

THE NON-METROPOLITAN MIDWEST AND THE GEOGRAPHY OF U.S. VALUE CHAINS

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Three messages

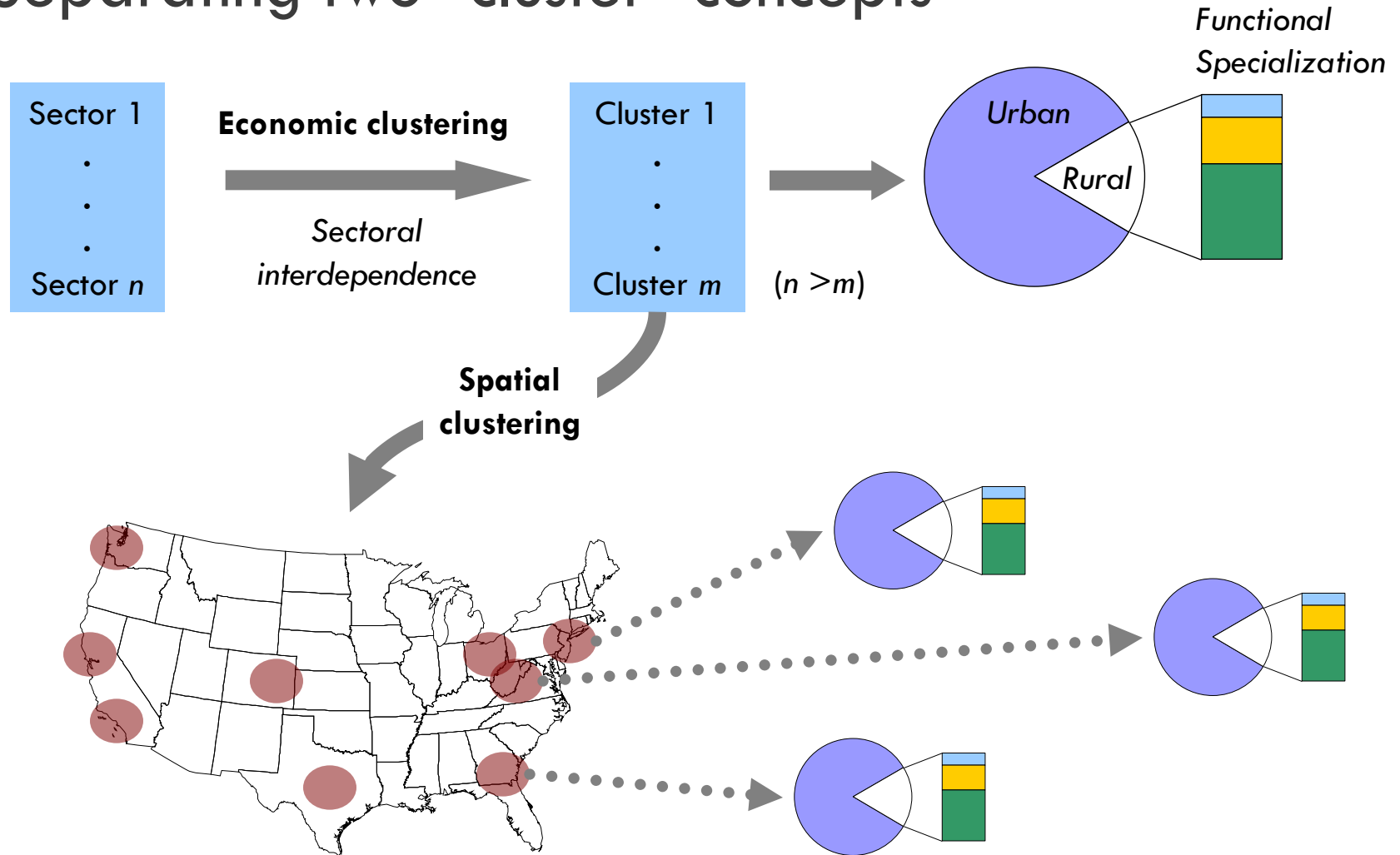
- The increasingly neglected appreciation of industries
- The importance of a flexible understanding of geography and of interfirm linkages over space
- The value of understanding the rural “shadow” economic base

Begin here: “Rural role in national value chains”

Feser & Isserman, 2008, *Regional Studies*

- What role do industry clusters play in rural economies?
 - ▣ Is there such thing as a *rural cluster*?
 - ▣ Can we use cluster ideas to better characterize the evolving economic base of rural areas?
 - ▣ How should policy makers utilize cluster ideas in rural development programs?
 - ▣ What and where are the rural clusters in the U.S., and what are their characteristics?

Separating two “cluster” concepts



Top-down method: Identify an exhaustive set of industry clusters (or value chains) through comprehensive analysis of interdependence between all sectors

