ECONOMIC IMPACT MODELING FOR HAMILTON COUNTY AND THE NORTH FLORIDA–SOUTH GEORGIA REGION

by

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This economic analysis is part of a project on economic development, community development and planning for the future in Hamilton County, Florida. The project was conducted by an interdisciplinary team organized by the School of Natural Resources and Environment at the University of Florida.

Academic units contributing to the project were:

Family, Youth and Community Sciences Department, IFAS

Food and Resource Economics Department, IFAS Hamilton County Extension Office, IFAS and Hamilton County

Landscape Architecture Department, College of Design, Construction and Planning

Urban and Regional Planning Department, College of Design, Construction and Planning

The project included:

1. An atlas of regional demographics and physical characteristics of the county.

2. A survey of citizens about their attitudes, priorities, needs, involvement and where they obtain services.

3. An analysis of the economic sectors which make up the county and region's economy.

4. A survey of the county's businesses about their needs for staying viable and expanding.

5. An analysis of current and projected land use in the county including land use scenarios for agriculture, conservation and human settlement

6. Development and concept designs for White Springs, Jasper and Jennings that will allow them to expand their economic activity.

ECONOMIC IMPACT MODELING FOR HAMILTON COUNTY AND THE NORTH FLORIDA–SOUTH GEORGIA REGION

Introduction

The School of Natural Resources and Environment, University of Florida (UF) initiated a project in January 2008 to assist Hamilton County, Florida in economic development, community involvement, and planning for the future. As part of the project, the Economic Impact Group in the Department of Food and Resource Economics at UF developed Impact Models that allow the estimation of total economic change associated with actual or proposed changes in particular sectors of the local or regional economy. Examples of potential changes that could be analyzed could include changes in economic activity such as increased tourism expenditures in the county, the expansion or contraction of existing industries in the county, or the development of new public facilities in the county. Essentially, direct changes in any type of economic activity that influences (changes) the amount of money flowing into the local economy from the outside will also have indirect effects felt throughout the local area. Those secondary effects are the key focus of impact modeling, both in terms of the size of the resulting impacts and in terms of identifying the components of the local economy most likely to be affected.

This paper offers a brief overview of economic impact analysis and the *Implan* modeling software and datasets used in the project. Final sections offer a brief description of the Hamilton County economy and a comparison to the surrounding region. The impact models will be available as the larger project proceeds to answer specific impact questions as the need arises. A glossary of terms typically employed in economic impact analysis is included as Appendix B in this paper.

Economic Impact Analysis

Regional economic impact models for Hamilton County and the surrounding area were developed using the *Implan Professional* software and associated datasets for Florida.[1] Datasets for Florida include economic data for all Florida counties, and for this project, additional data were purchased for three adjoining counties in Georgia (Brooks, Lowndes, and Echols). Models were developed separately for Hamilton County and for the seven-county region, consisting of Hamilton, Columbia, Suwannee, and Madison Counties in Florida, and Brooks, Lowndes, and Echols Counties in Georgia.

[1] Minnesota Implan Group, Inc. (MIG). *Implan Professional* economic impact and social accounting software, and Florida state data package for 2006, Stillwater, MN, October 2007.

The *Implan* modeling system accounts for commodity production, input purchases, employment, earned income, transfer payments, taxes, regional trade flows, and capital investment among over 500 industry sectors, resident households, and state and local governments. Models may be constructed for any state or region of the United States that consists of contiguous counties. Both national and regional data are used to construct region specific models based on purchase and sales relationships between the same industries at the national level. As noted, more than 500 sectors are included, but regional models include only those sectors with positive output and employment numbers. The model for Hamilton County reflects employment in approximately 100 sectors while the model for the larger region contains 248 sectors.

