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The Economic Contributions of Agriculture to the Northern New York Economy: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2019 & 2020

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Abstract

In 2019, agricultural industries, including agricultural production, agricultural support services, and agricultural manufacturing, directly contributed $1.5 billion in total industry output, 6.6 thousand jobs, and $344 Million in gross domestic product to the 4-county 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 $1.7 billion, 8.2 thousand, and $513 million, respectively. This implies relatively strong multiplier effects in agriculture for the region, whereby every $1 in output in agriculture generates an additional $0.19 in backward linked non-agricultural industries, every job in agriculture generates an additional 0.24 non-agricultural jobs, and every $1 in gross domestic product generates an additional $0.49 in non-agricultural contributions to gross domestic product.

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Introduction

Policymakers, industry leaders, planners and economic development professionals 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. 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 & Bills 2012).

In order to define appropriate firm, industry, and public policy strategies to strengthen opportunities for economic development and improve the competitiveness of agribusiness industries, we must identify and understand the industry linkages associated with agricultural-based economic activity in the economy, and through that assess agriculture's 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, focusing on a sub-state region consisting of Jefferson, Lewis, St. Lawrence, and Oswego counties, serves as complementary to a recent study conducted for New York State (NYS) by Schmit (2021). For ease of exposition, we will refer to the 4-county region as Northern New York (NNY). Generally, economic regions are most appropriately defined over levels of industrial and institutional activity, populations, and commuting distances, as opposed to areas defined over specific political boundaries (counties in our case). However, data availability issues often limit the application of the former and political boundary applications often serve useful purposes within public policy and economic development discussions. Defining regions is also dependent on the nature of research/study objectives.

Technically, any region defined as 'local' can be utilized within the analytical framework presented here, but the practical implications of the results therefrom are more limited. In general, the larger the economic region of focus, the larger the industry multiplier impacts, given restrictions on the level of 'local' spending that drives impact; i.e., there are more opportunities for leakage of dollars outside the local economy. For particular industries, however, this need not hold universally, as it depends on the extent of local backward link industry capacity to the industries and region of focus.

This report provides an assessment of the overall economic contribution of agriculture to the NNY economy, based on the framework utilized in Schmit (2021) and using economic data from 2019 and 2020. Such an assessment aids in the understanding agriculture's total contribution in terms of its direct and backward-linked industry exchanges, and its contribution relative to other industries. Given changes in market demands and supplies (and therefore prices) overtime, one can also evaluate these changes

relative to the changes in overall economic contributions. While much of our focus here is on 2019 (pre-Covid), we also provide comparisons of results with 2020, the first year under Covid-19 global health pandemic, to provide some indication of industry and supply chain adjustments during that time, albeit assessed along more aggregated industry definitions. How industries responded to the pandemic and how the inter-industry linkages change and evolve will be of particular consequence for future studies.

Methodological Approach

One approach to assessing agriculture's impacts to a defined 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).

Box 1. What are direct, indirect and induced effects?	
Direct effects	The set of expenditures applied to the predictive model for impact analysis. It is a series (or single) of production changes or expenditures made by producers and 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 (direct) change 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) is not a leakage to the regional economy. This money is recirculated through the household spending patterns causing further local economic activity.
Source: IMPLAN 2022	

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 the primary and intermediate input requirements by production sector, the distribution of sales of individual industries throughout an economy, and 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).

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 industries we define to represent "agriculture", permeate throughout the defined 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).

[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 2021).

In particular, we look at the contribution of all on-farm agricultural production industries, all agricultural support services industries, all agricultural processing industries, and the combined impact of all three. We also examine more closely several individual agricultural production and processing sectors. 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	Gross regional product derived from the income paid to owners of the factors of production. It is calculated as the 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 number of monthly of jobs, both full and part time. Not full-time equivalents.
Source: IMPLAN 2022	

The analysis is conducted using IMPLAN data and software. Following IMPLAN's recommended procedure for an economic contribution analysis to avoid double counting. In so doing, the direct and indirect effects reported have slightly different interpretations than in a traditional economic "impact" analysis. 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 have their common interpretation; i.e., additional industry sales due to consumption out of labor income.

Using the IMPLAN databases, it is possible to examine transactions among 544 industrial sectors of an economy. To gain a better understanding of the structure of industries within New York's agricultural system, we construct customized IO models for NYS and NNY based on this data. For our purposes, the 544 industries in IMPLAN are aggregated into 36 economic sectors. In this process of aggregation, we define 16 industry sectors specifically aligned with the major components of the agricultural system, including agricultural production (5), support services (1), and manufacturing (10) sectors. The other 20 economic sectors are defined by aggregating the remaining industries at the 2-digit NAICS level. The construction of those industry aggregates and enumeration by industry sales, employment, labor income, and total value added is shown in Table 1 for the year 2019.[2] The industries denoted in bold are those corresponding to the agricultural industries.[3]

[2] The detailed aggregation scheme is shown in Appendix B.

[3] Industry sales (output) for wholesale and retail trade sectors represent their margins, not total sales; i.e., total retail sales less cost of goods sold.

Table 1. Direct economic activity by industrial sector aggregate, NNY: Jefferson, Lewis, Oswego and St. Lawrence counties, 2019.

	Industry Sales		Employment		Labor Income		Total Value Added	
Industry Aggregate	$ million	% of total	Number of jobs	% of total	$ million	% of total	$ million	% of total
Ag production: Fruits & vegetables	16.0	0.1	370.6	0.2	5.2	0.1	12.7	0.1
Ag production: Greenhouse & nursery	6.2	0.0	105.3	0.1	2.5	0.0	4.7	0.0
Ag production: Grain, oilseed, & other crops	77.3	0.3	2,380.3	1.4	32.0	0.3	56.8	0.3
Ag production: Dairy	428.0	1.5	1,287.2	0.8	55.4	0.6	108.9	0.6
Ag production: Beef, poultry, & other animals	50.9	0.2	481.4	0.3	10.7	0.1	23.6	0.1
Agricultural support services	12.6	0.0	318.8	0.2	11.1	0.1	9.9	0.1
Forestry, commercial logging, fishing, & hunting	29.7	0.1	319.2	0.2	19.7	0.2	19.6	0.1
Mining and drilling	113.5	0.4	343.4	0.2	38.1	0.4	48.5	0.3
Utilities: generation & distribution	1,904.9	6.6	1,853.4	1.1	343.0	3.5	912.5	5.4
Construction	1,245.6	4.3	9,198.8	5.4	484.8	4.9	623.1	3.7
Ag manufacturing: Animal food	33.8	0.1	33.2	0.0	2.2	0.0	4.7	0.0
Ag manufacturing: Sugar & confectionary	4.0	0.0	14.0	0.0	0.3	0.0	0.4	0.0
Ag manufacturing: Fruit and vegetables	3.3	0.0	4.7	0.0	0.3	0.0	0.4	0.0
Ag manufacturing: Dairy	559.3	1.9	657.9	0.4	39.1	0.4	56.3	0.3
Ag manufacturing: Bakery & tortilla	40.2	0.1	385.1	0.2	11.2	0.1	15.3	0.1
Ag manufacturing: Meat & seafood	23.9	0.1	48.8	0.0	1.8	0.0	2.3	0.0
Ag manufacturing: Other foods	111.7	0.4	227.2	0.1	13.4	0.1	18.3	0.1
Ag manufacturing: Beverages	82.4	0.3	228.0	0.1	7.5	0.1	25.1	0.1
Ag manufacturing: Fert., chemical, & machinery	17.4	0.1	46.2	0.0	3.0	0.0	4.3	0.0
Non-Ag manufacturing	4,719.8	16.2	9,037.6	5.3	782.2	8.0	1,210.8	7.1
Wholesale trade	1,145.6	3.9	2,417.1	1.4	154.7	1.6	819.9	4.8
Retail trade	1,559.5	5.4	17,472.0	10.3	521.6	5.3	891.6	5.2
Transportation & warehousing	341.7	1.2	3,613.3	2.1	150.2	1.5	192.7	1.1
Information & communications	400.0	1.4	1,242.5	0.7	64.7	0.7	192.7	1.1
Finance & insurance	1,323.4	14.6	4,227.6	2.5	182.6	1.9	709.5	4.2
Real estate & rental	2,456.3	8.5	4,510.6	2.7	75.7	0.8	1,714.5	10.1
Professional services	950.0	3.3	6,248.3	3.7	373.5	3.8	484.3	2.8
Management of companies	244.6	0.8	1,586.7	0.9	82.4	0.8	100.0	0.6
Administrative & waste services	371.8	1.3	4,740.2	2.8	140.7	1.4	167.6	1.0
Educational services	185.1	0.6	2,315.6	1.4	98.8	1.0	133.5	0.8
Health & social services	2,216.9	7.6	20,426.3	12.0	1,159.8	11.8	1,302.8	7.7
Arts, entertainment, & recreation	138.6	0.5	2,309.3	1.4	29.3	0.3	58.7	0.3
Accommodations & food services	1,042.0	3.6	14,033.9	8.3	349.5	3.6	611.0	3.6
Other services	714.0	2.5	9,357.8	5.5	361.2	3.7	361.1	2.1
Government	6,483.3	22.3	48,139.6	28.3	4,188.7	42.8	6,112.3	35.9
Total	29,053.4	100.0	169,981.8	100.0	9,797.0	100.0	17,004.3	100.0

Note: See Appendix A for specific industries included in the industry aggregates. Source: IMPLAN 2022

Direct Impacts of Agriculture in NNY

Before discussing the results of the agriculture contribution analysis, it is useful to provide an overview of the NNY economy and to highlight agriculture's direct and relative contributions. A snapshot of the economy for 2019 is presented in Table 1. In terms of the relative contributions to the region's gross domestic product (i.e., total value added of $17,004 million), the top five industry aggregates are government (35.6%), real estate & rental (10.1%), health & social services (7.7%), non-ag manufacturing (7.1%), and retail trade (5.2%). Given differences in labor intensities across industries, rankings on employment tell a slightly different story. Here, the highest relative contributions to the region's total employment (i.e., 170 thousand jobs) are government (28.3%), health & social services (12.0%), retail trade (10.3%), accommodations & food services (8.3%), and other services (5.5%). Other than industries associated with primary household expenditures, the distribution for NNY looks considerably different than that for NYS, whose results are considerably influenced by New York City contributions (where 40% of the state lives). In particular to this region, government military operations play a significant factor.

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). In total, agricultural production activity generated $578.5 million in sales in 2019, which accounted for 2.0% of total industrial sales across the region. In terms of employment, agricultural production directly supported over 4,600 jobs, which represented 2.7% of total regional employment. Not surprisingly, dairy farming was the largest agricultural production sector in the region in terms of output ($428.0 million), labor income ($55.4 million), and total value added ($108.9 million); however, was second in total employment (i.e., average monthly jobs) to grains, oilseeds, and other crop production: i.e., 1,287 and 2,380 jobs, respectively.

The agricultural & forestry support services sector is included within our definition of agriculture to encompass key linkages with farm production. 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, horse boarding, etc. While the overall sales contributions are relatively small ($12.6 million), the labor-intensive nature of this service sector implies relatively strong direct contributions to agricultural employment.

