Community Economic Development

Data Analysis: Part II
Data Tools

A Sampling of Specific Tools

- Growth Indices
- Location Quotients
- Trade Area Analysis
- Spatial Analysis Tools

Community Economic Development: Data Analysis

Two characteristics of data analysis that we must keep in mind include:

- **Looking over time**
- **Comparison to others**

For example, if we are interest in how the local (county) economy is performing we need to look over time and benchmark or compare to other places. A simple Growth Index allows us to address this basic question.

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$$\text{Growth Index}_{t+1,i} = \left[\frac{\text{Measure}_{t+1,i}}{\text{Measure}_{t=0,i}} \right] * 100$$

Measure_i = Population, Employment, Income or Other Variable

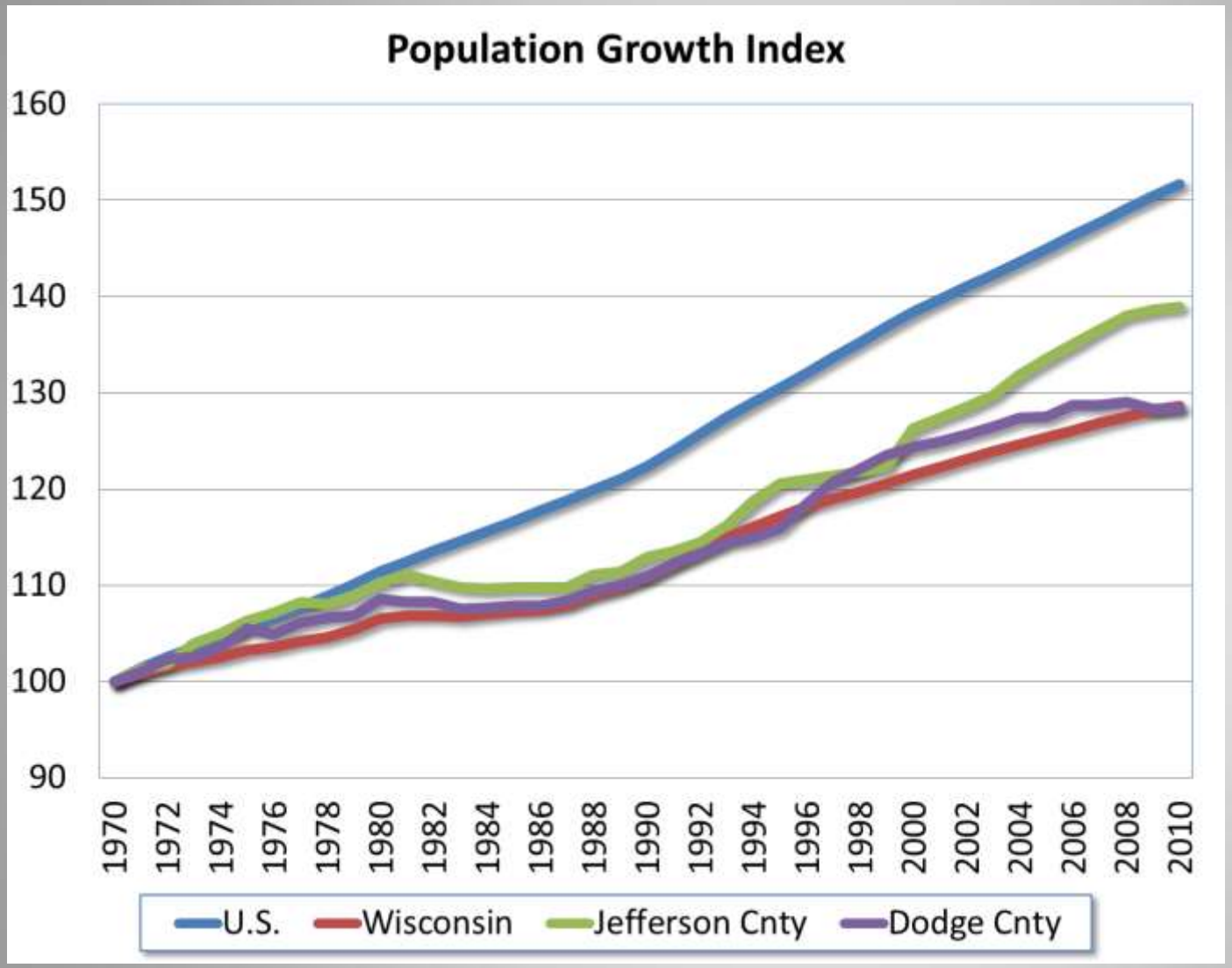
t refers to the year

i refers to the variable of interest

The numerical change in the index from one year to the next is the *growth rate*

Changes over time indicate general growth patterns and levels of stability

Community Economic Development: Data Analysis



Here we can see that Wisconsin's population growth is slower than the U.S., but Jefferson Cnty experienced significant population loss between 1980 and 1987, but "strong" growth from about 2000 till the Great Recession.

Why the difference between the two time periods?

Without comparisons, it would be difficult to "tell the story" of population growth in Jefferson County

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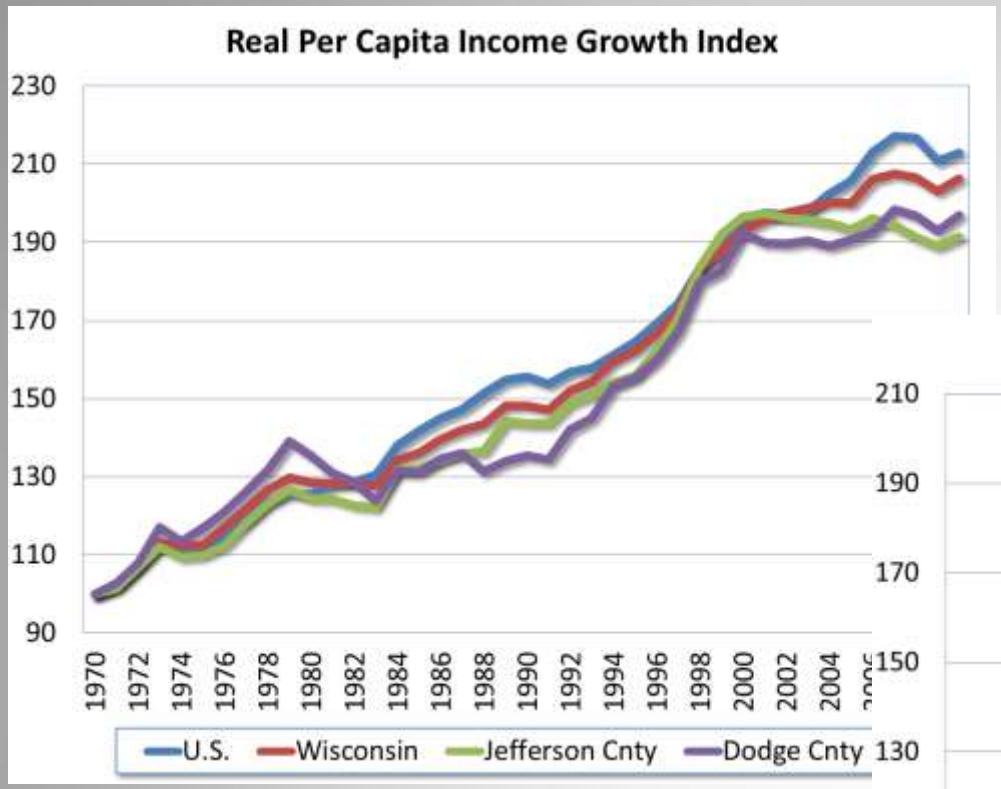

