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DIFFERENTIAL ECONOMIC IMPACTS FOR COOPERATIVE BUSINESS STRUCTURES: AN APPLICATION TO FARMER-OWNED COOPERATIVES IN NEW YORK STATE

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Abstract
A comprehensive economic impact assessment using input-output methods is developed to account for localized spending activities and distributions of residual earning to member owners by cooperatives. The framework is applied to agricultural supply, service, marketing, farm credit, and rural electric cooperatives doing business in New York State. Detailed spending patterns from cooperative survey data reveal that agricultural cooperatives in the state have higher levels of localized spending when compared to average industry firms using aggregate industry data and equivalent levels of direct industry output. Accordingly, total economic impacts for these cooperatives; i.e., the direct, indirect, and induced effects, are larger. Overall, agricultural cooperatives contribute 7%, 3%, and 10% more total impact with respect to jobs, labor income, and output in New York State. Limitations to the enumeration of total impact to local economies are discussed and directions for future research that encompass more than current economic impacts are proposed.

Differential economic impacts for cooperative business structures: An application to farmer-owned cooperatives in New York State

<a> Introduction

Cooperatively structured businesses play an important, but arguably under-valued, role in local, state, and national economies. Cooperative organizations have maintained relevance and even demonstrated dominance in significant sectors of the modern-day business environment, particularly in agriculture and within rural economies in the United States. Indeed, 76 of the cooperatives listed in the National Cooperative Bank's "Top 100" for 2020 were in agriculture (49), rural electricity (22), and farm credit (5) sectors, with a combined revenue representing 68% of the total (NCB 2021). Notably, the top three were all in agriculture; i.e., CHS, Dairy Farmers of America, and Land O'Lakes (NCB 2021). Cooperatives are characterized by the consolidation of member-owners who patronize the firm, express formal rights to the assets of the firm through control, and hold the right to the firm's residual earnings. The goal of the cooperative is designed to further the collective well-being of its member-owners, which may include both pecuniary and non-pecuniary benefits and to which both can affect spending patterns of the firm and their resultant impacts on local economies (Novkovic 2012; Iliopoulos and Theodorakopoulou 2014; Iliopoulos and Valentinov 2017, Munch et al. 2021).

Policy makers and community development agents are increasingly interested in alternative business models for locally owned businesses that will be responsive to community needs and stimulate local economic growth. Cooperatively structured businesses are a tool advocated to address market failures, stimulate a local economy, and improve the social well-being for local member-owners (McNamara et al. 2001; Majee and Hoyt 2011, Theodos et al. 2018, Munch et al. 2021). Accordingly, developing a framework to estimate their economic impacts requires detailed attention to cooperative spending patterns and how they may differ

from comparable firms organized under different structures. For example, distributing residual earnings to user-owners in proportion patronage, as opposed to dividends on shareholder investment, has important implications.[1]

Dedicated purchasing of commodities from members for re-sale or processing and/or the provision of supplies and services for members may also affect the proportion of economic activity occurring within defined regional economies. For cooperatives that promote a community focus or have competitive advantages in sourcing locally, they may choose to source additional inputs or services from more localized sources (Fulton and Hammond Ketilson 1992; Zeuli and Deller 2007; ICA Group 2012; Theodos et al. 2018). Particular to the procurement of raw farm commodities or supplies to members for re-sale, locational cost advantages of proximate sourcing makes economic sense regardless of firm structure; however, differences in member pricing, utilization of economic surplus, and more localized spending on other inputs and services can yield differences in impact.

The challenge in estimating economic contributions for cooperatives is in the proper delineation of expenditures and other outlays that differ from other firms. Collecting primary data for the economic region of study can result in differences in impacts and the distribution of them among local industries; however, the ability to and extent of such model customization is often compromised by the cost of primary data collection and rigidities in economic modeling to distinguish differences in economic activity (McFadden et al. 2016; Schmit et al. 2019; Jablonski et al. 2022). The primary issue of existing input-output (IO) and Social Accounting Matrix (SAM) models is that they do not distinguish among business structures; hence, any study estimating the

[1] Cooperatives can distribute residual earnings through dividends based on investment (to members and/or nonmembers based on the organization's bylaws), but it is less common and is not subject to the single taxation principle (subchapter T) of the Internal Revenue Service like patronage refunds. Cooperatives can also retain earnings (unallocated to members) within the organization with comparable tax effects as other businesses.

economic impacts of cooperatives requires customization to the unique operations and economic activities (Zeuli and Deller 2007, Uzea 2014).[2] However, once doing so, a comparison of results relative to the 'average industry firm' provides empirical evidence of the differences in economic impact for cooperatives versus other firms (Dudensing and Park 2013).

As is common, we utilize IO/SAM methods to assess the economic impacts from cooperative economic activity. A selection of publications estimating the economic impacts of cooperatives through these methods is summarized in Table 1.[3] While not exhaustive, the list suitably demonstrates differences in model customizations that reflect (or not) differences in economic activities for a cooperative business. Based on the cooperative surveys administered (if available) and author explanations, nearly all account explicitly for employee compensation of cooperative firms, however, most utilize existing (default) industry multipliers with no model customizations of intermediate input expenditures (e.g., McNamara 2001; Zeuli et al. 2003; Deller et al. 2009; Park et al. 2009; Duguid et al. 2015, Karaphillis et al. 2015, Karaphillis et al. 2017, Duguid & Karaphillis 2019, Demko et al. 2021). Others limit attention on input purchases to member purchases in marketing cooperatives or total costs of goods sold in supply cooperatives (e.g., Folsom 2003, McKee 2011; ICA Group 2012; Herian and Thompson 2016). While this is reasonable in terms of predominant local purchases (and thereby impact), only Coon and Leistritz (2001, 2005), Bhuyan and Leistritz (1996), and Frick et al. (2012) develop customized input spending patterns. Interestingly, based on the authors' reading of the papers, only about half explicitly account for member distributions of residual earnings (Table 1).

[2] For example, industry spending patterns in IMPLAN (a commonly utilized resource in economic impact studies) depict gross intermediate input purchases per dollar of output that are invariant across defined local economies (e.g., fruit farming in Washington State has an identical intermediate input spending pattern as in New York). Furthermore, the percentages of inputs purchased locally are based on gravity flow models that restrict all purchasers (industries and institutions) of inputs to source identical local proportions (IMPLAN 2020).
[3] Zeuli and Deller (2007), Deller et al. (2009) Uzea (2014), and Uzea and Duguid (2015) provide more detailed discussions of alternative methods used in the literature and the benefits and costs in using them.