Food manufacturing (including beverages) and agricultural-based product manufacturers (including fertilizers, chemicals, and machinery) are represented by over 50 individual sectors in IMPLAN (see Appendix B). For ease of exposition, we aggregated the individual sectors into 10 composite sectors: (*i*) animal foods, (*ii*) grain & oilseed milling, (*iii*) sugar & confectionary (*iv*) fruit, vegetables, & specialty products, (*v*) dairy, (*vi*) meat & seafood, (*vii*) bakery & tortilla, (*viii*) other foods, (*iv*) beverages (both alcoholic and nonalcoholic), and (*x*) fertilizer, chemicals, & machinery manufacturing.[5] In total, agriculturally based manufacturing industries in the region contributed to $842.3 million in sales, representing 2.9% of all regional economy output, and employed over 1,600 workers, representing 1.0% of region-wide employment. Over $122 million in value added contributed to 0.7% of the regional total.

[5] For comparison with Schmit (2021), we utilized the same 10-sector scheme for ag manufacturing. Technically, we present nine sectors here since there was no industrial activity reported for grain and oilseed milling in the region (i.e., rice milling, malt manufacturing, wet corn milling, oilseed processing, fats and oils refining and blending, and breakfast cereal manufacturing).

Dairy manufacturing accounted for 64% of all ag manufacturing sales and 40% of employment, and relies heavily on within-region milk production from the farming sector (i.e., strong backward linkages). Other processing sectors with relatively strong reliance on in-region farm production exist for fruit & vegetable manufacturing and meat processing. Beverage, bakery, confectionary, and other food manufacturing, as well as non-food ag manufacturing, activity exists, but rely less on inputs produced within the region.

Economic Contribution Results

The economic contribution of agriculture in NNY, as we have defined it, on total industrial sales (gross output) in 2019 was $1.7 billion; about 6.0% of the region's total output (Table 2). The $1.5 billion of direct contributions support an additional $163.0 million and $109.0 million in indirect and induced industry sales, respectively, through agriculture's inter-industry linkages. Individual agricultural component contributions are also shown in Table 2. Note, that while the direct contributions across agriculture's segments are additive, 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 $328.8 million in indirect effects includes backward-linkages to agricultural production sectors; i.e., manufacturers purchasing from farms. Thus, when looking at the composite all 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 NNY (i.e., the sum of the direct, indirect, and induced effects divided by the direct effect) is 1.19, meaning that for every dollar of output generated in agriculture, $0.19 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 0.11 (from business-to-business activity) and the induced effect is 0.08 (from labor income spending). Individual agricultural sector multipliers are also shown in Table 2. For comparison, we include the multipliers for NYS from Schmit (2021).[6] As is generally expected, the NYS multipliers are larger than the NNY (since the region is larger) as there are less opportunities for leakage; e.g., input purchases by NNY firms elsewhere in NYS.

Total employment contributions in 2019 by NNY agriculture were 8,197 jobs, 6,589 through its direct employment and an additional 1,608 through its indirect and induced industry effects (Table 2), and represents 4.8% of total employment in the region. In deference to industry output, the majority of jobs are generated by direct agricultural production activity and, by composition, through the indirect jobs generated by manufacturing, as illustrated in its higher jobs multiplier of 2.51. Also of note is the agricultural manufacturing jobs multiplier is higher than that of NYS, due to a lower direct jobs coefficient (jobs per $1M of output) and relatively higher reliance by manufacturers in the region for in-region milk supply relative to the state as a whole. In total, each job generated in agriculture supports another 0.24 jobs in the region 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 in the region supports $264.4 million of labor income, which is 2.7% of all labor income generated in the region. The overall labor income multiplier is 1.49, which

[6] Technically, we re-computed the NYS results from Schmit (2021) using updated 2019 data from IMPLAN. The results are very similar, albeit not identical. Full results for NYS are included in Appendix A.

Table 2. Economic contribution of agriculture on the NNY economy: Jefferson, Lewis, Oswego, and St. Lawrence counties, aggregate agricultural industry sectors, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	NNY Multiplier[d]	NYS Multiplier
Industry Output ($ million)						
Agricultural Production	578.5	96.8	60.9	736.2	1.27	1.59
Agricultural Support Services	12.6	0.7	5.4	18.7	1.48	1.89
Agricultural Manufacturing	876.1	328.8	66.6	1,271.5	1.45	1.62
All Agriculture	1,467.3	163.0	109.0	1,739.2	1.19	1.49
Employment (jobs)						
Agricultural Production	4,624.7	476.7	470.3	5,571.8	1.20	1.29
Agricultural Support Services	318.8	3.3	41.6	363.7	1.14	1.20
Agricultural Manufacturing	1,645.2	1,970.8	516	4,131.9	2.51	2.27
All Agriculture	6,588.7	766.1	842.6	8,197.4	1.24	1.67
Labor Income ($ million)						
Agricultural Production	105.8	19.6	18.8	144.2	1.36	2.07
Agricultural Support Services	11.1	0.1	1.7	12.9	1.16	1.38
Agricultural Manufacturing	78.9	63.9	20.5	163.4	2.07	2.24
All Agriculture	195.8	35.0	33.6	264.4	1.35	2.03
Total Value Added ($ million)						
Agricultural Production	206.7	57.4	36.7	300.7	1.46	1.77
Agricultural Support Services	9.9	0.4	3.2	13.5	1.37	1.75
Agricultural Manufacturing	127.1	141.6	40.2	308.9	2.43	2.50
All Agriculture	343.7	103.6	65.8	513.1	1.49	2.13

Source: IMPLAN 2022

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

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

[c] Induced effects represent industry activity due to spending out of labor income in the directly and indirectly affected industries.

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

indicates that for every dollar of labor income generated in agriculture, $0.49 is generated elsewhere in the NNY economy. Finally, consider total value added. Here, agriculture contributes $513.1 billion to the region's total GDP (3.0% of the total), through direct contributions of $343.7 million, and indirect and induced contributions of $103.6 million and $65.8 million, respectively.

As a preliminary analysis, of Covid-19's implications on agricultural activity, we conducted the same analysis for 2020 (Table 3). Comparable results for NYS are included in Appendix A. While we leave a detailed analysis to the interested reader, note that the total direct contributions for agriculture across all metrics increased relative to 2019. The results are generated largely from relatively strong increases in output and employment in agricultural manufacturing. The strong increases in direct labor income payments and, perhaps more localized spending, also translated into strong growth in induced effects. The evolution of inter-industry linkages as the Covid-19 endemic evolves will be an important consideration looking forward, particularly related to changes in supply changes and their temporal longevity.

Table 3. Economic contribution of agriculture on the NNY economy: Jefferson, Lewis, Oswego, and St. Lawrence counties, aggregate agricultural industry sectors, 2020.

	Direct[a]	Indirect[b]	Induced[c]	Total	NNY Multiplier[d]	NYS Multiplier
Industry Output ($ million)						
Agricultural Production	586.1	103.3	91.4	780.9	1.33	1.67
Agricultural Support Services	8.7	0.0	4.0	12.8	1.47	1.71
Agricultural Manufacturing	1,035.1	346.3	84.4	1,465.9	1.42	1.55
All Agriculture	1,630.0	177.4	146.2	1.953.6	1.20	1.44
% Change (2019)	*+11.1*	*+8.8*	*+34.2*	*+12.3*	*+1.1*	*-3.3*
Employment (jobs)						
Agricultural Production	4,673.0	513.3	688.1	5,874.4	1.26	1.38
Agricultural Support Services	264.3	0.0	30.5	294.8	1.12	1.14
Agricultural Manufacturing	1,801.1	2,043.8	637.3	4,482.2	2.49	2.28
All Agriculture	6,738.4	831.4	1,101.5	8,671.3	1.29	1.66
% Change (2019)	*+2.2*	*+8.5*	*+30.7*	*+5.8*	*+3.4*	*-0.6*
Labor Income ($ million)						
Agricultural Production	169.8	21.6	30.2	221.6	1.31	1.90
Agricultural Support Services	8.7	0.0	1.3	10.1	1.15	1.29
Agricultural Manufacturing	97.6	88.7	27.9	214.3	2.19	2.36
All Agriculture	276.2	40.6	48.4	365.2	1.32	2.03
% Change (2019)	*+41.1*	*+15.9*	*+43.9*	*+38.1*	*-2.1*	*+0.0*
Total Value Added ($ million)						
Agricultural Production	175.2	62.3	56.0	293.5	1.68	2.12
Agricultural Support Services	8.7	0.0	2.5	11.2	1.29	1.48
Agricultural Manufacturing	195.5	137.0	51.7	384.2	1.97	2.15
All Agriculture	379.4	109.6	89.7	578.7	1.53	1.95
% Change (2019)	*+10.4*	*+5.8*	*+36.3*	*+12.8*	*+2.2*	*-8.4*

Source: IMPLAN 2022. Superscript explanations are shown in Table 2.

Individual economic contribution analyses were also conducted for the five defined on-farm agricultural production (Tables 4 (2019) and 5 (2020)) and agricultural manufacturing sectors (Tables 6 (2019) and 7 (2020)). 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 local 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 farm production sectors in 2019 (Table 4), the induced effects for the fruit & vegetable, greenhouse & nursery and grain, oilseed, & other crop sectors are consistently larger than the indirect effects highlighting higher labor payments per unit of output and/or lower reliance on local intermediate inputs. In contrast, the indirect effects are relatively larger for the dairy and beef, poultry, & other animal sectors, reflecting relatively stronger local intermediate input availability. Interestingly, this was not the case for beef, poultry, & other animal production in 2020 (Table 5). The indirect contributions are consistently larger for each of the manufacturing sectors examined (Tables 6 and 7), and particularly so for industries with strong backward linkages to farm production sectors in the region.

Table 4. Economic contribution of agricultural production sectors on the NNY economy: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Fruit and Vegetable	16.0	1.3	2.6	19.9	1.24
Greenhouse and Nursery	6.2	0.4	1.2	7.9	1.27
Grain, Oilseed, and Other Crops	77.3	8.4	16.6	102.3	1.32
Dairy	428.0	102.6	38.0	568.6	1.33
Beef, Poultry, and Other Animals	50.9	7.6	6.4	64.9	1.27
All Ag Production	578.5	96.8	60.9	736.2	1.27
Employment					
Fruit and Vegetable	370.6	10.8	20.3	401.6	1.08
Greenhouse and Nursery	105.3	3.4	9.4	118.1	1.12
Grain, Oilseed, and Other Crops	2,380.3	69.8	120.7	2,570.8	1.08
Dairy	1,287.2	820.7	294.6	2,402.4	1.87
Beef, Poultry, and Other Animals	481.4	83.1	49.7	614.1	1.28
All Ag Production	4,625.7	476.7	470.3	5,571.8	1.20
Labor Income ($ million)					
Fruit and Vegetable	5.2	0.4	0.8	6.4	1.23
Greenhouse and Nursery	2.5	0.1	0.4	3.0	1.20
Grain, Oilseed, and Other Crops	32.0	2.5	5.1	39.6	1.24
Dairy	55.4	22.5	11.7	89.6	1.62
Beef, Poultry, and Other Animals	10.7	2.0	2.0	14.7	1.37
All Ag Production	105.8	19.6	18.8	144.2	1.36
Total Value Added ($ million)					
Fruit and Vegetable	12.7	0.8	1.6	15.1	1.19
Greenhouse and Nursery	4.7	0.3	0.7	5.7	1.21
Grain, Oilseed, and Other Crops	56.8	5.3	10.0	72.1	1.27
Dairy	108.9	61.1	22.9	192.9	1.77
Beef, Poultry, and Other Animals	23.6	4.7	3.9	32.2	1.36
All Ag Production	206.7	57.4	36.7	300.7	1.46

Source: IMPLAN 2022. Superscript explanations are shown in Table 2.

