North Dakota
DEPARTMENT OF COMMERCE
DIVISION OF ECONOMIC DEVELOPMENT & FINANCE

Economic Development by the Numbers

A source for data and statistical information to assist in promoting your community, county and state

May 2013

Feature: Regional Input-Output Modeling System (RIMS II)

This issue of Economic Development by the Numbers is the second in a two-part series that looks into economic multipliers. This issue will focus on the Regional Input-Output Modeling System II (RIMS II) produced by the US Bureau of Economic Analysis and includes an example of how to apply these multipliers.

Featured Web Site: https://www.bea.gov/regional/rims/

What is RIMS II?

Like other models that produce economic multipliers, RIMS II is used by economic developers to estimate the regional economic and industrial impacts of activities such as: opening or closing military bases, tourist expenditures, new energy facilities, energy conservation, opening or closing manufacturing plants, shopping malls, new sports stadiums, and new airport or port facilities. Unlike other models, RIMS II is just an input-output (I-O) table. This means that you'll have to use the multipliers to calculate your own economic effects while other models provide software to do that for you. But don't worry, we'll go over how to do that!

How is RIMS II Different from Other Economic Multiplier Models?

Advantages:

- Multipliers are ordered by series rather than through a subscription like other models.
- Data is available for a wide variety of geographic areas. This increases specificity and allows areas to be compared and contrasted.
- The multipliers of a RIMS II analysis return less than a 10% difference from other, more expensive analysis models.
- There is a larger number of industry subsections available to choose from which helps to lessen aggregate errors.

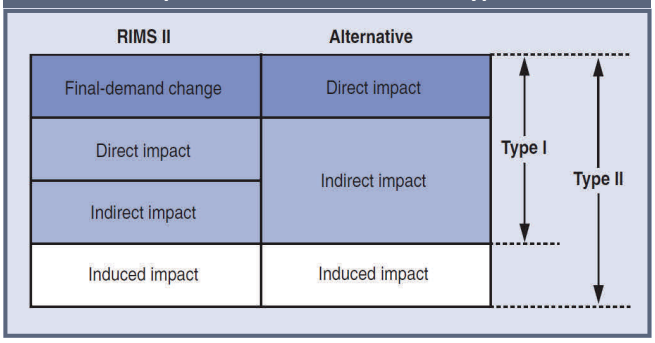
Disadvantages:

- The I-O tables leave you on your own to apply the multipliers to your project rather than help you through them.
- Other models collect data used in calculating multipliers more frequently and from a wider variety of sources.

Differences in Definitions:

The last issue of this newsletter covered some common terms used with multipliers. RIMS II uses those terms differently. For example, new jobs created by the expansion of a manufacturing plant (defined in other models as direct impact) is defined as the final-demand change. What would usually be defined indirect impact, RIMS II separates into two definitions: direct and indirect impact. Direct impact relates to the initial round of purchases by the final-demand industry (company affected) and indirect impact relates to the subsequent purchases in related industries (suppliers). The definition for induced impact is the same as in other models: the change in employee purchases. Table 1 depicts this difference in definition.

Table 1– Comparison of Definitions and Types I & II



Another difference with RIMS II is that it gives you two different types of multipliers. Type I multipliers account for direct and indirect impacts of the final-demand change, also know as the initial change (see Table 1 above). Type II not only accounts for the initial change, direct and indirect impacts, as Type I does, but also accounts for the induced impacts.

Ordering RIMS II

RIMS II multipliers can be ordered online through their website at https://www.bea.gov/regional/rims/rimsii/ and are ready between 1-3 business days after they are ordered. Multipliers can either be ordered through the **Annual Series**, which includes multipliers for 62 aggregate industries and is based on 2010 National & Regional data, or through the **Benchmark Series**, which includes multipliers for 406 individual industries, the 62 aggregate industries and is also based on 2010 Regional data, but only 2002 National data. Industry lists can be found at https://www.bea.gov/regional/rims/rimsii/industrylist.aspx?List=2 and are based on 2002 NAICS Codes. You can decide between the Annual or Benchmark Series by considering whether it's more important to have detailed industries or more recent data.

A set of multipliers for a region costs $275 and includes all RIMS II industries. Regions can be purchased by state, county, Metropolitan Statistical Area (MSA), Metropolitan Division, Micropolitan Statistical Area, BEA Economic Area, and Combined Statistical Area.

Multipliers can also be purchased by industry for $75. When purchased by industry, multipliers for all of the 50 states and the District of Columbia are included in the dataset.