Table 1. Summary of literature and model customizations to estimate the economic impacts of cooperatives.

					Customized expenditure categories			
Author (Year)	**Location**	**Industry**	**Model base**	**Data source**[1]	**Wages & benefits**	**Member distributions**	**Intermediate inputs**	**Investment**
Herian & Thompson (2016)	Nebraska	Agriculture	IMPLAN	Survey	Yes	Yes	Limited	Yes (total)
Duguid & Karaphillis (2019) Karaphillis et al. (2017) Duuid et al. (2015) Karaphillis et al. (2015)	Canada Canada British Columbia Manitoba	All	Country, Provincial multipliers	Survey	No	No	No	No
Demko et al. (2021)	Ohio	Agriculture, Food, Rural Electric	IMPLAN	Federal, Database	Yes	No	No	No
ICA Group (2012)	United States	Food	IMPLAN RIMS II	Survey, Industry	Yes	No	Limited	No
McKee (2011) Coon & Leistritz (2005) Coon & Leistritz (2001) Bhuyan & Leistritz (1996)	North Dakota	All	IMPLAN Authors Authors Authors	Survey, State	Yes	No Yes Yes No	Limited Yes Yes Yes	No
Frick et al. (2012)	Montana	All	Authors	Survey	Yes	Yes	Limited	No
Folsom (2003)	Minnesota	All	IMPLAN	Survey	Yes	Yes	Total	No
McNamara et al. (2001)	Colorado Indiana	Agriculture	IMPLAN	Survey	Yes	No	No	No
Zeuli, et al. (2003)	Wisconsin	All	IMPLAN	Survey	Yes	Yes	No	No
Deller, et al. (2009)	United States	All	IMPLAN	Survey Federal	Yes	Limited	No	No
Park, et al. (2009)	Texas	Agriculture	IMPLAN	Survey	Yes	No	No	No

[1] Survey = cooperative survey by authors, Federal = federally available data, State = State available data, Database = online business database, Industry = data provided by industry or industry associations

As expected, nearly all ignore capital investments made by cooperatives. Within an IO framework, intermediate transactions do not include capital purchases and, instead, are treated as investments (Horowitz and Planting 2009). This type of expense is distinct from intermediate expenses, as they are motivated by the desire to enhance future capacity. Because of the intertemporal nature of investments (i.e., the costs are incurred today but the reward is realized in the future), full capital expenses have little bearing on current multiplier estimates. However, should capital purchases accrue through local wholesale or retail businesses, their margin on those purchases is appropriate to include. Only Herian and Thompson (2016) include such expenditures, and there using total capital investment levels.

The primary contribution of this research is to a fully detailed composition of cooperative expenditures and member distributions through the combination of primary data collection (cooperative surveys), detailed review of corresponding annual reports, and aggregate cooperative business volumes from USDA (2021). In particular, we develop full production functions by detailed commodity for four cooperative categories: agricultural marketing cooperatives (MC), agricultural supply and service cooperatives (SSC), rural electric cooperatives (REC), and Farm Credit System cooperatives (FCC) in New York State (NYS). For each input expenditure, we enumerate both the level of spending and the proportion of that spending made in NYS. Second, all economic activity in NYS is accounted for regardless of cooperative location/headquarters. All RECs (4) and FCCs (2) operating in the state participated and provided publicly available financial reporting data. Gross and net (to avoid double counting) business volumes for MCs and SSCs operating in NYS are available from USDA (2021). Previous studies have either limited their results to survey respondents or used ad hoc extrapolation approaches to enumerate full economic activity (Table 1). Third, we carefully

account for the level and type of member distributions (current cash patronage refunds and equity redemptions) to their classification (qualified or unqualified) and appropriately account for income taxes consistent with subchapter T provisions of the Internal Revenue Service (IRS) code. Fourth, we include the wholesale margin on average annual capital expenditures. In particular, marketing cooperatives have substantial asset investments each year. To the degree they are procured through local agents (as enumerated by our survey), their margin is included. Finally, we compare our cooperative impact results with those of corresponding industry aggregates for an equivalent direct output effect.

We continue with a review of our analytical framework, followed by a discussion of the data collected, enumeration of direct effects, and composition of cooperative spending patterns. The impact results are discussed next, along with comparison of impacts using standard industry default data. We close with implications of our work and directions for future research.

<a> Analytical framework

As common in the literature, we follow an IO modeling approach using the IMPLAN software.[4] An argument against using IO methods to measure the contribution of cooperatives to local economies is the inability to account for the unique (financial) relationships cooperatives have with local economies (Zeuli and Deller 2007; Uzea 2014). However, this presumes the use of existing average industry production functions and multipliers that come from the baseline data and software; e.g., with RIMS or IMPLAN. Models in IMPLAN are fully customizable to incorporate alternative production functions based on primary data collection, either within the existing software or by outputting the baseline models, making adjustments, and running the

[4] Technically, we incorporate our analysis into a state-level IMPLAN SAM. A typical SAM provides a mapping into functional categories for households, usually based on household income class; however, the IMPLAN SAM does not serve this purpose except under restricted conditions (Alward and Lindall 1996).

models externally (e.g., Schmit and Jablonski 2017). In this sense, IO methods are well designed for this purpose, because, in contrast to more aggregate economic analyses, IO methods differentiate effects by economic sectors. Conventional macroeconomic models trace changes in aggregate economic indicators such as national or regional income, gross national or regional product and employment. These models, however, do not address the composition of these changes by production sector, nor do they trace the resultant effects throughout the economy (Schmit and Boisvert 2014). IO models can accommodate more sector-specific or region-specific detail than Computable General Equilibrium (CGE) models given their lower computational burden (Schmit and Boisvert 2014; Jablonski et al. 2022).[5]

The IO model provides 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.[6]

These indirect and induced changes in economic activity result from what are commonly known as "multiplier" effects throughout the various sectors in the economy. An initial expenditure of one dollar and/or the expansion of output in one sector set in motion a cascading series of impacts in the form of additional expenditures in other sectors. The initial direct spending and resultant indirect increases in business spending are associated with changes in

[5] For more information comparing alternative model strategies, benefits, and limitations to estimating economic impacts of cooperastives see Zeuli and Deller (2007), Uzea (2014), and Uzea and Duguid (2015).
[6] There are many standard texts on IO methods; for example, Yan (1969), Richardson (1972), Miller et al. (1989), and Miller and Blair (2009) discuss some of the more advanced topics in IO analysis.

output or sales, changes in employment and income, and changes in payments to land, capital and other primary factors of production. Part of these direct and indirect effects is in the form of the increased labor income generated in the economy due to the increased economic activity. To the extent that this additional income is spent within the local economy, there are additional effects referred to as induced impacts.

