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Abstract

In 2019, agricultural industries, including agricultural production, agricultural support services, and agricultural manufacturing, directly contributed $43.6 billion in total industry output, 163.1 thousand jobs, and $12.3 billion in gross domestic product to the New York State economy. When backward-linked supply chain business-to-business transactions (indirect effects) and household spending out of labor income (induced effects) are considered, these values grow to $65.2 billion, 269.7 thousand, and $26.3 billion, respectively. This implies relatively strong multiplier effects in agriculture for the state, whereby every $1 in output in agriculture generates an additional $0.49 in backward linked non-agricultural industries, every job in agriculture generates an additional 0.65 non-agricultural jobs, and every $1 in gross domestic product generates an additional $1.14 in non-agricultural contributions to gross domestic product.

* Associate Professor, Charles H. Dyson School of Applied Economics and Management, Cornell University. This publication presents an update to a similar analysis published in 2016 (Schmit 2016), with more recently available data. Any opinions, findings, conclusions, or recommendations expressed in this publication are the author's and do not necessarily reflect the views of Cornell University. All errors remain our sole responsibility.

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Introduction

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

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

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

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

This report serves as an update to previous efforts that documented the importance and relationships of the State's major agricultural industries (e.g., Schmit & Bills 2012, Schmit & Boisvert 2014, Schmit 2014, and Schmit 2016). This report provides an updated assessment of the overall contribution of agriculture to the NYS economy based on the framework utilized in Schmit (2016) using economic data from 2019 (the latest available at the time of this publication). Such an assessment aids in the understanding agriculture's total contribution in terms of its direct and backward-linked industry exchanges, and also its contribution relative to other industries. Given changes in market demands and supplies (and therefore prices) overtime, once can also evaluate these changes relative to the changes in overall economic contributions. A recent analysis focused on NYS's apple industry specifically is also available (Schmit et al. 2018, 2019). In addition, follow on assessments will denote changes in agricultural activities impacts

during the Covid-19 global health pandemic (2020-2021). How industries responded to the pandemic and what inter-industry linkages changed and persist will be of particular consequence for future study.

Methodological Approach

One approach to assessing agriculture's impacts in the NYS economy is through an economic contribution analysis. This type of analysis for an industry (like dairy farming) or collection of industries (like food processing) describes that portion of an economy that can be attributed to the existing industry (or industries) by using data internal to the underlying input-output (IO) model to identify all backward linkages in the study area; i.e., it identifies the total direct, indirect, and induced effects (see Box 1). IO models provide an insightful way to depict and investigate the underlying processes that bind an economy together. Its strengths lie in a detailed representation of 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).

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 2021	

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 in the state) permeate throughout the state's economy.

There are several metrics in which to measure the size of an economy; here, we consider industry sales (output), labor income, total value added, and employment (see Box 2). In particular, we look at the contribution of 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 in the state. Finally, we highlight the backward-linked industries most affected by agriculture's direct impacts; i.e., we highlight the distribution of industry indirect and induced effects.

[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).

The analysis is conducted using 2019 IMPLAN data and software. Following IMPLAN's recommended procedure for an economic contribution analysis, two preliminary steps are required before estimating the indirect and induced effects. First, commodity production for each industry of interest is modified so that each industry produces only its primary commodity; i.e., no by-products. This is necessary since trade flows within IMPLAN (which are modified next) apply to commodities, not industries.[2]

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 (2021)	

Second, within the trade flows data, the Regional Supply Coefficient (RSC) for each commodity contained in the contribution analysis is set to zero. The RSC indicates the proportion of local net supply of a commodity that goes to meet local demands. Editing the by-products and changing the RSC implies that all specified industry sectors will have sales only to exports (domestic or foreign), with zero intermediate output. This ensures that no industry or institution (including households) will purchase from these industries beyond the industry's total output. It forces the model to not be able to create any additional local impact for any of the sectors included in the contribution analysis, and effectively eliminates double counting of backward linkages.

Since all intermediate sales have been changed to final sales, the direct and indirect effects reported have slightly different interpretations. Specifically, the direct effects (with respect to output) represent all sales by the industries of interest (in our case, agricultural industries as defined above). Total gross output is used as the direct effect, including final demand and the indirect and induced agricultural effects associated with that final demand. The indirect effects represent all sales by the backward-linked supply chain industries. In other words, all indirect purchases in upstream sectors or, in our case, all sales in the agricultural supply chain. The induced effects have their common interpretation; i.e., additional industry sales due to consumption out of labor income. The contribution concept is illustrated in Figure 1.

