



Cluster, Import Substitution and Industry Targeting for Local Communities: An Application using IMPLAN

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Background for Wisconsin

Wisconsin went through a prolonged growth period from the mid to late 1980s through the 1990s.

The most recent recession was particularly harsh on Wisconsin. Strong growth in manufacturing through the 1990s set the stage for a significant downturn.

As a result of the strong downturn in manufacturing, Wisconsin communities are looking for alternative approaches for economic growth and development.



Background for Wisconsin

In 2001 the Fox Valley Chamber of Commerce (Appleton, Neehan, Meesasha, etc. just south of Green Bay) was looking to renew its recruitment advertising campaign.

In looking to renew its industry targeting study the consultant was going to charge \$50,000....a sum far beyond their budget.

They turned to UW-Extension for help. While we (UWEX) did not have an industry targeting tool ala Goode-Hastings-Leatherman we offered an alternative approach.

The effort was more “educational” in its focus rather than “consultant” but was considered a resounding success.



Background for Wisconsin

We labeled the analysis “gaps and disconnects.”

Gaps are defined as commodities that are imported into the region because they are not available locally.

Disconnects are defined as commodities that are available from local firms, but firms are electing to import the item rather than purchase from local vendors.

Most “gaps” could be easily explained and discarded. A range of “disconnects” was identified of particular interest to the workgroup.



Background for Wisconsin

Some of the “disconnects” that the group elected to focus on included what could be called business services:

- engineering and architectural services
- advertising services
- business consulting services.

Approaching Forward Wisconsin, the industrial recruitment arm of Wisconsin proved to be less than satisfactory.

Developed a more structured approach to their business visitation programs and business surveying.

Local Technical Schools very interested in findings as is UW-Oshkosh.



Background for Wisconsin

The success of the Fox Cities Chamber effort resulted in a multi-county effort undertaken by the Fox Valley Workforce Development Board.

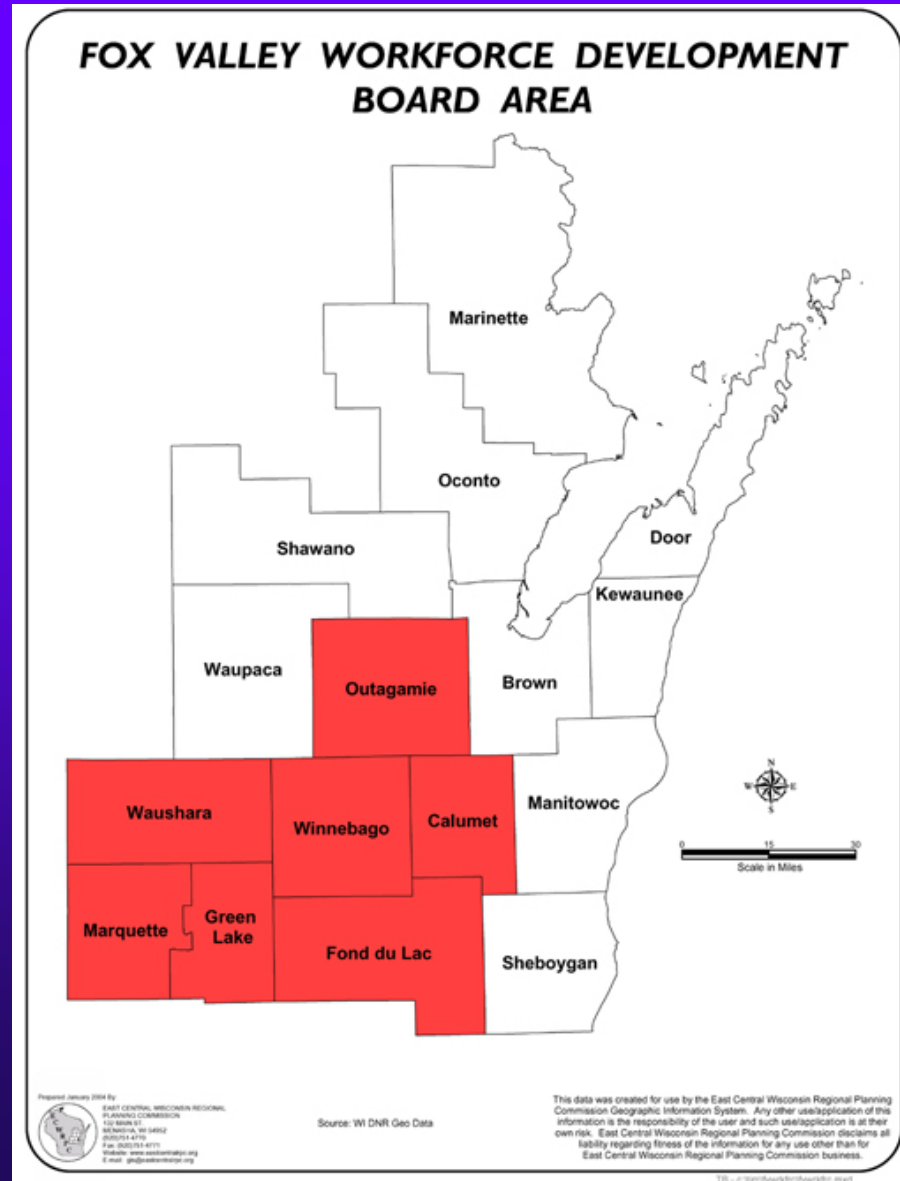
The objectives of this undertaking included:

- identify industries to focus development efforts on (aka targeting)
- build a case for thinking regionally in economic development efforts
- build a network for regional collaboration.

Lesson learned.....region is too big....too many “chefs in the kitchen”.....moved from an educational program to a series of consultant reports.



Background for Wisconsin



Background for Wisconsin

Two parallel efforts were also taking place:

1. At the 2nd UW Economic Summit the Governor's unrolled their vision for economic development that centered on the notion of clusters.

2. Rep Dave Obey's office secured a \$150,000 grant called the "Northern Edge Project" that focused attention on the economic performance of northern Wisconsin. The Center for Community Economic Development administered that grant and significant interest in developing alternative notion of clusters arose.

Background for Wisconsin

The effort I am sharing today is reflective of an effort undertaken in St. Croix County, WI.

In 1996 we undertook a study of the economic structure of the County's economy where we first introduced the notion of "gaps and disconnects." Out of this effort the plastics industry was identified for further analysis and focus.

Through a series of business visitation programs targeting the plastics industry a county-wide "Plastics Council" was formed that allowed plastics manufacturing firms were able to network. This effort is now spreading state-wide.

During the recent recession, unemployment spiked to over nine percent and caught the county off-guard. The idea of revisiting the 1996 study effort was advanced.



Outline of a Wisconsin Study

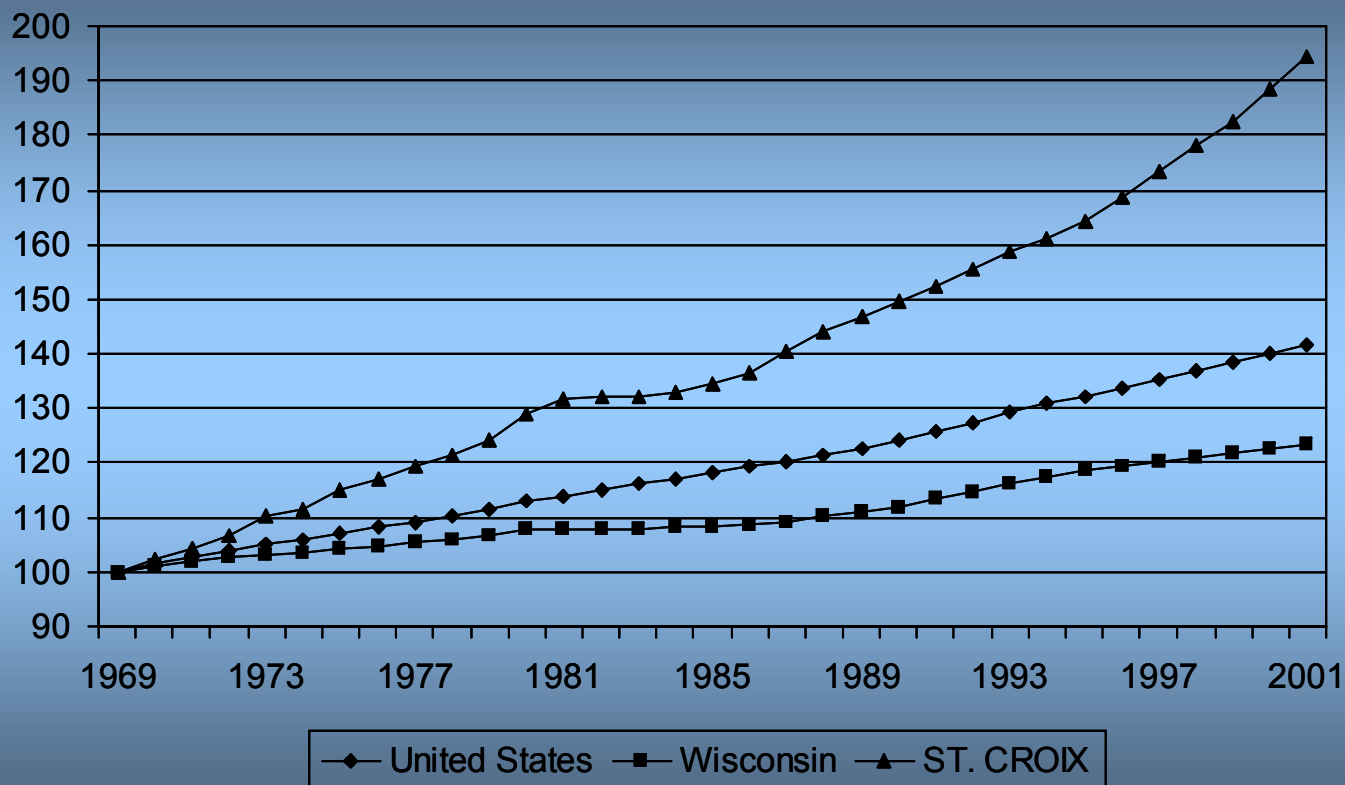
The intent of the study is to serve as a mechanism to have in-depth discussions about the local economy and involves three elements:

1. Detailed historical analysis of REIS data.
(Woods and Poole, Inc)
2. Detailed descriptive analysis of IMPLAN data
(Base year report)
3. Detailed descriptive analysis of imports, exports and inter-industry linkages.