To understand and trace, by sector, these indirect and induced economic effects resulting from cooperative economic activity, we enumerate direct effects for each cooperative type across several metrics and comprehensively define their spending patterns. In turn, this provides the analytical and empirical basis for estimating the *indirect* and *induced* impacts from the initial cooperative direct effects.

<b> Multipliers

For any individual sector, the output multiplier is defined as the direct plus indirect plus induced sales throughout the economy resulting from a one-dollar increase in sales to final demand.[7] However, total output generated throughout the economy is only one measure of the economic impact due to a direct increase in sales to final demand. To develop comparable measures for income and employment multipliers, we must change the base of comparison. In the case of an output multiplier, the natural base of comparison is in terms of the same direct change in output.

To construct an income multiplier, the natural base of comparison is a direct dollar change in income. Accordingly, we must consider an increase in final demand by enough to generate directly a dollar of income. These multipliers are defined as the direct plus indirect plus induced income effect due to a direct increase in income of one dollar. This transformation

[7] Final demand is the value of goods and services produced and sold to final users during the calendar year. Final use means that the good or service will be consumed and not incorporated into another product.

allows one to level the playing field across sectors in terms of direct income changes. In so doing, the size of the income multiplier varies inversely with the direct income coefficient (i.e., the dollars of income needed to produce one dollar of goods). The smaller is the share of payments to labor in the total value of inputs, the larger is the income multiplier for that sector. In other words, the smaller the direct income coefficient, the larger the direct change in output per additional dollar of income in that sector. Thus, there is a larger direct change in output to generate indirect and induced changes in sales and income throughout the economy.

The logic of changing the base of comparison for the income multiplier extends directly to an employment multiplier, which is defined as the direct plus indirect plus induced employment for a direct unit change in employment. As in the case of the income multiplier, the employment multiplier tends to be large when the direct employment coefficient (i.e., the employment per dollar of output) is small. Furthermore, since wage rates differ by sector, it is unlikely that the employment and income multipliers will be ranked the same across sectors of the economy.

<b> Member distributions

Of particular relevance for estimating cooperative economic impacts in an IO framework is to the accounting of member distributions through cash patronage refunds and redeemed equities. Specifically, two issues must be addressed: income tax provisions and the construct through which the distributions are analyzed.

Cooperatives benefit from the single taxation principle in the United States; i.e., for some distributions, income is taxed at the cooperative level or the member level but not both. To the design of cooperative production functions in our analysis, income taxes are included in the survey enumeration and directly accountable to taxes on production and imports (TOPI). Income taxes at the member level depend on the nature of the distribution. For qualified distributions,

both the cash and equity portions of the patronage refunds are taxable in the year of distribution. At the time of redemption of qualified distributions there is no tax implication to the member. For nonqualified distributions, the distribution is taxable to the member in the year of redemption. Through our detailed financial survey and inspection of annual reports, we appropriately apply income tax rules to member distributions.[8]

With respect to the analysis of patronage refunds, the literature is mixed. For example, Folsom (2003) consider patronage refunds as part of personal income, Zeuli et al. (2003) treat them as separate shock to final demand, and Coon and Leistritz (2001, 2005) and Deller (2009) treat them as household income. Differences in application are reasonable given variation in cooperative types and functions. For the household-owned (REC) and farmer-owned (MC, SSC, FCC) cooperatives in our study, we employ different strategies. Since RECs have both farm and non-farm members, member distributions (i.e., allocated credits in their terminology), are allocated as income through household spending patterns.[9] In so doing, not all of the distributions to members are spent locally based on their spending pattern. For the farmer-owned cooperatives, we inherently consider their ownership in the cooperative as an extension of their farm business. In so doing, we assume that member distributions are distributed to the farm business and allocated through average farm spending patterns on intermediate inputs and value added components.[10] Doing so necessarily implies that not all of the distributions are spent (e.g., allocations to other property income, savings) nor necessarily spent locally (i.e., intermediate inputs procured by farms may be nonlocal).

[8] Survey instruments are available from the authors upon request.
[9] Since IMPLAN currently has nine household spending categories by income level, we chose the middle category, with annual income between $50 and $75 thousand. As allocated credits are a small proportion to total output, this particular choice has little effect on the final impact results.
[10] An average farm spending pattern is constructed (including intermediate inputs and allocations to value added) based on farm industries in IMPLAN associated with the types of cooperatives modeled (i.e., fruit, vegetable, and dairy farming), and weighted by level of industry output.

<b> Representative industries

As discussed above, we compare the economic impact results for each type of cooperative with comparable industry sectors in IMPLAN based on the nature of cooperative activity in NYS and applying the same direct output effect. In so doing, the industry results reflect average industry spending patterns and allocations to value added. To the degree that particular business structures hold majority shares, the spending patterns will more closely align with those structures. In any event, they provide a reasonable comparison to the specific impacts accruing to cooperative firms.

Since no RECs in NYS generate electricity, RECs are compared to the "electric power transmission and distribution" industry in IMPLAN (49). FCCs are compared to the combination of "monetary authorities and depository credit intermediation" (433) and "nondepository credit intermediation and related activities (434) industries to reflect the primary competitors of farm credit firms. SSCs are compared to the combination of "retail – building material, farm/garden equipment, and supplies" with respect to supply activities (399) and "support activities for agriculture and forestry" (19) with respect to service activities. Finally, MCs are compared to the combination of IMPLAN industries 79 through 88 to reflect the primary manufacturing industries where agricultural marketing cooperatives operate in NYS; i.e., fruit, vegetable, and dairy product processing.[11] For comparisons with multiple industries, cooperative direct output effects are apportioned based on the IMPLAN industry's relative output in NYS.

