to the county could actually be a hindrance.

Although many say that the reason the property and sales taxes are higher in these counties is because of an influx of tourism and recreation. None of my tests looked at expenditures within the county as a reason for tax increases. Therefore, I infer that the reason there is an increase in tax revenue in counties with Wilderness Lands is because the counties have higher tax rates in these counties because the counties cost more money to function. The counties are bearing the costs of Wilderness by raising the tax rates within the county.

A positive increase in property values one would see, related to the Wilderness Lands, is the value of property increasing because of demand for the land, not because of the county's need for more revenue. Yet, there is no increase in any expenditure outside of the necessary costs to running a county. Further, there was no sign of spending in education, public welfare, or local government payroll. In summary, this increased spending in expenditures within a county make the Wilderness a net cost to the county, not a revenue builder.

Conclusions

After the implications of my tests, I reevaluated the basis for the research I conducted. The Wilderness Act initiated the designation of Wilderness Lands in the United States in 1964. The goal of the Wilderness Act was to designate lands that will remain “untouched.” This includes no building or construction on the land, no roads through the land, no motor vehicles allowed on the land, and a variety of other restrictions that allows the land to not be damaged by human use. Since this designation, counties with Wilderness Lands have argued about the costs and benefits of having the Wilderness land within their borders.

Many outdoor enthusiasts and environmentalists argue that the Wilderness Lands provide a benefit to the county. The Wilderness Lands, they say, could act as an amenity that brings value to the county. This value is provided by an increase in economic activity from visitors for recreation and tourism. Many also claim that the Wilderness Lands lead to population growth in to a county. The beauty and aesthetic value of the Wilderness Lands makes people want to live in the area. There are also claims included on this side of the discussion that, no matter the cost or benefits the lands provide to the counties in which they reside, the lands should be preserved.

Others argue that the Wilderness Lands are a hindrance to the county. These arguments explain that the presence of the Wilderness Lands takes away from the extraction resources, land that could potential be developed, require extra costs to the county, and lead to a decrease in economic activity in counties with Wilderness Lands. Those that argue this claim are a variety of government officials, construction,

extraction, and infrastructure employees, and even outdoor enthusiasts who want to be able to drive motor vehicles on the land for better access.

Although there are a variety of discussions on both sides of the spectrum, the best way to analyze the effects of Wilderness Lands on the counties for which they reside is by breaking the analysis into multiple sections. The first part is the question that was approached by many in my literature review: does the presence of Wilderness Lands have an effect on economic activity within a county? Early studies showed that there was a relationship between economic activity in a county and the presence of Wilderness Lands. However, a more recent study completed by Simmons, Yonk, and Steed with methods similar to those I used in my research looking globally at all of the counties in the United States, showed that there is a negative relationship between the economic activity in a county with Wilderness Lands.

The next step of the analysis on the effect of Wilderness Lands on the counties for which it resides is to look at the relationship between government revenue and counties with Wilderness Lands. This is the part of the analysis that my research covers. I first hypothesized that the presence of Federal Wilderness within a county increases that county's revenue. The revenue for my hypothesis included property tax, general tax revenue, and general revenue.

To test my first hypothesis, I looked specifically at the revenue variables, property tax, general tax revenue, and general revenue and their relationship with Wilderness Lands in a county. I was unable to reject the null hypothesis on this test due to the lack of relationship on general revenue. However, there was a

relationship found between the presence of Wilderness Lands and the county's property tax and total tax. This relationship was significant at the $P < .10$ level.

The results of my first test led me to conduct a second test looking at the costs a county bears with the presence of Wilderness Lands. The second hypothesis was that the Federal Wilderness within a county increases that county's expenditures. There were nine expenditure models tested. The results of these tests provided mixed results amongst the different expenditure variables. However, the expenditures that were significant are total expenditures, public welfare, highways, fire and protection, total debt, and health and hospitals.

These results led me to draw multiple conclusions about the effects of Wilderness Lands on the county's government revenue. After my first test, I agreed with many of the environmentalists and supporters of the Wilderness Lands. Although not all of the tests were significant, there was a positive correlation between Wilderness Lands and the county's property tax revenue. However, once I completed my second test and saw where the counties with Wilderness Lands were spending their money, I concluded that, although counties with Wilderness Lands have higher property tax revenue, they are possibly only raising their local tax rates to cover the costs associated with the presence of Wilderness Lands. This was proven through the tests completed testing the relationship between county expenditures and the presence of Wilderness Lands. Counties are spending more money on expenditures that help provide support for the Wilderness Lands. Because of the extra costs associated with having Wilderness Lands within a county, the counties are spending on fire and protection, hospitals and health, and highways.