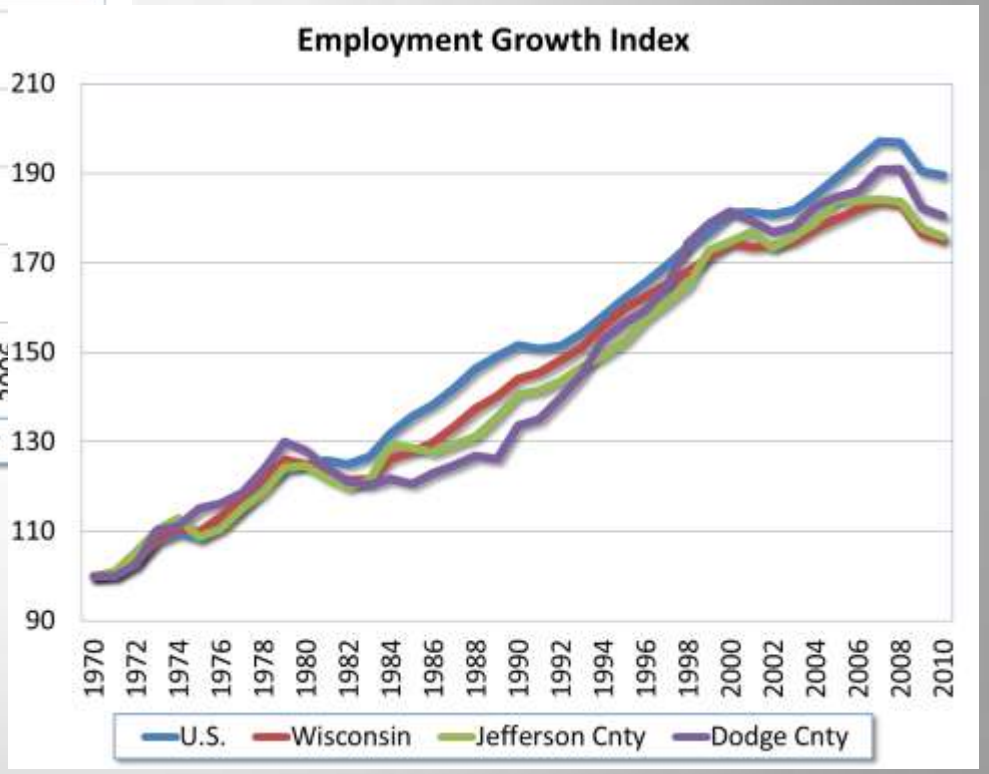

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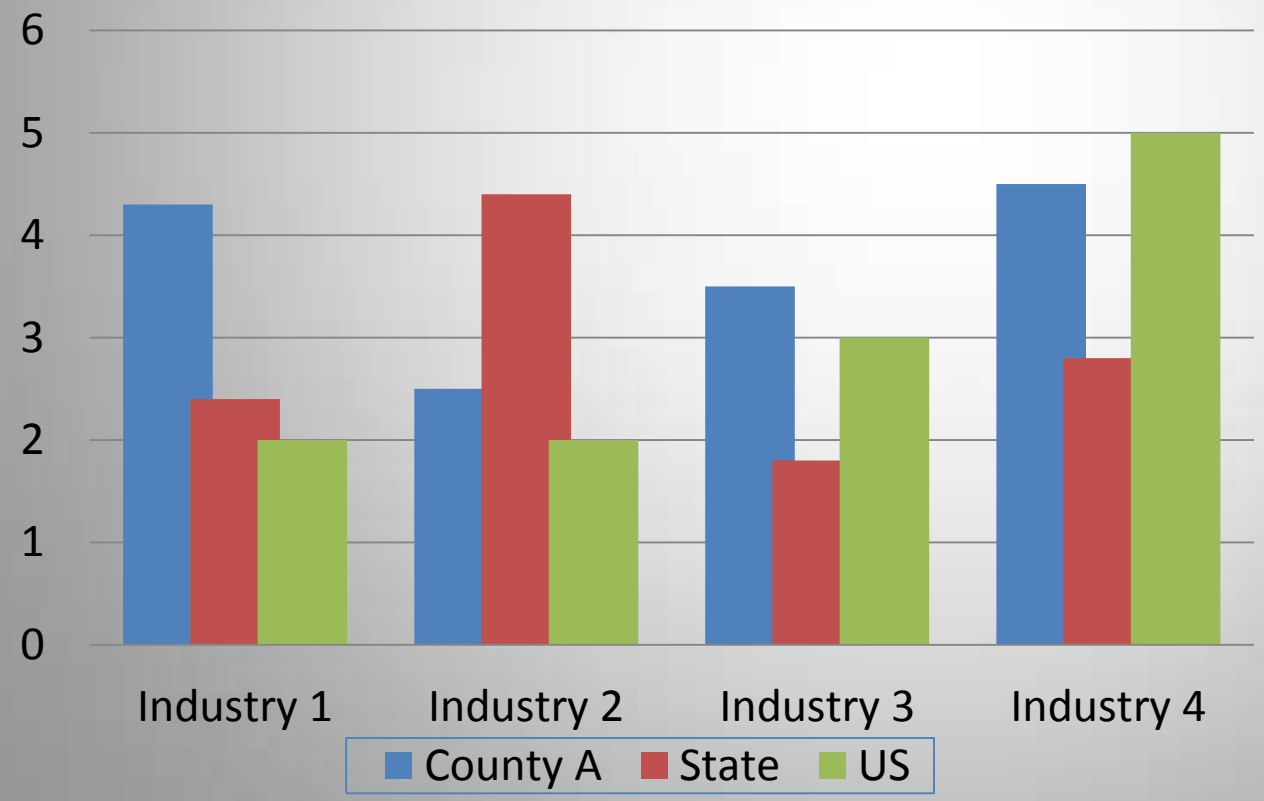
	Population							
Raw Data	1970	1971	1972	1973	1974	1975	1976	1977
U.S.	203982.313	206860.314	209283.987	211357.665	213341.613	215465.21	217562.808	219760.03
Wisc	4425.979	4460.449	4498.124	4518.09	4537.649	4568.846	4583.753	4611.974
Jefferson	60.242	61.016	61.297	62.606	63.234	63.988	64.524	65.166
Dodge	69.165	69.919	70.777	70.975	71.669	73	72.541	73.38
Calculations								
U.S.	=(B4/$B4)*100	=(C4/$B4)*101	=(D4/$B4)*102	=(E4/$B4)*103	=(F4/$B4)*104	=(G4/$B4)*105	=(H4/$B4)*106	=(I4/$B4)*107
Wisc	=(B5/$B5)*100	=(C5/$B5)*101	=(D5/$B5)*102	=(E5/$B5)*103	=(F5/$B5)*104	=(G5/$B5)*105	=(H5/$B5)*106	=(I5/$B5)*107
Jefferson	=(B6/$B6)*100	=(C6/$B6)*101	=(D6/$B6)*102	=(E6/$B6)*103	=(F6/$B6)*104	=(G6/$B6)*105	=(H6/$B6)*106	=(I6/$B6)*107
Dodge	=(B7/$B7)*100	=(C7/$B7)*101	=(D7/$B7)*102	=(E7/$B7)*103	=(F7/$B7)*104	=(G7/$B7)*105	=(H7/$B7)*106	=(I7/$B7)*107
Index								
U.S.	100.0	101.4	102.6	103.6	104.6	105.6	106.7	107.7
Wisc	100.0	100.8	101.6	102.1	102.5	103.2	103.6	104.2
Jefferson	100.0	101.3	101.8	103.9	105.0	106.2	107.1	108.2
Dodge	100.0	101.1	102.3	102.6	103.6	105.5	104.9	106.1

