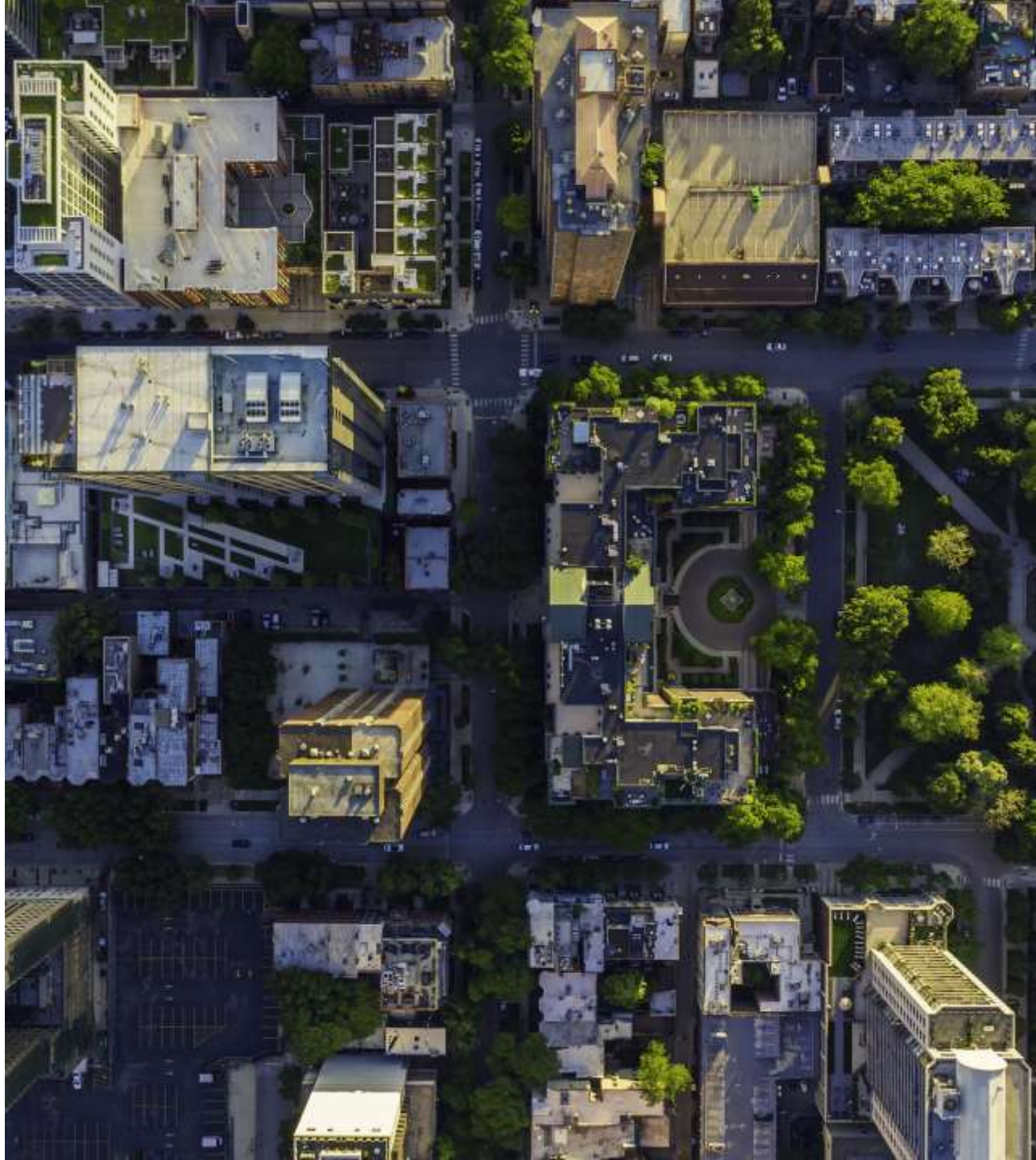
LOCATION QUOTIENT

Session 2 | Unpacking the primary tool for quantitative cluster analysis

CLUSTER IDENTIFICATION

Recognizing & prioritizing regional industry

CENTER FOR CLUSTER DEVELOPMENT



COURSE GOALS

1. Know how to identify clusters
2. Understand how to prioritize clusters for public support
3. Be prepared to lead your region in cluster identification and prioritization process

