

Using IMPLAN to Evaluate the Economic Contribution of 4-H to Colorado and Individual Counties

Abstract

Current economic conditions have made it essential for Extension programs such as 4-H to justify continued public investments. Past studies have examined the positive youth development aspects of 4-H, but do not look at the economic contributions of the program. Using individual record book data for the state of Colorado, the study reported here analyzes the contribution of 4-H to both the state economy and individual counties. We find that Colorado 4-H contributes over \$45 million dollars and 242 employees to the state economy.

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Introduction

Investment of tax dollars in Extension has led to an emphasis on evaluating the long- and short-term impacts of Extension projects and programs. As such a program, 4-H must justify the continued receipt of public funds and distinguish its programs from other youth development programs. The ability to demonstrate the relevance of non-mandated programs is critical to the future ability of Colorado 4-H to serve the citizens of Colorado. Several past studies (Astroth & Haynes, 2002; Goodwin et al., 2005; Goodwin, Carroll, & Oliver, 2007; Lamm & Harder, 2009; Lerner & Lerner, 2011) have documented life skill development and positive youth development in 4-H members as well as in other youth development programs (Kabes, 1991). In 2011, Tufts University completed an eight-year national longitudinal study of positive youth development that compared 4-H with other youth serving organizations such as Boy Scouts, Girl Scouts, and Boys and Girls Clubs (Lerner & Lerner, 2011). Study findings show that, compared to their non 4-H peers, young people in 4-H are:

- More likely to report better grades
- Less likely to engage in risky behavior
- More likely to pursue careers in science, engineering, and technology

- Two times more likely to plan to go to college
- 3.4 times more likely to contribute to their communities
- 2.3 times more likely to exercise and be physically active
- 3.4 times more likely to delay sexual activity by grade 12

The literature described above documents that 4-H provides positive benefits to youth, but little research has been conducted on the economic contribution of 4-H (or other youth development programs such as Scouting and Boys and Girls Club) to state and local county development. Many elected officials look for economic data to help make sound decisions regarding wise and appropriate use of public dollars to support educational efforts such as 4-H. Economic contributions of 4H to the Colorado economy include the money directly generated through the 4-H program, ripple effects as that money makes its way through the economy through subsequent spending, and local jobs supported by 4-H spending.

While economic contribution analysis is widely used, our review of the literature reveals only one such study related to 4-H (Harder & Hodges, 2011); that study involves only livestock projects and does not examine general projects. The current research appears to be the first large-scale study of the economic contribution of 4-H that incorporates both general (non-livestock) and livestock 4-H projects. General projects have become a very important part of 4-H in both urban and rural counties. The absence of general projects in a contribution analysis will favor rural counties with a larger proportion of livestock projects. The scarcity of research related to the economic contribution of 4-H means that policy makers do not have substantive evidence on the community contributions of 4-H beyond youth and volunteer development to support policy decisions.

In 2012, an economic contribution pilot study was conducted on three Colorado counties (Larimer, Boulder, & Weld). The pilot study was initiated by local Extension agents who desired to demonstrate the economic relevance of the 4-H program to county boards of commissioners. In 2013, the economic contribution study was expanded to all of Colorado, and both state and individual county contributions were calculated.

It is important to note that this is not an economic impact analysis. It is instead an economic contribution analysis. An economic impact analysis looks at the net change in economic activity associated with a given activity, while an economic contribution analysis looks at the gross change. To be an economic impact analysis, the expenditures must be new dollars that would not have been spent in the regional economy otherwise. Dollars spent on 4-H projects are not new dollars that otherwise would not have been spent in the regional economy, so this analysis is a contribution analysis. For example, money a family spends on a model rocket for their 4-H project does not count as an impact of 4-H to the local economy because that money would likely have been spent on something else in the region (such as a movie at a local theatre) if the family were not involved in 4-H. For further reading on the differences between impact and contribution analysis, refer to Watson, Wilson, Thilmany, and Winter, 2007.