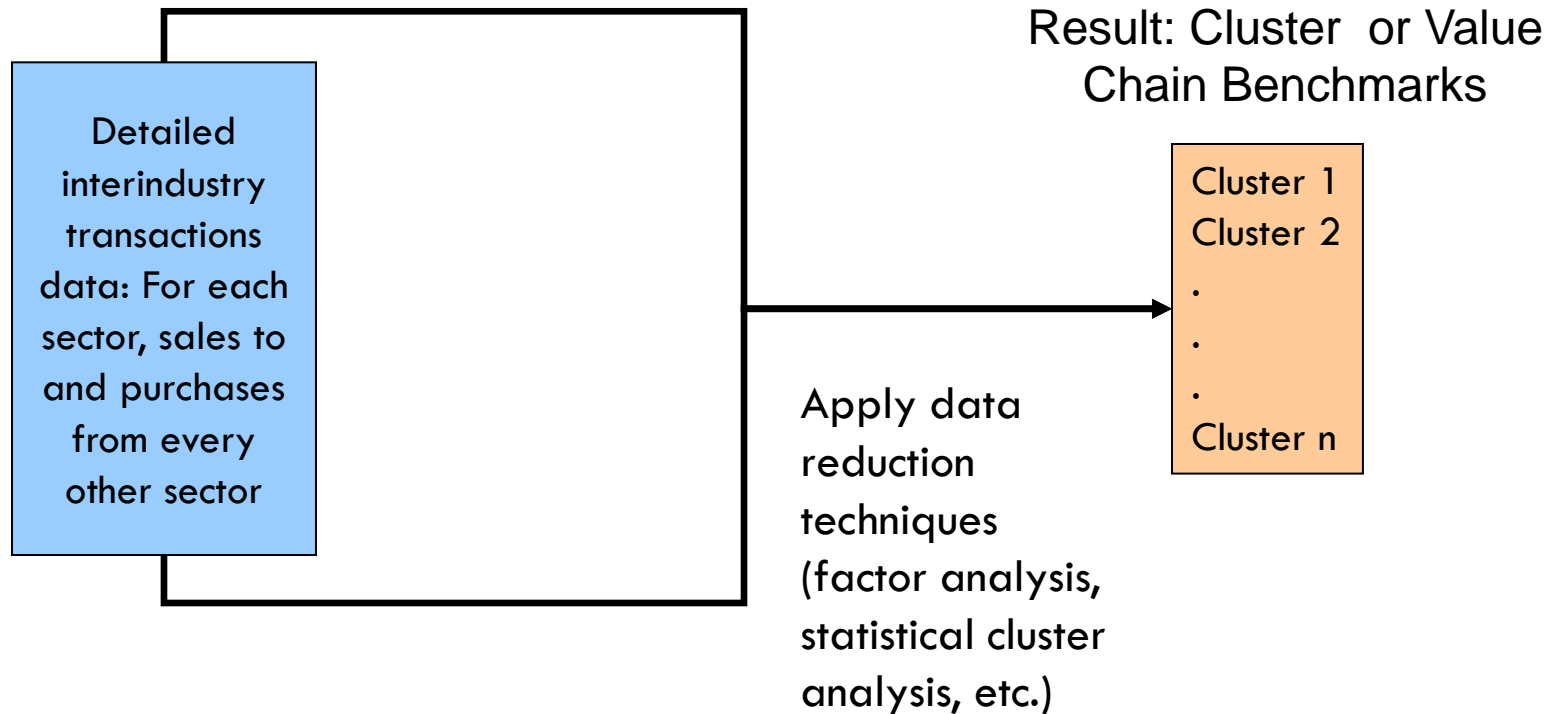


Table 1

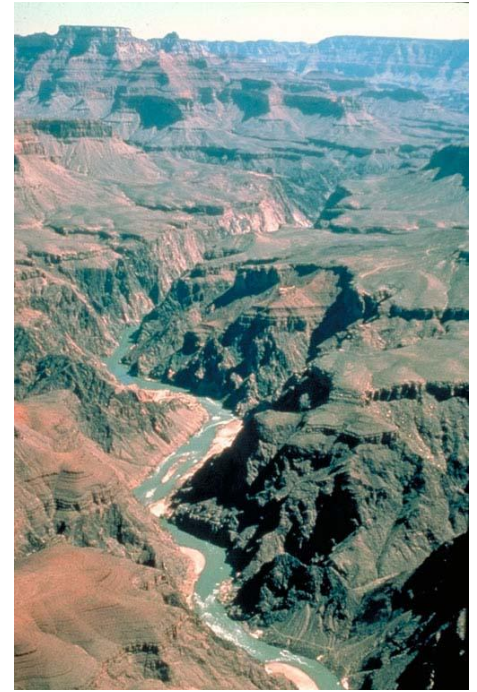
U.S. motor vehicles value chain

ID Code	IO Code	IO Label	2002 NAICS	Primary ID	Type	Linkage	Z-Score
23	336120	Heavy duty truck manufacturing	336120	23	Primary	0.51318	6.65
23	336211	Motor vehicle body manufacturing	336211	23	Primary	0.51100	6.62
23	336212	Truck trailer manufacturing	336212	23	Primary	0.50285	6.48
23	336110	Automobile & light truck manufacturing	336110	23	Primary	0.49863	6.41
23	336213	Motor home manufacturing	336213	23	Primary	0.46566	5.86
23	336214	Travel trailer & camper manufacturing	336214	23	Primary	0.44360	5.50
23	336300	Motor vehicle parts manufacturing	336300	16	Secondary	0.40194	4.81
23	336991	Motorcycle, bicycle, & parts manufacturing	336991	19	Secondary	0.34128	3.80
23	336999	All other transportation equipment manufacturing	336999	0	Secondary	0.29329	3.00
23	336612	Boat building	336612	0	Secondary	0.27436	2.69
23	334300	Audio & video equipment manufacturing	334300	12	Secondary	0.25887	2.43
23	335110	Electric lamp bulb and part manufacturing	335110	0	Secondary	0.17931	1.11

ID Code	A unique ID assigned to each (1, . . .45) identified value chain cluster
IO Code & Label	Input-output classification code, <i>Benchmark Input-Output Accounts of the United States, 1997</i>
2002 NAICS	2002 NAICS code (does not always concord directly to IO code)
Primary ID	Indicates the value chain cluster in which row sector is a <i>primary</i> member
Type	Indicates whether industry is <i>primary</i> or <i>secondary</i> to the value chain
Linkage & Z Score	Measures of strength of the sector's linkage to overall chain (higher value = stronger linkage)

Rural or urban?

Source: Isserman



Joined with metro/non-metro

“Integration” and “character”

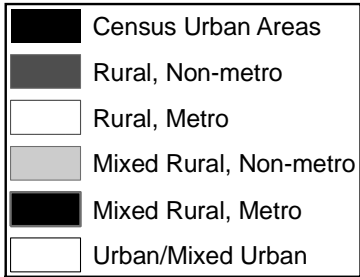
Table 5
Rural population and shares by metro designation, 2000

Type	Metro status	Total pop	Percent of total	Rural pop	Percent of rural	Farm pop	Percent of farm	n	Avg pop	Percent Rural	Percent Farm
Rural	Metro	6,589,186	2.3	5,134,419	8.7	285,576	9.6	304	21,675	77.9	4.3
Rural	Non-metro	21,375,266	7.6	16,143,924	27.3	1,129,623	37.8	1,486	14,384	75.5	5.3
Mixed Rural	Metro	59,132,936	21.0	15,971,278	27.0	652,240	21.8	467	126,623	27.0	1.1
Mixed Rural	Non-metro	27,291,697	9.7	12,706,423	21.5	658,413	22.0	555	49,174	46.6	2.4
Mixed Urban	Metro	40,333,682	14.3	6,018,827	10.2	180,184	6.0	146	276,258	14.9	0.4
Mixed Urban	Non-metro	175,003	0.1	36,526	0.1	450	0.0	11	15,909	20.9	0.3
Urban	Metro	126,524,136	45.0	3,052,200	5.2	81,045	2.7	172	735,605	2.4	0.1
Total		281,421,906	100.0	59,063,597	100.0	2,987,531	100.0	3,141	1,239,630	21.0	1.1

Source: U.S. Census and authors' calculations.