Outline of a Wisconsin Study

Figure 2. Population Growth Index (1969=100)

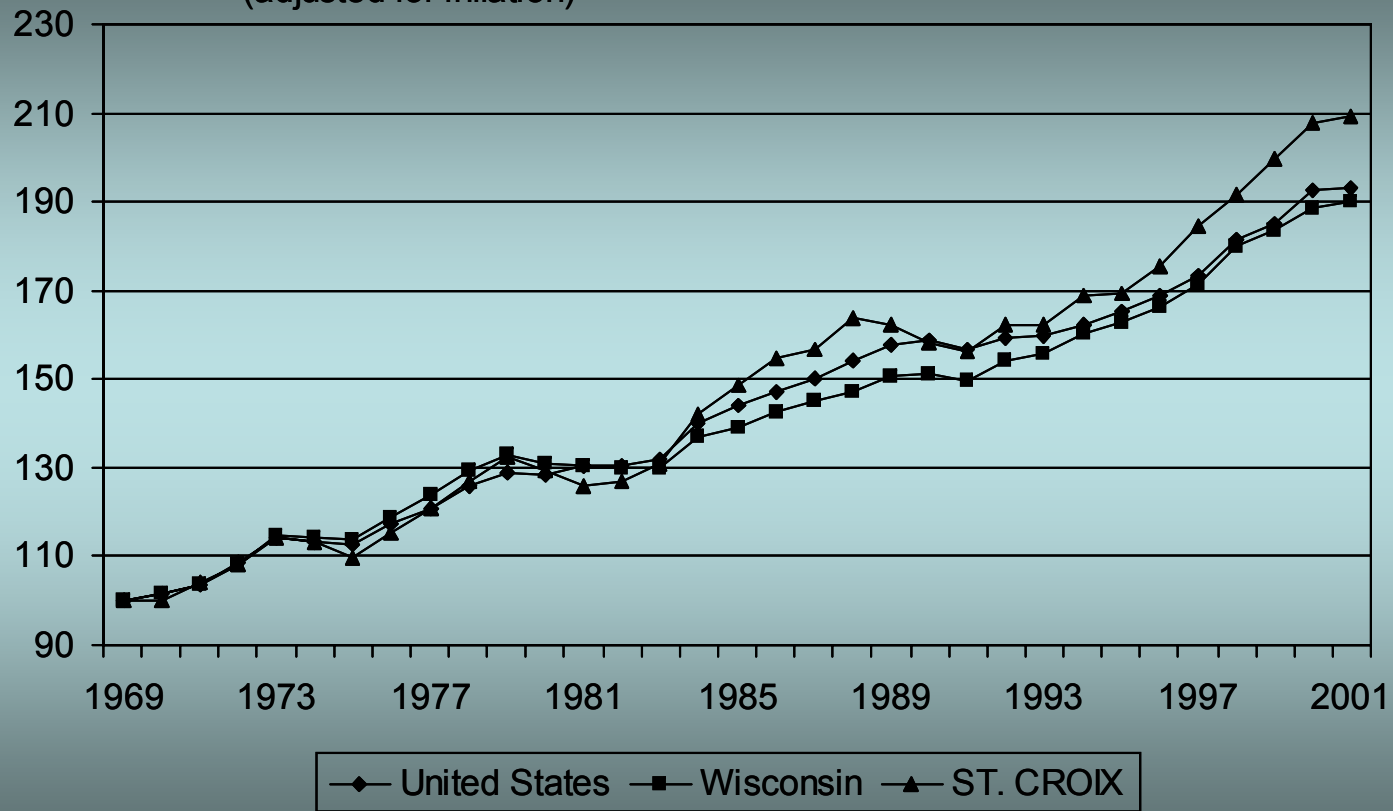


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Figure 4. Per Capita Income Growth Index (1969=100)
(adjusted for inflation)

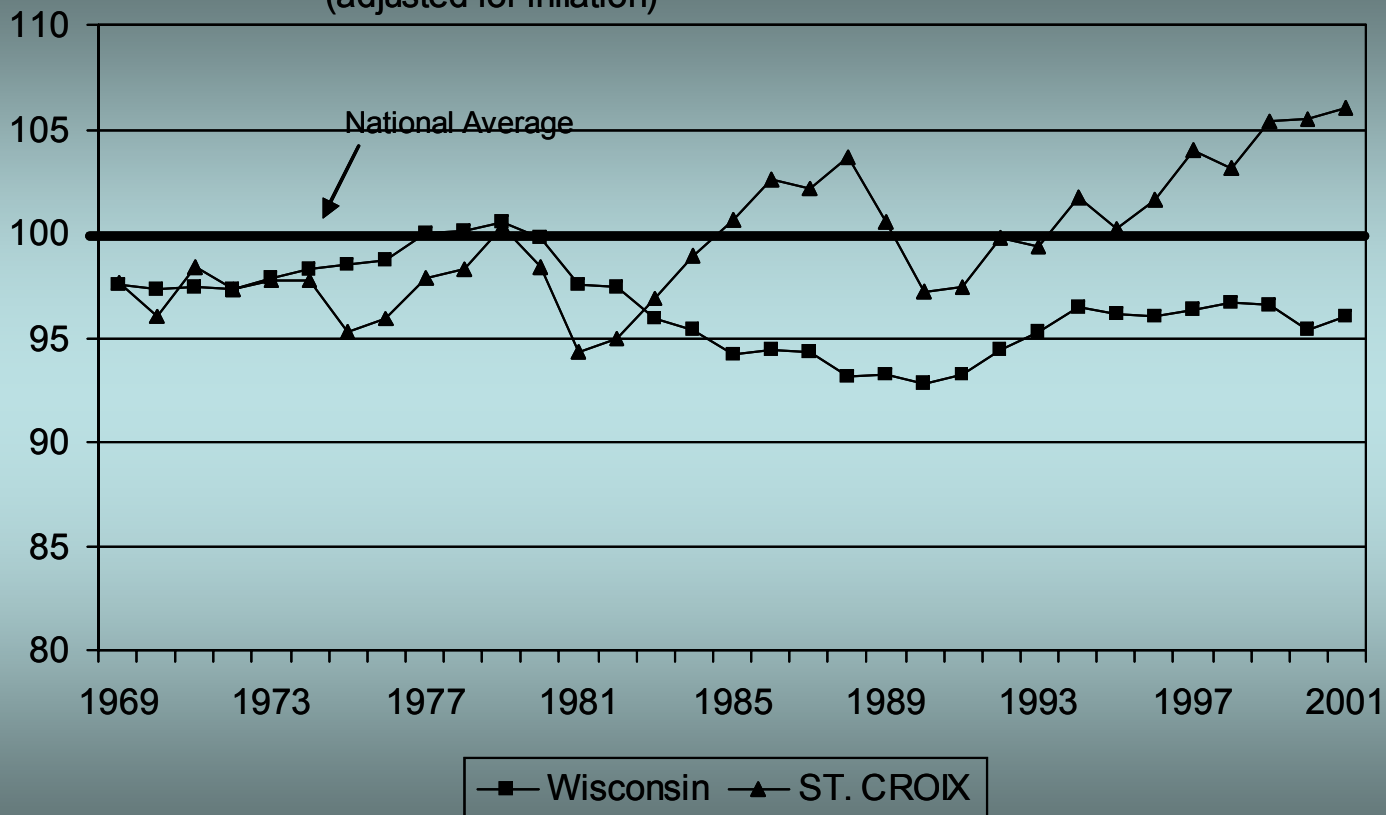


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Figure 5. Per Capita Income as a Percent of the National Average (adjusted for inflation)

