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### *Uses and Abuses of Economic Multipliers*

by

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There are many kinds of economic multipliers. Probably the most common and of interest here are those having to do with the linkages between sectors of an economy — sometimes called input-output or **interindustry multipliers**. These multipliers are numbers (greater than one) that when multiplied times an initial impact in a particular sector or industry, give an estimate of the total impact realized as that initial shock finds its way or “ripples” through related sectors of that economy.

We kind of like the term “ripple” — it is descriptive. We can all remember as children the pleasure of throwing rocks in a pond — especially big rocks! When the rock was big and the pond fairly small, what did we see? There was a big splash in the middle, followed by a series of waves, at first sizable and small in circumference and then getting

successively smaller but larger in circumference, until finally the last little ripple struck the edge of the pond. If the pond was large or the rock small, sometimes we couldn't see the last ripple strike the bank. Such it is with economic impacts — they ripple through an economy, sometimes like a tidal wave at first, but always giving way ultimately to a tiny ripple.

#### *The Essence of Multipliers*

An example may help us here. Suppose we'd like to know the total impact on Arizona's economy of a 10% increase in electronic equipment output in Maricopa County. The initial increase in output is called the **direct effect**. Clearly an electronic equipment manufacturer does not operate in isolation. The manu-

facturer purchases many different inputs that go into the production of electronic equipment — energy, equipment and machinery, electronic components, etc. These input purchases give rise to what might be called a “backward-linked ripple.”

Not only do electronic equipment manufacturers purchase more input from their suppliers, but these suppliers in turn purchase a greater volume of input from their suppliers. This backward-linked impact may go through several iterations depending on the extent to which sectors are interdependent and whether these backward-linked suppliers are represented in the economy of interest.

It may be, for example, that the supplier of the local electronic component wholesaler is located outside of Arizona. In which case that part of the ripple would be lost

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to the Arizona economy. We call this **leakage**. The less comprehensive or complete our local economy, the greater will be the leakage and the smaller our multiplier. On the output side, the electronic equipment manufacturers must sell their product. Like the input side, there is a whole chain of business activity associated with the marketing and distribution of electronic equipment. We call these connections “forward-linked” impacts. Similar to backward-linked effects the extent of the forward-linked effects on a local economy depends on leakage.

If there is limited product processing or value-added activity that takes place in the economy of interest, the ripple effects on that economy will be reduced — the multiplier will be smaller. The combination of the backward and forward linkage effects are often referred to as the **indirect effects** of a particular sector on its related economic sectors.

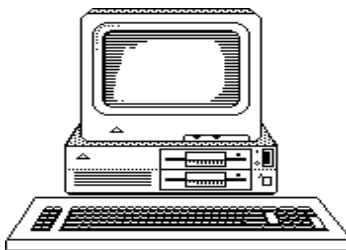
A final component of inter-industry multipliers has to do with what might be called the **consumption effect**. We like this term better than its more familiar name, **induced effect**. Employees of Maricopa County electronic equipment firms, their input suppliers and product distributors, and (in turn) of their suppliers and distributors are consumers as well as producers. Their consumption, however, depends on the income they receive as workers in businesses. These people and their families are just like the rest of us. They consume groceries, movies, weekend outings, blue jeans and what-have-you. This consump-

tion activity contributes to the amplitude and strength of the ripple. Multipliers that take into account the consumption effect as well as the indirect effect are often labeled Type II or Type III multipliers. In contrast, a multiplier that just considers the indirect effect is called a Type I multiplier.

To complete our introduction to interindustry multipliers, we should be aware that there are a good many different kinds of such multipliers. There are income multipliers, gross receipts or output multipliers, value-added multipliers and employment multipliers.

An income multiplier tells us how much income will increase or decrease in a total economy as the income of a particular sector changes due to an increase or decrease in the output of that sector. An employment multiplier tells us how many jobs will be gained or lost in the total economy as employment of a particular sector changes due to an increase or decrease in the sector’s output. Other multipliers are interpreted similarly.

When someone “hits you with a multiplier” it is important to find out which kind they’re talking about, which economy they’re referring to, and whether the consumption effect is included or excluded. There are a ton of multipliers floating around out there — so beware!



### Appropriate Uses

The appropriate use of an interindustry multiplier is as a means for estimating the full impact on an economy of an increase or reduction in the final demand for particular products or services. When used carefully and appropriately multipliers can be of considerable value to policy analysts and policy makers. Unfortunately, the inappropriate uses of multipliers are numerous and all too frequent. We turn to that topic next.

### Common Abuses

There are no doubt hundreds of inappropriate interpretations and ways to misuse statistics — economic multipliers are statistics (numbers) and they have been and will continue to be misused, confused and abused. In this section we focus on but eight of the most common and sometimes flagrant misuses of multipliers. Rather than be too negative, permit us to turn these abuses on their head and offer instead “some things to remember” for those of us that want to use and interpret these multipliers appropriately.

