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Abstract

In 2014, agricultural industries, including agricultural production, agricultural support services, and agricultural manufacturing, directly contributed $44.8 billion in total industry output, 145.3 thousand jobs, and $13.8 billion in gross domestic product to the New York State economy. When backward-linked supply chain business-to-business transactions (indirect effects) and household spending out of labor income (induced effects) are considered, these values grow to $63.8 billion, 251.5 thousand, and $26.1 billion, respectively. This implies relatively strong multiplier effects in agriculture for the state, whereby every additional $1 in output in agriculture generates an additional $0.42 in backward linked non-agricultural industries, every additional job in agriculture generates an additional 0.73 non-agricultural jobs, and every additional $1 in gross domestic product generates an addition $0.89 in non-agricultural contributions to gross domestic product.

* Associate Professor, Charles H. Dyson School of Applied Economics and Management, Cornell University. This publication presents an update to similar analysis published in 2014 (Schmit 2014), with more recently available data. Any opinions, findings, conclusions, or recommendations expressed in this publication are the author's and do not necessarily reflect the views of Cornell University. All errors remain our sole responsibility.

The Economic Contributions of Agriculture to the New York State Economy (2014)

Introduction

Policymakers, industry leaders, planners and economic development professionals in New York State (NYS) are often confronted with a set of fundamental questions about agriculture-based economic development and its potential to support and/or enhance the economic vitality of communities across the state. Some of these questions are:

1. How can efforts to grow food and farming industries play into mainstream economic development efforts?
2. Are there unexploited opportunities to boost performance in agriculture and food sectors?
3. What types of programs or policies would support increases in backward linked business-to-business transactions (i.e., multiplier effects) for agricultural industries?
4. What benefits might come to local economies from more emphasis on local farm and food systems (i.e., import substitution) and/or more aggressive efforts to target offshore markets (i.e., exports)?
5. How can educators, community leaders, and public agencies intervene with farm and agribusiness firms in ways that lead to cumulative improvements in the economic and social climate for communities as well as farm and food production?

Answers to these types of questions are elusive. To remain successful, agricultural producers and associated agribusiness firms need to effectively and continuously adapt to changing economic conditions, consumer preferences, and technological advancements. To that end, firms are seeking innovative methods to attract new and growing markets for their commodities and products, vertically integrate their operations in both upstream and downstream markets, invest in new consumer-driven product development, and develop domestic and international joint ventures and strategic alliances. These activities suggest growing farm-to-food developments at the farm, as well as increased interaction and coordination with other industries, within and outside traditional agribusiness industries (Schmit and Bills 2012).

In order to define appropriate firm, industry, and public policy strategies to strengthen opportunities for economic development and improve the competitiveness of NYS's agribusiness industry, we must identify and understand the industry linkages associated with agricultural-based economic activity in the economy, and through that assess agriculture's impact (or contribution) to the economy. Given that structural relationships and market opportunities and challenges within the economy change over time, revisiting these issues regularly is important.

This report serves as an update to a previous effort that documented the importance and relationships of the State's major agricultural industries (see Schmit and Bills 2012, Schmit and Boisvert 2014, and Schmit 2014 for details). This report provides an updated assessment of the

overall contribution of agriculture to the NYS economy based on the framework utilized in Schmit (2014) using economic data from 2014. Such an assessment will aid in the understanding agriculture's total contribution in terms of its direct and backward-linked industry exchanges, but also its contribution relative to other industries. Given changes in market demands and supplies (and therefore prices) overtime, once can also evaluate these changes relative to the changes in overall economic contributions.

Methodological Approach

One approach to assessing agriculture's impacts in the NYS economy is through an economic contribution analysis. This type of analysis for an industry (like dairy farming) or collection of industries (like food processing) describes that portion of an economy that can be attributed to the existing industry (or industries) by using data internal to the underlying input-output (IO) model to identify all backward linkages in the study area; i.e., it identifies the total direct, indirect, and induced effects (see Box 1). IO models provide an insightful way to depict and investigate the underlying processes that bind an economy together. Its strengths lie in a detailed representation of: a) the primary and intermediate input requirements by production sector, b) the distribution of sales of individual industries throughout an economy, and c) the interrelationships among these industries and other economic sectors of an economy. The methodology's analytical capacity lies in its ability to estimate the indirect and induced economic effects stemming from the direct expenditures that lead to additional purchases by final users in an economy (Schmit and Boisvert 2014).

Box 1. What are direct, indirect and induced effects?	
Direct effects	The set of expenditures applied to the predictive model (i.e., I/O multipliers) for impact analysis. It is a series (or single) of production changes or expenditures made by producers/consumers as a result of an activity or policy. These initial changes are determined by an analyst to be a result of this activity or policy.
Indirect effects	The impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value added.
Induced effects	The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added. IMPLAN's default multiplier recognizes that labor income (employee compensation and proprietor income components of value added) is not a leakage to the regional economy. This money is recirculated through the household spending patterns causing further local economic activity.
Source: IMPLAN 2016	

In a contribution analysis, existing total output, not just final demand[1], provides the initial (direct) effects of the analysis and, when compared to the entire economy, the results provide insight into the relative extent of the industry in the economy and the strength of its backward linkages. In our particular application, IO analysis is used to assess how the value of agriculturally-related production, support services, and manufacturing (i.e., the

[1] The value of goods and services produced and sold to final users (institutions) during the calendar year. Final use means that the good or service will be consumed and not incorporated into another product (IMPLAN 2016).

industries we define to represent agriculture in the state) permeate throughout the state's economy.

There are several metrics in which to measure the size of an economy; here, we consider industry sales (output), labor income, total value added, and employment (see Box 2). In particular, we look at the contribution of: (*i*) all on-farm agricultural production industries, (*ii*) all agricultural support services industries (including forestry support services), (*iii*) all agricultural processing industries, and (*iv*) the combined impact of all three. We also examine more closely several individual agricultural production and processing sectors in the state. Finally, we highlight the backward-linked industries most affected by agriculture's direct impacts; i.e., we highlight the distribution of industry indirect and induced effects.

Box 2. Metrics Considered in our Analysis	
Output	The value of annual industry production, expressed in producer prices. For manufacturers this would be sales plus/minus change in inventory. For service sectors production = sales. For retail and wholesale trade, output = gross margin and not gross sales.
Labor Income	All forms of employment income, including employee compensation (total payroll costs of the employee paid by the employer; i.e., wages and benefits) and proprietor income (payments received by self-employed individuals and unincorporated business owners).
Value Added	The difference between an industry's total output and the cost of its intermediate inputs. It equals gross output minus the cost of intermediate inputs Value added consists of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus. Gross regional product derived from the income paid to owners of the factors of production. It is calculated as tthe difference between an industry's total output and the cost of its intermediate inputs. It consists of employee compensation, proprietor income, other property type income, and net taxes on production and imports.
Employment	The average annual number of jobs, both full and part time. Not full-time equivalents.
Source: IMPLAN (2016)	

The analysis is conducted using 2014 IMPLAN data and software. Following IMPLAN's recommended procedure for an economic contribution analysis, two preliminary steps are required before estimating the indirect and induced effects.[2] First, commodity production for each industry of interest is modified so that each industry produces only its primary commodity; i.e., no by-products. This is necessary since trade flows within IMPLAN (which are modified next) apply to commodities, not industries.[3] Second, within the trade flows data, the Regional Supply Coefficient (RSC) for each commodity contained in the contribution analysis is set to zero. The RSC indicates the proportion of local net supply of a commodity that goes to meet local

[2] A full description for conducting a contribution analysis in IMPLAN is available at http://support.implan.com/index.php?option=com_content&view=article&id=366.

[3] An industry may produce more than one commodity. For example, the industry "dairy cattle and milk production" produces three commodities: "dairy cattle and milk products", "agriculture and forestry support services", and "other amusements and recreation"; the proportional values are 0.98, 0.01, and 0.01, respectively. This likely reflects the dairy farming industry producing such things as technical farm services and agri-tourism, albeit in very small amounts.

demands. Editing the by-products and changing the RSC implies that all specified industry sectors will have sales only to exports (domestic or foreign), with zero intermediate output. This ensures that no one will purchase from these industries beyond the industry's total output. It forces the model to not be able to create any additional local impact for any of the sectors included in the contribution analysis, and effectively eliminates double counting of backward linkages. Furthermore, since all intermediate sales have been changed to final sales, the direct and indirect effects reported by IMPLAN have slightly different interpretations. Specifically, the direct effects (with respect to output) represent all sales by the industries of interest (in our case, agricultural industries as defined above). Total gross output is used as the direct effect, including final demand and the indirect and induced agricultural effects associated with that final demand. The indirect effects represent all sales by the backward-linked supply chain industries. In other words, all indirect purchases in upstream sectors or, in our case, all sales in the agricultural supply chain. The induced effects (by consumers) have their common interpretation; i.e., additional industry sales due to consumption out of increased income. The contribution concept is illustrated in Figure 1.

