

**The Role of Agriculture in the Oregon Economy – A Study Based on
IMPLAN Estimates**

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The purpose of this paper is to study the role of the food-related sectors in the Oregon economy in terms of employment and employee compensation, and the supply and demand of Oregon agricultural commodities and processed foods. The IMPLAN¹ database provides estimates of supply, demand, exports and imports (both domestic and foreign), employee compensation, employment etc., for each sector of the Oregon economy. This paper presents IMPLAN estimates (for 2000) of these economic indicators for the state. A detailed study of IMPLAN estimates can provide valuable insights into the functioning of the Oregon food sector. The output and employment multipliers for the state are also presented in this study. Individuals who want to carry out economic impact analysis of the agricultural and food sectors in Oregon are welcome to use these multipliers.

Oregon employment and employee compensation in the food-related sectors

Table 1 presents Oregon employment, employee compensation that is the wage bill and average wage by sector for the year 2000. The employment estimates represent full and part time jobs. Employee compensation includes employer paid labor benefits such as health insurance in jobs where those benefits are paid.

The farming sector², for example, employed 55,637 individuals and accounted for approximately 2.613 percent of the total state employment. The total wage bill for the sector was about \$410.06 million dollars, which is about 0.629 percent of the total wage bill for the state economy. The average wage for farming was about \$7,370.

Among the food-related sectors, 'eating and drinking' accounted for the largest number of jobs; the amount is 116,204 followed by 'food stores' (44,027) and 'food processing' (24,600). For the Food-related sectors, the average wage (\$31,954) was highest for 'food processing'.

Table 1 further reveals that 'farming' and 'food processing' directly accounted for 80,237 jobs (3.77 percent of total state employment), while adding 'greenhouse and nursery products', 'commercial fishing', 'agricultural services', 'landscape and horticultural services'³, 'food stores' and 'eating and drinking' accounted for 283,236 jobs (13 percent of total state employment). The table reveals the importance of 'food-related retail trade' and 'eating and drinking' in generating employment in the state economy. The average wage for the food-related sectors (except food processing) is considerably below the state average of \$30,610, particularly for farming, commercial fishing and Agricultural-forest-fishery services the average wage is quite low. One

reason for the low wages in these sectors is due to the seasonal nature of employment and the importance of part time jobs.

Table 1: Oregon Employment, employee compensation and average wage by sector

Sec tor No.	Sector	Employment	Percentage of Total State employment	Employee Compensat ion (\$m)	Percentage of Total employee Compensation	Average Wage (\$)
1	Farms	55,637	2.613	410.06	0.629	7370
23	Greenhouse and Nursery Products	8,949	0.420	239.25	0.367	26735
24	Forestry Products	7,927	0.372	114.91	0.176	14495
25	Commercial Fishing	3,432	0.161	24.27	0.037	7070
26	Agricultural- Forestry- Fishery Services	17,097	0.803	118.93	0.182	6956
27	Landscape and Horticultural Services	13,527	0.635	135.41	0.208	10011
28	Metal mining	330	0.015	1.80	0.003	5446
38	Oil mining	409	0.019	0.50	0.001	1225
40	Non-metal mining	2,026	0.095	80.76	0.124	39859
48	Construction	138,912	6.524	4,478.99	6.873	32243
58	Food processing	24,600	1.155	786.06	1.206	31954
108	Textiles	963	0.045	34.84	0.053	36178
124	Apparel	3,734	0.175	67.69	0.104	18128
133	Wood products	53,357	2.506	2,071.87	3.179	38831
148	Furniture	5,126	0.241	145.74	0.224	28433
161	Pulp and paper	7,857	0.369	489.19	0.751	62261
174	Printing and publishing	19,202	0.902	714.23	1.096	37196
186	Chemicals and allied	3,587	0.168	194.96	0.299	54352
210	Petroleum products	417	0.020	20.26	0.031	48592
215	Rubber products	6,882	0.323	259.54	0.398	37713
221	Leather products	416	0.020	12.28	0.019	29521
230	Stone, glass and clay	6,232	0.293	247.33	0.380	39687
254	Primary metals	11,259	0.529	627.68	0.963	55747
273	Fabricated metal	16,515	0.776	637.34	0.978	38591
307	Industrial machinery	21,508	1.010	1,196.47	1.836	55630
355	Electrical equipment	39,358	1.849	3,815.68	5.855	96947
384	Transportation equipment	20,135	0.946	998.54	1.532	49592
400	Scientific instruments	10,413	0.489	789.78	1.212	75847
415	Miscellaneous mfg	6,344	0.298	153.10	0.235	24133
433	Railroads and Related Services	2,622	0.123	212.04	0.325	80867
434	Local- Interurban Passenger Transit	6,084	0.286	118.67	0.182	19505
435	Motor Freight Transport and Warehousing	33,998	1.597	1,075.78	1.651	31643

436	Water Transportation	2,776	0.130	152.88	0.235	55073
437	Air Transportation	12,592	0.591	510.49	0.783	40541
438	Pipe Lines- Except Natural Gas	21	0.001	1.05	0.002	49922
439	Transportation Services	6,580	0.309	201.73	0.310	30658
441	Communications	14,819	0.696	849.18	1.303	57303
443	Utilities	7,956	0.374	656.81	1.008	82556
447	Wholesale Trade	101,384	4.762	5,012.79	7.692	49444
448	Retail Trade	200,761	9.429	4,065.24	6.238	20249
450	Food Stores	44,027	2.068	1,011.91	1.553	22984
454	Eating & Drinking	116,204	5.458	1,569.43	2.408	13506
456	Banking	22,321	1.048	846.81	1.299	37938
457	Credit Agencies	24,969	1.173	546.98	0.839	21906
458	Security and Commodity Brokers	6,033	0.283	502.97	0.772	83369
459	Insurance Carriers	17,108	0.804	879.59	1.350	51414
460	Insurance Agents and Brokers	17,563	0.825	456.03	0.700	25965
461	Real estate	59,131	2.777	574.20	0.881	9711
463	Hotels and Lodging Places	26,609	1.250	441.83	0.678	16605
464	Personal services	34,150	1.604	304.32	0.467	8911
469	Business services	135,334	6.356	3,796.14	5.825	28050
477	Automotive services	22,859	1.074	493.64	0.757	21595
480	Repair services	9,413	0.442	139.90	0.215	14863
483	Motion Pictures	8,896	0.418	175.22	0.269	19697
484	Recreation services	44,955	2.111	552.12	0.847	12282
490	Health services	136,690	6.420	4,892.02	7.506	35789
494	Legal Services	16,447	0.772	619.40	0.950	37660
495	Education services	36,932	1.735	585.33	0.898	15849
498	Social services	46,764	2.196	971.78	1.491	20781
502	Non-profit organizations	42,093	1.977	647.17	0.993	15375
506	Professional services	75,792	3.560	1,607.46	2.466	21209
510	State & local non-ed government	100,530	4.722	4,564.80	7.004	45407
513	Federal non-military	41,224	1.936	2,142.74	3.288	51978
516	Special sectors	0	0.000	0.00	0.000	0
519	Federal Government - Military	12,914	0.607	291.58	0.447	22579
522	State & Local Government - Education	121,749	5.718	4,718.94	7.241	38760
525	Domestic Services	12,676	0.595	115.44	0.177	9107
Total		2,129,127	100.000	65,171.90	100.000	30610

Table 2 presents Oregon employment, employee compensation and average wage for the food-related sectors in maximum sector detail. The food-related sectors directly accounted for approximately 12.92 percent of the total state employment, and approximately 6.54 percent of the total state wage bill. The average wage for the food-related sectors was approximately \$15,502. The average wage for the non-food sectors was about \$32,850, while the average wage for the state as a whole was about \$30,610. Among Food sectors, the average wage for the ‘food processing’ sectors (Sectors 58 – 103) is higher than the average wage for the ‘farming sectors’ (Sector 1 –

20) in most cases. Among the ‘farming’ sectors, the highest employment is in ‘grass-seeds,’ followed by ‘hay and pasture’ and ‘fruits’. The highest average wage is in ‘vegetables,’ followed by ‘tree and nuts’ and ‘cattle feedlots’. Among the ‘food processing’ sectors, the highest employment is in ‘frozen fruits, juices and vegetables’, followed by ‘bread, cake and related products’. The highest average wage is in ‘flavoring extract and syrups’ followed by ‘soybean oil mills.’

