The Cost of County Rural Residential Development
A Statewide Summary of Results

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Introduction

The demographic structure of the western U.S. has seen dramatic changes over the last twenty years. Population in the Rocky Mountain West has grown at an annual rate of 2.2 percent per year between 1990 and 1997. Many counties in Wyoming have had to accommodate more and more in-migrants and summer home sites. Between 1990 and 1997, 10 out of twenty-three counties experienced growth rates higher than the State average. As a result many counties have had to adjust to a changing economic and demographic structure. The following analysis estimates the role of rural residential development in the fiscal structure of the county, estimates of residential contributions to county level revenues and its demands on county government expenses are provided.

Growth has become an issue for many of the counties in the State for both cities and rural areas. Counties in western half of the State have experienced the fastest growth both for the overall population and in the incorporated areas, Table 1. Few counties have actually seen negative growth rates in the unincorporated areas. Teton, Sublette, Lincoln, Park, Uinta, and Crook Counties have experienced the fastest growth in the non-incorporated areas, while Weston, Albany, and Carbon have experienced declines in non-incorporated areas.

Table 1. Population Growth in Wyoming Counties, 1990-2000

	Total County Population			Incorporated Pop			Unincorporated Pop		
CNTYNAME	1990	2000	Pop Change	1990	2000	Pop Change	1990	2000	Pop Change
Teton Co.	11,173	14,530	30.0%	4,708	5,981	27.0%	6,465	8,549	32.2%
Sublette Co.	4,843	5,850	20.8%	2,269	2,590	14.1%	2,574	3,260	26.7%
Lincoln Co.	12,625	13,990	10.8%	7,062	7,300	3.4%	5,563	6,690	20.3%
Park Co.	23,178	26,080	12.5%	13,563	15,144	11.7%	9,615	10,936	13.7%
Uinta Co.	18,705	20,580	10.0%	13,989	15,226	8.8%	4,716	5,354	13.5%
Crook Co.	5,294	5,890	11.3%	2,477	2,744	10.8%	2,817	3,146	11.7%
Campbell Co.	29,370	32,930	12.1%	18,781	21,112	12.4%	10,589	11,818	11.6%
Johnson Co.	6,145	6,920	12.6%	3,533	4,021	13.8%	2,612	2,899	11.0%
Converse Co.	11,128	12,470	12.1%	7,563	8,531	12.8%	3,565	3,939	10.5%
Niobrara Co.	2,499	2,730	9.2%	1,609	1,751	8.8%	890	979	10.0%
Laramie Co.	73,142	79,520	8.7%	51,436	55,674	8.2%	21,706	23,846	9.9%
Big Horn Co.	10,525	11,540	9.6%	6,678	7,316	9.6%	3,847	4,224	9.8%
Sheridan Co.	23,562	25,350	7.6%	15,291	16,302	6.6%	8,271	9,048	9.4%
Fremont Co.	33,662	36,320	7.9%	18,135	19,697	8.6%	15,527	16,623	7.1%
Platte Co.	8,145	8,730	7.2%	4,891	5,292	8.2%	3,254	3,438	5.7%
Natrona Co.	61,226	63,600	3.9%	52,095	54,088	3.8%	9,131	9,512	4.2%
Goshen Co.	12,373	12,950	4.7%	6,727	7,131	6.0%	5,646	5,819	3.1%
Washakie Co.	8,388	8,720	4.0%	6,053	6,324	4.5%	2,335	2,396	2.6%
Sweetwater Co.	38,823	39,600	2.0%	32,628	33,269	2.0%	6,195	6,331	2.2%
Hot Springs Co.	12,373	12,950	4.7%	11,091	11,665	5.2%	1,282	1,285	0.2%
Weston Co.	6,518	6,460	-0.9%	4,165	4,153	-0.3%	2,353	2,307	-2.0%
Albany Co.	30,797	29,150	-5.3%	26,877	25,316	-5.8%	3,920	3,834	-2.2%
Carbon Co.	16,659	15,440	-7.3%	14,417	13,351	-7.4%	2,242	2,089	-6.8%

In many of Wyoming's counties the quantity of private rural land is smaller than the associated Federal and State lands. Since growth in rural areas would only occur on private land, the impact of rural population change is even more dramatic based upon acres lost per person. Like the population change in rural areas described in Table 1, changes in non-incorporated acres per non-incorporated population show a similar pattern, Table 2. Teton, Lincoln, Sublette, and Uinta Counties experienced the sharpest declines in private non-incorporated acres per person while Weston, Albany, and Carbon have experience increases (due to changes in population.)