→ 85.6 percent of US rural population

Non-metro accounts for 48.9 percent



Separating two “cluster” concepts

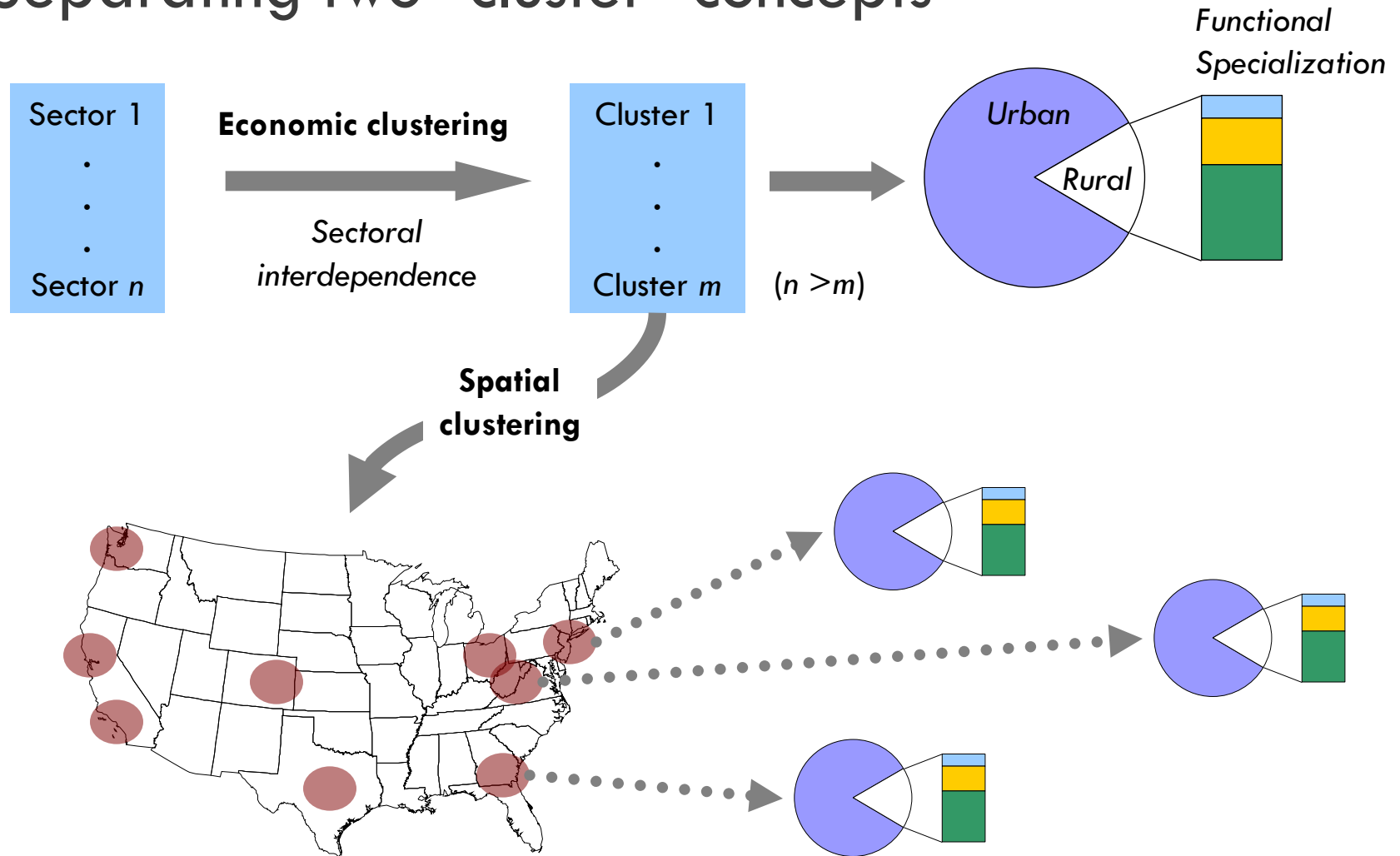


Table 8

Rural-urban distribution of U.S. value chains, 2002

Sorted in descending order of rural non-metro percentage

ID	Cluster	Emp (000s)	Percent of total U.S. value chain employment							
			Rural			Mixed Rural			Mixed	
			Non- metro	Metro	Total	Non- metro	Metro	Total	Urban	Urban
6	Mining	274.6	29.8	5.7	35.5	20.7	23.7	44.4	8.6	11.5
20	Wood processing	1,017.8	20.1	4.2	24.3	18.0	22.2	40.2	12.2	22.8
26	Feed products	301.1	18.9	4.0	23.0	21.0	26.2	47.2	10.3	19.5
7	Farming	12.8	16.4	1.2	17.6	16.3	24.6	40.8	6.6	35.0
18	Wood products & furniture	650.7	15.0	3.5	18.4	15.6	20.7	36.3	18.0	26.7
32	Grain milling	44.9	14.2	3.3	17.5	21.4	25.8	47.2	9.5	25.8
10	Chemical-based products	484.1	13.1	4.0	17.1	18.2	28.3	46.5	13.9	21.9
1	Textiles & apparel	953.9	13.0	2.9	15.8	16.0	19.4	35.4	13.2	35.1
24	Wood building products	858.1	12.6	2.8	15.5	15.8	24.1	39.9	15.4	29.1
45	Leather products	169.0	12.4	2.4	14.8	13.9	18.6	32.4	13.2	39.5
2	Packaged food products	1,285.3	12.1	2.7	14.8	18.1	21.6	39.7	11.8	33.6
22	Concrete, brick building products	755.3	12.0	2.8	14.9	15.6	25.2	40.8	15.6	28.6
15	Dairy products	246.0	11.7	2.4	14.1	14.0	19.6	33.6	15.7	36.6
40	Appliances	995.2	10.9	2.2	13.1	16.3	23.2	39.5	15.4	31.9
19	Construction machinery & distrb equip	594.5	9.2	1.9	11.1	17.1	20.5	37.6	16.0	35.3
3	Plastics & rubber manufacturing	632.7	9.1	3.3	12.4	13.6	27.2	40.8	15.1	31.3
23	Motor vehicles	1,104.8	8.9	2.2	11.1	14.8	23.1	37.8	18.6	32.4
16	Nondurable industry machinery	1,654.5	8.2	2.0	10.2	14.3	21.1	35.4	17.0	37.3
30	Petroleum & gas	1,345.7	8.0	2.2	10.2	9.8	23.2	32.9	13.5	43.3
25	Plastics products	894.7	7.9	2.3	10.2	12.6	23.8	36.3	17.1	36.1
4	Aluminum & aluminum products	679.9	7.3	1.5	8.8					
41	Copper & copper products	238.3	6.9	1.2	8.1					
14	Metalworking & fabricated metal goods	702.6	6.8	2.4	9.2					
11	Machine tools	1,155.1	6.8	1.8	8.6					
33	Rubber products	538.4	6.5	1.7	8.2					
34	Glass products	354.0	6.5	1.7	8.2					
36	Steel milling	220.3	5.9	1.6	7.5					
44	Breweries	316.4	5.0	1.7	6.7					