Table2: Oregon State, employee compensation and average wage for Food related Sector (2002)

Sect or No.	Sector	State Employment	Percentage of Total State Employment	Employee compensation (\$m)	Percentage of Employee Compensation	Average Wage (\$m)
1	Dairy Farm Products	1,291	0.06	30.15	0.046	23355
2	Poultry and Eggs	374	0.02	8.48	0.013	22672
3	Ranch Fed Cattle	3,760	0.18	36.51	0.056	9711
4	Range Fed Cattle	2,393	0.11	25.63	0.039	10709
5	Cattle Feedlots	403	0.02	11.48	0.018	28497
6	Sheep- Lambs and Goats	543	0.03	1.12	0.002	2071
7	Hogs- Pigs and Swine	79	0.00	0.62	0.001	7833
8	Other Meat Animal Products	31	0.00	0.19	0.000	6339
9	Miscellaneous Livestock	1,563	0.07	9.67	0.015	6187
11	Food Grains	2,275	0.11	8.86	0.014	3894
12	Feed Grains	317	0.01	2.04	0.003	6435
13	Hay and Pasture	10,408	0.49	21.89	0.034	2104
14	Grass Seeds	13,585	0.64	12.23	0.019	900
15	Tobacco	0	0.00	0.00	0.000	0
16	Fruits	5,143	0.24	93.70	0.144	18218
17	Tree Nuts	241	0.01	7.43	0.011	30866
18	Vegetables	2,494	0.12	97.64	0.150	39150
19	Sugar Crops	226	0.01	1.17	0.002	5164
20	Miscellaneous Crops	2,040	0.10	8.94	0.014	4381
23	Greenhouse and Nursery Products	8,949	0.42	239.25	0.367	26735
25	Commercial Fishing	3,432	0.16	24.27	0.037	7070
26	Agricultural- Forestry- Fishery Ser.	17,097	0.80	118.93	0.182	6956
27	Landscape and Horticultural Services	13,527	0.64	135.41	0.208	10011
58	Meat Packing Plants	339	0.02	9.95	0.015	29359
59	Sausages and Other Prepared Meats	965	0.05	26.01	0.040	26954
60	Poultry Processing	560	0.03	16.86	0.026	30114
61	Creamery Butter	59	0.00	2.74	0.004	46365
62	Cheese- Natural and Processed	450	0.02	14.51	0.022	32237
63	Condensed and Evaporated Milk	22	0.00	1.24	0.002	56310
64	Ice Cream and Frozen Desserts	199	0.01	8.00	0.012	40182
65	Fluid Milk	1,179	0.06	54.20	0.083	45970
66	Canned Specialties	71	0.00	2.09	0.003	29409

67	Canned Fruits and Vegetables	1,779	0.08	51.96	0.080	29208
68	Dehydrated Food Products	597	0.03	20.46	0.031	34277
69	Pickles- Sauces- and Salad Dressings	810	0.04	26.16	0.040	32293
70	Frozen Fruits- Juices and Vegetables	7,379	0.35	195.63	0.300	26511
71	Frozen Specialties	215	0.01	10.43	0.016	48501
72	Flour and Other Grain Mill Products	263	0.01	11.41	0.018	43370
73	Cereal Preparations	96	0.00	3.23	0.005	33665
74	Rice Milling	4	0.00	0.08	0.000	19728
75	Blended and Prepared Flour	292	0.01	9.80	0.015	33541
76	Wet Corn Milling	13	0.00	0.40	0.001	30499
77	Dog- Cat- and Other Pet Food	0	0.00	0.00	0.000	0
78	Prepared Feeds- N.E.C	314	0.01	13.14	0.020	41849
79	Bread- Cake- and Related Products	2,335	0.11	86.45	0.133	37026
80	Cookies and Crackers	707	0.03	35.78	0.055	50606
81	Sugar	297	0.01	10.80	0.017	36371
82	Confectionery Products	149	0.01	2.55	0.004	17134
83	Chocolate and Cocoa Products	26	0.00	0.84	0.001	32481
84	Chewing Gum	0	0.00	0.00	0.000	0
85	Salted and Roasted Nuts & Seeds	78	0.00	1.92	0.003	24615
86	Cottonseed Oil Mills	0	0.00	0.00	0.000	0
87	Soybean Oil Mills	5	0.00	0.29	0.000	57648
88	Vegetable Oil Mills- N.E.C	0	0.00	0.00	0.000	0
89	Animal and Marine Fats and Oils	75	0.00	2.31	0.004	30725
90	Shortening and Cooking Oils	147	0.01	4.57	0.007	31082
91	Malt Beverages	368	0.02	15.04	0.023	40873
92	Malt	0	0.00	0.00	0.000	0
93	Wines- Brandy- and Brandy Spirits	794	0.04	18.03	0.028	22712
94	Distilled Liquor- Except Brandy	47	0.00	2.68	0.004	56999
95	Bottled and Canned Soft Drinks, Water	752	0.04	31.36	0.048	41705
96	Flavoring Extracts and Syrups- N.E.C.	54	0.00	3.52	0.005	65139
97	Canned and Cured Sea Foods	97	0.00	2.78	0.004	28693
98	Prepared Fresh/ Frozen Fish/ Seafood	1,182	0.06	25.88	0.040	21894
99	Roasted Coffee	415	0.02	18.63	0.029	44892
100	Potato Chips & Similar Snacks	289	0.01	8.93	0.014	30909
101	Manufactured Ice	63	0.00	1.09	0.002	17267
102	Macaroni and Spaghetti	8	0.00	0.12	0.000	15346
103	Food Preparations- N.E.C	1,105	0.05	34.19	0.052	30944
450	Food Stores	44,027	2.07	1,011.91	1.553	22984
454	Eating & Drinking	116,204	5.46	1,569.43	2.408	13506
Sub Total (food related sector)		275,000	12.92	4,263.03	6.54	15502
Rest of the Oregon Economy		1,854,127	87.08	60,908.87	93.46	32850
		2,129,127	100.00	65,171.90	100.00	\$30,610

Oregon supply and demand of agricultural commodities and processed foods

The relationship between regional demand and supply of agricultural products assumes importance in understanding issues of food sufficiency as it relates to agricultural and food production in Oregon. A region produces agricultural products for consumption within the region, and for exports. In case of the IMPLAN data, exports imply both domestic (rest of the U.S.) and foreign exports. Similarly, a region imports agricultural products, both from domestic (rest of the U.S.) and foreign sources, to meet the demands of industries and consumers (households, government etc) in the region. The demand that is fulfilled by local producers assumes importance, because, the higher the proportion of demand fulfilled by local producers, the lower is the potential for growth from import substitution. Although there are estimates of agricultural production are widely available for crop and livestock activities from the National Agricultural Statistics Service (NASS), estimates of agricultural demand, in terms of intermediate demand and final demand are available only from regional input-output data. Likewise, estimates of agricultural and food imports are available only from these same data.

In this study we use the year 2000 SAM (Social Accounting Matrix) of the Oregon economy to address supply/demand issues relating to the Oregon food system. We examine the regional supply and demand of agricultural products based on the 2000 IMPLAN data.

Tables 3 and 4 present the regional supply (and exports) and demand (and imports) of agricultural commodities, respectively. Tables 6 and 7 present the regional supply (and exports) and demand (and imports) of processed food commodities, respectively. Tables 5 and 8 present total supply and total demand of agricultural commodities and processed food commodities, respectively.