Once the basic formulas are written, it is fairly easy to cut and paste the block of formulas for other variables, such as income and employment.

Community Economic Development: Data Analysis

In regional economics one of the "bread n' butter" tools for data analysis is the Location Quotient and has been in use for over 50 years.

The Location Quotient is a simple comparison between the share of economic activity (generally measured by employment) in some industry for the community (county) compared to the nation or the state.



In this simple bar chart of employment shares across industries, we want to compare the county to either the state or the nation.

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Community Economic Development: Data Analysis

$$LQ = \frac{\%\text{ of local employment in sector i}}{\%\text{ national employment in sector i}}$$

Critical Values

LQ < 1 Underspecialized, potential for expansion? **(Weakness?)**

LQ = 1 As expected

LQ > 1 Overspecialized, driver of local economy **(Strength?)**

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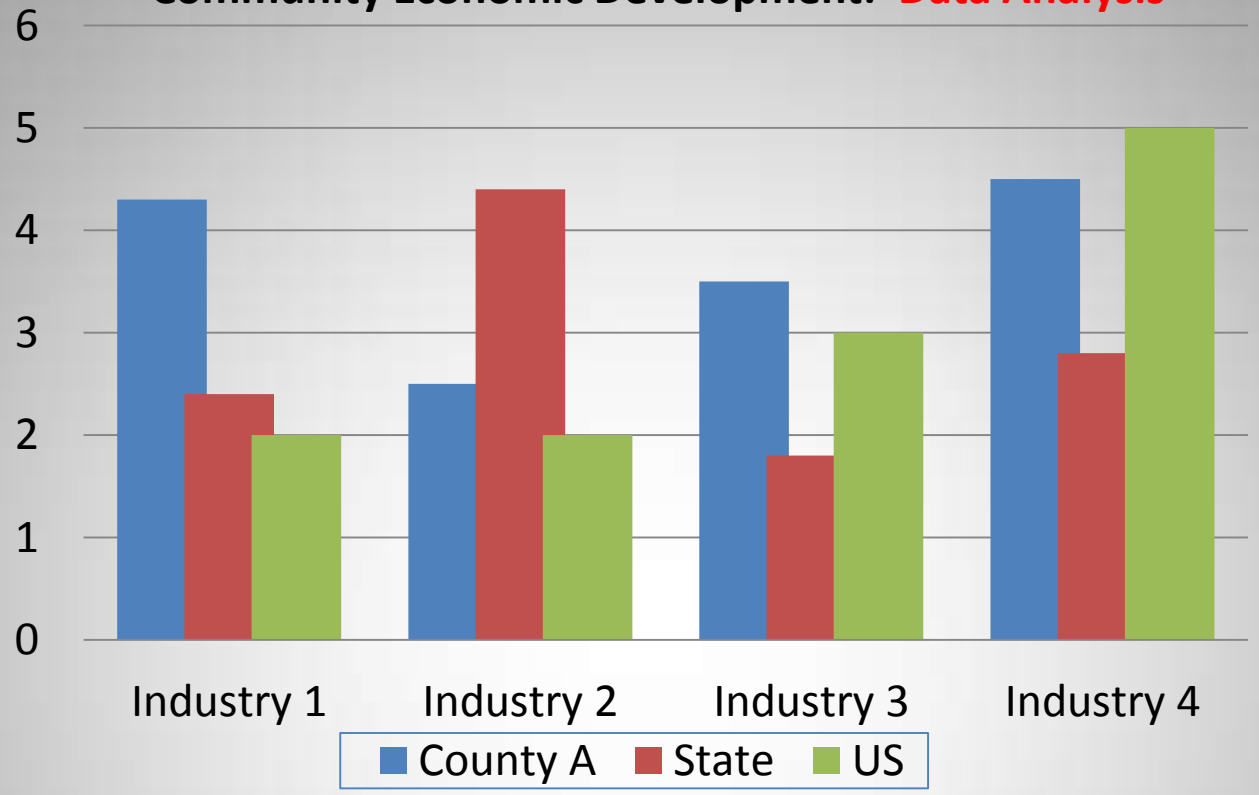
Community Economic Development: Data Analysis



Location Quotient

	State	US	
Industry 1	1.8	2.2	Strength
Industry 2	0.6	1.3	???
Industry 3	1.9	1.2	Strength
Industry 4	1.6	0.9	???

The "benchmark" or "reference" economy which to compare the community matters!