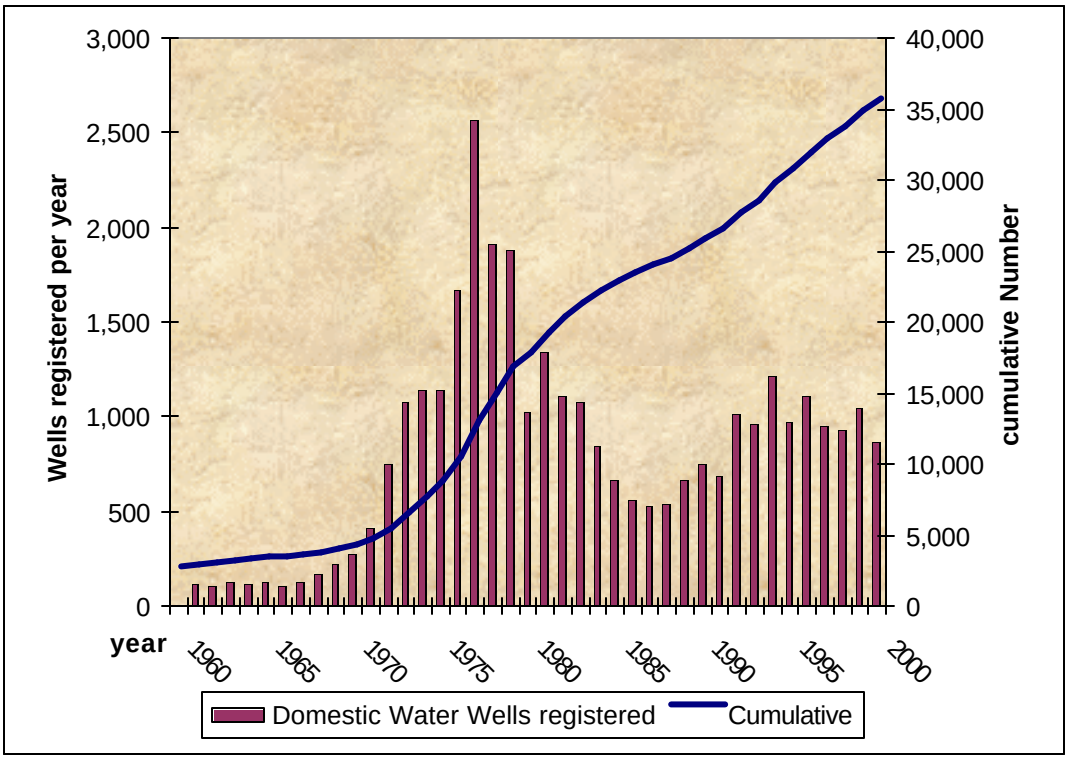
Table 2. Population Changes in Incorporated areas Non-Incorporated areas, and Private Non-incorporated Land per rural person, 1990-2000