By definition, total economic activity within IMPLAN industries includes both cooperative and non-cooperative firms. As such, the comparison of 'cooperative' and 'industry

[11] Specifically, these industries (IMPLAN industry code) include "frozen fruits, juices and vegetables manufacturing" (79), "frozen specialties manufacturing" (80), "canned fruits and vegetables manufacturing" (81), "canned specialties" (82), "dehydrated food products manufacturing" (83), "fluid milk manufacturing" (84), "creamery butter manufacturing" (85), "cheese manufacturing" (86), "dry, condensed, and evaporated dairy product manufacturing" (87), and "ice cream and frozen dessert manufacturing" (88).

average' impacts is not pure and the degree of overlap is dependent on the level of cooperative business activity (or market shares) within the IMPLAN-defined industries. With respect to NYS, RECs are largely limited geographically and FCCs are a small proportion of competitor credit financing available. As opposed to the Midwest and other areas of the United States, agricultural supply and service cooperatives are less common in NYS and, for cooperatives that exist, commonly encompass both functions. Only in marketing cooperatives, and particularly in dairy processing, do marketing cooperatives hold a relatively large share. Based on our industry comparisons, RECs, FCCs, SSCs, and MCs represent approximately 0.08%, 0.15%, 0.55%, and 37.91% of total industry output, respectively.

<a> Cooperative data

Spending patterns for the four types of cooperatives are based on a survey to all agricultural cooperatives operating in NYS in 2016. Importantly, the financial surveys explicitly ask for both the level and percentage of NYS activity attributable to output, intermediate inputs, member distributions, and other value added components. In combination with corresponding annual reports, we fully allocate output to a variety of intermediate input and value added sectors. Responding supply, service, and marketing cooperatives were largely limited to larger cooperatives operating in the state. To this degree, the relatively low response rate of all cooperatives in these categories (12%) is offset by the large business volumes of the responding firms relative to the totals reported by USDA (92%). Given this large reported volume shares, average cooperative spending patterns in the state would largely be a reflection of these larger firms. The output allocations to intermediate inputs, member distributions, and other value added categories from the 2016 survey are used and applied to the 2019 estimates of net cooperative business volumes for these categories (USDA 2021).

There are a small number of Rural Electric (4) and Farm Credit (2) cooperatives operating in the state and all responded to 2016 survey. Combined with their annual reports and other public financial reporting documents, we fully allocate the value of output to intermediate inputs and value added components. Annual reports and public financial reporting documents from 2019 were used to update output and value added components, while retaining the intermediate input spending pattern from 2016. Farm Credit output includes net interest income (total interest income less interest payments to CoBank, their funder) and other service income.

<b> NYS direct effects

The direct contributions of agricultural cooperatives in NYS for 2019 are reported in Table 2. As expected, marketing cooperatives dominate the totals and include several large cooperatives in fruit and dairy product manufacturing operating in multiple states. The direct contributions represent the proportion of total activity attributable to NYS member business based on the survey results. Further, to avoid double counting and for consistency with wholesale/retail trade industries defined as their margins in IMPLAN, the business volume of supply cooperatives operating in NYS - as wholesale or retail firms - is reduced by the total costs of goods sold (COGS) using the net margin proportion of supply cooperatives in the United States from USDA (2021). State-level margins are not reported; however, the relative margins are likely similar. Recall that for SSCs and MCs, we use net business volumes from USDA (2021) to avoid double counting of economic activity between agricultural cooperatives in the state.

Table 2. Direct contributions to New York State economy, by cooperative type, 2019

Co-op Type	Output ($M)	Employee compensation ($M)	Member distributions ($M)[1]	Other property income and taxes ($M)	Value added ($M)	Jobs	Average capital purchases ($M) (whol. margin)
Rural Electric	29.15	9.55	1.58	8.65	19.78	84	2.17
Farm Credit	183.14	38.77	60.84	62.96	162.57	305	1.05
Supply & Service	39.90	19.94	0.11	0.84	20.88	180	0.71
Marketing	4,160.55	213.57	28.49	137.35	379.41	4,106	14.67
Total	4,412.74	281.84	91.01	209.80	582.65	4,675	

Source: Author survey, Cooperative Annual Reports, USDA (2021).

[1] Gross cash patronage refunds and equity redemptions prior to income tax adjustments as necessary.

<b> Spending patterns

The cooperative spending patterns and comparative industry averages are shown in Table 3 (REC, FCC) and Table 4 (SSC, MC).[12] As the survey delineation of expenditures is based on total firm output, we show both total output and the output attributable to NYS member business for 2019. Accordingly, gross absorption values (GAV); i.e., the dollars of expenditure or outlay per $1 of output, are comparable across cooperative and industry categories, but the percentages attributable to NYS activity (%NY) are not. To compare localized spending, total dollars of NYS spending, by category, are shown at the bottom of each table.[13]

While we leave a detailed examination of the GAVs across components and categories to the interested reader, it is reasonable to conclude the spending patterns are, indeed, different. For example, in Table 3, RECs appear to have a cost advantage of electricity purchases (GAV = 0.260) relative to that of their industry peers (GAV =0.592). FCCs have relatively similar total intermediate input expenditures per dollar of output, but operate on a model that distributes a relatively high proportion of residual earnings through patronage distributions (GAV = 0.322); comparable profits in the industry aggregate are likely in the form of shareholder dividends and reflected in other property income (GAV = 0.685). In Table 4, agricultural supply and service firms have a much larger share of intermediate input purchases per dollar of output (i.e., 0.728 versus 0.342), and marketing cooperatives would seem to pass on higher prices to their farm supplier members than in the industry aggregate (i.e., 0.636 versus 0.349).

[12] To avoid double counting as goods move along the supply chain, purchases from wholesale and retail trade sectors are margined to reflect only the value of the services provided by these sectors in delivering commodities from producers' establishments to purchasers. The values of the commodities (in producer prices) are apportioned to one or more deliveries to final demand, depending on the location and allocation of final deliveries.
[13] Specifically, NYS spending for cooperatives is equal to total output times GAV times %NY. NYS spending for industry aggregates is equal to NY output times GAV times %NY.

Table 3. Rural Electric and Farm Credit spending patterns and comparative IMPLAN industry averages.