A different picture of
the US rural/non-metro
economic base

Findings

- Based on 2002 employment data, rural non-metro counties capture 4.7% of overall US private non-farm employment but 5.0% or more of US employment in 28 of 45 national value chains
 - ▣ Mostly natural resource-based/ag, but...
 - ▣ Among the 28 are several manufacturing chains, including chemical-based products, construction machinery and distribution equipment, motor vehicles, non-durable industry machinery, and machine tools
 - ▣ Rural America is closely tied to a wide range of national industries
- Rural places not exclusively based in low-wage and secondary industries in given chains

But an imperfect measure of value chains

Top down (2008 results)

- Analyze buyer-supplier patterns among n industries and organize into r groups
 - ▣ Example: 400 industries organized into 45 fixed “clusters” or “chains”

Bottom up (new results)

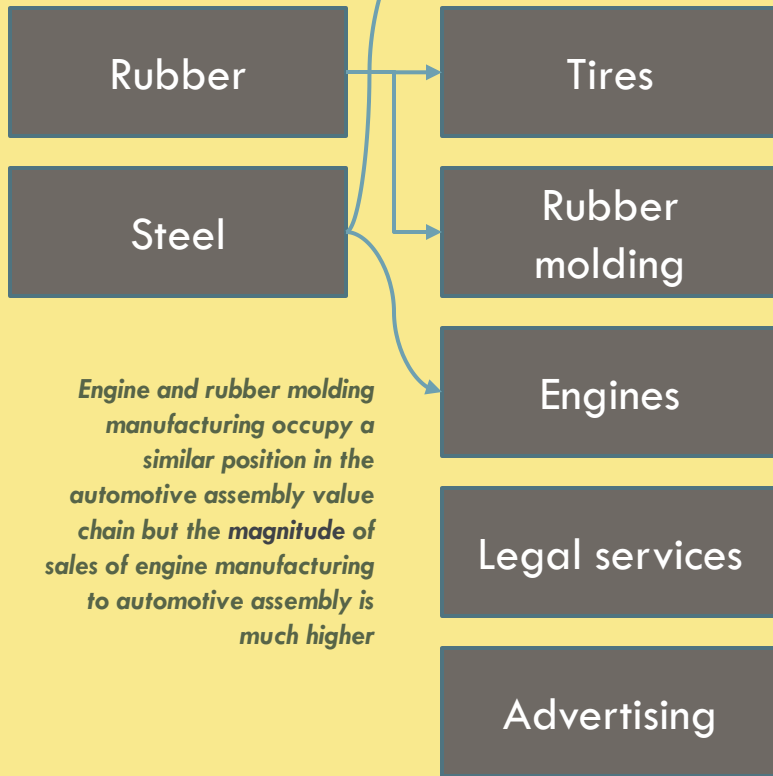
- Identify the linked industries associated with each individual industry
 - ▣ Example: 400 value chains identified for each of 400 industries

Bottom up implementation requires...

- A measure of how closely *linked* a given industry is to all other individual industries
 - ▣ *Linkage* has several dimensions
 1. *Proximity* in an extended value chain
 2. *Directionality* in exchange between industries (for industries A and B, where A buys supplies from B, A is a *buyer* and B is a *supplier*)
 - A has a *backward linkage* relationship with B
 - B has a *forward linkage* relationship with A
 3. *Magnitude* of exchange
 - Industries buy more from (or sell more to) some industries than others

Hypothetical

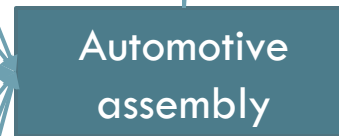
Wheel manufacturing is a direct supplier to automotive assembly and steel is an indirect supplier (through wheel manufacturing). Wheel manufacturing is closer in proximity to automotive assembly in the automotive assembly value chain.



Engine and rubber molding manufacturing occupy a similar position in the automotive assembly value chain but the magnitude of sales of engine manufacturing to automotive assembly is much higher

Automotive assembly's backward linkages

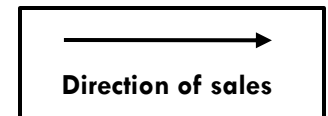
Exports and purchases by consumers and governments are sources of **final demand**



The **direction** of automotive assembly's linkage to rubber molding is **backward**. The direction of its linkage to vehicle rental services is **forward**. The direction of vehicle rental services linkage to automotive assembly is **backward**.

