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Abstract: This paper compares the development of input-output multipliers of the 1977 RIMSII model with the multipliers of the 1982 version of IMPLAN model for the state of Idaho. The results show that differences in the output multipliers from the two models do exist. The greatest differences were located in the data reduction techniques of the models. IMPLAN multipliers will be consistently lower than RIMSII multipliers.

Keywords: multipliers, input-output, RIMSII, IMPLAN, non-survey, techniques, simple location quotients, regional purchases coefficients

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I. The Problem: What is the Difference Between IMPLAN and RIMSII Multipliers in Idaho?

The purpose of this paper is to compare the type II output multipliers built from the USDA/Forest Service (IMPLAN) and USDC/Bureau of Economic Analysis (RIMSII) input/output models for the state of Idaho in 1982. Both the IMPLAN and RIMSII models are developed using non-survey techniques. In the past, many papers have compared non-survey and survey based models as well as different non-survey models, and discussed the confidence in the multipliers that were generated (Round; Brucker, et al.; Schaffer and Chu; Stevens, et al.; Jenson and Macdonald; Olson ; Ralston, et al.). Thus, it may be instructive to determine how differences between models may cause variations between multiplers in each sector.

The IMPLAN and RIMSII models maybe expected to differ by source and type of data, procedure for scaling the national interindustry coefficients, and means of closing a model. Possible differences in the closing processes have been minimized by applying the RIMSII closure assumptions to the IMPLAN model. The IMPLAN model was set up to employ the RIMSII aggregation of sectors. Therefore, the focus of this analysis is on the effect of differences in data and scaling within the IMPLAN and RIMSII input/output models.

II IMPLAN "Type II" and Type III Output Multipliers

The USDA/FS/IMPLAN model does not generate type II multipliers. For this study, "type II" IMPLAN multipliers

are derived using IMPLAN data and a standard augmented Leontief inverse procedure.[1] IMPLAN type III multipliers are determined as a matter of routine by the IMPLAN program.[2]

There is an important economic difference between type II and III multipliers. Type III multiplier implicitly assume that the economy in a region is at full employment. Type II multipliers assume that the economy is at less than full employment. Consequently, type III multipliers are usually 5-15% less than type II multipliers (Olson, p. 7).

III. Comparison between IMPLAN and RIMSII

The major source of difference between IMPLAN and RIMSII multipliers is the techniques used to scale the national interindustry coefficieints. The non-survey scaling or "data reduction" techniques result in the estimation of commodity import-export flows across region borders, or cross-hauling (Alward and Despotakis, p.2).

The data reduction method used in IMPLAN is a variation of regional purchases coefficient technique (RPC)(Alward and Despotakis, p.4). The RPC's represent values that are calculated for commodities in a study area, based on the area's population, land area, employee compensation, and employment numbers (Olson, sec. 4, p. 57). The STEB variation may estimate gross flow components of a region's import-export trade in constructing regional accounts (Alward and Despotakis, p.6).

The integration process of the RPC technique into IMPLAN requires an extra step. Since the STEB technique only

adjusts technical coefficients to reflect regional purchasing patterns, an alteration is needed to show dollar flows among economic agents. It is here that the RPC's derive imports and exports. To insure that the double-entry accounting system still balances, a constraint is imposed, so that the calculated RPC's are not greater than the supply-demand pool ratio for that commodity (Alward and Despotakis p.45).

RIMSII estimates regional direct coefficients through a simple location quotient technique (SLQ)(Cartwright et al. p. 15). The SLQ assumes that the output needs of a specific industry in a region, is relative to the output needs for each industry nationally. These outputs reflect the same ratio as the total regional to total national output.

Comparisons between the supply-demand pool and SLQ's show that they are conceptually equivalent when "regional total sales are the national sales scaled to the regions share of aggregate total sales, and when the region's final demand for a commidity is the nation's final demand for the same commodity, scaled by the region's share of aggregated total sales" (Robison and Miller, p.1525). If also, the RPC approach always generates regional coefficients that are less than or equal to those generated by the supply-demand pool, then IMPLAN's type II multipliers will be, on average, less than RIMSII's.

Another source for the difference between IMPLAN and RIMSII multipliers is the handling of foreign imports. The

RIMSII technical coefficients are not foreign import purged, while IMPLAN's are. In IMPLAN, the multipliers show domestic trade flow levels, while in RIMSII the multipliers include both domestic and foreign transactions (Olson, p. E-3). This would tend to imply that RIMSII multipliers on the average would be higher than IMPLAN type II multipliers.

There are several other contrasts that may attribute to the differences between RIMSII and IMPLAN multipliers, however these differences have been minimized in attempt reproduce the RIMSII accounts using the IMPLAN data. First, the aggregation schemes, while designed to be identical, are in fact slightly different. This occurs because IMPLAN uses a different method of aggregating industries than RIMSII. Another possible source of conflict between the IMPLAN and RIMSII multipliers is the closing of the models. To minimize this difference the RIMSII method of closing has been imposed upon the IMPLAN data. Also, data years used differ between the models. IMPLAN uses the 1977 use and make tables, but price update the data to 1982 dollars, while attempting to retain 1977 structure. (Olson, pp. 2-15). RIMSII on the other hand only uses only 1977 numbers in their calculations.