There is also a relationship between counties with Wilderness Lands and the county's debt. In conclusion, counties with Wilderness Lands are spending and borrowing more than counties without Wilderness Lands, in order to support the costs associated with the land.

There has been a lack of consensus among authors on the effects Wilderness Lands have on local economies, the environment, and the counties in which they reside. The goal of my research was to provide an analysis on the missing pieces of the research. To this point, there was no analysis done specifically on the effects Wilderness Lands have on local government tax revenue. Through my two-part test, I found that sales and property taxes in counties with Wilderness Lands are higher than those that do not have the presence of Wilderness Lands. However I also found that expenditures in counties with Wilderness Lands are more than expenditure costs in counties without Wilderness Lands. My findings provide more clarity to the effects of Wilderness Lands, and add the missing piece to the literature on the topic.

Appendix

Table 2.1
Total Expenditures
Observations 3144
Pseudo R Sqr .9976

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .952 | .013 | .000*** |
| Wilderness Lands (Dummy) | 9640.172 | 5387.791 | .074* |
| Bureau of Reclamation | -95.282 | 2794.681 | .973 |
| Dept of Defense | 300.515 | 239.704 | .210 |
| Forest Service | -185.147 | 79.109 | .019** |
| Fish and Wildlife | -341.897 | 202.205 | .091* |
| National Park Service | -51.113 | 199.749 | .798 |
| Other Fed Lands | -1795.547 | 1248.382 | .150 |
| Tribal Lands | -78.207 | 84.872 | .357 |
| Tenn Valley Authority | 125.869 | 235.162 | .593 |
| County Area | -.145 | .146 | .321 |
| Population | .021 | .012 | .074* |
| Race | -280.454 | 163.185 | .086* |
| Household Income | 1.479 | .415 | .000*** |
| Earnings in Mining | .096 | .288 | .001*** |
| Earning in Wood | .010 | .088 | .219 |
| Earning Construction | .001 | .001 | .144 |
| Arts, Rec, Entertain | .001 | .003 | .718 |
| Net Migration | -3.660 | 3.347 | .274 |
| Forestry, Fish, Hunt | .006 | .009 | .517 |
| Constant | -20010.62 | 9504.266 | .035** |

*P<.10 **P<.05 ***P<.01

Table 2.2
Expenditures in Education
Observations 3144
Pseudo R Sqr .9516

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .320 | .0268 | .000*** |
| Wilderness Lands (Dummy) | 939.59 | 6080.569 | .877 |
| Bureau of Reclamation | -5465.61 | 2441.222 | .025** |
| Dept of Defense | 816.733 | 604.604 | .177 |
| Forest Service | -168.585 | 79.776 | .035** |
| Fish and Wildlife | -1118.329 | 345.990 | .001*** |

| | | | |
|----------------------------------|-----------|----------|---------|
| National Park Service | -871.511 | 428.648 | .042** |
| Other Fed Lands | -1352.519 | 1629.857 | .407 |
| Tribal Lands | -45.928 | 129.546 | .723 |
| Tenn Valley Authority | -637.303 | 415.711 | .125 |
| County Area | .113 | .251 | .651 |
| Population | .022 | .0124 | .076* |
| Race | -525.518 | 259.016 | .043** |
| Household Income | 3.66 | .839 | .000*** |
| Earnings in Mining | .103 | .029 | .000*** |
| Earning in Wood | .006 | .012 | .616 |
| Earning Construction | .001 | .001 | .207 |
| Earnings in Arts, Rec, Entertain | .000 | .006 | .901 |
| Net Migration | 7.193 | 3.912 | .066* |
| Forestry, Fish, Hunt | .000 | .011 | .995 |
| Constant | -56156.82 | 14121.76 | .000*** |

