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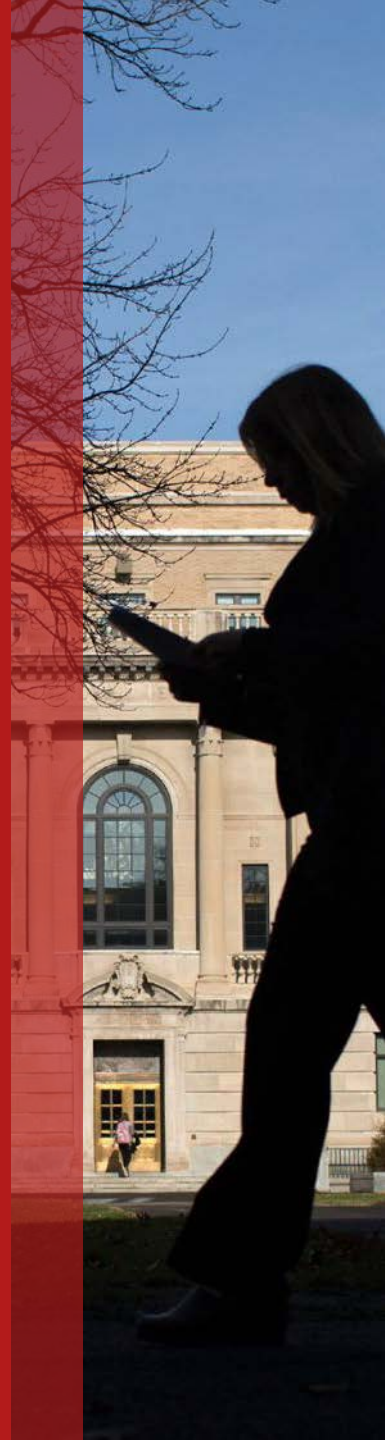
Assessing the Differential Economic Impacts for Agricultural Cooperatives and their Importance in the Agriculture Supply Chain

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NCERA-210 Annual Meeting

St. Paul, MN





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Acknowledgements

The Northeast Cooperative Council

Participating Cooperatives

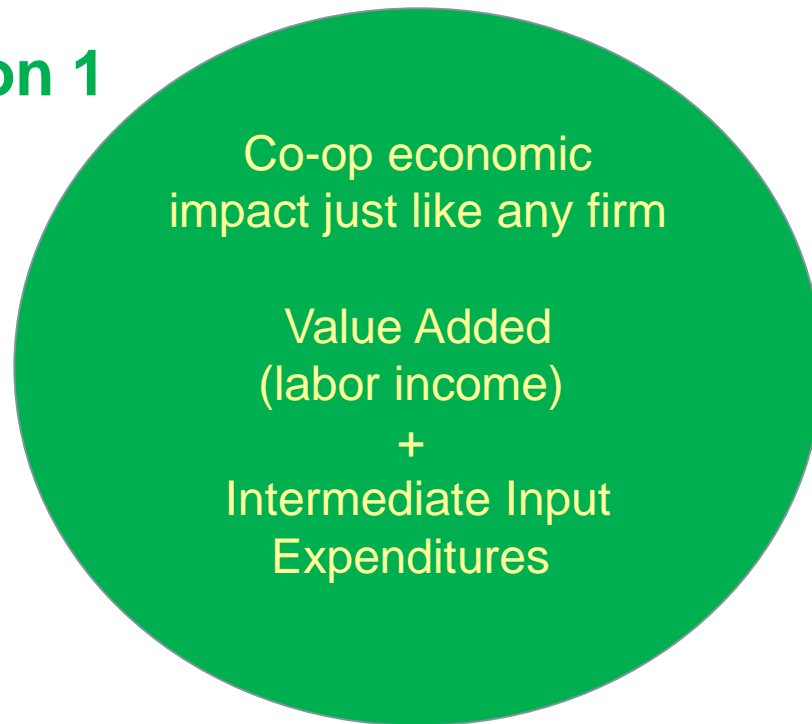
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Cooperative value creation & economic impact

- Goal: Properly measure the economic impact of cooperatives
 1. Persuasive to public audiences
 2. Credibly based on available economic data
 3. Capture differences between cooperatives and other types of firms
- Related goal: Properly measure cooperative performance **FOR MEMBERS**