If you have chosen a region to analyze instead of a specific industry, you will have to define the region first. The region should include the entire area affected by the initial change in order to be the most accurate. A good way to conceptualize how large the region should be is to think of where the suppliers are located and where the workers live and spend their money. If you select too small of a region, the resulting multipliers will be artificially large. If you select too large of a region, the visible effects of the overall change will be minimal.

How to Use RIMS II Multiplier Tables

After your order is ready and you have followed the link to the order details page. You can view the multiplier tables on the website, download them in a zipped file, or view the summary tables as a PDF.

The summary tables include the four final-demand multipliers and the two direct effect multipliers that you will use to calculate the economic impact of your project. You will receive summary tables for both type I and II multipliers. These are the tables that are used in calculating total changes like those in the examples on the next two pages.

Final-demand multipliers provide an estimate of the total change per dollar when multiplied by an initial change. They can be expressed in terms of output, earnings, employment, and value-added.

Direct-effect multipliers provide an estimate of the total change in earnings and employment across all industries in the region when multiplied by a change in earnings and employment in the final-demand industry.

Table 2 below depicts the different final-demand and direct-effect multipliers' definitions and application.

If you download the multipliers in the zipped file option, you will also get separate tables for each type of multiplier. If you ordered regional multipliers, these tables will show the relationship between industries.

Assumptions of RIMS II

There are a couple of assumptions that the RIMS II model makes that we need to keep in mind when we are analyzing our project. The main assumptions are that there are no supply constraints, purchase patterns are fixed, and inputs will be bought locally. In other words, if a firm increases production, it's assumed that there will still be supplies and workers available locally to fill their need at the same price level or pay.

Some of these assumptions can be worked around by using the "Bill-of-Goods" approach. This approach requires information on changing purchasing behavior that's caused by the initial change in economic activity. More information on RIMS II and the "Bill-of-Goods" approach can be found in the RIMS II user guide at https://www.bea.gov/regional/pdf/rims/rimsii_user_guide.pdf.

Table 2– Multiplier Definitions and Applications

Multiplier	Definition	Application
Final-Demand Multipliers		
Output	Total industry output per $1 change in final-demand	Change in final demand x multiplier = total output impact
Value Added	Total value added per $1 change in final-demand	Change in final demand x multiplier = total value-added impact
Earnings	Total earnings per $1 change in final-demand	Change in final demand x multiplier = total value-added impact
Employment	Total jobs per $1 million change in final-demand	Change in final demand x multiplier = total jobs impact
Direct-Effect Multipliers		
Earnings	Total earnings per $1 change in earnings in final-demand industry	Change in earnings in final-demand industry x multiplier = total
Employment	Total jobs per one job change in final-demand industry	Change in jobs in final-demand industry x multiplier = total jobs

Applying RIMS II Multipliers: A Motor Vehicle Parts Example

The following is an example of an increase in motor vehicle parts manufacturing taken from the RIMS II User Guide provided by the Bureau of Economic Analysis. This example is helpful in describing the application of the RIMS II multipliers. It goes through how to calculate total change, a change in jobs or earnings, and how to separate impacts. There are more examples in the User Guide at https://www.bea.gov/regional/pdf/rims/rimsii_user_guide.pdf.

Table 3- Multipliers for Motor Vehicle Parts Manufacturing, Kokomo, Indiana, Metropolitan Statistical Area

Type	Final-demand			Direct–effect	
	Value added	Earnings	Employment (jobs/ $1 million)	Earnings	Employment
Type I	0.4102	0.1778	3.3654	1.3508	1.4680
Type II	0.4703	0.1992	4.1447	1.5135	1.8080

1. Detailed industries from the benchmark series

Calculating a Total Change

You can use a final-demand multiplier when only the initial change in jobs or earnings in the final-demand industry is known. This change can be used with RIMS II multipliers to provide an estimate of the total change.

To give an example that shows how a final-demand change can be calculated, consider a manufacturing plant in Kokomo, Indiana, that decides to hire 250 workers to add a third production shift. The plant produces automobile transmissions that are shipped to an assembly plant in Toluca, Mexico. The mayor, who helped convince the manufacturer to add the third shift, wants an estimate of the total impact of the increase in the plant's production on local GDP (value added) to show the importance of the increase in production to the community.

To conduct the economic impact study, the following decisions are made:

- The number of workers hired by the manufacturing plant (250) can be used with the final-demand and direct-effect employment multipliers to calculate the total change.
- The automobile parts manufacturing industry from the benchmark series is chosen for the analysis because it most closely matches the industry detail available for the final-demand change.
- Kokomo MSA, Indiana is selected as the region.