Data Collection

As a way of facilitating life and workforce skill development, Colorado 4-H members are required to fill out record books for each project that they complete and exhibit at the county fair. Each record book has a financial component where the member is asked to report all expenses for their project; for livestock projects, they are asked to break these expenses down by feed and non-feed expenses. These record books were the main source of data for this analysis.

Data from the individual record books was solicited from each of the 60 counties where the Colorado 4-H program has a presence. Agents were given a template to use to compile all their county record book expenses broken down by project. The county economic contribution analysis aggregated these expenditures by county and combined them with organizational expenses to find direct 4-H expenditures per county. The Colorado state analysis was the aggregate of all the individual counties' direct expenditures. Of the 60 4-H counties in Colorado, 56 participated and returned the data template for analysis; of those 56 counties, only 41 counties had complete data sufficient for individual county contribution analysis. For the state level analysis, values for counties with missing or incomplete data were extrapolated from enrollment numbers and average project expenditures from neighboring counties with similar demographics.

Organizational expenses, or the public cost in county, state, and federal funds to implement the 4-H program in Colorado, were also compiled. The organizational expenses included 4-H agent wages, facility fees, and utilities and other miscellaneous expenses associated with running the 4-H program. The CSU Extension Chief Financial Officer provided these data to the State 4-H Director for compilation and review of accuracy.

Research Methods

The study on the economic contribution of Colorado and individual county 4-H reported here uses the record book data detailed in the previous section and the most recent version (2011 data, software version 3), of the Impact Analysis for Planning (IMPLAN) software to perform an economic contribution analysis of 4-H. The IMPLAN software allows researchers to conduct an input-output analysis, which is a methodological framework that characterizes the financial linkages in the regional economy between industries, households, and institutions. In this study, the analysis is conducted both with the State of Colorado as a region and with each individual county as a region. It includes only economic activity and does not capture non-market values, such as life skills development. Detailed descriptions of input-output modeling can be found in Blaine, Bowen-Ellzy, and Davis (2011) and Shields and Deller (2003).

Since input-output analysis looks at the linkages in the economy, the contribution of 4-H is not limited to its own activities (direct effect) because 4-H expenditures affect related sectors, such as input suppliers and support industries. Using the IMPLAN software, direct spending information collected in the member record books was used to estimate the following economic multiplier or "spillover" effects:

- **Direct effects:** These effects are a result of the actual expenditures of 4-H members and 4-H organizational expenditures such as wages and supplies. Member expenditure data was collected

directly from 4-H members' record books. For example, if a participant purchases a \$25 model rocket for a rocketry project, the \$25 is a direct effect.

- **Indirect effects:** These effects arise due to linkages in the supply chain, such as local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain. For example, the store from which a 4-H member purchases a model rocket kit will use part of that money elsewhere in the economy, such as buying more inventories, paying rent, or hiring an accountant to help them file their taxes.
- **Induced effects:** These effects are a result of employee household spending. For example, when the participant buys a model rocket kit, some small proportion of that expense goes to paying wages of the sales attendant, who then re-circulates those wages in the form of household purchases of things such as clothing or groceries.

The direct, indirect, and induced effects were influenced by both the expenditures that were reported in the member record books and organizational expenditures such as wages for agents. Especially at the county level, leakage of participant expenditures exists, meaning a proportion of participant expenditures are spent outside of the given region. 4-H participants do not indicate where they purchase project items in their record books; we know that especially for rural counties many of these purchases were made outside of the county and should not be included as a contribution to the county economy. To account for this, we use the regional purchase coefficients (RPC) generated by IMPLAN to determine how much of this direct spending stays in the county and should be included in the region's direct effects and how much "leaks" out of the region. When the RPC is low, it indicates that expenditures quickly leak out of the region to be spent in other counties or out of state. For more information on RPC's please refer to Taylor and Fletcher, 1993.