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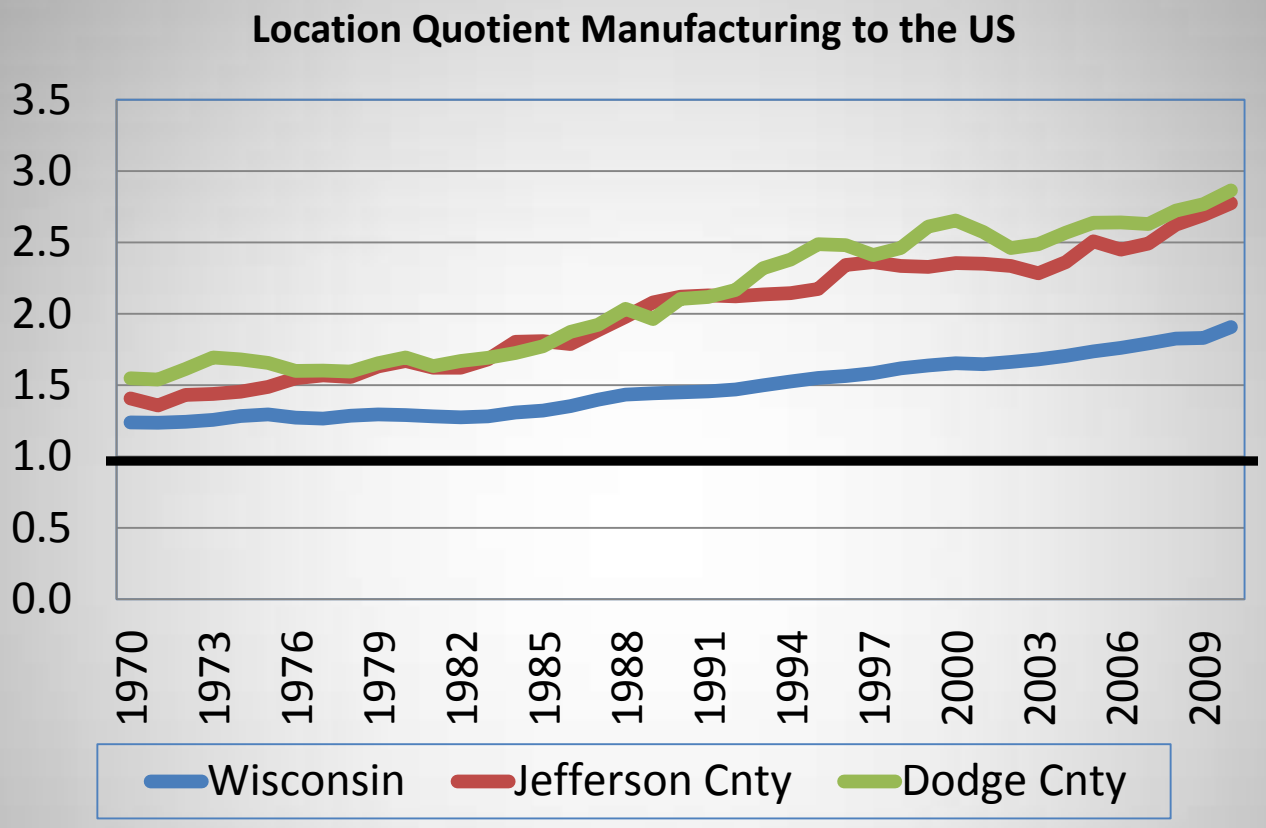
Community Economic Development: Data Analysis



Using the BEA REIS annual data one can even track the Location Quotient over time. Here is clear that manufacturing is a strength and growing in relative strength.

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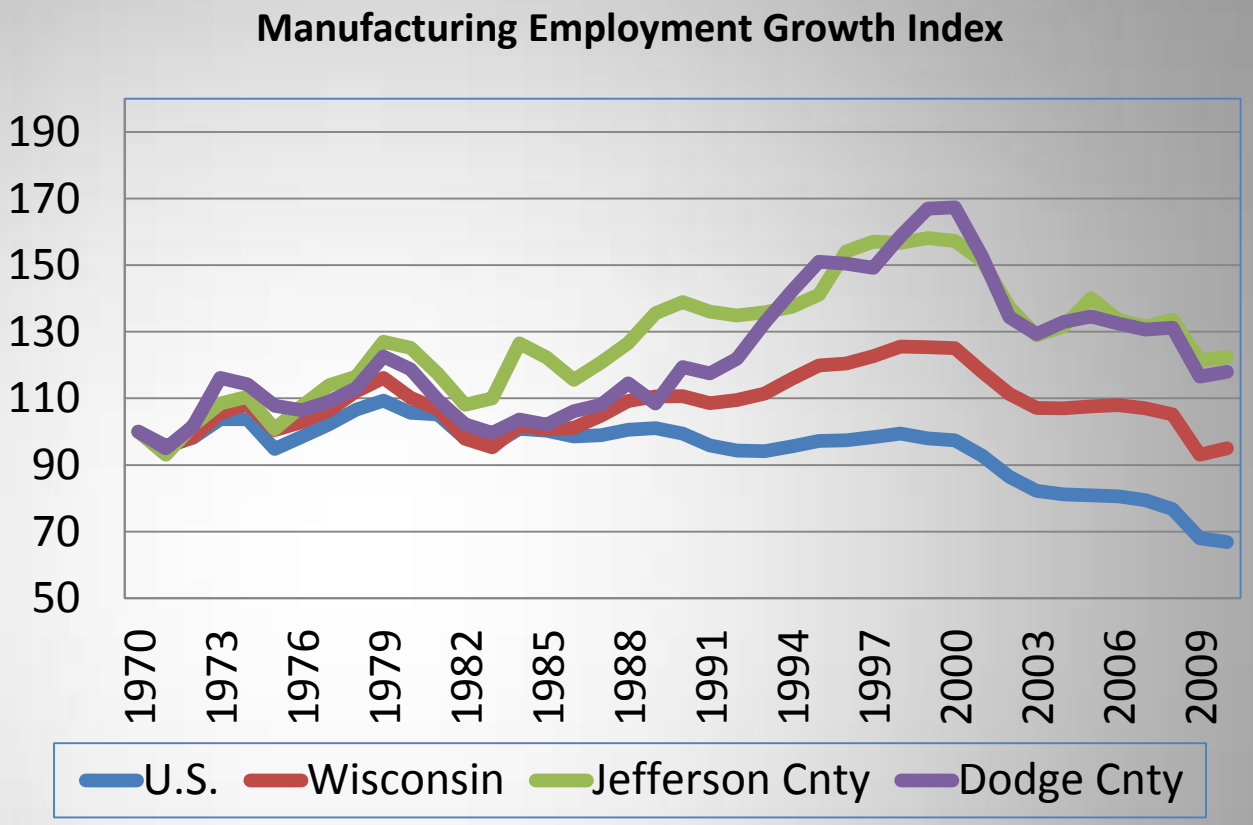
Community Economic Development: Data Analysis

But examining the LQ in isolation might lead to incorrect inferences. If we look at the manufacturing employment growth index a different picture appears.