Using the IMPLAN data bases, it is possible to examine transactions among 536 industrial sectors of an economy as defined by the North American Industry Classification System (NAICS), the standard used by Federal statistical agencies to classify business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. To gain a better understanding of the structure of industries within New York's agricultural system, we construct an IO model for New York State based on this 2014 data.[4]

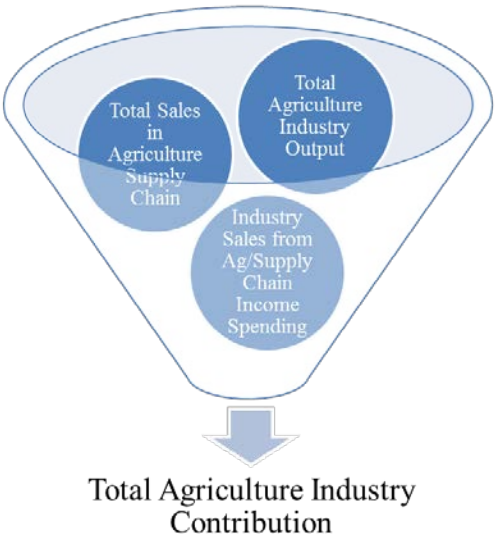

Figure 1. Elements of an agricultural economic contribution analysis

The 536 industries in the IMPLAN data base are aggregated into 36 economic sectors. In this process of aggregation, we define 16 of these industry sectors specifically aligned with the major components of the State's agricultural system, including agricultural production (5), service (1), and manufacturing (10) sectors. The other 20 economic sectors are defined by aggregating the remaining industries at the 2-digit NAICS level (Table 1).[5]

[4] Technically, we incorporate our analysis into a IMPLAN Social Accounting Matrix (SAM) model, rather than an IO model. The SAM has an input-output model at its core, but because the SAM distinguishes household purchasing patterns by income group, the impacts and multipliers based on the SAM reflect the ripple-effects throughout the economy with somewhat greater precision than do those based in an I-O model (Miller and Blair, 2009, chapter 11).
[5] The detailed aggregation scheme is shown in Appendix Table A1.

Table 1. Direct economic activity, New York State, 2014.

Industry	Industry Sales $ million	Industry Sales % of total	Employment Number of jobs	Employment % of total	Labor Income $ million	Labor Income % of total	Total Value Added $ million	Total Value Added % of total
Ag production - fruit and vegetable	**807**	**0.0**	**11,039**	**0.1**	**420**	**0.0**	**696**	**0.1**
Ag production - greenhouse and nursery	**512**	**0.0**	**5,926**	**0.1**	**282**	**0.0**	**408**	**0.0**
Ag production - grain, oilseed, other crops	**981**	**0.0**	**15,403**	**0.1**	**239**	**0.0**	**469**	**0.0**
Ag production – dairy	**3,472**	**0.2**	**13,145**	**0.1**	**800**	**0.1**	**1,905**	**0.1**
Ag production - beef, poultry, other animal	**893**	**0.0**	**8,971**	**0.1**	**164**	**0.0**	**462**	**0.0**
Ag support services	**304**	**0.0**	**7,088**	**0.1**	**198**	**0.0**	**221**	**0.0**
Forestry and comm. logging, fishing, & hunting	376	0.0	5,623	0.0	141	0.0	177	0.0
Mining and drilling	3,257	0.2	17,428	0.1	1,167	0.1	815	0.1
Utilities - generation and distribution	48,340	2.3	40,509	0.3	6,082	0.7	18,626	1.4
Construction	99,450	4.6	519,476	4.4	33,110	3.8	47,045	3.4
Ag manufacturing - animal foods	**2,284**	**0.1**	**1,740**	**0.0**	**125**	**0.0**	**267**	**0.0**
Ag manufacturing - grain and oilseed milling	**1,607**	**0.1**	**1,037**	**0.0**	**91**	**0.0**	**187**	**0.0**
Ag manufacturing - sugar and confectionary	**1,285**	**0.1**	**3,159**	**0.0**	**167**	**0.0**	**246**	**0.0**
Ag manufacturing - fruit, vegetable, specialty	**2,739**	**0.1**	**6,087**	**0.1**	**360**	**0.0**	**463**	**0.0**
Ag manufacturing – dairy	**8,236**	**0.4**	**10,084**	**0.1**	**700**	**0.1**	**976**	**0.1**
Ag manufacturing - meat and seafood	**2,061**	**0.1**	**4,656**	**0.0**	**247**	**0.0**	**347**	**0.0**
Ag manufacturing - bakery and tortilla	**5,262**	**0.2**	**37,942**	**0.3**	**1,343**	**0.2**	**2,131**	**0.2**
Ag manufacturing - other foods	**5,164**	**0.2**	**8,487**	**0.1**	**523**	**0.1**	**910**	**0.1**
Ag manufacturing - beverages (alc & nonalc)	**7,829**	**0.4**	**8,839**	**0.1**	**804**	**0.1**	**3,759**	**0.3**
Ag manufacturing – fert., chem., machinery	**1,378**	**0.1**	**1,726**	**0.0**	**119**	**0.0**	**320**	**0.0**
Non-food/ag manufacturing	173,780	8.1	408,183	3.5	32,974	3.8	55,439	4.0
Wholesale trade	101,178	4.7	377,712	3.2	36,020	4.2	68,714	5.0
Retail trade	92,193	4.3	1,068,869	9.1	41,378	4.8	63,341	4.6
Transportation & warehousing	51,691	2.4	365,350	3.1	18,347	2.1	25,671	1.9
Information	175,072	8.2	311,148	2.6	45,262	5.2	103,002	7.5
Finance and insurance	341,330	15.9	889,086	7.5	146,695	17.0	254,281	18.5
Real estate & rental	228,585	10.7	522,178	4.4	19,646	2.3	163,295	11.9
Professional- scientific and technical services	191,610	8.9	1,033,204	8.8	109,519	12.7	130,536	9.5
Management of companies	41,573	1.9	155,089	1.3	23,787	2.8	28,141	2.0
Administrative and waste services	47,771	2.2	605,423	5.1	28,580	3.3	35,013	2.5
Educational services	32,703	1.5	377,103	3.2	19,574	2.3	21,756	1.6
Health and social services	154,202	7.2	1,629,499	13.8	93,294	10.8	100,104	7.3
Arts- entertainment and recreation	30,527	1.4	339,703	2.9	13,492	1.6	19,323	1.4
Accommodations and food services	59,131	2.8	840,594	7.1	25,873	3.0	38,387	2.8
Other services	50,065	2.3	737,303	6.2	27,439	3.2	33,511	2.4
Government	176,640	8.2	1,412,592	12.0	135,130	15.6	154,335	11.2
Total	2,144,286	100.0	11,801,400	100.0	864,093	100.0	1,375,279	100.0

Source: IMPLAN 2016

Direct Impacts of Agriculture

Before discussing the results of the agriculture contribution analysis, it is useful to provide an overview of the NYS economy and to highlight agriculture's direct and relative contributions. A snapshot of the economy for 2014 is presented in Table 1. In terms of the relative contributions to the state's gross domestic product (i.e., total value added of $1,375 billion), the top five industries in NYS are finance and insurance (18.5%), real estate and rental (10.9%), and government (11.2%), professional technical services (9.5%) and information (7.5%). Given differences in labor intensities across industries, rankings on employment (total full and part time jobs) tell a slightly different story. Here, the highest relative contributions to the state's total employment (i.e., 11.8 million jobs) are for health and social services (12.8%), government (12.0%), retail trade (9.1%), professional technical services (8.8%), and finance and insurance (7.5%). Given over 40% of the state's population lives in New York City, state-level industry concentrations are certainly influenced by the composition of industries in the New York City Metropolitan Area.

Looking towards the agricultural industries, five aggregated on-farm production sectors are considered: (*i*) fruit and vegetable, (*ii*) greenhouse and nursery, (*iii*) grain, oilseed, and other crops, (*iv*) dairy, and (*v*) beef, poultry, and other animal production (Table 1, see Appendix Table A1 for detailed sector listings). In total, agricultural production activity generated about $6.6 billion in sales in 2014, which accounted for 0.3% of total industrial sales across the state. In terms of employment, agricultural production had over 54 thousand direct jobs, which represented about 0.5% of total state-level employment. Not surprisingly, on-farm dairy production was the largest single industry agricultural production sector in the state.

The agricultural and forestry support services sector is included within our broad definition of agriculture to encompass its key linkages with the farm production sectors. Agricultural support services include a variety of support activities related to custom harvesting and field preparation, fertilizer and chemical spraying, sorting, grading, and packing services, livestock insemination and breeding services, milk and crop testing, etc. While the overall sales contributions are relatively small ($304 million, Table 1), the relatively labor-intensive nature of the sector implies relatively strong contributions to overall agricultural employment; i.e., over 7,000 jobs in 2014.