Economic multipliers derived from the models for a particular sector of the local or regional economy can be used to reflect additional economic activity created (lost) through supply chain purchases from other businesses (indirect effects) and industry employee household consumer spending (induced effects), as well as the direct effect of new (lost) revenue in the sector of interest. For example, multipliers for an agricultural processing operation would capture the backward linkages to farming, farm supply businesses, and the impact of employee spending. Multipliers generally express the size of secondary effects for a given sector in a given region as a ratio of the total change in economic activity in the region relative to the direct change**.** Multipliers may be expressed as ratios of output (sales), value added, income, or employment, or as ratios of total income or employment changes relative to changes in direct output (sales). Multipliers express the degree of interdependency between sectors in a region's economy and therefore vary considerably across regions and sectors. In general those regional industries with more extensive backward linkages within the region will have larger multipliers, and industries located in regions that are larger and more economically diverse will have larger multipliers.

As will be noted in more detail in the descriptive section to follow, the question related to the size of the region and the level of economic diversity in the region is particularly important in a rural area with relatively small towns like Hamilton County. A large part of any secondary impacts (indirect and induced) associated with economic change in Hamilton County are likely to take place outside the county as local businesses and residents purchase goods and services in surrounding counties in the cities of Valdosta, Georgia, and Live Oak, Madison, and Lake City, Florida.

Hamilton County: A Brief Overview

As noted above, the *Implan* models developed for Hamilton County and for the seven-county region allow the estimation of multiplier effects associated with direct economic change (increase or decrease) in the county or region. The datasets on which the models are based also allow a descriptive overview of the economy for the county and region with comparisons between the two. Data are presented for groups of sectors in this paper and a detailed list of sectors for Hamilton County is included as Appendix A. Detailed data for either the county or the multi-county region are available on request from the authors.

Table 1 provides data for industry output (sales), employment (jobs), value added, and exports (sales outside the local area) for Hamilton County. Total output (Column 1) is expressed in millions of dollars and reflects total gross sales generated in the county with output for government sectors equal to expenditures. Total sales for the county are slightly more than $1 billion with more than 77 percent of sales generated by agricultural and natural resource industries and related manufacturing and service activities. This same grouping of sectors also accounts for about 26 percent of employment in the county. The education, government, and health care sectors combined account for almost 10 percent of output and approximately 40 percent of county employment, with the largest components being education and government. Retail trade provides slightly more than 300 jobs, with smaller levels of employment in other service, transportation, and travel related sectors.

The third column of Table 1 provides information on value added for each of the sector groupings for Hamilton County. Value added is calculated as the difference between gross sales and purchased inputs for each individual sector. This measure consists for the most part of employee compensation, profits, rental income, and indirect business taxes. Value added reflects the net new economic activity generated at the county level and is consistent with the calculation of Gross National Product at the national level. Again, the agricultural and natural resources grouping and the public sectors, including health care, are responsible for a significantly large portion of the total.

A final column of Table 1 provides an estimate of sales outside the county (local exports) by the various groupings of sectors. Note again the dominance of the agricultural and natural resources related industry grouping. This data likely, however, overstates the relative importance of agricultural and natural resource related exports to the county economy. Expenditures locally on education, government, and health care also involve significant flows of money into the local area from state, federal, or private insurance sources. Such outside monies would include grants and revenue sharing from the state and federal governments, state funding for local schools, and payments for medical care from non-local insurance companies or state or federal payments for medical care.

Given the relative importance of the agricultural and natural resource sectors to Hamilton County, Table 2 provides a detailed reporting of data for individual sectors making up the broader grouping. Recall from Table 1 that the agricultural and natural resources grouping of industries generated about 77 percent of total output and 26 percent of employment in the county. For this grouping of sectors, phosphatic fertilizer manufacturing makes up about 96 percent of output and about 79 percent of employment for the larger group. This clearly reflects the dominant role of the phosphate industry in the county.

Overall, the data in Table 1 reflect an economy that is highly concentrated in relatively few activities. Phosphate combined with public employment (education and government) together with health care accounts for around two-thirds of total employment. Other types of manufacturing and service activities make up a much smaller portion of the county economy. Again, the absence of a larger group of service sectors would suggest that a large portion of local spending is lost to the county economy as local businesses and households shop elsewhere for goods and services.

