

Economic Multipliers: How Communities Can Use Them for Planning

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The economic structure of rural communities in Arkansas is changing. Rural Arkansas communities have lost manufacturing, farm and forestry jobs. This has resulted in declining populations, which has caused ripple effects throughout rural Arkansas. Some leaders are revitalizing their communities by diversifying their local economies. Economic multipliers help leaders predict the “ripple effects” of new and expanding, as well as declining, industry.

A new or expanding industry can have economic impacts beyond the jobs and income generated by the original project. Often community leaders do not have the time or expertise to obtain and decipher complex economic data to evaluate the benefits and costs of using tax dollars to encourage industry to locate or expand. A multiplier is a single number which summarizes the total economic benefits resulting from a change in the local economy.

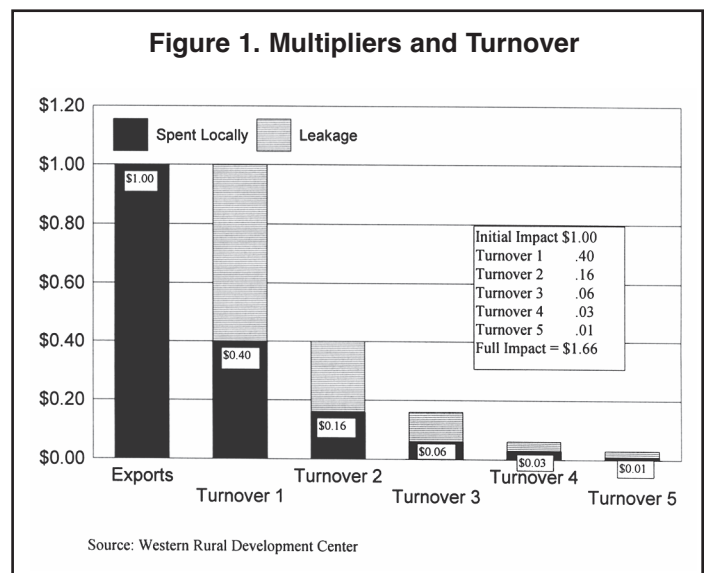
If used wisely, multipliers provide planners and community leaders with estimates of employment, gross sales and income that will result from new economic activity. Comparison of the alternatives can help communities decide where to invest time and resources to get the greatest benefit.

In this fact sheet we define multipliers and show how they are calculated, explain how to interpret them and identify their limitations. We also provide an example to illustrate the use of multipliers.

Multiplier

A multiplier summarizes the total impact that can be expected from change in a given economic activity. For example, a new manufacturing facility or an increase in exports by a local firm are economic changes which can spur ripple effects or spin-off activities. Multipliers measure the economic impact of these new exports, including the resulting spin-off activities.

Figure 1 illustrates the multiplier concept. One dollar is received into the local economy from export sales of a commodity.¹ Of this \$1, 40 cents



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¹ By export we do not necessarily mean international export, rather, sales beyond the community borders.

is spent for goods and services within the community. The firms and individuals who receive this 40 cents spend 16 cents within the community. Of the 16 cents, only 6 cents is spent locally, and so on. The total amount of money received by local firms and residents as a result of the initial \$1 in added export earnings is \$1.66. Therefore, the multiplier is 1.66.

Types of Multipliers

Change may be measured in several ways. Some community leaders may be primarily concerned with employment or income while others may want to estimate the total value added to the local economy. Since multipliers are simple ratios of total to initial change, numerous economic multipliers are easy to calculate (see Appendix). Four multipliers are commonly used to assess impacts of an initial increase in production resulting from an increase in sales, usually called final demand in multiplier analysis. The four are: (1) Output, (2) Employment, (3) Income and (4) Value Added Multipliers.

Output Multiplier

The output multiplier estimates the total change in local sales, including the initial \$1 of sales outside the area, resulting from a \$1 increase in sales outside of the study area (final demand). Multiplying the increase in sales of the exporting industry by the output multiplier provides an estimate of the total increase in sales for the study area, including the \$1 export sales. The output multiplier is used to assess the interdependence of sectors in the local economy.

To illustrate the use of multipliers, consider the following hypothetical situation. Lumberland Inc., a sawmill operation in Wilburn County, gets an order from a Japanese furniture manufacturer for an additional \$1 million lumber products.