Table 5. Economic contribution of agricultural production sectors on the NNY economy: Jefferson, Lewis, Oswegon, and St. Lawrence counties, 2020.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Fruit and Vegetable	21.6	3.1	5.1	29.9	1.38
Greenhouse and Nursery	7.7	0.7	1.8	10.2	1.32
Grain, Oilseed, and Other Crops	95.7	21.5	32.1	149.3	1.56
Dairy	406.5	96.7	47.3	550.6	1.35
Beef, Poultry, and Other Animals	54.6	7.9	11.9	74.4	1.36
All Ag Production	586.1	103.3	91.4	780.9	1.33
Employment					
Fruit and Vegetable	408.4	23.6	38.1	470.2	1.15
Greenhouse and Nursery	116.6	4.9	13.6	135.11	1.16
Grain, Oilseed, and Other Crops	2,622.2	146.5	241.6	3,010.3	1.15
Dairy	1,092.8	754.1	358.4	2,204.3	2.02
Beef, Poultry, and Other Animals	433.0	84.9	79.7	607.6	1.40
All Ag Production	4,673.0	513.3	688.1	5,874.4	1.26
Labor Income ($ million)					
Fruit and Vegetable	9.7	0.9	1.7	12.3	1.26
Greenhouse and Nursery	3.7	0.2	0.6	4.5	1.21
Grain, Oilseed, and Other Crops	61.7	5.5	10.6	77.8	1.26
Dairy	73.1	25.8	15.7	114.5	1.57
Beef, Poultry, and Other Animals	21.6	2.6	3.9	28.2	1.30
All Ag Production	169.8	21.6	30.2	221.6	1.31
Total Value Added ($ million)					
Fruit and Vegetable	13.1	2.0	3.1	18.2	1.39
Greenhouse and Nursery	5.3	0.4	1.1	5.8	1.29
Grain, Oilseed, and Other Crops	40.2	14.0	19.6	73.8	1.84
Dairy	90.0	53.7	29.0	172.7	1.92
Beef, Poultry, and Other Animals	26.7	4.3	7.3	38.3	1.43
All Ag Production	175.2	62.3	56.0	293.5	1.46

Source: IMPLAN 2022. Superscript explanations are shown in Table 2.

Table 6. Economic contribution of agricultural manufacturing sectors to the NNY economy: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Animal foods	33.8	8.2	2.4	44.4	1.31
Sugar & Confectionary	4.0	0.7	0.2	5.0	1.23
Fruit, Vegetable, & Specialty	3.3	0.4	0.2	3.9	1.18
Dairy	559.3	269.8	39.8	868.9	1.55
Bakery and Tortilla	40.2	7.3	6.1	53.6	1.33
Meat & Seafood	23.9	8.8	1.8	34.5	1.45
Other foods	111.7	25.9	9.9	147.4	1.32
Beverages (alc. and nonalc)	82.4	12.9	5.0	100.4	1.22
Fertilizer, chemical, machinery	17.4	2.8	1.7	21.9	1.26
All Ag Manufacturing	876.1	328.8	66.6	1,271.5	1.45
Employment					
Animal foods	33.2	165.1	18.7	217.1	6.54
Sugar & Confectionary	14.0	4.5	1.7	20.2	1.44
Fruit, Vegetable, & Specialty	4.7	4.0	1.7	10.3	2.18
Dairy	657.9	1,161.3	308.1	2,127.3	3.23
Bakery and Tortilla	385.1	69.3	47.5	501.9	1.30
Meat & Seafood	48.8	78.0	14.1	141.0	2.89
Other foods	227.2	395.8	76.2	699.3	3.08
Beverages (alc. and nonalc)	228.0	113.6	39.0	380.6	1.67
Fertilizer, chemical, machinery	46.2	15.1	13.1	74.4	1.61
All Ag Manufacturing	1,645.2	1,970.8	516	4,131.9	2.51
Labor Income ($ million)					
Animal foods	2.2	2.9	0.7	5.9	2.64
Sugar & Confectionary	0.3	0.2	0.1	0.6	1.80
Fruit, Vegetable, & Specialty	0.3	0.1	0.1	0.5	1.55
Dairy	39.1	45.6	12.3	97.0	2.48
Bakery and Tortilla	11.2	2.1	1.9	15.2	1.36
Meat & Seafood	1.8	2.1	0.6	4.4	2.51
Other foods	13.4	7.9	3.0	24.3	1.81
Beverages (alc. and nonalc)	7.5	3.3	1.6	12.4	1.64
Fertilizer, chemical, machinery	3.0	0.7	0.5	4.2	1.41
All Ag Manufacturing	78.9	63.9	20.5	163.4	2.07
Total Value Added ($ million)					
Animal foods	4.7	5.6	1.5	11.8	2.49
Sugar & Confectionary	0.4	0.4	0.1	0.9	2.29
Fruit, Vegetable, & Specialty	0.4	0.2	0.1	0.8	1.87
Dairy	56.3	101.8	24.0	182.1	3.24
Bakery and Tortilla	15.3	4.1	3.7	23.1	1.51
Meat & Seafood	2.3	4.5	1.1	7.9	3.46
Other foods	18.3	17.2	5.9	41.4	2.26
Beverages (alc. and nonalc)	25.1	8.2	3.0	36.3	1.45
Fertilizer, chemical, machinery	4.3	1.6	1.0	6.9	1.60
All Ag Manufacturing	127.1	141.6	40.2	308.9	2.43

Table 7. Economic contribution of agricultural manufacturing sectors to the NNY economy: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2020.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Animal foods	32.5	8.0	2.9	43.4	1.34
Sugar & Confectionary	11.9	1.8	1.0	14.7	1.23
Fruit, Vegetable, & Specialty	3.4	0.4	0.2	3.9	1.16
Dairy	555.9	260.9	43.2	860.0	1.55
Bakery and Tortilla	42.6	6.6	6.4	55.5	1.30
Meat & Seafood	71.4	18.7	6.5	96.6	1.35
Other foods	175.7	38.2	15.9	229.7	1.31
Beverages (alc. and nonalc)	113.4	15.0	6.8	135.1	1.19
Fertilizer, chemical, machinery	28.5	4.4	2.4	35.3	1.24
All Ag Manufacturing	1,035.1	346.3	84.4	1,465.9	1.42
Employment					
Animal foods	30.8	147.1	21.8	199.7	6.48
Sugar & Confectionary	34.4	11.4	7.4	53.2	1.55
Fruit, Vegetable, & Specialty	4.8	4.1	1.1	10.0	2.11
Dairy	610.0	1,050.6	326.3	1,986.9	3.26
Bakery and Tortilla	364.5	62.6	48.1	475.2	1.30
Meat & Seafood	139.5	139.1	48.9	327.6	2.35
Other foods	305.7	516.1	119.9	941.7	3.08
Beverages (alc. and nonalc)	248.4	119.9	50.9	419.2	1.69
Fertilizer, chemical, machinery	63.0	24.5	17.8	105.2	1.67
All Ag Manufacturing	1,801.1	2,043.8	637.3	4,482.2	2.49
Labor Income ($ million)					
Animal foods	2.3	3.9	1.0	7.2	3.09
Sugar & Confectionary	1.7	0.5	0.3	2.5	1.50
Fruit, Vegetable, & Specialty	0.2	0.1	0.0	0.4	2.02
Dairy	39.1	55.4	14.3	108.8	2.78
Bakery and Tortilla	12.0	2.3	2.1	16.5	1.37
Meat & Seafood	7.5	6.7	2.1	16.3	2.18
Other foods	20.0	15.2	5.3	40.5	2.02
Beverages (alc. and nonalc)	10.7	4.5	2.2	17.4	1.63
Fertilizer, chemical, machinery	4.2	1.2	0.8	6.1	1.47
All Ag Manufacturing	97.6	88.7	27.9	214.3	2.19
Total Value Added ($ million)					
Animal foods	5.1	4.0	1.8	10.9	2.12
Sugar & Confectionary	2.4	1.0	0.6	4.0	1.66
Fruit, Vegetable, & Specialty	0.4	0.2	0.1	0.7	1.83
Dairy	70.0	88.5	26.5	185.0	2.64
Bakery and Tortilla	18.0	3.5	3.9	25.4	1.41
Meat & Seafood	9.3	9.9	4.0	23.1	2.48
Other foods	38.1	20.5	9.7	68.4	1.80
Beverages (alc. and nonalc)	45.9	8.7	4.1	58.8	1.28
Fertilizer, chemical, machinery	6.3	2.5	1.4	10.2	1.63
All Ag Manufacturing	195.5	137.0	51.7	384.2	1.97

Agriculture's Distributional Implications

Tables 2 and 3 provide the aggregate contributions of indirect and induced effects as a result of agriculture's direct effects. While these are useful in assessing total contributions to the economy, it is also useful to examine what non-agricultural industry sectors contribute most to the total indirect and induced effects. Table 8 (2019) and Table 9 (2020) rank industry linkages based on the level of indirect output effects from all agricultural activity in the region, while Table 10 (2019) and Table 11 (2020) do the same for employment. Ranking industries by the indirect effects places more attention to the business-to-business intermediate input transactions in the region stimulated by agriculture's direct activities, rather than spending out of labor income of the direct (agriculture) and indirect (non-agriculture) industries, although both are important.[7] Comparable distributions of indirect and induced effects for NYS are included in Appendix A and may be particularly useful in understanding what backward-linked industries are more or less associated within the 4-county region relative to the state as a whole.

For ease of exposition, our focus will consider the results for 2019; the rankings and percentages change for 2020, but the main effects are similar. While all sector effects are shown (Table 8), note that the top two industries comprise over 50% of all indirect sector output contributions: wholesale trade (36.2%) and real estate & rental (18.1%). The former includes regional wholesale distributors for equipment, machinery, supplies, petroleum, grocery, and other durable and nondurable goods (see Appendix B). This makes intuitive sense given the nature of input purchases for agricultural industries and procurement of them through intermediaries rather than directly through manufacturers in the region (if they exist at all). The real estate and rental industry aggregate includes land and property rental and leasing, as well as machinery and equipment rental and leasing. The next five industries are distant from the first two but collectively encompass an additional 31% of indirect effects: transportation and warehousing (7.8%), management of companies (6.8%), finance & insurance (6.1%), government (5.7%), and utilities (4.7%).[8]

Table 10 provides a similar ranking of the strongest industrial sector backward linkages, but now in terms of employment effects. Here, the top 3 industry effects comprise over one-half (51.5%) of the total indirect effects: government (18.1%), transportation and warehousing (17.5%), and wholesale trade (16.3%). Indirect effects accruing through the government sector (highly labor intensive) likely accrue through government transit, utilities, and other government enterprises and services; however, the magnitude is surprisingly large relative to the percentage at the state level (9.3%, Table A9). Remember, these indirect effects accrue through both spending of the agricultural industries themselves (i.e., 1st round indirects) and the spending from those industries of which agriculture buys from (i.e., 2nd and later round indirects). The remaining industries with at least 5% of the total indirect effects include: management of companies (9.4%), real estate and rental (7.1%), retail trade (6.2%), and administrative and waste services (5.3%).