Hamilton County-Regional Comparisons

To allow comparisons between Hamilton County and the surrounding area, Table 3 presents the same data for the county as in Table 1 along with the similar set of data for the seven-county region (Hamilton, Madison, Suwannee, and Columbia Counties in Florida, and Brooks, Lowndes, and Echols Counties in Georgia). Column 1 presents output (gross sales) data for Hamilton County while column 2 reflects each sector of the seven-county region. The final column of the table shows each sector grouping in Hamilton County as a percentage of the total for the same sector grouping in the region. Table 4 is set up the same as Table 3 using employment data for the county and region.

Using either output or employment measures, the key differences between the region and the county economy is the less dominant role of the public sectors and the agricultural and natural resource sectors at the regional level when compared to the county. Further, the regional economy is more diversified with more employment and output in the manufacturing and service sectors.

The latter difference noted above is particularly important to the question of economic development and the impact of new business activities. It is the service sectors of a local economy that serve to circulate new money within the local area. The lack of an adequate service sector implies that the local multiplier effects of new activity are going to be relatively low. In other words, when new activity is generated at the county level, much of the additional spending “leaks” out of the local area as local residents and businesses commute to surrounding counties to purchase goods and services.

Concluding Comments

As noted earlier, the *Implan* models developed for Hamilton County and the seven-county region are available to support local economic development activities. Using the existing models, faculty with the Economic Impact Group can estimate the total impact of actual or proposed changes in any sector of the local or regional economy. Multiplier effects can be expressed in terms of output (sales), employment, or value added. In each case, the multiplier calculated using *Implan* reflects the total impact in the local economy of a change (increase or decrease) in a particular economic sector. Further, the models can provide information beyond the absolute size of impacts by identifying components of a local economy most likely to be affected by changes in particular industries.

Information from impact models is often used by local officials in assessing the importance of a local industry for purposes of debating economic incentive programs for new businesses, to support requests for assistance related to the loss of a local business, or as a part of educational programs to help local residents understand the local economy.

Using the *Implan* models requires local input on the type of business activity being considered and the level of the output or employment change. In the case of new government facilities, health care facilities, or tourism related activities, information would be required on the level and types of expenditures that would take place in the local area.

Table 1: Economic Data, Hamilton County, 2006

Industry Groups	Sum of Industry Output ($M)	Sum of Employment (Jobs)	Sum of Total Value Added ($M)	Sum of Total Exports ($M)
Agriculture, Natural Resources, Related Manufacturing & Services	810.40	1116	86.85	693.41
Construction	16.42	176	4.58	0.00
Consumer Services	12.37	172	5.27	4.56
Education	23.94	707	23.79	1.38
Government	50.45	661	43.42	0.00
Health Care	29.37	343	18.30	16.07
Information and Communications	3.45	38	1.96	0.08
Manufacturing	0.47	4	0.18	0.14
Miscellaneous Residual Accounts	-0.31	0	-0.31	4.17
Private Households	23.91	104	21.46	0.55
Professional and Technical Services	7.66	66	5.08	0.67
Real Estate and Financial Services	3.47	41	2.27	0.98
Retail Trade	15.07	304	9.22	2.39
Social Services & Organizations	9.93	158	5.55	8.02
Transportation	17.85	171	9.63	4.11
Travel, Food and Entertainment Services	10.65	169	6.46	5.44
Utilities	4.56	11	2.96	0.81
Wholesale Trade	1.45	11	0.98	0.08
Grand Total	**1041.12**	**4252**	**247.63**	**742.88**

Source: IMPLAN Professional Data, Minnesota IMPLAN group Inc., Stillwater, Minnesota 55082

Table 2: Economic Data, Hamilton County Agricultural and Natural Resource Industries, 2006