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

Using the IMPLAN databases, it is possible to examine transactions among 544 industrial sectors of an economy as defined by the North American Industry Classification System (NAICS), the standard used by Federal statistical agencies to classify business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. To gain a better understanding of the structure of industries within New York's agricultural system, we construct an IO model for NYS based on this 2019 data.[3]

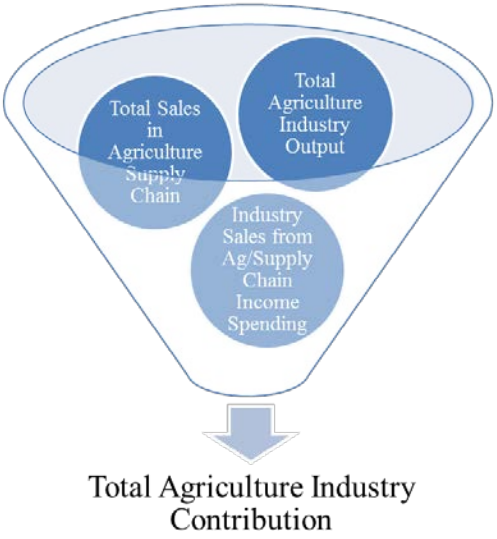

Figure 1. Elements of an agricultural economic contribution analysis.

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 State's agricultural system, including agricultural production (5), service (1), and manufacturing (10) sectors. The other 20 economic sectors are defined by aggregating the remaining industries at the 2-digit NAICS level (Table 1).[4]

Direct Impacts of Agriculture

Before discussing the results of the agriculture contribution analysis, it is useful to provide an overview of the NYS economy and to highlight agriculture's direct and relative contributions. A snapshot of the economy for 2019 is presented in Table 1. In terms of the relative contributions to the state's gross domestic product (i.e., total value added of $1,746 billion), the top five industry aggregates in NYS are finance & insurance (19.4%), real estate & rental (12.1%), professional services (10.1%), government (9.9%), and information & communications (7.8%). Given differences in labor intensities across industries, rankings on employment tell a slightly different story. Here, the highest relative contributions to the state's total employment (i.e., 11.8 million jobs) are for health & social services (14.3%), government (11.0%), professional services (9.0%), retail trade (7.8%), and accommodations & food services (7.8%). Given over 40% of the state's population lives in New York City, state-level industry concentrations are certainly influenced by the composition of industries in the New York City Metropolitan Area. Even still, the highest-ranking industry aggregates are consistent with the overall distribution of household expenditures.

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

Table 1. Direct economic activity by industrial sector aggregate, New York State, 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	654	0.0	10,399	0.1	220	0.0	559	0.0
Ag production: Greenhouse & nursery	396	0.0	5,788	0.0	189	0.0	302	0.0
Ag production: Grain, oilseed, & other crops	809	0.0	22,057	0.2	226	0.0	601	0.0
Ag production: Dairy	2,858	0.1	9,239	0.1	268	0.0	727	0.0
Ag production: Beef, poultry, & other animals	529	0.0	4,999	0.0	71	0.0	248	0.0
Agricultural support services	413	0.0	10,588	0.1	367	0.0	323	0.0
Forestry, commercial logging, fishing, & hunting	481	0.0	5,783	0.0	318	0.0	327	0.0
Mining and drilling	3,628	0.1	12,321	0.1	2,942	0.3	869	0.0
Utilities: generation & distribution	50,897	1.9	40,089	0.3	8,358	0.8	23,753	1.4
Construction	100,061	3.8	603,933	4.7	46,100	4.4	59,936	3.4
Ag manufacturing: Animal food	2,601	0.1	2,636	0.0	238	0.0	450	0.0
Ag manufacturing: Grain & oilseed milling	1,201	0.0	1,082	0.0	91	0.0	128	0.0
Ag manufacturing: Sugar & confectionary	1,483	0.1	3,590	0.0	207	0.0	259	0.0
Ag manufacturing: Fruit and vegetables	2,880	0.1	6,606	0.1	464	0.0	579	0.0
Ag manufacturing: Dairy	8,791	0.3	11,970	0.1	952	0.1	1,241	0.1
Ag manufacturing: Bakery & tortilla	6,288	0.2	45,512	0.4	1,956	0.2	2,471	0.1
Ag manufacturing: Meat & seafood	2,401	0.1	5,290	0.0	362	0.0	414	0.0
Ag manufacturing: Other foods	5,193	0.2	10,274	0.1	803	0.1	1,068	0.1
Ag manufacturing: Beverages	6,007	0.2	11,642	0.1	1,431	0.1	2,660	0.2
Ag manufacturing: Fert., chemical, & machinery	1,136	0.0	1,474	0.0	119	0.0	255	0.0
NonAg manufacturing	166,480	6.3	382,661	3.0	34,593	3.3	58,722	3.4
Wholesale trade	123,797	4.7	354,715	2.8	37,898	3.6	74,404	4.3
Retail trade	106,537	4.0	1,001,683	7.8	44,808	4.2	68,992	4.0
Transportation & warehousing	63,271	2.4	564,282	4.4	26,521	2.5	37,873	2.2
Information & communications	224,513	8.5	313,990	2.5	55,938	5.3	135,350	7.8
Finance & insurance	465,928	17.6	923,520	7.2	165,868	15.7	339,563	19.4
Real estate & rental	305,839	11.5	728,505	5.7	30,301	2.9	211,055	12.1
Professional services	250,010	9.4	1,150,819	9.0	140,509	13.3	175,908	10.1
Management of companies	45,328	1.7	166,555	1.3	26,243	2.5	30,151	1.7
Administrative & waste services	74,389	2.8	671,501	5.3	42,815	4.0	50,421	2.9
Educational services	33,076	1.2	366,342	2.9	21,586	2.0	25,578	1.5
Health & social services	204,405	7.7	1,825,251	14.3	120,523	11.4	132,619	7.6
Arts, entertainment, & recreation	42,939	1.6	356,519	2.8	19,275	1.8	30,832	1.8
Accomodations & food services	93,244	3.5	995,216	7.8	38,383	3.6	62,942	3.6
Other services	66,377	2.5	762,440	6.0	37,254	3.5	42,555	2.4
Government	186,839	7.0	1,400,769	11.0	149,729	14.2	172,652	9.9
Total	2,650,627	100.0	12,773,854	100.0	1,057,516	100.0	1,745,925	100.0

