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Assessing the Role of Agriculture in a County's Economy

David L. Darling and Robert Sampson

Introduction

Agriculture makes a substantial contribution to the economic welfare of all Indiana counties. However, because of the nature of agricultural activity its role is less visible than manufacturing, mining or other industries where large investments and large numbers of people are concentrated at one site. To produce \$25,000 worth of corn a farm may use 100 acres of land. On the other hand, a manufacturing firm could be producing \$1,000,000 worth of products on 5 acres.

In Indiana over 70 percent of the land is used for farming. The obvious reason is that this is the highest income-producing use of all the feasible alternatives. But as new economic alternatives for a particular plot become feasible, land may change from agriculture to residential, commercial, industrial, or other uses.

Land use changes have been occurring in Indiana since the first settler cleared trees. However, today, in some locations, prime agricultural land appears to be limited and the stock is being diminished.

As elected officials and business, farm and other community leaders consider and plan for the economic future, the mix of industrial types making up the total economy deserves analysis. What is a desirable mix of agriculture, manufacturing, mining, tourism and other industries? What are the consequences of expanding any sector? And, finally, what does each individual sector contribute to the total economy? The objective of this publication is to provide assistance in addressing these questions by describing a procedure for assessing the role of agriculture in a county's economy.

Sources of Agricultural Income

Income returns from agriculture at the local or community level may be classified as direct or primary income and indirect or secondary income.

Components of direct income for purposes of this analysis are as follows:

- Farm operators' and proprietors' gross farm income
- Wages paid hired labor and contract labor
- Federal government agricultural program payments and earnings from the sale of recreational services by the farm sector.

The indirect or secondary income contribution arises from the spending of direct farm income. A portion of the direct income is used to purchase farm

business inputs and the rest is used for living expenses, loan payments, or savings. Expenditure of these dollars support local businesses which pay wages and provide income to local proprietors. The impact of the expenditures of direct agricultural income increases agricultural and non-agricultural incomes, thus creating a "multiplier effect."

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How to Estimate the Income Multiplier For Your County

An income multiplier can help determine the total effect of one new dollar of income received by a local resident. The multiplier ranges in value from one to some value greater than one. Each multiplier has two components. The initial direct income or primary effect is the first component and the remaining amount generated by the expenditure of the direct income is the second component, or the secondary effect.

Thus, a multiplier of 1.75 can be divided into:

Primary effect	=	1.00
Secondary effect	=	.75
Total effect	=	1.75

In this example a local resident earns one new dollar. After he spends that new income other local residents receive an additional 75 cents in income. The total income effect of that new dollar is \$1.75.

The following is a brief description of how to estimate an income multiplier.

$$IM = \frac{1}{1 - PCL \times PSY}$$

- IM = Income multiplier
- PCL = Proportion of new household income which will be spent locally
- PSY = Proportion of household income spent locally which remains in the local economy to become local income.

From the above definition, it becomes clear that two different items must be estimated, PCL and PSY.

The proportion of new income which will be spent locally (PCL) will vary according to who receives the new income. For example, if those who are already highly paid receive the additional income, a sizable part of the new income could be spent on a vacation away from home. However, if the additional income comes to those with low incomes, they would be more likely to spend all the new income locally to purchase food, pay their rent and buy new clothes.

To estimate where people will spend their new income, a survey of the recipients can be undertaken. Or if it is impractical to survey the actual recipients of the new income, a survey of those likely to have similar spending patterns can be undertaken. An example of a survey form is included in the appendix.

The proportion of local consumption which becomes income to local residents (PSY) varies from one county to another. The most accurate way to

determine this item is to develop an input-output table from data collected directly from each local firm or a sample of local firms that make up an industry. However, the intent of this procedure is to avoid the costly and time-consuming process of developing an input-output table.

The value of PSY is determined by the amount of expenditures and sales local firms make to local households and other local firms. It is also influenced by who receives the profits from these local businesses, people who live in the county or outside. To illustrate how PSY can vary, let's consider a local establishment that sells ice cream. A local resident purchases 1 quart for a dollar from the ice cream shop. What proportion of that dollar will become income to the owner of the ice cream shop and other county residents? To start with, it depends on how much profit the ice cream shop owner makes on that quart. It also depends on how much of the dollar paid for the ice cream becomes income to local residents working in the ice cream shop. Next, PSY will vary according to where the owner spends the remainder of the capital and operating budget. If the owner buys the ice cream from a local creamery, which in turn buys its dairy products from a local dairy farm, PSY will be relatively large. However, if the ice cream was bought from a wholesaler located in another county, and he purchased it from another outside source, PSY will be relatively small.