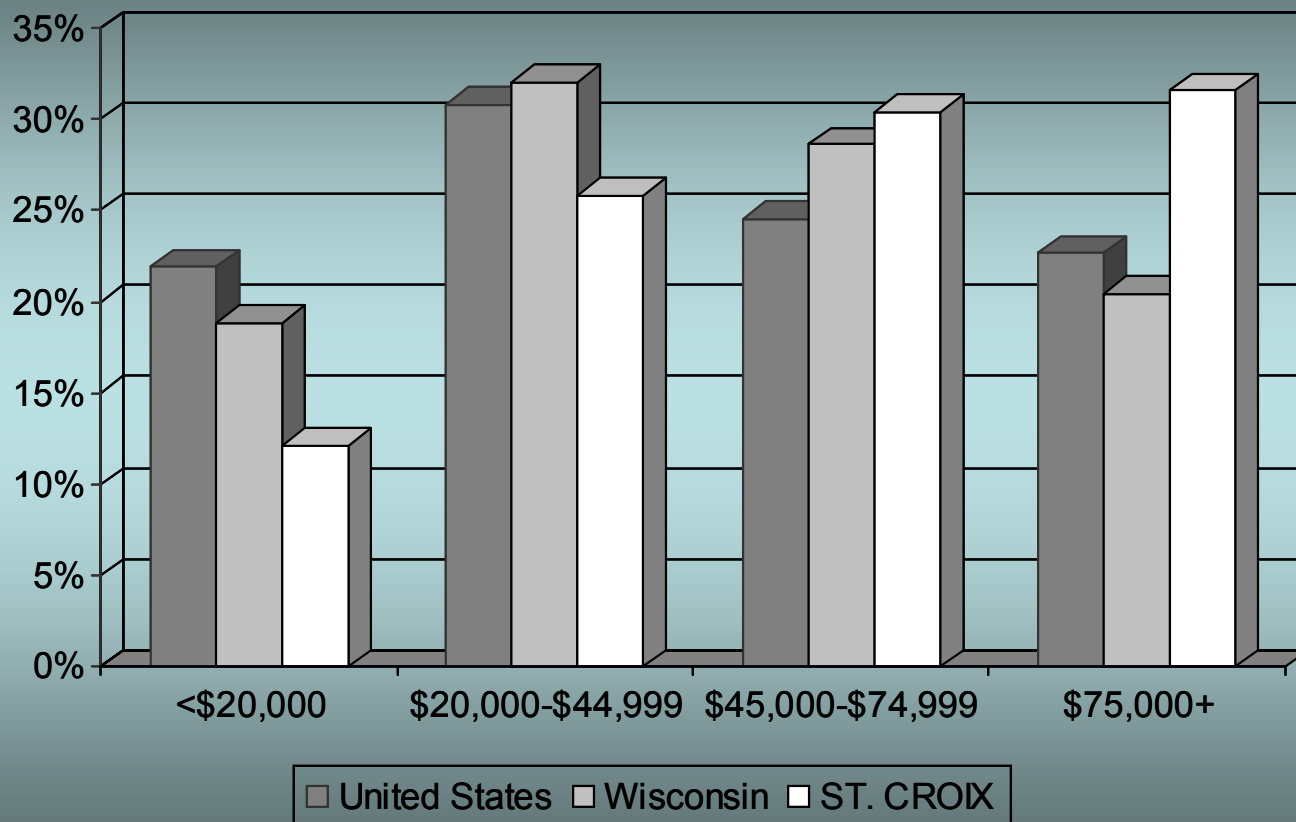


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Figure 6. Income Distribution (Number of Households) 2001

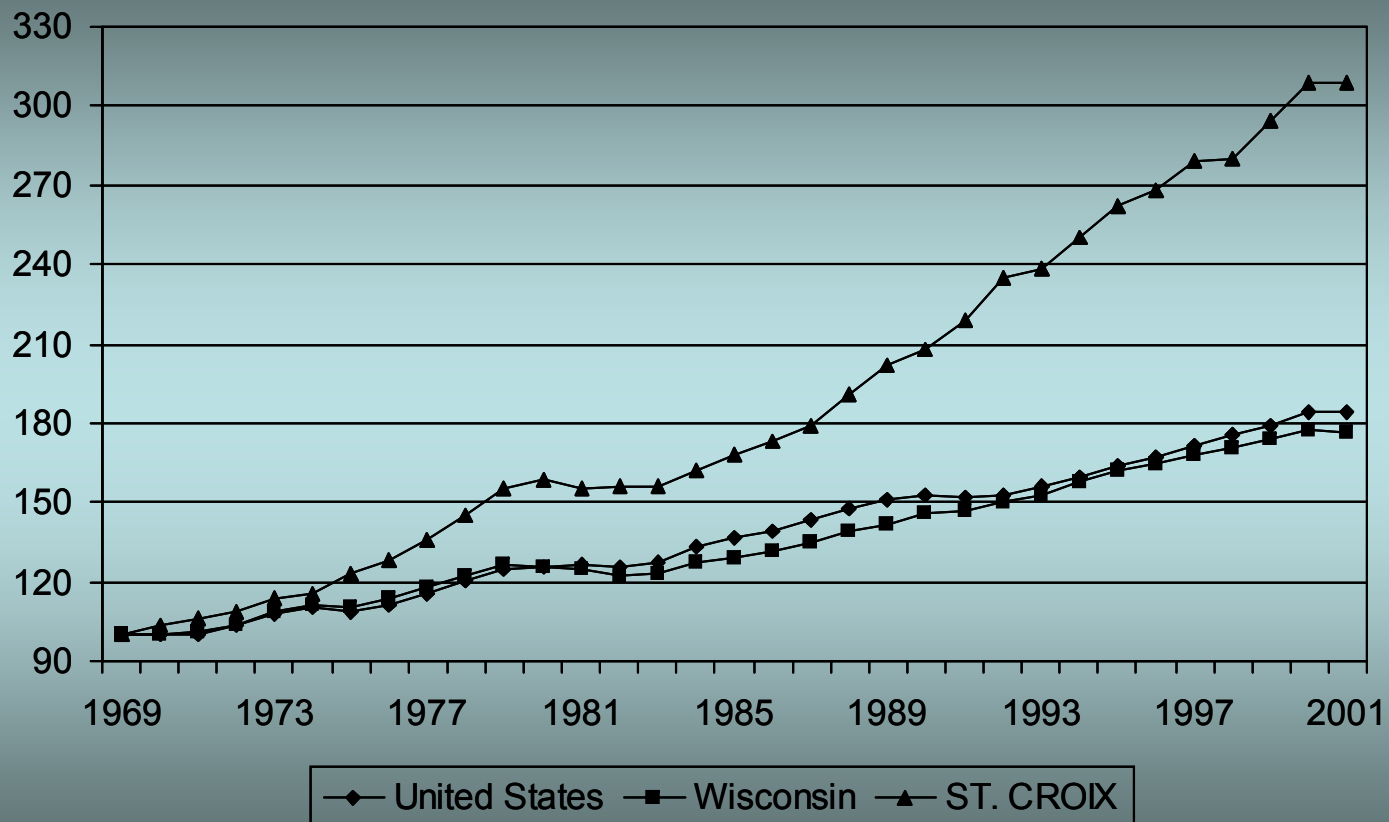


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Figure 7. Total Employment Growth Index (1969=100)

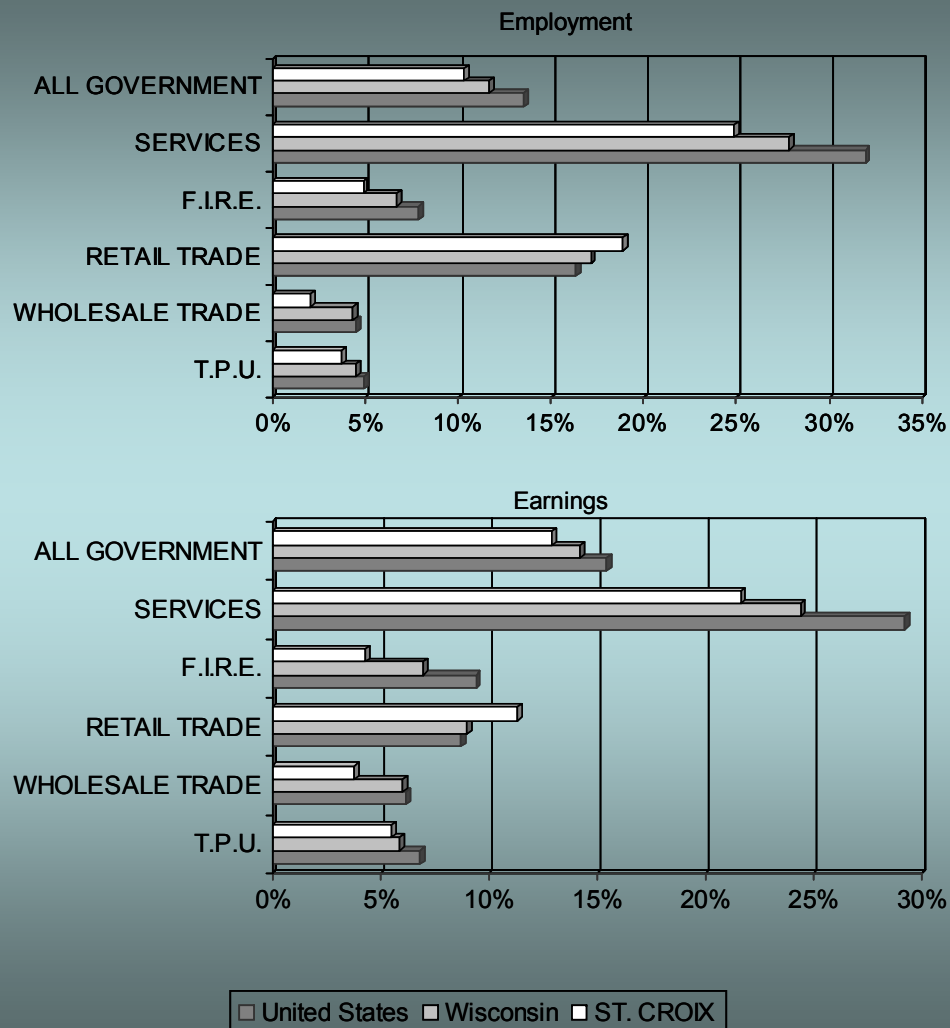


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Figure 8. Sources of Earnings & Employment--Service Producing 2001