Note: See Appendix A for specific industries included in the industry aggregates. Source: IMPLAN 2021

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 about $5.2 billion in sales in 2019, which accounted for 0.2% of total industrial sales across the state. In terms of employment, agricultural production had over 52 thousand jobs, which represented about 0.4% of total state-level employment. Not surprisingly, dairy farming was the largest single industry agricultural production sector in the state.

The agricultural and forestry support services sector is included within our broad definition of agriculture to encompass its key linkages with farm production sectors. Agricultural support services include a variety of support activities related to custom harvesting and field preparation, fertilizer and chemical spraying, sorting, grading, and packing services, livestock insemination and breeding services, milk and crop testing, etc. While the overall sales contributions are relatively small ($413 million, Table 1), the labor-intensive nature of this service sector implies relatively strong contributions to overall agricultural employment; i.e., over 10,500 jobs in 2019.

Food (including beverages) and agricultural-based product manufacturers (including fertilizers, chemicals, and food/ag machinery) are represented by over 50 individual sectors in IMPLAN (see Appendix A). 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 (Table 1). In total, agriculturally-based manufacturing industries in the state contributed nearly $38 billion in sales, representing about 1.4% of all sales in the state, and employed over 100 thousand workers, representing 0.8% of state-wide employment. Over $9.5 billion in value added contributed to about 0.5% of state totals.

Dairy manufacturing accounted for 23% of all agricultural manufacturing sales and 12% of employment, and relies heavily on within-state milk production from the farming sector (i.e., strong backward linkages). Other processing sectors with relatively strong reliance on in-state farm production and with strong output contributions are from fruit and vegetable, meat processing, and the beverage sectors. Other relatively large agricultural manufacturing sectors include bakery and tortilla product manufacturing, grain and oilseed milling, and other foods, but rely less on raw product inputs produced in the state. The diversity of the composition of agricultural manufacturing is a reflection of both a diverse agricultural production sector and a large population base.

Economic Contribution Results

The economic contribution of agriculture, as we have defined it, on total industrial sales in 2019 was $65.2 billion; about 2.5% of NYS's total sales (Table 2). The $43.6 billion of direct contributions (total gross output) support an additional $11.7 billion and $9.8 billion in indirect and induced industry sales, respectively, through agriculture's inter-industry linkages. Individual agricultural component contributions (i.e., for farm production, service, and manufacturing separately) are also shown in Table 2. Note, that while the direct contributions across agriculture's segments are additive (i.e., for the direct effects, agricultural production + agricultural support services + agricultural manufacturing = all agriculture), the same is not true for the indirect and induced impacts. For example, when looking at the

agricultural manufacturing sector in isolation, a portion of the $14.6 billion 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.

Table 2. Economic contribution of agriculture on the New York State economy, aggregate agricultural industry sectors, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Implicit Multiplier[d]
Industry Output ($ million)					
Agricultural Production	5,245	1,860	1,248	8,353	1.59
Agricultural Support Services	413	62	316	791	1.91
Agricultural Manufacturing	37,982	14,597	9,050	61,629	1.62
All Agriculture	43,640	11,716	9,828	65,184	1.49
Employment (jobs)					
Agricultural Production	52,483	8,158	7,241	67,882	1.29
Agricultural Support Services	10,588	236	1,836	12,660	1.20
Agricultural Manufacturing	100,077	72,802	52,802	225,682	2.26
All Agriculture	163,148	49,263	57,273	269,683	1.65
Labor Income ($ million)					
Agricultural Production	975	573	492	2,039	2.09
Agricultural Support Services	367	21	125	513	1.40
Agricultural Manufacturing	6,621	4,789	3,581	14,991	2.26
All Agriculture	7,963	4,436	3,889	16,289	2.05
Total Value Added ($ million)					
Agricultural Production	2,437	1,066	834	4,337	1.78
Agricultural Support Services	323	37	211	571	1.77
Agricultural Manufacturing	9,525	8,367	6,077	23,969	2.52
All Agriculture	12,285	7,421	6,599	26,305	2.14

Source: IMPLAN 2021

[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.