*P<.10 **P<.05 ***P<.01

Table 2.3
Public Welfare
Observations 3144
Pseudo R Sqr .8382

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .0817 | .010 | .000*** |
| Wilderness Lands (Dummy) | -16155.52 | 4208.952 | .000*** |
| Bureau of Reclamation | -2479.158 | 2696.152 | .358 |
| Dept of Defense | -245.637 | 237.854 | .302 |
| Forest Service | 137.443 | 43.149 | .001** |
| Fish and Wildlife | 334.409 | 183.294 | .068 |
| National Park Service | -93.824 | 431.713 | .828 |
| Other Fed Lands | 225.703 | 614.893 | .714 |
| Tribal Lands | 133.770 | 74.757 | .074 |
| Tenn Valley Authority | -347.297 | 215.828 | .108 |
| County Area | .117 | .0881 | .181 |
| Population | -.0197 | .0097 | .043** |
| Race | 386.759 | 116.701 | .001*** |
| Household Income | -1.338 | .332 | .000*** |
| Earnings in Mining | -.055 | .0135 | .000*** |
| Earning in Wood | -.014 | .010 | .156 |
| Earning Construction | -.001 | .000 | .132 |

| | | | |
|----------------------|---------|---------|------|
| Arts, Rec, Entertain | -.003 | .004 | .514 |
| Net Migration | .023 | 3.064 | .994 |
| Forestry, Fish, Hunt | -.014 | .013 | .294 |
| Constant | 5782.64 | 8916.24 | .517 |

*P<.10 **P<.05 ***P<.01

Table 2.4
Hospitals and Health
Observations 3144
Pseudo R Sqr .8745

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .089 | .005 | .000*** |
| Wilderness Lands (Dummy) | -6627.28 | 3303.465 | .045** |
| Bureau of Reclamation | 520.474 | 1613.17 | .747 |
| Dept of Defense | 111.73 | 259.082 | .666 |
| Forest Service | 58.65 | 34.94 | .093* |
| Fish and Wildlife | 111.459 | 145.530 | .444 |
| National Park Service | 526.035 | 292.354 | .072* |
| Other Fed Lands | -103.969 | 447.088 | .816 |
| Tribal Lands | -43.802 | 73.993 | .554 |
| Tenn Valley Authority | 826.607 | 618.367 | .181 |
| County Area | -.031 | .064 | .624 |
| Population | -.006 | .004 | .148 |
| Race | 48.290 | 88.81 | .587 |
| Household Income | -.870 | .222 | .000*** |
| Earnings in Mining | .004 | .004 | .396 |
| Earning in Wood | -.003 | .007 | .682 |
| Earning Construction | -.0006 | .0006 | .318 |
| Arts, Rec, Entertain | .001 | .002 | .613 |
| Net Migration | -1.245 | 2.090 | .551 |
| Forestry, Fish, Hunt | -.004 | .006 | .433 |
| Constant | 25018.08 | 7061.042 | .000*** |

*P<.10 **P<.05 ***P<.01

Table 2.5
Highways
Observations 3144
Pseudo R Sqr .8670

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .032 | .0022 | .000*** |
| Wilderness Lands (Dummy) | 2480.50 | 1508.92 | .100 |
| Bureau of Reclamation | 1206.45 | 2002.213 | .547 |
| Dept of Defense | -79.481 | 87.114 | .362 |
| Forest Service | -13.737 | 16.951 | .418 |
| Fish and Wildlife | 30.506 | 94.637 | .747 |
| National Park Service | -166.224 | 157.822 | .292 |
| Other Fed Lands | -320.952 | 182.747 | .079* |
| Tribal Lands | 46.595 | 27.152 | .086 |
| Tenn Valley Authority | -34.091 | 40.205 | |
| County Area | .015 | .037 | .676 |
| Population | .004 | .002 | .107 |
| Race | 13.305 | 28.767 | .644 |
| Household Income | .434 | .111 | .000*** |
| Earnings in Mining | .014 | .004 | .001*** |
| Earning in Wood | .001 | .002 | .427 |
| Earning Construction | .000 | .000 | .322 |
| Arts, Rec, Entertain | -.0008 | .001 | .470 |
| Net Migration | -.663 | 1.135 | .559 |
| Forestry, Fish, Hunt | .003 | .003 | .424 |
| Constant | -13650.78 | 3487.395 | .000*** |

