THE ECONOMIC IMPACT OF AGRICULTURE AND OTHER INDUSTRIES IN TEXAS

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What is the economic impact of different types of businesses and industries on the economy of Texas? What type of new plant or enterprise will create the greatest amount of new output and income within the state? How does the economic effect of a change in demand for agricultural products and processing compare with manufacturing, mining and services?

Decision-makers concerned with the development of agriculture and other sectors of Texas economy frequently ask these questions. To answer them, one must measure not only the direct or initial effect of a change in the economy but also all secondary effects and repercussions resulting from the initial change. In economic terms, this kind of measure is called the "multiplier effect."

The Multiplier Concept

Industrial activity can be classified into three broad categories: primary, processing and service industries.

Farming, mining and forestry are classified as primary industries because they are tied directly to natural resources. Secondary or processing industries use raw materials from primary industries in their manufacturing operations. These secondary industries include petroleum refining, plastic molding, meat packing, dairy processing and others.

A third category—service industries—produce to meet the needs of primary and processing industries and their employees. These industries include wholesale and retail stores, transportation, insurance, finance and communications.

An understanding of the three kinds of industries assists in understanding the economic

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multiplier concept. Economic activity in the primary and processing industries tends to have repercussions in other primary and processing industries as well as in service industries. Therefore, a unit of primary and secondary economic activity usually tends to have a greater impact on total output in the economy than a unit of service industry activity.

Three types of multipliers are often considered in comparing industries. They are output, employment and income multipliers. Each is related to changes in final consumer demand, such as an increase in household consumption, exports from the state or government purchases.

An output multiplier indicates the total dollar change in output generated in the economy from a $1 change in the final demand for the product of a particular industry. To illustrate this concept, suppose there is an increase in the out-of-state (export) demand for Texas-processed meat products. To meet this demand, Texas meat processors increase their output of processed meat. This is the direct effect. But to produce more meat requires increased production of Texas livestock, plus more feed, fertilizer, agricultural chemicals, services and other inputs. These comprise the secondary output effects of the initial change and continue in chain reaction until virtually all segments of the Texas economy are affected. The total change in output in the entire economy resulting from a $1 increase in final demand in a particular industry is summarized in the output multiplier.

As output increases, additional employees are required in the production, processing and services industries. An employment multiplier may then be estimated to express the total change in employment resulting from this one-unit change in employment in a particular industry.

Similarly, an increase in output and employment causes an increase in income. The total change in income resulting from a $1 change in income of a particular industry is measured by the income multiplier.

In the highly complex and interrelated Texas economy, these multipliers provide tools to measure the impact of a change in the demand for products in one industry on the entire economy. A recent research study provides estimates of output, employment and income multipliers that may be used by private and public decision-makers in fostering the future growth and development of the Texas economy.[1] This fact sheet summarizes major findings of the study.

[1]Jones, Lonnie L. and Gholam Mustafa, **The Structure of the Texas Economy, Emphasis on Agriculture**, Bulletin 1121, The Texas Agricultural Experiment Station, Texas A&M University, College Station, Texas.

Multipliers by Economy Sectors

The state's economy can be classified or divided in many ways. For purposes of the study, it was divided into 31 major industries, which are shown with each industry's economic multiplier in Table 1.

Agriculture and its processing sectors, which significantly influence the economy, are closely interrelated with other sectors of the general economy. Their output, income and employment multipliers were among the largest of the 31 sector multipliers computed in the study. The meat products output multiplier of 2.82 was the largest, followed by the poultry and eggs sector and meat animals sector with multipliers of 2.46 and 2.36, respectively. These output multipliers indicate the total change in output in the economy that is required to meet a $1 increase in final demand for each of the given sectors.