To understand the contents of Table 3 consider the following description of the 'dairy farm products' sector. The state produced and estimated \$207.11 million of 'dairy farm products'. Foreign exports were \$0.25 million, while domestic (outside of Oregon but inside the United States) exports were \$56.07 million, implying that most production was sold within the state of Oregon. Regional supply (amount sold in Oregon) was \$150.78 million. The percentage of the total production of 'dairy farm products' sold in Oregon was 72.80 percent, while the percentage sold in the U.S. (Oregon and rest of the U.S.) was 99.878 percent.

Table 4 shows that industry demand (Oregon industries that use 'dairy farm products' as inputs in production) was \$277.191 million, while \$1.46 million of 'dairy farm products' was purchased by Oregon households, government etc as a final demand, These two figures include imported 'dairy farm products' from outside of Oregon. Industry imports (intermediate imports) of 'dairy farm products' were \$127.20 million and imports by consumers,

government etc (final imports) were \$0.67 million. Regional demand (\$150.78 million) is the demand that is met by Oregon supply, the same figure as reflected in “column E” of Table 3. The last column of Table 4 indicates that 54.11 percent of the total demand for ‘dairy farm products’ in the state is met by regional (in Oregon) suppliers.

Tables 3 and 4 reveal that in the case of 4 sectors – ‘food grains’, ‘feed grains’, and ‘grass seeds’, both percentage supply sold in Oregon and percentage of total demand met by Oregon Supply are low, implying that these sectors export most of their output, while most of the regional demand is fulfilled by imports. This is partially due to the fact that the ‘food grains’ sector, for example, does not represent a single commodity, but differentiated products. Therefore, the region exports the products that are produced widely in the state, and imports the products that are not produced in the state. It is important to remember the commodity aggregation that occurs when SAM-based models are used for the study of the supply and demand of agricultural commodities. What appears as cross-hauling (the simultaneous importing and exporting of the same commodity) is sometimes the trade of different commodities that are grouped in the same Standard Industrial Classification (SIC) sector, but in fact are really different commodities. For example, wheat and rice are both classified as food grains.

Table 3 reveals that there were 2 important commodities that were not produced at all in Oregon; they are ‘cotton’ and ‘tobacco’. Though the demand for these two commodities are significantly low, however all of the demand for these commodities was met by imports (Table 4). This implies a potential for import substitution. However, most agricultural economists would agree that the production of ‘tobacco’, for example, in Oregon probably would be a money losing enterprise and tobacco would not be able to compete with other agricultural commodities for the necessary land, labor and capital.

Like ‘food grains’, ‘grass seeds’ etc, for ‘miscellaneous crops’ and ‘oil bearing crops’ as well majority of the in-state supply went for exports and at the same time majority of the demands for these commodities were being met by imports (Tables 3, 4). In the case of ‘fruits’, they too are characterized by excess supply, and a large portion of total supply is exported, however, these crops are also used to meet a relatively high portion of in-state demand. For example, 62.77 percent of the Oregon demand for ‘fruits’ is met from in-state sources (Table 4), while at the same time 61.17 percent of total food supply had been exported out of the state.

Table 3: Oregon Regional Supply and Exports of Agricultural products (2002)

		A	B=A-C	C	D	E=A-C-D	F=E/A	G=B/A
Sec tor No.	Sector	Total Commodity Supply	Net Commodity Supply	Foreign Exports (\$m)	Domestic Exports (\$m)	Regional Supply (\$m)	Supply Sold in Oregon	Supply Sold in US

		(\$m)	(\$m)				(%)	(%)
1	Dairy Farm Products	207.11	206.85	0.25	56.07	150.78	72.80	99.88
2	Poultry and Eggs	89.13	88.13	1.00	31.43	56.70	63.62	98.88
3	Ranch Fed Cattle	216.67	215.13	1.55	160.68	54.44	25.13	99.29
4	Range Fed Cattle	145.78	145.01	0.77	91.58	53.43	36.65	99.47
5	Cattle Feedlots	102.79	102.11	0.68	53.79	48.32	47.01	99.34
6	Sheep- Lambs and Goats	7.49	7.06	0.43	5.25	1.82	24.25	94.28
7	Hogs- Pigs and Swine	5.56	5.54	0.01	0.00	5.54	99.81	99.81
8	Other Meat Animal Products	1.42	1.42	0.00	1.20	0.23	15.83	100.00
9	Miscellaneous Livestock	32.37	26.82	5.55	0.00	26.82	82.85	82.85
10	Cotton	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Food Grains	119.83	40.72	79.11	37.33	3.39	2.83	33.98
12	Feed Grains	187.06	180.43	6.63	157.75	22.69	12.13	96.46
13	Hay and Pasture	101.08	96.33	4.75	82.14	14.19	14.04	95.30
14	Grass Seeds	303.57	231.84	71.73	224.65	7.18	2.37	76.37
15	Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Fruits	237.86	182.56	55.30	90.20	92.36	38.83	76.75
17	Tree Nuts	22.09	19.28	2.82	12.17	7.11	32.16	87.25
18	Vegetables	367.32	320.59	46.73	145.55	175.04	47.65	87.28
19	Sugar Crops	16.44	11.28	5.16	0.00	11.28	68.61	68.61
20	Miscellaneous Crops	123.18	75.64	47.54	64.38	11.26	9.14	61.41
21	Oil Bearing Crops	1.19	0.68	0.50	0.61	0.07	5.81	57.46

Table 4: Oregon Regional Demand and Imports of Agricultural products (2002)

		A	D	E	F	G=A+D-E-F	H=G/(A+D)
Sect or No.	Sector	Intermediate Commodity Demand (\$ m)	Final Commodity Demand (\$ m)	Intermediate Commodity Imports (\$ m)	Final Commodity Imports (\$ m)	Regional Demand met by Oregon Supply (\$ m)	Percentage of Regional Demand met by Oregon Supply
1	Dairy Farm Products	277.191	1.46	127.20	0.67	150.78	54.11
2	Poultry and Eggs	56.298	39.59	23.01	16.18	56.70	59.13
3	Ranch Fed Cattle	59.804	0.00	5.36	0.00	54.44	91.03
4	Range Fed Cattle	56.872	0.00	3.44	0.00	53.43	93.95
5	Cattle Feedlots	60.702	0.00	12.38	0.00	48.32	79.60
6	Sheep- Lambs and Goats	2.113	0.00	0.30	0.00	1.82	85.99
7	Hogs- Pigs and Swine	25.961	0.00	20.42	0.00	5.54	21.36
8	Other Meat Animal Products	0.228	0.00	0.00	0.00	0.23	98.72
9	Miscellaneous Livestock	26.013	29.67	13.48	15.38	26.82	48.17
10	Cotton	3.285	0.00	3.29	0.00	0.00	0.00

11	Food Grains	25.393	0.00	22.00	0.00	3.39	13.35
12	Feed Grains	197.327	5.11	175.21	4.53	22.69	11.21
13	Hay and Pasture	123.857	2.58	109.96	2.29	14.19	11.22
14	Grass Seeds	13.796	0.94	7.07	0.48	7.18	48.74
15	Tobacco	0.140	0.00	0.14	0.00	0.00	0.00
16	Fruits	14.533	132.60	5.41	49.37	92.36	62.77
17	Tree Nuts	7.346	7.76	3.89	4.11	7.11	47.04
18	Vegetables	184.103	142.13	85.32	65.87	175.04	53.65
19	Sugar Crops	24.558	0.00	13.28	0.00	11.28	45.93
20	Miscellaneous Crops	51.889	0.58	40.75	0.45	11.26	21.46
21	Oil Bearing Crops	17.717	0.56	17.65	0.55	0.07	0.38

The total supply (production) and total demand for agricultural commodities, for Washington, is presented in Table 5. The table reveals that total supply of 'grass seeds' was almost 20 times of its demand. Besides that, for 'food grains', 'fruits', 'tree nuts', 'food grains' 'vegetable' and 'miscellaneous crops' also supply outnumber its demand by quite significant margin, however, for 'sugar crops' and 'oil bearing crops' very less amount of demand has been met by the domestic supply