Food (including beverages) and agricultural-based (including fertilizers, chemicals, and machinery) product manufacturers are represented by over 45 individual sectors in IMPLAN (see Appendix Table A1). For ease of exposition, we aggregated the individual sectors into 10 composite sectors, namely: (*i*) animal foods, (*ii*) grain and oilseed milling, (*iii*) sugar and confectionary (*iv*) fruit, vegetables, and specialty products, (*v*) dairy, (*vi*) meat and seafood, (*vii*) bakery and tortilla, (*viii*) other foods, (*iv*) beverages (both alcoholic and nonalcoholic), and (*x*) fertilizer, chemicals, and machinery manufacturing (Table 1). In total, agriculturally-based manufacturing industries in the state contributed nearly $38 billion in sales, representing about

1.8% of all sales in the state, and employment of over 83 thousand workers, representing slightly more than 0.7% of all state-wide employment. Over $9.6 billion in value added contributed to about 0.7% of state totals.

Dairy manufacturing accounted for over 21% of all agricultural manufacturing sales and 12% of employment, and relies heavily on within-state milk production from the farming sector (i.e., strong backward linkages). Other processing sectors with relatively strong reliance on in-state farm production and with strong output contributions are from fruit and vegetable, meat processing, and the beverage sectors. Other relatively large agricultural manufacturing sectors include bakery and tortilla product manufacturing, grain and oilseed milling, and other foods, but generally rely less on raw product inputs produced in the state. The diversity of the composition of agricultural manufacturing is a reflection of both a diverse agricultural production sector and a large population base.

Economic Contribution Results

The economic contribution of agriculture, as we have defined it, on total industrial sales in 2014 was $63.8 billion; about 3.0% of NYS's total sales (see Industry Output, All Agriculture, Table 2). The $44.8 billion of direct contributions (total gross output) support an additional $11.5 billion and $7.5 billion in indirect and induced industry sales, respectively, through agriculture's inter-industry linkages. Individual agricultural component contributions (i.e., for farm production, service, and manufacturing separately) are also shown in Table 2. Note, that while the direct contributions across agriculture's segments are additive (i.e., for the direct effects, agricultural production + agricultural support services + agricultural manufacturing = all agriculture), the same is not true for the indirect and induced impacts. For example, when looking at the agricultural manufacturing sector in isolation, a portion of the $15.1 billion in indirect effects includes backward-linkages to agricultural production sectors (as defined in the contribution analysis). Thus, when looking at the composite agriculture sector results, those agricultural production effects are already accounted for in the direct effects. Simply summing the individual indirect and induced impacts across agriculture's three components would result in double counting.

The implied output multiplier for all agriculture in NYS (i.e., the sum of the direct, indirect, and induced effects divided by the direct effect) is 1.42, meaning that for every additional dollar generated in agriculture, $0.42 is generated in backward linked (nonagricultural) industries (Table 2). If we decompose the multiplier effect into its indirect and induced components, the indirect effect is 0.25 (from business-to-business activity) and the induced effect is 0.17 (from labor income spending). Individual component contributions and output multipliers are also shown in the top section of Table 2.

Table 2. Economic contribution of agriculture on the New York State economy, aggregate agricultural industry sectors, 2014.

	Direct[a]	Indirect[b]	Induced[c]	Total	Implicit Multiplier[d]
Industry Output ($ million)					
Agricultural Production	6,665	1,310	1,660	9,635	1.45
Agricultural Support Services	304	41	148	493	1.62
Agricultural Manufacturing	37,844	15,080	6,697	59,621	1.58
All Agriculture	44,813	11,499	7,536	63,849	1.42
Employment (jobs)					
Agricultural Production	54,484	8,898	11,294	74,675	1.37
Agricultural Support Services	7,088	181	1,009	8,278	1.17
Agricultural Manufacturing	83,757	77,718	45,963	207,437	2.48
All Agriculture	145,328	54,458	51,683	251,469	1.73
Labor Income ($ million)					
Agricultural Production	1,905	458	667	3,030	1.59
Agricultural Support Services	198	14	60	271	1.37
Agricultural Manufacturing	4,480	5,391	2,713	12,585	2.81
All Agriculture	6,584	4,523	3,054	14,161	2.15
Total Value Added ($ million)					
Agricultural Production	3,941	748	1,102	5,791	1.47
Agricultural Support Services	221	23	98	342	1.55
Agricultural Manufacturing	9,606	9,240	4,481	23,327	2.43
All Agriculture	13,768	7,270	5,042	26,081	1.89

Source: IMPLAN 2016

[a] Direct effects represent total activity (sales, employment, labor income, value added) by the respective industry.

[b] Indirect effects represent all activity by the backward-linked supply chain industries.

[c] Induced effects represent additional industry activity due to consumption out of increased income by households in the directly and indirectly affected industries.

[d] The implicit multiplier is calculated as the total effect divided by the direct effect.

Total employment contributions in 2014 by New York agriculture was 251,469 jobs, 145,328 jobs through its direct employment, and an additional 106,141 jobs through its indirect and induced industry effects (Table 2). This represents approximately 2.1% of total NYS employment. As with industry output, the majority of the jobs are generated by agricultural manufacturing activity. Indeed, the agricultural manufacturing employment multiplier (2.48) is well above either the agricultural production (1.37) or support services (1.17) sectors and, in part, reflects strong linkages to agricultural production. In total, an additional job generated in agriculture supports another 0.73 jobs in backward-linked non-agricultural industry sectors.

Now consider labor income, which includes employee compensation (wages and benefits) and proprietor (self-employment) income. All of agriculture supports $14.2 billion in labor income, which is 1.6% of all labor income generated in NYS. The overall labor income multiplier is 2.15,

which indicates that for every additional dollar of labor income generated in agriculture, $1.15 is generated elsewhere in the NYS economy. As with output and employment, the bulk of the impact comes from agricultural manufacturing. Finally, consider total value added. Here, agriculture contributes $26.1 billion to the state's total GDP (1.9% of the total), through direct contributions of $13.8 billion, and indirect and induced contributions of $7.2 billion and $5.0 billion, respectively.

Economic contribution analyses were also conducted for each of the five defined on-farm agricultural production sectors (Table 3) and a subset of agricultural manufacturing sectors (Table 4). The results allow a more detailed comparison of the relative size of contributions across industries, and their related indirect and induced contributions. In addition, the relative contributions within industries can provide insight into the input-based nature of their production processes. For ease of exposition, we leave a detailed examination of each of the sector's results to the interested reader. However, note that for the on-farm production sectors (Table 3), the induced effects for the fruit and vegetable and greenhouse and nursery sectors are consistently larger than the indirect effects highlighting more intensive labor inputs required per unit of output (i.e., higher payments to labor) for these sectors. In contrast, the indirect effects are relatively larger for the grain, oilseed, and other crop, dairy sectors, reflecting relatively stronger business-to-business transactions. In addition, the indirect contributions are consistently larger than the induced contributions for each of the agricultural manufacturing sectors examined (Table 4) due, in part, to their relatively strong inter-industry linkages to farm production sectors in NYS.

Distributional Implications of Inter-Industry Linkages

Table 2 provides the total contributions from indirect and induced effects as a result of agriculture's direct contributions. While these results are useful in assessing total contributions to the NYS economy, it is additionally useful to examine what industry sectors contribute to those total indirect and induced effects. In other words, examining the relative sizes of the backward linkages across sectors.

Agricultural Production Linkages

Table 5 ranks the industry linkages (from highest to lowest) based on the level of indirect output effects from on-farm agricultural production activity in NYS (i.e., the direct effect), following the sector aggregation scheme illustrated in Table 1. The sizes of the individual indirect and induced effects are shown, along with the total of the indirect and induced effects. Ranking industries by the indirect effects places more attention to the business-to-business transactions in the state, rather than spending out of labor income, which is assumed in the model to be invariant to where the direct effect occurs (i.e., household spending is the same whether the labor income came from agriculture or a nonagricultural industry).

Table 3. Economic contribution of agricultural production sectors, New York State, 2014.