[7] Major household consumption expenditure categories are clearly articulated in the top induced effects; i.e., health care (health & social services, 21.3%), housing (real estate & rental, 20.7%), retail trade (13.3%, including food purchases), and finance & insurance (10.3%).

[8] Management of companies industries generally includes various holding companies (e.g., personal, financial, insurance) and centralized administrative offices (e.g., corporate, regional, and headquarters offices).

Table 8. Distribution of indirect and induced output effects, by industry, from agricultural industry activities in Northern New York: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	1,467.3	100.0	163.0	100.0	109.0	100.0	272.0	100.0
	All Agriculture	1,467.3	100.0						
1	Wholesale trade			59.0	36.2	3.0	2.8	62.1	22.8
2	Real estate & rental			29.4	18.1	22.5	20.7	52.0	19.1
3	Transportation & warehousing			12.7	7.8	1.8	1.6	14.5	5.3
4	Management of companies			11.1	6.8	1.2	1.1	12.3	4.5
5	Finance & Insurance			9.9	6.1	11.2	10.3	21.1	7.8
6	Government			9.3	5.7	4.8	4.4	14.1	5.2
7	Utilities: generation & distribution			7.7	4.7	2.4	2.2	10.1	3.7
8	Retail trade			4.2	2.6	14.5	13.3	18.7	6.9
9	Scientific & technical services			4.2	2.6	1.7	1.5	5.9	2.2
10	Non-Ag manufacturing			3.7	2.3	0.7	0.6	4.4	1.6
11	Administrative & waste services			3.2	1.9	1.5	1.4	4.6	1.7
12	Construction			2.8	1.7	1.1	1.0	3.9	1.4
13	Other services			1.9	1.2	7.2	6.6	9.1	3.3
14	Accommodations & food services			1.7	1.0	7.9	7.3	9.6	3.5
15	Information			1.3	0.8	1.8	1.6	3.1	1.1
16	Mining & drilling			0.3	0.2	0.0	0.0	0.3	0.1
17	Arts, entertainment & recreation			0.3	0.2	1.3	1.2	1.6	0.6
18	Forestry & comm. logging, fishing, & hunting			0.2	0.1	0.1	0.1	0.3	0.1
19	Educational services			0.0	0.0	1.2	1.1	1.2	0.5
20	Health & social services			0.0	0.0	23.2	21.3	23.2	8.5

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

Table 9. Distribution of indirect and induced output effects, by industry, from agricultural industry activities in Northern New York: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2020.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	1,630.0	100.0	177.4	100.0	146.2	100.0	323.6	100.0
	All Agriculture	1,630.0	100.0						
1	Wholesale trade			62.9	35.5	4.3	3.0	67.2	20.8
2	Real estate & rental			36.0	20.3	31.4	21.5	67.4	20.8
3	Transportation & warehousing			11.9	6.7	1.9	1.3	13.9	4.3
4	Finance & Insurance			11.4	6.4	15.6	10.7	26.9	8.3
5	Management of companies			10.7	6.0	1.2	0.9	11.9	3.7
6	Utilities: generation & distribution			8.8	5.0	3.3	2.2	12.1	3.7
7	Government			8.5	4.8	5.8	4.0	14.3	4.4
8	Non-Ag manufacturing			5.0	2.8	1.0	0.7	6.0	1.8
9	Scientific & technical services			5.0	2.8	2.5	1.7	7.5	2.3
10	Retail trade			4.2	2.4	19.9	13.6	24.1	7.5
11	Administrative & waste services			4.1	2.3	2.3	1.6	6.4	2.0
12	Construction			3.4	1.9	1.5	1.0	4.9	1.5
13	Other services			1.8	1.0	8.7	5.9	10.5	3.2
14	Accommodations & food services			1.5	0.8	9.7	6.6	11.2	3.4
15	Information			1.4	0.8	2.5	1.7	3.9	1.2
16	Mining & drilling			0.5	0.3	0.0	0.0	0.5	0.2
17	Forestry & comm. logging, fishing, & hunting			0.2	0.1	0.1	0.0	0.3	0.1
18	Arts, entertainment & recreation			0.2	0.1	1.1	0.7	1.2	0.4
19	Educational services			0.0	0.0	1.7	1.2	1.8	0.5
20	Health & social services			0.0	0.0	31.6	21.6	31.6	9.8

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

Table 10. Distribution of indirect and induced employment effects, by industry, from agricultural industry activities in Northern New York: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	6,588.7	100.0	766.1	100.0	842.6	100.0	1,608.7	100.0
	All Agriculture	6,588.7	100.0					0.0	0.0
1	Government			138.6	18.1	71.1	8.4	209.8	13.0
2	Transportation & warehousing			134.3	17.5	18.8	2.2	153.1	9.5
3	Wholesale trade			124.6	16.3	6.4	0.8	130.9	8.1
4	Management of companies			72.1	9.4	7.5	0.9	79.6	4.9
5	Real estate & rental			54.1	7.1	41.4	4.9	95.4	5.9
6	Retail trade			47.1	6.2	162.3	19.3	209.4	13.0
7	Administrative & waste services			40.3	5.3	18.9	2.2	59.2	3.7
8	Finance & Insurance			31.5	4.1	35.9	4.3	67.4	4.2
9	Scientific & technical services			27.5	3.6	11.1	1.3	38.6	2.4
10	Other services			24.8	3.2	94.3	11.2	119.1	7.4
11	Accommodations & food services			23.1	3.0	106.5	12.6	129.6	8.1
12	Construction			20.5	2.7	7.9	0.9	28.4	1.8
13	Utilities: generation & distribution			7.5	1.0	2.3	0.3	9.8	0.6
14	Non-Ag manufacturing			7.1	0.9	1.3	0.2	8.4	0.5
15	Arts, entertainment & recreation			5.1	0.7	21.7	2.6	26.9	1.7
16	Information			4.0	0.5	5.6	0.7	9.6	0.6
17	Forestry & comm. logging, fishing, & hunting			2.6	0.3	0.7	0.1	3.3	0.2
18	Mining & drilling			0.9	0.1	0.0	0.0	1.0	0.1
19	Educational services			0.4	0.0	15.2	1.8	15.6	1.0
20	Health & social services			0.0	0.0	213.8	25.4	213.8	13.3

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

Table 11. Distribution of indirect and induced employment effects, by industry, from agricultural industry activities in Northern New York: Jefferson, Lewis, Oswego, and St. Lawrence counties, 2020.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	6,738.4	100.0	831.4	100.0	1,101.5	100.0	1,932.9	100.0
	All Agriculture	6,738.4	100.0						
1	Wholesale trade			168.7	20.3	11.6	1.1	180.3	9.3
2	Transportation & warehousing			137.5	16.5	22.4	2.0	159.9	8.3
3	Government			131.6	15.8	90.5	8.2	222.0	11.5
4	Management of companies			66.0	7.9	7.7	0.7	73.7	3.8
5	Real estate & rental			65.3	7.9	56.9	5.2	122.2	6.3
6	Retail trade			44.1	5.3	209.5	19.0	253.7	13.1
7	Administrative & waste services			43.5	5.2	24.4	2.2	67.8	3.5
8	Scientific & technical services			38.4	4.6	19.6	1.8	58.1	3.0
9	Finance & Insurance			38.2	4.6	52.4	4.8	90.6	4.7
10	Other services			23.8	2.9	117.8	10.7	141.6	7.3
11	Construction			23.1	2.8	10.2	0.9	33.4	1.7
12	Accommodations & food services			19.6	2.4	127.3	11.6	146.9	7.6
13	Non-Ag manufacturing			9.6	1.2	1.9	0.2	11.6	0.6
14	Utilities: generation & distribution			8.7	1.0	3.2	0.3	11.9	0.6
15	Arts, entertainment & recreation			4.7	0.6	29.4	2.7	34.1	1.8
16	Information			4.0	0.5	7.1	0.6	11.1	0.6
17	Forestry & comm. logging, fishing, & hunting			2.7	0.3	0.9	0.1	3.6	0.2
18	Mining & drilling			1.5	0.2	0.1	0.0	1.6	0.1
19	Educational services			0.4	0.0	21.8	2.0	22.2	1.1
20	Health & social services			0.0	0.0	286.9	26.0	286.9	14.8

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

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 $1.7 billion in industrial output and nearly 8,200 jobs in the Northern New York region of Jefferson, Lewis, Oswego, and St. Lawrence counties when the value of inter-industry linkages is considered. While total agriculturally related industry activity represents a relatively small proportion of total regional output (6.0%), employment (4.8%), and contributions to GDP (3.0%), the impact of agriculture for smaller rural communities in the region are critically important.

The general points of this exercise were to better understand agricultures' total economic contributions to this NNY region and to demonstrate the strong ripple (multiplier) effects agriculture has given strong backward-linked supply chain effects and related industry spending out of labor income. 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.

While industries with strong ripple effects in the region 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 or can be expanded. In addition, expansionary effects can be induced by policy or other means to increase the size of existing multipliers (i.e., a focus on expansion of backward linked industry capacity). In any event, the likelihood of expansion of 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 the region. In closing, 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 problematic to base estimates of the economic impacts on current estimates of economic multipliers.

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APPENDIX A

Table A1. Economic contribution of agriculture on the NYS economy, aggregate agricultural industry sectors, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Agricultural Production	5,245.2	1,867.2	1,202.3	8,314.8	1.59
Agricultural Support Services	413.2	61.7	305.8	780.7	1.89
Agricultural Manufacturing	37,981.8	14,657.5	8,730.4	61,370.0	1.62
All Agriculture	43,640.2	11,832.8	9,492.9	64,965.9	1.49
Employment (jobs)					
Agricultural Production	52,482.6	8,278.9	7,194.5	67,955.9	1.29
Agricultural Support Services	10,587.9	242.2	1,832.6	12,662.9	1.20
Agricultural Manufacturing	100,077.4	74,961.0	52,534.4	227,575.7	2.27
All Agriculture	163,147.8	51,922.2	57,054.1	272,124.1	1.67
Labor Income ($ million)					
Agricultural Production	974.6	566.9	471.6	2,013.1	2.07
Agricultural Support Services	367.5	21.0	119.9	508.4	1.38
Agricultural Manufacturing	6,620.9	4,771.9	3,437.6	14,830.3	2.24
All Agriculture	7,962.9	4,432.5	3,738.3	16,133.7	2.03
Total Value Added ($ million)					
Agricultural Production	2,437.0	1,064.8	802.5	4,304.3	1.77
Agricultural Support Services	322.7	36.4	204.1	563.2	1.75
Agricultural Manufacturing	9,525.3	8,387.1	5,856.0	23,768.4	2.50
All Agriculture	12,284.9	7,473.1	6,367.1	26,125.1	2.13

Source: IMPLAN 2022. Numbers updated from Schmit (2021) with IMPLAN data updates.

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

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

[c] Induced effects represent industry activity due to spending out of labor income in the directly and indirectly affected industries.