Table 5: Total Supply and Total Demand of Agricultural products (2000)

Sect or No.	Sector	Total Commodity Supply (\$m)	Total Demand (\$m)	Total SS/Total DD (%)
1	Dairy Farm Products	207.11	278.651	74.32
2	Poultry and Eggs	89.13	95.892	92.95
3	Ranch Fed Cattle	216.67	59.804	362.31
4	Range Fed Cattle	145.78	56.872	256.32
5	Cattle Feedlots	102.79	60.702	169.33
6	Sheep- Lambs and Goats	7.49	2.113	354.68
7	Hogs- Pigs and Swine	5.56	25.961	21.40
8	Other Meat Animal Products	1.42	0.228	623.78
9	Miscellaneous Livestock	32.37	55.688	58.14
10	Cotton	0.00	3.285	0.00
11	Food Grains	119.83	25.393	471.89
12	Feed Grains	187.06	202.432	92.41
13	Hay and Pasture	101.08	126.440	79.94
14	Grass Seeds	303.57	14.737	2059.91
15	Tobacco	0.00	0.140	0.00
16	Fruits	237.86	147.138	161.66
17	Tree Nuts	22.09	15.104	146.27
18	Vegetables	367.32	326.237	112.59
19	Sugar Crops	16.44	24.558	66.94
20	Miscellaneous Crops	123.18	52.466	234.78
21	Oil Bearing Crops	1.19	18.274	6.49

Tables 6 and 7 present the same information as Tables 3 and 4 except that the focus is processed foods rather than raw agricultural commodities. Thus, instead of raw milk as summarized in ‘dairy farm products’ in Tables 3 and 4, Tables 6 and 7 present information on the following products of raw milk: ‘creamery butter’, ‘cheese-natural and processed’, ‘condensed and evaporated milk’, ‘ice cream and frozen deserts’, and finally ‘fluid milk’, each as individual commodities.

In the case of processed milk products Table 6 shows that except for ‘creamery butter’ most of the Oregon supply of these products is consumed in Oregon. In the case of ‘creamery butter’, about 56 percent of the supply is absorbed in Oregon, while for cheese the amount is 96.77 percent and for condensed and evaporated milk it was 96.55 percent. However, looking at the demand side, the story is somewhat different. Roughly 87 percent of the demand for ‘creamery butter’ in Oregon is satisfied in-state, while for ‘condensed and evaporated milk’ only 36.41 percent of its total was met by in-state supply. Looking at Table 7, we can see that for most of processed foods there is scope for import substitution based simply on the percent of regional demand that is met by imports. Whether an import substitution strategy makes economic sense for a particular commodity is, of course, a more complicated question.

Table 6: Oregon Regional Supply and Exports of Processed Food products (2002)

		A	B=A-C	C	D	E=A-C-D	F=E/A	G=B/A
Sec tor No.	Sector	Total Commodity Supply (\$m)	Net Commodity Supply (\$m)	Foreign Exports (\$m)	Domestic Exports (\$m)	Regional Supply (\$m)	Supply Sold in Oregon (%)	Supply Sold in US (%)
58	Meat Packing Plants	172.00	156.42	15.58	0.00	156.42	90.94	90.94
59	Sausages and Other Prepared Meats	159.88	159.88	0.00	0.00	159.88	100.00	100.00
60	Poultry Processing	83.63	78.55	5.08	0.00	78.55	93.92	93.92
61	Creamery Butter	33.32	33.14	0.18	14.62	18.52	55.58	99.47
62	Cheese- Natural and Processed	178.82	177.06	1.75	4.03	173.03	96.77	99.02
63	Condensed and Evaporated Milk	37.16	35.88	1.28	0.00	35.88	96.55	96.55
64	Ice Cream and Frozen Desserts	57.22	56.41	0.81	0.00	56.41	98.58	98.58
65	Fluid Milk	402.73	402.00	0.72	159.61	242.39	60.19	99.82
66	Canned Specialties	35.38	35.03	0.35	31.12	3.91	11.04	99.00
67	Canned Fruits and Vegetables	412.02	379.05	32.96	363.01	16.04	3.89	92.00
68	Dehydrated Food Products	110.72	80.65	30.07	77.32	3.33	3.01	72.84
69	Pickles- Sauces, Salad Dressings	238.18	227.86	10.32	219.58	8.28	3.48	95.67
70	Frozen Fruits Juices and Vegetables	1,416.18	1,238.91	177.27	1,212.48	26.43	1.87	87.48
71	Frozen Specialties	59.14	59.14	0.00	54.18	4.96	8.39	100.00

72	Flour and other Grain Mill Products	80.23	75.64	4.59	70.74	4.90	6.11	94.28
73	Cereal Preparations	46.65	45.62	1.04	40.10	5.51	11.82	97.78
74	Rice Milling	4.67	4.00	0.67	3.48	0.52	11.17	85.67
75	Blended and Prepared Flour	90.65	87.46	3.18	83.09	4.38	4.83	96.49
76	Wet Corn Milling	7.78	6.18	1.60	3.98	2.20	28.29	79.40
77	Dog- Cat- and Other Pet Food	1.09	1.09	0.00	0.00	1.09	100.00	100.00
78	Prepared Feeds- N.E.C	125.27	120.30	4.97	114.17	6.12	4.89	96.03
79	Bread- Cake- and Related Products	402.05	394.86	7.19	69.57	325.29	80.91	98.21
80	Cookies and Crackers	137.42	137.42	0.00	18.63	118.78	86.44	100.00
81	Sugar	115.01	111.85	3.16	97.64	14.21	12.36	97.25
82	Confectionery Products	40.24	39.62	0.62	31.73	7.89	19.61	98.46
83	Chocolate and Cocoa Products	6.14	5.21	0.93	4.15	1.06	17.36	84.92
84	Chewing Gum	5.04	5.04	0.00	4.08	0.96	19.14	100.00
85	Salted and Roasted Nuts & Seeds	28.96	27.65	1.31	24.74	2.92	10.07	95.49
86	Cottonseed Oil Mills	0.62	0.62	0.00	0.00	0.62	100.00	100.00
87	Soybean Oil Mills	11.42	10.18	1.23	0.00	10.18	89.19	89.19
88	Vegetable Oil Mills- N.E.C	1.95	1.95	0.00	0.00	1.95	100.00	100.00
89	Animal and Marine Fats and Oils	20.77	14.46	6.30	6.39	8.07	38.86	69.65
90	Shortening and Cooking Oils	88.50	82.42	6.07	23.45	58.98	66.64	93.14
91	Malt Beverages	117.93	115.54	2.38	93.95	21.60	18.31	97.98
92	Malt	0.01	0.01	0.00	0.00	0.01	100.00	100.00
93	Wines- Brandy- and Brandy Spirits	147.36	133.60	13.76	118.43	15.17	10.29	90.66
94	Distilled Liquor- Except Brandy	20.69	17.87	2.83	13.83	4.03	19.49	86.33
95	Bottled, Canned Soft Drinks & Water	267.46	265.14	2.32	226.46	38.68	14.46	99.13
96	Flavoring Extracts and Syrups- N.E.C.	32.43	31.46	0.96	23.79	7.67	23.65	97.03
97	Canned and Cured Sea Foods	17.77	10.76	7.01	10.01	0.75	4.24	60.56
98	Prepared Fresh/ Frozen Fish/ Seafood	179.92	179.92	0.00	171.99	7.94	4.41	100.00
99	Roasted Coffee	250.76	235.62	15.13	174.95	60.67	24.19	93.96
100	Potato Chips & Similar Snacks	93.87	90.86	3.02	5.56	85.29	90.86	96.79
101	Manufactured Ice	2.92	2.85	0.07	0.00	2.85	97.44	97.44
102	Macaroni and Spaghetti	1.10	1.04	0.06	0.00	1.04	94.32	94.32
103	Food Preparations- N.E.C	256.26	233.81	22.44	81.00	152.81	59.63	91.24