HOW THE COURSE WAS BUILT

- Experience working with cluster development professionals
- Assessments of federal cluster funding
- Reviews of academic literature and regional reports
- Interviews with cluster leaders
- Testing with two cohorts of regional practitioners

COURSE SESSIONS

1. About Clusters
2. Location Quotient
3. Qualitative Assessment
4. Prioritizing Assistance
5. Beyond Identification

LOCATION QUOTIENT

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DAY AGENDA

1. Calculating and interpreting Location Quotients
2. Data sources for LQs
3. Problems with relying on LQ alone for cluster IDs

DEFINITION OF A CLUSTER

- A cluster is a concentration of interconnected businesses, assets, and institutions operating in a sector (or related sectors) within a region.
- How do you know when your region's industry concentration has risen to the level that it may constitute a cluster?
  - Technical method: Location Quotient

WHY LEARN ABOUT LQS?

- LQ is a valid measure of relative concentration
- LQ is the industry standard for assessing cluster presence
  - Reviewers of cluster funding ask for or will expect it
  - Economic consultants hired by your region will use it
- Understanding proper uses – and limitations & shortcomings – will make you more informed for:
  - Developing local economic development strategy
  - Creating funding requests
  - Drafting contractor RFPs and evaluating their responses, reports

LQ CALCULATION

- LQ is a ratio of ratios
  - Ratio 1 measures the concentration of the industry's economic activity within the region of interest
  - Ratio 2 measures the concentration of the industry's economic activity within the reference point (usually the nation, but could be state or world)
  - LQ is the ratio of regional concentration to national concentration
- What is economic activity?
  - LQs are most often calculated with employment or establishments
  - Research spending, investment and other measures can be used
  - In identifying a cluster, looking at multiple LQs can help (more on this later)

LQ FORMULA

$$LQ_i = (e_i / e) / (E_i / E)$$

Location Quotient for a region's industry [LQ_i]

