Economic Multipliers: Can a rural community use them?

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Rapid growth and development is affecting an increasing number of western rural communities. Rapid economic and social changes often require local decision-makers serving on planning boards, county commissions, and city councils to handle increased workloads in shortened periods of time. Although few of these people are trained in economics, they are often required to decipher complex economic data.

One expression frequently used in such situations is the economic multiplier. Because multipliers yield quick results, they are often used in generalizing the economic impacts of change. Decision-makers need to know whether a multiplier will provide useful information—or whether it will render misinformation. This publication will attempt to explain multipliers, show how they are used in calculating impacts, and provide some criteria for determining whether a given multiplier can be used in a specific situation. The concepts presented here are generally applicable only to small rural regions or to local economies.

Economic multipliers

Development in a community can have economic multiplier effects beyond the direct impacts of the original project. Multipliers arise from the fact that local businesses, households, and governmental agencies purchase goods and services from one another. Such interaction within the local economy resulting from the stimulus of a new development creates indirect or multiplier effects.

The multiplier is a single number that summarizes the total direct and indirect responding effects of a given change in the local economy.
An income multiplier is the total change in personal income (wage and salary changes) resulting from a development. And employment multipliers refer to the total additional employment stimulated by the new activity.

Multipliers require an estimate of the total change produced; these estimates can range from guessing to using sophisticated computer models. The source of the multiplier is a function of the kind of economic model used—how closely the model describes the economic reality of the community under assumptions of that specific study.

There are two general categorizations of multiplier models: aggregate and disaggregate. Aggregate multipliers lump many different types of businesses together. Disaggregate multipliers consider each type of business and provide a multiplier for each sector. One type of disaggregate model is referred to as input-output models. These community economic models divide the economy of a region into separate economic sectors, and estimate what each sector buys and sells from all other sectors.

For best results, a sector is composed of businesses that have similar purchase and sales patterns. This is important to determine within the community have different purchasing and sales patterns, and hence different multipliers. From this, it is possible to determine the total changes in the economy caused by an increase or decrease in sales of any one sector. For example, an aggregate (economic base type) model might provide only one employment multiplier which would be used to represent all sales to local residents. The total effect resulting from any outside stimulus to the economy. A disaggregate multipliers model would provide a multiplier for each different type of business. Because disaggregate multipliers are more specific, they are generally more trustworthy than aggregate multipliers. Accuracy required, and when one and money available, determine whether the model will be aggregate or disaggregate. In many cases an aggregated rough estimate may be sufficient.

Economic sectors are usually further identified as basic or nonbasic. Examples of basic businesses which predominantly serve goods and services to individuals located in or head-quartered outside the local economy (export). By bringing outside dollars into the community, these sectors stimulate economic growth and development. Nonbasic sectors include those businesses that exist primarily to serve local communities. These sectors support the basic sectors and are aggregated. In many cases an aggregated rough estimate may be sufficient.

Although aggregate economic multipliers can be defined for all sectors, only those for the basic sectors are reliable. The most reliable multipliers reflect the impact of a proposed development or economic change.

Misuse of multipliers

Multipliers are often misused or misunderstood. Problems frequently encountered in applying multipliers to community change include: (1) using different multipliers interchangeably; (2) double counting; and (3) confounding multipliers with other economic measurements, such as turnover and value added.

Interchanging multipliers. As mentioned earlier, multipliers can be estimated for changes in business output, household income, and employment. These different multipliers are sometimes mistakenly used interchangeably. This should not be done, as the sizes of the component effects are not the same—employers measure total effects differently. For example, a multiplier resulting from an increase in income is estimated from the change in income, while a multiplier resulting from a change in employment is calculated from the change in employment. These multipliers are often used incorrectly, and the usage is generally misused.

Double Counting. Unless otherwise specified, the circular multiplier concept is used in all multiplier calculations. Consider, for example, a mining business multiplier of 1.10 for the direct effect, and 1.20 for the indirect effect. The direct effect is thus accounted for by the multiplier and should not be double counted. Thus, the total estimated $400,000 total impact resulting from an increase in income (the above 2.3 multiplier) includes $200,000 direct spending, plus $400,000 indirect spending. The multiplier effect is sometimes thought to refer only to the indirect effect. In this case, the impact is added to the multiplier effect, and is thereby counted twice—yielding an inflated estimate of change.

Pyramiding. A more complicated error in using multipliers is called pyramiding. This occurs when a multiplier for a nonbasic sector is used, in addition to the appropriate base multiplier.

For example, sugar beet processing has been a major contributor to exports in many western rural communities. Many farmers were paid cash on processing. However, when the mills were closed, and local officials wanted to determine the economic effect of the closing, as well as the subsequent effect upon local farmers. The multiplier for the sugar beet processing sector includes the effect upon farmers, who receive cash but the product is sold to local processors and not exported. Therefore, the multiplier effect for this sector is used to determine the impact of the changes in the sugar industry on the total economic impact. It would be misleading if the multiplier for farms, whose effect had already been counted, were added to processing.

Pyramiding results in particular serious errors because they result in greatly inflated impact estimates. If inflated estimates are used in making decisions about such things as school rooms or other new facilities, the results can be very expensive.