Table 7: Oregon Regional Demand and Imports of Processed Food products (2002)

A	D	E	F	G=A+D- E-F	H=G/(A+D)
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Sect or No.	Sector	Intermediate Commodity Demand (\$ m)	Final Commodity Demand (\$ m)	Intermediate Commodity Imports (\$ m)	Final Commodity Imports (\$ m)	Regional Demand met by Oregon Supply (\$ m)	Percentage of Regional Demand met by Oregon Supply
58	Meat Packing Plants	107.425	527.18	80.947	397.239	156.42	24.65
59	Sausages and Other Prepared Meats	36.796	209.14	12.876	73.184	159.88	65.01
60	Poultry Processing	48.816	327.27	38.621	258.915	78.55	20.89
61	Creamery Butter	10.313	10.94	1.328	1.409	18.52	87.13
62	Cheese- Natural and Processed	71.111	143.08	13.663	27.491	173.03	80.79
63	Condensed and Evaporated Milk	31.311	67.22	19.910	42.741	35.88	36.41
64	Ice Cream and Frozen Desserts	29.218	45.69	7.217	11.285	56.41	75.30
65	Fluid Milk	30.066	240.04	3.085	24.626	242.39	89.74
66	Canned Specialties	5.696	76.88	5.427	73.239	3.91	4.73
67	Canned Fruits and Vegetables	36.469	179.75	33.763	166.413	16.04	7.42
68	Dehydrated Food Products	20.867	18.51	19.102	16.942	3.33	8.46
69	Pickles, Sauces and Salad Dressings	14.926	84.04	13.677	77.007	8.28	8.37
70	Frozen Fruits- Juices and Vegetables	100.595	82.75	86.093	70.817	26.43	14.42
71	Frozen Specialties	0.482	131.75	0.464	126.806	4.96	3.75
72	Flour and Other Grain Mill Products	69.787	9.98	65.497	9.364	4.90	6.15
73	Cereal Preparations	3.028	108.21	2.878	102.845	5.51	4.96
74	Rice Milling	4.651	11.83	4.504	11.459	0.52	3.16
75	Blended and Prepared Flour	11.499	52.83	10.717	49.232	4.38	6.80
76	Wet Corn Milling	52.840	14.79	51.119	14.308	2.20	3.26
77	Dog- Cat- and Other Pet Food	3.210	93.33	3.174	92.274	1.09	1.13
78	Prepared Feeds- N.E.C	98.804	15.45	93.508	14.620	6.12	5.36
79	Bread- Cake- and Related Products	116.935	227.44	6.479	12.601	325.29	94.46
80	Cookies and Crackers	4.206	115.99	0.049	1.361	118.78	98.83
81	Sugar	61.544	37.54	52.717	32.159	14.21	14.34
82	Confectionery Products	13.995	182.24	13.432	174.909	7.89	4.02
83	Chocolate and Cocoa Products	14.475	11.34	13.878	10.874	1.06	4.13
84	Chewing Gum	1.866	22.86	1.793	21.968	0.96	3.90
85	Salted and Roasted Nuts & Seeds	6.019	31.24	5.548	28.796	2.92	7.83
86	Cottonseed Oil Mills	7.879	0.00	7.262	0.000	0.62	7.83
87	Soybean Oil Mills	65.031	0.78	54.970	0.659	10.18	15.47
88	Vegetable Oil Mills- N.E.C	21.611	5.44	20.056	5.046	1.95	7.19
89	Animal and Marine Fats and Oils	14.076	0.10	6.064	0.044	8.07	56.92
90	Shortening and Cooking Oils	38.585	43.16	10.745	12.018	58.98	72.15
91	Malt Beverages	42.469	178.93	38.326	161.480	21.60	9.75
92	Malt	3.540	0.00	3.534	0.000	0.01	0.16
93	Wines- Brandy- and Brandy Spirits	13.907	116.89	12.294	103.335	15.17	11.60
94	Distilled Liquor- Except Brandy	17.470	58.08	16.537	54.974	4.03	5.34
95	Bottled, Canned Soft Drinks & Water	30.189	387.34	27.392	351.457	38.68	9.26
96	Flavoring Extracts and Syrups- N.E.C.	39.918	52.82	36.616	48.449	7.67	8.27
97	Canned and Cured Sea Foods	0.475	23.54	0.460	22.799	0.75	3.14

98	Prepared/Fresh. Frozen Fish/ Seafood	51.656	38.54	47.111	35.145	7.94	8.80
99	Roasted Coffee	27.907	51.45	6.571	12.115	60.67	76.45
100	Potato Chips & Similar Snacks	4.046	127.45	1.421	44.777	85.29	64.87
101	Manufactured Ice	0.695	6.73	0.428	4.151	2.85	38.35
102	Macaroni and Spaghetti	2.142	16.26	2.021	15.336	1.04	5.66
103	Food Preparations- N.E.C	0.481	236.84	0.171	84.341	152.81	64.39

Table 8 represents the total supply (production) and total demand for processed foods, for the state. The table reveals that for ‘frozen fruits, juices and vegetables’, and ‘roasted coffee’ supply exceeds its demand quite significantly. For frozen fruits in particular, the correspondingly supply amount to almost 7 times of its demand. Sector like ‘creamy butter, ‘fluid milk’, ‘blended and prepared flour’ total supply exceeds total demand by relatively large amounts. However, the table also indicates that total for majority of the sectors in ‘processed food sector’ demand exceeds total supply for most processed foods.

Table 8: Total Supply and Total Demand of Processed Food products (2002)

Sector No.	Sector	Total Commodity Supply (\$m)	Total Demand (\$m)	Total SS/Total DD (%)
58	Meat Packing Plants	172.00	634.601	27.10
59	Sausages and Other Prepared Meats	159.88	245.938	65.01
60	Poultry Processing	83.63	376.083	22.24
61	Creamery Butter	33.32	21.256	156.75
62	Cheese- Natural and Processed	178.82	214.190	83.49
63	Condensed and Evaporated Milk	37.16	98.526	37.71
64	Ice Cream and Frozen Desserts	57.22	74.908	76.39
65	Fluid Milk	402.73	270.102	149.10
66	Canned Specialties	35.38	82.572	42.85
67	Canned Fruits and Vegetables	412.02	216.220	190.55
68	Dehydrated Food Products	110.72	39.374	281.21
69	Pickles- Sauces- and Salad Dressings	238.18	98.964	240.67
70	Frozen Fruits- Juices and Vegetables	1,416.18	183.341	772.43
71	Frozen Specialties	59.14	132.229	44.72
72	Flour and Other Grain Mill Products	80.23	79.764	100.58
73	Cereal Preparations	46.65	111.235	41.94
74	Rice Milling	4.67	16.485	28.33
75	Blended and Prepared Flour	90.65	64.324	140.92
76	Wet Corn Milling	7.78	67.629	11.51
77	Dog- Cat- and Other Pet Food	1.09	96.540	1.13
78	Prepared Feeds- N.E.C	125.27	114.253	109.64
79	Bread- Cake- and Related Products	402.05	344.372	116.75
80	Cookies and Crackers	137.42	120.194	114.33
81	Sugar	115.01	99.087	116.07
82	Confectionery Products	40.24	196.231	20.51
83	Chocolate and Cocoa Products	6.14	25.816	23.77
84	Chewing Gum	5.04	24.726	20.39
85	Salted and Roasted Nuts & Seeds	28.96	37.261	77.72
86	Cottonseed Oil Mills	0.62	7.879	7.83
87	Soybean Oil Mills	11.42	65.811	17.35
88	Vegetable Oil Mills- N.E.C	1.95	27.048	7.19
89	Animal and Marine Fats and Oils	20.77	14.179	146.48
90	Shortening and Cooking Oils	88.50	81.741	108.27
91	Malt Beverages	117.93	221.401	53.26
92	Malt	0.01	3.540	0.16
93	Wines- Brandy- and Brandy Spirits	147.36	130.799	112.66
94	Distilled Liquor- Except Brandy	20.69	75.546	27.39
95	Bottled and Canned Soft Drinks & Water	267.46	417.530	64.06
96	Flavoring Extracts and Syrups- N.E.C.	32.43	92.735	34.97
97	Canned and Cured Sea Foods	17.77	24.013	74.02
98	Prepared Fresh Or Frozen Fish Or Seafood	179.92	90.193	199.49

