Costs and Benefits of Public Programs to Back-to-the-Land and Conventional Rural Households

Gerald Marousek

Migration of people with self-sufficient life-style into conventionally oriented rural communities raises economic, as well as social, issues. Benefit-cost analysis was used to examine the fiscal impacts of eight public programs on two types of residents in an Idaho rural community. Data were obtained from a household survey and local, state, and federal revenue collections and expenditures. "Back-to-the-land" residents paid fewer costs than did conventional rural dwellers, but also received fewer benefits. Age and income were lower in the back-to-the-land population, however, which may have been primarily responsible for that group's smaller educational benefits (the largest program examined) and tax payments.

This is a case study of fiscal impacts of eight public programs on a rural community which experienced rapid population growth from "back-to-the-land" settlement. This type of population movement, while not representing a large number of people, is nevertheless occurring in many rural areas in the United States. Furthermore, the physical, social, and economic impacts of back-to-the-land migration are made on rural communities with few resources and little experience to bring to bear on the resulting problems.

Citizens and public officials in communities where sudden population growth occurs are faced with the question: who pays for, and who benefits from the public services that must be provided? The answer will indicate the fiscal impacts, via the public sector, of population growth which has or is likely to take place. In addition, knowledge of fiscal impacts of growth can be useful in determining and directing the type of population growth a community desires.

The case study approach is particularly adapted to emerging problem situations where there is an awareness, but lack of knowledge of the exact extent and ultimate direction of the phenomenon. This situation describes the back-to-the-land movement. The case studied is an individual one, but many similar situations may be observed in rural America.

The Setting

"Back-to-the-land" people are defined as rural Americans whose major socioeconomic objectives are self-sufficiency and independence from a highly organized and mechanized society. Their life-style includes advocacy of physical labor with little concern for financial security. Many seek outside employment only when necessary to supply the household with certain items which they are unable to provide themselves.

The community studied, Boundary County, Idaho, had a 1970 population of 6,400, 56 percent of whom were rural residents. Timber harvesting and processing is the most important industry, followed by ag-

Gerald Marousek is Professor and Agricultural Economist at the University of Idaho.

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ricultural production. The county has experienced a high rate of population growth since 1970, primarily through immigration of "back-to-the-land" settlers. Local observers estimated that back-to-the-land people comprised ten percent of rural dwellers in 1974.

Members of the community, expecially those of long-term residency, were of the opinion that the population influx had greatly increased the demand for public services, particularly welfare and education. Further, they contended that those benefiting from the increased level of public services were not contributing a proportional share to the total cost of providing these services to the community.

Objectives

Based on the observed situation and expressed opinions in the Boundary County rural community, a study was made to determine (1) the relative composition of the rural population, i.e., "back-to-the-land" versus "conventional" rural residents, (2) the revenue contributions and expenditure-benefits for each group with respect to eight selected public programs, (3) the expenditure-benefit/cost ratios and net expenditure-benefits of the programs for each group, and (4) the programs' effects on real income redistribution among the groups studied, other local residents and taxpayers outside Boundary County. The programs examined were: public health nurse, restorium (rest home), indigent assistance, financial and medical assistance, public schools, public library, airport, and rural solid waste disposal. Administrative responsibility for public health and financial-medical assistance programs rests with the Idaho Department of Health and Welfare. Public schools and the library are administered by county-wide school and library district boards, respectively. The other four programs are administered by the board of county commissioners.

Benefit-Cost Analysis

Benefit-cost analysis is widely used to determine the economic efficiency of public projects. More recently the technique has been adapted for measuring the distribution of costs and benefits in the public sector. Holland applied benefit-cost analysis to public education; Boisvert and Mapp extended it to evaluate school financing alternatives. Hoyt and Ayer have shown how the results of benefit-cost analysis applied to population groups can be used to justify changes in tax structures and expenditure policies to achieve income redistribution goals.