Automotive assembly's forward linkages

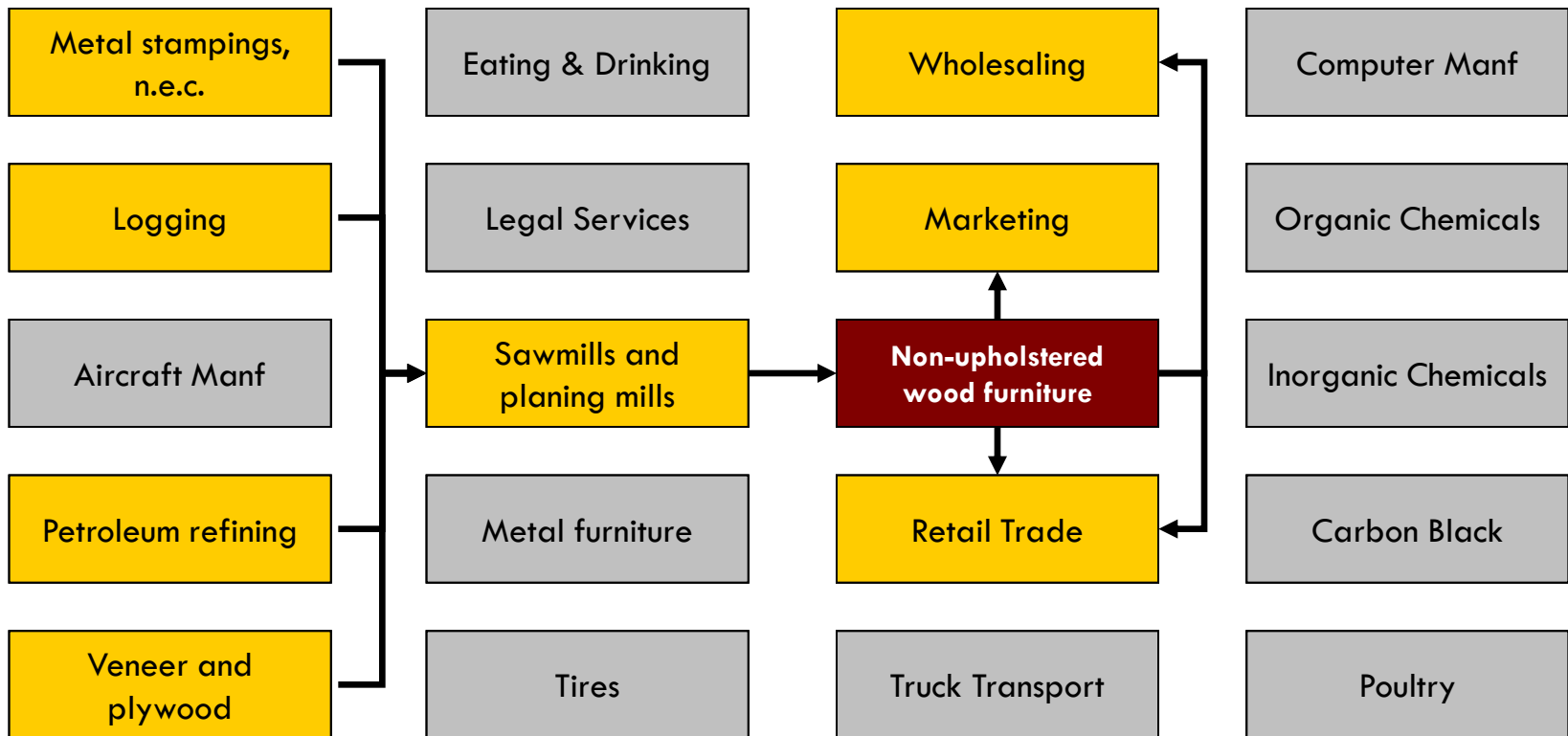
Purchases by vehicle rental services are a source of **intermediate demand**