99	Roasted Coffee	250.76	79.357	315.99
100	Potato Chips & Similar Snacks	93.87	131.492	71.39
101	Manufactured Ice	2.92	7.428	39.35
102	Macaroni and Spaghetti	1.10	18.399	6.00
103	Food Preparations- N.E.C	256.26	237.324	107.98

Oregon balance of trade for agricultural commodities and processed foods

On the issue of balance of trade in agricultural commodities, Table 9 indicates that the state has a positive trade balance (value of exports exceeds the value of imports). The state exported \$1545.29 million of agricultural products in 2002, while imports were worth \$849.47 million. The largest exports were by the 'grass seeds' sector, while the largest imports were by the 'feed grains' sector. In contrast to agricultural commodities, Table 10 indicates that the state has a positive, but relatively small in comparison to the agricultural sector, trade balance in case of processed food items. Washington processed food exports were \$4041.10 million, while imports were \$3854.46 million. In case of processed foods, the largest exports were by 'frozen fruits, juices and vegetables', amounting \$1389.75 million worth of exports, while the largest imports were by 'bottled and canned soft drinks and water.'

Table 9: Oregon Trade Balance of Agricultural Products (2002)

Sect or No.	Sector	Total Exports (\$m)	Total Imports (\$m)	Trade Balance (\$m)
1	Dairy Farm Products	56.325	127.87	-71.54
2	Poultry and Eggs	32.428	39.19	-6.76
3	Ranch Fed Cattle	162.232	5.36	156.87
4	Range Fed Cattle	92.348	3.44	88.91
5	Cattle Feedlots	54.471	12.38	42.09
6	Sheep- Lambs and Goats	5.676	0.30	5.38
7	Hogs- Pigs and Swine	0.011	20.42	-20.41
8	Other Meat Animal Products	1.199	0.00	1.20
9	Miscellaneous Livestock	5.551	28.86	-23.31
10	Cotton	0.000	3.29	-3.29
11	Food Grains	116.437	22.00	94.43
12	Feed Grains	164.377	179.75	-15.37
13	Hay and Pasture	86.894	112.25	-25.36
14	Grass Seeds	296.383	7.55	288.83
15	Tobacco	0.000	0.14	-0.14
16	Fruits	145.499	54.78	90.72
17	Tree Nuts	14.987	8.00	6.99
18	Vegetables	192.278	151.20	41.08

19	Sugar Crops	5.160	13.28	-8.12
20	Miscellaneous Crops	111.917	41.21	70.71
21	Oil Bearing Crops	1.117	18.21	-17.09
	Total	1,545.28	849.28	695.82

Table 10: Oregon Trade Balance of Processed Food Products (2002)

Sect or No.	Sector	Total Exports (\$m)	Total Imports (\$m)	Trade Balance (\$m)
1	Dairy Farm Products	56.325	127.87	-71.54
2	Poultry and Eggs	32.428	39.19	-6.76
3	Ranch Fed Cattle	162.232	5.36	156.87
4	Range Fed Cattle	92.348	3.44	88.91
5	Cattle Feedlots	54.471	12.38	42.09
6	Sheep- Lambs and Goats	5.676	0.30	5.38
7	Hogs- Pigs and Swine	0.011	20.42	-20.41
8	Other Meat Animal Products	1.199	0.00	1.20
9	Miscellaneous Livestock	5.551	28.86	-23.31
10	Cotton	0.000	3.29	-3.29
11	Food Grains	116.437	22.00	94.43
12	Feed Grains	164.377	179.75	-15.37
13	Hay and Pasture	86.894	112.25	-25.36
14	Grass Seeds	296.383	7.55	288.83
15	Tobacco	0.000	0.14	-0.14
16	Fruits	145.499	54.78	90.72
17	Tree Nuts	14.987	8.00	6.99
18	Vegetables	192.278	151.20	41.08
19	Sugar Crops	5.160	13.28	-8.12
20	Miscellaneous Crops	111.917	41.21	70.71
21	Oil Bearing Crops	1.117	18.21	-17.09
58	Meat Packing Plants	15.580	478.19	-462.60
59	Sausages and Other Prepared Meats	0.000	86.06	-86.06
60	Poultry Processing	5.081	297.54	-292.46
61	Creamery Butter	14.798	2.74	12.06
62	Cheese- Natural and Processed	5.783	41.15	-35.37
63	Condensed and Evaporated Milk	1.281	62.65	-61.37
64	Ice Cream and Frozen Desserts	0.815	18.50	-17.69
65	Fluid Milk	160.334	27.71	132.62
66	Canned Specialties	31.474	78.67	-47.19
67	Canned Fruits and Vegetables	395.973	200.18	195.80
68	Dehydrated Food Products	107.392	36.04	71.35
69	Pickles- Sauces- and Salad Dressings	229.896	90.68	139.21

70	Frozen Fruits- Juices and Vegetables	1,389.749	156.91	1232.84
71	Frozen Specialties	54.178	127.27	-73.09
72	Flour and Other Grain Mill Products	75.326	74.86	0.46
73	Cereal Preparations	41.141	105.72	-64.58
74	Rice Milling	4.149	15.96	-11.81
75	Blended and Prepared Flour	86.270	59.95	26.32
76	Wet Corn Milling	5.581	65.43	-59.85
77	Dog- Cat- and Other Pet Food	0.000	95.45	-95.45
78	Prepared Feeds- N.E.C	119.141	108.13	11.01
79	Bread- Cake- and Related Products	76.757	19.08	57.68
80	Cookies and Crackers	18.635	1.41	17.22
81	Sugar	100.801	84.88	15.92
82	Confectionery Products	32.350	188.34	-155.99
83	Chocolate and Cocoa Products	5.071	24.75	-19.68
84	Chewing Gum	4.077	23.76	-19.68
85	Salted and Roasted Nuts & Seeds	26.043	34.34	-8.30
86	Cottonseed Oil Mills	0.000	7.26	-7.26
87	Soybean Oil Mills	1.234	55.63	-54.39
88	Vegetable Oil Mills- N.E.C	0.000	25.10	-25.10
89	Animal and Marine Fats and Oils	12.698	6.11	6.59
90	Shortening and Cooking Oils	29.520	22.76	6.76
91	Malt Beverages	96.330	199.81	-103.48
92	Malt	0.000	3.53	-3.53
93	Wines- Brandy- and Brandy Spirits	132.187	115.63	16.56
94	Distilled Liquor- Except Brandy	16.661	71.51	-54.85
95	Bottled and Canned Soft Drinks & Water	228.776	378.85	-150.07
96	Flavoring Extracts and Syrups- N.E.C.	24.758	85.07	-60.31
97	Canned and Cured Sea Foods	17.020	23.26	-6.24
98	Prepared Fresh Or Frozen Fish Or Seafood	171.988	82.26	89.73
99	Roasted Coffee	190.088	18.69	171.40
100	Potato Chips & Similar Snacks	8.580	46.20	-37.62
101	Manufactured Ice	0.074736454	4.58	-4.51
102	Macaroni and Spaghetti	0.062711902	17.36	-17.29
103	Food Preparations- N.E.C	103.444582	84.51	18.93
	Total	4041.097	3854.457	186.640

Output and employment multipliers for Oregon

Multipliers capture the direct, indirect and induced effects associated with a change in final demand (consumption by households, government, exports etc.). The direct effect is the effect on the industry that is directly affected by the change in final demand. In other words, it is the change in demand for the products of the industry being directly affected. The indirect effect reflects the change in production of industries that are linked to the industry being directly affected (due to a change in final

demand). The indirect effect captures the inter-industry purchases of goods and services. The induced effect captures the change in household spending due to changes in income and production, in the economy, as a result of change in final demand. Type I multipliers measure the direct and indirect effects, while Type SAM multipliers capture the direct, indirect and induced effects. Tables 11 and 12 respectively, presents the output and employment multipliers for the food-related sectors. The multipliers were obtained from IMPLAN.