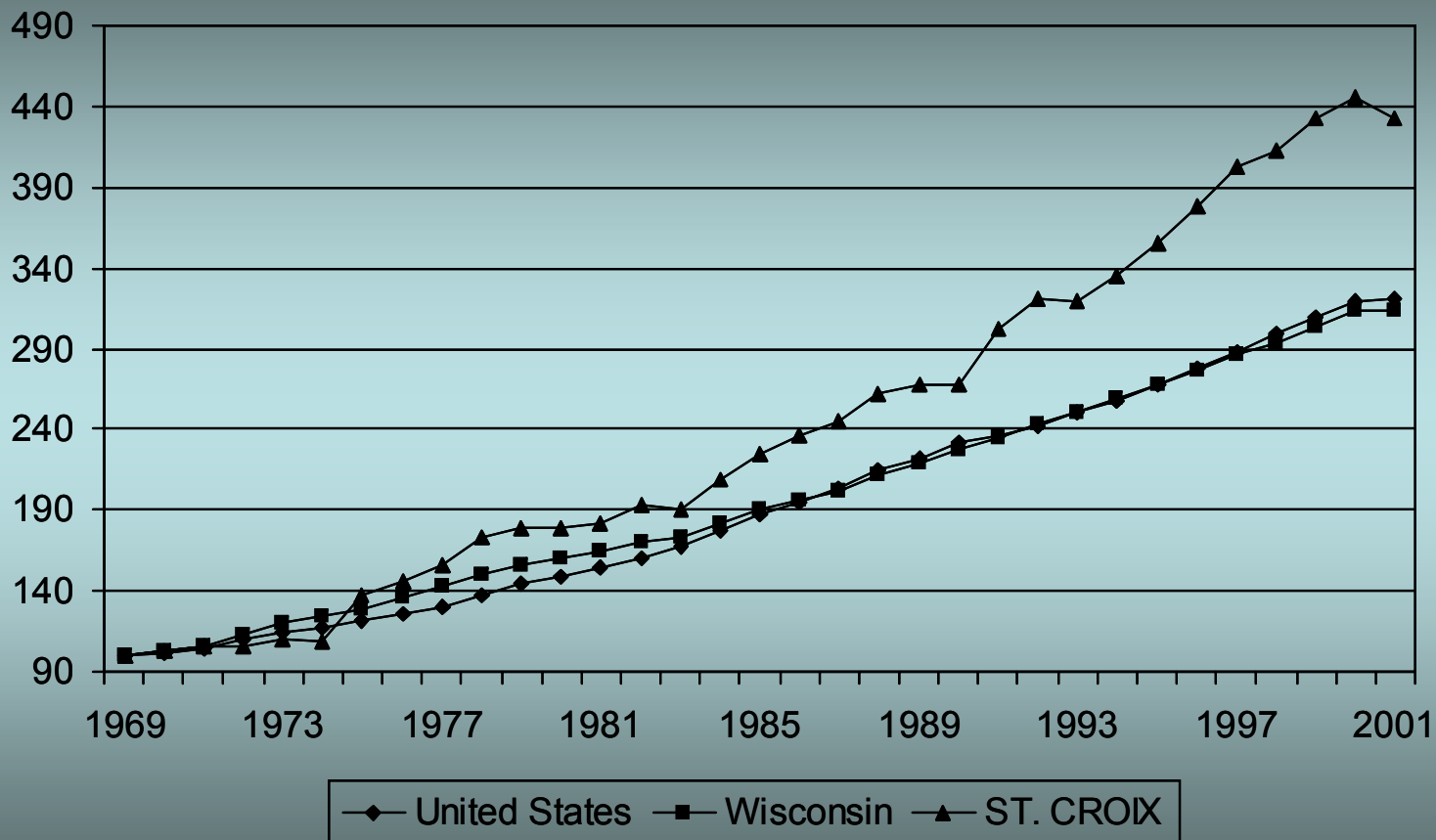


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Figure 10. Service Employment Growth Index (1969=100)