Agriculture and Natural Resources Industry	Sum of Industry Output ($M)	Sum of Employment (Jobs)	Sum of Total Value Added ($M)	Sum of Total Exports ($M)
Agricultural Inputs & Services (fertilizers, pesticides, veterinary, support activities, equipment manufacturing) (Total)	**778.48**	**911**	**75.69**	**664.59**
Agriculture and forestry support activities	0.22	10	0.13	0.00
Phosphatic fertilizer manufacturing	777.62	890	75.38	664.59
Veterinary services	0.64	11	0.17	0.00
Environmental Horticulture (nursery/greenhouse/landscape services) (Total)	**1.29**	**10**	**1.03**	**0.30**
Greenhouse and nursery production	0.61	7	0.49	0.29
Landscape Services	0.67	3	0.53	0.00
Forestry, Wood & Paper Product Manufacturing (Total)	**11.67**	**27**	**2.43**	**12.38**
Forest nurseries- forest products- and timber	8.82	14	1.83	10.43
Logging	2.85	13	0.60	1.94
Fruit & Vegetable Farming & Processing (Total)	**4.34**	**44**	**2.72**	**3.76**
Fruit farming	0.59	12	0.30	0.45
Vegetable and melon farming	3.76	32	2.42	3.31
Grain & Oilseed Farming & Processing (Total)	**0.73**	**15**	**0.36**	**0.70**
Grain farming	0.67	14	0.32	0.64
Oilseed farming	0.06	1	0.03	0.06
Livestock & Dairy Farming & Animal Products Manufacturing (Total)	**10.48**	**67**	**2.69**	**9.29**
Animal production- except cattle and poultry	2.40	8	0.29	2.21
Cattle ranching and farming	3.49	46	0.35	2.81
Poultry and egg production	4.59	13	2.05	4.28
Mining (Total)	**0.00**	**0**	**0.00**	**0.00**
Other Crop Farming (Total)	**1.00**	**7**	**0.50**	**0.21**
All other crop farming	0.83	6	0.42	0.05
Cotton farming	0.17	1	0.07	0.16
Other Food Product Manufacturing (Total)	**0.00**	**0**	**0.00**	**0.00**
Sugarcane Farming, Refined Sugar & Confections (Total)	**0.00**	**0**	**0.00**	**0.00**
Tobacco Farming & Manufacturing (Total)	**1.46**	**26**	**1.33**	**1.40**
Tobacco farming	1.46	26	1.33	1.40
Wildlife (hunting) (Total)	**0.97**	**9**	**0.12**	**0.79**
Hunting and trapping	0.97	9	0.12	0.79
Grand Total	**810.40**	**1,115.80**	**86.85**	**693.41**

Source: IMPLAN Professional Data, Minnesota IMPLAN group Inc., Stillwater, Minnesota 55082

Table 3: Economic Data, Hamilton County & North Florida−South Georgia Region*, Output by Industry Group, 2006

Industry Groups	Industry Output for Hamilton CO.($M)	Percentage of Total For Hamilton CO.	Industry Output for N.FL S.GA Region($M)	Percentage of Total for N.FL S.GA Region	Hamilton CO. Output as percentage of the Region
Agriculture, Natural Resources, Related Manufacturing & Services	810.40	77.84%	3,986.27	30.34%	20.33%
Construction	16.42	1.58%	751.22	5.72%	2.19%
Consumer Services	12.37	1.19%	428.13	3.26%	2.89%
Education	23.94	2.30%	603.28	4.59%	3.97%
Government	50.45	4.85%	917.06	6.98%	5.50%
Health Care	29.37	2.82%	759.49	5.78%	3.87%
Information and Communications	3.45	0.33%	279.81	2.13%	1.23%
Manufacturing	0.47	0.05%	1,065.91	8.11%	0.04%
Miscellaneous Residual Accounts	-0.31	-0.03%	-8.60	-0.07%	3.62%
Private Households	23.91	2.30%	624.88	4.76%	3.83%
Professional and Technical Services	7.66	0.74%	574.79	4.37%	1.33%
Real Estate and Financial Services	3.47	0.33%	548.31	4.17%	0.63%
Retail Trade	15.07	1.45%	990.93	7.54%	1.52%
Social Services & Organizations	9.93	0.95%	139.49	1.06%	7.12%
Transportation	17.85	1.71%	491.87	3.74%	3.63%
Travel, Food and Entertainment Services	10.65	1.02%	495.67	3.77%	2.15%
Utilities	4.56	0.44%	131.72	1.00%	3.46%
Wholesale Trade	1.45	0.14%	358.68	2.73%	0.41%
Grand Total	**1041.12**	100.00%	**13,138.92**	100.00%	7.92%