Table 11: Output Multipliers for food-related sectors for Oregon

Sec tor No.	Sector	Direct effect	Indirect Effect	Induced Effect	Total	Type I Multiplier	Type SAM Multiplier
1	Dairy Farm Products	1.000	0.371	0.187	1.558	1.371	1.558
2	Poultry and Eggs	1.000	0.417	0.178	1.595	1.417	1.595
3	Ranch Fed Cattle	1.000	0.498	0.213	1.711	1.498	1.711
4	Range Fed Cattle	1.000	0.708	0.239	1.947	1.708	1.947
5	Cattle Feedlots	1.000	0.517	0.174	1.691	1.517	1.691
6	Sheep, Lambs and Goats	1.000	0.492	0.200	1.692	1.492	1.692
7	Hogs, Pigs and Swine	1.000	0.378	0.157	1.535	1.378	1.535
8	Other Meat Animal Products	1.000	0.476	0.190	1.666	1.476	1.666
9	Miscellaneous Livestock	1.000	0.313	0.254	1.566	1.313	1.566
11	Food Grains	1.000	0.538	0.179	1.717	1.538	1.717
12	Feed Grains	1.000	0.539	0.189	1.728	1.539	1.728
13	Hay and Pasture	1.000	0.548	0.197	1.745	1.548	1.745
14	Grass Seeds	1.000	0.472	0.142	1.614	1.472	1.614
16	Fruits	1.000	0.429	0.380	1.809	1.429	1.809
17	Tree Nuts	1.000	0.409	0.334	1.743	1.409	1.743
18	Vegetables	1.000	0.548	0.331	1.879	1.548	1.879
19	Sugar Crops	1.000	0.549	0.184	1.734	1.549	1.734
20	Miscellaneous Crops	1.000	0.659	0.242	1.901	1.659	1.901
21	Oil Bearing Crops	1.000	0.445	0.245	1.690	1.445	1.690
22	Forest Products	1.000	0.517	0.166	1.683	1.517	1.683
23	Greenhouse and Nursery Products	1.000	0.415	0.338	1.753	1.415	1.753
24	Forestry Products	1.000	0.076	0.413	1.489	1.076	1.489
25	Commercial Fishing	1.000	0.049	0.458	1.507	1.049	1.507
26	Agricultural, Forestry, Fishery Services	1.000	0.260	0.420	1.680	1.260	1.680
27	Landscape and Horticultural Services	1.000	0.343	0.363	1.706	1.343	1.706
58	Meat Packing Plants	1.000	0.951	0.192	2.143	1.951	2.143
59	Sausages and Other Prepared Meats	1.000	0.558	0.200	1.758	1.558	1.758
60	Poultry Processing	1.000	0.572	0.243	1.815	1.572	1.815
61	Creamery Butter	1.000	0.972	0.226	2.198	1.972	2.198
62	Cheese, Natural and Processed	1.000	0.757	0.184	1.942	1.757	1.942
63	Condensed and Evaporated Milk	1.000	0.501	0.162	1.663	1.501	1.663

64	Ice Cream and Frozen Desserts	1.000	0.537	0.239	1.776	1.537	1.776
65	Fluid Milk	1.000	0.623	0.201	1.823	1.623	1.823
66	Canned Specialties	1.000	0.572	0.191	1.763	1.572	1.763
67	Canned Fruits and Vegetables	1.000	0.580	0.243	1.823	1.580	1.823
68	Dehydrated Food Products	1.000	0.418	0.226	1.644	1.418	1.644
69	Pickles, Sauces, and Salad Dressings	1.000	0.440	0.174	1.614	1.440	1.614
70	Frozen Fruits, Juices and Vegetables	1.000	0.636	0.250	1.886	1.636	1.886
71	Frozen Specialties	1.000	0.413	0.240	1.652	1.413	1.652
72	Flour and Other Grain Mill Products	1.000	0.638	0.255	1.893	1.638	1.893
73	Cereal Preparations	1.000	0.793	0.244	2.037	1.793	2.037
74	Rice Milling	1.000	0.748	0.222	1.970	1.748	1.970
75	Blended and Prepared Flour	1.000	0.563	0.217	1.780	1.563	1.780
76	Wet Corn Milling	1.000	0.411	0.129	1.540	1.411	1.540
78	Prepared Feeds, N.E.C	1.000	0.353	0.150	1.504	1.353	1.504
79	Bread, Cake, and Related Products	1.000	0.407	0.251	1.658	1.407	1.658
80	Cookies and Crackers	1.000	0.310	0.240	1.550	1.310	1.550
81	Sugar	1.000	0.646	0.201	1.847	1.646	1.847
82	Confectionery Products	1.000	0.552	0.194	1.746	1.552	1.746
83	Chocolate and Cocoa Products	1.000	0.604	0.238	1.842	1.604	1.842
85	Salted and Roasted Nuts & Seeds	1.000	0.526	0.179	1.705	1.526	1.705
87	Soybean Oil Mills	1.000	0.398	0.140	1.538	1.398	1.538
89	Animal and Marine Fats and Oils	1.000	0.517	0.193	1.710	1.517	1.710
90	Shortening and Cooking Oils	1.000	0.466	0.129	1.596	1.466	1.596
91	Malt Beverages	1.000	0.331	0.166	1.497	1.331	1.497
93	Wines, Brandy, and Brandy Spirits	1.000	0.623	0.242	1.865	1.623	1.865
94	Distilled Liquor, Except Brandy	1.000	0.250	0.156	1.407	1.250	1.407
95	Bottled and Canned Soft Drinks & Water	1.000	0.465	0.200	1.664	1.465	1.664
96	Flavoring Extracts and Syrups, N.E.C.	1.000	0.203	0.210	1.413	1.203	1.413
97	Canned and Cured Sea Foods	1.000	0.239	0.218	1.457	1.239	1.457
98	Prepared Fresh Or Frozen Fish Or Seafood	1.000	0.286	0.176	1.462	1.286	1.462
99	Roasted Coffee	1.000	0.751	0.254	2.004	1.751	2.004
100	Potato Chips & Similar Snacks	1.000	0.444	0.183	1.627	1.444	1.627
101	Manufactured Ice	1.000	0.349	0.363	1.712	1.349	1.712
102	Macaroni and Spaghetti	1.000	0.549	0.225	1.774	1.549	1.774
103	Food Preparations, N.E.C	1.000	0.431	0.221	1.652	1.431	1.652

Table 11 reveals that the output multipliers (Type SAM) for ‘creamery butter’, ‘rice milling’, and ‘roasted coffee’ the corresponding values are higher than 2, implying that a change in final demand for these sectors causes at least double large impact (in terms of output) on the economy. Table 12 reveals that the employment multipliers (Type SAM) for ‘roasted coffee’, ‘soybean oil mills’, ‘cereal preparations’ and ‘creamery butter’ are relatively high, for each of them multiplier value exceeds 7.00, thus a change in final demand for these sectors has relatively large employment impacts throughout the economy.