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

Table A2. Economic contribution of agriculture on the NYs economy, aggregate agricultural industry sectors, 2020.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Agricultural Production	5,641.4	2,196.8	1,595.5	9,430.6	1.67
Agricultural Support Services	341.3	403.3	242.2	583.9	1.71
Agricultural Manufacturing	40,555.4	14,342.6	7,781.6	62,679.6	1.55
All Agriculture	46,538.1	11,654.2	8,707.0	66,899.3	1.44
% Change (2019)	*+6.6*	*-1.5*	*-8.3*	*+3.0*	*-3.4*
Employment (jobs)					
Agricultural Production	53,007.2	10,614.4	9,376.9	72,998.5	1.38
Agricultural Support Services	10,402.3	1.6	1,424.0	11,827.9	1.14
Agricultural Manufacturing	93,147.4	73,601.2	46,014.9	212,763.5	2.28
All Agriculture	156,556.9	52,025.0	51,424.5	260,006.4	1.66
% Change (2019)	*-4.0*	*+0.2*	*-9.9*	*-4.4*	*-0.4*
Labor Income ($ million)					
Agricultural Production	1,511.5	704.9	653.8	2,870.2	1.90
Agricultural Support Services	343.7	0.1	99.1	443.0	1.29
Agricultural Manufacturing	6,130.7	5,159.3	3,204.4	14,494.4	2.36
All Agriculture	7,982.9	4,628.7	3,585.8	16,200.4	2.03
% Change (2019)	*+0.3*	*+4.4*	*-4.1*	*+0.1*	*+0.0*
Total Value Added ($ million)					
Agricultural Production	2,148.8	1,334.7	1,076.4	4,559.9	2.12
Agricultural Support Services	340.7	0.2	163.2	504.2	1.48
Agricultural Manufacturing	11,574.9	8,051.6	5,273.2	24,899.8	2.15
All Agriculture	14,064.5	7,467.4	5,901.2	27,433.1	1.95
% Change (2019)	*+14.4*	*-0.1*	*-7.3*	*+5.0*	*-8.3*

Source: IMPLAN 2022.

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

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

[c] Induced effects represent industry activity due to spending out of labor income in the directly and indirectly affected industries.

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

Table A3. Economic contribution of agricultural production sectors on the NYS economy, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Fruit and Vegetable	653.7	69.7	190.9	914.3	1.40
Greenhouse and Nursery	396.4	57.6	162.0	616.0	1.55
Grain, Oilseed, and Other Crops	808.5	160.1	222.4	1,191.0	1.47
Dairy	2,858.1	1,492.3	548.0	4,898.3	1.71
Beef, Poultry, and Other Animals	528.5	156.4	94.4	779.3	1.47
All Ag Production	5,245.2	1,867.2	1,202.3	8,314.8	1.59
Employment					
Fruit and Vegetable	10,399.3	509.8	1,142.5	12,051.5	1.16
Greenhouse and Nursery	5,788.3	377.8	969.7	7,135.7	1.23
Grain, Oilseed, and Other Crops	22,057.4	1,114.9	1,331.7	24,503.9	1.11
Dairy	9,238.8	6,682.0	3,284.1	19,204.9	2.08
Beef, Poultry, and Other Animals	4,998.9	788.9	566.1	6,353.9	1.27
All Ag Production	52,482.6	8,278.9	7,194.5	67,955.9	1.29
Labor Income ($ million)					
Fruit and Vegetable	220.2	26.3	74.8	321.3	1.46
Greenhouse and Nursery	189.3	21.5	63.5	274.3	1.45
Grain, Oilseed, and Other Crops	225.7	58.6	87.2	371.4	1.65
Dairy	268.5	430.7	214.9	914.0	3.40
Beef, Poultry, and Other Animals	70.9	47.1	37.1	155.1	2.19
All Ag Production	974.6	566.9	471.6	2,013.1	2.07
Total Value Added ($ million)					
Fruit and Vegetable	559.3	45.4	127.3	732.1	1.31
Greenhouse and Nursery	302.4	37.1	108.1	447.5	1.48
Grain, Oilseed, and Other Crops	600.7	105.0	148.4	854.1	1.42
Dairy	727.0	833.6	365.8	1,926.4	2.65
Beef, Poultry, and Other Animals	247.6	87.0	63.0	397.7	1.61
All Ag Production	2,437.0	1,064.8	802.5	4,304.3	1.77

Source: IMPLAN 2022. Numbers updated from Schmit (2021) with IMPLAN data updates in 2022.

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

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

[c] Induced effects represent additional industry activity due to spending out of labor 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 A4. Economic contribution of agricultural production sectors on the NYS economy, 2020.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Fruit and Vegetable	848.5	208.2	290.7	1,347.5	1.59
Greenhouse and Nursery	491.9	92.2	180.3	764.4	1.55
Grain, Oilseed, and Other Crops	1,015.3	463.7	447.7	1,926.7	1.90
Dairy	2,714.6	1,377.5	553.5	4,645.6	1.71
Beef, Poultry, and Other Animals	570.9	152.7	153.2	876.8	1.54
All Ag Production	5,641.4	2,196.8	1,595.5	9,430.6	1.67
Employment					
Fruit and Vegetable	11,103.5	1,602.7	1,709.7	14,415.8	1.30
Greenhouse and Nursery	6,195.3	572.3	1,060.1	7,827.6	1.26
Grain, Oilseed, and Other Crops	23,530.4	2,953.8	2,633.4	29,117.6	1.24
Dairy	7,633.5	6,105.7	3,257.5	16,996.7	2.23
Beef, Poultry, and Other Animals	4,544.6	786.0	901.9	6,232.5	1.37
All Ag Production	53,007.2	10,614.4	9,376.9	72,998.5	1.38
Labor Income ($ million)					
Fruit and Vegetable	320.5	83.1	119.1	522.7	1.63
Greenhouse and Nursery	219.9	34.7	73.8	328.4	1.49
Grain, Oilseed, and Other Crops	455.0	161.6	183.4	800.0	1.76
Dairy	357.6	413.4	226.8	997.8	2.79
Beef, Poultry, and Other Animals	158.5	48.9	62.8	270.2	1.71
All Ag Production	1,511.5	704.9	653.8	2,870.2	1.90
Total Value Added ($ million)					
Fruit and Vegetable	545.4	142.9	196.0	884.3	1.62
Greenhouse and Nursery	336.3	61.3	121.5	519.2	1.54
Grain, Oilseed, and Other Crops	381.3	314.6	302.0	997.9	2.62
Dairy	600.7	778.3	373.3	1,752.3	2.92
Beef, Poultry, and Other Animals	285.0	85.1	103.3	473.5	1.66
All Ag Production	2,148.8	1,334.7	1,076.4	4,559.9	2.12

Source: IMPLAN 2022

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

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

[c] Induced effects represent additional industry activity due to spending out of labor 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 A5. Economic contribution of agricultural manufacturing sectors to the NYS economy, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Animal foods	2,601.2	860.1	402.2	3,863.6	1.49
Grain & oilseed milling	1,201.4	461.1	199.1	1,861.6	1.55
Sugar & Confectionary	1,482.5	620.6	335.2	2,438.4	1.64
Fruit, Vegetable, & Specialty	2,880.2	1,055.5	637.9	4,573.6	1.59
Dairy	8,791.4	5,835.1	1,815.6	16,442.2	1.87
Bakery and Tortilla	6,288.0	2,255.6	2,153.2	10,696.8	1.70
Meat & Seafood	2,401.2	759.4	476.2	3,636.8	1.51
Other foods	5,193.1	2,043.9	1,176.2	8,413.2	1.62
Beverages (alc. and nonalc)	6,006.6	1,650.8	1,599.7	9,257.0	1.54
Fertilizer, chemical, machinery	1,136.2	440.2	216.5	1,792.9	1.58
All Ag Manufacturing	37,981.8	14,657.5	8,730.4	61,370.0	1.62
Employment					
Animal foods	2,636.5	5,719.9	2,409.6	10,766.0	4.08
Grain & oilseed milling	1,082.4	4,933.1	1,192.5	7,208.0	6.66
Sugar & Confectionary	3,589.7	2,867.4	2,007.1	8,464.2	2.36
Fruit, Vegetable, & Specialty	6,606.1	5,392.2	3,820.3	15,818.5	2.39
Dairy	11,970.4	23,315.5	10,886.8	46,172.8	3.86
Bakery and Tortilla	45,512.0	10,598.5	12,886.3	68,996.7	1.52
Meat & Seafood	5,290.2	4,613.8	2,852.3	12,756.3	2.41
Other foods	10,273.8	11,800.6	7,045.4	29,119.9	2.83
Beverages (alc. and nonalc)	11,642.4	7,811.8	9,609.9	29,064.1	2.50
Fertilizer, chemical, machinery	1,474.0	1,823.4	1,296.2	4,593.5	3.12
All Ag Manufacturing	100,077.4	74,961.0	52,534.4	227,575.7	2.27
Labor Income ($ million)					
Animal foods	238.5	282.2	157.7	678.3	2.84
Grain & oilseed milling	90.6	166.2	78.0	334.8	3.70
Sugar & Confectionary	206.5	228.3	131.3	566.1	2.74
Fruit, Vegetable, & Specialty	463.6	365.2	250.0	1078.8	2.33
Dairy	951.8	1400.7	712.3	3064.8	3.22
Bakery and Tortilla	1955.8	854.5	843.7	3654.0	1.87
Meat & Seafood	362.0	255.3	186.6	803.9	2.22
Other foods	802.5	725.0	461.0	1988.5	2.48
Beverages (alc. and nonalc)	1431.0	567.7	628.5	2627.2	1.84
Fertilizer, chemical, machinery	118.7	162.9	84.8	366.5	3.09
All Ag Manufacturing	6,620.9	4,771.9	3,437.6	14,830.3	2.24
Total Value Added ($ million)					
Animal foods	449.6	488.5	268.5	1206.7	2.68
Grain & oilseed milling	127.8	300.1	132.9	560.8	4.39
Sugar & Confectionary	259.3	380.8	223.7	863.8	3.33
Fruit, Vegetable, & Specialty	579.1	611.8	425.8	1616.7	2.79
Dairy	1241.3	2654.4	1213.1	5108.8	4.12
Bakery and Tortilla	2471.2	1361.0	1437.6	5269.9	2.13
Meat & Seafood	413.8	447.1	317.9	1178.8	2.85
Other foods	1068.2	1254.6	785.2	3108.1	2.91
Beverages (alc. and nonalc)	2660.1	1008.7	1068.7	4737.5	1.78
Fertilizer, chemical, machinery	254.7	267.5	144.5	666.7	2.62
All Ag Manufacturing	9,525.3	8,387.1	5,856.0	23,768.4	2.50

Table A6. Economic contribution of agricultural manufacturing sectors to the NYS economy, 2020.