Since about 1998 mfg employment has been declining. A "strength" in a declining industry?



How the LQ be increasing while employment in manufacturing is declining? The size of the dominator (percent of employment in mfg in the US) is declining faster than the size of the numerator. What are the implications for the community? Is this an opportunity or a threat?

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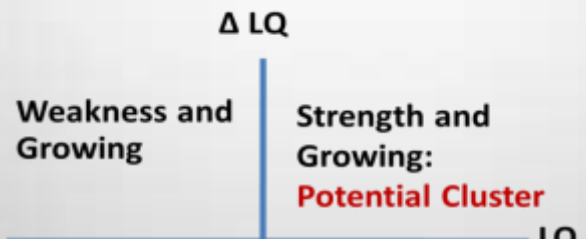
Community Economic Development: Data Analysis

As discussed at length in the sections on economic growth theory and firm location theory, the notion of economic clusters, while not a new concept, has revamped how many think about and approach economic growth and development policies.

One approach, suggested by Harvard business economist Michael Porter who many incorrectly attribute the notion of clusters to, uses location quotients to build a simple grid.

Figure A1: Porter's Identification of Clusters



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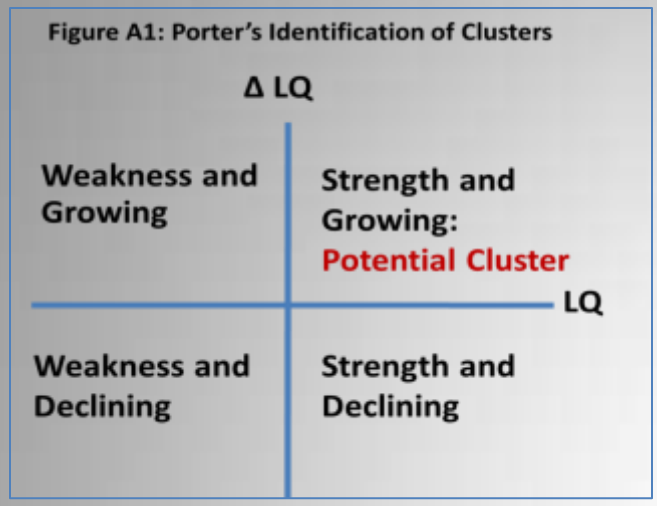

Here one plots the most current location quotient on one axis (in this example the horizontal axis) and the change in the location quotient over time (in this example the vertical axis). There are four possible combinations.

1. The LQ is greater than one and growing in size: a strength and growing (a potential cluster?)
2. The LQ is greater than one but is declining in size: a strength and declining (a potential threat?)
3. The LQ is less than one but is growing in size: weakness and growing (a potential opportunity?)
4. The LQ is less than one and is declining in size: weakness and declining (ignore?)

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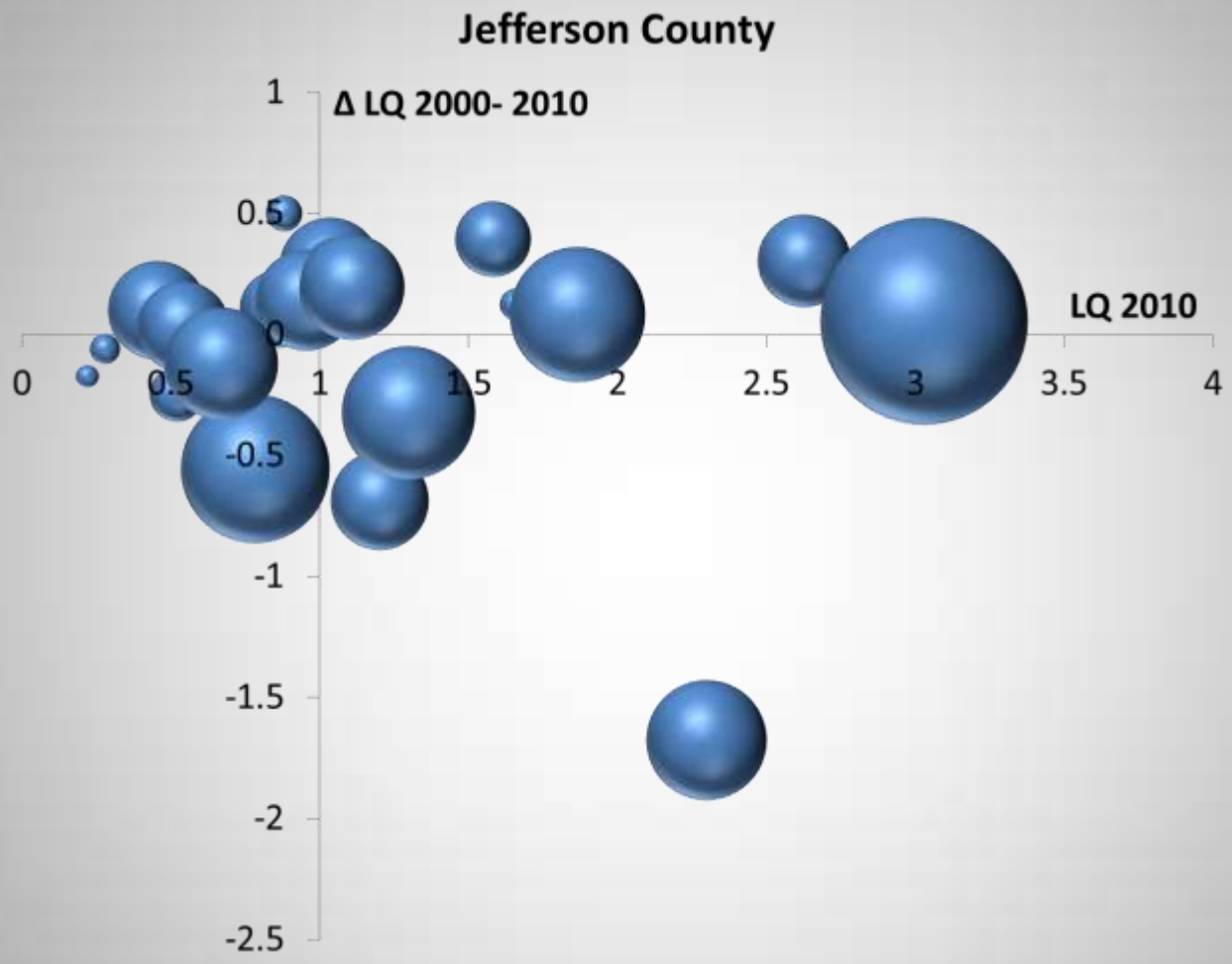

Here the "size" of the bubble is the relative size of the industry as measured by the its share of employment.