Using this example, an output multiplier of 1.9 indicates that for every \$1 of lumber exported to Japan, an additional \$0.90 of output is produced in the local economy. If Lumberland sells \$1 million of lumber to Japan, then \$900,000 of additional output is produced locally to supply Lumberland Inc., other affected industries and consumers. If most of the supplies and services are purchased outside the local community, the output multiplier would be considerably lower, such as 1.4, or 40 cents for every dollar of export sales.

Employment Multiplier

Communities often wish to know the number of jobs that will be created as a result of a new economic activity. The employment multiplier measures the total change in employment resulting from an initial change in employment of an exporting industry. The additional employment in the new

activity multiplied by the employment multiplier for the industry provides an estimate of the total new jobs created in the area of study (i.e., county, district, state or region).

Consider the example of Lumberland hiring 300 new employees if the employment multiplier for sawmills is 2.1. In this scenario, an additional 330 jobs ($630 - 300$) would be created as a result of the 300 new jobs in Lumberland.

Income Multiplier

The income multiplier measures the total increase in income in the local economy resulting from a \$1 increase in income received by workers in the exporting industry. Multiplying the initial change in income by the income multiplier for the industry provides an estimate of the increase in income for all individuals in the study area resulting from the initial growth of one industry.

Consider the Lumberland sawmill example. If it is known that Lumberland will pay out new wages and salaries of \$350,000 and the income multiplier is 2.0, then the resulting increase in income in all sectors is \$700,000 ($\$350,000 \times 2.0$). For every \$100 in wages Lumberland pays, an additional \$100 in wages will be added to the total payroll of the study area.

Value Added Multiplier

The value added multiplier provides an estimate of the additional value added to the product or service as a result of this economic activity. Value added includes employee compensation, tax on production and imports, proprietary and other property income. Summing the value added of all businesses in a state is equivalent to the Gross State Product.

Consider again the situation of Lumberland which is to produce \$1 million worth of lumber products to be exported to Japan. The total value added that is generated from the production of the lumber products can be calculated by multiplying the value added to the lumber products times the multiplier. If the value added to the \$1 million of lumber products is \$360,000 and the value added multiplier is 2.2, then \$432,000 ($\$360,000 \times 1.2$) of "value" is added to products in other industries affected by the increase in lumber sales.

Geographic Area and Multipliers

Everyone, especially economic development workers, likes to show that the new firm being recruited or the existing industry being expanded will have large spin-off effects (i.e., high multipliers). Multipliers usually range between 1.0 and 3.0 and vary by the amount of economic activity within an

area and by the interaction of industries within the area. The more inputs purchased locally and the more consumer expenditures at local shops, the higher the multiplier. The larger the area, the more economic activity will likely occur within the area.

Figure 2 illustrates this concept. The output multiplier for poultry processing increases as we expand the area. The multiplier increases from 1.5 for Howard County to 1.7 for the Southwest Planning and Development District and is 2.1 for Arkansas. It would be inappropriate to use the state multiplier of 2.1 to estimate the economic impact on Howard County.

Figure 2. Output Multipliers

Type of Industry	Howard Co.	Southwest PDD	Arkansas
Poultry Processing	1.5	1.7	2.1

The area included when computing multipliers should be large enough to serve as a functional economic unit. However, it would be inappropriate to use a state or multi-state multiplier to analyze the economic impact on a county's local economy. As you expand the geographic area to include more of the backward-linked industries and businesses that supply goods and services, you increase the size of the multiplier. A state multiplier will reflect all interactions between businesses and industry throughout the state and not the economic interrelationships within a county or region within the state.

Danger in Generalization

Multipliers vary widely from industry to industry depending on where input purchases are made. In Arkansas, poultry processing plants have an output multiplier of 2.1, whereas the plastic pipe and pipe-

fitting industry has a multiplier of 1.3. Increasing sales (final demand) by \$1 in the poultry processing industry increases production and sales in other sectors of the economy by \$1.10. This compares with an increase of only 30 cents for every \$1 increase in sales in the plastic pipe and pipefitting industry.

Using the average multiplier for manufacturing, which is 1.5, would overestimate the impact of the plastic pipe and pipefitting industry and underestimate the impact in the poultry processing industry. Using an industry specific multiplier provides more accurate estimates of economic impacts.

Multipliers Versus Turnover

Turnover refers to the number of times some of the initial dollar, that is received from outside the community, changes hands within the community. Turnover is sometimes incorrectly used interchangeably with multiplier. When money is received from outside the community, only part of the money remains in the community when it changes hands. Therefore, turnover is the number of times some portion of the money changes hands within the community. A multiplier, however, reveals how much of each dollar turns over in the community.