	Acres (Private)	Private Noincp	Non-inc pop 1990	2000	Pct. Change	Non incorporated Acres / person 1990	2000	Percent Change
Teton Co.	25,087	21,567	6,465	8,549	24.4%	3	3	-24.4%
Sublette Co.	591,925	590,709	2,574	3,260	21.0%	229	181	-21.0%
Lincoln Co.	551,323	542,555	5,563	6,690	16.8%	98	81	-16.8%
Park Co.	685,337	683,417	9,615	10,936	12.1%	71	62	-12.1%
Uinta Co.	716,738	709,954	4,716	5,354	11.9%	151	133	-11.9%
Crook Co.	1,448,753	1,447,665	2,817	3,146	10.5%	514	460	-10.5%
Campbell Co.	2,314,458	2,312,922	10,589	11,818	10.4%	218	196	-10.4%
Johnson Co.	1,591,016	1,589,864	2,612	2,899	9.9%	609	548	-9.9%
Converse Co.	2,062,609	2,061,649	3,565	3,939	9.5%	578	523	-9.5%
Niobrara Co.	1,387,630	1,382,958	890	979	9.1%	1,554	1,413	-9.1%
Laramie Co.	1,537,056	1,536,032	21,706	23,846	9.0%	71	64	-9.0%
Big Horn Co.	124,568	122,200	3,847	4,224	8.9%	32	29	-8.9%
Sheridan Co.	1,050,677	1,050,421	8,271	9,048	8.6%	127	116	-8.6%
Fremont Co.	711,858	711,090	15,527	16,623	6.6%	46	43	-6.6%
Platte Co.	1,082,329	1,082,073	3,254	3,438	5.4%	333	315	-5.4%
Natrona Co.	1,548,596	1,537,396	9,131	9,512	4.0%	168	162	-4.0%
Goshen Co.	1,305,440	1,304,224	5,646	5,819	3.0%	231	224	-3.0%
Washakie Co.	366,557	361,821	2,335	2,396	2.5%	155	151	-2.5%
Sweetwater Co.	1,860,085	1,857,781	6,195	6,331	2.1%	300	293	-2.1%
Hot Springs Co.	636,732	635,004	1,282	1,285	0.2%	495	494	-0.2%
Weston Co.	1,091,723	1,089,611	2,353	2,307	-2.0%	463	472	2.0%
Albany Co.	1,918,305	1,909,729	3,920	3,834	-2.2%	487	498	2.2%
Carbon Co.	2,116,287	2,115,135	2,242	2,089	-7.3%	943	1,013	7.3%
State Total	26,725,089	26,655,777	135,115	148,322	8.9%	197	180	-8.9%

While the above tables document growth in counties related to people looking to change their residence, growth in many counties is occurring to both changes in residence and to the expansion of second homes or summer home sites. These latter are hard to document but also contribute fragmentation of habitat. A data source that can capture both is the number of registered domestic use wells recorded by the State Engineers Office[1]. The annual growth rate in the number of domestic use water wells registered per year has increased by over

38 percent during the same period 1990 to 2000, Figure 1. This compares with statewide rural population growth during the same period of 8.9 percent and is faster than the highest growth counties in Table 1. Currently there are over 35,000 domestic use water wells registered in the State.

Figure 1. Domestic use water wells registered to the State, Annual and Cumulative



[1] This database was suggested by Jeff Hammerlink of the Spatial Data and Visualization Center at the University of Wyoming. Dennis Feeney of the Water Resources Data System in the Department of Civil and Architectural Engineering provided access to the database. For both their input we are grateful.

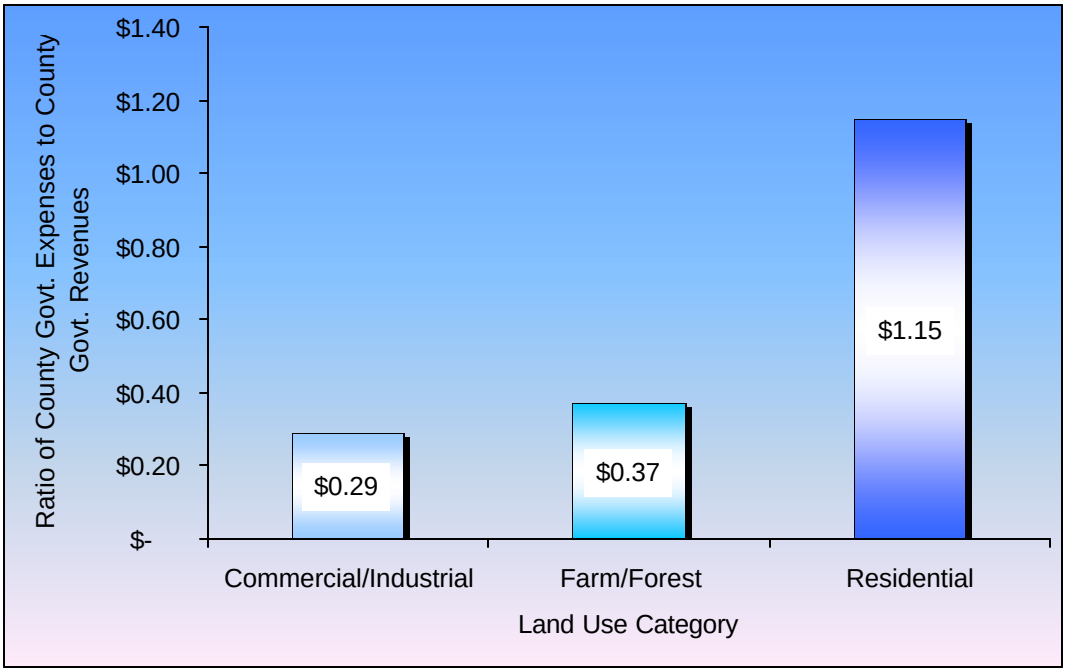
Baseline Cost of Rural Government Services