Option 1



Option 2



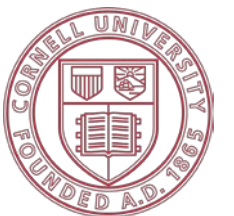
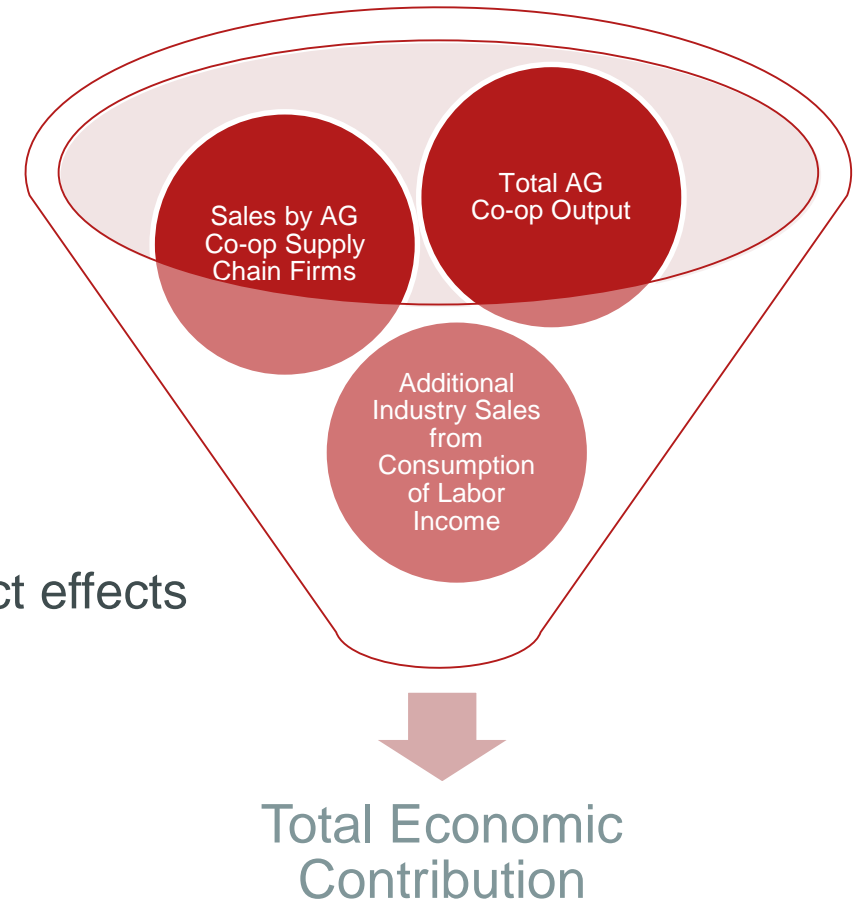
Ways cooperatives create value...

- **Co-op Level Returns**
 - Firm activity, Member Patronage Refunds & Dividends
- **Economic Value Added** (co-op level performance through enhanced returns)
 - Rate of return above that required to compensate investors for risk (McKinsey 2001)
- **Mutual Benefit** (not normally measured)
 - Market Access, Market Existence, Countervailing Power, Fair Dealing, Competitive Yardstick
 - Member Ownership & Member Control
- **Member-Level Returns** (not normally measured, unique to the member)
 - Price differentials, service differentials, farm profit differentials, risk reduction
- **Joint Maximization of Cooperative + Member Level**
 - Complicates Impact Measurement

Economic Contribution Analysis

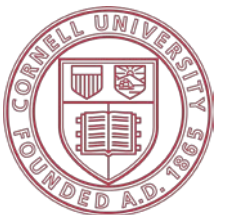
- **Direct:** activity causing the local transactions
 - Cooperative spending (employment, materials, etc.)
- **Indirect:** backward-linked supply chain transactions
 - Suppliers increasing payroll or production capacity in NYS
- **Induced:** labor income spending from both direct and indirect effects
 - Employees using paycheck to go shopping in NYS