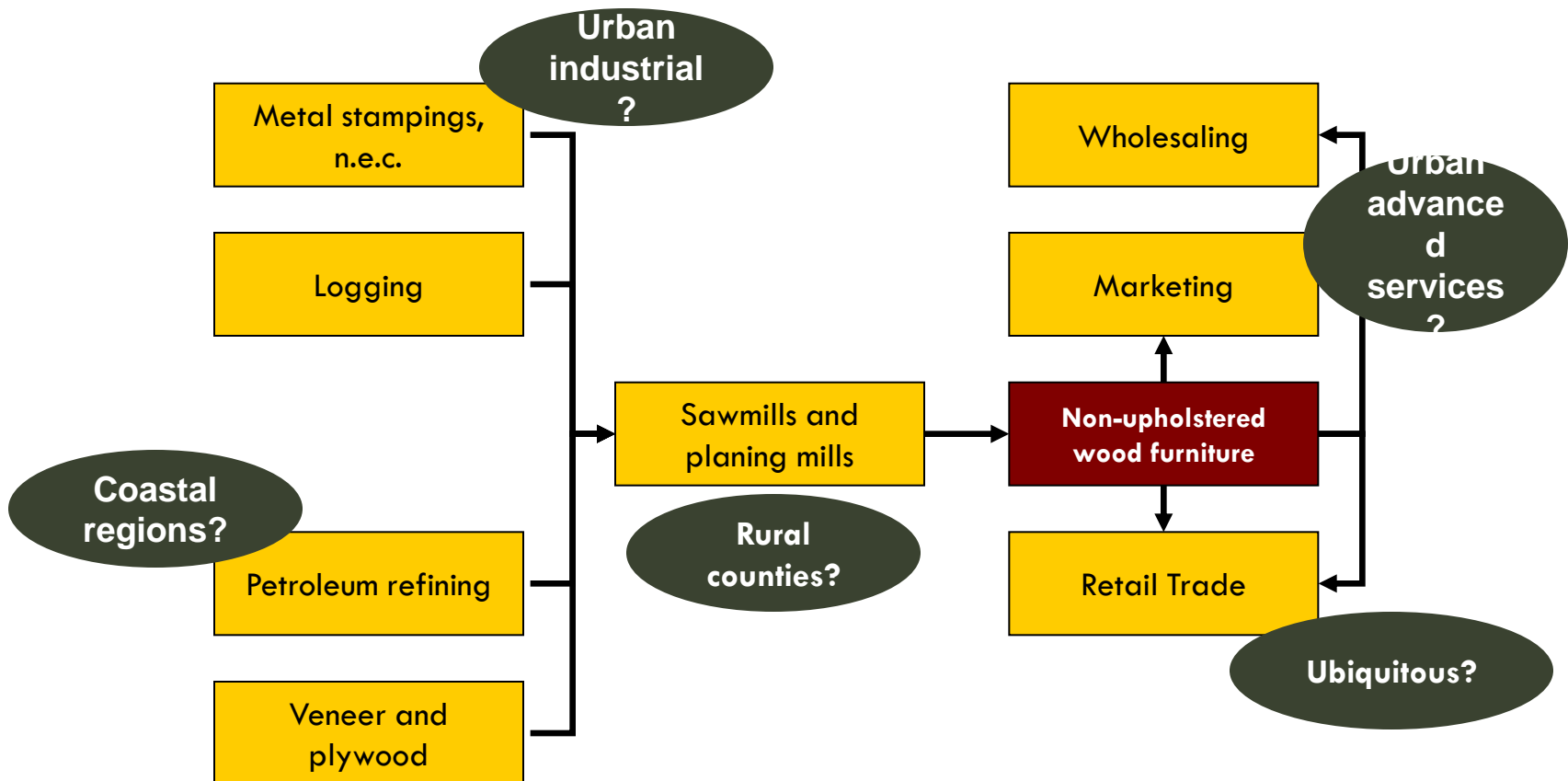
Complications

- In reality, all industries are linked to all other industries but some industries are more closely linked than others
- No single index captures the complexity effectively
- Purchases and sales flows—e.g., in input-output tables—capture only one dimension (financial exchange) of inter-industry linkages

Illustrative US chain for a hypothetical core industry

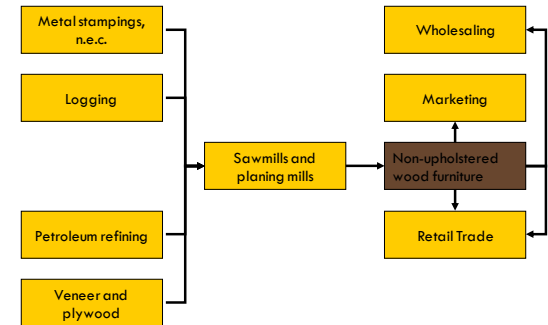


Revealing a value chain in space?



What is a “regional cluster?”

Exploratory analysis



CORE INDUSTRY

Absolute Size	Specialization	Historic Growth	Forecast Growth
Employment	Location Quotient	Region	Region
Output		State/Province	State/Province
		Nation	Nation
		Region/Int'l	Region/Int'l

LINKED INDUSTRIES

Absolute Size	Specialization	Historic Growth	Forecast Growth
Employment	Location Quotient	Region	Region
Output		State/Province	State/Province
		Nation	Nation
		Region/Int'l	Region/Int'l

Explore as a group or individually

Some findings: Non-metro Midwest

Study year: 2008

□ Number of industries

▣ Core LQ > 1.1 = 217 of 399

- Of those, with Linked LQ > 1.1 = 123 of 217

 - Of those, with core jobs > 10,000 = 29 of 123

- Of those, “highly” education-intensive = 1 of 50 (forest nurseries and forest products)

- Of those, “moderately” education-intensive = 25 of 109

▣ Core LQ < 0.9 = 159 of 399

- Of those, with Linked LQ > 1.1 = 32 of 159

 - Of those, highly education-intensive = 1 of 50 (junior colleges)

 - Of those, moderately education-intensive = 9 of 109

Non-metro Midwest economic base?

NIIO	NIIO Label	Core		Linked	
		Jobs	LQ	Jobs	LQ
251	Household laundry equipment manufacturing	6,611	10.61	1,814,283	1.16
1	Oilseed farming	91,793	10.37	1,163,207	1.55
2	Grain farming	251,212	8.43	1,067,106	1.54
191	Farm machinery and equipment manufacturing	20,015	7.70	882,935	3.14
42	Beet sugar manufacturing	2,037	7.56	1,619,548	1.19
37	Wet corn milling	2,754	7.26	1,094,924	1.61
21	Iron ore mining	1,573	6.47	539,113	1.54
13	Animal production, except cattle and poultry and eggs	119,722	6.42	988,742	2.49
49	Cheese manufacturing	10,733	6.08	1,578,802	1.15
52	Animal (except poultry) slaughtering, rendering, and processing	73,002	6.05	2,104,921	1.14
281	All other transportation equipment manufacturing	3,435	6.00	2,126,060	1.09
50	Dry, condensed, and evaporated dairy product manufacturing	3,628	5.72	938,604	1.14
139	Rubber and plastics hoses and belting manufacturing	5,779	4.88	391,704	2.06
35	Other animal food manufacturing	6,896	4.84	1,207,963	1.85
267	Truck trailer manufacturing	8,137	4.84	1,825,774	1.52
34	Dog and cat food manufacturing	4,074	4.78	2,065,626	1.29
167	Ferrous metal foundries	18,654	4.75	255,626	1.84
269	Travel trailer and camper manufacturing	9,617	4.71	793,514	0.98
8	Sugarcane and sugar beet farming	11,473	4.71	956,540	1.39
10	Cattle ranching and farming	81,211	4.64	1,514,798	1.59
250	Household refrigerator and home freezer manufacturing	3,394	4.63	1,767,443	1.00
38	Soybean and other oilseed processing	2,891	4.62	962,840	1.65
237	Automatic environmental control manufacturing	4,312	4.59	1,051,868	0.85
279	Motorcycle, bicycle, and parts manufacturing	2,790	4.41	694,705	0.98
193	Construction machinery manufacturing	15,310	4.41	1,910,810	1.14
268	Motor home manufacturing	4,181	4.39	601,221	0.72
257	Storage battery manufacturing	2,823	4.07	1,959,971	1.25

Non-metro Midwest “shadow” economic base?