The implied output multiplier for all agriculture in NYS (i.e., the sum of the direct, indirect, and induced effects divided by the direct effect) is 1.49, meaning that for every dollar of output generated in agriculture, $0.49 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 0.27 (from business-to-business activity) and the induced effect is 0.23 (from labor income spending). Individual agricultural sector contributions and output multipliers are also shown in the top section of Table 2.

Total employment contributions in 2019 by New York agriculture was 269,683 jobs, 163,148 jobs through its direct employment and an additional 106,535 jobs through its indirect and induced industry effects

(Table 2). This represents approximately 2.1% of total NYS employment. As with industry output, the majority of the jobs are generated by agricultural manufacturing activity. Indeed, the agricultural manufacturing employment multiplier (2.26) is well above either the agricultural production (1.29) or support services (1.20) sectors and, in part, reflects strong linkages to agricultural production in the state. In total, each job generated in agriculture supports another 0.65 jobs in backward-linked non-agricultural industry sectors.

Now consider labor income, which includes employee compensation (wages and benefits) and proprietor (self-employment) income. All of agriculture supports $16.3 billion of labor income, which is 1.5% of all labor income generated in NYS. The overall labor income multiplier is 2.05, which indicates that for every dollar of labor income generated in agriculture, $1.05 is generated elsewhere in the NYS economy. As with output and employment, the bulk of the impact comes from agricultural manufacturing. Finally, consider total value added. Here, agriculture contributes $26.3 billion to the state's total GDP (1.5% of the total), through direct contributions of $12.3 billion, and indirect and induced contributions of $7.4 billion and $6.6 billion, respectively.

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

Distributional Implications of Inter-Industry Linkages

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

Agricultural Production Linkages

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

Table 3. Economic contribution of agricultural production sectors, New York State, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Implicit Multiplier[d]
Industry Output ($ million)					
Fruit and Vegetable	654	68	200	922	1.41
Greenhouse and Nursery	396	58	168	622	1.57
Grain, Oilseed, and Other Crops	809	155	227	1,191	1.47
Dairy	2,858	1,488	569	4,915	1.72
Beef, Poultry, and Other Animals	529	156	98	783	1.48
Employment					
Fruit and Vegetable	10,399	599	1,161	12,159	1.17
Greenhouse and Nursery	5,788	376	976	7,140	1.23
Grain, Oilseed, and Other Crops	22,057	1,055	1,321	24,433	1.11
Dairy	9,239	6,488	3,309	19,036	2.06
Beef, Poultry, and Other Animals	4,999	775	570	6,344	1.27
Labor Income ($ million)					
Fruit and Vegetable	220	29	79	328	1.49
Greenhouse and Nursery	189	22	37	248	1.31
Grain, Oilseed, and Other Crops	226	56	90	371	1.64
Dairy	268	435	224	927	3.45
Beef, Poultry, and Other Animals	71	48	39	158	2.22
Total Value Added ($ million)					
Fruit and Vegetable	559	45	134	738	1.32
Greenhouse and Nursery	302	37	112	452	1.49
Grain, Oilseed, and Other Crops	601	102	152	854	1.42
Dairy	727	835	380	1,943	2.67
Beef, Poultry, and Other Animals	248	88	65	401	1.62

Source: IMPLAN 2021

[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 4. Economic contribution of selected agricultural manufacturing sectors, New York State, 2019.

	Direct[a]	Indirect[b]	Induced[c]	Total	Implicit Multiplier[d]
Industry Output ($ million)					
Grain and Oilseed	1,201	412	192	1,805	1.50
Fruit, Vegetable, and Specialty	2,880	1,025	660	4,565	1.58
Dairy	8,791	5,850	1,895	16,536	1.88
Meat and Seafood	2,401	755	489	3,645	1.52
Beverages (alc and nonalc)	6,007	1,614	1,638	9,259	1.54
Employment					
Grain and Oilseed	1,082	4,672	1,113	6,867	6.34
Fruit, Vegetable, and Specialty	6,606	5,227	3,834	15,667	2.37
Dairy	11,970	22,785	11,019	45,774	3.82
Meat and Seafood	5,290	4,719	2,840	12,849	2.43
Beverages (alc and nonalc)	11,642	7,083	9,541	28,266	2.43
Labor Income ($ million)					
Grain and Oilseed	91	148	76	314	3.47
Fruit, Vegetable, and Specialty	464	364	260	1,087	2.35
Dairy	952	1,418	747	3,117	3.27
Meat and Seafood	362	250	193	804	2.22
Beverages (alc and nonalc)	1,431	557	647	2,635	1.84
Total Value Added ($ million)					
Grain and Oilseed	128	271	128	527	4.12
Fruit, Vegetable, and Specialty	579	1,025	441	2,045	3.53
Dairy	1,241	2,674	1,267	5,182	4.17
Meat and Seafood	414	442	327	1,183	2.86
Beverages (alc and nonalc)	2,660	974	1,095	4,730	1.78