Source: IMPLAN Professional Data, Minnesota IMPLAN group Inc., Stillwater, Minnesota 55082

* Region consist of Brooks, Echols, and Lowndes Counties in Georgia, and Columbia, Hamilton, Madison, and Suwannee Counties in Florida

Table 4: Economic Data, Hamilton County & North Florida−South Georgia Region*, Employment by Industry Group, 2006

Industry Groups	Employment for Hamilton CO. (Jobs)	Percentage of Total for Hamilton CO. (Jobs)	Employment for N.FL-S.GA Region (Jobs)	Percentage of Total for N.FL-S.GA Region (Jobs)	Hamilton CO. Employment as percentage of the Region (Jobs)
Agriculture, Natural Resources, Related Manufacturing & Services	1116	26.24%	13,300	11.52%	8.39%
Construction	176	4.14%	6,943	6.01%	2.53%
Consumer Services	172	4.05%	4,164	3.61%	4.13%
Education	707	16.63%	14,786	12.80%	4.78%
Government	661	15.55%	10,403	9.01%	6.35%
Health Care	343	8.07%	9,277	8.03%	3.70%
Information and Communications	38	0.89%	1,651	1.43%	2.30%
Manufacturing	4	0.09%	4,801	4.16%	0.08%
Miscellaneous Residual Accounts	0		0		
Private Households	104	2.45%	2,134	1.85%	4.87%
Professional and Technical Services	66	1.56%	7,341	6.36%	0.90%
Real Estate and Financial Services	41	0.96%	3,428	2.97%	1.20%
Retail Trade	304	7.15%	15,077	13.05%	2.02%
Social Services & Organizations	158	3.72%	2,919	2.53%	5.41%
Transportation	171	4.02%	4,886	4.23%	3.50%
Travel, Food and Entertainment Services	169	3.97%	10,774	9.33%	1.57%
Utilities	11	0.26%	360	0.31%	3.06%
Wholesale Trade	11	0.26%	3,245	2.81%	0.34%
Grand Total	**4252**	100.00%	**115,489**	100.00%	3.68%

Source: IMPLAN Professional Data, Minnesota IMPLAN group Inc., Stillwater, Minnesota 55082

* Region consist of Brooks, Echols, and Lowndes Counties in Georgia, and
Columbia, Hamilton, Madison, and Suwannee Counties in Florida

APPENDIX A

Hamilton County Economic Data by Sector, 2006

Sector #	Sector	Industry Output ($M)	Employment (Jobs)
1	Oilseed farming	0.06	1
2	Grain farming	0.67	14
3	Vegetable and melon farming	3.76	32
5	Fruit farming	0.59	12
6	Greenhouse and nursery production	0.61	7
7	Tobacco farming	1.46	26
8	Cotton farming	0.17	1
10	All other crop farming	0.83	6
11	Cattle ranching and farming	3.49	46
12	Poultry and egg production	4.59	13
13	Animal production, except cattle and poultry	2.40	8
14	Logging	2.85	13
15	Forest nurseries, forest products, and timber	8.82	14
17	Hunting and trapping	0.97	9
18	Agriculture and forestry support activities	0.22	10
30	Power generation and supply	2.55	6
31	Natural gas distribution	0.43	1
33	New residential one-unit structures (all)	7.40	61
34	New multifamily housing structures (all)	1.60	20
35	New residential additions and alterations (all)	1.11	8
37	Manufacturing and industrial buildings	0.21	3
38	Commercial and institutional buildings	2.60	38
39	Highway, street, bridge, and tunnel construct	0.54	7
40	Water, sewer, and pipeline construction	0.39	4
41	Other new construction	1.20	19
42	Maintenance and repair of farm and nonfarm residential structures	0.35	3
43	Maintenance and repair of nonresidential buildings	0.78	8
44	Maintenance and repair of highways and streets	0.11	2
45	Other maintenance and repair construction	0.14	3
157	Phosphatic fertilizer manufacturing	777.62	890
243	Machine shops	0.33	3
390	Wholesale trade	1.45	11
392	Rail transportation	1.07	6
394	Truck transportation	10.11	91
397	Scenic and sightseeing trans and support activities for transportation	4.93	37
398	Postal service	1.30	25
399	Couriers and messengers	0.09	6