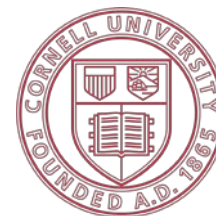
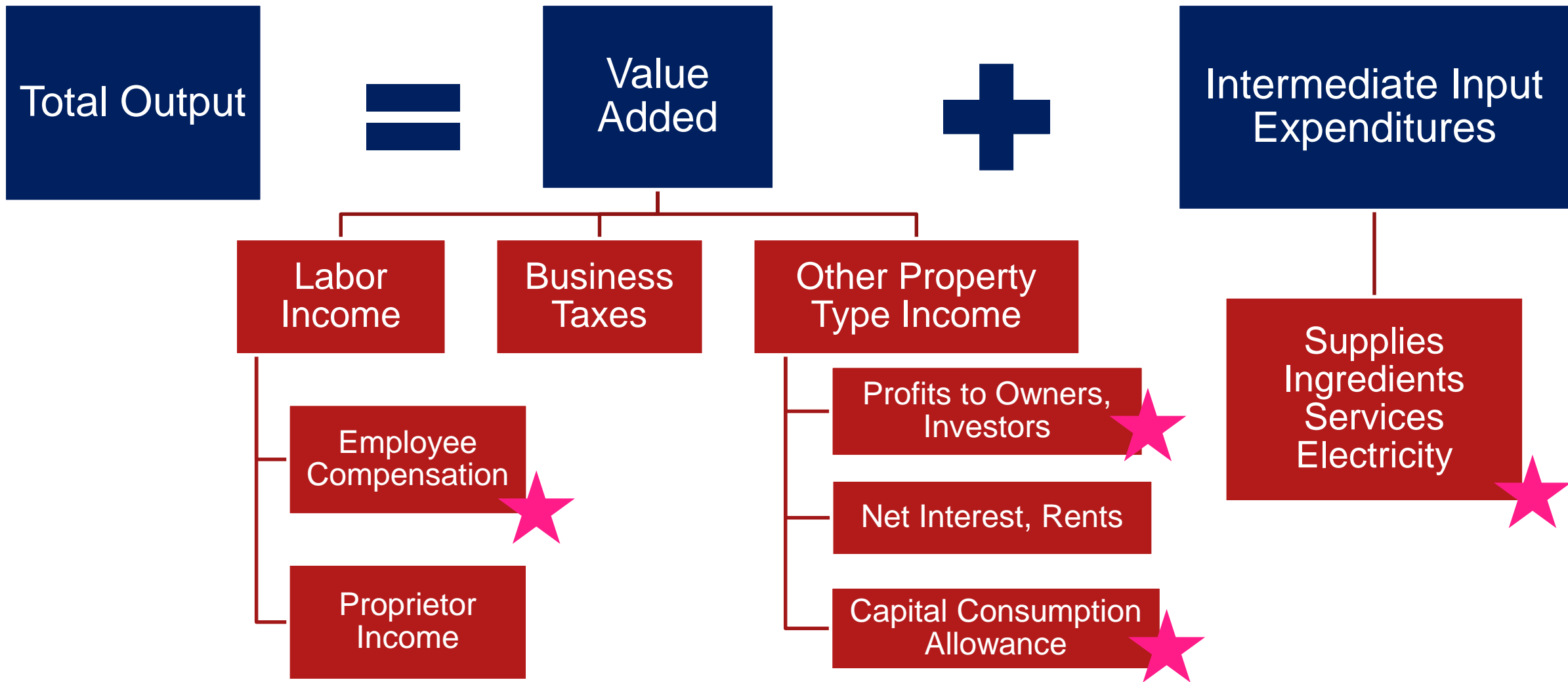
$$\text{Multiplier Effect} = \frac{\text{Direct} + \text{Indirect} + \text{Induced}}{\text{Direct}}$$