Source: IMPLAN 2016

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

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

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

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

Table 5. Distribution of indirect and induced output effects, by industry, from agricultural production activities, New York State, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
0	Total	5,245	100.0	1,860	100.0	1,248	100.0	3,108	100.0
0	Grain Oilseed Other Crop Farming	809	15.4	-	-	-	-	-	-
0	Fruit and Vege Farming	654	12.5	-	-	-	-	-	-
0	Greenhouse and Nursery	396	7.6	-	-	-	-	-	-
0	Beef Poultry Other Animal Farming	529	10.1	-	-	-	-	-	-
0	Dairy Farming	2,858	54.5	-	-	-	-	-	-
1	Wholesale Trade	-	-	549	29.5	54	4.4	604	19.4
2	Real estate and rental	-	-	321	17.3	232	18.6	553	17.8
3	Ag Manuf - Animal food	-	-	263	14.1	1	0.1	264	8.5
4	Finance and insurance	-	-	111	6.0	163	13.1	274	8.8
5	Transportation and warehousing	-	-	97	5.2	35	2.8	132	4.2
6	Support Activities for Ag and Forestry	-	-	97	5.2	0	0.0	97	3.1
7	Professional services	-	-	88	4.7	65	5.2	153	4.9
8	Admin and waste services	-	-	45	2.4	36	2.9	81	2.6
9	Information	-	-	42	2.3	71	5.7	113	3.6
10	Utilities generation distribution	-	-	42	2.3	21	1.7	63	2.0
11	Management of companies enterprises	-	-	35	1.9	17	1.4	52	1.7
12	Government	-	-	35	1.9	33	2.7	68	2.2
13	NonAg Manuf	-	-	23	1.3	12	0.9	35	1.1
14	Construction	-	-	20	1.1	9	0.8	30	1.0
15	Ag Manuf - fert chem mach	-	-	19	1.0	0	0.0	19	0.6
16	Retail Trade	-	-	14	0.8	98	7.9	113	3.6
17	Accommodations and food services	-	-	12	0.6	67	5.4	79	2.5
18	Ag Manuf - grain oilseed milling	-	-	11	0.6	0	0.0	11	0.4
19	Ag Manuf - beverages	-	-	10	0.6	2	0.2	13	0.4
20	Other services	-	-	10	0.6	62	5.0	72	2.3
21	Arts entertainment recreation	-	-	6	0.3	27	2.1	32	1.0
22	Ag Manuf - meat seafood	-	-	3	0.1	1	0.1	4	0.1
23	Ag Manuf - dairy	-	-	1	0.1	2	0.1	3	0.1
24	Mining and drilling	-	-	1	0.1	0	0.0	1	0.0
25	Educational services	-	-	1	0.0	30	2.4	31	1.0
26	Ag Manuf - Other foods	-	-	1	0.0	1	0.1	2	0.1
27	Ag Manuf - sugar confectionary	-	-	1	0.0	0	0.0	1	0.0
28	Forestry Comm logging fishing hunting	-	-	0	0.0	0	0.0	1	0.0
29	Ag Manuf - fruit vege specialty	-	-	0	0.0	1	0.0	1	0.0
30	Ag Manuf - bakery tortilla	-	-	0	0.0	2	0.2	2	0.1
31	Health and social services	-	-	0	0.0	204	16.4	204	6.6

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 production activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix A.

While all sector effects are shown, note that the top 10 industries represent 89% of all indirect sector contributions. Major household consumption expenditure categories are clearly articulated in the top induced effects; i.e., housing (real estate & rental), health care (health & social services), finance & insurance, and retail trade (including food purchases). The primary indirect effects highlight important supply chain industries for agriculture in NYS; i.e., wholesale trade (including wholesale product sellers and distributors), real estate & rental (e.g., rented or leased land and equipment), animal food manufacturing (for dairy and other livestock farmings), finance & insurance, transportation & warehousing, and agricultural support services. In fact, these six industries represent 77% of the total indirect effects (i.e., $1.4 billion of the $1.9 billion). The total indirect and induced effects from the agricultural production sectors is $3.1 billion.