On one level rural residential development seems to be a winner. It replaces lower value agricultural land with high value residential land, thereby increasing the revenues to county government. However, policy-makers and scientists have increasingly questioned that supposed benefit. Fragmenting farm and ranch land can have a significant impact on wildlife and water quality. It can increase the conflicts between traditional users and newcomers, and, it also ultimately ends up diminishing the very reason people move to rural areas: The agrarian rural lifestyle and landscapes. Finally, it has been asserted by policy makers and analysts that fragmentation of rural lands increases in county expenditures from additional rural residents are higher than the contribution of rural residential development to a county's revenue stream.

Previous work in Wyoming and elsewhere suggest that on average, residential development in rural areas incur costs to all county taxpayers in excess of revenues generated. While homeowners and developers have become more conscientious about internalizing the cost of additional infrastructure into the price of homes, those costs are only part of the total cost to county taxpayers. Expanded government services required for the new residents also increases the cost to all county residents. The American Farmland Trust (AFT, 1999) lead the development of cost of county government study methods in 1986. AFT reports that for over sixty such studies around the nation, on average, rural residential developments to require $1.16 in county government services for every dollar of tax revenue contribution, Figure 2. Agriculture, commercial, and industrial both require significantly less in county services for

every dollar they provide in taxes. Recent work in Sublette County by the University of Wyoming Cooperative Extension Service, estimated that a household with two jobs and two students required $1.67 in county government services for every dollar of revenue provided. The results are similar to studies done in other States.

Figure 2. American Farmland Trust Compilation of Cost of Community Services Studies



The AFT approach typically involves categorizing revenues and expenditures into four categories: Residential, agriculture, industrial, and commercial. From these summarized estimates of revenues and expenditures, ratios of expenditures to revenues for each category are calculated. The methodology provides a simple and straightforward way to estimate the average fiscal impacts of rural land fragmentation.

We depart from the AFT methodology and use a county and school fiscal impact model developed at the Department of Agricultural and Applied

Economics at the University of Wyoming to estimate the ratios. The model permits testing underlying assumptions in cost of community service analyses and construct forecasts for specific projects. County revenues and expenditures totals are allocated to the following categories: rural residents, agriculture, commercial and industrial, and urban residents using a time series cross-sectional regression model. The estimated ratios were calculated from a statistical model that predicts county revenues and expenditures based upon assessed valuation by major category, the quantity of agricultural land, rural population, incorporated population, and personal income[2]. All counties were used to estimate the models except for Teton County. The unique nature of Teton County's wealth and fiscal structure distorts the statistical results for the other counties.

[2] See the Appendix for a description of the statistical model.