Because dollars spent ripple through the economy differently for different industries, the direct expenditures were broken down by industry. Based on knowledge of each of the projects available to 4-H members, all direct expenditures were assigned to one of the following industries based on the 4-H project to which they were attributed:

- Cattle ranching and farming
- Poultry and egg production
- Animal production except cattle, poultry and eggs
- Support activities for agriculture and forestry
- Retail – electronics and appliances
- Retail – building material and garden supply
- Retail – food and beverage

- Retail – sporting goods, hobbies, books and music
- Retail – Miscellaneous
- Veterinary services
- Photographic services
- Fitness and recreational sports centers
- State and local government

These direct 4-H expenditures broken down by category were then used to create a unique 4-H sector in the IMPLAN software that drew from the above listed sectors. The direct expenditures in the created 4-H sector are then used to calculate multiplier effects. We calculate and evaluate the output and employment multiplier effects. The direct spending combined with these multiplier effects creates a better picture of the total economic contribution of 4-H to Colorado and individual counties.

Findings

Basic summary statistics (Table 1) show that expenditures vary greatly by project. For instance, the average expenditure for horse 4-H projects in 2013 was \$4,801, while the average expenditure for general projects was \$125, with project expenditures as low as \$6. These numbers are promising for 4-H because they show that, while some animal projects are inherently expensive, there are projects available to participants of any economic background.

Table 1.
Statewide Average Expenditures per Member, by
Selected Projects

4-H Project	Average Project Expenditures
Goats	\$752
Alpaca	\$1,724
Rabbit	\$363
Beef	\$3,265
Dog	\$681
Fowl	\$350
Horse	\$4,801
Sheep	\$1,006
Swine	\$1,117

Shooting Sports	\$421
General Projects	\$125

The IMPLAN analysis uses the direct spending values, calculated from project and organizational expenditures, to calculate output (sales value) and employment and tax effects of that direct spending. These effects were broken down by direct, indirect and induced effects (described in the methodology section). Table 2 displays the output effects of 4-H on the Colorado economy. As can be seen in the table, 4-H generated over \$45 million dollars in output (sales value) into the Colorado economy. Of this \$45 million, about half was direct effects (direct spending from record books and operational expenses), but the other half was generated through the direct expenditures trickling through the economy in the form of indirect and induced effects. Of the direct effects spending, approximately two thirds, or \$14,980,000, were generated from 4-H member spending to support their project work and approximately one third, or \$7,300,000, was generated from the public spending to support the program. It is also important to note that the effects of the public spending to support the program also ripple through the economy by way of indirect and induced effects.

These indirect and induced effects occur because when purchases are made in the local economy, some of the dollars remain in the economy for a second round of spending, some of the dollars from that second round of spending remain in the economy for a third round, and so on. The amount of money that remains in the economy after all of these rounds can be seen in the output multipliers in Table 3. The indirect output multiplier is 0.66, meaning that for every dollar spent, \$0.66 is trickled back into the economy through local industries buying goods and services from other industries. The induced multiplier is 0.36, which indicates that for every dollar spent, \$0.36 trickled back into the economy through employee household spending. The employee may be, for example, the person working behind the desk at the hobby store or the 4-H Extension agent. The total output multiplier is 2.02, which is the sum of the direct (1) indirect (0.66) and induced (0.36) multipliers. The total output multiplier indicates that if Colorado 4-H was to expand output (direct expenditures) by \$1 million; the total economic contribution to Colorado of that \$1 million could be as large as \$2.02 million.