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Community Economic Development: Data Analysis

Jefferson County Cluster Analysis: Level One

	LQ 2010	Change 2000 to 2010	Share of Employment
Strength and Growing			
Utilities	3.162	0.326	0.3
Manufacturing	3.029	0.054	19.5
Farm	2.626	0.302	3.9
State and Local Govt	1.865	0.082	8.3
Federal Military	1.659	0.123	0.5
Arts, Entertainment and Recreation	1.581	0.394	2.6
Other Service Except Govt	1.107	0.195	5.0
Information Serv	1.050	0.274	1.7
Construction	1.035	0.272	4.7
Strength and Declining			
Administration and Waste Services	2.299	-1.676	6.6
Health Care and Social Assistance	1.297	-0.323	8.1
Real Estate, Rental and Lease	1.200	-0.687	4.4
Weakness and Growing			
Management of Companies and Enterpris	0.879	0.501	0.6
Finance and Insurance	0.953	0.140	4.6
Transportation and Warehousing	0.859	0.105	2.7
Wholesale Trade	0.454	0.101	4.4
Forestry, Fishing and Related	0.490	0.087	0.6
Professional and Technical Services	0.542	0.031	3.8
Weakness and Declining			
Federal Civilian	0.276	-0.061	0.4
Accommodation and Food Services	0.667	-0.121	5.7
Mining	0.218	-0.174	0.2
Educational Services	0.519	-0.247	1.3
Retail Trade	0.782	-0.554	10.0

These are the data behind the "Porter Bubble Chart".

Manufacturing clearly fits the Porter definition of a potential cluster, but from the employment growth industries, it is declining. What are the implications?

Also note that retail is a weakness and declining, but one in ten jobs in the county are in retail. Given Jefferson County's geographic location between Madison to the west and the Milwaukee area to the east, the retail competition is significant and may explain this result.

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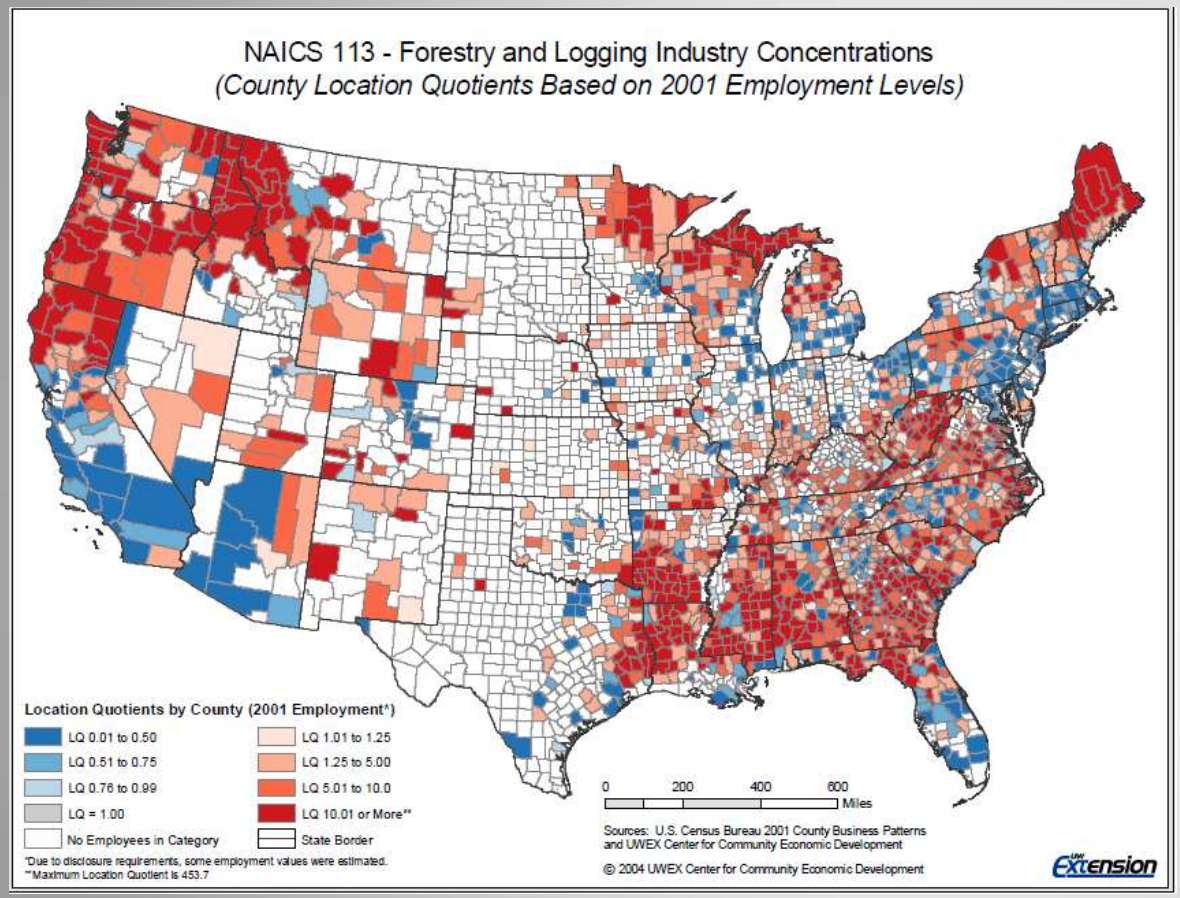

Simple mapping of LQs across industries can also provide powerful insights into the local economy.

In this example, there are clearly parts of the US where forestry and logging industries are clustered or grouped, including northern Wisconsin.

These types of maps also drives home the idea that individual communities are part of a larger regional economy.

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Using just employment data and a small handful analysis tools (growth indices and location quotients) it is possible to paint a fairly complete picture of the regional economy.

We can also begin to understand how easy it would be to overwhelm the community with too much analysis. If a growth index is graphed for each of the 23 1-digit NAICS industries along with a graphing of the LQ over time that is almost 60 charts. Add in growth indices for population and all sources of income, we can easily exceed 100 figures (charts). Presenting and discussing 100 plus figures in the setting of a community meeting would be overwhelming.