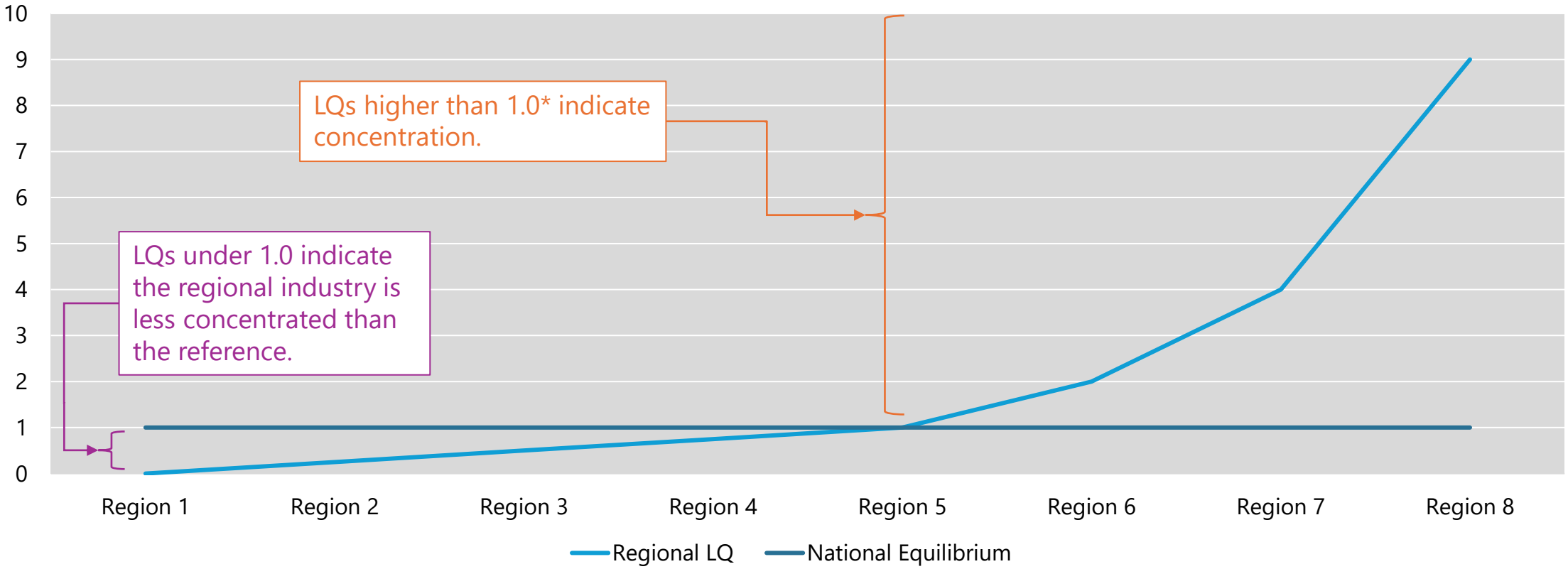
equals

(Regional economic activity in the industry [e_i] *divided by* total regional economic activity [e])

divided by

(Reference economic activity in the industry [E_i] *divided by* total reference economic activity [E])

INTERPRETING LQ



* Some sources use an LQ of 1.25 as a threshold to consider an industry concentrated. This helps account for measurement error but is not a hard rule. See the information on feeling more confident in LQ, later in this lesson.

LQ CALCULATION EXAMPLE

- Acme Metro has 1,250 employees in snake oil manufacturing and 100,000 total employees.
- The U.S. has 160,000 snake oil manufacturing employees and 160 million total employees.
- LQ Formula: $LQ_i = (e_i / e) / (E_i / E)$
- Acme Metro snake oil manufacturing employment LQ:
  - e_i = 1,250
  - e = 100,000
  - E_i = 160,000
  - E = 160,000,000
  - LQ = (1,250 / 100,000) / (160,000 / 160,000,000) = **12.5**

➢ The LQ indicates Acme has high concentration in this sector and may have a cluster.

EXAMPLES OF LQ IN PRACTICE: CLASSIC U.S. CLUSTERS

Industry	U.S. Region	Employment LQ
Motion picture & video	Los Angeles County, Cal.	9.2
R&D in biotechnology	Middlesex (Cambridge) County, Mass.	25.2
Securities and commodity exchanges	New York County	17.8