Two concepts are important in the example just cited. The first is *value added*. In our example, the *value added* by the ice cream shop to the ice cream is the difference between what is paid for it and what the shop sells it for. This dollar difference is used to pay for wages, salaries, profit, rent, utilities, interest on any non-mortgage loans, etc. The second concept is *backward linkage*. In our example, the *backward linkages* of the ice cream shop are the transactions with other businesses which supply the ice cream, the paper cups and other goods and services needed by the ice cream shop. PSY is determined by the amount of the value added *spent locally* and the backward linkage with other *local* firms.

Now that we know what affects the relative size of PSY, it is possible to estimate it for your county. Consider the economy of your county. Do local businesses buy and sell to each other? If so, what proportion of their purchases and sales are made locally? In what consumer goods and services is your county self-sufficient? Who owns local businesses, county residents or outsiders?

The variable PSY has been calculated in more detailed studies to range from a low of approximately .25 to a high of approximately .60. A highly rural county typically would have a very low PSY. Here, there are no major towns or cities and few local firms to do business with each other. An urban economy, on the other hand,

would be likely to have a very high PSY. It could be a regional trade center. Here, retailers can buy from locally based wholesalers, and farmers can buy from locally based farm supply and implement dealers.

To aid those who wish to estimate their county's income multiplier, a map of Indiana with an estimated PSY range for each county is included in the appendix. This range will fall into one of the following categories:

PSY	
.25 to .32	Very low
.32 to .39	Low
.39 to .46	Medium
.46 to .53	High
.53 to .60	Very high

Methodology for Estimating Agriculture's Direct and Indirect Contributions

Now that the reader is familiar with the multiplier concept and its use, it is possible to describe a method for estimating agriculture's income contribution to a county's economy. To illustrate this methodology, the authors use data for Clay County, Indiana.

In 1974, it was estimated that Clay County residents' income was \$46,928,000. * Of this, agriculture's direct contribution was \$8,412,000, or about 18 percent. This included net farm operators' income, wages paid by farm operators to hired labor, other farm-related income and non-operator landlords' income.

Agriculture's direct contribution in Clay County is summarized as follows:

1. Net Farm Income to Operators and Proprietors	\$ 7,992,000
2. Wages Paid Hired Labor and Contract Labor	379,000
3. Other Farm-Related Income	41,000
Total	\$ 8,412,000

The source of data needed to calculate these three items comes from the 1974 Census of Agriculture.

1. Net Farm Income to Operators and Proprietors: This figure is the difference between the market value of agricultural goods sold by Clay County farmers and their business expenditures. † Included in this number is rent paid to non-operator landlords after deductions of their farm expenditures.

2. Wages Paid Hired Labor and Contract Labor: Under "farm production expenses," "hired farm labor" and "contract labor" are both included.

* Source: Bureau of Economic Analysis, U.S. Department of Commerce. (This figure was adjusted upwards to agree with farm income data reported in the 1974 Census of Agriculture).

† Authors of the Census of Agriculture warn against calculating net farm income in this manner. However, since this technique considers the local income effect from farm business expenditures as well, the effects of a possible miscalculation are lessened.

3. Other Farm-Related Income: Under "other farm related income," "recreational services" and "government farm programs" are both included.

Agriculture's indirect income contribution is summarized as follows:

1. Income generated locally by Farm Operators, Farm Workers and Landlord Household Expenditures	\$ 2,804,000
2. Income generated locally by Farm Expenditures	3,015,000
Total	\$ 6,767,000

1. Income Generated Locally by Farm Operator, Farm Worker, and Landlord Household Expenditures: This comes from multiplying total direct agricultural income by an "income multiplier." For the state of Indiana, \$2.25 additional income is generated when net farm income expenditures increase by \$1.00. ‡ But for a county, this income multiplier would be somewhat less as mentioned in the previous discussion on how to estimate income multipliers.

To estimate this in Clay County, the county Cooperative Extension Agent identified a group of farm families. The farm activities of this group, about 20 families, included all types of farm enterprises in the county, such as cash grain and grain-livestock combinations. Next, this group was individually contacted by phone and asked to participate in two surveys; the Farm Business Spending Patterns Survey§ and the Household Spending Patterns Survey. After securing an agreement to complete the surveys, each family was mailed a set immediately. A stamped, self-addressed envelope was also enclosed to aid the respondent.