But:

1. **The practitioner or educator must conduct a full analysis of the data to ensure that all pieces of the puzzle are examined.**
2. **Only the key pieces are required to engage the community in a discussion.**

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Community Economic Development: Data Analysis

Trade Area Analysis:

The Analysis of Retail Sales

Potential Sales: A measure of the sales one would expect if the community was performing on par with the state average.

Trade Area Capture: A measure of the population being supported by the local retail market.

Pull Factor: A numerical index describing the local market's ability to attract, or pull in, customers.

Surplus and Leakage: The difference between potential sales and actual sales

Data required:

- Community Population
- Community Income
- Retail Sales

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Data for an example community

$1,000,000	= actual retail sales for eating and drinking establishments,
$750	= state per capita sales for eating and drinking establishments,
$7,500	= community per capita income,
$10,000	= state per capita income.
2,000	= community population
.75	= Index of Income ($7,500 / $10,000)

Community Economic Development: Data Analysis

The *trade area captured* for this hypothetical community is

$$\text{Trade Area Captured} = \frac{\text{Actual Sale}}{\text{State Per Capita Sales} * \text{Index of Income}}$$

or

$$\text{Trade Area Captured} = \frac{\$1{,}000{,}000}{\$750 * (\$7{,}500 / \$10{,}000)} = 1{,}778$$

In this example, the community's eating and drinking establishment market is supporting 1,778 full-time customer equivalents.

Community Economic Development: Data Analysis

To compute the ***pull factor***, simply divide the community's trade area captured by the community's population. Or

$$\text{Pull Factor} = \frac{\text{Trade Area Captured}}{\text{Community Population}} = \frac{1{,}778}{2{,}000} = 0.889$$

For this community, trade area captured is less than the community's population, hence the pull factor is less than one, or the restaurant market in this community is loosing customers to surrounding markets.

PF < 1 ➔ weakness, or loosing "potential" sales

PF = 1 ➔ as "expected"

PF > 1 ➔ strength, or gaining "surplus" sales

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Community Economic Development: Data Analysis

The community's sales *surplus* or *leakage* for the restaurant market is calculated by comparing potential sales to actual sales.

Surplus (Leakage) = Actual Sales - Potential Sales

= $1,000,000 - $1,125,000

= -$125,000

Because potential sales are greater than actual sales in this example, this community is said to have a $125,000 leakage in this retail market.

In other words, the dollar value of the pull factor being less than one is approximately $125,000.

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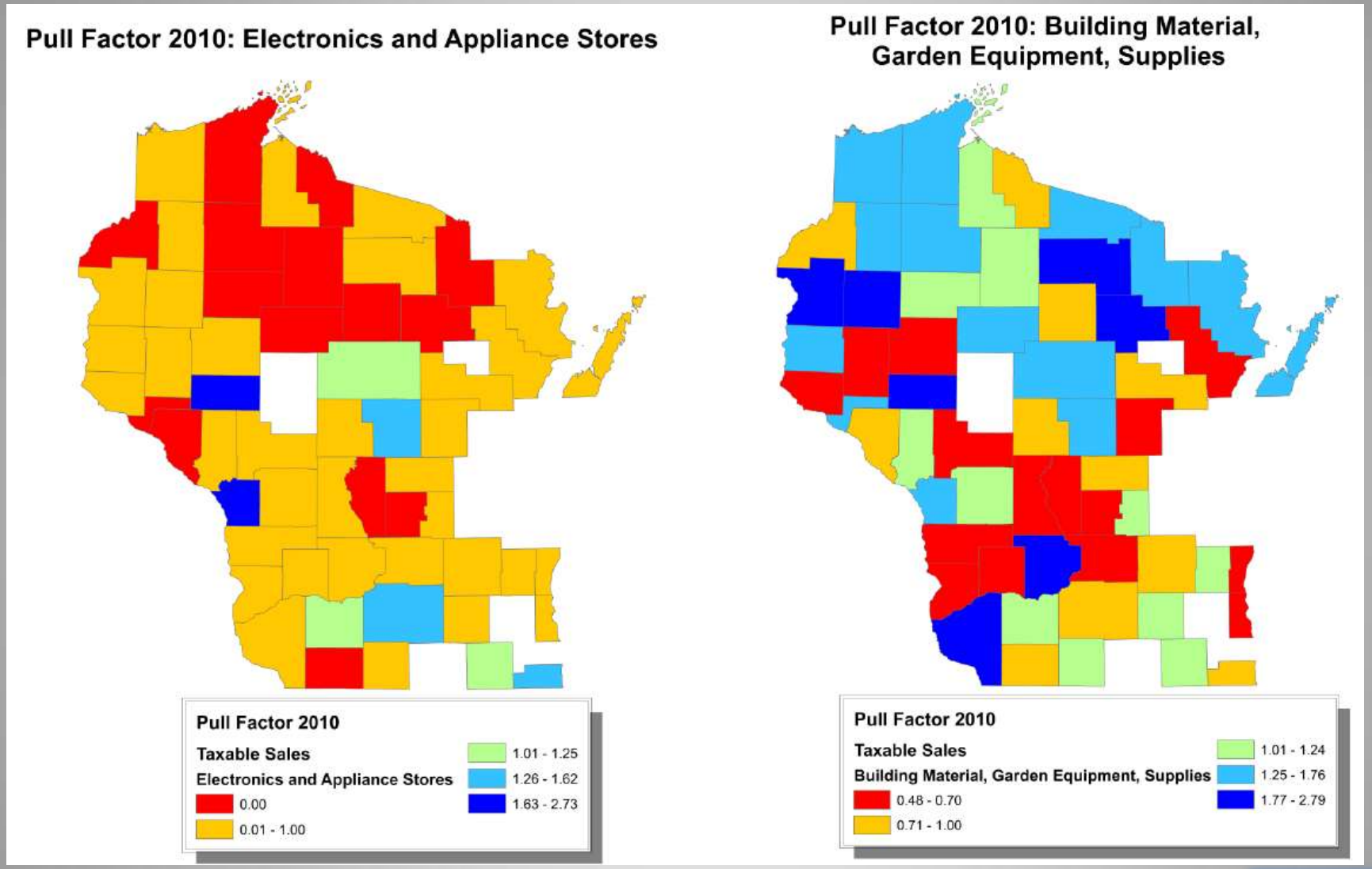