Related Literature

- **State/Regional Level: Limited primary data collection, ag/nonag sectors mixed, headquartered in state/region**
 - ND: Bhuyan and Leistriz (1996), Coon and Leistriz (2001), Coon and Leistriz (2005), McKee (2011)
 - TX: Park, Baros, and Dudensing (2009)
 - NE: Herian and Thompson (2016)
 - MN: Folsom (2003)
 - WI: Zeuli et al (2003), Pitman (2014)
 - Great Plains/Cornbelt: McNamara, Fulton, and Hine (2001)
- **National Level: All sectors, limited primary data, varies by industry**
 - Deller et al. (2009)
- **None collect data on intermediate input purchases or regional purchase coefficients**
 - Zeuli and Deller (2007), McKee et al 2006, Uzea (2014)
- **Patronage refunds/equity redemptions ignored or implemented in different ways**
 - Leistriz (2004), Folsom (2003), Bangsund and Leistriz (1998), Deller (2009), Zeuli and Deller (2007)
 - Propr income (PI), corporate profits (OPTI), farm sales/output increment (increase absorption coefficient on farm sector)
 - Taxation
 - Household income, farm income
- **SAM versus IO**
 - Uzea (2014)
- **Very little in peer-reviewed literature**





Our Contributions & Approach

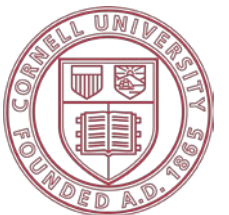
- Customized production functions & LPPs for ag co-op
 - *Financial surveys*
 - *Analysis-By-Parts (ABP) in IMPLAN*
- Allocation of residual earnings (cash/stock PRs) and equity redemptions
 - *Financial surveys*
 - *Annual reports*
- Secondary data on NET co-op business volume
 - *USDA Rural Development*
- Average annual capital expenditures
 - *Financial surveys*
 - *Local wholesale margin*
- Contributions relative to IOFs
 - *Distribution of PRs to LOCAL owners*
 - *Differences in production functions and LPPs*



IMPLAN Economic Modeling Software



- Originally developed by USFS (1970s), now private data and software business in North Carolina
- 536 unique industries
- Developed a customized New York Input-Output model within IMPLAN
- Edited IMPLAN data to better reflect local (NYS) conditions
 - Surveys
 - Marketing, Supply, Service
 - Farm Credit
 - Rural Electric
 - Annual reports



Primary Data: Our Survey

- Ag co-ops (farmer owned) & RECs doing business in NYS
 - Percentage of business in NYS if headquartered out of state
- Detailed intermediate input expenditure section
- Unique survey for each of type of cooperative

Farm Credit

Response rate: **100%**

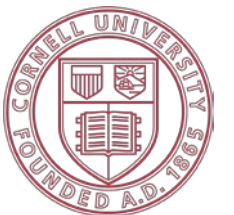
Rural Electric

Response rate: **100%**

Marketing, Supply, Service

Response rate: 12%

Response rate by volume: 92%



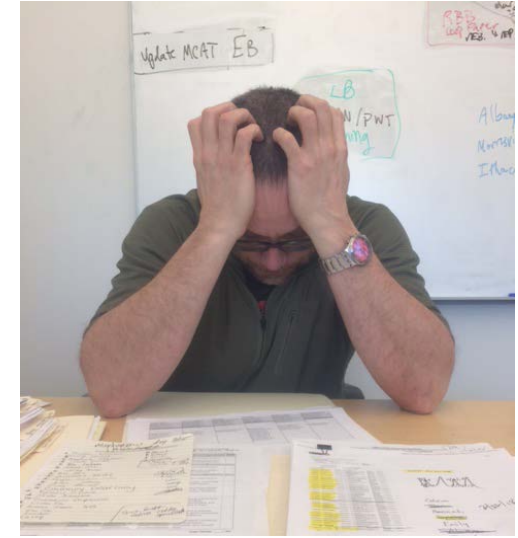
Economic Modeling Issues

Avoiding Double Counting

- Consider one supply chain player (the cooperative), direct vs. indirect, etc.
 - Farm Milk Production + Milk Marketing co-op
- Account for purchases between co-ops
 - Cheese co-op purchases milk from fluid milk co-op

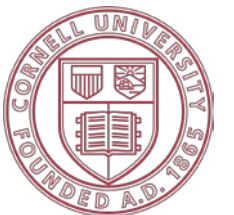
Uniqueness co-op business activity?