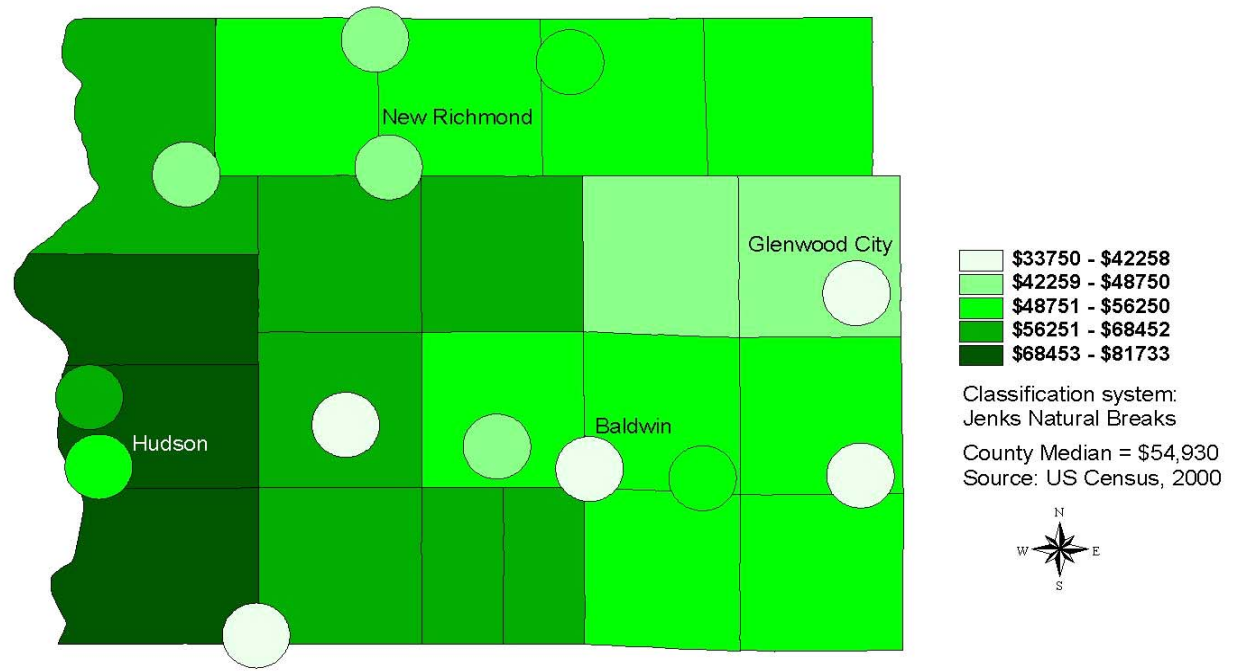


Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

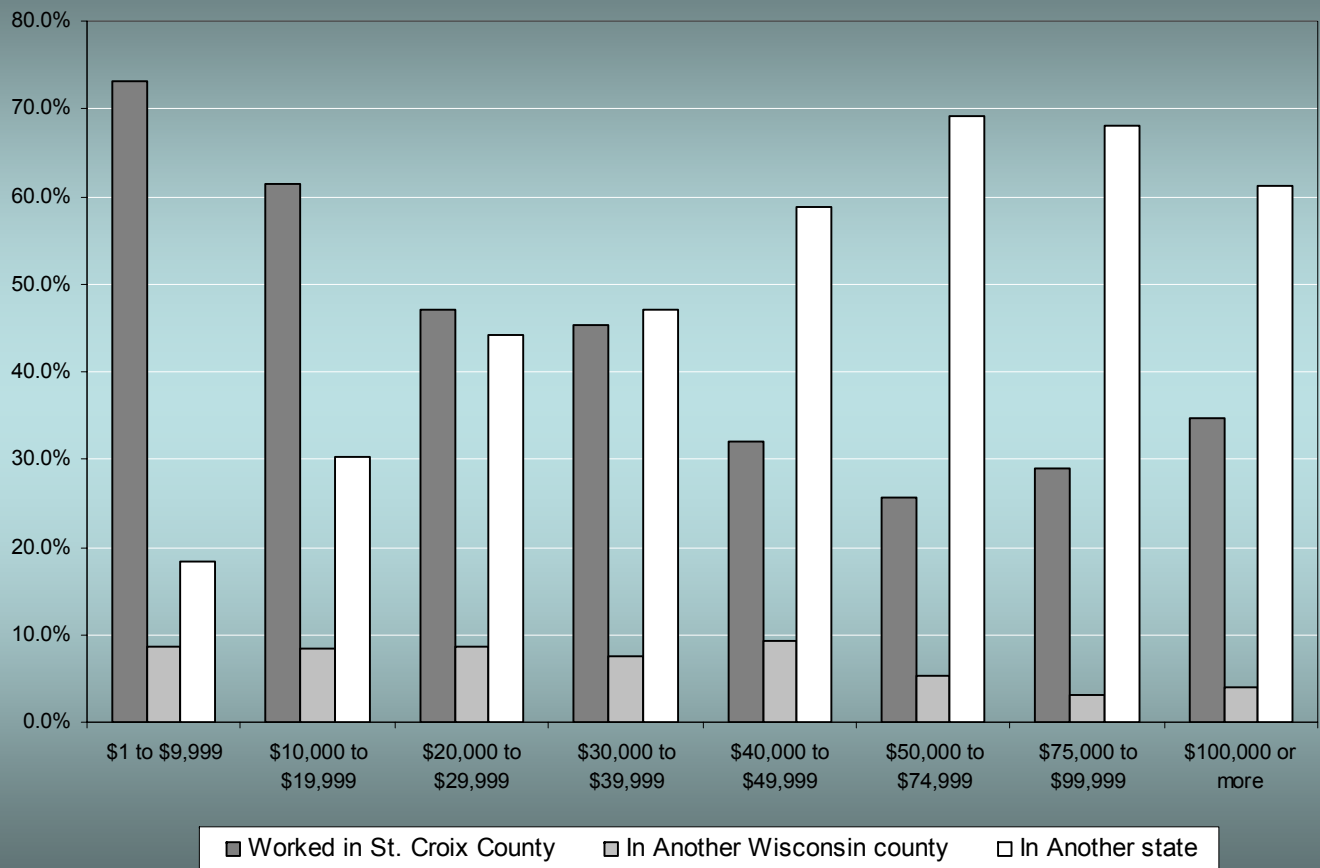
Figure 14. Median Household Income
St. Croix County





Outline of a Wisconsin Study

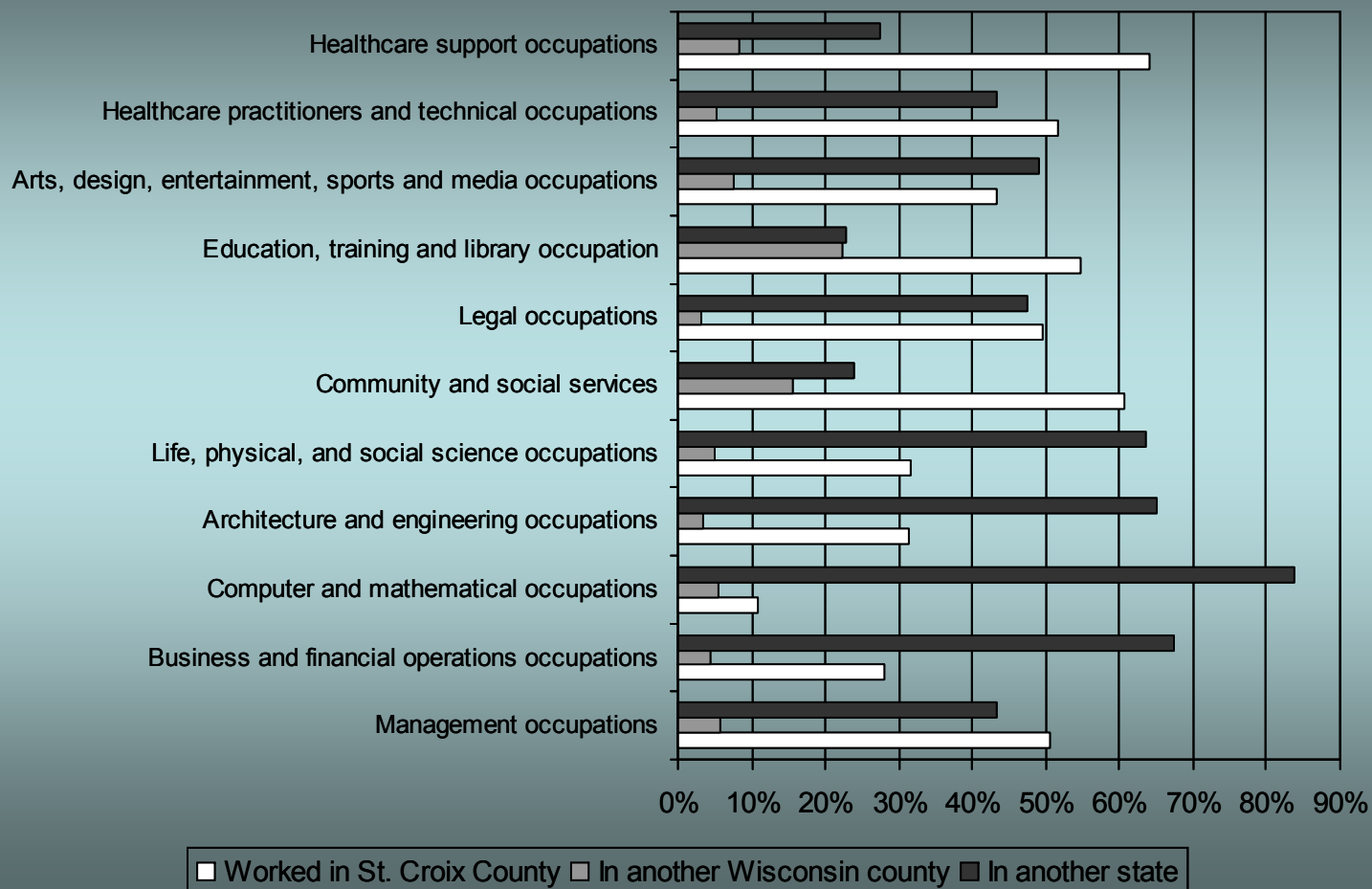
Figure 19. Commuting Status by Wage/Salary Income, Census 2000
Employed Persons 16 Years and over living in St. Croix Croix Co





Outline of a Wisconsin Study

Figure 20. Commuting Status by Occupation Census 2000
 Employed Persons 16 Years and over living in St. Croix County





Outline of a Wisconsin Study

Table 1. Top Twenty-five Industries Based on Industry Sales

	Industry Sales	Jobs	Earnings per Jobs	Total Income per Jobs
Cheese manufacturing	\$ 257,516,510	455	\$ 36,116	\$ 52,774
Plastics plumbing fixtures and all other plastics	\$ 165,270,767	943	\$ 33,981	\$ 55,904
Food services and drinking places	\$ 97,700,378	2,761	\$ 9,773	\$ 15,959
Wholesale trade	\$ 90,306,152	701	\$ 46,619	\$ 86,196
Hospitals	\$ 88,336,678	953	\$ 27,257	\$ 27,940
Truck transportation	\$ 83,088,310	737	\$ 30,343	\$ 51,254
Automotive repair and maintenance, except car wash	\$ 81,227,661	693	\$ 16,503	\$ 51,448
Cattle ranching and farming	\$ 79,820,702	1,008	\$ 5,485	\$ 2,981
Packaging machinery manufacturing	\$ 74,094,887	392	\$ 50,334	\$ 77,505
Real estate	\$ 74,090,881	731	\$ 7,603	\$ 70,683
State & Local Education	\$ 67,223,709	1,637	\$ 35,863	\$ 41,064
Monetary authorities and depository credit interme	\$ 66,086,578	539	\$ 25,456	\$ 83,562
Motor and generator manufacturing	\$ 57,920,265	451	\$ 32,812	\$ 45,426
AC, refrigeration, and forced air heating	\$ 57,495,026	292	\$ 43,737	\$ 57,809
State & Local Non-Education	\$ 54,934,914	1,479	\$ 31,665	\$ 37,139
Other animal food manufacturing	\$ 53,518,379	108	\$ 41,963	\$ 61,298
Motor vehicle and parts dealers	\$ 53,231,392	780	\$ 30,677	\$ 41,311
Fruit and vegetable canning and drying	\$ 51,486,233	176	\$ 36,372	\$ 87,018
Offices of physicians, dentists, and other health	\$ 49,579,422	742	\$ 37,191	\$ 48,859
Metal window and door manufacturing	\$ 49,407,536	345	\$ 39,533	\$ 65,355
New residential 1-unit structures, nonfarm	\$ 48,778,427	402	\$ 30,331	\$ 40,880
Commercial and institutional buildings	\$ 47,436,165	596	\$ 30,152	\$ 32,854
All other food manufacturing	\$ 39,313,232	175	\$ 34,062	\$ 53,467
Food and beverage stores	\$ 39,038,361	967	\$ 14,647	\$ 21,216
Commercial printing	\$ 34,181,198	297	\$ 34,832	\$ 45,010
County-wide Average			\$ 24,664	\$ 42,076