‡ Source: John Gordon, "Agriculture's Impact on Indiana's Economy." EC-450, Cooperative Extension Service, Purdue University.

§ Examples of these surveys appear in the appendix.

From the results of the Household Spending Patterns Survey, it was calculated that an average of 62.5 percent of the farm families' household expenditures were made within Clay County. Thus, the PCL for farm households was set at .625. Next, the PSY (proportion of household income spent locally which remains in the local economy to become local income) was estimated to be .40. This was done by first considering the range suggested for Clay County of .39 to .45. Because Clay County borders the metropolitan area of Terre Haute and it is known that the Clay County economy is strongly linked with the Terre Haute economy, a conservative number of .40 was chosen as the best estimate of PSY for this purpose. The resulting multiplier now can be calculated to be 1.333. For every dollar of primary income about 33 cents worth of secondary income results.

$$\frac{1}{1 - .625 \text{ (PCL)} \times .40 \text{ (PSY)}} = \frac{1}{.75} = 1.333$$

Thus, from the \$8,412,000 of primary income, \$2,804,000 of secondary income is generated.

$$\begin{aligned} \$8,412,000 \times .333 &= \$2,804,000 \\ &\text{(rounded to the nearest \$1,000)} \end{aligned}$$

2. Income Generated Locally by Farm Business Expenditures: Farm operators' expenditures are reported in the *Census of Agriculture*. In Clay County, the expenditures minus labor costs were \$12,059,000. By multiplying this figure by an income multiplier the desired information was calculated. This multiplier can be derived in a similar manner to the previous one. From the results of the Farm Business Spending Patterns Survey, an average of 50 percent of farm business expenditures appear to be made within Clay County. Thus, the PCL for farm businesses was set at .50. The same size PSY was used again, .40. The resulting multiplier now can be calculated to be 1.25. For every dollar of primary income spent by farm businesses in Clay County, 25 cents of secondary income results.

$$\frac{1}{1 - .50 \text{ (PCL)} \times .40 \text{ (PSY)}} = \frac{1}{.80} = 1.25$$

Thus, from the expenditure of \$12,059,000 by Clay County farm businesses, \$3,015,000 of secondary income is generated.

$$\begin{aligned} \$12,059,000 \times .25 &= \$3,015,000 \\ &\text{(rounded to the nearest \$1,000)} \end{aligned}$$

In summary, agriculture's total contribution is as follows:

Direct	
1. Net Farm Income to Operators and Proprietors	\$ 7,992,000
2. Wages Paid Hired Labor and Contract Labor	379,000
3. Other Farm Related Income	41,000
	Subtotal \$ 8,412,000

In the income multiplier equation, substitute the proportion of farm business expenditures spent in the county for the proportion of household expenditures spent locally (PCL).

Indirect	
4. Income generated locally by Farm Operators, Farm Workers and Landlord Household Expenditures	\$ 2,804,000
5. Income generated locally by Farm Expenditures	3,015,000
	Total \$14,231,000

Thus, out of \$46,928,000 earned in Clay County from wages and proprietary sources, \$14,231,000 is contributed by the agricultural sector, approximately 30 percent of the total.

If total agricultural income, \$14,231,000, is divided by the number of acres farmed, 161,662, \$88 of income can be attributed to each acre in agriculture. Therefore, in 1974 it required 114 acres to generate \$10,000 worth of income. And, for every 114 acres of Clay County agricultural land converted to nonfarm use, the income equivalent of one \$10,000 job is removed from the county's economy.

|| See map in the appendix for source of this range.

APPENDIX

Household Spending Patterns Survey

Your place of residence is: put the name of your community on the appropriate line.

_____ A municipality in the county

_____ An unincorporated area in the county

_____ Some other county

Percent of Disposable Personal Income* spent in the following places:

%

_____ Saved

_____ In the City

_____ In rest of County

_____ Outside County

Total 100%

* Disposable Personal Income is defined as total personal income minus Social Security, federal taxes, state taxes, and local taxes.