Because the change in jobs in the final-demand industry is available, the total change can be calculated in two steps:

1. Divide the final-demand employment multiplier by the direct-effect employment multiplier. This result is a ratio of the number of jobs per million dollars of output for the final-demand industry.
2. Divide the initial change in jobs in the final-demand industry by the ratio calculated in step 1. The result is the total change expressed in millions of dollars.

Table 3 above shows the multipliers for the automobile parts manufacturing industry in Kokomo, Indiana. Using the initial change in jobs and the Type I multipliers, the related final-demand change is $109.1 million (the result will be $109.1, but remember the final-demand employment multiplier is in jobs per million dollars and therefore really means $109,100,000).

$$\$109.1\ \textit{million} = \frac{250\ \textit{jobs}}{(3.3654 \div 1.4680)}$$

Step 2

Step 1

Using this estimate and the final-demand value-added multiplier, local GDP is calculated to increase by $44.8 million.

$$\$44.8\textit{million} = \$109.1\ \textit{million} \times 0.4102$$

If information on a change in earnings in the final-demand industry is available instead of a change in jobs, the total change can be calculated similarly using the final-demand and direct-effect earnings multipliers instead of the employment multipliers.

Either Type I or Type II multipliers can be used to calculate a total change, just remember that Type II multipliers also include induced impacts.

Calculating a Change in Jobs or Earnings

You can also calculate the initial change in jobs or earning in the final-demand industry when only the total change is available.

To show how an initial change in jobs can be calculated, consider the manufacturing plant in Kokomo, Indiana.

Suppose it is only known that the plant's output is expected to increase by $115.0 million. The mayor would like an estimate of the related increase in jobs at the plant.

When employment information is available, the initial change in jobs in the final-demand industry can be calculated in two steps:

1. For the final-demand industry, divide the final-demand employment multiplier by the direct-effect employment multiplier. This result is the ratio of the number of jobs per million dollars of output for the final-demand industry (meaning that you should use $115 in the equation rather than $115,000,000).
2. Multiply the total change by the ratio calculated in step 1. The result is the initial change in jobs in the final-demand industry.

Using the total change and the Type I multipliers in Table 3, the plant is expected to hire 263 workers to increase production.

$$263\ jobs = \$115\ million \times \left(\frac{3.3654}{1.4680}\right)$$

Step 1 Step 2

This estimate differs from the initial change in the prior example (250 jobs) because the estimate is based on the ratio of jobs to output for the final-demand industry in RIMS II rather than on the information collected for the example.

The initial change in earnings in the final-demand industry can be calculated similarly to the change in jobs by replacing the final-demand and direct-effect employment multipliers with the earnings multipliers.

Again, either Type I or Type II multipliers can be used to calculate a total change, just remember that Type II multipliers also include induced impacts.

Separating Impacts for Inter-Industry and Consumer Spending

RIMS II does not provide separate estimates of the direct, indirect, and induced effects of total change, but these estimates can be easily created by using the Type I and Type II multipliers.

To give an example that shows how the impacts of total change can be separated, consider again the manufacturing plant in Kokomo, Indiana, that plans to hire 250 workers. The mayor would like a separation of the total impact on jobs in the region.

The separation of impacts can be calculated in three steps:

1. Estimate the Type I and Type II impacts of the total change.
2. If these impacts are expressed in terms of output, subtract the initial change from the Type I output impact. The result is an estimate of the direct and indirect impacts expressed in terms of output. If the impacts are expressed in terms of jobs or earnings, subtract the initial change in jobs or earnings in the final-demand industry from the Type I job or earnings impact. The result is an estimate of the direct and indirect impacts expressed in terms of jobs or earnings.
3. Subtract the Type I impact from the Type II impact. The result is an estimate of the induced impact.

The separation of impacts can be calculated by using the direct-effect employment multipliers in Table 3. Using these multipliers, the Type I impact of the initial change is 367 jobs.

$$367\ jobs\ (Type\ I) = 250\ jobs \times 1.4680$$

The Type II impact of the total change is 452 jobs.

$$452\ jobs\ (Type\ II) = 250\ jobs \times 1.8080$$

Step 1

Both of these estimates include the initial 250 jobs at the manufacturing plant. The direct and indirect impact is 117 new jobs.

$$117\ jobs = 367\ jobs - 250\ jobs$$

Step 2

The induced impact is 85 new jobs.

$$85\ jobs = 452\ jobs - 367\ jobs$$

Step 3

Other helpful sources for understanding RIMS II:

http://blog.bea.gov/tag/rims-ii/

http://www.bea.gov/papers/pdf/WP_IOMIA_RIMSII_020612.pdf

Publication prepared by:

North Dakota Department of Commerce

Economic Development & Finance Division

Phone: (701) 328-7252

Email: zwergeland@nd.gov