	Direct[a]	Indirect[b]	Induced[c]	Total	Implicit Multiplier[d]
Industry Output ($ million)					
Fruit and Vegetable	807	69	316	1,193	1.48
Greenhouse and Nursery	512	42	208	762	1.49
Grain, Oilseed, and Other Crops	981	322	251	1,555	1.58
Dairy	3,472	836	757	5,065	1.46
Beef, Poultry, and Other Animals	893	139	147	1,179	1.32
Employment					
Fruit and Vegetable	11,039	729	2,152	13,920	1.26
Greenhouse and Nursery	5,926	354	1,418	7,698	1.30
Grain, Oilseed, and Other Crops	15,403	2,603	1,710	19,716	1.28
Dairy	13,145	5,415	5,161	23,720	1.80
Beef, Poultry, and Other Animals	8,971	759	998	10,728	1.20
Labor Income ($ million)					
Fruit and Vegetable	420	29	127	576	1.37
Greenhouse and Nursery	282	17	84	382	1.36
Grain, Oilseed, and Other Crops	239	120	101	460	1.92
Dairy	800	272	305	1,376	1.72
Beef, Poultry, and Other Animals	164	43	59	266	1.62
Total Value Added ($ million)					
Fruit and Vegetable	696	44	210	950	1.36
Greenhouse and Nursery	408	26	138	572	1.40
Grain, Oilseed, and Other Crops	469	205	167	841	1.79
Dairy	1,905	454	503	2,863	1.50
Beef, Poultry, and Other Animals	462	71	97	631	1.37

Source: IMPLAN 2016

[a] Direct effects represent total activity (sales, employment, labor income, value added) by the respective industry.

[b] Indirect effects represent all activity by the backward-linked supply chain industries.

[c] Induced effects represent additional industry activity due to consumption out of increased income by households in the directly and indirectly affected industries.

[d] The implicit multiplier is calculated as the total effect divided by the direct effect.

Table 4. Economic contribution of selected agricultural manufacturing sectors, New York State, 2014.

	Direct[a]	Indirect[b]	Induced[c]	Total	Implicit Multiplier[d]
Industry Output ($ million)					
Grain and Oilseed	1,607	760	251	2,618	1.63
Fruit, Vegetable, and Specialty	2,739	1,128	532	4,399	1.61
Dairy	8,236	5,646	1,642	15,524	1.88
Meat and Seafood	2,061	616	295	2,972	1.44
Beverages (alc and nonalc)	7,829	2,145	1,108	11,081	1.42
Employment					
Grain and Oilseed	1,037	5,045	1,703	7,786	7.51
Fruit, Vegetable, and Specialty	6,087	5,601	3,617	15,305	2.51
Dairy	10,084	25,359	11,198	46,640	4.63
Meat and Seafood	4,656	4,748	2,008	11,411	2.45
Beverages (alc and nonalc)	8,839	9,854	7,555	26,248	2.97
Labor Income ($ million)					
Grain and Oilseed	91	272	101	464	5.11
Fruit, Vegetable, and Specialty	360	412	214	986	2.74
Dairy	700	1,672	661	3,032	4.33
Meat and Seafood	247	180	119	546	2.21
Beverages (alc and nonalc)	804	799	446	2,049	2.55
Total Value Added ($ million)					
Grain and Oilseed	187	455	166	809	4.32
Fruit, Vegetable, and Specialty	463	671	353	1,487	3.21
Dairy	976	3,244	1,093	5,313	5.44
Meat and Seafood	347	345	196	888	2.56
Beverages (alc and nonalc)	3,759	1,285	736	5,780	1.54

Source: IMPLAN 2016

[a] Direct effects represent total activity (sales, employment, labor income, value added) by the respective industry.

[b] Indirect effects represent all activity by the backward-linked supply chain industries.

[c] Induced effects represent additional industry activity due to consumption out of increased income by households in the directly and indirectly affected industries.

[d] The implicit multiplier is calculated as the total effect divided by the direct effect.

Table 5. Indirect and induced output effects, by industry, from agricultural production activity, New York State, 2014.[a]

		Indirect		Induced		Indirect+Induced	
Rank	Industry	$ million	% of total	$ million	% of total	$ million	% of total
1	Wholesale trade	300.5	22.9	82.2	5.0	382.6	12.9
2	Ag support services	208.5	15.9	0.1	0.0	208.5	7.0
3	Ag manufacturing - animal food	164.7	12.6	1.3	0.1	166.0	5.6
4	Real estate and rental	112.8	8.6	298.5	18.0	411.4	13.8
5	Finance and insurance	86.9	6.6	200.3	12.1	287.2	9.7
6	Transportation and warehousing	75.8	5.8	40.0	2.4	115.8	3.9
7	Professional services – scientific and technical	61.2	4.7	74.4	4.5	135.5	4.6
8	Utilities - generation and distribution	45.0	3.4	38.2	2.3	83.2	2.8
9	Ag manufacturing – fertilizer, chemicals, machinery	39.0	3.0	0.3	0.0	39.3	1.3
10	NonAg-based manufacturing	35.8	2.7	31.8	1.9	67.6	2.3
11	Construction	32.5	2.5	17.4	1.0	49.8	1.7
12	Government	27.4	2.1	63.2	3.8	90.6	3.0
13	Information	25.7	2.0	89.8	5.4	115.5	3.9
14	Administrative and waste services	23.8	1.8	39.9	2.4	63.8	2.1
15	Management of companies and enterprises	17.4	1.3	17.4	1.1	34.9	1.2
16	Other services	12.0	0.9	68.1	4.1	80.1	2.7
17	Retail trade	10.1	0.8	132.6	8.0	142.7	4.8
18	Ag manufacturing – grain and oilseed milling	9.0	0.7	0.6	0.0	9.6	0.3
19	Accommodations and food services	5.8	0.4	85.2	5.1	91.1	3.1
20	Ag manufacturing – beverages (alc and nonalc)	5.1	0.4	5.7	0.3	10.7	0.4
21	Arts, entertainment, and recreation	4.3	0.3	37.8	2.3	42.1	1.4
22	Ag manufacturing - meat and seafood	2.1	0.2	2.2	0.1	4.2	0.1
23	Mining and drilling	1.7	0.1	0.8	0.0	2.4	0.1
24	Educational services	1.4	0.1	47.7	2.9	49.1	1.7
25	Ag manufacturing - dairy	0.5	0.0	4.1	0.2	4.6	0.2
26	Ag manufacturing - other foods	0.5	0.0	1.9	0.1	2.3	0.1
27	Ag manufacturing - sugar and confectionary	0.3	0.0	0.4	0.0	0.7	0.0
28	Forestry and commercial logging, fishing, and hunting	0.3	0.0	0.3	0.0	0.6	0.0
29	Ag manufacturing – bakery and tortilla	0.2	0.0	3.3	0.2	3.6	0.1
30	Ag manufacturing – fruit, vegetables, and specialty	0.1	0.0	1.6	0.1	1.6	0.1
31	Health and social services	0.0	0.0	272.9	16.4	272.9	9.2
	Total	1,310.4	100.0	1,659.8	100.0	2,970.2	100.0

Source: IMPLAN 2016

[a] Industries are ranked based on their level of indirect effects (i.e., business-to-business linkages) generated from the (direct) agricultural production activity. The total output contribution from agricultural production sectors (i.e., the direct effect) was $6,665 million in 2014. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix Table A1.

While all sector effects are shown, note that the top 10 industries represent over 86% of all indirect sector contributions. Major household consumption expenditure categories are clearly articulated in the top induced effects; i.e., housing (real estate and rental), finance and insurance, health care (health and social services), and retail trade (including food purchases). The primary indirect effects highlight important supply chain industries for agriculture in NYS; i.e., wholesale trade (including wholesale product sellers and distributors), agricultural support services (e.g., crop and animal care), animal food manufacturing (consistent with large dairy and other livestock activities), real estate and rental (e.g., rented or leased land and equipment), and finance and insurance. In fact, these top five indirectly affected industries represent two-thirds of total indirect effects (i.e., $873 million of the $1.3 billion). The total indirect and induced effects from the agricultural production sectors is nearly $3.0 billion.

Table 6 provides a similar ranking of the strongest industrial sector backward linkages, but now in terms of employment effects. Again, the top 10 industry effects comprise most (92.1%) of the total indirect effects. While some of the top industries from Table 5 remain near the top, the relative rankings have changed considerably, and now represent sectors that are relatively more labor intensive (particularly service sectors). In particular, note the very strong employment linkages with firms involved in agricultural support service that comprises 54.6% of all indirect effects. Strong linkages with wholesale trade, transportation and warehousing, professional technical services, and administrative services also exist and account for 12.6%, 6.0%, 3.7%, and 3.4% of all indirect effects, respectively. Strong induced employment effects with retail trade, accommodations food services, real estate and rental, and other service sectors are consistent household spending activities in highly-oriented service types of sectors.

Agricultural Processing Linkages

The nature of the backward-linked industries, ranked by total indirect effects, for agricultural manufacturing activity are shown in Table 7 (with respect to output) and Table 8 (with respect to employment). In terms of output (employment), the top 10 industries represent 78.9% (83.2%) of all indirect sector contributions. As before, major industry expenditures by households are reflected in the highest induced effects, namely real estate and rental, health and social services, finance and insurance, and retail trade (Table 7).