	Electricity Trans. & Distn.				Credit & Related Services			
Output (2019) [1]	**Cooperative**		**Industry 49**		**Cooperative**		**Ind. 433-434**	
Total output ($M)	29.15				318.82			
New York output ($M)	29.15		29.15		183.14		183.14	
Expenditure Component [2]	**GAV**	**%NY**	**GAV**	**%NY**	**GAV**	**%NY**	**GAV**	**%NY**
Agriculture								
Mining			0.000	63.9				
Utilities	0.260	100.0	0.592	41.5	0.003	57.1	0.000	95.2
Construction services	0.003	100.0	0.002	91.1	0.006	57.1	0.003	91.1
Manufactured goods	0.004	0.7	0.008	4.5	0.002	0.0	0.002	9.0
Wholesale trade services	0.002	95.3	0.001	94.7	0.001	1.4	0.000	94.7
Retail trade services	0.000	100.0	0.000	91.6	0.000	0.5	0.000	86.8
Transportation/storage services	0.000	43.2	0.004	66.2	0.000	0.9	0.002	75.7
Information communications	0.007	66.4	0.001	78.8	0.009	58.0	0.003	73.0
Finance and insurance services	0.014	48.0	0.002	98.9	0.006	57.1	0.056	97.3
Real estate and rental			0.001	89.3	0.001	58.8	0.003	92.0
Administrative services	0.028	45.0	0.007	90.4	0.082	56.2	0.017	90.9
Ent./Accom./Food services	0.002	25.0	0.001	80.0	0.008	57.8	0.005	73.6
Other services	0.001	100.0	0.001	48.3	0.007	57.5	0.005	57.3
Total intermediate inputs [3]	0.321	90.3	0.619	42.4	0.125	55.2	0.096	89.8
Employee Compensation	0.328	100.0	0.103	100.0	0.214	56.8	0.215	100.0
Prop. inc./Member distns.[4]	0.054	100.0	0.002	100.0	0.322	59.2	0.004	100.0
Other Prop. income + Taxes [5]	0.297		0.277		0.339		0.685	
Total value added	0.679		0.381		0.875		0.904	
New York Spending ($M) and Jobs								
Intermediate inputs	8.46		7.64		22.05		15.73	
Employee compensation	9.55		3.00		38.76		39.43	
Prop. inc./Member distns. [5]	1.58		0.04		60.82		0.66	
Cap. purchases (Wh. margin) [6]	2.17		2.17		1.05		1.05	
Total NYS Spending	21.76		12.85		122.8		56.87	
NYS Jobs [7]	84.00		20.56		305.00		273.50	

[1] Rural electric co-ops operate fully within NY, Farm Credit co-ops do business within and outside the state. Total output includes all output regardless of location. NY output is the proportion of total output attributable to NY member business. For appropriate comparison, the level of NY output is assigned to the industry. Farm credit output includes net interest income (interest income from borrowers less interest payments to CoBank for lent funds) and services income.

[2] Gross absorption value (GAV) = dollars of expenditure per $1 of output, %NY = percent of expenditures occurring in NY. %NY for cooperatives are based on total firm output. Accordingly, GAVs are comparable across cooperative and industry categories but %NY are not. Their combination (total NY spending) is shown at the bottom of the table.

[3] Numbers may not add due to rounding. GAVs equal to 0.000 are greater than 0.0000 but less than 0.0005.

[4] For ease of exposition, member distributions are categorized under proprietor income. They are technically analyzed through household and farm-spending patterns, for rural electric and farm credit cooperatives, respectively, with appropriate income tax consequences levied based on the nature of the distributions

[5] Per convention, other property type income and taxes on production and imports do not generate additional impact (they are exogenous). They are included here for completeness; by definition, output = intermediate inputs + value added.

[6] Wholesale margin of average annual capital purchases. For comparison, they are included in industry categories of equal amounts.

[7] NY jobs for cooperatives based on author survey data and USDA (2021). Jobs for industries are equal to their jobs to output ratio multiplied by NY co-op output.

Table 4. Agricultural supply & service and marketing cooperative spending patterns and comparative IMPLAN industry averages.

	Ag Supply & Support Services				Food Manufacturing			
Output (2019) [1]	**Cooperative**		**Ind. 19 & 399**		**Cooperative**		**Ind. 79-88**	
Total output ($M)	248.2				22,710.52			
New York output ($M)	39.90		39.90		4,160.55		4,160.55	
Expenditure Component [2]	**GAV**	**%NY**	**GAV**	**%NY**	**GAV**	**%NY**	**GAV**	**%NY**
Agriculture			0.002	17.2	0.636	16.4	0.349	77.2
Mining			0.000	15.2			0.001	0.1
Utilities	0.009	25.7	0.012	97.2	0.007	13.1	0.011	94.8
Construction services	0.004	42.1	0.004	91.1	0.003	5.9	0.004	91.1
Manufactured goods	0.263	3.3	0.029	16.0	0.221	6.0	0.314	25.1
Wholesale trade services	0.001	9.8	0.016	94.7	0.015	9.1	0.004	82.1
Retail trade services	0.003	10.4	0.005	86.9	0.000	0.9	0.004	82.1
Transportation/storage services	0.061	14.5	0.038	65.8	0.025	10.0	0.044	52.1
Information communications	0.048	19.8	0.014	75.6	0.001	11.8	0.003	78.2
Finance and insurance services	0.023	16.3	0.022	95.1	0.002	11.6	0.004	97.5
Real estate and rental	0.100	24.4	0.090	91.4	0.005	9.9	0.003	82.2
Administrative services	0.095	2.1	0.097	91.7	0.007	4.2	0.034	91.3
Ent./Accom./Food services	0.061	18.4	0.004	83.6	0.001	7.3	0.002	75.6
Other services	0.058	13.7	0.010	66.3	0.007	11.7	0.006	49.7
Total intermediate inputs [3]	0.728	13.7	0.342	81.0	0.929	13.4	0.869	59.7
Employee Compensation	0.252	31.9	0.411	100.0	0.050	18.9	0.094	100.0
Prop. inc./Member distns.[4]	0.004	11.5	0.037	100.0	0.004	31.9	0.002	100.0
Other Prop. income + Taxes [5]	0.016		0.210		0.017		0.034	
Total value added	0.272		0.658		0.071		0.131	
New York Spending ($M) and Jobs								
Intermediate inputs	20.10		11.06		2,823.38		2,157.16	
Employee compensation	19.94		16.42		213.57		391.68	
Prop. inc./Member distns. [5]	0.11		1.46		28.49		10.15	
Cap. purchases (Wh. margin) [6]	0.71		0.71		14.67		14.67	
Total NYS Spending	40.86		29.65		3,080.10		2,573.69	
NYS Jobs [7]	179.82		427.13		4,106.48		6,130.24	

[1] Supply and Service and Marketing cooperatives do business within and outside the state. Total output includes all output regardless of location. NY output is the proportion of total output attributable to NY member business. For appropriate comparison, the level of NY output is assigned to the industry. Business volume for supply cooperatives represents the net margin, total sales less cost of goods sold (USDA 2021).