One of the problems associated with the use of benefit-cost analysis in the public sector is measurement of an intangible output, such as education. In addressing this problem Bieker and Anschel (1973, 1974) concluded that the relationship between input and output was different for each curriculum in five public rural high schools which they studied, and thus each curriculum had a unique production function. However, the traditional method of measuring output in terms of expenditure-benefits is made tenable by assuming constant average and marginal costs. Thus in the case of education, output is proportional to expenditures per pupil. This approach is taken by Barlow in deriving "benefit-burden" ratios relative to local school finance.

Partial, static benefit-cost analysis was used in the study reported here. Partial, a term used by Weisbrod, indicates that only directly attributable costs and expenditure-benefits were included. Costs and benefits were calculated for either the 1974 calendar or fiscal year, depending on the administration of the program. This "one shot" approach results in the static nature of the analysis, as defined by Macrariello. Time and budget constraints on obtaining data for analyzing the programs dictated the use of partial, static analysis.

The Expenditure-Benefit and Cost Models

The general expenditure-benefit model

has two components: (1) the average total cost of one unit of program output and (2) the average number of units of output consumed by each population group. The average household expenditure-benefit received by a given group from a given program is the product of (1) and (2): expenditure-benefit equals the average total cost per unit of program output times the average number of units consumed (Appendix equation 1).

In the public school program, for example, the expenditure-benefit from education attributed to a conventional household was estimated to be the average cost per student of education times the average number of school-age children in conventional households. The variables of each program's expenditure-benefit model will differ as the definition of each program's total output, units of consumption and expenditure-benefit recipients differ. However, their general interpretation will remain unchanged.

Total program costs must be defined as a program's total appropriation when detailed cost data are not available. Total program output will be defined in most cases as the total number of public program consumers or participants in a given fiscal period. The definition of a single unit of program output will vary according to the nature of goods and services provided, the number of times the benefits can be received by an individual from the program in a given fiscal period, and the available records.

The total cost of a public program accruing to a household is defined as equal to that household's payments to all levels of government times the respective ratios of government expenditures on the program to total government expenditures. Thus average household cost can be expressed as the sum, over all revenue sources, of the proportion of each revenue source spent on the program times the average contribution by the back-to-the-land or conventional rural household to each revenue source (Appendix equation 2).

Again using the public school program as an example, the average cost of education attributed to conventional households was estimated to be the average household local property tax payment times the percentage of local property tax revenue spent on education, plus the results of the same computations for tax payments in relation to public school expenditures at the state and federal levels.

Program appropriations may be made from the general fund or from dedicated (trust) funds. Payments into dedicated funds are allocated directly to their respective programs. Other tax payments are assumed to be allocated among programs in the same proportions as individual program appropriations are of the total general fund budget. Expenditures resulting from deficit financing are also allocated proportionally among programs.

Data Sources and Sample Design

Secondary data were available for: (1) total expenditures, costs, or appropriations for each program; (2) the level of government making program revenues available; (3) the total amount dedicated and/or appropriated to each program by each level of government; (4) the fund from which revenues were appropriated or dedicated; (5) the types and total amounts of revenues deposited in relevant funds; (6) the total amounts of each type of revenue collected by each level of government; (7) the total net budgetary receipts collected by each level of government; (8) the total expenditures made by each level of government; and (9) total output or consumption of each program.

Data not available from secondary sources were collected from Boundary County's rural households by a personal interview sample survey. Information obtained included: (1) public program participation or use, (2) tax and other payments made to public agencies, (3) number of bottles of beer and packages of cigarettes purchased, (4) expenditures for

personal consumption and household goods, construction, recreation equipment, and farm inputs, and (5) subsidiary data. Items (2) through (4) documented income, property, sales, and excise taxes, and school lunch payments. The last category of primary data included the age of each adult household member and each household's adjusted gross income, from which group averages were derived.

A one-in-k randomized sample survey design was used [Mendenhall, Ott, and Schaeffer].[1] Based on estimates of 10 percent back-to-the-land people in the rural population, 3.96 persons per rural household, and a 1975 Boundary County population of 6,510, 12.5 percent of 1,312 households with rural mail service were in the back-to-the-land group. Because the resources available necessitated a relatively small sample, a 6.0 percent bound on the error of the estimator was accepted. Using the above data, n = 111.3 and k = 11.8 rounded to 12. The survey included 113 households. Households were categorized as back-to-the-land or conventional by asking adults members if they attempted to live as, or considered their lifestyle to be that of, a "homesteader" or "back-to-the-lander." If this self-perceptive question did not evoke a response, the interviewer designated household type on the basis of the interview experience and observation.