1. It is a multiplier, not an “adder”. A common mistake, as strange as it may seem, is to apply a multiplier to a direct effect and then add the result to the direct effect to get the “total impact.” The fallacy goes something like this. Suppose our direct change is \$3 and our multiplier is 2: we multiply  $\$3 \times 2 = \$6$  to get the “indirect effect” and

then add it to the original direct effect, i.e.,  $\$6 + \$3 = \$9$ . Right? Wrong. A multiplier is a multiplier, not an “adder”! We already accounted for the original direct effect of \$3 when we multiplied by 2. When we multiplied we got the “whole thing” (direct effect plus indirect effect), not just the indirect effect.

2. Beware of pyramid builders. Pyramiding is a seemingly irresistible way of double-counting utilized by those feeling the need to show a large impact. The trick goes something like this. Let's say that the copper mining sector has an output multiplier of, say, 2.0. The copper refining sector has a multiplier of say, 1.8. The copper wire manufacturing sector has a multiplier of, say, 2.1. Oh yes, and the electric sector that supplies all three has a multiplier of, say, 1.9. So, the total impact must be 2.0 times copper mining output plus 1.8 times copper refining output plus 2.1 times copper wire manufacturing output plus 1.9 times sales of electricity used in copper production. Pretty slick, huh? The problem, of course, is that when we calculated the multiplier for the copper mining sector (if we did it correctly), we included all of both the backward- and the forward-linked sales and purchases connected to the mining of copper and its inputs and

the refining of copper ore and the manufacture of copper wire.

3. Use the appropriate multiplier for the task. We've already touched on this problem. There are many different kinds of multipliers. We need to make sure we're using the right one for the job at hand. If we're interested in employment impacts then we obviously need to use an employment multiplier, not an income multiplier. If we're interested in the impact on the Arizona economy then we need an Arizona-economy multiplier, not one for the U.S. economy, or one for Pinal County.
4. Turnover of dollars always exceeds the multiplier. The number of times that money changes hand in an economy has no correspondence to (is not a good measure of) the ripple effect. An initial dollar may turnover (change hands) many times, but remember that only a part of that dollar remains in the local economy each time it changes hands .
5. Distinguish between output changes and mere price changes. Incomes of cotton producers in Pinal County will go up (other things equal) if the price of cotton rises. But increases in gross receipts or income only give rise to the full economic multiplier effect when there is a change in

the output of a sector. An increase in the price that producers receive for their product will have a consumption effect, but it will not affect purchases of inputs and the amount of product to be processed (at least in that production year).

6. The displaced resources will not remain idle forever. When people use economic multipliers to build a case that the loss of a firm or industry is large, there is often a tendency to assume that the direct loss and the indirect loss are total and permanent. We know, of course, that this is not necessarily the case. If I lose my job, what do I do? I will look for another job. Assuming I find one, it will have a direct positive effect in my new work/industry/location as well as positive indirect and consumption effects. In analyzing gains and losses (direct, indirect, and consumption), we must always remember that for some resources unemployment is temporary. In addition, all economic sectors and employment generate indirect and consumption multiplier effects, not just the one in which we happen to work.
7. Sales within a sector may comprise a lot of the ripple. How we define sectors makes a big difference in how big or small “our sector's” multiplier might

be. For example, it is likely that the multipliers for the dairy sector of most economies will be larger than for the agricultural sector as a whole. Why? When we are looking at the dairy sector, purchases from other agricultural sectors are appropriate to count as indirect effects, e.g., the purchase of alfalfa hay from a neighboring farm. But when we think of agriculture in total as a sector, this purchase would be considered part of the direct effect, and thus would not be appropriate to claim as part of the interindustry ripple effect. It's a variant of the old "smoke and mirrors" business; one can make things look quite different just by redefining what's in and what's outside your industry. However, by increasing the size of your sector, you often reduce the size of the multiplier too. So while the amount of impact that is direct, indirect and consumption related will be quite different, the total impacts should be very similar.

8. Watch out for comparisons of apples and oranges. Another more subtle abuse of multipliers comes into play when someone wants to compare total impacts to something else in the economy. For example, a convenient state level economic figure is the total gross state product. This figure is similar to value-added in that it represents returns to primary inputs like labor, land and capital in the region. It can be thought of as net receipts, net of the cost of intermediate inputs. It is tempting to compare a total output impact to the gross state product to find out how 'big' the impact of the sector is in relative terms. The problem is that output is a **gross** receipts figure. When you compare gross receipts plus impacts of one sector to the net receipts for the entire economy, the one sector looks like it is bigger than it truly is.

There aren't any easy rules for detecting misuses in this area. However, do ask, are we comparing equivalent figures? Did the figures come out of the same data source and are they consistent?