Sector #	Sector	Industry Output ($M)	Employment (Jobs)
401	Motor vehicle and parts dealers	1.42	17
402	Furniture and home furnishings stores	0.30	4
403	Electronics and appliance stores	0.02	1
404	Building material and garden supply stores	2.19	35
405	Food and beverage stores	3.97	90
406	Health and personal care stores	0.95	17
407	Gasoline stations	4.27	77
408	Clothing and clothing accessories stores	0.05	2
409	Sporting goods, hobby, book, and music stores	0.05	3
410	General merchandise stores	1.33	31
411	Miscellaneous store retailers	0.52	27
412	Nonstore retailers	1.37	31
420	Radio and television broadcasting	0.11	1
422	Telecommunications	1.98	6
425	Nondepository credit intermediation and related activities	0.27	3
426	Securities, commodity contracts, and investments	0.48	6
428	Insurance agencies, brokerages, and related	0.96	21
430	Monetary authorities and depository credit intermediation	1.01	7
431	Real estate	0.75	4
434	Machinery and equipment rental and leasing	0.23	1
435	General and consumer goods rental, except video tapes and discs	0.21	4
437	Legal services	0.90	10
438	Accounting and bookkeeping services	1.01	14
439	Architectural and engineering services	0.07	1
444	Management consulting services	0.09	1
446	Scientific research and development services	0.08	1
447	Advertising and related services	0.35	4
449	Veterinary services	0.64	11
452	Office administrative services	0.41	1
453	Facilities support services	0.25	1
454	Employment services	2.80	18
455	Business support services	0.27	1
458	Services to buildings and dwellings	0.96	4
461	Elementary and secondary schools	0.20	11
465	Offices of physicians, dentists, and other health providers	2.67	37
466	Other ambulatory health care services	1.35	11
467	Hospitals	14.61	114
468	Nursing and residential care facilities	10.73	181
469	Child day care services	1.28	24
470	Social assistance, except child daycare services	3.75	80
474	Promoters of performing arts and sports, and agents	5.51	75

Sector #	Sector	Industry Output ($M)	Employment (Jobs)
478	Other amusement, gambling, and recreation industries	0.27	4
479	Hotels and motels, including casino hotels	2.51	32
480	Other accommodations	0.12	1
481	Food services and drinking places	2.24	57
483	Automotive repair and maintenance, except car	2.29	35
485	Commercial machinery repair and maintenance	1.14	13
486	Household goods repair and maintenance	6.25	44
487	Personal care services	1.25	36
488	Death care services	0.26	6
489	Dry cleaning and laundry services	0.59	22
491	Religious organizations	5.49	59
493	Civic, social, professional, and similar organizations	0.69	19
494	Private households	1.02	104
497	State and local government passenger transit	0.36	6
498	State and local government electric utilities	1.59	4
499	Other State and local government enterprises	10.23	55
503	State and local education	23.73	696
504	State and local non-education	38.06	573
505	Federal military	1.36	26
506	Federal non-military	0.80	7
508	Inventory valuation adjustment	-0.31	0
509	Owner-occupied dwellings	22.90	0
458a	Landscape services (70% of service to buildings)	0.67	3
458b	Non-landscape services (70% of service to buildings)	0.29	1

Source: IMPLAN Professional Data, Minnesota IMPLAN group Inc., Stillwater, Minnesota 55082

APPENDIX B

Glossary of Economic Impact Terms

Terms are presented in groups within a logical rather than alphabetical order

Region defines the geographic area for which impacts are estimated. Regions are generally an aggregation of one or more counties. This analysis includes estimates for individual states of the U.S.