NIIO	NIIO Label	Core		Linked	
		Jobs	LQ	Jobs	LQ
4	Fruit and tree nut farming	5,995	0.69	995,459	2.60
170	Custom roll forming	162	0.54	297,357	2.07
67	Tobacco product manufacturing	78	0.08	199,389	2.04
74	Fabric coating mills	230	0.56	229,763	1.82
68	Fiber, yarn, and thread mills	117	0.06	980,742	1.72
23	Gold, silver, and other metal ore mining	168	0.21	523,763	1.65
280	Military armored vehicle, tank, and tank component manufacturing	7	0.03	808,084	1.54
6	Tobacco farming	229	0.17	1,102,829	1.53
155	Ground or treated mineral and earth manufacturing	179	0.74	337,924	1.50
276	Railroad rolling stock manufacturing	735	0.72	251,601	1.46
125	Paint and coating manufacturing	1,510	0.79	212,357	1.38
94	Pulp mills	179	0.65	762,970	1.36
289	Mattress manufacturing	598	0.46	281,792	1.35
194	Mining and oil and gas field machinery manufacturing	1,373	0.44	309,602	1.31
7	Cotton farming	915	0.44	870,631	1.29
57	Tortilla manufacturing	504	0.64	1,632,349	1.21
73	Textile and fabric finishing mills	496	0.26	676,584	1.21
69	Broadwoven fabric mills	365	0.20	715,025	1.20
146	Other pressed and blown glass and glassware manufacturing	600	0.61	540,575	1.19
294	Ophthalmic goods manufacturing	762	0.50	1,427,185	1.18
66	Distilleries	22	0.07	1,941,663	1.17
31	Natural gas distribution	3,944	0.81	340,345	1.16

Non-metro Midwest clusters?

NIIO Label	Core		Linked	
	Jobs	LQ	Jobs	LQ
Grain farming	251,212	8.43	1,067,106	1.54
Animal production, except cattle and poultry and eggs	119,722	6.42	988,742	2.49
Motor vehicle parts manufacturing	96,313	3.44	801,515	1.69
Oilseed farming	91,793	10.37	1,163,207	1.55
Automotive repair and maintenance, except car washes	90,391	1.46	2,072,130	1.11
Cattle ranching and farming	81,211	4.64	1,514,798	1.59
Animal (except poultry) slaughtering, rendering, and processing	73,002	6.05	2,104,921	1.14
Support activities for agriculture and forestry	56,450	1.82	903,083	2.07
Dairy cattle and milk production	48,779	3.91	1,163,972	1.99
Other plastics product manufacturing	40,380	2.70	199,924	1.94
Farm machinery and equipment manufacturing	20,015	7.70	882,935	3.14
Poultry processing	20,014	1.84	2,115,424	1.11
Death care services	19,802	1.96	598,292	1.10
Ferrous metal foundries	18,654	4.75	255,626	1.84
Ornamental and architectural metal products manufacturing	18,529	1.81	702,111	1.10
Construction machinery manufacturing	15,310	4.41	1,910,810	1.14
All other crop farming	14,409	2.07	1,008,807	1.50
Logging	14,372	2.26	1,062,730	1.28

Relative & absolute
size combined, both
core and linked
industries

Education-intensity continued...

US highly education-intensive industries concentrated in the non-metro Midwest, 2008

NIIO	NIIO Label	Jobs	Location Quotients	
			Jobs	VA
237	Automatic environmental control manufacturing	4,312	4.59	4.57
222	Computer storage device manufacturing	2,073	1.96	1.53
374	Community food, housing, and other relief services, including rehabilitation services	62,311	1.96	1.84
15	Forest nurseries, forest products, and timber tracts	1,137	1.74	1.59
397	Religious organizations	25,212	1.31	1.11
239	Totalizing fluid meters and counting devices manufacturing	657	1.23	1.48
398	Grantmaking, giving, and social advocacy organizations	36,236	1.15	0.98
354	Veterinary services	20,090	1.12	1.32

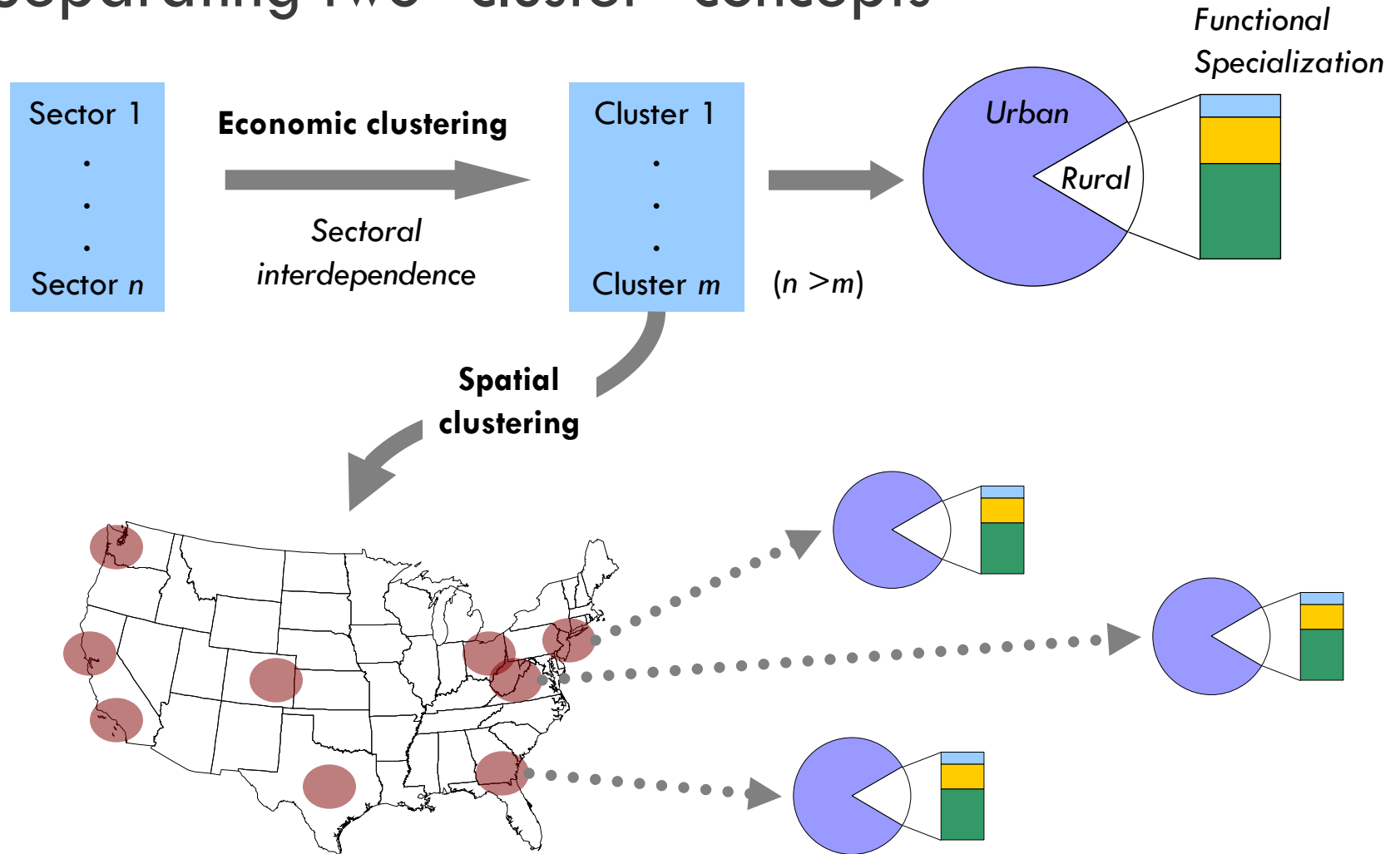
US highly education-intensive industries with linked industries concentrated in the non-metro Midwest, 2008