The RIMSII type-II output multipliers for Idaho average about 6% higher than IMPLAN's across the thirty-five sectors. See table 1. However, not all RIMSII multipliers are greater than or equal to IMPLAN's as the theory predicts. Thirty RIMSII multipliers are greater than

IMPLAN's by an average of 8% (range: .5 to 23%). Five RIMSII multipliers are less than IMPLAN's by about -6.4% (range -.1 to -15%).

The five sectors (sectors 11, 17, 23, 27, 28) where IMPLAN multipliers type II are higher than RIMSII type II multipliers are not explained by the theoretical differences. However these differences may be caused by the sectoring differences. The type III IMPLAN multipliers are greater than type II IMPLAN multipliers in sectors 15, 18, 25, 26, 29, 31, 33, 35, a result which is inconsistent with the theory. This may be the result of inaccurate employment numbers for these sectors for the estimation of type III multipliers.

IV. Conclusion

It was found that the majority of the differences between IMPLAN and RIMSII were in the data reduction process. The major difference here is the handling of the foreign imports, and the data reduction methods. If the supply-demand pool techniques are actually equivalent to SLQ techniques, and RPC's techniques are equal or less than supply-demand pool, IMPLAN multipliers will be consistently lower than RIMSII multipliers. (We have not been able to prove to our complete satisfaction that this condition always holds.) Differences in the aggregation schemes and the data of the closing of the models may allow IMPLAN multipliers to be greater.

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Table 1 TOTAL OUTPUT MULTIPLIERS, BY INDUSTRY AGGREGATION

Sector	---TYPE II--- RIMSII	IMPLAN	TYPE III IMPLAN
1 Agriculture products and agriculture, forest, and fishery services.....	2.0953	1.7772	1.7366
2 Miscellaneous mining.....	1.6159	1.5515	1.4200
3 New Construction.....	1.9327	1.6988	1.5698
4 Maintenance and repair construct.	1.8379	1.6569	1.4348
5 Food/kindred products and tobacco	2.3005	1.9781	1.9194
6 Textile mill products.....	1.4614	1.3588	1.2855
7 Apparel.....	1.4490	1.3825	1.1754
8 Paper and allied products.....	1.8792	1.5261	1.4020
9 Printing and publishing.....	1.8798	1.5636	1.5458
10 Chemicals and petroleum refinish	1.8149	1.6767	1.5323
11 Rubber and leather products.....	1.6091	1.8581	1.7783
12 Lumber, wood products and furn..	2.2129	1.8908	1.8151
13 Stone, clay, and glass products.	1.9893	1.6375	1.5385
14 Primary metal industries.....	1.6895	1.6818	1.4947
15 Fabricated metal products.....	1.5069	1.4577	1.4810
16 Machinery, except electrical....	1.6997	1.4754	1.3287
17 Electric and electronic equip...	1.6502	1.6767	1.4436
18 Motor vehicles and equipment....	1.4065	1.3466	1.3472
19 Transportation equipment, except motor vehicles.....	1.7436	1.6232	1.6002

Table 1. Cont.

Sector	---TYPE II--- RIMSII	IMPLAN	TYPE III IMPLAN
20 Instrument and related products.	1.6164	1.5812	1.4480
21 Misc manufacturing industries...	1.6661	1.5843	1.5449
22 Transportation*.....	1.8003	1.7265	1.4909
23 Communication*.....	1.4475	1.5087	1.3335
24 Electric, gas, water, and sanitation services*.....	1.3697	1.3428	1.2746
25 Wholesale trade.....	1.7190	1.6932	3.6536
26 Retail trade.....	1.7298	1.7188	1.7430
27 Finance.....	1.6764	1.6782	1.5332
28 Insurance.....	1.9311	2.1397	1.9907
29 Real estate.....	1.2759	1.2094	1.2188
30 Hotels/lodging and amusements...	1.7492	1.6807	2.1087
31 Personal services.....	1.6829	1.6322	1.6301
32 Business services.....	1.7622	1.7299	1.5070
33 Eating and drinking places.....	1.9169	1.7437	1.9412
34 Health services.....	1.8284	1.8140	1.6179
35 Miscellaneous services.....	1.7672	1.6365	1.6673

* Includes government enterprises

[1] The type II IMPLAN multipliers were derived by using a Lotus spreadsheet program, to augment IMPLAN's interindustry transaction matrix by (1) a total household consumption column, (2) a value added row (the sum of proprietary income and employee compensation), and (3) a household industries scalar. The total industries output column was appended with the sum of the elements in the "earnings" row. The augmented transaction matrix is divided by the augment total industries output vector to derive the A matrix of interindustry transaction shares. The the augmented A matrix is subtracted from an Identity matrix to derive the I-A or Leontief matrix. This matrix is inverted to derive $(I-A)^{-1}$ or the Leontief inverse matrix. The unaugmented elements are added by columns to derive the type II output multipliers by industry.

[2] Type III IMPLAN multipliers are based on changes in employment and population. This is done by converting the direct and indirect effects to changed in employment based on each sector's employment/output ratio. This ratio is multiplied by population/employment ratio that is turn is multiplied by average regional per capita consumption rates as changes in final demand. This change in final demand is multiplied by the Leontief matrix to derive the first round of induced effects. This process is repeated until population change is less than 10 people (Olson, p. 7).