Table 6 provides a similar ranking of the strongest industrial sector backward linkages, but now in terms of employment effects. Again, the top 10 industry effects comprise most (90.5%) of the total indirect effects. While most of the top 10 industries from Table 5 remain near the top, the relative rankings have changed considerably, and now represent sectors that are relatively more labor intensive (particularly service sectors). In particular, note the very strong employment linkages with firms involved in agricultural support service that comprises 30.5% of all indirect effects. Strong linkages with wholesale trade, transportation & warehousing, professional services, and administrative services also exist and account for 19.3%, 10.6%, 5.0%, and 4.9% of all indirect effects, respectively. Strong induced employment effects with health care services, retail trade, real estate & rental, accommodations food services, and other service sectors are consistent household spending activities in highly-oriented service sectors.

Agricultural Processing Linkages

The nature of the backward-linked industries, ranked by total indirect effects, for agricultural manufacturing activity are shown in Table 7 (with respect to output) and Table 8 (with respect to employment). In terms of output (employment), the top 10 industries represent 85.3% (83.1%) of all indirect sector contributions. As before, major industry expenditures by households are reflected in the highest induced effects, namely real estate & rental, health & social services, finance & insurance, and retail trade.

The strong backward linkages to dairy farming are evident when considering linkages to agricultural manufacturing activity in NYS. Just behind purchases from wholesalers & distributors, the dairy farming sector represents nearly 17% of all indirect output effects (Table 7). Industry sizes, seasonality effects, and relative sourcing volumes by food manufacturing firms for NYS farm produced products is indicative in the rankings of grain, oilseed, & other crop farming (14), beef & other livestock farming (19), fruit & vegetable farming (20), and greenhouse & nursery (29). Strong volumes of business with wholesale trade operations and transportation & warehousing firms reflect strong purchases by ag manufacturing firms for input supplies used in their production and in distribution and storage services.

Given differences in labor intensities in agricultural production sectors mentioned previously, it is not surprising that indirect employment effects to ag production industries rank higher than that for employment. Specific rankings are grain, oilseed & other crop farming (1), dairy farming (4), beef & other livestock farming (9), fruit & vegetable farming (10), and greenhouse & nursery (23). Collectively, they make up over 32% of indirect effects generated by agricultural manufacturing in the state.

Table 6. Distribution of indirect and induced employment effects, by industry, from agricultural production activities, New York State, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	Jobs	%	Jobs	%	Jobs	%	Jobs	%
0	Total	52,483	100.0	8,158	100.0	7,241	100.0	15,399	100.0
0	Grain Oilseed Other Crop Farming	22,057	42.0	-	-	-	-	-	-
0	Fruit and Vege Farming	10,399	19.8	-	-	-	-	-	-
0	Greenhouse and Nursery	5,788	11.0	-	-	-	-	-	-
0	Beef Poultry Other Animal Farming	4,999	9.5	-	-	-	-	-	-
0	Dairy Farming	9,239	17.6	-	-	-	-	-	-
1	Support Activities for Ag and Forestry	-	-	2,487	30.5	1	0.0	2,488	16.2
2	Wholesale Trade	-	-	1,574	19.3	156	2.2	1,730	11.2
3	Transportation and warehousing	-	-	867	10.6	311	4.3	1,178	7.6
4	Real estate and rental	-	-	765	9.4	553	7.6	1,318	8.6
5	Professional services	-	-	405	5.0	297	4.1	703	4.6
6	Admin and waste services	-	-	404	4.9	324	4.5	728	4.7
7	Ag Manuf - Animal food	-	-	267	3.3	1	0.0	267	1.7
8	Government	-	-	261	3.2	250	3.5	511	3.3
9	Finance and insurance	-	-	220	2.7	324	4.5	544	3.5
10	Retail Trade	-	-	136	1.7	923	12.8	1,059	6.9
11	Management of companies enterprises	-	-	130	1.6	62	0.9	191	1.2
12	Accommodations and food services	-	-	124	1.5	714	9.9	838	5.4
13	Construction	-	-	123	1.5	57	0.8	180	1.2
14	Other services	-	-	118	1.4	714	9.9	832	5.4
15	Information	-	-	59	0.7	99	1.4	158	1.0
16	NonAg Manuf	-	-	54	0.7	27	0.4	81	0.5
17	Arts entertainment recreation	-	-	49	0.6	221	3.0	270	1.8
18	Utilities generation distribution	-	-	33	0.4	17	0.2	50	0.3
19	Ag Manuf - fert chem mach	-	-	25	0.3	0	0.0	25	0.2
20	Ag Manuf - beverages	-	-	20	0.2	5	0.1	25	0.2
21	Ag Manuf - grain oilseed milling	-	-	10	0.1	0	0.0	10	0.1
22	Educational services	-	-	8	0.1	332	4.6	341	2.2
23	Ag Manuf - meat seafood	-	-	6	0.1	2	0.0	8	0.1
24	Forestry Comm logging fishing hunting	-	-	5	0.1	3	0.0	8	0.1
25	Mining and drilling	-	-	4	0.0	1	0.0	4	0.0
26	Ag Manuf - dairy	-	-	2	0.0	2	0.0	4	0.0
27	Ag Manuf - sugar confectionary	-	-	1	0.0	1	0.0	2	0.0
28	Ag Manuf - Other foods	-	-	1	0.0	2	0.0	3	0.0
29	Ag Manuf - bakery tortilla	-	-	1	0.0	16	0.2	16	0.1
30	Ag Manuf - fruit vege specialty	-	-	1	0.0	1	0.0	2	0.0
31	Health and social services	-	-	0	0.0	1,825	25.2	1,825	11.9