The strong backward linkages to on-farm dairy production are evident when considering linkages to agricultural manufacturing activity in New York State. Just behind purchases from wholesalers and distributors, the dairy farming sector represents nearly 20% of all indirect output effects (Table 7). Relative sourcing volumes by food manufacturing firms for NYS farm produced products is indicative in the relative rankings beef and other livestock farming (ranked 13th), grain, oilseed, and other crop farming (ranked 14th), and fruit and vegetable farming (ranked 18th) (Table 7). Strong volumes of business with wholesale trade operations and

Table 6. Indirect and induced employment effects, by industry, from agricultural production activity, New York State, 2014.[a]

		Indirect		Induced		Indirect+Induced	
Rank	Industry	$ million	% of total	$ million	% of total	$ million	% of total
1	Ag support services	4,855.1	54.6	1.3	0.0	4,856.4	24.1
2	Wholesale trade	1,121.6	12.6	306.8	2.7	1,428.5	7.1
3	Transportation and warehousing	535.9	6.0	282.7	2.5	818.5	4.1
4	Professional services – scientific and technical	329.8	3.7	400.9	3.5	730.7	3.6
5	Administrative and waste services	302.1	3.4	505.9	4.5	808.0	4.0
6	Real estate and rental	257.8	2.9	682.0	6.0	939.7	4.7
7	Finance and insurance	226.4	2.5	521.7	4.6	748.1	3.7
8	Government	219.1	2.5	505.4	4.5	724.4	3.6
9	Other services	176.2	2.0	1,003.4	8.9	1,179.6	5.8
10	Construction	169.5	1.9	90.7	0.8	260.2	1.3
11	Ag manufacturing - animal food	125.5	1.4	1.0	0.0	126.5	0.6
12	Retail trade	116.6	1.3	1,537.5	13.6	1,654.1	8.2
13	NonAg-based manufacturing	84.0	0.9	74.7	0.7	158.7	0.8
14	Accommodations and food services	82.9	0.9	1,211.5	10.7	1,294.4	6.4
15	Management of companies and enterprises	65.1	0.7	65.1	0.6	130.2	0.6
16	Ag manufacturing – fertilizer, chemicals, machinery	48.9	0.5	0.4	0.0	49.3	0.2
17	Arts, entertainment, and recreation	48.4	0.5	420.6	3.7	469.0	2.3
18	Information	45.7	0.5	159.6	1.4	205.3	1.0
19	Utilities - generation and distribution	37.8	0.4	32.0	0.3	69.7	0.3
20	Educational services	16.3	0.2	549.7	4.9	566.0	2.8
21	Mining and drilling	9.0	0.1	4.1	0.0	13.1	0.1
22	Ag manufacturing – grain and oilseed milling	5.8	0.1	0.4	0.0	6.2	0.0
23	Ag manufacturing – beverages (alc and nonalc)	5.8	0.1	6.4	0.1	12.1	0.1
24	Ag manufacturing - meat and seafood	4.7	0.1	4.9	0.0	9.6	0.0
25	Forestry and commercial logging, fishing, and hunting	4.0	0.0	4.8	0.0	8.7	0.0
26	Ag manufacturing – bakery and tortilla	1.7	0.0	23.9	0.2	25.6	0.1
27	Ag manufacturing - other foods	0.8	0.0	3.1	0.0	3.8	0.0
28	Ag manufacturing - sugar and confectionary	0.7	0.0	1.0	0.0	1.7	0.0
29	Ag manufacturing - dairy	0.6	0.0	5.1	0.0	5.7	0.0
30	Ag manufacturing – fruit, vegetables, and specialty	0.1	0.0	3.5	0.0	3.6	0.0
31	Health and social services	0.1	0.0	2,883.6	25.5	2,883.6	14.3
	Total	8,897.7	100.0	11,293.5	100.0	20,191.2	100.0

Source: IMPLAN 2016

[a] Industries are ranked based on their level of indirect effects (i.e., business-to-business supply chain linkages) generated from the (direct) agricultural production activity. The total employment contribution from agricultural production sectors (i.e., the direct effect) was 54,484 jobs in 2014. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix Table A1.

Table 7. Indirect and induced output effects, by industry, from agricultural manufacturing activity, New York State, 2014.[a]

		Indirect		Induced		Indirect+Induced	
Rank	Industry	$ million	% of total	$ million	% of total	$ million	% of total
1	Wholesale trade	11,726.7	15.1	1,229.4	2.7	12,956.1	10.5
2	Dairy farming	11,105.3	14.3	0.5	0.0	11,105.8	9.0
3	Transportation and warehousing	8,203.0	10.6	1,123.7	2.4	9,326.6	7.5
4	Professional services - scientific and technical	5,815.5	7.5	1,628.4	3.5	7,443.9	6.0
5	Administrative and waste services	5,181.1	6.7	2,064.8	4.5	7,245.9	5.9
6	Grain, oilseed, and other crop farming	5,077.1	6.5	4.6	0.0	5,081.7	4.1
7	Management of companies amd enterprises	4,909.1	6.3	254.9	0.6	5,164.0	4.2
8	Beef, poultry, and other animal farming	3,824.0	4.9	23.2	0.1	3,847.3	3.1
9	Government	3,072.4	4.0	2,061.9	4.5	5,134.4	4.2
10	Support activities for agriculture and forestry	2,409.3	3.1	8.8	0.0	2,418.1	2.0
11	Other services	2,299.1	3.0	4,091.5	8.9	6,390.6	5.2
12	Fruit and vegetable farming	2,112.8	2.7	49.9	0.1	2,162.8	1.7
13	Retail trade	2,110.9	2.7	6,263.1	13.6	8,374.0	6.8
14	Finance and insurance	1,797.3	2.3	2,121.5	4.6	3,918.8	3.2
15	Accommodations and food services	1,646.6	2.1	4,926.2	10.7	6,572.8	5.3
16	Real estate and rental	1,511.5	1.9	2,806.9	6.1	4,318.3	3.5
17	NonAg-based manufacturing	1,434.0	1.8	303.7	0.7	1,737.6	1.4
18	Construction	1,175.7	1.5	370.7	0.8	1,546.3	1.3
19	Information	751.1	1.0	658.5	1.4	1,409.6	1.1
20	Arts, entertainment, and recreation	489.8	0.6	1,702.6	3.7	2,192.3	1.8
21	Utilities - generation and distribution	445.8	0.6	132.0	0.3	577.8	0.5
22	Forestry and commercial logging, fishing, and hunting	387.1	0.5	18.6	0.0	405.7	0.3
23	Mining and drilling	99.9	0.1	16.8	0.0	116.7	0.1
24	Greenhouse, nursery and floriculture production	99.7	0.1	12.0	0.0	111.6	0.1
25	Educational services	32.5	0.0	2,150.2	4.7	2,182.7	1.8
26	Health and social services	1.0	0.0	11,938.5	26.0	11,939.5	9.7
	Total	15,080.2	100.0	6,696.8	100.0	21,777.1	100.0

Source: IMPLAN 2016

[a] Industries are ranked based on their level of indirect effects (i.e., business-to-business supply chain linkages) generated from the (direct) agricultural manufacturing activity. The total output contribution from agricultural manufacturing sectors (i.e., the direct effect) was $37,844 million in 2014. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix Table A1.

Table 8. Indirect and induced employment effects, by industry, from agricultural manufacturing activity, New York State, 2014.[a]

		Indirect		Induced		Indirect+Induced	
Rank	Industry	$ million	% of total	$ million	% of total	$ million	% of total
1	Wholesale trade	11,726.7	15.1	1,229.4	2.7	12,956.1	10.5
2	Dairy farming	11,105.3	14.3	0.5	0.0	11,105.8	9.0
3	Transportation and warehousing	8,203.0	10.6	1,123.7	2.4	9,326.6	7.5
4	Professional services - scientific and technical	5,815.5	7.5	1,628.4	3.5	7,443.9	6.0
5	Administrative and waste services	5,181.1	6.7	2,064.8	4.5	7,245.9	5.9
6	Grain, oilseed, and other crop farming	5,077.1	6.5	4.6	0.0	5,081.7	4.1
7	Management of companies amd enterprises	4,909.1	6.3	254.9	0.6	5,164.0	4.2
8	Beef, poultry, and other animal farming	3,824.0	4.9	23.2	0.1	3,847.3	3.1
9	Government	3,072.4	4.0	2,061.9	4.5	5,134.4	4.2
10	Ag support services	2,409.3	3.1	8.8	0.0	2,418.1	2.0
11	Other services	2,299.1	3.0	4,091.5	8.9	6,390.6	5.2
12	Fruit and vegetable farming	2,112.8	2.7	49.9	0.1	2,162.8	1.7
13	Retail trade	2,110.9	2.7	6,263.1	13.6	8,374.0	6.8
14	Finance and insurance	1,797.3	2.3	2,121.5	4.6	3,918.8	3.2
15	Accommodations and food services	1,646.6	2.1	4,926.2	10.7	6,572.8	5.3
16	Real estate and rental	1,511.5	1.9	2,806.9	6.1	4,318.3	3.5
17	NonAg-based manufacturing	1,434.0	1.8	303.7	0.7	1,737.6	1.4
18	Construction	1,175.7	1.5	370.7	0.8	1,546.3	1.3
19	Information	751.1	1.0	658.5	1.4	1,409.6	1.1
20	Arts, entertainment, and recreation	489.8	0.6	1,702.6	3.7	2,192.3	1.8
21	Utilities - generation and distribution	445.8	0.6	132.0	0.3	577.8	0.5
22	Forestry and commercial logging, fishing, and hunting	387.1	0.5	18.6	0.0	405.7	0.3
23	Mining and drilling	99.9	0.1	16.8	0.0	116.7	0.1
24	Greenhouse, nursery and floriculture production	99.7	0.1	12.0	0.0	111.6	0.1
25	Educational services	32.5	0.0	2,150.2	4.7	2,182.7	1.8
26	Health and social services	1.0	0.0	11,938.5	26.0	11,939.5	9.7
	Total	77,718.2	100.0	45,962.6	100.0	123,680.9	100.0