Table 1. Output, Employment and Income Multipliers by Sectors, Texas Economy

Type and Name of Sector	Output Multiplier	Rank	Employment Multiplier	Rank	Income Multiplier	Rank
Agricultural Product Producing Sectors						
1. Dairy farm products	2.04	7	1.80	14	2.56	8
2. Poultry and eggs	2.46	2	2.57	9	4.36	2
3. Meat animals and other livestock products	2.36	3	2.37	10	3.25	6
4. Cotton	1.83	10	1.54	18	1.83	12
5. Food, feed grains and grass seeds	1.77	12	1.27	23	1.73	13
6. Fruit and tree nuts	1.45	24	1.11	26	1.30	28
7. Vegetables and other crops	1.53	18	1.16	25	1.39	26
8. Oil bearing crops	1.75	13	1.27	23	1.67	14
9. Farm forest, greenhouse and nursery	1.32	28	1.08	28	1.22	30
10. Forestry and fishery products	1.50	20	3.95	6	1.39	26
Agricultural Product Processing Sectors						
11. Meat products	2.82	1	8.57	1	5.29	1
12. Dairy products	1.85	9	3.77	7	2.76	7
13. Canning, freezing and dehydrating	1.66	15	1.52	19	2.26	9
14. Grain mill products	2.25	5	4.94	5	4.07	4
15. Fats and oil mills	2.18	4	7.19	3	4.20	3
16. Textiles, apparel and fabrics	1.37	26	1.09	27	1.58	20
17. Agricultural, forestry and fishery services	1.78	11	1.70	16	2.08	11
18. Other agricultural processing	1.53	18	6.48	4	1.53	23
Other Industrial Sectors						
19. Mining	1.48	22	1.79	15	1.44	24
20. Construction	1.54	17	1.98	12	1.66	15
21. Lumber and wood products	1.51	19	1.35	22	1.65	16
22. Chemicals and fertilizer	1.94	8	3.20	8	2.09	10
23. Petroleum refining and related industries	2.12	6	7.67	2	3.40	5
24. Farm machinery	1.47	23	1.45	20	1.63	18
25. Other manufacturing	1.50	20	1.52	19	1.61	19
26. Transportation and warehousing services	1.49	21	1.55	17	1.42	25
27. Communications (radio, television, etc.) and utility (electric, gas and sanitary) services	1.59	16	1.99	11	1.57	21
28. Wholesale and retail trade	1.35	27	1.16	25	1.27	29
29. Finance, insurance and real estate	1.43	25	1.84	13	1.35	27
30. Other services	1.54	17	1.40	21	1.54	22
31. Government enterprises	1.66	14	1.22	24	1.64	17

The multipliers are large, relative to those of other sectors, because they are closely linked with sources of input supplies and resources within the state. For example, the meat products sector depends directly on livestock and poultry producers for supplies of slaughter animals. These producers, in turn, demand large quantities of feed grains and other productive inputs from agricultural supply and other sectors.

Income and employment multipliers were also large for agricultural sectors. Meat products, poultry and eggs and fats and oil mills sectors had the largest income multipliers of all sectors. It was estimated, for instance, that if the meat products sector sufficiently expanded its sales to final demand and that if one additional dollar was paid in wages, salaries and other income, then the total effect on the Texas economy would equal a $5.29 rise in total income.

Other agricultural and related processing sectors had relatively large income multipliers, as did certain manufacturing sectors. The largest manufacturing income multiplier was 3.40 in the petroleum refining sector.

Employment multipliers were highest in the meat products, petroleum refining and fats and oil mills sectors of the Texas economy. The creation of one new man-year of employment in either of these sectors, resulting from increased output, would have a significant impact on total employment in the general economy. This again reflects the relatively close relationship and high demand for resources located within the state.

Use of Economic Multipliers

The initiation of economic development strategies that maximize the total effects on output, income and employment in the state's economy would seem an appropriate development goal. The estimated multipliers shown in Table 1 provide a comparative analysis of the economy in this respect. As general guidelines, these multipliers may be used in conjunction with other economic and social development planning factors, such as resource availability, environmental factors and capital and labor requirements, to select industrial sectors that should receive emphasis in achieving development goals.

For example, if the development goal is to make a currently underemployed labor force (made up of semi-skilled laborers) productive, resource development funds would be better spent in the agricultural processing sector rather than the finance sector. Employment and output multipliers give some indication of how much more fruitful any developmental activities in one sector would be when compared with another.

Additional information regarding the interpretation and application of these multipliers to problem solving and decision making can be secured from the Extension resource development economist or your local county agricultural agent.

Results reported here are based on a statewide study. Regional multipliers provide more specific coefficients for interested decision makers. (See references.)

References

Texas Agricultural Experiment Station Publication B-1121, *Structure of the Texas Economy: Emphasis on Agriculture.*

The following publications are available from the Office of the Governor, Division of Planning Coordination.

An Input-Output Model of the Upper Rio Grande Region of Texas
An Input-Output Model of the High Plains Region of Texas
An Input-Output Model of the Low Rolling Plains Region of Texas
An Input-Output Model of the North Central Region of Texas
An Input-Output Model of the Northeast Region of Texas
An Input-Output Model of the South Central Region of Texas
An Input-Output Model of the Lower Rio Grande Region of Texas
An Input-Output Model of the Houston Region of Texas
An Input-Output Model of the Southeast Region of Texas