- No co-op industry sectors in IMPLAN
- Default industry production function is national average
- Default LPPs based on local supply/demand conditions, invariant across industries



Primary Data Collection Difficulties

- Financial data → DETAILED financial data
→ DETAILED LOCAL financial data
- 1.5 year collection process
 - Invitation, reminder1, reminder2
 - Online, paper, email, phone
 - Variable terminologies
- Reconciliation of surveys and annual reports



Production Function Example (aggregated)

- Customized from primary data from all (4) RECs in NYS
- Industries here aggregated to 2-digit NAICS
 - For presentation, not analysis (536)
 - 11 2-digit sectors with spending shown
- Note REC's (non-generation) largest intermediate input

NYS Rural Electric Cooperatives			
Intermediate Input Purchases		Spending per Dollar of Output	Local Purchase Percentage
22	Utilities	0.2351	100%
23	Construction	0.0029	100%
31-33	Manufacturing	0.0038	1%
42	Wholesale Trade	0.0020	95%
44-45	Retail Trade	0.0001	100%
48-49	Transportation & Warehousing	0.0001	43%
51	Information	0.0059	66%
52	Finance & Insurance	0.0129	48%
54-62	Professional Services	0.0254	45%
71-72	Entertainment, Accom, Food Ser	0.0021	25%
81-92	Other	0.0005	100%
Total Intermediate Inputs		0.2908	90%
Total Value Added		0.7092	

Electric Power Trans & Dist, NYS IMPLAN Default

Intermediate Input Purchases		Spending per Dollar of Output	Local Purchase Percentage
21	Mining	0.0001	7%
22	Utilities	0.5935	81%
23	Construction	0.0004	96%
31-33	Manufacturing	0.0013	14%
42	Wholesale Trade	0.0003	95%
44-45	Retail Trade	0.0000	87%
48-49	Transportation & Warehousing	0.0009	66%
51	Information	0.0002	83%
52	Finance & Insurance	0.0005	99%
53	Real estate & Rental	0.0002	95%
54-62	Professional Services	0.0015	93%
71-72	Entertainment, Accom, Food Ser	0.0002	89%
81-92	Other	0.0001	81%
Total Intermediate Inputs		0.5991	81%
Total Value Added		0.4009	

$$\text{TVA} = 0.1124 \text{ LI} + 0.1875 \text{ OPTI} + 0.1011 \text{ TOPI}$$

NYS Rural Electric Cooperatives

Intermediate Input Purchases		Spending per Dollar of Output	Local Purchase Percentage
21	Mining		
22	Utilities	0.2351	100%
23	Construction	0.0029	100%
31-33	Manufacturing	0.0038	1%
42	Wholesale Trade	0.0020	95%
44-45	Retail Trade	0.0001	100%
48-49	Transportation & Warehousing	0.0001	43%
51	Information	0.0059	66%
52	Finance & Insurance	0.0129	48%
53	Real Estate & Rental		
54-62	Professional Services	0.0254	45%
71-72	Entertainment, Accom, Food Ser	0.0021	25%
81-92	Other	0.0005	100%
Total Intermediate Inputs		0.2908	90%
Total Value Added		0.7092	

$$\text{TVA} = 0.3820 \text{ LI} + 0.3270 \text{ OPTI} + 0.0002 \text{ TOPI}$$

NYS Fluid Milk Manufacturing IMPLAN Default

Intermediate Input Purchases		Spending per Dollar of Output	Local Purchase Percentage
11	Ag Production & Ag Support	0.4575	84%
21	Mining	0.0009	0%
22	Utilities	0.0092	95%
23	Construction	0.0044	91%
31-33	Manufacturing (not FMM)	0.1215	38%
84	Fluid Milk Manufacturing	0.0893	69%
42	Wholesale Trade	0.0762	95%
44-45	Retail Trade	0.0056	82%
48-49	Transportation & Warehousing	0.0479	52%
51	Information	0.0032	77%
52	Finance & Insurance	0.0040	98%
53	Real estate & Rental	0.0036	80%
54-62	Professional Services	0.0298	92%
71-72	Entertainment, Accom, Food Ser	0.0020	74%
81-92	Other	0.0049	61%
Total Intermediate Inputs		0.8598	75%
Total Value Added		0.1402	