	Direct[a]	Indirect[b]	Induced[c]	Total	Multiplier[d]
Industry Output ($ million)					
Animal foods	2,722.4	814.2	371.9	3,908.4	1.44
Grain & oilseed milling	1,216.4	416.0	190.7	1,823.2	1.50
Sugar & Confectionary	1,550.1	597.9	298.3	2,446.2	1.58
Fruit, Vegetable, & Specialty	3,345.3	1,090.7	632.6	5,068.6	1.52
Dairy	9,692.8	5,833.8	1,794.9	17,321.6	1.79
Bakery and Tortilla	6,136.6	1,990.6	1,798.9	9,926.1	1.62
Meat & Seafood	2,405.3	780.7	448.5	3,634.5	1.51
Other foods	5,969.9	2,075.3	1,105.3	9,150.4	1.53
Beverages (alc. and nonalc)	6,404.5	1,616.8	1,194.9	9,216.2	1.44
Fertilizer, chemical, machinery	2,722.4	814.2	371.9	3,908.4	1.44
All Ag Manufacturing	40,555.4	14,342.6	7,781.6	62,679.6	1.55
Employment					
Animal foods	2,543.9	5,684.9	2,188.0	10,416.8	4.09
Grain & oilseed milling	1,047.3	4,557.5	1,121.7	6,726.6	6.42
Sugar & Confectionary	3,294.7	2,753.8	1,754.0	7,802.6	2.37
Fruit, Vegetable, & Specialty	6,789.3	5,756.4	3,720.8	16,266.4	2.40
Dairy	12,029.8	22,712.7	10,571.7	45,314.3	3.77
Bakery and Tortilla	40,149.4	9,498.9	10,574.5	60,222.8	1.50
Meat & Seafood	4,962.7	4,712.9	2,638.3	12,313.9	2.48
Other foods	9,894.3	11,998.2	6,502.9	28,395.4	2.87
Beverages (alc. and nonalc)	11,022.3	7,732.2	7,040.6	25,795.0	2.34
Fertilizer, chemical, machinery	1,413.7	1,761.6	1,176.7	4,352.0	3.08
All Ag Manufacturing	93,147.4	73,601.2	46,014.9	212,763.5	2.28
Labor Income ($ million)					
Animal foods	232.6	299.2	152.3	684.2	2.94
Grain & oilseed milling	89.5	181.0	78.1	348.6	3.89
Sugar & Confectionary	194.2	234.9	122.1	551.2	2.84
Fruit, Vegetable, & Specialty	503.6	407.4	259.0	1,170.0	2.32
Dairy	967.4	1,601.0	735.9	3,304.2	3.42
Bakery and Tortilla	1,801.7	801.8	736.6	3,340.1	1.85
Meat & Seafood	335.3	307.2	183.7	826.1	2.46
Other foods	790.5	798.3	452.7	2,041.5	2.58
Beverages (alc. and nonalc)	1,092.6	592.4	490.0	2,174.9	1.99
Fertilizer, chemical, machinery	123.4	164.8	81.9	370.1	3.00
All Ag Manufacturing	6,130.7	5,159.3	3,204.4	14,494.4	2.36
Total Value Added ($ million)					
Animal foods	573.5	437.4	250.8	1,261.7	2.20
Grain & oilseed milling	178.2	234.3	128.6	541.1	3.04
Sugar & Confectionary	341.5	368.0	201.0	910.5	2.67
Fruit, Vegetable, & Specialty	867.8	627.5	426.5	1,921.8	2.21
Dairy	1,682.1	2,636.0	1,211.6	5,529.6	3.29
Bakery and Tortilla	2,623.7	1,197.7	1,213.1	5,034.5	1.92
Meat & Seafood	427.8	467.7	302.4	1,197.9	2.80
Other foods	1,624.0	1,238.4	745.3	3,607.7	2.22
Beverages (alc. and nonalc)	2,989.2	983.2	806.1	4,778.5	1.60
Fertilizer, chemical, machinery	267.2	258.9	134.9	661.0	2.47
All Ag Manufacturing	11,574.9	8,051.6	5,273.2	24,899.8	2.15

Table A7. Distribution of indirect and induced output effects, by industry, from agricultural industry activities in NYS, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	43,640.2	100.0	11,832.8	100.0	9,492.9	100.0	21,325.7	100.0
	All Agriculture	43,640.2	100.0						
1	Wholesale trade			3,680.6	31.1	403.4	4.2	4,084.0	19.2
2	Transportation & warehousing			1,280.3	10.8	267.2	2.8	1,547.5	7.3
3	Management of companies			1,139.2	9.6	120.5	1.3	1,259.7	5.9
4	Scientific & technical services			997.2	8.4	452.8	4.8	1,450.0	6.8
5	Real estate & rental			981.2	8.3	1,792.8	18.9	2,774.0	13.0
6	Finance & Insurance			858.8	7.3	1,261.7	13.3	2,120.6	9.9
7	Information			567.1	4.8	571.8	6.0	1,138.9	5.3
8	Administrative & waste services			524.5	4.4	277.3	2.9	801.8	3.8
9	Non-Ag manufacturing			474.1	4.0	90.4	1.0	564.5	2.6
10	Utilities: generation & distribution			446.2	3.8	175.9	1.9	622.1	2.9
11	Government			321.9	2.7	249.1	2.6	571.0	2.7
12	Retail trade			121.3	1.0	756.2	8.0	877.4	4.1
13	Other services			119.9	1.0	478.4	5.0	598.3	2.8
14	Accommodations & food services			117.0	1.0	514.7	5.4	631.7	3.0
15	Construction			102.4	0.9	75.0	0.8	177.5	0.8
16	Forestry & comm. logging, fishing, & hunting			42.6	0.4	1.5	0.0	44.1	0.2
17	Arts, entertainment & recreation			42.0	0.4	199.7	2.1	241.7	1.1
18	Mining & drilling			10.7	0.1	1.0	0.0	11.7	0.1
19	Educational services			5.8	0.0	232.2	2.4	238.0	1.1
20	Health & social services			0.0	0.0	1,571.3	16.6	1,571.4	7.4

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

Table A8. Distribution of indirect and induced output effects, by industry, from agricultural industry activities in NYS, 2020.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	46,538.1	100.0	11,654.2	100.0	8,707.0	100.0	20,361.2	100.0
	All Agriculture	46,538.1	100.0						
1	Wholesale trade			3,658.4	31.4	390.3	4.5	4,048.7	19.9
2	Management of companies			1,138.7	9.8	110.4	1.3	1,249.1	6.1
3	Transportation & warehousing			1,126.3	9.7	197.1	2.3	1,323.4	6.5
4	Real estate & rental			1,094.5	9.4	1,694.5	19.5	2,789.0	13.7
5	Scientific & technical services			937.7	8.0	417.0	4.8	1,354.8	6.7
6	Finance & Insurance			912.7	7.8	1,254.7	14.4	2,167.3	10.6
7	Information			581.7	5.0	562.5	6.5	1,144.1	5.6
8	Administrative & waste services			516.5	4.4	262.3	3.0	778.7	3.8
9	Non-Ag manufacturing			455.1	3.9	79.4	0.9	534.5	2.6
10	Utilities: generation & distribution			442.4	3.8	168.7	1.9	611.1	3.0
11	Government			288.2	2.5	209.2	2.4	497.4	2.4
12	Retail trade			129.0	1.1	722.9	8.3	851.9	4.2
13	Construction			109.9	0.9	71.7	0.8	181.6	0.9
14	Other services			104.5	0.9	396.3	4.6	500.8	2.5
15	Accommodations & food services			76.7	0.7	383.9	4.4	460.6	2.3
16	Forestry & comm. logging, fishing, & hunting			42.8	0.4	1.3	0.0	44.1	0.2
17	Arts, entertainment & recreation			22.1	0.2	118.4	1.4	140.5	0.7
18	Mining & drilling			12.2	0.1	1.0	0.0	13.3	0.1
19	Educational services			4.8	0.0	213.6	2.5	218.5	1.1
20	Health & social services			0.0	0.0	1,451.8	16.7	1,451.8	7.1

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

Table A9. Distribution of indirect and induced employment effects, by industry, from agricultural industry activities in NYS, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	163,147.8	100.0	51,922.2	100.0	57,054.1	100.0	108,976.3	100.0
	All Agriculture	163,147.8	100.0						
1	Transportation & warehousing			11,418.7	22.0	2,383.0	4.2	13,801.8	12.7
2	Wholesale trade			10,546.1	20.3	1,155.9	2.0	11,701.9	10.7
3	Government			4,826.7	9.3	3,734.5	6.5	8,561.1	7.9
4	Administrative & waste services			4,734.8	9.1	2,503.1	4.4	7,237.8	6.6
5	Scientific & technical services			4,590.2	8.8	2,084.4	3.7	6,674.6	6.1
6	Management of companies			4,185.8	8.1	442.8	0.8	4,628.6	4.2
7	Real estate & rental			2,337.2	4.5	4,270.4	7.5	6,607.6	6.1
8	Finance & Insurance			1,702.3	3.3	2,500.9	4.4	4,203.2	3.9
9	Other services			1,377.4	2.7	5,495.0	9.6	6,872.4	6.3
10	Accommodations & food services			1,249.2	2.4	5,493.1	9.6	6,742.3	6.2
11	Retail trade			1,140.1	2.2	7,109.5	12.5	8,249.6	7.6
12	Non-Ag manufacturing			1,089.8	2.1	207.8	0.4	1,297.6	1.2
13	Information			793.1	1.5	799.7	1.4	1,592.8	1.5
14	Construction			618.2	1.2	452.8	0.8	1,071.0	1.0
15	Forestry & comm. logging, fishing, & hunting			512.2	1.0	18.2	0.0	530.4	0.5
16	Utilities: generation & distribution			351.4	0.7	138.5	0.2	489.9	0.4
17	Arts, entertainment & recreation			348.5	0.7	1,658.0	2.9	2,006.4	1.8
18	Educational services			64.0	0.1	2,571.9	4.5	2,635.9	2.4
19	Mining & drilling			36.2	0.1	3.6	0.0	39.8	0.0
20	Health & social services			0.4	0.0	14,031.1	24.6	14,031.5	12.9

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

Table A10. Distribution of indirect and induced employment effects, by industry, from agricultural industry activities in NYS, 2020.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
	Total	156,556.9	100.0	52,025.0	100.0	51,424.5	100.0	103,449.5	100.0
	All Agriculture	156,556.9	100.0						
1	Transportation & warehousing			12,532.5	24.1	2,193.2	4.3	14,725.7	14.2
2	Wholesale trade			10,613.8	20.4	1,132.3	2.2	11,746.0	11.4
3	Scientific & technical services			4,497.2	8.6	2,000.0	3.9	6,497.3	6.3
4	Administrative & waste services			4,389.7	8.4	2,229.0	4.3	6,618.7	6.4
5	Government			4,309.7	8.3	3,128.6	6.1	7,438.3	7.2
6	Management of companies			4,230.7	8.1	410.2	0.8	4,640.8	4.5
7	Real estate & rental			2,717.9	5.2	4,207.8	8.2	6,925.6	6.7
8	Finance & Insurance			1,757.7	3.4	2,416.3	4.7	4,174.0	4.0
9	Other services			1,274.4	2.4	4,833.4	9.4	6,107.8	5.9
10	Retail trade			1,121.3	2.2	6,286.1	12.2	7,407.4	7.2
11	Non-Ag manufacturing			1,034.4	2.0	180.5	0.4	1,214.9	1.2
12	Accommodations & food services			850.3	1.6	4,253.6	8.3	5,103.9	4.9
13	Information			759.9	1.5	734.8	1.4	1,494.7	1.4
14	Construction			615.9	1.2	402.1	0.8	1,018.0	1.0
15	Forestry & comm. logging, fishing, & hunting			588.6	1.1	18.2	0.0	606.8	0.6
16	Utilities: generation & distribution			341.8	0.7	130.3	0.3	472.1	0.5
17	Arts, entertainment & recreation			297.1	0.6	1,590.8	3.1	1,887.9	1.8
18	Educational services			52.0	0.1	2,301.4	4.5	2,353.4	2.3
19	Mining & drilling			39.9	0.1	3.3	0.0	43.2	0.0
20	Health & social services			0.4	0.0	12,972.5	25.2	12,972.8	12.5

Note: Industries are ranked on their level of indirect effects (i.e., the strength of their local business-to-business linkages) generated from the (direct) agricultural industry activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix B.