[2] Gross absorption value (GAV) = dollars of expenditure per $1 of output, %NY = percent of expenditures occurring in NY. %NY for cooperatives are based on total firm output. Accordingly, GAVs are comparable across cooperative and industry categories but %NY are not. Their combination (total NY spending) is shown at the bottom of the table.

[3] Numbers may not add due to rounding. GAVs equal to 0.000 are greater than 0.0000 but less than 0.0005.

[4] For ease of exposition, member distributions are categorized under proprietor income. They are technically analyzed through farm-spending patterns, with appropriate income tax consequences levied based on the nature of the distributions

[5] Per convention, other property type income and taxes on production and imports do not generate additional impact (they are exogenous). They are included here for completeness; by definition, output = intermediate inputs + value added.

[6] Wholesale margin of average annual capital purchases, scaled by net cooperative business volume (USDA 2021). For comparison, they are included in industry categories of equal amounts.

[7] NY jobs for cooperatives based on author survey data and USDA (2021). Jobs for industries are equal to their jobs to output ratio multiplied by NY co-op output.

The levels of NY spending at the bottom of Table 3 and Table 4 illustrate where cooperative gains in economic impacts accrue and, not surprisingly, varies by type of cooperative. For example, REC impact gains accrue largely through higher employment/wages and patronage refunds, while relative FCC's benefits are generated from member distributions of residual earnings. SSC impact gains largely accrue through more localized spending on intermediate inputs and, to a lesser degree, employee compensation. Finally, MC impact gains accrue primarily through local intermediate input purchases and, to a lesser degree, patronage refunds. The nature of these differences on spending will, necessarily, carry through to the results presented next. In any event, based on the industry aggregates used for comparison, total NYS spending is higher for each cooperative category relative to average industry firms.

<a> Empirical results

The economic impact results are summarized in Tables 5 and 6. Table 5 presents the total results as well as results differentiated by spending (i.e., on intermediate inputs, employee compensation, and the margined capital purchases) and member distribution categories. Table 6 compares the total results for cooperatives relative to the industry aggregates selected.

<c> Economic impacts and multipliers

The total direct, indirect, and induced effects of cooperative business activity in NYS is summarized on the left side of Table 5. We include metrics on jobs, labor income, and output. For cooperatives, direct labor income is defined as employee compensation and member distributions (Table 2); for the industry aggregates, direct labor income encompasses employee compensation and proprietor income. Rural electric cooperatives in NYS contribute to a total of 180 jobs, $18.7 million in labor income, and $53.7 million in total output. When compared to the initial direct effects, computed multipliers are 2.14, 1.68, and 1.84, respectively. To interpret,

Table 5. Agricultural cooperative economic contributions in New York State, by cooperative category and type of outlay.

	Total			Spending [1]			Member Distribution [2]		
Effect	Jobs	Labor Income ($M)	Output ($M)	Jobs	Labor Income ($M)	Output ($M)	Jobs	Labor Income ($M)	Output ($M)
Rural Electric Cooperatives									
Direct	84.00	11.14	29.15	79.44	9.55	27.56	4.56	1.58	1.58
Indirect	40.90	4.14	15.20	32.20	3.59	13.69	8.70	0.55	1.50
Induced	54.90	3.43	9.33	52.70	3.29	8.95	2.20	0.14	0.37
Total	179.80	18.70	53.67	164.34	16.43	50.21	15.46	2.27	3.46
Multiplier [3]	*2.14*	*1.68*	*1.84*						
Farm Credit Cooperatives									
Direct	305.00	99.61	183.14	203.68	38.77	122.30	101.32	60.84	60.84
Indirect	232.90	17.48	43.16	141.60	13.31	28.52	91.30	4.17	14.64
Induced	285.10	17.77	48.37	208.90	13.03	35.48	76.20	4.74	12.89
Total	823.00	134.86	274.67	554.18	65.11	186.31	268.82	69.75	88.36
Multiplier	*2.70*	*1.35*	*1.50*						
Agricultural Supply and Service Cooperatives									
Direct	179.82	20.05	39.90	179.33	19.94	39.80	0.48	0.11	0.11
Indirect	151.20	11.39	33.18	151.00	11.38	33.16	0.20	0.01	0.02
Induced	125.80	7.85	21.36	125.70	7.84	21.34	0.10	0.01	0.02
Total	456.82	39.28	94.45	456.03	39.15	94.29	0.78	0.12	0.15
Multiplier	*2.54*	*1.96*	*2.37*						
Agricultural Marketing Cooperatives									
Direct	4,106.48	242.06	4,160.55	4,078.36	213.57	4,132.06	28.12	28.49	28.49
Indirect	15,950.80	1,014.93	3,845.13	15,910.40	1,013.08	3,838.65	40.40	1.85	6.49
Induced	5,063.10	315.34	857.64	5,029.70	313.26	851.97	33.40	2.08	5.67
Total	25,120.38	1,572.33	8,863.32	25,018.46	1,539.91	8,822.67	101.92	32.42	40.65
Multiplier	*6.12*	*6.50*	*2.13*						
All Agricultural Cooperatives									
Direct	4,675.30	372.85	4,412.74	4,540.82	281.84	4,321.73	134.48	91.01	91.01
Indirect	16,375.80	1,047.93	3,936.67	16,235.20	1,041.35	3,914.02	140.60	6.58	22.65
Induced	5,528.90	344.39	936.70	5,417.00	337.42	917.74	111.90	6.97	18.96
Total	26,580.00	1,765.17	9,286.11	26,193.02	1,660.61	9,153.49	386.98	104.56	132.62
Multiplier	*5.69*	*4.73*	*2.10*						

[1] Spending includes intermediate inputs, employee compensation, and the wholesale margin on capital purchases. Direct labor income represents only employee compensation.