*P<.10 **P<.05 ***P<.01

Table 2.6
Police
Observations 3144
Pseudo R Sqr .9823

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .0648 | .0017 | .000*** |
| Wilderness Lands (Dummy) | 1474.776 | 1066.591 | .167 |
| Bureau of Reclamation | 469.8468 | 441.1796 | .287 |
| Dept of Defense | -11.343 | 73.422 | .877 |
| Forest Service | -13.238 | 10.721 | .217 |
| Fish and Wildlife | 51.181 | 42.633 | .230 |
| National Park Service | 108.28 | 89.063 | .224 |

| | | | |
|-----------------------|----------|---------|---------|
| Other Fed Lands | -106.802 | 163.184 | .513 |
| Tribal Lands | 14.909 | 19.038 | .434 |
| Tenn Valley Authority | 33.829 | 45.449 | .0457** |
| County Area | -.022 | .0248 | .370 |
| Population | .0015 | .0015 | .293 |
| Race | 8.84 | 23.62 | .708 |
| Household Income | -.215 | .070 | .002*** |
| Earnings in Mining | -.006 | .001 | .001*** |
| Earning in Wood | -.001 | .002 | .501 |
| Earning Construction | -.0003 | .0001 | .085* |
| Arts, Rec, Entertain | -.0003 | .0007 | .617 |
| Net Migration | -.3653 | .684 | .594 |
| Forestry, Fish, Hunt | .0005 | .0022 | .807 |
| Constant | 4001.95 | 2115.58 | .059 |

*P<.10 **P<.05 ***P<.01

Table 2.7
Fire and Protection
Observations 3144
Pseudo R Sqr .96449

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .0264 | .0008 | .000*** |
| Wilderness Lands (Dummy) | 1295.277 | 556.668 | .020** |
| Bureau of Reclamation | 369.326 | 383.839 | .336 |
| Dept of Defense | -14.953 | 35.397 | .673 |
| Forest Service | -7.344 | 5.131 | .152 |
| Fish and Wildlife | 19.888 | 37.191 | .593 |
| National Park Service | -3.623 | 38.546 | .925 |
| Other Fed Lands | -22.68 | 55.85 | .685 |
| Tribal Lands | -16.87 | 7.985 | .035** |
| Tenn Valley Authority | 16.415 | 18.966 | .387 |
| County Area | -.0294 | .016 | .081 |
| Population | .001 | .0006 | .074* |
| Race | -40.019 | 11.234 | .000*** |
| Household Income | .076 | .0369 | .040** |
| Earnings in Mining | -.001 | .001 | .327 |
| Earning in Wood | .001 | .001 | .322 |
| Earning Construction | .000 | .000 | .840 |
| Arts, Rec, Entertain | -.000 | .000 | .820 |
| Net Migration | -.181 | .296 | .541 |
| Forestry, Fish, Hunt | .000 | .000 | .260 |

| | | | |
|----------|---------|---------|------|
| Constant | 588.346 | 998.994 | .556 |
|----------|---------|---------|------|

*P<.10 **P<.05 ***P<.01

Table 2.8
Total Debt
Observations 3144
Pseudo R Sqr .9346

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|-------------|----------------|---------|
| General Revenue | 1.158 | .095 | .000*** |
| Wilderness Lands (Dummy) | 89013.73 | 36731.81 | .015** |
| Bureau of Reclamation | 60185.24 | 50729.92 | .236 |
| Dept of Defense | -2198.104 | 2053.903 | .285 |
| Forest Service | -1205.33 | 492.210 | .014** |
| Fish and Wildlife | 1323.481 | 1597.68 | .408 |
| National Park Service | -2722.69 | 1573.16 | .084* |
| Other Fed Lands | 33012.42 | 31080.3 | .288 |
| Tribal Lands | -890.999 | 588.246 | .130 |
| Tenn Valley Authority | 2375.095 | 2008.414 | .237 |
| County Area | -1.304 | 1.025 | .203 |
| Population | .080 | .055 | .145 |
| Race | -239.82 | 1037.175 | .817 |
| Household Income | -3.309 | 2.969 | .265 |
| Earnings in Mining | .622 | .168 | .000*** |
| Earning in Wood | .150 | .081 | .064* |
| Earning Construction | .017 | .0100 | .082* |
| Arts, Rec, Entertain | .026 | .0288 | .351 |
| Net Migration | -2.534 | 7.652 | .886 |
| Forestry, Fish, Hunt | .064 | .062 | .302 |
| Constant | 75970.51 | 54041.71 | .160 |