APPENDIX B

Table B1. Mapping of Northern New York modelL to IMPLAN industries, (bolded industries included as agricultural industries).

New York model		Implan industry	
1	**Ag production – fruits & vegetables**	3	Vegetable and melon farming
		4	Fruit farming
		5	Tree nut farming
2	**Ag production – greenhouse and nursery**	6	Greenhouse, nursery, and floriculture production
3	**Ag production – grain, oilseed, & other crops**	1	Oilseed farming
		2	Grain farming
		7	Tobacco farming (no industry in NYS)
		8	Cotton farming (no industry in NYS)
		9	Sugarcane and sugar beet farming (no industry in NYS)
		10	All other crop farming
4	**Ag production – dairy**	12	Dairy cattle and milk production
5	**Ag production – beef, poultry, & other animal**	11	Beef cattle ranching and farming
		13	Poultry and egg production
		14	Animal production, except cattle and poultry and eggs
6	**Ag support services**	19	Support activities for agriculture and forestry
7	Forestry and commercial logging, fishing, & hunting	15	Forestry, forest products, and timber tract production
		16	Commercial logging
		17	Commercial fishing
		18	Commercial hunting and trapping
8	Mining & drilling	20	Oil and gas extraction
		21	Coal mining (no industry in NYS)
		22	Copper, nickel, lead, and zinc mining
		23	Iron ore mining (no industry in NYS)
		24	Gold ore mining
		25	Silver ore mining (no industry in NYS)
		26	Uranium-radium-vanadium ore mining (no industry in NYS)
		27	Other metal ore mining (no industry in NYS)
		28	Stone mining and quarrying
		29	Sand and gravel mining
		30	Other clay, ceramic, refractory minerals mining
		31	Potash, soda, and borate mineral mining (no industry in NYS)
		32	Phosphate rock mining (no industry in NYS)
		33	Other chemical and fertilizer mineral mining
		34	Other nonmetallic minerals
		35	Drilling oil and gas wells
		36	Support activities for oil and gas operations
		37	Metal mining services
		38	Other nonmetallic minerals services
9	Utilities – generation & distribution	39	Electric power generation - Hydroelectric
		40	Electric power generation - Fossil fuel
		41	Electric power generation - Nuclear
		42	Electric power generation - Solar
		43	Electric power generation - Wind
		44	Electric power generation – Geothermal (no industry in NYS)
		45	Electric power generation - Biomass
		46	Electric power generation - All other
		47	Electric power transmission and distribution
		48	Natural gas distribution
		49	Water, sewage and other systems
10	Construction	50	Construction of new health care structures
		51	Construction of new manufacturing structures

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

New York model		Implan industry	
		107	Wineries
		108	Distilleries
20	**Ag manufacturing – fertilizer, chemical, machinery**	167	Nitrogenous fertilizer manufacturing
		168	Phosphatic fertilizer manufacturing (no industry in NYS)
		169	Fertilizer mixing
		170	Pesticide and other agricultural chemical manufacturing
		208	Lime manufacturing (no industry in NYS)
		260	Farm machinery and equipment manufacturing
		266	Food product machinery manufacturing
21	NonAg manufacturing	109	Tobacco product manufacturing
		110	Fiber, yarn, and thread mills
		111	Broadwoven fabric mills
		112	Narrow fabric mills and schiffli machine embroidery
		113	Nonwoven fabric mills
		114	Knit fabric mills
		115	Textile and fabric finishing mills
		116	Fabric coating mills
		117	Carpet and rug mills
		118	Curtain and linen mills
		119	Textile bag and canvas mills
		120	Rope, cordage, twine, tire cord and tire fabric mills
		121	Other textile product mills
		122	Hosiery and sock mills
		123	Other apparel knitting mills
		124	Cut and sew apparel contractors
		125	Mens and boys cut and sew apparel manufacturing
		126	Womens and girls cut and sew apparel manufacturing
		127	Other cut and sew apparel manufacturing
		128	Apparel accessories and other apparel manufacturing
		129	Leather and hide tanning and finishing
		130	Footwear manufacturing
		131	Other leather and allied product manufacturing
		132	Sawmills
		133	Wood preservation
		134	Veneer and plywood manufacturing
		135	Engineered wood member and truss manufacturing
		136	Reconstituted wood product manufacturing
		137	Wood windows and door manufacturing
		138	Cut stock, resawing lumber, and planing
		139	Other millwork, including flooring
		140	Wood container and pallet manufacturing
		141	Manufactured home (mobile home) manufacturing
		142	Prefabricated wood building manufacturing
		143	All other miscellaneous wood product manufacturing
		144	Pulp mills
		145	Paper mills
		146	Paperboard mills
		147	Paperboard container manufacturing
		148	Paper bag and coated and treated paper manufacturing
		149	Stationery product manufacturing
		150	Sanitary paper product manufacturing
		151	All other converted paper product manufacturing
		152	Printing
		153	Support activities for printing
		154	Petroleum refineries

New York model	Implan industry	
	155	Asphalt paving mixture and block manufacturing
	156	Asphalt shingle and coating materials manufacturing
	157	Petroleum lubricating oil and grease manufacturing
	158	All other petroleum & coal products mfg. (no industry in NYS)
	159	Petrochemical manufacturing
	160	Industrial gas manufacturing
	161	Synthetic dye and pigment manufacturing
	162	Other basic inorganic chemical manufacturing
	163	Other basic organic chemical manufacturing
	164	Plastics material and resin manufacturing
	165	Synthetic rubber manufacturing
	166	Artificial and synthetic fibers and filaments manufacturing
	171	Medicinal and botanical manufacturing
	172	Pharmaceutical preparation manufacturing
	173	In-vitro diagnostic substance manufacturing
	174	Biological product (except diagnostic) manufacturing
	175	Paint and coating manufacturing
	176	Adhesive manufacturing
	177	Soap and other detergent manufacturing
	178	Polish and other sanitation good manufacturing
	179	Surface active agent manufacturing
	180	Toilet preparation manufacturing
	181	Printing ink manufacturing
	182	Explosives manufacturing
	183	Custom compounding of purchased resins
	184	Photographic film and chemical manufacturing
	185	Other miscellaneous chemical product manufacturing
	186	Plastics packaging materials & unlaminated film & sheet mfg
	187	Unlaminated plastics profile shape manufacturing
	188	Plastics pipe and pipe fitting manufacturing
	189	Laminated plastics plate, sheet (exc. packaging), & shape mfg
	190	Polystyrene foam product manufacturing
	191	Urethane & other foam product (exc. polystyrene) mfg
	192	Plastics bottle manufacturing
	193	Other plastics product manufacturing
	194	Tire manufacturing
	195	Rubber and plastics hoses and belting manufacturing
	196	Other rubber product manufacturing
	197	Pottery, ceramics, and plumbing fixture manufacturing
	198	Brick, tile, and other structural clay product manufacturing
	199	Flat glass manufacturing
	200	Other pressed and blown glass and glassware manufacturing
	201	Glass container manufacturing
	202	Glass product manufacturing made of purchased glass
	203	Cement manufacturing
	204	Ready-mix concrete manufacturing
	205	Concrete block and brick manufacturing
	206	Concrete pipe manufacturing
	207	Other concrete product manufacturing
	209	Gypsum product manufacturing
	210	Abrasive product manufacturing
	211	Cut stone and stone product manufacturing
	212	Ground or treated mineral and earth manufacturing
	213	Mineral wool manufacturing
	214	Miscellaneous nonmetallic mineral products manufacturing

New York model	Implan industry	
	215	Iron and steel mills and ferroalloy manufacturing
	216	Iron, steel pipe and tube manufacturing from purchased steel
	217	Rolled steel shape manufacturing
	218	Steel wire drawing
	219	Alumina refining and primary aluminum production
	220	Secondary smelting and alloying of aluminum
	221	Aluminum sheet, plate, and foil manufacturing
	222	Other aluminum rolling, drawing and extruding
	223	Nonferrous metal (exc aluminum) smelting and refining
	224	Copper rolling, drawing, extruding and alloying
	225	Nonferrous metal, except copper and aluminum, shaping
	226	Secondary processing of other nonferrous metals
	227	Ferrous metal foundries
	228	Nonferrous metal foundries
	229	Custom roll forming
	230	Crown and closure manufacturing and metal stamping
	231	Iron and steel forging
	232	Nonferrous forging
	233	Cutlery, utensil, pot, and pan manufacturing
	234	Handtool manufacturing
	235	Prefabricated metal buildings and components manufacturing
	236	Fabricated structural metal manufacturing
	237	Plate work manufacturing
	238	Metal window and door manufacturing
	239	Sheet metal work manufacturing
	240	Ornamental and architectural metal work manufacturing
	241	Power boiler and heat exchanger manufacturing
	242	Metal tank (heavy gauge) manufacturing
	243	Metal cans manufacturing
	244	Metal barrels, drums and pails manufacturing
	245	Hardware manufacturing
	246	Spring and wire product manufacturing
	247	Machine shops
	248	Turned product and screw, nut, and bolt manufacturing
	249	Metal heat treating
	250	Metal coating and nonprecious engraving
	251	Electroplating, anodizing, and coloring metal
	252	Valve and fittings, other than plumbing, manufacturing
	253	Plumbing fixture fitting and trim manufacturing
	254	Ball and roller bearing manufacturing
	255	Small arms ammunition manufacturing (no industry in NYS)
	256	Ammunition, except for small arms, manufacturing
	257	Small arms, ordnance, and accessories manufacturing
	258	Fabricated pipe and pipe fitting manufacturing
	259	Other fabricated metal manufacturing
	261	Lawn and garden equipment manufacturing
	262	Construction machinery manufacturing
	263	Mining machinery and equipment manufacturing
	264	Oil and gas field machinery and equipment manufacturing
	265	Semiconductor machinery manufacturing
	267	Sawmill, woodworking, and paper machinery
	268	Printing machinery and equipment manufacturing
	269	All other industrial machinery manufacturing
	270	Optical instrument and lens manufacturing
	271	Photographic and photocopying equipment manufacturing