[2] Direct labor income represents the value of member distributions. Direct, indirect, and induced effects are additive across spending and member distribution categories. As such, the direct employment and output effects for member distribution represent the number of jobs required to produce that value of output for redistribution to members. Income tax consequences are accounted for in the impact calculations; i.e., the direct effects here are gross distributions.

[3] Multipliers are computed for the total direct effects. The multiplier defined as the total effect (direct + indirect + induced) divided by the direct effect.

Table 6. Comparison of New York State cooperative economic impacts and average industry defaults for same level of direct output.

	Cooperatives [1]			Industry Default [2]			Co-op Percent Change [3]		
Effect	Jobs	Labor Income ($M)	Output ($M)	Jobs	Labor Income ($M)	Output ($M)	Jobs	Labor Income	Output
Electricity Transmission and Distribution (Industry default = IMPLAN 49)									
Direct	84.00	11.14	29.15	20.56	3.04	29.15	308.6	266.1	0.0
Indirect	40.90	4.14	15.20	30.20	3.29	12.66	35.4	25.7	20.1
Induced	54.90	3.43	9.33	25.50	1.59	4.32	115.3	115.6	115.7
Total	179.80	18.70	53.67	76.26	7.92	46.13	135.8	136.0	16.4
Credit and Related Services (Industry default = IMPLAN 433-434)									
Direct	305.00	99.61	183.14	273.50	40.09	183.14	11.5	148.5	0.0
Indirect	232.90	17.48	43.16	92.50	10.60	22.27	151.8	64.9	93.8
Induced	285.10	17.77	48.37	207.40	12.94	35.22	37.5	37.4	37.3
Total	823.00	134.86	274.67	573.40	63.62	240.63	43.5	112.0	14.1
Agricultural Supply and Service (Industry default = IMPLAN 19, 399)									
Direct	179.82	20.05	39.90	427.13	17.87	39.90	-57.9	12.2	0.0
Indirect	151.20	11.39	33.18	68.70	5.56	15.55	120.1	104.8	113.4
Induced	125.80	7.85	21.36	94.10	5.87	15.97	33.7	33.7	33.7
Total	456.82	39.28	94.45	589.93	29.30	71.43	-22.6	34.1	32.2
Food Processing and Marketing (Industry default = IMPLAN 79-88)									
Direct	4,106.48	242.06	4,160.55	6,130.24	401.86	4,160.55	-33.0	-39.8	0.0
Indirect	15,950.80	1,014.93	3,845.13	12,215.60	891.16	3,018.33	30.6	13.9	27.4
Induced	5,063.10	315.34	857.64	5,248.00	327.10	890.02	-3.5	-3.6	-3.6
Total	25,120.38	1,572.33	8,863.32	23,593.84	1,620.11	8,068.90	6.5	-2.9	9.8
Total Industries (Industry default = IMPLAN, 19, 49, 79-88, 399, 433-434)									
Direct	4,675.30	372.85	4,412.74	6,851.41	462.86	4,412.74	-31.8	-19.4	0.0
Indirect	16,375.80	1,047.93	3,936.67	12,407.00	910.61	3,068.80	32.0	15.1	28.3
Induced	5,528.90	344.39	936.70	5,575.00	347.49	945.54	-0.8	-0.9	-0.9
Total	26,580.00	1,765.17	9,286.11	24,833.41	1,720.96	8,427.09	7.0	2.6	10.2

[1] Labor income includes employee compensation and member distributions for cooperatives and employee compensation and proprietor income for the industry averages.

[2] Comparative industries in IMPLAN (code) include: Support activities for agriculture and forestry (19), Electric power transmission and distribution (49), Frozen fruits, juices and vegetables manufacturing (79), Frozen specialties manufacturing (80), Canned fruits and vegetables manufacturing (81), Canned specialties (82), Dehydrated food products manufacturing (83), Fluid milk manufacturing (84), Creamery butter manufacturing (85), Cheese manufacturing (86), Dry, condensed, and evaporated dairy product manufacturing (87), Ice cream and frozen dessert manufacturing (88), Retail – building material and farm/garden equipment and supplies stores (399), Monetary authorities and depository credit intermediation (433), and Nondepository credit intermediation and related activities (434). The level of cooperative output (direct effect) is apportioned to industries by their relative contribution to total industry output for each category.

[3] Cooperative activity is included in the total industry estimates in IMPLAN. The percentage of cooperative output in NYS relative to total industry estimates are 0.08%, 0.15%, 0.55%, and 37.91%, for rural electric, Farm Credit, supply and service, and food processing cooperatives, respectively.

every job employed directly by RECs generates an additional 1.14 in backward-linked industry sectors. Similarly, every $1 in income generated by the cooperative creates an additional $0.68 in income in other sectors in the NYS economy. The differences in indirect and induced effects distinguish impacts accruing from business-to-business input transactions and spending out of income, respectively.

For each dollar of income generated in FCC, SSC, and MC, an additional $0.35, $0.96, and $5.50 is generated in backward linked industries. Food manufacturing multipliers are relatively large in NYS due to large agricultural production sectors and, in the case of cooperatives, from their members. The comparable number for the industry aggregate (79-88) is $4.00 (Table 6). The difference between the multipliers, as discussed above, is primarily due to a lower labor income coefficient; i.e., the amount of labor income per dollar of output for cooperatives is lower (0.06) than it is for the average industry firm (0.10).[14] In comparing the results, the levels of multipliers should be evaluated in conjunction with, and not in lieu of, the total impacts generated.