Source: IMPLAN 2001 and the University of Wisconsin



Outline of a Wisconsin Study

Table 2. Top Twenty-five Industries by Employment

	Jobs	Earnings per Jobs	Total Income per Jobs
Food services and drinking places	2,761	\$ 9,773	\$ 15,959
State & Local Education	1,637	\$ 35,863	\$ 41,064
State & Local Non-Education	1,479	\$ 31,665	\$ 37,139
Nursing and residential care facilities	1,066	\$ 16,020	\$ 17,782
Cattle ranching and farming	1,008	\$ 5,485	\$ 2,981
Food and beverage stores	967	\$ 14,647	\$ 21,216
Hospitals	953	\$ 27,257	\$ 27,940
Plastics plumbing fixtures and all other plastics	943	\$ 33,981	\$ 55,904
Civic, social, professional and similar organizati	796	\$ 8,157	\$ 8,192
Motor vehicle and parts dealers	780	\$ 30,677	\$ 41,311
General merchandise stores	778	\$ 13,479	\$ 19,135
Employment services	764	\$ 14,564	\$ 19,337
Offices of physicians, dentists, and other health	742	\$ 37,191	\$ 48,859
Truck transportation	737	\$ 30,343	\$ 51,254
Real estate	731	\$ 7,603	\$ 70,683
Wholesale trade	701	\$ 46,619	\$ 86,196
Automotive repair and maintenance, except car wash	693	\$ 16,503	\$ 51,448
Gasoline stations	663	\$ 14,161	\$ 22,800
Commercial and institutional buildings	596	\$ 30,152	\$ 32,854
Monetary authorities and depository credit interme	539	\$ 25,456	\$ 83,562
Grain farming	462	\$ 3,046	\$ 14,105
Cheese manufacturing	455	\$ 36,116	\$ 52,774
Motor and generator manufacturing	451	\$ 32,812	\$ 45,426
All other crop farming	404	\$ 4,508	\$ 20,126
New residential 1-unit structures, nonfarm	402	\$ 30,331	\$ 40,880
County-wide Average		\$ 24,664	\$ 42,076

Source: IMPLAN 2001 and the University of Wisconsin



Outline of a Wisconsin Study

Table 4. Top Twenty-five Industries by Total Income

	Total Income	Jobs	Earnings per Jobs	Total Income per Jobs
State & Local Education	\$ 67,223,710	1,637	\$ 35,863	\$ 41,064
Wholesale trade	\$ 60,393,058	701	\$ 46,619	\$ 86,196
State & Local Non-Education	\$ 54,934,913	1,479	\$ 31,665	\$ 37,139
Plastics plumbing fixtures and all other plastics	\$ 52,701,405	943	\$ 33,981	\$ 55,904
Real estate	\$ 51,651,247	731	\$ 7,603	\$ 70,683
Monetary authorities and depository credit interme	\$ 45,056,257	539	\$ 25,456	\$ 83,562
Food services and drinking places	\$ 44,070,440	2,761	\$ 9,773	\$ 15,959
Truck transportation	\$ 37,793,394	737	\$ 30,343	\$ 51,254
Offices of physicians, dentists, and other health	\$ 36,233,174	742	\$ 37,191	\$ 48,859
Automotive repair and maintenance, except car wash	\$ 35,627,954	693	\$ 16,503	\$ 51,448
Motor vehicle and parts dealers	\$ 32,241,668	780	\$ 30,677	\$ 41,311
Packaging machinery manufacturing	\$ 30,353,747	392	\$ 50,334	\$ 77,505
Hospitals	\$ 26,623,518	953	\$ 27,257	\$ 27,940
Cheese manufacturing	\$ 24,034,681	455	\$ 36,116	\$ 52,774
Metal window and door manufacturing	\$ 22,534,129	345	\$ 39,533	\$ 65,355
Legal services	\$ 21,149,767	301	\$ 42,477	\$ 70,317
Food and beverage stores	\$ 20,518,236	967	\$ 14,647	\$ 21,216
Motor and generator manufacturing	\$ 20,486,823	451	\$ 32,812	\$ 45,426
Commercial and institutional buildings	\$ 19,594,156	596	\$ 30,152	\$ 32,854
Nursing and residential care facilities	\$ 18,952,677	1,066	\$ 16,020	\$ 17,782
AC, refrigeration, and forced air heating	\$ 16,893,416	292	\$ 43,737	\$ 57,809
New residential 1-unit structures, nonfarm	\$ 16,452,183	402	\$ 30,331	\$ 40,880
Air purification equipment manufacturing	\$ 16,214,206	290	\$ 39,308	\$ 55,967
Insurance agencies, brokerages, and related	\$ 16,061,892	304	\$ 28,098	\$ 52,853
Fruit and vegetable canning and drying	\$ 15,342,771	176	\$ 36,372	\$ 87,018
County-wide Average			\$ 24,664	\$ 42,076

Source: IMPLAN 2001 and the University of Wisconsin



Outline of a Wisconsin Study

Table 5. Location Quotient

	St. Croix	County Employment	Wisconsin
Packaging machinery manufacturing	105.452	392	5.330
Air purification equipment manufacturing	88.585	290	2.757
Cheese manufacturing	65.101	455	18.364
Industrial pattern manufacturing	56.647	77	7.918
Motor and generator manufacturing	35.102	451	4.127
Coated and uncoated paper bag manufacturing	30.615	114	1.145
Custom architectural woodwork and millwork	28.212	72	1.312
Metal window and door manufacturing	24.760	345	1.962
Die-cut paper office supplies manufacturing	20.987	51	0.893
All other food manufacturing	17.903	175	2.297
Other animal food manufacturing	16.300	108	2.043
Rolling mill and other metalworking machinery	15.569	51	0.655
AC, refrigeration, and forced air heating	13.745	292	2.195
Plastics plumbing fixtures and all other plastics	12.811	943	2.994
Miscellaneous electrical equipment manufacturing	11.443	59	1.308
All other forging and stamping	11.342	166	3.670
Other rubber product manufacturing	10.866	216	1.407
Lighting fixture manufacturing	9.933	74	1.239
Fruit and vegetable canning and drying	9.913	176	3.063
Construction machinery manufacturing	9.557	118	2.800
Miscellaneous fabricated metal product manufacturi	7.876	102	4.398
All other crop farming	7.667	404	3.636
Showcases, partitions, shelving, and lockers	6.860	99	1.649
Metal cutting machine tool manufacturing	6.716	41	2.838
Cement manufacturing	6.666	18	0.096