Sector is a grouping of industries that produce similar products or services. Most economic reporting and models in the U.S. are based on the Standard Industrial Classification system (SIC code) or the North American Industrial Classification System (NAICS).

Impact analysis estimates the impact of a change in output or employment resulting from a change in final demand to households, governments or exports.

Input-output (I-O) model. An input-output model is a representation of the flows of economic activity between industry sectors within a region. The model captures what each business or sector must purchase from every other sector in order to produce its output of goods or services. Using such a model, flows of economic activity associated with any change in spending may be traced either forwards (e.g., spending generates employee wages which induces further spending) or backwards (e.g., purchases of plants that leads growers to purchase additional inputs -- fertilizers, containers, etc.). Multipliers for a region may be derived from an input-output model of the region's economy.

IMPLAN is a micro-computer-based input output modeling system and Social Accounting Matrix (SAM). With IMPLAN, one can estimate I-O models of up to 528 sectors for any region consisting of one or more counties. IMPLAN includes procedures for generating multipliers and estimating impacts by applying final demand changes to the model. The current version of the software is *IMPLAN Pro* 2.0.

Final demand is the term for sales to final consumers (households or government). Sales between industries are termed **intermediate sales**. Economic impact analysis generally estimates the regional economic impacts of final demand changes.

Direct effects are the changes in economic activity during the first round of spending. **Secondary effects** are the changes in economic activity from subsequent rounds of re-spending. There are two types of secondary effects: **Indirect effects** are the changes in sales, income or employment within the region in backward-linked industries supplying goods and services to businesses. For example, the increased sales in input supply firms resulting from more nursery industry sales is an indirect effect. **Induced effects** are the increased sales within the region from household spending of the income earned in the Green Industry and supporting industries. Employees in the Green Industry and supporting industries spend the income they earn on

housing, utilities, groceries, and other consumer goods and services. This generates sales, income and employment throughout the region's economy. **Total effects** are the sum of direct, indirect and induced effects.

Multipliers capture the size of the secondary effects in a given region, generally as a ratio of the total change in economic activity in the region relative to the direct change**.** Multipliers may be expressed as ratios of sales, income or employment, or as ratios of total income or employment changes relative to direct sales. Multipliers express the degree of interdependency between sectors in a region's economy and therefore vary considerably across regions and sectors. **Type I** multipliers include only direct and indirect effects. **Type II** multipliers also include induced effects. **Type SAM** multipliers used by IMPLAN additionally account for capital investments and transfer payments such as welfare and retirement income. A **sector-specific multiplier** gives the total changes to the economy associated with a unit change in output or employment in a given sector**. Aggregate multipliers** sum multiplier effects across many sectors with a single number. They are based on an assumed distribution of spending across these economic sectors, i.e., a weighted average of sector specific multipliers with the percentage of spending in each sector as the weighting factor.

Purchaser prices are the prices paid by the final consumer of a good or service. **Producer prices** are the prices of goods at the factory or production point. For manufactured goods the purchaser price equals the producer price plus a retail margin, a wholesale margin, and a transportation margin. For services, the producer and purchaser prices are equivalent.

Margins. The retail, wholesale and transportation margins are the portions of the purchaser price accruing to the retailer, wholesaler, and grower, respectively. Only the retail margins of many goods purchased by consumers accrue to the local region, as the wholesaler, shipper, and manufacturer often lie outside the local area.

Measures of economic activity. Sales or output is the dollar volume of a good or service produced or sold. **Final demand** is sales to final consumers, including households, governments, and exports. **Intermediate sales** are sales to other industrial sectors. **Income** is the money earned within the region from production and sales. Total income includes personal income (wage and salary income, including income of sole proprietor's profits and rents). **Jobs** or employment is a measure of the number of jobs required to produce a given volume of sales/production, usually expressed as full time equivalents, or as the total number including part time and seasonal positions. **Value added** is the sum of total income and indirect business taxes. Value added is the most commonly used measure of the contribution of a region to the national economy, as it avoids double counting of intermediate sales and captures only the "value added" by the region to final products.