Population Characteristics

Information obtained in the sample survey revealed some of the contrasts in demographic and economic characteristics of conventional and back-to-the-land rural households. The estimated 10 percent back-to-the-land composition of the Boundary County rural population was substantiated by the survey. On this basis approximately 427 of the 1974 total rural population of 4,134 were back-to-the-land people.

Average adult age in conventional rural households was 42.6 years, 15 years older than in back-to-the-land households. This result is consistent with the average number of school enrollees in grades 1 through 12: nearly one per household for conventional people versus one-sixth in back-to-the-land households.

Conventional rural households paid more in each of the four major types of taxes (federal income, state income, state sales and local property) in 1973 than did the back-to-the-land group. The higher conventional household average adult age, number of school enrollees and tax payments are each statistically significant. Adjusted gross income averaged nearly $13,000 in conventional rural households in 1973 compared to about $5,750 in back-to-the-land households (Table 1).

Estimated Benefits and Costs

Expenditure-benefits from the eight programs averaged $1,138 in conventional rural households, nearly 80 percent of which accrued from the public school program and 14 percent from Department of Health and Welfare programs. Back-to-the-land expenditure-benefits were $306 per household, one-half from public schools and one-third from health and welfare. On the cost side, conventional rural households averaged $479, with public schools and health and welfare accounting for very nearly the same proportions of total costs as of benefits. Seventy percent of the $178 cost for back-to-the-land households was for public school support and 17 percent for health and welfare programs (Table 2).

[1] $$n = \frac{Npq}{(N-1)\frac{B^2}{4} + pq}$$

where:
k = number of elements per frame, n = sample size, N = total population, p = population proportion estimate, q = 1−p, and B = error of the estimate bound

TABLE 1. Selected demographic and economic characteristics of Boundary County conventional rural and back-to-the-land sample households.

Characteristic (Unit)	Conventional rural households	Back-to-the-Land households
1974 rural population proportions (%)	89.66	10.34[a]
1974 adults' average age (years)	42.6 *	27.5
1973-74 public school enrollees (no./household)	0.94*	0.17
1973 adjusted gross income ($/household)[b]	12,985.00**	5,751.00
1973 individual tax payments ($/household)		
Federal income	777.43*	319.21
Idaho income	168.41*	38.54
Idaho sales	233.62*	116.72
General property[c]	301.52*	94.94

[a] Error of estimator is ±6.29% at a 95% level of significance.
[b] All monetary receipts less federal transfer payments, death payments, gifts, inheritances, certain types of income, and farm production expenses.
[c] Boundary County real property taxes.
*Statistically different at 1% level of significance.
**Statistically different at 5% level of significance.

Income Distribution Effects

Expenditure-Benefit/Cost Ratios. EB/C ratios ranged from 0.62 to 5.68 for conventional households and from zero to 10.15 for back-to-the-land households. The EB/C ratios for all eight programs combined demonstrate that for every dollar paid, the real income of conventional rural and back-to-the-land households was increased by $2.38 and $1.72, respectively, a difference of 66¢ per dollar cost. The cost/expenditure-benefit (inverse) ratios of the eight programs were 0.42 and 0.58 for the conventional rural and back-to-the-land groups, respectively. This indicates that the back-to-the-land group paid 16 percent more program costs in relation to benefits derived than did conventional rural households.

Net Expenditure-Benefits. Total net benefits (EB-C) were $659 for conventional households and $128 for back-to-the-land households. Educational programs (public school and public library) resulted in net benefits of $574 to conventional rural households and $57 to back-to-the-land households. For public income maintenance programs (indigent assistance and Department of Health and Welfare), real income totalling $89 and $76 was redistributed to conventional and back-to-the-land households, respectively. Public health nurse, restorium, airport and rural solid waste programs together redistributed four dollars real income from conventional households and five dollars from back-to-the-land households.