NIIO	NIIO Label	Core		Linked	
		Jobs	LQ	Jobs	LQ
15	Forest nurseries, forest products, and timber tracts	1,137	1.74	841,234	2.65
366	Junior colleges, colleges, universities, and professional schools	51,655	0.74	2,278,943	1.14
239	Totalizing fluid meters and counting devices manufacturing	657	1.23	2,344,239	1.07
374	Community food, housing, and other relief services, including rehabilitation services	62,311	1.96	2,118,230	1.04
235	Electromedical and electrotherapeutic apparatus manufacturing	935	0.36	1,166,698	1.02
354	Veterinary services	20,090	1.12	1,619,100	1.02
124	Biological product (except diagnostic) manufacturing	1,068	0.97	2,776,562	1.02
121	Medicinal and botanical manufacturing	1,025	0.96	1,623,634	1.00
122	Pharmaceutical preparation manufacturing	4,562	0.45	2,509,178	1.00

Three messages

- The increasingly neglected appreciation of industries
- The importance of a flexible understanding of geography and of interfirm linkages over space
- The value of understanding the rural “shadow” economic base

Separating two “cluster” concepts



Clusters and sectors in strategy

Guides:

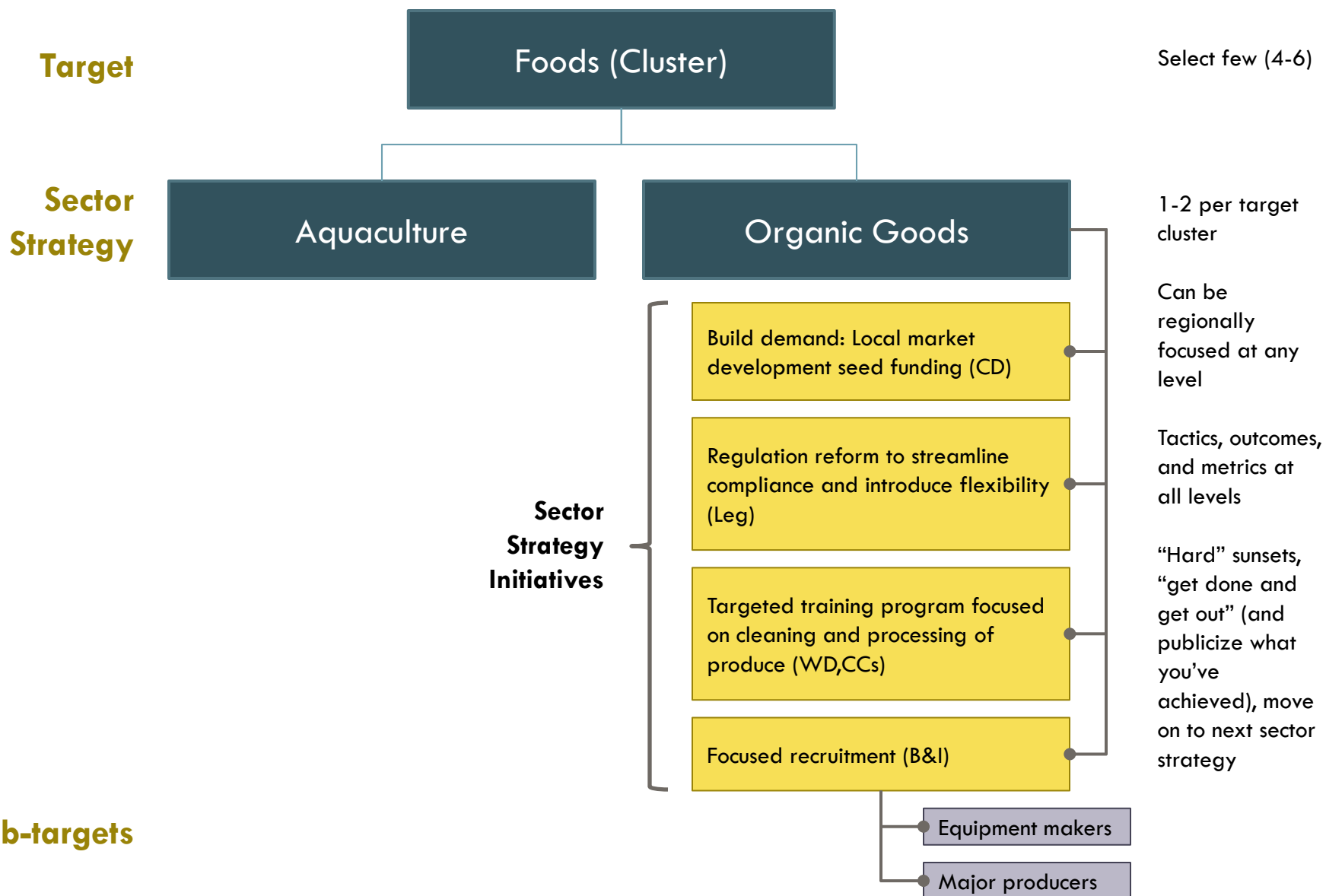
Select few (4-6)

1-2 per target cluster

Can be regionally focused at any level

Tactics, outcomes, and metrics at all levels

“Hard” sunsets, “get done and get out” (and publicize what you’ve achieved), move on to next sector strategy



Questions or comments?

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