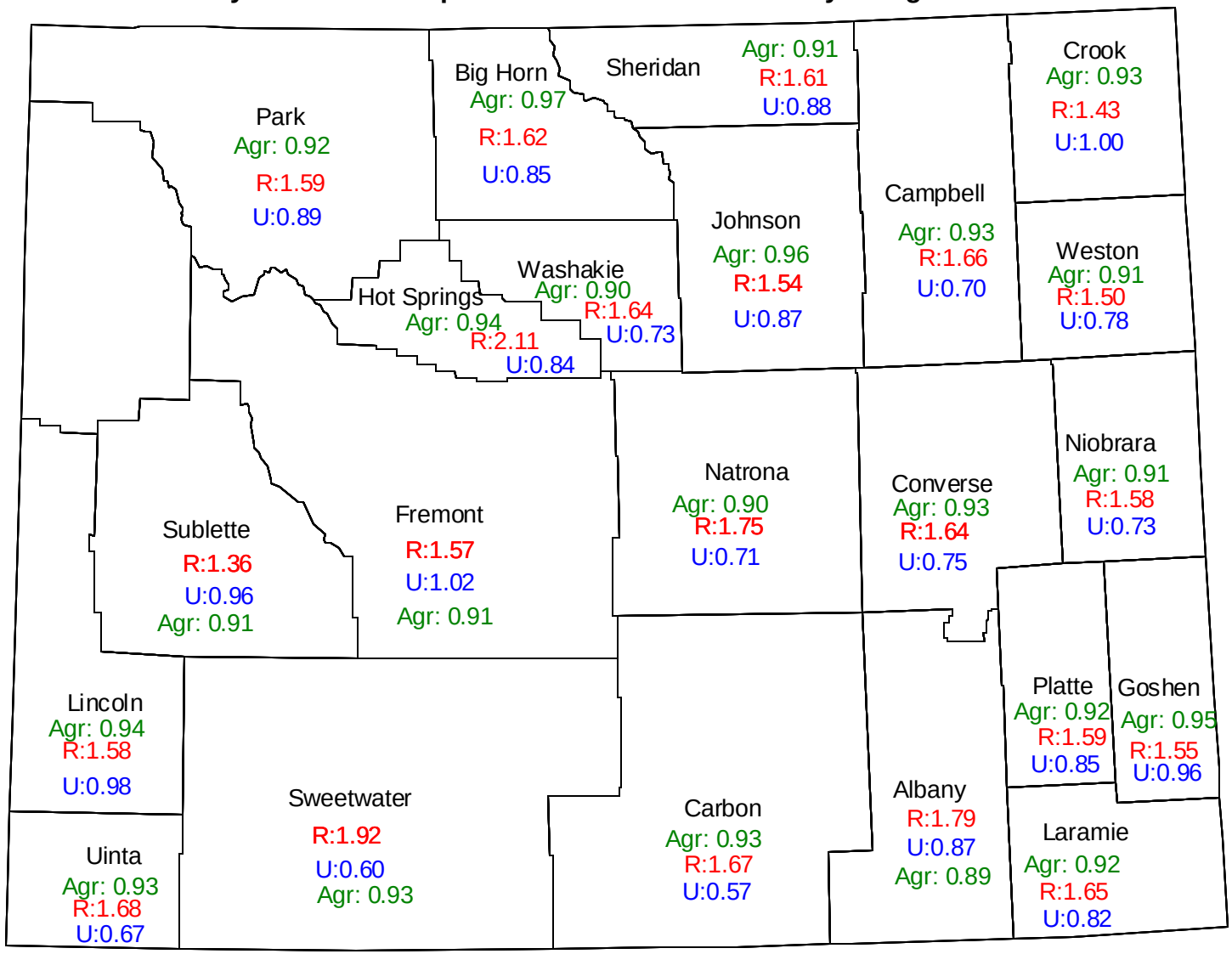
Results

The first scenario analyzed is a reduction in agricultural land by 35 acres with a corresponding increase of one family of four. In this scenario, it is assumed that the family has a household income approximately equal to each County's average household income and that the value of the house being built is about average for each county residential assessed valuation. The results are presented in Figure 3.

Results show that replacement of rural agricultural land costs the county taxpayer more than it receives in tax revenue. The ratio estimates ("R:" in Figure 3 range from a low of $1.36 in Sublette County to a high of $2.11 in Hot Springs County. Important in this scenario are the assumptions about what kind of rural household is actually moving on the 35 acres. The estimates in Figure 2 reflect average household incomes and average family size. Changing either would affect ratio in different ways. Assuming no kids or higher incomes both affect the size of the ratio in different ways.

Another scenario is isolating the affect of one acre of agricultural land. Assuming an average agricultural land value equal to the county average, the ratios of expenditures to revenues for agricultural land vary between $0.89 for Albany County and $0.97 for Big Horn County. This analysis measures the impact of one acre of agricultural land.

Figure 3. Ratios of County and School Expenditures to Revenues for Wyoming Counties



Agr: Agricultural land change

R: Replacement of 35 acres of Agricultural Land with one family of four

U: Addition of one urban family of four

* Not included in the statistical model due to the unique nature of the wealth and tax structure of the County

The final scenario in Figure 3 is adding one family to the county's urban areas. Since this analysis does not consider municipal government revenues and expenditures, adding an additional family to a county's urban areas becomes a net winner for County government. After all, services are mostly provided through a separate fiscal system, municipal government yet they pay taxes into the county revenues. The implication of this result is that to maintain county fiscal stability and protect open spaces, growing a county's urban areas makes sense financially and environmentally. The above analysis does include city fiscal impacts of the addition of one urban family.

Conclusions

The estimates presented above give an average view of the cost of residential development in un-incorporated areas for the years 1993 to 1998. The results show that on average expansions in rural residential development do not pay for themselves. While developers have become increasingly sensitive to rural infrastructure issues, and very often include in the price of a house, the cost of additional infrastructure, the operating cost increases of government services are not generally accounted for. The results above confirm this observation. Agriculture and urban residential development on the other hand, contributes slightly more to the county treasury than it requires in county government services.