APPENDIX

Farm Business Spending Patterns Survey

Where is your farm located:

_____ Name of County

_____ Location in County, such as
the name of a municipality

Percent of total farm business expenditure spent in the following places:

%

_____ In the County where
your farm is located

_____ In all other places

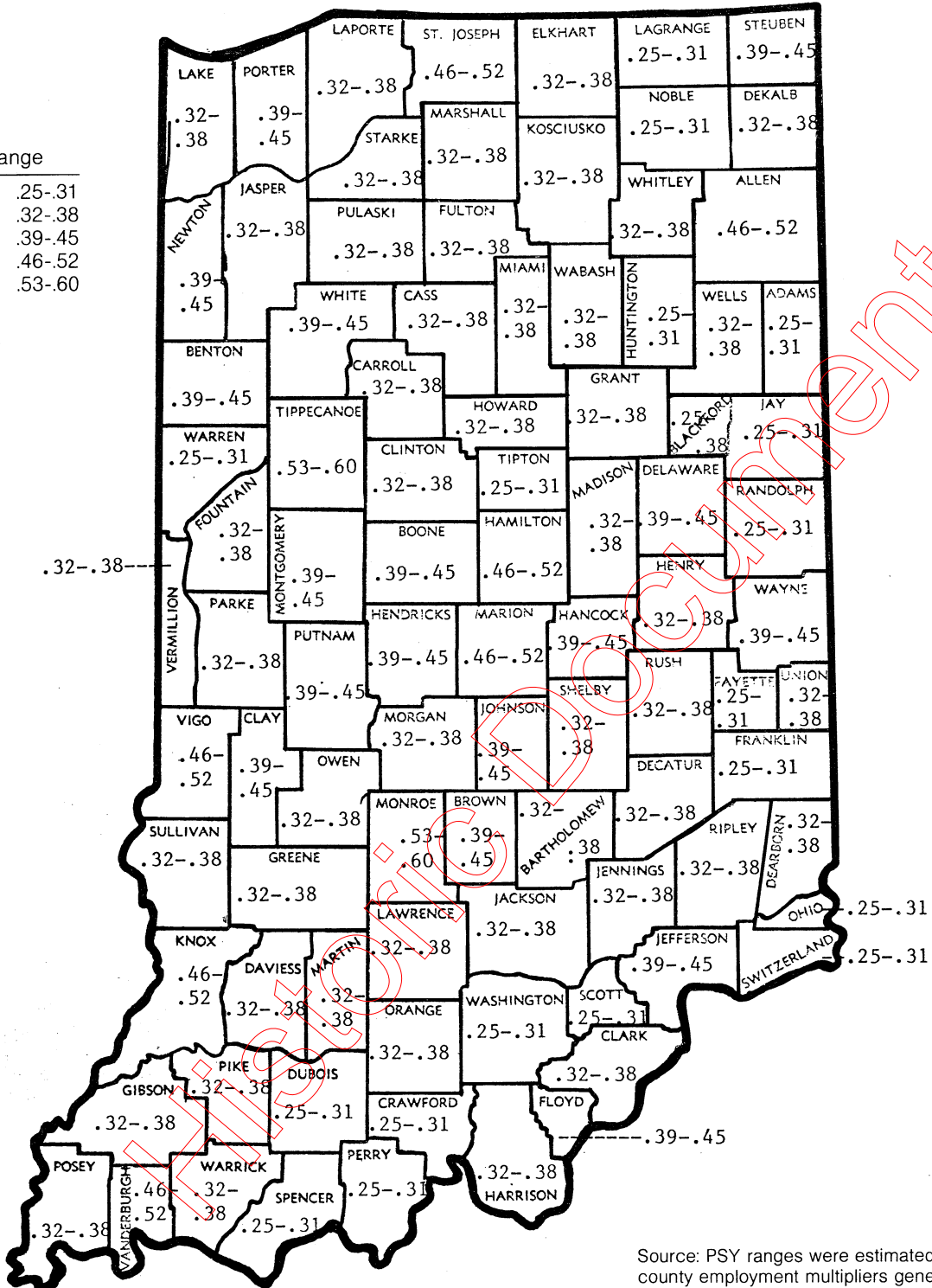
Total 100%

What type farming activities are you engaged in? List major crops and livestock produced.

APPENDIX

PSY-RANGE - Proportion of a dollar of local consumption which becomes income to local residents.

	Range
Very Low	- .25-.31
Low	- .32-.38
Medium	- .39-.45
High	- .46-.52
Very High	- .53-.60



Source: PSY ranges were estimated from county employment multipliers generated by Argonne Laboratories.

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