Redistributed Income Sources. All but one of the programs examined were financed from two or more tax sources. The sources of real income redistributed by each program were segregated into exclusively locally-derived revenue (Boundary County property tax) and all other revenue. The $659 real income redistributed to the average conventional rural household was composed of 20 percent Boundary County property tax revenue and 80 percent revenue from all other sources. Twenty-five percent of the real income accruing to back-to-the-land households was derived from local property taxes; 75 percent came from other sources. Of Boundary County property tax revenues redistributed to conventional rural and back-to-the-land households, 98 and 92 percent, respectively, came from educational programs. For conventional rural households 84 percent of the total real income gain from all other revenue sources came through public schools; for back-to-the-land households, 71 percent came from health and welfare. Thus, the programs served as vehicles through which income was redistributed to both types

TABLE 2. Estimated expenditure-benefits, costs, ratio of expenditure-benefits to costs, and net expenditure-benefits for 8 Boundary County public programs for an average household in back-to-the-land and conventional rural subpopulation samples.

	Conventional rural				Back-to-the-land			
Program	EB	C	EB/C	EB - C	EB	C	EB/C	EB - C
Pub. Health Nurse	$ 6.390	$ 10.358	0.617	$ (3.968)*	$ 3.010	$ 3.896	0.773	$ (0.886)
Restorium	6.668	1.465	4.552	5.203	0	0.417	0	(0.417)
Indigent Assist.	4.802	2.856	1.681	1.946	7.121	.968	7.356	6.153
Dep't. of Health & Welfare	158.823	72.270	2.198	86.553	101.210	31.009	3.264	70.201
Public School	903.765	366.958	2.243	536.807	157.458	125.047	1.259	32.411
Public Library	45.623	8.038	5.676	37.585	27.763	2.736	10.147	25.027
Airport	3.216	4.927	0.653	(1.711)	0	1.446	0	(1.446)
Rural Solid Waste	8.499	12.000	0.708	(3.501)	9.320	12.000	0.777	(2.680)
TOTAL	$1,137.786	$478.872	2.376**	$658.914	$305.882	$177.519	1.723**	$128.363

*Parentheses indicate that the number is negative.
**Total expenditure-benefits divided by total costs for all 8 programs.

of rural Boundary County residents and from nonrural local taxpayers and taxpayers residing in other areas of Idaho and the United States (Table 3).

Age and Income Factors

Back-to-the-land households consumed fewer of the publicly provided goods and services and paid fewer of those taxes examined than did conventional rural households. Expenditure-benefits to back-to-the-land households from all eight programs were $832 less than to conventional rural households. Back-to-the-land and conventional households paid $579 and $1,519, respectively, through five federal and state taxes and the Boundary County property tax. The extent to which socioeconomic values determined the incidence of program benefits and costs to the two groups is not clear, however. Other factors may have had greater influence on the differences in consumption patterns for public programs and in tax payments.

The average ages of the adult members of back-to-the-land and conventional rural households were 27.5 years and 42.6 years, respectively. One would expect households in which the average age of adult members is just over 40 years to have a larger number of children enrolled in public schools than households in which the average adult age is 15 years less. This was the case in rural Boundary County. The restorium program also likely would be used more by conventional rural households; their age structure suggests more elderly members, requiring rest home facilities.

If expenditure-benefits from the public school and restorium programs are omitted, only $80 more benefits accrued to conventional households than to back-to-the-land households. Thus, programs for which consumption could reasonably be expected to increase with household age accounted for 90 percent of the difference in benefits. This result suggests that the life-style of back-to-the-land households may not have been the primary factor affecting their demand for the

TABLE 3. Sources of real income redistributed to (+) and from (−) the average household in Boundary County rural subpopulations via 8 1974 fiscal year public programs.

Program	Conventional Rural Subpopulation		Back-to-the-land Subpopulation	
	County property tax revenues	All other revenues	County property tax revenues	All other revenues
Public School	$ +90.345	$+446.462	$ +5.455	$+26.956
Public Library	+36.360	+1.225	+24.211	+0.816
Airport	−1.662	−.049	−1.376	−.070
Rural Solid Waste	−3.501	0	−2.680	0
Dept. of Health & Welfare	+2.709	+83.844	+2.197	+68.004
Indigent Assistance	+1.636	+.310	+5.173	+.980
Restorium	+4.375	+.828	−.417	0
Public Health Nurse	−1.582	−2.386	−.296	−.590
TOTAL	$+128.680	$+530.234	$+32.267	$+96.096

publicly provided goods and services examined.