There are several important considerations and caveats in interpreting these ratios for implementing local policy. Both the numerator (expenditures) and the denominator (revenues) can change depending upon county government

policies, specific demographics, and wealth of the rural resident in question. A rural home that is sufficiently large (in assessed value terms) can increase the contribution to revenues thus affecting the denominator, and lowering the magnitude of the ratio.

Second, actual expenditures can change the numerator. A household that has no children in the local school system clearly comes closer to actually paying its way than one that does. A household with more than the countywide average number of children would generate a ratio higher than that reported in Figure 2. There may be other expenditures that either increase or decrease because of specific policies by local government and/or by the households themselves that can affect expenditures (the numerator). Even with a large assessed value a positive revenue effect of a wealthy rural resident can be negated if those residents expect more government services (law enforcement, fire protection for example).

Demographic changes such as commuting, retirees, and household size can affect the ratio of expenditures to revenues. Commuting generally is a net loss because the resident is using county government services, but is not employed by a firm that is contributing to county revenues. Retirees are not using local education services, but may require other types of services.

Finally, the kind of agriculture can make a difference in both the numerator and the denominator. A high value crop generally will pay more in tax revenue than a low value commodity simply because of higher potential revenues, but it also might require more in government services for road and bridge, pest management, law enforcement, and others. Just how that might affect the ratio

depends upon the specific situation. On average though, agriculture provides more in revenues to county government than it requires in expenditures

References

American Farmland Trust. “Cost of Community Services Studies”. American Farmland Trust Information Center. WWW.farmland.org. August 1999.

Tax Reform 2000. “Building Wyomings Tax Structure for the 21st Century, Report to the State of Wyoming” Tax Reform 2000 Committee. http://legisweb.state.wy.us/1999inte/t2000/tax2000.htm

Wyoming Department of Education. “Statistical Report Series No. 1” Years 1993-1998.

Wyoming Department of Education. “Statistical Report Series No. 3” Years 1993-1998.

APPENDIX

The model used is a time series cross sectional model of county revenues and expenditures. The analysis covered the period from 1993 to 1998 and estimated average annual expenditure and revenues as a function of rural population, incorporated population, and mineral assessed valuation, and acres of agricultural land. County revenues and expenditures were taken from county budgets and revenue estimates reported in the State Department of Audit records. School revenues and expenditure estimates are taken from Department of Education Statistical reports. Average annual expenditure and revenues are a function of rural population, incorporated population, and mineral assessed valuation, and acres of agricultural land, total assessed valuation, and personal income.

Table A1. Statistical model of Revenues and expenditures for County government and Schools

County Revenues				
Var	Coef.	Std. Coef.	Std. Error	t-Stat
CONSTANT	1.851613	---	0.456587	4.055337
Rural Population	0.209372	0.211065	0.043456	4.818037
Personal income	0.438367	0.511842	0.039897	10.98755
Acres of agricultural land	0.095236	0.069773	0.032401	2.939234
Mineral Assessed Valuation	0.280512	0.436212	0.014629	19.1747
County Expenditures				
Var	Coef.	Std. Coef.	Std. Error	t-Stat
CONSTANT	1.140075	---	0.470011	2.425633
Incorporated population	0.192114	0.237601	0.02868	6.698507
Rural Population	0.241967	0.243081	0.033013	7.329436
Acres of agricultural land	0.104249	0.076112	0.029051	3.588468
Total Assessed Valuation	0.485795	0.583939	0.022266	21.818
School revenues				
Var	Coef.	Std. Coef.	Std. Error	t-Stat
CONSTANT	4.45262	---	0.334197	13.32334
Rural Population	0.256211	0.249351	0.04097	6.253601
Personal income	0.511585	0.576676	0.038012	13.45861
Total Assessed Valuation	0.197684	0.230199	0.023782	8.312455
School expenses				
Var	Coef.	Std. Coef.	Std. Error	t-Stat
CONSTANT	7.189025	---	0.579923	12.39652
Incorporated population	0.326484	0.320755	0.058756	5.556642
Rural Population	0.413919	0.500636	0.049505	8.361209
Total Assessed Valuation	0.164246	0.193075	0.040128	4.093077