NYS Fluid Milk Manufacturing Cooperative A

Intermediate Input Purchases		Spending per Dollar of Output	Local Purchase Percentage
11	Ag Production & Ag Support	0.4918	99%
21	Mining		
22	Utilities	0.0131	95%
23	Construction	0.0014	86%
31-33	Manufacturing (not FMM)	0.2476	86%
84	Fluid Milk Manufacturing		
42	Wholesale Trade	0.0014	100%
44-45	Retail Trade		
48-49	Transportation & Warehousing	0.0180	77%
51	Information	0.0010	83%
52	Finance & Insurance	0.0017	100%
53	Real estate & Rental	0.0090	95%
54-62	Professional Services		
71-72	Entertainment, Accom, Food Ser	0.0022	50%
81-92	Other	0.0088	100%
Total Intermediate Inputs		0.7959	94%
Total Value Added		0.2041	

Patronage Refunds

Patronage refunds **increase** impact relative to traditional (nonlocal) dividends in investor-owned firms.

Cash Patronage Refunds

- Farm-level impact in year received

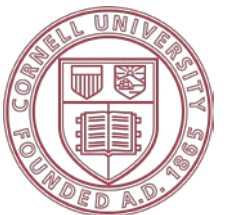
Stock Patronage Refunds Distributed

- No farm-level impact in year received

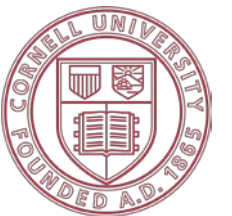
Stock Patronage Refunds Redeemed

- Farm-level impact in year redeemed

- Utilize farm-level **or household** spending patterns for distribution to member-owners; allowances for savings, taxes
- Account for income tax implications at the cooperative and farm-level
 - Qualified
 - Non-Qualified



Our Results

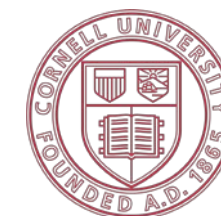


Economic Contribution of Agricultural Cooperatives in NYS

Economic Contribution of Agricultural Cooperatives in NYS (2016 dollars)

Cooperative Type	Direct Effect	Indirect Effect	Induced Effect	Total Effect	Contribution Multiplier
Output (\$ Million)					
Rural Electric	28.0	12.8	9.2	50.0	1.78
Farm Credit	176.2	35.9	47.1	259.2	1.47
Supply and Service	358.4	306.1	196.3	860.9	2.40
Marketing	3,286.5	2,996.6	645.6	6,928.7	2.11
Total	3,849.1	3,351.4	898.2	8,098.8	2.10
Employment (jobs)					
Rural Electric	84	34	58	176	2.09
Farm Credit	289	205	295	789	2.73
Supply and Service	3,430	1,498	1,231	6,159	1.80
Marketing	1,942	12,450	4,058	18,450	9.50
Total	5,745.0	14,186.7	5,641.9	25,573.6	4.45

Source: Cooperative surveys, IMPLAN (2016), USDA Rural Development (2017), author calculations

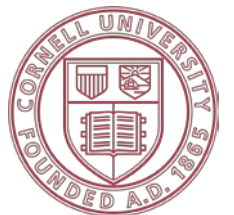


Economic Contribution of Agricultural Cooperatives in NYS

Economic Contribution of Agricultural Cooperatives in NYS (2016 dollars)

Cooperative Type	Direct Effect	Indirect Effect	Induced Effect	Total Effect	Contribution Multiplier
Labor Income (\$ Million)					
Rural Electric	10.7	3.3	3.8	17.8	1.67
Farm Credit	70.9	12.8	27.2	110.9	1.56
Supply and Service	180.1	106.8	72.8	359.6	2.00
Marketing	193.3	748.6	245.3	1,187.2	6.14
Total	455.0	871.5	349.1	1,675.5	3.68
Total Value Added (\$ Million)					
Rural Electric	19.0	6.3	6.6	32.0	1.68
Farm Credit	157.8	19.1	47.1	223.9	1.42
Supply and Service	138.9	197.4	125.6	461.8	3.32
Marketing	372.4	1567.3	422.9	2362.6	6.34
Total	688.1	1,791.1	602.2	3080.3	4.48