Source: IMPLAN 2001 and the University of Wisconsin



Outline of a Wisconsin Study

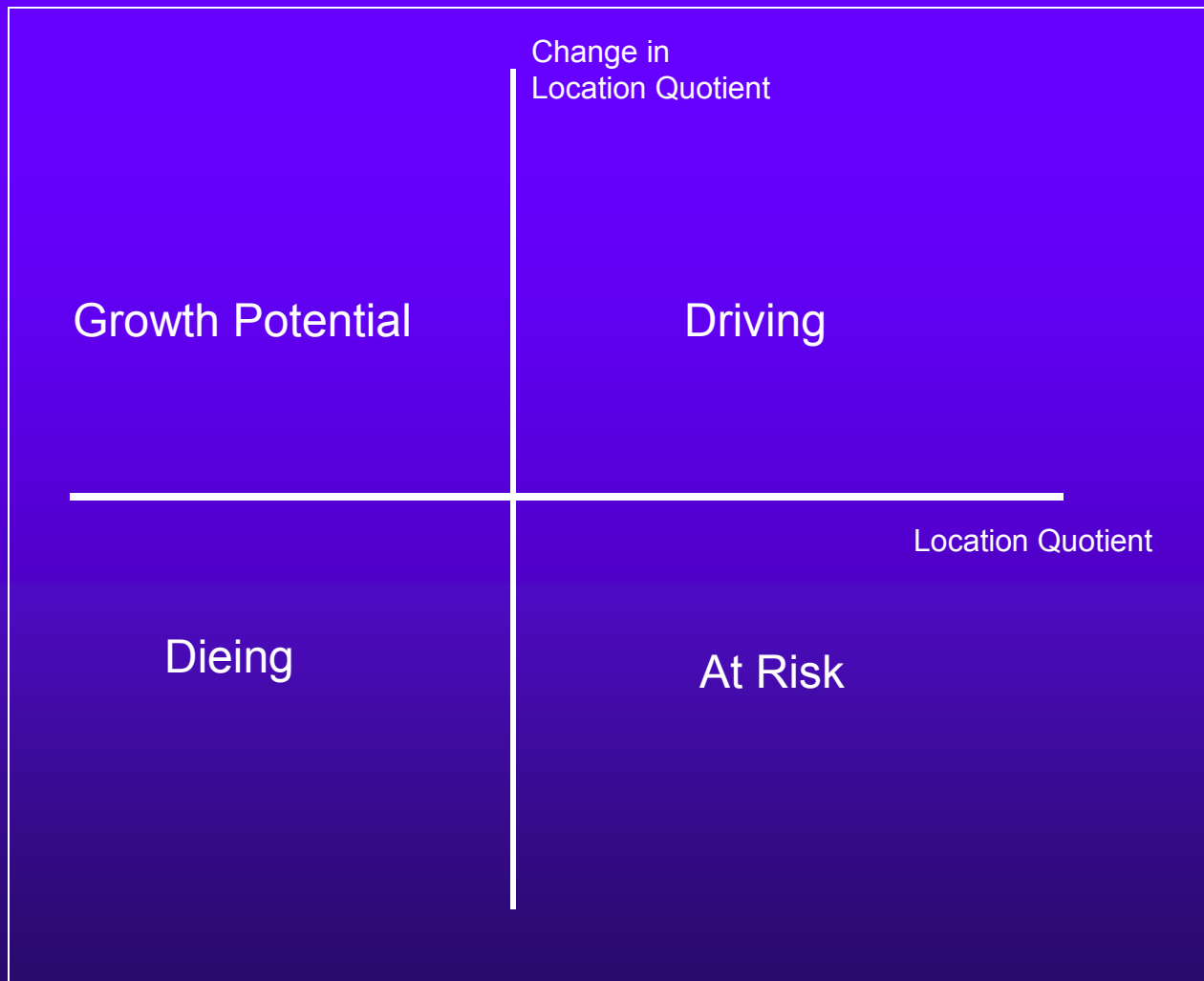


Figure X: Porter Style Approach to Industry Targeting



Outline of a Wisconsin Study

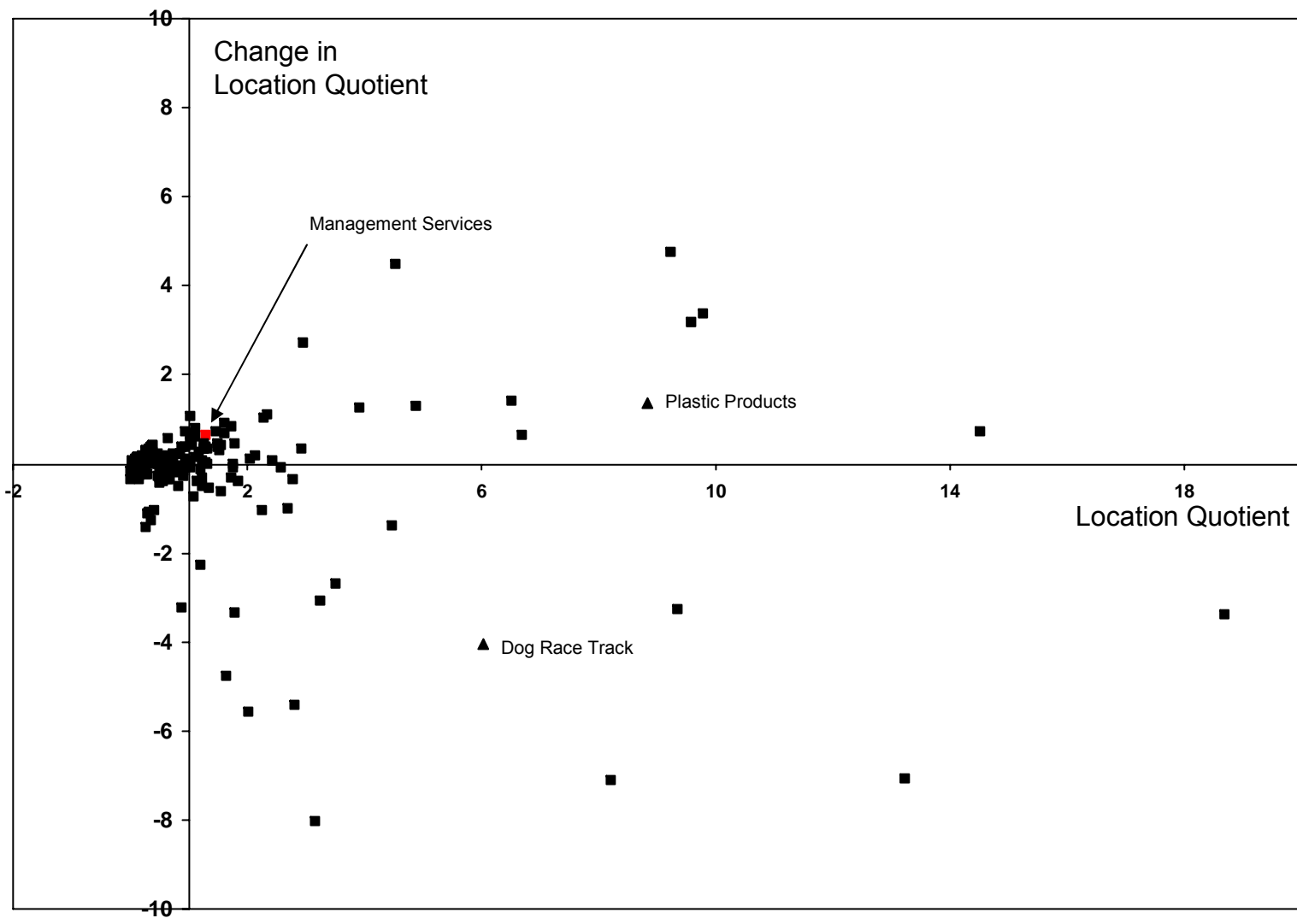


Figure X: Application of Porter Style Approach to Industry Targeting to St. Croix County, WI



Outline of a Wisconsin Study

Table 6. Top Twenty-five Industries by Total Exports

	Total Exports	Jobs	Earnings per Jobs	Total Income per Jobs
Cheese manufacturing	\$ 187,270,285	455	\$ 36,116	\$ 52,774
Plastics plumbing fixtures and all other plastics	\$ 143,269,547	943	\$ 33,981	\$ 55,904
AC, refrigeration, and forced air heating	\$ 58,147,272	292	\$ 43,737	\$ 57,809
Other animal food manufacturing	\$ 53,162,136	108	\$ 41,963	\$ 61,298
Fruit and vegetable canning and drying	\$ 48,261,638	176	\$ 36,372	\$ 87,018
Metal window and door manufacturing	\$ 45,110,993	345	\$ 39,533	\$ 65,355
Motor and generator manufacturing	\$ 41,200,903	451	\$ 32,812	\$ 45,426
All other food manufacturing	\$ 38,707,829	175	\$ 34,062	\$ 53,467
Other rubber product manufacturing	\$ 29,309,202	216	\$ 24,413	\$ 36,476
Air purification equipment manufacturing	\$ 27,245,957	290	\$ 39,308	\$ 55,967
All other forging and stamping	\$ 25,828,548	166	\$ 38,570	\$ 57,775
Truck transportation	\$ 24,585,031	737	\$ 30,343	\$ 51,254
Packaging machinery manufacturing	\$ 23,892,128	392	\$ 50,334	\$ 77,505
Automotive repair and maintenance, except car wash	\$ 23,202,287	693	\$ 16,503	\$ 51,448
Grain farming	\$ 22,481,216	462	\$ 3,046	\$ 14,105
Construction machinery manufacturing	\$ 21,804,848	118	\$ 51,614	\$ 76,811
Machine shops	\$ 20,621,731	274	\$ 40,927	\$ 48,845
Gasoline stations	\$ 18,612,667	663	\$ 14,161	\$ 22,800
Commercial printing	\$ 17,478,014	297	\$ 34,832	\$ 45,010
Insurance agencies, brokerages, and related	\$ 17,084,177	304	\$ 28,098	\$ 52,853
Monetary authorities and depository credit interme	\$ 16,992,485	539	\$ 25,456	\$ 83,562
Motor vehicle and parts dealers	\$ 15,559,138	780	\$ 30,677	\$ 41,311
Lighting fixture manufacturing	\$ 14,938,985	74	\$ 61,037	\$ 90,554
Miscellaneous fabricated metal product manufacturi	\$ 14,533,221	102	\$ 36,885	\$ 56,911
Coated and uncoated paper bag manufacturing	\$ 14,392,483	114	\$ 49,535	\$ 58,824
County-wide Average			\$ 24,664	\$ 42,076

Source: IMPLAN 2001 and the University of Wisconsin



Outline of a Wisconsin Study

Table 7. Top Twenty-five Industries by Intermediate Imports

	Intermediate Imports	Jobs	Earnings per Jobs	Total Income per Jobs
Wholesale trade	\$ 91,284,676	701	\$ 46,619	\$ 86,196
Cattle ranching and farming	\$ 40,321,011	1,008	\$ 5,485	\$ 2,981
Real estate	\$ 35,463,745	731	\$ 7,603	\$ 70,683
Plastics material and resin manufacturing	\$ 34,282,185	2	\$ 25,890	\$ 54,810
Management of companies and enterprises	\$ 32,991,432	153	\$ 58,555	\$ 67,395
Lessors of nonfinancial intangible assets	\$ 26,088,793	1	\$ 36,542	\$ 2,735,489
Iron and steel mills	\$ 25,985,779	0	-0-	-0-
Petroleum refineries	\$ 21,891,262	0	-0-	-0-
Insurance carriers	\$ 21,433,310	25	\$ 27,875	\$ 36,154
Grain farming	\$ 18,237,268	462	\$ 3,046	\$ 14,105
Paperboard container manufacturing	\$ 17,042,101	0	-0-	-0-
Paper and paperboard mills	\$ 17,029,882	0	-0-	-0-
Telecommunications	\$ 16,238,346	118	\$ 30,981	\$ 77,114
Architectural and engineering services	\$ 15,649,824	147	\$ 33,797	\$ 52,203
Securities, commodity contracts, investments	\$ 14,581,543	63	\$ 16,927	\$ 20,006
Other animal food manufacturing	\$ 13,448,013	108	\$ 41,963	\$ 61,298
All other electronic component manufacturing	\$ 12,415,666	50	\$ 29,786	\$ 36,516
Nondepository credit intermediation and related a	\$ 12,100,590	69	\$ 40,990	\$ 79,872
Advertising and related services	\$ 11,452,237	175	\$ 18,087	\$ 30,222
Power generation and supply	\$ 10,582,869	25	\$ 189,371	\$ 536,308
Other basic organic chemical manufacturing	\$ 9,576,180	0	-0-	-0-
All other miscellaneous professional and technical	\$ 9,396,149	4	\$ 25,048	\$ 108,006
Management consulting services	\$ 9,224,545	76	\$ 32,050	\$ 51,762
Monetary authorities and depository credit interme	\$ 9,033,617	539	\$ 25,456	\$ 83,562
Aluminum sheet, plate, and foil manufacturing	\$ 8,904,678	0	-0-	-0-
County-wide Average			\$ 24,664	\$ 42,076