9. Impact results are only as reasonable as the direct effect estimates. Yet another way to abuse multipliers is to begin with an initial output, income, employment or value-added figure that is higher (or lower) than it should be. This is potentially one of the most serious abuses. Always ask yourself, do the output, personal income, employment and value-added numbers used as the basis for the impact analysis make sense? When possible, check for independent sources of information on these initial effects. For example, you might examine the wage and salary per employee numbers to see if they are close to the national averages in that industry. Examine the assumptions underlying the calculation of these initial impacts to make sure they are reasonable. Compare the direct effect estimates to those in similar studies.

We hope that you feel more familiar with economic impact analysis after reading this article. And we hope that you will be a discriminating and critical user (not abuser!) of economic impact analysis results.

## NO ONE WANTS TO BE THE RIPPLE

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In the previous article, economic impact was likened to the ripples created when a stone is dropped into a pond. The biggest occur where the stone hits the water, but none of the ripples would have occurred had the stone not been dropped in the first place. In considering changes in economic activity, people often ask "What will be the economic impact of this change?" The simple truth of the matter is that not everything will have an impact because it may already be part of the ripple. It's not bad to be part of the ripple, but, well, no one wants to be the ripple.

When we talk about economic impacts, we are generally applying an economic or export base or an input-output multiplier to generate an estimate of impacts. Input-output multipliers were discussed in the previous article. To better understand multipliers, a brief discussion of export base analysis is useful. Export base analysis distinguishes between products or services that are exported (basic) and those that are consumed locally (nonbasic). The terms "basic" and "nonbasic" are

commonly used in this context. While perhaps not the most descriptive terms, they nonetheless are the accepted jargon. This distinction is made because it is the goods and services that are made in a community but sold outside of its borders that bring income into the region and allow for growth and development (although proponents of import substitution argue that reducing leakage of income out of the community can also stimulate growth). These "basic" activities provide the means to purchase products that the region cannot produce itself. The basic activities also support the "nonbasic" production.

Generally, export base multipliers are used to examine employment impacts. So, for example, if the employment multiplier for a community is 1.8, then for every one new basic job, the nonbasic jobs will increase by .8. This multiplier has both an indirect effect (due to the purchase of local services and materials) and an induced effect (due to changes in personal income of employees). The size of the multiplier depends on the amount of leakage, or the amount of spending on goods and services from outside the community with each round of spending.

The definition of "economic impact" in its simplest and broadest sense is the change in some economic measure associated with a change in some other economic activity. The above discussion on export base analysis argues that the phrase "economic impact" should be applied only to export based activities. Here are a few examples of what we mean.

Consider a small coffee shop that is open only during the lunch hour to service the employees at a large office complex. This coffee shop required an investment in building and equipment, it provides jobs and pays salaries and taxes. What is its economic "impact" on the community? From an export base analysis perspective, it has no impact on the community. It exists because of the employees in the office building and the income they earn. The lunchroom is part of the ripple.



What about a large housing development that is beginning construction? This housing project is located a short distance from a new manufacturing plant and the developer is hoping that the location will attract many of the immigrants expected to work at this facility. The developer has made considerable investment in land and numerous construction workers are already at work on model units. What is the economic "impact" of his multi-million dollar project? Again, the answer is zero. A housing project designed to serve local workers is part of the nonbasic sector, it is part of the manufacturing plant's ripple.

Consider another identical housing development designed to attract well-to-do retirees. To the extent that the developer can attract retirees from other places or prevent local retirees from outmigrating, the project represents goods and services sold to persons with incomes derived from outside of the region. So this housing project is part of the export base of the community and it does have an economic impact.

Suppose a major discount retail store locates in a community. They construct a large retail outlet, they hire employees locally and begin to operate. What is the economic impact of this facility? Once again, it is zero. The purpose of most retail stores is to sell to local residents. Local residents may choose to spend a fixed amount of income there or at some other local retail store. In general, their level of expenditures does not change. When residents shift their spending to the new outlet, existing stores will suffer a loss in income and the resulting loss in employment will offset the gain in employment at the new retail store. Some existing retail stores may go out of business. The net change is zero.

However, if the store caters to visitors or tourists or it results in more people from just outside the community coming to shop in the community (i.e., it increases the community's trade area), or if it keeps people in the community from shopping outside of the community, then it will have economic impact. Perhaps the clearest example of this is the factory outlet stores that are springing up around the state. These

stores are placed to attract customers who are from outside the community but traveling through or visiting the community.

You may be thinking that it is no wonder that no one wants to be the ripple. Being part of the ripple effect is not the sort of thing that politicians get too excited about. But, for those of us whose businesses are part of the ripple, we can take solace in the fact that our contribution to gross state and national product counts just as much as the next guy's. Nevertheless, next time you wonder about the economic impact of some project or look at an economic impact study we hope you will ask whether the project in question is indeed causing the impact or is part of the ripple caused by the impact of something else. Since many industries both export and supply the local market, we hope you will also observe whether efforts have been made to differentiate between export and local sales when possible.