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 production activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix A.

Table 7. Distribution of indirect and induced output effects, by industry, from agricultural manufacturing activities, New York State, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	$Mill	%	$Mill	%	$Mill	%	$Mill	%
0	Total	39,319	100.0	15,014	100.0	9,275	100.0	24,289	100.0
0	AgManuf – Animal food	2,750	7.0	-	-	-	-	-	-
0	AgManuf - grain oilseed milling	1,290	3.3	-	-	-	-	-	-
0	AgManuf - sugar confectionary	1,547	3.9	-	-	-	-	-	-
0	AgManuf - fruit vege specialty	2,995	7.6	-	-	-	-	-	-
0	AgManuf - dairy	9,106	23.2	-	-	-	-	-	-
0	AgManuf – bakery tortilla	6,437	16.4	-	-	-	-	-	-
0	AgManuf – meat seafood	2,504	6.4	-	-	-	-	-	-
0	AgManuf - Other foods	5,334	13.6	-	-	-	-	-	-
0	AgManuf - beverages	6,158	15.7	-	-	-	-	-	-
0	AgManuf – fert chem mach	1,197	3.0	-	-	-	-	-	-
1	WholesaleT rade	-	-	3,679	24.5	402	4.3	4,081	16.8
2	Dairy Farming	-	-	2,529	16.8	0	0.0	2,529	10.4
3	Transportation and warehousing	-	-	1,243	8.3	261	2.8	1,504	6.2
4	Management of companies enterprises	-	-	1,165	7.8	124	1.3	1,289	5.3
5	Professional services	-	-	1,082	7.2	483	5.2	1,565	6.4
6	Realestate and rental	-	-	893	5.9	1,747	18.8	2,641	10.9
7	Finance and insurance	-	-	765	5.1	1,204	13.0	1,970	8.1
8	Admin and waste services	-	-	519	3.5	270	2.9	789	3.2
9	Information	-	-	479	3.2	530	5.7	1,009	4.2
10	Non Ag Manuf	-	-	449	3.0	88	0.9	537	2.2
11	Utilities generation distribution	-	-	428	2.8	161	1.7	589	2.4
12	Grain Oilseed Other Crop Farming	-	-	420	2.8	1	0.0	421	1.7
13	Government	-	-	350	2.3	250	2.7	600	2.5
14	Beef Poultry Other Animal Farming	-	-	245	1.6	1	0.0	247	1.0
15	Fruit and Vege Farming	-	-	142	0.9	3	0.0	145	0.6
16	Retail Trade	-	-	136	0.9	736	7.9	872	3.6
17	Other services	-	-	121	0.8	469	5.1	590	2.4
18	Accomodations and food services	-	-	111	0.7	508	5.5	619	2.5
19	Construction	-	-	98	0.7	71	0.8	169	0.7
20	Support Activities for Ag and Forestry	-	-	59	0.4	0	0.0	59	0.2
21	Arts entertainment recreation	-	-	38	0.3	199	2.1	237	1.0
22	Forestry Comm logging fishing hunting	-	-	36	0.2	2	0.0	37	0.2
23	Mining and drilling	-	-	11	0.1	1	0.0	13	0.1
24	Greenhouse and Nursery	-	-	9	0.1	1	0.0	10	0.0
25	Educational services	-	-	6	0.0	225	2.4	230	0.9
26	Health and social services	-	-	0	0.0	1,536	16.6	1,536	6.3

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 manufacturing activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix A.

Table 8. Distribution of indirect and induced employment effects, by industry, from agricultural manufacturing activities, New York State, 2019.