Source: IMPLAN 2016

[a] Industries are ranked based on their level of indirect effects (i.e., business-to-business supply chain linkages) generated from the (direct) agricultural manufacturing activity. The total employment contribution from agricultural manufacturing sectors (i.e., the direct effect) was 83,757 jobs in 2014. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix Table A1.

transportation and warehousing firms reflect strong purchases by agricultural manufacturing firms for input supplies used in their production and distribution and storage services.

Given the strong output linkages from Table 7, it is not surprising that agricultural manufacturing (particularly dairy processing) strongly supports employment in the dairy farming sector. In particularly, nearly 15% of all indirect employment effects for agricultural manufacturing are in this sector (Table 9). Other top sectors with strong backward linked indirect employment effects include wholesale trade, transportation and warehousing, and professional and technical services.

Summary

Economic contribution analyses identify the portion of a region's economy that can be attributed to an existing industry or combination of industries through its direct, indirect and induced effects. Agriculture, incorporating agricultural production, support services, and manufacturing, represents a $63.8 billion industry in NYS, with over 250,000 jobs when the value of inter-industry linkages is considered. While total agriculturally-related industry activity represents a relatively small proportion of total state output (3.0%), employment (2.1%), and contributions to GDP (1.9%), relative contributions for smaller rural agricultural areas and communities will vary.

The general points of this exercise were to better understand agricultures' total contribution to the NYS economy and to demonstrate the strong ripple (multiplier) effects agriculture has given its strong backward-linked supply chain effects and related industry spending out of labor income generated in agriculture. In addition, a closer examination of the distribution of the indirect and induced effects promotes a better understanding with what sectors these ripple effects arise from. While industries with strong ripple effects in the state may be desirable industries to target for expansion from a policy perspective, it is important to emphasize that the sizes of these multipliers says nothing about the likelihood or means by which they will/can be expanded. The likelihood of expansion of the sectors depends on where markets may be expanding and the extent to which these are the ones in which the multipliers are large. The extent to which public policy can help in expanding opportunities is also important.

Throughout this report we have examined the several multiplier effects associated with the various ag-based economic sectors in NYS. In closing, however, it is important to re-emphasize that it is most appropriate to use these multipliers to examine the impact of marginal (rather small) changes in any particular industry. Relatively large changes in an industry are most likely to be accompanied by structural changes in the nature of the economy's inter-industry transactions. Under these conditions, it may be more problematic to base estimates of the economic impacts on current estimates of economic multipliers.

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Appendix

Table A1. Mapping of IMPLAN industries to industries of the 2014 New York model (bolded industries included as agricultural industries).

New York model		Implan industry	
Number and Name		**Number and Name**	
1	**Ag production – fruit and vegetable**	3 4 5	Vegetable and melon farming Fruit farming Tree nut farming
2	**Ag production – greenhouse and nursery**	6	Greenhouse, nursery, and floriculture production
3	**Ag production – grain, oilseed, and other crops**	2 1 7 8 9 10	Grain farming Oilseed farming Tobacco farming (no industry in NYS) Cotton farming (no industry in NYS) Sugarcane and sugar beet farming (no industry in NYS) All other crop farming
4	**Ag production – dairy**	11 13 14	Beef cattle ranching and farming Poultry and egg production Animal production, except cattle and poultry and eggs
5	**Ag production – beef, poultry, and other animal**	6	Greenhouse, nursery, and floriculture production
6	**Ag support services**	19	Support activities for agriculture and forestry
7	Forestry and commercial logging, fishing, and hunting	15 16 17 18	Forestry, forest products, and timber tract production Commercial logging Commercial fishing Commercial hunting and trapping
8	Mining and drilling	20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Extraction of natural gas and crude petroleum Extraction of natural gas liquids Coal mining (no industry in NYS) Iron ore mining (no industry in NYS) Gold ore mining Silver ore mining (no industry in NYS) Lead and zinc ore mining (no industry in NYS) Copper ore mining Uranium-radium-vanadium ore mining (no industry in NYS) Other metal ore mining Stone mining and quarrying Sand and gravel mining Other clay, ceramic, refractory minerals mining Potash, soda, borate mineral mining (no industry in NYS) Phosphate rock mining (no industry in NYS) Other chemical and fertilizer mineral mining Other nonmetallic minerals Drilling oil and gas wells Support activities for oil and gas operations Metal mining services Other nonmetallic minerals services
9	Utilities – generation and distribution	41 42 43 44 45 46 47 48 49 50 51	Electric power generation - Hydroelectric Electric power generation - Fossil fuel Electric power generation - Nuclear Electric power generation - Solar Electric power generation - Wind Electric power generation – Geothermal (no industry in NYS) Electric power generation - Biomass Electric power generation - All other Electric power transmission and distribution Natural gas distribution Water, sewage and other systems
10	Construction	52 53	Construction of new health care structures Construction of new manufacturing structures

10	Construction (continued)	54 55 56 57 58 59 60 61 62 63 64	Construction of new power and communication structures Construction of new educational and vocational structures Construction of new highways and streets Construction of new comm. structures, incl. farm structures Construction of other new nonresidential structures Construction of new single-family residential structures Construction of new multifamily residential structures Construction of other new residential structures Maintenance and repair construction of nonres. structures Maintenance and repair construction of residential structures Maint. & rep. constr. of highways, streets, bridges, tunnels
11	**Ag manufacturing – animal foods**	65 66	Dog and cat food manufacturing Other animal food manufacturing
12	**Ag manufacturing – grain and oilseed milling**	67 68 69 70 71 72 73	Flour milling Rice milling (no industry in NYS) Malt manufacturing (no industry in NYS) Wet corn milling (no industry in NYS) Soybean and other oilseed processing Fats and oils refining and blending Breakfast cereal manufacturing
13	**Ag manufacturing – sugar and confectionary**	74 75 76 77 78	Beet sugar manufacturing Sugar cane mills and refining Nonchocolate confectionery manufacturing Chocolate and confectionery manufacturing from cacao beans Confectionery manufacturing from purchased chocolate
14	**Ag manufacturing – fruit, vegetable, and specialty**	79 80 81 82 83	Frozen fruits, juices and vegetables manufacturing Frozen specialties manufacturing Canned fruits and vegetables manufacturing Canned specialties Dehydrated food products manufacturing
15	**Ag manufacturing – dairy**	84 85 86 87 88	Fluid milk manufacturing (includes yogurt) Creamery butter manufacturing Cheese manufacturing Dry, condensed, and evaporated dairy product manufacturing Ice cream and frozen dessert manufacturing
16	**Ag manufacturing – meat and seafood**	89 90 91 92 93	Animal, except poultry, slaughtering Meat processed from carcasses Rendering and meat byproduct processing Poultry processing Seafood product preparation and packaging
17	**Ag manufacturing – bakery and tortilla**	94 95 96 97 98	Bread and bakery product, except frozen, manufacturing Frozen cakes and other pastries manufacturing Cookie and cracker manufacturing Dry pasta, mixes, and dough manufacturing Tortilla manufacturing
18	**Ag manufacturing – other foods**	99 100 101 102 103 104 105	Roasted nuts and peanut butter manufacturing Other snack food manufacturing Coffee and tea manufacturing Flavoring syrup and concentrate manufacturing Mayonnaise, dressing, and sauce manufacturing Spice and extract manufacturing All other food manufacturing58
19	**Ag manufacturing – beverages**	106 107 108 109 110	Bottled and canned soft drinks & water Manufactured ice Breweries Wineries Distilleries
20	**Ag manufacturing – fertilizer, chemical, machinery**	169 170	Nitrogenous fertilizer manufacturing Phosphatic fertilizer manufacturing