Figure 1 illustrates the difference between turnover and multiplier. In the example, \$1 received from exports changes hands five times within the local economy. The multiplier is 1.66, although some portion of the initial dollar turns over five times.

During each exchange of money for goods or services, some of the original dollar leaves the local economy, which reduces the amount spent locally during the next exchange. Multipliers measure the full impact of a dollar on the local economy, whereas turnover merely indicates the number of times some of the initial dollar is spent locally.

APPENDIX

Computing Multipliers

Direct, Indirect and Induced Effects

To understand how multipliers are calculated, knowing the meaning of direct, indirect and induced effects is essential.

- **Direct effects** are those occurring to the firm that exports additional goods or services.
- **Indirect effects** occur to industries in the backward-linked industries that supply the exporting firm.
- **Induced effects** result from households spending some of the additional income they receive in the local area.

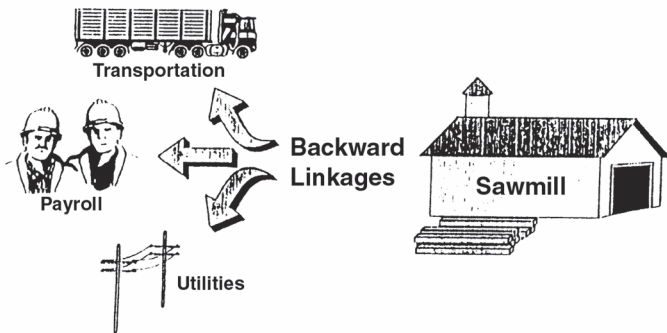
To illustrate the three effects, the Lumberland sawmill example will be further developed.

Lumberland gets an order from a Japanese furniture manufacturer for an additional \$1 million of lumber products. Because of the new contract, Lumberland must add workers and spend additional dollars for transportation services, utilities and other production needs. Lumberland's expenditures for the additional production inputs used in manufacturing the Japanese order are referred to as "direct effects." "Direct effects" are production changes required to produce the product.

Lumberland's additional spending triggers a series of chain reactions, or spin-off effects. Logging companies and businesses which supply Lumberland

Inc. with raw materials and services must increase their production to meet Lumberland's needs. Likewise, the increase in sales of Lumberland's suppliers generates more business for the firms that supply them. These effects are referred to as "indirect effects" and occur in the backward-linked industries (see figure 3). Indirect effects result from production changes in industries that supply the firm where the change was initiated.

Figure 3. Indirect Effects



Each dollar of employee income earned in the direct and indirect activities triggers an additional chain of spending. This spin-off effect is referred to as an "induced effect," which is sometimes called the consumption effect. The workers hired by Lumberland to fill the order for Japan earn new income as do the new workers hired to supply Lumberland's increased needs.

Induced effects occur as households spend some of their additional income on goods and services in the local community. The increased production of lumber generates additional income, some of which is spent on goods and services within the community, thus increasing the multiplier effect.

Type I and Type II Multipliers

A multiplier is a simple ratio. Most multipliers are calculated as:

$$\text{Multiplier} = \frac{\text{Total Change}}{\text{Initial Change}}$$

You will most often hear or read of Type I and Type II multipliers. This is economic jargon for identifying which effects are included when calculating the multiplier. Type I multipliers include the direct and indirect effects. The indirect effects are those associated with changes in the backward-linked industries due to an increase in demand from the directly affected industry. Therefore, Type I multipliers are calculated as follows:

$$\text{Type I Multiplier} = \frac{(\text{Direct} + \text{Indirect Effects})}{\text{Direct Effects}}$$

A Type II multiplier (sometimes referred to as Type III) includes the direct, indirect and induced effects. It includes the effect on the backward-linked industries as well as the induced or consumption effect. Type II multipliers are similar to Type III multipliers, except the method of calculating the induced effects is different. Type II (and Type III) multipliers are calculated as follows:

$$\text{Type II Multiplier} = \frac{(\text{Direct} + \text{Indirect} + \text{Induced Effects})}{\text{Direct Effects}}$$

The reader may find it helpful to remember and interpret multipliers as simple ratios. Economic multipliers provide estimates of the total impact resulting from an initial change in economic output (final demand). The higher the multiplier, the greater the effect on the local economy.

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