Source: IMPLAN 2001 and the University of Wisconsin



Table 8. Import Substitution Candidates

Good or Service Imported	Industry Importing	Level of Import
Agriculture and forestry support activities		
	Cattle ranching and farming	\$ 2,780,228
	All other crop farming	\$ 2,610,620
	Grain farming	\$ 2,183,558
	Vegetable and melon farming	\$ 370,304
	Oilseed farming	\$ 210,220
	Greenhouse and nursery production	\$ 123,472
Securities, commodity contracts, investments		
	Monetary authorities and depository credit interme	\$ 3,534,917
	Hospitals	\$ 2,990,156
	Securities, commodity contracts, investments	\$ 739,545
	Cheese manufacturing	\$ 693,354
	Funds, trusts, and other financial vehicles	\$ 368,397
	Packaging machinery manufacturing	\$ 287,036
Architectural and engineering services		
	Commercial and institutional buildings	\$ 3,044,234
	Other new construction	\$ 1,311,871
	New residential 1-unit structures, nonfarm	\$ 1,135,829
	Other State and local government enterprises	\$ 1,005,209
	Real estate	\$ 601,491
	Plastics plumbing fixtures and all other plastics	\$ 587,487
Management consulting services		
	Hospitals	\$ 1,310,889
	Wholesale trade	\$ 760,819
	Truck transportation	\$ 381,994
	Monetary authorities and depository credit interme	\$ 373,321
	Cheese manufacturing	\$ 342,567
	Motor vehicle and parts dealers	\$ 336,171
Advertising and related services		
	Motor vehicle and parts dealers	\$ 946,524
	Food and beverage stores	\$ 835,159
	Food services and drinking places	\$ 793,097
	Wholesale trade	\$ 754,965
	Gasoline stations	\$ 691,272
	Management of companies and enterprises	\$ 454,041
Management of companies and enterprises		
	Cheese manufacturing	\$ 2,448,249
	Plastics plumbing fixtures and all other plastics	\$ 2,220,129
	Motor vehicle and parts dealers	\$ 1,764,213
	Food and beverage stores	\$ 1,556,640
	Packaging machinery manufacturing	\$ 1,414,357
	Gasoline stations	\$ 1,288,451

Source: IMPLAN 2001 and the University of Wisconsin



Sellers to Management Services

Sales: \$895,000
Advertising Services

Sales: \$294,000
Real Estate

Sales: \$228,000
Legal Services

Sales: \$180,000
Auto Repair/Maintenance

Management Services
Sales: \$15,039,000
Jobs: 153
Income: \$10,345,000

Buyers of Management Services

LP: \$988,000
Cheese Production
Import: \$2,448,000

LP: \$896,000
Foam Product Mfg
Import: \$0

LP: \$712,000
Motor Vech. & Parts Dealers
Import: \$1,764,000

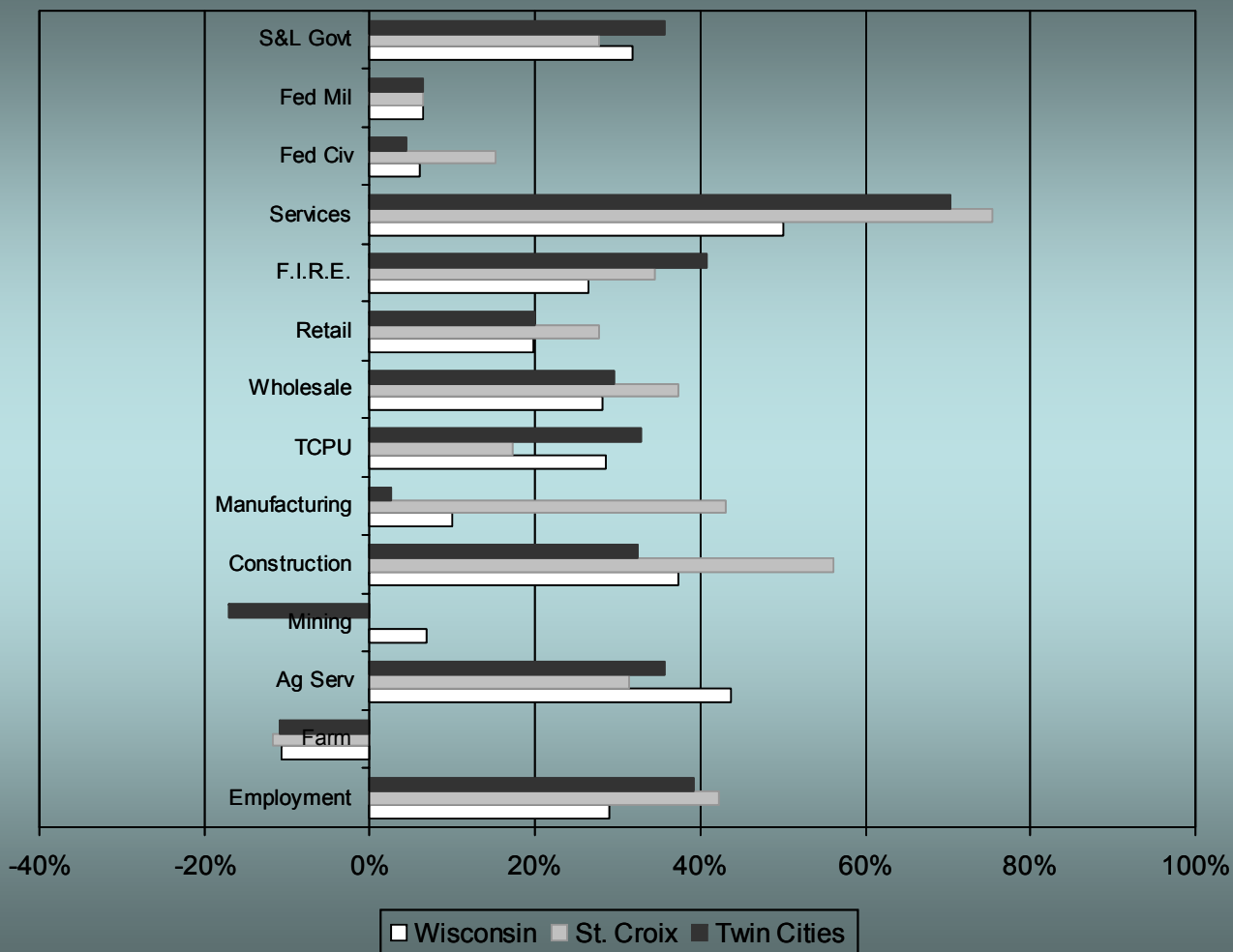
LP: \$628,000
Food & Bev. Stores
Import: \$1,556,000

Figure X: Porter Style Approach to Industry Clustering Applied to St. Croix County, WI



Outline of a Wisconsin Study

Figure 22. Employment Growth Rates: 2001-2025



Source: Woods and Poole, Inc and the Department of Agricultural and Applied Economics, UW-Madison/Extension



Outline of a Wisconsin Study

Goal 1: Increase coordination of economic development programs St. Croix County.

Action Plan 1: Initially seek to increase joint marketing among existing business through the development of a quarterly magazine to promote St. Croix County for businesses that have average wages more than \$35,000 per year and that have a fringe benefit package. Expand coordination efforts to include areas not within business parks. Seek to coordinate promotional efforts with emerging 10-County economic development marketing group. Establish a networking forum for the coordinators of the industrial and business parks within the County. Leadership: Bill Rubin, Jerry Brown

Goal 2: Foster "home grown" businesses in the business services and high tech sectors.

Action Plan 2: Encourage and motivate entrepreneurship through the publication of success stories in local newspapers. Develop initial agreement from newspaper editors and identify a list of potential entrepreneurs to interview. Publicize entrepreneurial assistance programs. Better market the business opportunities within the County. Leadership: Buck Malick and Jim Janke

Goal 3: Identify opportunities for business services sector development with existing businesses

Action Plan 3: Develop a survey of current businesses to identify current suppliers of business services and assess potential interest in utilizing local suppliers. Seek assistance from the Economic Research Center at UW-River Falls for implementation. Identify potential opportunities for additional business networking. Leadership: Barbara Nemecek, Jack Breault, Sue Lohmeier.



Summary, Concerns, Issues

- Strong potential for “data overload”.
- Easy to “over task’ the work group.
- Having right players at the table vital.
- Must maintain educational role.
- Agent role is central.
- Powerful tool to think about structure of the local economy.
- Work group often “ends” with more questions than they came to the table with.
- Local knowledge plays a key role.