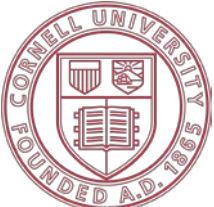
Source: Cooperative surveys, IMPLAN (2016), USDA Rural Development (2017), author calculations



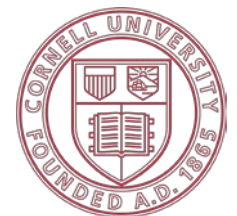
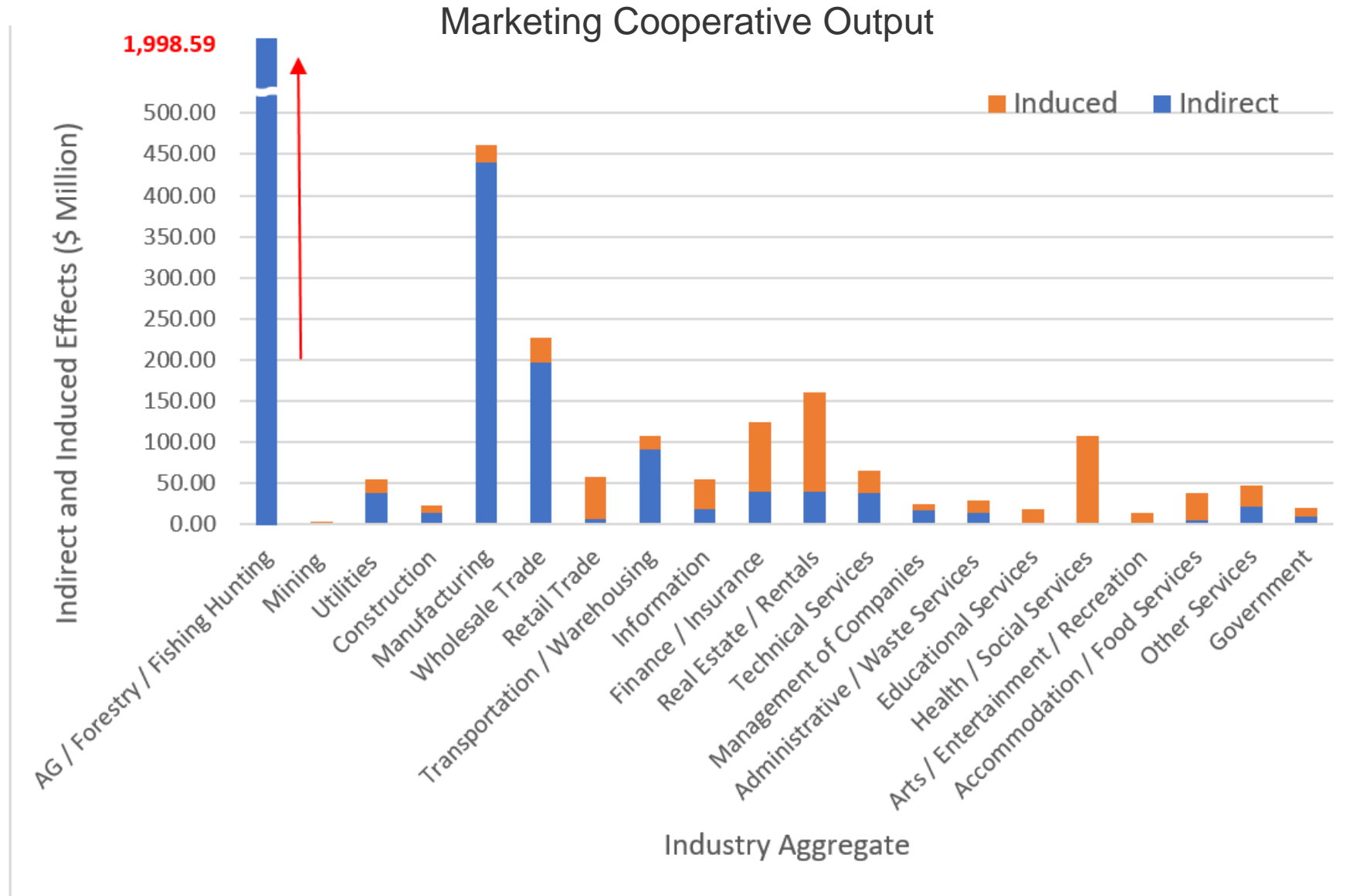
Ag Cooperatives Relative to All NYS Agriculture