Table 3.
Output and Output Multipliers for Colorado 4-H

	Output Multiplier	Output
Direct Effect	1	\$22,280,000 (\$14,980,000 4-H member spending 66% and \$7,300,000 public funds 33%)
Indirect Effect	0.66	\$14,704,800
Induced	0.36	\$8,020,800

Effect		
Total Effect	2.02	\$45,005,600

Employment multipliers (Table 4) are interpreted differently than output multipliers. An employment multiplier represents the number of jobs per \$1 million dollars in direct output. The direct employment multiplier of 2.88 means that every 1 million dollars in direct 4-H output plays a role in directly employing 2.88 people; with a direct output of \$22,280,000, this translates to 64.1 employees. When we add in the indirect and the induced employees to the direct employees, in 2013 Colorado 4-H played a role in employing 242 people in Colorado.

Table 4.
Employment and Employment Multipliers for Colorado 4-H

	Employment Multiplier	Employment
Direct Effect	2.88	64.1
Indirect Effect	5.16	114.9
Induced Effect	2.81	62.6
Total Effect	10.84	241.6

Table 5 contains the main takeaway findings on the contribution of 4-H to the Colorado economy. In 2013, 4-H contributed over \$45 million dollars in output to the Colorado economy and played a role in creating 242 jobs. Colorado 4-H also generated \$715,990 in indirect business taxes, which include excise, sales, and property taxes. In addition to the state analysis, individual county analyses and reports containing these results for the individual counties were given to each county to use in local level communications with clientele, donors, and county, state, and national level elected officials. Individual county analysis results varied greatly, with economic contributions of 4-H to the county economy ranging from \$77,170 to \$2,575,910.

Table 5.
Economic Contribution of Colorado 4-H

Output (revenue)	\$ 45,018,628
Indirect Business Tax	\$ 715,990
Employment	242

The key finding of the study reported here is that for every public dollar spent to support the 4-H program in Colorado, there is a six-fold contribution to the economy. The \$7.3 million in county, state, and federal funding spent each year to implement the program is leveraged to contribute \$45 million to the state's economy. In addition to the \$45 million dollars in economic contribution, Colorado 4-H also depends on 11,000 volunteers to support the program. Based on the national 4-H volunteer, research, knowledge, and competency study (Volunteer Research, 2004), it is estimated the average 4-H volunteer provides 128 hours of service per year to the organization. According to The Independent Sector, an organization that looks at policy issues affecting the non-profit sector, the 2013 value for volunteer time in Colorado is \$25.10 per hour ("Independent Sector" 2013). For more information on how Independent Sector calculates the value of Volunteer time please go to their website: http://www.independentsector.org/volunteer_time. This equates to \$35,340,800 in volunteer time contributed in 2013. When combined with the \$45 million economic contribution this comes to \$80 million, which is 10 times greater than public dollars invested in the program.

The bottom line is that the study provides evidence that the Colorado 4-H program is leveraging public dollars and contributing to the overall Colorado economy. Public funding to support the 4-H program is a needed catalyst that allows this contribution to the state's economy to occur.

Implications

The study reported here is the first complete statewide economic contribution study of a state 4-H program. Extension and its programs exist in an era in which each program must demonstrate its relevance to the public who financially supports them. The study is one step towards illustrating the relevance of 4-H and serves to help justify continued flow of public funds to this beneficial program. Results from the study will be most effective when delivered hand-in-hand with the positive social impacts (non-market values) of the 4-H program, such as those in the 2013 Tufts University study of Positive Youth Development.

Study results can provide local and county level policy makers with even more justification because dollars they invest in 4-H can be used to leverage state and federal outlays of dollars to their county level programs, amplifying the benefits of investment by local officials. The results empower local Extension agents with quantitative data that illustrate the contributions that 4-H makes to the local economy (including tax revenues) and can then be used to educate local decision makers in times of tough budget decisions. Some potential ways local agents can get this information out to their local decision makers is including it in their yearly budget discussions or having 4-H participants present the information at a city council meeting.

This information will be a valuable resource as county, state, and national level elected officials tackle budgetary challenges in the future. Sound economic data on social programs like 4-H has been lacking in the past, and it is our hope that this study and its methodology can be transferred to other states. The ultimate future research goal is to aggregate state data into a national 4-H economic impact study.

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