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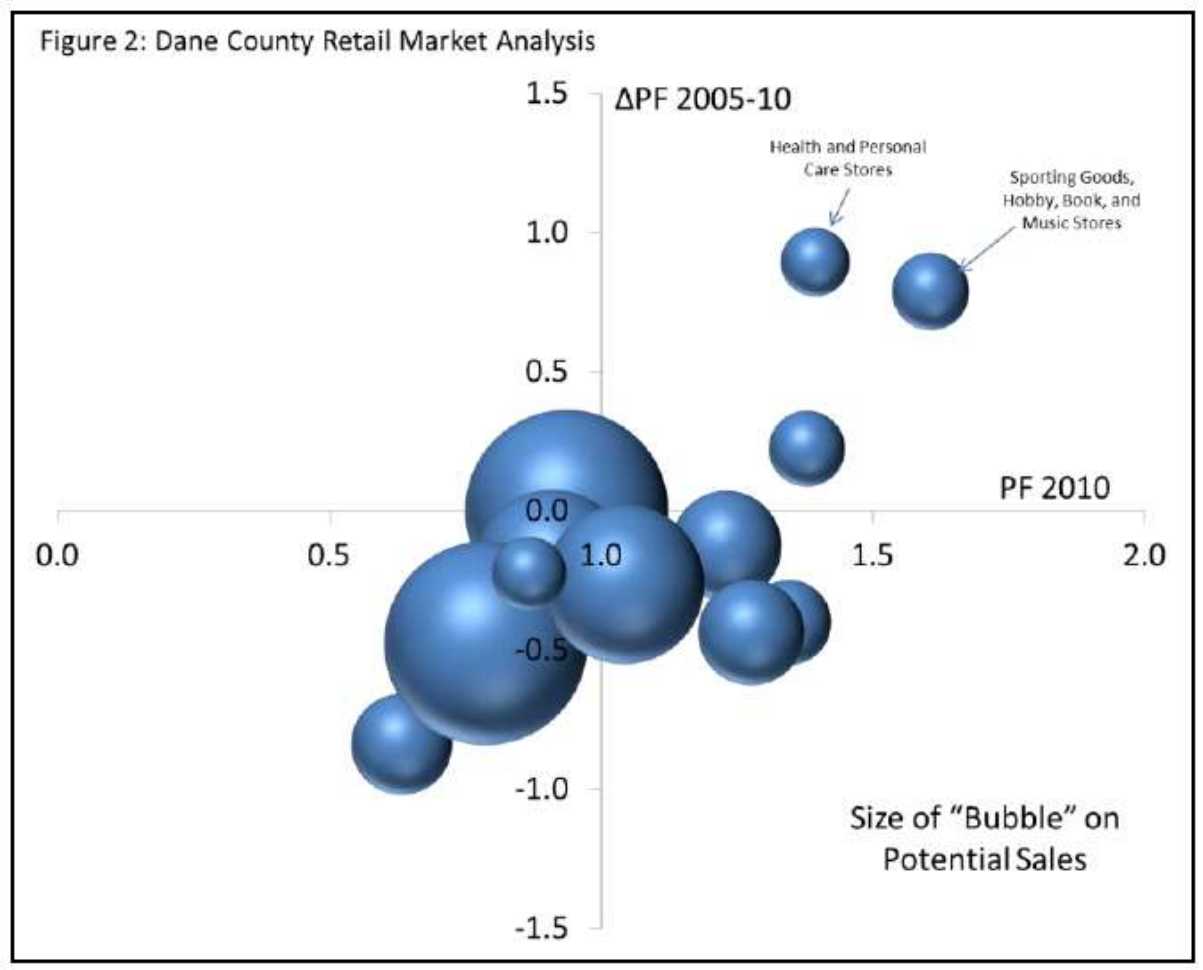

Because the Pull Factor (PF) is comparable to the Location Quotient (LQ), we can use the simple plotting of the current PF and the change in PF over time to identify strengths, weaknesses, opportunities and threats.

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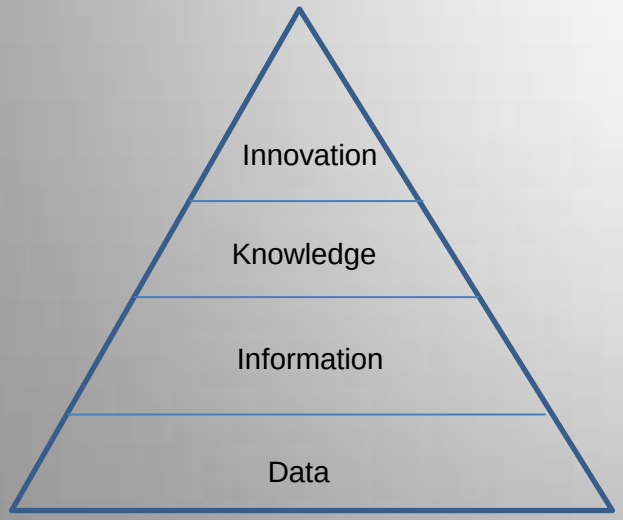
Community Economic Development: Data Analysis

This brief overview of data analysis we have explored three simple tools:

1. **Growth Indices**
2. **Location Quotients**
3. **Trade Area Analysis**

While we have only scratched the surface in terms of the range of data analysis tools at our disposal, these three simple tools can provide powerful insights into the local economy.



But it is important to keep in mind that the goal of data analysis is to move the community to a point where they can be innovative in addressing local economic concerns.

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Community Economic Development: Data Analysis

- **Looking for Challenges – Surprises**
  - **Surprises that can spark discussion**
- **Looking for Insights, Not Precision**
- **What is the "story" the data is trying to tell you?**

In the end, when you look at secondary data you should ***believe it all and trust none of it.***

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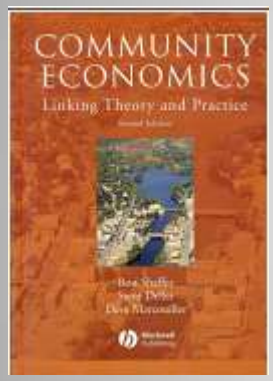
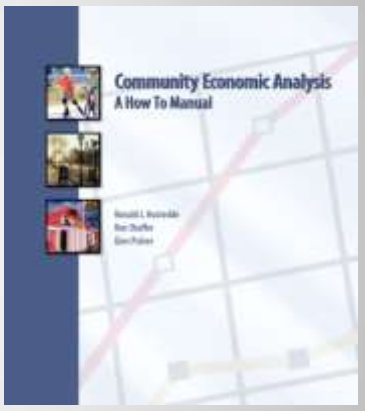
Recommended Readings

(Two books you should have on your shelf.)

Shaffer, R., S.C. Deller and D.W. Marcouiller. (2004).
Community Economics: Linking Theory and Practice.
Blackwell: Oxford England.





www.epa.gov/greenkit/pdfs/howto.pdf
www.ncrcrd.msu.edu/uploads/files/133/ncrcrd-rrd186-print.pdf

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