New York model	Implan industry	
	272	Other commercial service industry machinery manufacturing
	273	Air purification and ventilation equipment manufacturing
	274	Heating equipment (except warm air furnaces) manufacturing
	275	Air conditioning, refrigeration, & warm air heating equip. mfg
	276	Industrial mold manufacturing
	277	Special tool, die, jig, and fixture manufacturing
	278	Cutting tool and machine tool accessory manufacturing
	279	Machine tool manufacturing
	280	Rolling mill and other metalworking machinery manufacturing
	281	Turbine and turbine generator set units manufacturing
	282	Speed changer, industrial high-speed drive, & gear mfg
	283	Mechanical power transmission equipment manufacturing
	284	Other engine equipment manufacturing
	285	Pump and pumping equipment manufacturing
	286	Air and gas compressor manufacturing
	287	Elevator and moving stairway manufacturing
	288	Conveyor and conveying equipment manufacturing
	289	Overhead cranes, hoists, and monorail systems manufacturing
	290	Industrial truck, trailer, and stacker manufacturing
	291	Power-driven handtool manufacturing
	292	Welding and soldering equipment manufacturing
	293	Packaging machinery manufacturing
	294	Industrial process furnace and oven manufacturing
	295	Fluid power cylinder and actuator manufacturing
	296	Fluid power pump and motor manufacturing
	297	Scales, balances, & misc. general purpose machinery mfg
	298	Electronic computer manufacturing
	299	Computer storage device manufacturing
	300	Computer terminals & other computer peripheral equip. mfg
	301	Telephone apparatus manufacturing
	302	Broadcast & wireless communications equipment mfg
	303	Other communications equipment manufacturing
	304	Audio and video equipment manufacturing
	305	Printed circuit assembly (electronic assembly) manufacturing
	306	Bare printed circuit board manufacturing
	307	Semiconductor and related device manufacturing
	308	Capacitor, resistor, coil, transformer, & other inductor mfg
	309	Electronic connector manufacturing
	310	Other electronic component manufacturing
	311	Electromedical & electrotherapeutic apparatus manufacturing
	312	Search, detection, and navigation instruments manufacturing
	313	Automatic environmental control manufacturing
	314	Industrial process variable instruments manufacturing
	315	Totalizing fluid meter and counting device manufacturing
	316	Electricity and signal testing instruments manufacturing
	317	Analytical laboratory instrument manufacturing
	318	Irradiation apparatus manufacturing
	319	Watch, clock, & other measuring and controlling device mfg
	320	Blank magnetic and optical recording media manufacturing
	321	Software and other prerecorded and record reproducing
	322	Electric lamp bulb and part manufacturing
	323	Lighting fixture manufacturing
	324	Small electrical appliance manufacturing
	325	Household cooking appliance manufacturing
	326	Household refrigerator and home freezer manufacturing

New York model	Implan industry	
	327	Household laundry equipment manufacturing
	328	Other major household appliance manufacturing
	329	Power, distribution, and specialty transformer manufacturing
	330	Motor and generator manufacturing
	331	Switchgear and switchboard apparatus manufacturing
	332	Relay and industrial control manufacturing
	333	Storage battery manufacturing
	334	Primary battery manufacturing
	335	Fiber optic cable manufacturing
	336	Other communication and energy wire manufacturing
	337	Wiring device manufacturing
	338	Carbon and graphite product manufacturing
	339	All other miscellaneous electrical equipment & component mfg
	340	Automobile manufacturing
	341	Light truck and utility vehicle manufacturing
	342	Heavy duty truck manufacturing
	343	Motor vehicle body manufacturing
	344	Truck trailer manufacturing (no industry in NYS)
	345	Motor home manufacturing (no industry in NYS)
	346	Travel trailer and camper manufacturing
	347	Motor vehicle gasoline engine and engine parts manufacturing
	348	Motor vehicle electrical & electronic equipment manufacturing
	349	Motor vehicle transmission & power train parts manufacturing
	350	Motor vehicle seating and interior trim manufacturing
	351	Motor vehicle metal stamping
	352	Other motor vehicle parts manufacturing
	353	Motor veh. steering, susp. (exc. spring), & brake sys. mfg
	354	Aircraft manufacturing
	355	Aircraft engine and engine parts manufacturing
	356	Other aircraft parts and auxiliary equipment manufacturing
	357	Guided missile & space vehicle manuf. (no industry in NYS)
	358	Prop. units & parts for space vehicles and guided missiles mfg
	359	Railroad rolling stock manufacturing
	360	Ship building and repairing
	361	Boat building
	362	Motorcycle, bicycle, and parts manufacturing
	363	Military vehicle, tank, & tank comp. mfg (no industry in NYS)
	364	All other transportation equipment manufacturing
	365	Wood kitchen cabinet and countertop manufacturing
	366	Upholstered household furniture manufacturing
	367	Nonupholstered wood household furniture manufacturing
	368	Other household nonupholstered furniture manufacturing
	369	Institutional furniture manufacturing
	370	Wood office furniture manufacturing
	371	Custom architectural woodwork and millwork
	372	Office furniture, except wood, manufacturing
	373	Showcase, partition, shelving, and locker manufacturing
	374	Mattress manufacturing
	375	Blind and shade manufacturing
	376	Surgical and medical instrument manufacturing
	377	Surgical appliance and supplies manufacturing
	378	Dental equipment and supplies manufacturing
	379	Ophthalmic goods manufacturing
	380	Dental laboratories
	381	Jewelry and silverware manufacturing

New York model	Implan industry
	382 Sporting and athletic goods manufacturing
	383 Doll, toy, and game manufacturing
	384 Office supplies (except paper) manufacturing
	385 Sign manufacturing
	386 Gasket, packing, and sealing device manufacturing
	387 Musical instrument manufacturing
	388 Fasteners, buttons, needles, and pins manufacturing
	389 Broom, brush, and mop manufacturing
	390 Burial casket manufacturing
	391 All other miscellaneous manufacturing
22 Wholesale trade	392 Wholesale - Motor vehicle and motor vehicle parts and supplies
	393 Wholesale - Professional & commercial equipment and supplies
	394 Wholesale - Household appliances & electrical & elec. goods
	395 Wholesale - Machinery, equipment, and supplies
	396 Wholesale - Other durable goods merchant wholesalers
	397 Wholesale - Drugs and druggists' sundries
	398 Wholesale - Grocery and related product wholesalers
	399 Wholesale - Petroleum and petroleum products
	400 Wholesale - Other nondurable goods merchant wholesalers
	401 Wholesale - Wholesale elec. markets & agents and brokers
23 Retail trade	402 Retail - Motor vehicle and parts dealers
	403 Retail - Furniture and home furnishings stores
	404 Retail - Electronics and appliance stores
	405 Retail - Building material and garden equipment supplies stores
	406 Retail - Food and beverage stores
	407 Retail - Health and personal care stores
	408 Retail - Gasoline stores
	409 Retail - Clothing and clothing accessories stores
	410 Retail - Sporting goods, hobby, musical instrument, book stores
	411 Retail - General merchandise stores
	412 Retail - Miscellaneous store retailers
	413 Retail - Nonstore retailers
24 Transportation and warehousing	414 Air transportation
	415 Rail transportation
	416 Water transportation
	417 Truck transportation
	418 Transit and ground passenger transportation
	419 Pipeline transportation
	420 Scenic, sightseeing transportation, support activities for transp
	421 Couriers and messengers
	422 Warehousing and storage
25 Information	423 Newspaper publishers
	424 Periodical publishers
	425 Book publishers
	426 Directory, mailing list, and other publishers
	427 Greeting card publishing
	428 Software publishers
	429 Motion picture and video industries
	430 Sound recording industries
	431 Radio and television broadcasting
	432 Cable and other subscription programming
	433 Wired telecommunications carriers
	434 Wireless telecommunications carriers (except satellite)
	435 Satellite, telecomm resellers, and all other telecommunications
	436 Data processing, hosting, and related services

New York model		Implan industry	
		437	News syndicates, libraries, archives, all other info services
		438	Internet publishing and broadcasting and web search portals
26	Finance and Insurance	439	Nondepository credit intermediation and related activities
		440	Securities & commodity contracts intermediation & brokerage
		441	Monetary authorities and depository credit intermediation
		442	Other financial investment activities
		443	Direct life insurance carriers
		444	Insurance carriers, except direct life
		445	Insurance agencies, brokerages, and related activities
		446	Funds, trusts, and other financial vehicles
27	Real estate and rental	447	Other real estate
		448	Tenant-occupied housing
		449	Owner-occupied dwellings
		450	Automotive equipment rental and leasing
		451	General & consumer goods rental except video tapes & discs
		452	Video tape and disc rental
		453	Comm. & industrial machinery & equipment rental & leasing
		454	Lessors of nonfinancial intangible assets
28	Professional – scientific and technical services	455	Legal services
		456	Accounting, tax preparation, bookkeeping, and payroll services
		457	Architectural, engineering, and related services
		458	Specialized design services
		459	Custom computer programming services
		460	Computer systems design services
		461	Other computer related services, incl facilities management
		462	Management consulting services
		463	Environmental and other technical consulting services
		464	Scientific research and development services
		465	Advertising, public relations, and related services
		466	Photographic services
		467	Veterinary services
		468	Marketing research, all other misc prof, scientific, tech services
29	Management of companies	469	Management of companies and enterprises
30	Administrative and waste services	470	Office administrative services
		471	Facilities support services
		472	Employment services
		473	Business support services
		474	Travel arrangement and reservation services
		475	Investigation and security services
		476	Services to buildings
		477	Landscape and horticultural services
		478	Other support services
		479	Waste management and remediation services
31	Educational services	480	Elementary and secondary schools
		481	Junior colleges, colleges, universities, and professional schools
		482	Other educational services
32	Health and social services	483	Offices of physicians
		484	Offices of dentists
		485	Offices of other health practitioners
		486	Outpatient care centers
		487	Medical and diagnostic laboratories
		488	Home health care services
		489	Other ambulatory health care services
		490	Hospitals
		491	Nursing and community care facilities

New York model	Implan industry	
	492	Res. mental retardation & health, subst abuse, other facilities
	493	Individual and family services
	494	Child day care services
	495	Community food, housing, other relief, incl rehab services
	496	Performing arts companies
	497	Commercial Sports Except Racing
	498	Racing and Track Operation
	499	Independent artists, writers, and performers
	500	Promoters of performing arts, sports, agents for public figures
33 Arts, entertainment and recreation	501	Museums, historical sites, zoos, and parks
	502	Amusement parks and arcades
	503	Gambling industries (except casino hotels)
	504	Other amusement and recreation industries
	505	Fitness and recreational sports centers
	506	Bowling centers
	507	Hotels and motels, including casino hotels
	508	Other accommodations
34 Accommodations and food services	509	Full-service restaurants
	510	Limited-service restaurants
	511	All other food and drinking places
	512	Automotive repair and maintenance, except car washes
	513	Car washes
	514	Electronic and precision equipment repair and maintenance
	515	Comm. & industrial machinery & equip. repair and maint.
	516	Personal and household goods repair and maintenance
	517	Personal care services
	518	Death care services
35 Other services	519	Dry-cleaning and laundry services
	520	Other personal services
	521	Religious organizations
	522	Grantmaking, giving, and social advocacy organizations
	523	Business and professional associations
	524	Labor and civic organizations
	525	Private households
	526	Postal service
	527	Federal electric utilities (no industry in NYS)
	528	Other federal government enterprises
	529	State government passenger transit
	530	State government electric utilities
	531	Other state government enterprises
	532	Local government passenger transit
	533	Local government electric utilities
	534	Other local government enterprises
36 Government	535	Not an industry (Used and secondhand goods)
	536	Not an industry (Scrap)
	537	Not an industry (Rest of world adjustment)
	538	Not an industry (Noncomparable foreign imports)
	539	Employment and payroll of state govt, non-education
	540	Employment and payroll of state govt, education
	541	Employment and payroll of local govt, non-education
	542	Employment and payroll of local govt, education
	543	Employment and payroll of federal govt, non-military
	544	Employment and payroll of federal govt, military

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