20	**Ag manufacturing – fertilizer, chemical, machinery (continued)**	171 Fertilizer mixing 172 Pesticide and other agricultural chemical manufacturing 262 Farm machinery and equipment manufacturing 267 Food product machinery manufacturing
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		167	Synthetic rubber manufacturing
		168	Artificial and synthetic fibers and filaments manufacturing
		173	Medicinal and botanical manufacturing
		174	Pharmaceutical preparation manufacturing
		175	In-vitro diagnostic substance manufacturing
		176	Biological product (except diagnostic) manufacturing
		177	Paint and coating manufacturing
		178	Adhesive manufacturing
		179	Soap and other detergent manufacturing
		180	Polish and other sanitation good manufacturing
		181	Surface active agent manufacturing
		182	Toilet preparation manufacturing
		183	Printing ink manufacturing
		184	Explosives manufacturing
		185	Custom compounding of purchased resins
		186	Photographic film and chemical manufacturing
		187	Other miscellaneous chemical product manufacturing
		188	Plastics packaging materials, unlaminated film, sheet mfg
		189	Unlaminated plastics profile shape manufacturing
		190	Plastics pipe and pipe fitting manufacturing
		191	Laminated plastics plate, sheet (ex packaging), shape mfg
		192	Polystyrene foam product manufacturing
		193	Urethane, other foam product (ex polystyrene) manufacturing
		194	Plastics bottle manufacturing
		195	Other plastics product manufacturing
		196	Tire manufacturing
		197	Rubber and plastics hoses and belting manufacturing
		198	Other rubber product manufacturing
21	Nonfood/ag manufacturing (continued)	199	Pottery, ceramics, and plumbing fixture manufacturing
		200	Brick, tile, and other structural clay product manufacturing
		201	Flat glass manufacturing
		202	Other pressed and blown glass and glassware manufacturing
		203	Glass container manufacturing
		204	Glass product manufacturing made of purchased glass
		205	Cement manufacturing
		206	Ready-mix concrete manufacturing
		207	Concrete block and brick manufacturing
		208	Concrete pipe manufacturing
		209	Other concrete product manufacturing
		210	Lime manufacturing
		211	Gypsum product manufacturing
		212	Abrasive product manufacturing
		213	Cut stone and stone product manufacturing
		214	Ground or treated mineral and earth manufacturing
		215	Mineral wool manufacturing
		216	Miscellaneous nonmetallic mineral products manufacturing
		217	Iron and steel mills and ferroalloy manufacturing
		218	Iron, steel pipe and tube manufacturing from purchased steel
		219	Rolled steel shape manufacturing
		220	Steel wire drawing
		221	Alumina refining and primary aluminum production
		222	Secondary smelting and alloying of aluminum
		223	Aluminum sheet, plate, and foil manufacturing
		224	Other aluminum rolling, drawing and extruding
		225	Nonferrous metal (exc aluminum) smelting and refining
		226	Copper rolling, drawing, extruding and alloying
		227	Nonferrous metal, except copper and aluminum, shaping
		228	Secondary processing of other nonferrous metals
		229	Ferrous metal foundries
		230	Nonferrous metal foundries

21	Nonfood/ag manufacturing (continued)	231	Iron and steel forging
		232	Nonferrous forging
		233	Custom roll forming
		234	Crown and closure manufacturing and metal stamping
		235	Cutlery, utensil, pot, and pan manufacturing
		236	Handtool manufacturing
		237	Prefabricated metal buildings and components manufacturing
		238	Fabricated structural metal manufacturing
		239	Plate work manufacturing
		240	Metal window and door manufacturing
		241	Sheet metal work manufacturing
		242	Ornamental and architectural metal work manufacturing
		243	Power boiler and heat exchanger manufacturing
		244	Metal tank (heavy gauge) manufacturing
		245	Metal cans manufacturing
		246	Metal barrels, drums and pails manufacturing
		247	Hardware manufacturing
		248	Spring and wire product manufacturing
		249	Machine shops
		250	Turned product and screw, nut, and bolt manufacturing
		251	Metal heat treating
		252	Metal coating and nonprecious engraving
		253	Electroplating, anodizing, and coloring metal
		254	Valve and fittings, other than plumbing, manufacturing
		255	Plumbing fixture fitting and trim manufacturing
		256	Ball and roller bearing manufacturing
		257	Small arms ammunition manufacturing
		258	Ammunition, except for small arms, manufacturing
		259	Small arms, ordnance, and accessories manufacturing
		260	Fabricated pipe and pipe fitting manufacturing
		261	Other fabricated metal manufacturing
		263	Lawn and garden equipment manufacturing
		264	Construction machinery manufacturing
		265	Mining machinery and equipment manufacturing
		266	Oil and gas field machinery and equipment manufacturing
		268	Semiconductor machinery manufacturing
		269	Sawmill, woodworking, and paper machinery
		270	Printing machinery and equipment manufacturing
		271	All other industrial machinery manufacturing
		272	Optical instrument and lens manufacturing
		273	Photographic and photocopying equipment manufacturing
		274	Other commercial service industry machinery manufacturing
		275	Air purification and ventilation equipment manufacturing
		276	Heating equipment (except warm air furnaces) manufacturing
		277	Air conditioning, refrigeration, warm air heating eq mfg
		278	Industrial mold manufacturing
		279	Special tool, die, jig, and fixture manufacturing
		280	Cutting tool and machine tool accessory manufacturing
		281	Machine tool manufacturing
		282	Rolling mill and other metalworking machinery manufacturing
		283	Turbine and turbine generator set units manufacturing
		284	Speed changer, industrial high-speed drive, gear manufacturing
		285	Mechanical power transmission equipment manufacturing
		286	Other engine equipment manufacturing
		287	Pump and pumping equipment manufacturing
		288	Air and gas compressor manufacturing
		289	Measuring and dispensing pump manufacturing
		290	Elevator and moving stairway manufacturing
		291	Conveyor and conveying equipment manufacturing
		292	Overhead cranes, hoists, and monorail systems manufacturing

21	Nonfood/ag manufacturing (continued)	293 Industrial truck, trailer, and stacker manufacturing 294 Power-driven handtool manufacturing 295 Welding and soldering equipment manufacturing 296 Packaging machinery manufacturing 297 Industrial process furnace and oven manufacturing 298 Fluid power cylinder and actuator manufacturing 299 Fluid power pump and motor manufacturing 300 Scales, balances, misc general purpose machinery mfg 301 Electronic computer manufacturing 302 Computer storage device manufacturing 303 Computer terminals, other computer peripheral equipment mfg 304 Telephone apparatus manufacturing 305 Broadcast and wireless communications equip manufacturing 306 Other communications equipment manufacturing 307 Audio and video equipment manufacturing 308 Bare printed circuit board manufacturing 309 Semiconductor and related device manufacturing 310 Capacitor, resistor, coil, transformer, other inductor mfg 311 Electronic connector manufacturing 312 Printed circuit assembly (electronic assembly) manufacturing 313 Other electronic component manufacturing 314 Electromedical and electrotherapeutic apparatus manufacturing 315 Search, detection, and navigation instruments manufacturing 316 Automatic environmental control manufacturing 317 Industrial process variable instruments manufacturing 318 Totalizing fluid meter and counting device manufacturing 319 Electricity and signal testing instruments manufacturing 320 Analytical laboratory instrument manufacturing 321 Irradiation apparatus manufacturing 322 Watch, clock, and other measuring and controlling device mfg 323 Blank magnetic and optical recording media manufacturing 324 Software and other prerecorded and record reproducing 325 Electric lamp bulb and part manufacturing 326 Lighting fixture manufacturing 327 Small electrical appliance manufacturing 328 Household cooking appliance manufacturing 329 Household refrigerator and home freezer manufacturing 330 Household laundry equipment manufacturing 331 Other major household appliance manufacturing 332 Power, distribution, and specialty transformer manufacturing 333 Motor and generator manufacturing 334 Switchgear and switchboard apparatus manufacturing 335 Relay and industrial control manufacturing 336 Storage battery manufacturing 337 Primary battery manufacturing 338 Fiber optic cable manufacturing 339 Other communication and energy wire manufacturing 340 Wiring device manufacturing 341 Carbon and graphite product manufacturing 342 All other misc electrical equipment and component mfg 343 Automobile manufacturing 344 Light truck and utility vehicle manufacturing 345 Heavy duty truck manufacturing 346 Motor vehicle body manufacturing 347 Truck trailer manufacturing 348 Motor home manufacturing 349 Travel trailer and camper manufacturing 350 Motor vehicle gasoline engine and engine parts manufacturing 351 Motor vehicle electrical and electronic equip manufacturing 352 Motor vehicle steering, suspension comp (ex spring), brake mfg