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## **Hiring a Consultant to Do Economic Impact Analysis**

*Julie Leones*

The following are a few guidelines to consider when hiring someone to do economic impact analysis for you:

1. Check the training and experience the individual has related to building and running macro-economic models.
2. Ask for a sample of previous economic impact analyses that this person has done. Using what you now know about multipliers, check the analysis and the resulting impact results to see if they look reasonable. Do you see any misuses of multipliers in the report? Was the study of a change that caused impact and not of something that was really part of the ripple? Can the consultant answer questions about the way she or he ran the analysis in these other studies to your satisfaction?
3. Ask what model the analyst is using as the basis for estimating impacts. Some widely used models based on secondary data include input-output models such as RIMS II, IMPLAN, and the

Benjamin Stevens model. A widely used econometric model is REMI. Some researchers, particularly at Universities or larger consulting firms have developed their own models or have modified versions of the models listed above. Make sure that the model that the consultant uses is legitimate. Asking several researchers who do macroeconomic modeling about a particular model is one way to gather this information.

4. The cost of economic impact studies can vary a great deal. It depends on the complexity of the situations to be modeled. It also depends upon whether there is existing data on the direct effect or impact of the activity or whether the researcher will have to collect primary data to estimate the direct effect of the activity. As Milton Friedman, a Nobel Laureate in Economics once said, "There's no such thing as a free lunch." You will get what you pay for in an economic impact analysis.

Be somewhat suspicious of any individual who offers to do an economic impact analysis for you at a significantly lower price than other consultants.

The quality and detail that you require from an economic impact analysis will depend on

how you plan to use the results. For some purposes, a quick and dirty job is fine, for others it could lead to major policy blunders or making administrative decisions that are extremely costly in the future.

For example, if you commission a study on the economic impact that a firm you are recruiting would have on the community as a basis for determining the size of the incentive package you will offer them. If your impact analysis provides estimates that are much higher than they should be, you may end up "giving away the farm" in providing more in incentives than you can ever hope to recoup through increased

tax revenue (net of the marginal value of increased government services provided to the firm and its employees). In this case also, you need to recognize that economic impact analysis is not sufficient information. You also need **fiscal impact** information, i.e., you need to know what the net effect of the change will be on government revenues and expenses.

As a rule, critically evaluate any impact analysis results presented to you by a firm that will be affected by the outcome of your decision. They obviously have a vested interest and may have applied pressure to or misled the impact modeler in order to get inflated or deflated figures.

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### *How Big a Multiplier?*

We've avoided giving any specific multipliers to you in earlier articles, because, quite frankly, the size of multipliers can vary from barely more than 1 on up to a two digit number depending on many factors such as the size of the economy in question, the degree of interdependency in the economy and between a particular industry and other sectors, the time period, and whether an output, income or employment multiplier is being used.



Most of us who work in this area have been confronted with the "all purpose" or "standard" multiplier. These are multipliers that people pull out of the air because they don't

have access to multipliers estimated using a full blown model or because they don't know any better. The most common ones we hear, are output multipliers of 3 or 3.5. These are large for state economies and even more so for county and city economies. To give you some sense of scale in multipliers, the RIMS II type II output multipliers for sectors in Arizona currently range from 1.11 to 2.47 (the average is 1.86).<sup>1</sup> The IMPLAN type III output multipliers from the 1985 Arizona model range from 1.33 to 2.40 (the average is 1.62).

The county level models are likely to have even smaller output multipliers depending on the county and the industry. As a rough rule of thumb, the county level multiplier for a given industry is smaller than the state level multiplier for that industry. The smaller the county or the region, the more likely the multiplier is to be small relative to the state level multiplier.

Again, while we don't want to create some new and equally unjustifiable "standard" multiplier, we did want to provide you with some sense of the size of reasonable output multipliers.

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<sup>1</sup> For more examples of state level economic multipliers, see: "Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)." U.S. Department of Commerce. Economics and Statistics Administration. Bureau of Economic Analysis. May 1992. Government Printing Office. ISBN 0-16-037944-x.

### Editor's Note

We hope you find this newsletter useful. In upcoming newsletters, we will be focusing on improving business retention and expansion efforts and would be very interested in receiving letters from you concerning your experiences with business retention and expansion and how you think this approach to development could be improved.

A second topic to be addressed in an upcoming newsletter is the notion of reinventing government, of changing incentive structures and the mission of public organizations to improve their efficiency and the quality of their service. Again, we welcome letters from readers sharing examples of 'entrepreneurial' government you have encountered in Arizona.

Sincerely,

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