Indirect		Direct		Indirect		Induced		Indirect + Induced	
Rank	Description	Jobs	%	Jobs	%	Jobs	%	Jobs	%
0	Total	100,077	100.0	72,802	100.0	52,802	100.0	125,605	100.0
0	Ag Manuf - Animal food	2,636	2.6	-	-	-	-	-	-
0	Ag Manuf - grain oilseed milling	1,082	1.1	-	-	-	-	-	-
0	Ag Manuf - sugar confectionary	3,590	3.6	-	-	-	-	-	-
0	Ag Manuf - fruit vege specialty	6,606	6.6	-	-	-	-	-	-
0	Ag Manuf - dairy	11,970	12.0	-	-	-	-	-	-
0	Ag Manuf - bakery tortilla	45,512	45.5	-	-	-	-	-	-
0	Ag Manuf - meat seafood	5,290	5.3	-	-	-	-	-	-
0	Ag Manuf - Other foods	10,274	10.3	-	-	-	-	-	-
0	Ag Manuf - beverages	11,642	11.6	-	-	-	-	-	-
0	Ag Manuf - fert chem mach	1,474	1.5	-	-	-	-	-	-
1	Grain Oilseed Other Crop Farming	-	-	11,078	15.2	17	0.0	11,095	8.8
2	Transportation and warehousing	-	-	10,714	14.7	2,254	4.3	12,969	10.3
3	Wholesale Trade	-	-	10,305	14.2	1,126	2.1	11,431	9.1
4	Dairy Farming	-	-	7,845	10.8	0	0.0	7,846	6.2
5	Professional services	-	-	4,858	6.7	2,169	4.1	7,026	5.6
6	Admin and waste services	-	-	4,541	6.2	2,367	4.5	6,908	5.5
7	Management of companies enterprises	-	-	4,196	5.8	445	0.8	4,641	3.7
8	Government	-	-	2,559	3.5	1,825	3.5	4,384	3.5
9	Beef Poultry Other Animal Farming	-	-	2,227	3.1	12	0.0	2,238	1.8
10	Fruit and Vege Farming	-	-	2,183	3.0	45	0.1	2,229	1.8
11	Real estate and rental	-	-	2,072	2.8	4,053	7.7	6,124	4.9
12	Finance and insurance	-	-	1,503	2.1	2,365	4.5	3,869	3.1
13	Support Activities for Ag and Forestry	-	-	1,472	2.0	12	0.0	1,483	1.2
14	Other services	-	-	1,348	1.9	5,223	9.9	6,572	5.2
15	Retail Trade	-	-	1,251	1.7	6,771	12.8	8,022	6.4
16	Accommodations and food services	-	-	1,143	1.6	5,223	9.9	6,366	5.1
17	NonAg Manuf	-	-	1,005	1.4	196	0.4	1,202	1.0
18	Information	-	-	658	0.9	728	1.4	1,386	1.1
19	Construction	-	-	568	0.8	415	0.8	983	0.8
20	Forestry Comm logging fishing hunting	-	-	421	0.6	18	0.0	439	0.3
21	Utilities generation distribution	-	-	323	0.4	122	0.2	445	0.4
22	Arts entertainment recreation	-	-	311	0.4	1,612	3.1	1,923	1.5
23	Greenhouse and Nursery	-	-	126	0.2	20	0.0	145	0.1
24	Educational services	-	-	60	0.1	2,416	4.6	2,476	2.0
25	Mining and drilling	-	-	36	0.0	4	0.0	40	0.0
26	Health and social services	-	-	0	0.0	13,363	25.3	13,363	10.6

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 manufacturing activity. Industry aggregation follows from Table 1, with the full sector aggregation scheme outlined in Appendix A.

Summary

Economic contribution analyses identify the portion of a region's economy that can be attributed to an existing industry or combination of industries through its direct, indirect and induced effects. Agriculture, incorporating agricultural production, support services, and manufacturing, represents a $65.2 billion industry in NYS and supporting over 269,000 jobs when the value of inter-industry linkages is considered. While total agriculturally related industry activity represents a relatively small proportion of total state output (2.5%), employment (2.1%), and contributions to GDP (1.5%), the relative contributions for smaller rural agricultural areas and communities will vary.

The general points of this exercise were to better understand agricultures' total contribution to the NYS economy and to demonstrate the strong ripple (multiplier) effects agriculture has given its strong backward-linked supply chain effects and related industry spending out of labor income generated in agriculture. In addition, a closer examination of the distribution of the indirect and induced effects promotes a better understanding with what sectors these ripple effects arise.

While industries with strong ripple effects in the state may be desirable industries to target for expansion from a policy perspective, it is important to emphasize that the sizes of these multipliers says nothing about the likelihood or means by which they will 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 NYS. 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. Mapping of 2019 New York model (bolded industries included as agricultural industries) to IMPLAN 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
33	Arts, entertainment and recreation	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
		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
34	Accommodations and food services	507	Hotels and motels, including casino hotels
		508	Other accommodations
		509	Full-service restaurants
		510	Limited-service restaurants
		511	All other food and drinking places
35	Other services	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
		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
36	Government	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
		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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