*P<.10 **P<.05 ***P<.01

Table 2.9
Local Government Payroll
Observations 3144
Pseudo R Sqr .9963

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|-------------|----------------|---------|
| General Revenue | .0368 | .0002 | .000*** |
| Wilderness Lands (Dummy) | 147.084 | 243.471 | .546 |
| Bureau of Reclamation | -.875 | 108.90 | .994 |
| Dept of Defense | 30.052 | 15.961 | .060* |
| Forest Service | -5.834 | 2.250 | .010*** |

| | | | |
|-----------------------|----------|---------|---------|
| Fish and Wildlife | -16.578 | 10.85 | .127 |
| National Park Service | -24.508 | 14.305 | .087* |
| Other Fed Lands | 9.499 | 28.421 | .738 |
| Tribal Lands | .648 | 4.396 | .883 |
| Tenn Valley Authority | 2.959 | 14.455 | .838 |
| County Area | -.009 | .008 | .244 |
| Population | .0005 | .0003 | .158 |
| Race | -1.079 | 6.342 | .865 |
| Household Income | .032 | .013 | .013** |
| Earnings in Mining | .002 | .000 | .000*** |
| Earning in Wood | .000 | .000 | .113 |
| Earning Construction | .000 | .000 | .197 |
| Arts, Rec, Entertain | -.0003 | .0003 | .282 |
| Net Migration | -.215 | .1524 | .157 |
| Forestry, Fish, Hunt | .000 | .000 | .834 |
| Constant | -821.009 | 544.968 | .132 |

*P<.10 **P<.05 ***P<.01

Table 2.11
Health
Observations 3144
Pseudo R Sqr .7734

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .030 | .005 | .000*** |
| Wilderness Lands (Dummy) | -5036.097 | 1913.738 | .009*** |
| Bureau of Reclamation | -151.0549 | 717.345 | .833 |
| Dept of Defense | 202.594 | 122.585 | .098 |
| Forest Service | 78.430 | 25.728 | .002*** |
| Fish and Wildlife | -58.839 | 76.229 | .440 |
| National Park Service | 42.901 | 161.835 | .791 |
| Other Fed Lands | -196.178 | 112.823 | .082* |
| Tribal Lands | -19.420 | 30.559 | .525 |
| Tenn Valley Authority | -172.843 | 59.59 | .004*** |
| County Area | .078 | .067 | .250 |
| Population | -.005 | .003 | .093* |
| Race | -22.33 | 57.17 | .696 |
| Household Income | .0167 | .159 | .916 |
| Earnings in Mining | -.005 | .003 | .162 |
| Earning in Wood | -.0005 | .0037 | .888 |
| Earning Construction | -.0001 | .0002 | .435 |

| | | | |
|----------------------|----------|----------|------|
| Arts, Rec, Entertain | .0008 | .001 | .604 |
| Net Migration | -.997 | 1.051 | .343 |
| Forestry, Fish, Hunt | -.002 | .002 | .451 |
| Constant | 1724.215 | 3339.785 | .606 |

*P<.10 **P<.05 ***P<.01

Table 2.12
Hospitals
Observations 3144
Pseudo R Sqr .7224

| Variable | Coefficient | Standard Error | P Value |
|--------------------------|--------------------|-----------------------|----------------|
| General Revenue | .058 | .010 | .000*** |
| Wilderness Lands (Dummy) | -1591.191 | 3616.37 | .660 |
| Bureau of Reclamation | 671.529 | 2014.776 | .739 |
| Dept of Defense | -90.860 | 251.537 | .718 |
| Forest Service | -19.773 | 45.997 | .667 |
| Fish and Wildlife | 170.299 | 156.4295 | .276 |
| National Park Service | 483.134 | 385.154 | .210 |
| Other Fed Lands | 92.208 | 411.669 | .823 |
| Tribal Lands | -24.381 | 80.456 | .762 |
| Tenn Valley Authority | 999.450 | 659.271 | .130 |
| County Area | -.109 | .0797 | .169 |
| Population | -.0005 | .003 | .891 |
| Race | 70.621 | 116.691 | .545 |
| Household Income | -.877 | .327 | .007** |
| Earnings in Mining | .009 | .007 | .224 |
| Earning in Wood | -.002 | .0069 | .694 |
| Earning Construction | -.0004 | .0005 | .441 |
| Arts, Rec, Entertain | .0006 | .0032 | .848 |
| Net Migration | -.248 | 1.628 | .879 |
| Forestry, Fish, Hunt | -.002 | .004 | .540 |
| Constant | 23293.86 | 6582.361 | .000*** |

*P<.10 **P<.05 ***P<.01

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