	Cooperative Multipliers vs. All Agriculture Multipliers (NYS)		Cooperative Impact Percentages of All Agriculture (NYS)	
	AG Co-op Multiplier	All AG Multiplier ¹	Percent of all NYS AG	Percent of all NYS AG Where Co-ops Primarily Reside
Output	2.10	1.42	12.7%	50.6%
Employment	4.45	1.73	10.2%	63.6%
Labor Income	3.66	2.15	11.7%	61.5%

Source: Cooperative surveys, IMPLAN (2016), USDA Rural Development (2017), author calculations. ¹Schmit 2016



Distribution of Indirect and Induced Effects

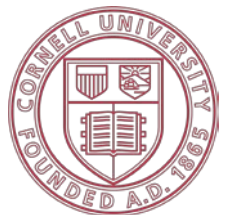


The Cooperative Difference, Part I: Distribution of profits locally

- How much is the agricultural cooperative business structure worth compared to other/investor-owned firms?
 - **Co-op-level (profits) & member-level (purchases) returns ACCOUNTED FOR!**
 - **Added value of local patronage refunds (locally distributed profits) ONLY!**
 - **Changes in local purchasing patterns for intermediate inputs IGNORED (for now)!**

Cooperative Member Value in NYS from PRs ONLY		
GAINS IN TOTAL IMPACT		
Cooperative Type	Employment (jobs)	Labor Income (\$ Million)
Rural Electric	11	2.2
Farm Credit	262	53.8
Supply and Service	7	1.4
Marketing	175	35.0
Total	455	92.4
Relative Change	+2%	+6%

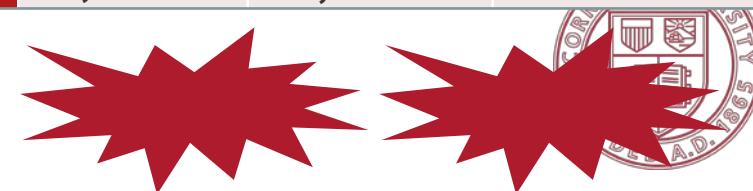
Source: Cooperative surveys, IMPLAN (2016), USDA Rural Development (2017), author calculations



The Cooperative Difference, Part II: The Full Economic Effect

COMPARISON OF TOTAL EFFECTS (from same direct output effect)

	Farmer Co-op	Industry Average	Co-op Difference		Farmer Co-op	Industry Average	Co-op Difference
	Employment (jobs)				Output (\$M)		
Rural Electric (IMPLAN 49)	176	76	+132%		50.0	44.3	+13%
Farm Credit (IMPLAN 433, 434)	789	556	+42%		259.2	229.2	+13%
Supply & Service (IMPLAN 19)	6,159	9,684	-36%		860.9	592.0	+45%
Marketing (IMPLAN 79 - 88)	18,450	17,271	+7%		6,928.7	6,126.7	+13%
Total	25,574	27,588	-7%		8,098.8	6,992.2	+16%
	Labor Income (\$M)				Total Value Added (\$M)		
Rural Electric (IMPLAN 49)	17.8	7.6	+134%		32.0	19.4	+65%
Farm Credit (IMPLAN 433, 434)	110.9	60.3	+84%		223.9	194.3	+15%
Supply & Service (IMPLAN 19)	359.6	317.7	+13%		461.8	403.7	+14%
Marketing (IMPLAN 79 - 88)	1,187.2	1,138.5	+4%		2,362.6	1,981.3	+19%
Total	1,675.5	1,524.1	+10%		3,080.3	2,598.7	+19%



Conclusions & Next Steps

- Local ownership (residual returns) create more impact for co-ops relative to IOFs
- Purchasing patterns (what & where) create additional impact relative to aggregate industry estimates for NYS Ag Co-ops
 - Co-op versus non-co-op, OR
 - Poor industry averages (particularly trade flows)?
- Robustness of results?
 - Part I for sure
 - Part II likely, relative to level of absorption coefficients to member users
- Finishing extension & research publications
- Approach applicable to other geographies & sectors



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