Table 12: Employment Multipliers for food-related sectors for Oregon

Sec tor No.	Sector	Direct Effect^	Indirect Effect^	Induced Effect^	Total	Type I Multiplier*	Type SAM Multiplier **
1	Dairy Farm Products	6.043	5.832	2.478	14.352	1.965	2.375
2	Poultry and Eggs	4.172	7.219	2.357	13.748	2.730	3.295
3	Ranch Fed Cattle	17.131	7.402	2.821	27.354	1.432	1.597
4	Range Fed Cattle	16.175	10.729	3.169	30.073	1.663	1.859
5	Cattle Feedlots	3.868	5.795	2.311	11.975	2.498	3.096
6	Sheep, Lambs and Goats	71.596	14.332	2.645	88.573	1.200	1.237
7	Hogs, Pigs and Swine	14.024	5.271	2.082	21.377	1.376	1.524
8	Other Meat Animal Products	21.311	7.300	2.518	31.129	1.343	1.461
9	Miscellaneous Livestock	43.546	4.650	3.361	51.558	1.107	1.184
11	Food Grains	19.754	5.639	2.371	27.764	1.285	1.405
12	Feed Grains	12.191	7.260	2.507	21.958	1.596	1.801
13	Hay and Pasture	41.221	7.383	2.613	51.217	1.179	1.243
14	Grass Seeds	44.587	4.781	1.885	51.253	1.107	1.150
16	Fruits	21.270	6.690	5.035	32.995	1.315	1.551
17	Tree Nuts	10.740	6.593	4.427	21.760	1.614	2.026
18	Vegetables	6.717	9.614	4.382	20.713	2.431	3.083
19	Sugar Crops	13.549	7.181	2.441	23.171	1.530	1.710
20	Miscellaneous Crops	16.397	14.229	3.209	33.836	1.868	2.064
21	Oil Bearing Crops	18.336	5.314	3.246	26.896	1.290	1.467
22	Forest Products	11.744	6.892	2.194	20.829	1.587	1.774
23	Greenhouse and Nursery Products	12.464	5.641	4.477	22.583	1.453	1.812
24	Forestry Products	10.638	1.900	5.470	18.008	1.179	1.693
25	Commercial Fishing	26.798	0.574	6.069	33.441	1.021	1.248
26	Agricultural, Forestry, Fishery Services	33.303	3.093	5.561	41.957	1.093	1.260
27	Landscape and Horticultural Services	28.119	4.096	4.811	37.026	1.146	1.317
58	Meat Packing Plants	2.622	11.360	2.544	16.526	5.332	6.302
59	Sausages and Other Prepared Meats	4.679	5.317	2.646	12.641	2.136	2.702
60	Poultry Processing	7.222	4.961	3.218	15.401	1.687	2.132
61	Creamery Butter	1.523	7.006	2.992	11.521	5.600	7.565
62	Cheese, Natural and Processed	2.345	6.132	2.445	10.922	3.615	4.658
63	Condensed and Evaporated Milk	1.637	4.363	2.152	8.152	3.665	4.980
64	Ice Cream and Frozen Desserts	4.458	4.619	3.168	12.245	2.036	2.747
65	Fluid Milk	2.684	5.617	2.659	10.961	3.093	4.084
66	Canned Specialties	2.581	5.391	2.535	10.508	3.089	4.071
67	Canned Fruits and Vegetables	4.903	5.443	3.218	13.564	2.110	2.767
68	Dehydrated Food Products	5.234	4.157	2.990	12.381	1.794	2.366
69	Pickles, Sauces, and Salad Dressings	3.050	4.163	2.302	9.515	2.365	3.120
70	Frozen Fruits, Juices and Vegetables	4.959	6.138	3.317	14.414	2.238	2.907
71	Frozen Specialties	4.464	3.637	3.175	11.276	1.815	2.526
72	Flour and Other Grain Mill Products	3.080	6.417	3.383	12.880	3.083	4.182
73	Cereal Preparations	1.942	7.622	3.235	12.799	4.925	6.591

74	Rice Milling	2.841	6.591	2.942	12.374	3.320	4.355
75	Blended and Prepared Flour	3.346	5.039	2.871	11.256	2.506	3.364
76	Wet Corn Milling	1.672	5.336	1.710	8.718	4.192	5.215
78	Prepared Feeds, N.E.C	2.543	3.511	1.990	8.044	2.380	3.163
79	Bread, Cake, and Related Products	5.856	4.267	3.327	13.450	1.729	2.297
80	Cookies and Crackers	4.717	3.039	3.175	10.932	1.644	2.317
81	Sugar	2.587	6.495	2.660	11.742	3.510	4.538
82	Confectionery Products	4.519	5.371	2.574	12.464	2.189	2.758
83	Chocolate and Cocoa Products	3.838	5.753	3.152	12.743	2.499	3.321
85	Salted and Roasted Nuts & Seeds	2.605	5.511	2.371	10.487	3.115	4.026
87	Soybean Oil Mills	0.916	3.650	1.853	6.419	4.982	7.005
89	Animal and Marine Fats and Oils	4.257	4.246	2.554	11.057	1.998	2.597
90	Shortening and Cooking Oils	1.664	3.553	1.714	6.932	3.135	4.165
91	Malt Beverages	3.120	3.165	2.205	8.491	2.014	2.721
93	Wines, Brandy, and Brandy Spirits	5.294	5.860	3.211	14.365	2.107	2.714
94	Distilled Liquor, Except Brandy	2.343	2.418	2.073	6.834	2.032	2.917
95	Bottled and Canned Soft Drinks & Water	2.958	4.349	2.647	9.954	2.470	3.365
96	Flavoring Extracts and Syrups, N.E.C.	3.610	1.994	2.787	8.391	1.552	2.324
97	Canned and Cured Sea Foods	7.587	2.941	2.892	13.420	1.388	1.769
98	Prepared Fresh Or Frozen Fish Or Seafood	6.387	4.939	2.332	13.658	1.773	2.138
99	Roasted Coffee	1.547	7.250	3.362	12.159	5.686	7.859
100	Potato Chips & Similar Snacks	3.497	4.544	2.420	10.461	2.299	2.992
101	Manufactured Ice	23.543	3.453	4.809	31.804	1.147	1.351
102	Macaroni and Spaghetti	7.957	5.150	2.977	16.084	1.647	2.021
103	Food Preparations, N.E.C	5.427	4.755	2.925	13.107	1.876	2.415

^ Per Million dollars of output, * Type I = (Direct + Indirect) / Direct,

** Type SAM= (Direct + Indirect + Induced) / Direct,

Summary and conclusions

The purpose of this paper was to study the role of the food-related sectors in the Oregon economy. The IMPLAN database was the source of data. The food-related sectors directly accounted for approximately 13 percent of the total state employment, and 6.54 percent of the total state wage bill. The average wage for the food-related sectors was approximately \$15,502. The average wage for the non-food sectors was about \$32,850, while the average wage for the state as a whole was about \$30,610. The study reveals the importance of the food-related retail sectors like ‘eating and drinking’ and ‘food stores’ among the food-related sectors. ‘Eating and drinking’ and ‘food stores’ accounted for 5.46 percent and 2.07 percent of the total state employment, respectively. The share of ‘farming’ and ‘food-processing’ in total state employment was 2.613 and 1.155 percent, respectively. In the second part of the study, the relationship between Oregon supply and demand of agricultural commodities and processed foods was studied using an IMPLAN-based SAM (Social Accounting Matrix). ‘Food grains’ was characterized by

excess supply, with most of that supply being exported out of Oregon, and much of Oregon demand being met by out-of-state sources. In the case of 'fruits', they too are characterized by excess supply, and a large portion of the total supply is exported. However, in this case a relatively high portion of in-state demand is met by in-state producers. For many processed foods, the demand fulfilled by Oregon producers is low, implying that there is a possibility of import-substitution. The study reveals that the state has a positive trade balance (value of exports exceeds the value of imports) for agricultural commodities, as well the same for processed foods, but in a relatively smaller quantity.

Endnotes

¹ IMPLAN (Impact Analysis for Planning) is a regional economic modeling software. The economy is divided into 528 sectors. Data are available from the county-level to the national-level.

² ‘Greenhouse and nursery products’ has been separated out from ‘farms’, and is considered a food-related sector.

³ ‘Landscape and horticultural services’ has been separated out from ‘ag services’, and is considered a food-related sector.