Turnover and Value Added. Economic measures incorrectly used for multipliers also result in misestimation. Two examples are turnover and value added. Turnover refers to the number of times turnover occurs in the community. Figure 1, for example, the local turn over five times; however, only part of the multiplier is economically active. Some components of the multiplier may be nonbasic. Value added reflects the portion of a product's total value added within the local community. The value added would consider the value of a local raw product—rice wheat delivered to the mill— and the value of the final product. While the wholesale value of the food, then figure the ratio between the two. With cleaning and milling, etc., the wholesale value may represent several times the value of the raw product and may be a fairly large number.

Evaluating multipliers

The determination of whether a multiplier is accurate can be a complicated procedure requiring time, extensive research, and the assistance of a trained econo-

mist. On the other hand, there are several questions that anyone who uses multipliers should ask. Essentially the test of accuracy for a multiplier is: How close does it stand in comparison to the economic relationships in the community being considered?

(1) Is the multiplier based on local data, or is it an overlay?

A multiplier must be developed for the area it affects. The data must be developed specifically for data from that area. These data multipliers are based on assumptions that they will adequately reflect relationships in the area. An example would be using the retail multiplier from a large city to estimate a mining impact in northeastern Nevada.

A multiplier based on regional geographic factors on the basis of general geographic relationships should only be used for regions that are similar.

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(4) If you are dealing with an employment multiplier, is it based on number of jobs or full-time equivalent (FTE)? Employment multipliers are often considered to be the most important multipliers used in impact analysis. This is because changes in employment can be transmitted to changes in population, which, in turn, affect social service needs and tax base requirements. Employment multipliers can be calculated on the basis of number of jobs or on FTE. One FTE equals one person working full-time for one year.

When multipliers are calculated on a number-of-jobs basis, comparisons between industries are difficult because of different definitions of part-time workers. For example, part-time work in one industry might be four hours per day, while in another it might be ten hours per week. If calculations were based on number of jobs, a comparison of multipliers would be misleading. The conversion of jobs to FTE also helps adjust for seasonal employment in industries such as agriculture, recreation, and forestry.

(5) What is the base year on which the economic model was formulated? Inflation can affect multipliers in two ways: (1) through changes in the prices of industry inputs, and (2) through changes in the purchasing patterns produced by inflation. Each input-output multiplier assumes that price relationships between sectors remain constant over time (at least for the period under consideration). In other words, the studies estimating multipliers assume that costs change proportionally: utility prices change at nearly the same rate as the food, steel, and other commodities. If some prices change drastically in relation to others, then purchasing patterns and multipliers will likely change.

Marketing patterns change slowly, however, and while they must be considered, they usually do not present a major problem unless the multiplier is several years old. The rate of growth in the local area will influence the period of use for the multipliers.

(6) What can a multiplier do? The multipliers discussed here are static in nature, as are most multipliers encountered by local decisionmakers. Static means that a multiplier can be used in "if/then" situations; they do not project the future. For example, if a new mine that employs 500 people comes into a county, then the total employment increase would be the employment multiplier times 500. A static model cannot be used to make projections about the time needed for an impact to run its course, or about the distribution of the impact over time. Static multipliers only indicate that if X happens, then Y will eventually occur.

(7) How large is the impact in relation to the size of the affected industry on which the multiplier is based? Dramatic changes in an industry’s scale will usually alter markets, service requirements, and other components of an industry’s spending patterns. Assume a mining sector employment multiplier of 2.0 had been developed in a rural economy having 132 FTE. If a mine were proposed several years later with an estimated 300 FTE, the multiplier of 2.0 would probably not accurately reflect the change in employment because of the scale of the project relative to the industry existing when the multiplier was developed. In essence, the new industry would probably change the existing economic structure in the local area.

(8) Who calculated the multiplier—and did the person or agency doing the calculation have a vested interest in the result? Multipliers are calculated by people using statistics, and as such, there is always the opportunity to adjust the size of the multiplier intentionally. Before accepting the results of a given multiplier, take time to assess the origin of the data. Studies conducted by individuals or firms having a vested interest in the study’s results deserve careful examination.

(9) Is household income included as a sector similar to the business sectors in the local economic model? The decision to include household income in the model depends upon whether or not the household sector is expected to react similarly to other sectors when the economy changes, or whether personal income is largely produced by outside forces. Discussion of this issue is too lengthy for this publication, but the important point is that multipliers from models that include household sectors are likely to be larger than those from models without household sectors.

Conclusion

The list of questions presented here should provide a basis for evaluating the accuracy and appropriateness of a multiplier in a given situation. To make decisions in very important cases—or in cases where a multiplier appears to be problematic—it is advisable to consult someone trained in the calculation, evaluation, and use of economic multipliers.

Although multipliers must be used with care, they are helpful in evaluating economic changes within communities. They are particularly enlightening in evaluating the distribution of impact throughout a community—to identify who stands to benefit from a particular economic change—and where some concerns may lie.

This publication is part of the "Coping with Growth" series produced by the Western Rural Development Center. Other titles in the series include:

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$0.25