The middle and right-most columns of Table 5 delineate economic impacts for cooperatives between spending activities and member distributions. In an IO framework, the direct, indirect, and induced effects are additive (linear) across these categories. As such, the direct employment and output effects for member distributions represent the number of jobs required to produce that value of output for redistribution to members. Naturally, for cooperatives with higher member distributions per dollar of output (e.g., FCC), the proportions of total economic impact attributable to member distributions is higher. For those with limited

[14] Using the direct labor income and output values, the labor income coefficient for marketing cooperatives is calculated as 242.06 / 4160.55 = 0.058 (Table 5). For the average industry firm, it is 401.86 / 4160.55 = 0.096 (Table 6).

patronage refunds (e.g., SSC), nearly all of the impacts are attributable to their local spending activity. In the case of marketing cooperatives, for example, paying members higher prices for their products will reduce profit distributions available to members (reducing impacts from member distributions), but will increase the impact from cooperative spending activities as a result of the higher prices. Only to the degree that the relative level of patronage refunds (to output) are stable over time, do the distinctions of cooperative impact across spending and member distributions categories hold. Naturally, profits (and residual earnings to members) can and do change over time. Further, determinations of member pricing and distributions of residual earnings are board decisions and subject to variation over time given market conditions and cooperative strategy.

For ease of exposition, we leave a detailed review of the impact results to the interested reader. In summary, agricultural cooperatives in NYS contributed to over 26,000 jobs, nearly $1.8 billion in labor income, and over $9.2 billion in total output (Table 5). We attend to how these results would look if, instead, the same levels of direct output were channeled through the average industry firm next.

<c> Industry comparison

Table 6 summarizes the economic impact results if the level of direct output of the cooperative was instead channeled through the industry aggregate firms. By definition, the direct output effect is identical to the cooperatives, but the amount of direct jobs and labor income is determined by the industries' jobs to output and labor income to output ratios. Identical modeling activities were applied in IMPLAN and, ultimately, reflect the differences in spending patterns

illustrated in Table 3 and Table 4.[15] Given the higher levels of total NYS spending by cooperatives, higher total output effects for cooperatives are expected. However, given differences in direct job coefficients and in the distributions of spending on intermediate inputs and value added components positive or negative differences can result across individual direct, indirect, and induced categories.

Higher jobs and labor income coefficients for RECs contribute to the large increases in those total effects (more than double), while the change in total output is more modest, albeit substantial (+16%). Large patronage distributions drive the positive changes for FCCs. A negative change on total jobs for SSCs is driven by the lower direct jobs coefficient, even though both the indirect and induced jobs effects changes are positive. As jobs are an, arguably, cruder measure of impact (i.e., not all jobs are created equal), the relatively large labor income results for SSCs (for direct, indirect, and induced effects) tells a more meaningful result (+34%). Finally, a lower direct jobs coefficient for marketing cooperatives is offset by larger indirect effects due to higher local spending on intermediate inputs. Given the larger market shares for MCs within the IMPLAN 79-88 aggregate, the more modest percentage changes is expected.

Given differences in cooperative functions and spending allocations across cooperative types, it is expected that the results, when compared to the average industry firm, will vary across them. Ultimately, higher levels of NYS spending necessarily contribute to positive percentage changes for cooperatives given the same direct output effect. In total, cooperative economic impacts were 7.0%, 2.6%, and 10.2% larger with respect to jobs, labor income, and industry output relative to the average industry firm (Table 6).

[15] All results are modeled through an Analysis-by-Parts approach in IMPLAN to which spending on intermediate inputs, employee compensation, and proprietor income (member distributions for cooperatives) are defined separately (Lucas 2019)

<a> Conclusions

Economic impact assessments are based on the level and location of spending relative to the local economy of interest. To that end, analyzing any business structure requires careful attention to their representative spending patterns on intermediate inputs, spending on employee compensation, and how firm profits are allocated and utilized. Cooperative spending patterns may differ based on the location of member business, attention to local sourcing of inputs, and how residual earnings are allocated. Given a generally common goal to focus on 'community' and 'local economies' it was hypothesized that cooperatives (in aggregate) generate larger economic impacts than the average industry firm. To analyze this completely requires not only detailed financial information but also an appropriate 'industry average' for comparison.

Through a comprehensive approach, our hypothesis is generally affirmed; however, more detailed inspections on industry metrics (e.g., jobs versus output) or within the total effects (e.g., direct versus indirect versus induced effects) reveal that not all effects are necessarily larger for cooperatives. This is not a failing on the part of cooperatives, but rather a result of differences in business operations, particular sub-industry distinctions, and/or existing market conditions. Remember, economic impact assessments provide a 'snapshot' of economic activity over a given period; those snapshots can and do change over time. Is it possible to find an investor-owned firm (IOF) whose mission includes supporting local businesses (through local input purchases) and distributes dividends to local investors that are then spent locally? Of course. The comparison to a similarly structured cooperative may show little differences in impact.

The objectives of this research were to (1) develop a comprehensive framework to incorporate the uniqueness of cooperative business operations and influence economic impact, (2) enumerate representative spending patterns for agricultural cooperatives in NYS, and (3)

assess the differences in economic impacts of the 'average' cooperative to the 'average' industry firm. To this end, we were successful. However, the results should be viewed as one, but not the only, measure of the impact cooperatives have on local economies. The definition of 'impact', particularly in the research of cooperatives, transcends current financial and economic impacts. Indeed, how to capture the value related to countervailing market power, missing goods and services, and local economic stability remain incomplete areas of research study (Uzea 2014, Uzea and Duguid 2015). These are not simple problems to solve.

The literature has explored issues related to addressing market failures, albeit primarily through analysis of market power and effects at the firm level, without particular attention to local welfare effects or impacts on local communities (Zeuli and Deller 2007). Further, econometric approaches regarding cooperative longevity proposed by Zeuli and Deller (2007) remain ripe for exploration given availability of business data that specifies firm business structure. How do local economies look in the absence of cooperatives? How does one estimate prices received/paid by members in the absence of the cooperative? An assessment of these counterfactuals needs new thinking and new approaches to address them (Uzea and Duguid 2015).

Additional research on the value members subscribe to democratic control and ownership rights is only beginning to be enumerated (e.g., Munch et al. 2021). Are gains in member value through participation additive to or a suitable offset of, perhaps, lower economic impact? Furthermore, what is the value/impact of social/human capital gains of members and to communities as a result of member participation and cooperative activity (Novkovic 2012)? A large literature exists on the evaluation of community capitals and its impact on local economies or various forms of business activity (Schmit, et al. 2017). Opportunities to link new data on

community capital assets (e.g., Schmit et al. 2021) with cooperative business activity provides unique opportunities to address new and lingering issues of cooperative research. A careful examination of these issues is a top priority for our continuing research.

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