21	Nonfood/ag manufacturing (continued)	353	Motor vehicle transmission and power train parts manufacturing
		354	Motor vehicle seating and interior trim manufacturing
		355	Motor vehicle metal stamping
		356	Other motor vehicle parts manufacturing
		357	Aircraft manufacturing
		358	Aircraft engine and engine parts manufacturing
		359	Other aircraft parts and auxiliary equipment manufacturing
		360	Guided missile and space vehicle manufacturing
		361	Propulsion units, parts for space vehicles, guided missiles mfg
		362	Railroad rolling stock manufacturing
		363	Ship building and repairing
		364	Boat building
		365	Motorcycle, bicycle, and parts manufacturing
		366	Military armored vehicle, tank, tank component manufacturing
		367	All other transportation equipment manufacturing
		368	Wood kitchen cabinet and countertop manufacturing
		369	Upholstered household furniture manufacturing
		370	Nonupholstered wood household furniture manufacturing
		371	Other household nonupholstered furniture manufacturing
		372	Institutional furniture manufacturing
		373	Wood office furniture manufacturing
		374	Custom architectural woodwork and millwork
		375	Office furniture, except wood, manufacturing
		376	Showcase, partition, shelving, and locker manufacturing
		377	Mattress manufacturing
		378	Blind and shade manufacturing
		379	Surgical and medical instrument manufacturing
		380	Surgical appliance and supplies manufacturing
		381	Dental equipment and supplies manufacturing
		382	Ophthalmic goods manufacturing
		383	Dental laboratories
		384	Jewelry and silverware manufacturing
		385	Sporting and athletic goods manufacturing
		386	Doll, toy, and game manufacturing
		387	Office supplies (except paper) manufacturing
		388	Sign manufacturing
		389	Gasket, packing, and sealing device manufacturing
		390	Musical instrument manufacturing
		391	Fasteners, buttons, needles, and pins manufacturing
		392	Broom, brush, and mop manufacturing
		393	Burial casket manufacturing
		394	All other miscellaneous manufacturing
22	Wholesale trade	395	Wholesale trade
23	Retail trade	396	Retail - Motor vehicle and parts dealers
		397	Retail - Furniture and home furnishings stores
		398	Retail - Electronics and appliance stores
		399	Retail - Building material and garden equipment supplies stores
		400	Retail - Food and beverage stores
		401	Retail - Health and personal care stores
		402	Retail - Gasoline stores
		403	Retail - Clothing and clothing accessories stores
		404	Retail - Sporting goods, hobby, musical instrument, book stores
		405	Retail - General merchandise stores
		406	Retail - Miscellaneous store retailers
		407	Retail - Nonstore retailers
24	Transportation and warehousing	408	Air transportation
		409	Rail transportation
		410	Water transportation
		411	Truck transportation
		412	Transit and ground passenger transportation

24	Transportation and warehousing (continued)	413	Pipeline transportation
		414	Scenic, sightseeing transportation, support activities for transp
		415	Couriers and messengers
		416	Warehousing and storage
25	Information	417	Newspaper publishers
		418	Periodical publishers
		419	Book publishers
		420	Directory, mailing list, and other publishers
		421	Greeting card publishing
		422	Software publishers
		423	Motion picture and video industries
		424	Sound recording industries
		425	Radio and television broadcasting
		426	Cable and other subscription programming
		427	Wired telecommunications carriers
		428	Wireless telecommunications carriers (except satellite)
		429	Satellite, telecomm resellers, and all other telecommunications
		430	Data processing, hosting, and related services
		431	News syndicates, libraries, archives, all other info services
		432	Internet publishing and broadcasting and web search portals
26	Finance and Insurance	433	Monetary authorities and depository credit intermediation
		434	Nondepository credit intermediation and related activities
		435	Securities and commodity contracts intermed and brokerage
		436	Other financial investment activities
		437	Insurance carriers
		438	Insurance agencies, brokerages, and related activities
		439	Funds, trusts, and other financial vehicles
27	Real estate and rental	440	Real estate
		441	Owner-occupied dwellings
		442	Automotive equipment rental and leasing
		443	General and consumer goods rental except video tapes and discs
		444	Video tape and disc rental
		445	Commercial and industrial machinery, equipment rental, leasing
		446	Lessors of nonfinancial intangible assets
28	Professional – scientific and technical services	447	Legal services
		448	Accounting, tax preparation, bookkeeping, and payroll services
		449	Architectural, engineering, and related services
		450	Specialized design services
		451	Custom computer programming services
		452	Computer systems design services
		453	Other computer related services, incl facilities management
		454	Management consulting services
		455	Environmental and other technical consulting services
		456	Scientific research and development services
		457	Advertising, public relations, and related services
		458	Photographic services
		459	Veterinary services
		460	Marketing research, all other misc prof, scientific, tech services
29	Management of companies	461	Management of companies and enterprises
30	Administrative and waste services	462	Office administrative services
		463	Facilities support services
		464	Employment services
		465	Business support services
		466	Travel arrangement and reservation services
		467	Investigation and security services
		468	Services to buildings
		469	Landscape and horticultural services
		470	Other support services
		471	Waste management and remediation services

31	Educational services	472	Elementary and secondary schools
		473	Junior colleges, colleges, universities, and professional schools
		474	Other educational services
32	Health and social services	475	Offices of physicians
		476	Offices of dentists
		477	Offices of other health practitioners
		478	Outpatient care centers
		479	Medical and diagnostic laboratories
		480	Home health care services
		481	Other ambulatory health care services
		482	Hospitals
		483	Nursing and community care facilities
		484	Resid mental retardation & health, subst abuse, other facilities
		485	Individual and family services
		486	Community food, housing, other relief, incl rehab services
		487	Child day care services
33	Arts, entertainment and recreation	488	Performing arts companies
		489	Commercial Sports Except Racing
		490	Racing and Track Operation
		491	Promoters of performing arts, sports, agents for public figures
		492	Independent artists, writers, and performers
		493	Museums, historical sites, zoos, and parks
		494	Amusement parks and arcades
		495	Gambling industries (except casino hotels)
		496	Other amusement and recreation industries
		497	Fitness and recreational sports centers
		498	Bowling centers
34	Accommodations and food services	499	Hotels and motels, including casino hotels
		500	Other accommodations
		501	Full-service restaurants
		502	Limited-service restaurants
		503	All other food and drinking places
35	Other services	504	Automotive repair and maintenance, except car washes
		505	Car washes
		506	Electronic and precision equipment repair and maintenance
		507	Comm and industrial machinery and equip repair and maint
		508	Personal and household goods repair and maintenance
		509	Personal care services
		510	Death care services
		511	Dry-cleaning and laundry services
		512	Other personal services
		513	Religious organizations
		514	Grantmaking, giving, and social advocacy organizations
		515	Business and professional associations
		516	Labor and civic organizations
		517	Private households
36	Government	518	Postal service
		519	Federal electric utilities
		520	Other federal government enterprises
		521	State government passenger transit
		522	State government electric utilities
		523	Other state government enterprises
		524	Local government passenger transit
		525	Local government electric utilities
		526	Other local government enterprises
		527	Not an industry (Used and secondhand goods)
		528	Not an industry (Scrap)
		529	Not an industry (Rest of world adjustment)
		530	Not an industry (Noncomparable foreign imports)
		531	Employment and payroll of state govt, non-education

36 Government (continued)	532 Employment and payroll of state govt, education 533 Employment and payroll of local govt, non-education 534 Employment and payroll of local govt, education 535 Employment and payroll of federal govt, non-military 536 Employment and payroll of federal govt, military

OTHER A.E.M. EXTENSION BULLETINS

EB No	Title	Fee (if applicable)	Author(s)
2016-08	Dairy Farm Business Summary, Northern New York Region, 2015	($16.00)	Knoblauch, W., Dymond, C., Karszes, J., Howland, B., Murray, P., Manning, J. and Kimmich, R.
2016-07	Dairy Farm Business Sumarry, Hudson and Central New York Region, 2015	($16.00)	Knoblauch, W., Dymond, C., Karszes, J., Howland, B., Buxton, S., Kiraly, M., Kimmich, R., Shoen, K., and Overton, R.
2016-06	An Analysis of Opportunities For Food Hub Development In Northern New York		Severson, R., Schmit, T., and Shin, P.
2016-05	Business Transfer Guide for the Junior Generation		Richards, S., Shipman, L., Welch, D. and Leubner, E.
2016-04	Dairy Farm Business Summary, Western New York Region, 2015	($16.00)	Knoblauch, W., Dymond, C., Karszes, J., Howland, B., Hanchar, J., Petzen, J., Overton, R., and Kimmich, R.
2016-03	Dairy Farm Business Summary, New York Large Herd Farms, 300 Cows or Larger, 2015	($20.00)	Karszes, J., Knoblauch, W. and Dymond, C.
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2015-13	Workforce Issues: Profiles of Specialty Crop Farms in New York State		Maloney, T., Smith, M., Saputo, R. and B. Rickard
2015-12	Cost of Establishment and Production of Cold Hardy Grapes in the Thousand Islands Region of New York - 2015		Oh, D., Kananizadeh, S., Gómez, M. and T. Martinson
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