Conventional rural households paid more in federal income, state income, state sales, and local property taxes in 1973 than did back-to-the-land households. One would expect that at least some of the difference in tax payments, as well as in program use, was related to household age. In other words, households in the conventional rural population have had a longer time to achieve higher income, acquire more property, and thereby have larger consumption expenditures. These are the bases on which taxes are levied. Thus, while the life-style of the back-to-the-land group may have accounted for some of its lower public program consumption and tax payments, age composition may have been the dominant factor.

Conclusions

The study area was found to include as large a proportion of "back-to-the-land" residents as local observers estimated. And back-to-the-land households were net beneficiaries of the public programs examined. But so too were conventional rural households, to a greater extent in both absolute and relative terms. Age composition of the immigrant population may well account for most of the difference in program use and tax payments between the two groups. In terms of community development, rural Boundary County has experienced an influx of immigrants with relatively low assets and income, but also with lower demand for public services than the rest of the rural population. Time will determine whether the differences are primarily a function of life-style or of life-stage.

References

Barlow, Robin. "Efficiency Aspects of Local School Finance." *J. Pol. Econ.* 78(1970): 1028-1039.

Bieker, Richard F. and Kurt R. Anschel. "Estimating Educational Production Functions for Rural High Schools: Some Findings." *Amer. J. Agr. Econ.* 55(1973): 515-519.

———. "Estimating Educational Production Functions for Rural High Schools: Reply" *Amer. J. Agr. Econ.* 56(1974): 835-836.

Boisvert, Richard N. and Harry P. Mapp, Jr. "A Benefit-Burden Analysis of Public School Financing: The Impact on Rural and Urban Taxpayers." *Amer. J. Agr. Econ.* 56(1974): 578-585.

Chase, Samuel B., Jr., editor. *Problems in Public Expenditure Analysis.* Washington, D.C.: The Brookings Institution, 1970.

Holland, David W. "The Distribution of the Costs and Benefits of Public Schooling." *Southern J. Agr. Econ.* 5(1973): 71-81.

Hoyt, Paul G. and Harry W. Ayer. "The Distribution of Tax Burdens and Government Expenditure Benefits in Metro and Nonmetro Arizona." *Western J. Agr. Econ.* 1(1977): 238-241.

Macrariello, Joseph A. *Dynamic Benefit-Cost Analysis.* Lexington, Massachusetts: Lexington Books, 1975.

Mendenhall, William, Lyman Ott and Richard L. Schaeffer. *Elementary Survey Sampling.* Belmont, California: Wadsworth Publishing Company, 1971.

Stubbs, David. *Impact of the Back-to-the-Land Population in Boundary County, Idaho, on the Distribution of Real Income through the Public Sector,* M.S. Thesis, University of Idaho, 1976.

Appendix

1. Expenditure-Benefit Equation

$$EB_j = \left(\frac{TC}{Q}\right)\bar{X}_j$$

where:

EB_j = average household expenditure-benefit of program to the group sample ("back-to-the-land" or conventional rural" households)

TC = total program costs

Q = total units of program output, e.g. student days of school attendance

$$\bar{X}_j = \frac{X_j}{n_j}$$

where:

X_j = total units of program output consumed by the group sample

n_j = number of households in the group sample

2. Cost Equation

$$C_j = \frac{A_1}{R_1}\bar{P}_{1j} + \frac{A_2}{R_2}\bar{P}_{2j} + \cdots \frac{A_q}{R_q}\bar{P}_{qj}$$

where:

C_j = average household cost of program to the group sample

A = total appropriation (sources 1 . . . q)

R = total revenue collected (sources 1 . . . q)

$$\bar{P}_j = \frac{P_j}{n_j}$$

where:

P_j = total household payments (sources 1 . . . q) by the group sample

n_j = number of households in the group sample