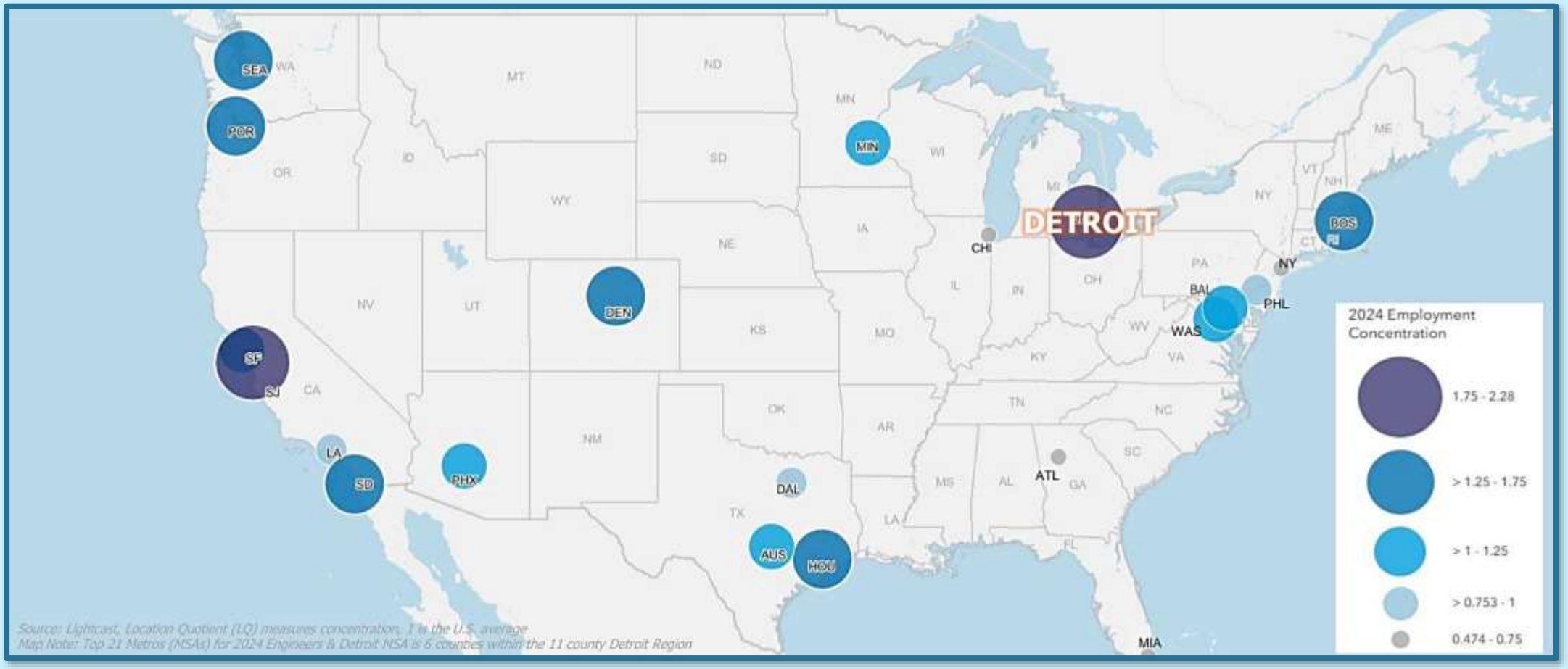
LEVERAGING LQS

- LQs can be used to explore regional industries in greater depth
  - ➢ This requires a sufficiently large area and/or industry for the data to work
- LQs can be used to benchmark your region and identify peers
  - ➢ This approach can yield better comparisons for sector-specific strategies than looking at economy or population size alone
- LQs can be calculated on different metrics for additional insights
  - Number of businesses, research activity, startup investment are options
  - Assessing concentration from multiple angles can highlight strengths, weaknesses, that can be useful to understand in a cluster development strategy

EXAMPLE OF OTHER LQ USES – DETROIT'S AUTO SUBCLUSTERS

Source: Detroit Regional Partnership, Exploring the Mobility & Automotive Industry Cluster, https://www.detroitregionalpartnership.com/mobility-auto-industrycluster/

EXAMPLE OF OTHER LQ USES – BENCHMARKING YOUR PEERS



Source: Detroit Regional Partnership, Exploring the Mobility & Automotive Industry Cluster, https://www.detroitregionalpartnership.com/mobility-auto-industrycluster/

MULTIPLE LOOKS: PHARMACEUTICAL MANUFACTURING IN UTAH, 2023

- Utah has notable concentrations in pharma mfg. employment and establishments
- The state does not exhibit strengths in business research or investment
- Utah may have a pharma mfg. cluster. If so, it may be focused on the production locations of larger companies, not their investigative branches or newer companies.

Economic Activity	LQ
Employment	1.97
Establishments	2.45
Business R&D	0.65
Startup Deals	0.72

WHAT IS THE RIGHT REGION?

- Many jurisdictions will be interested in a specific geography (e.g., metro)
  - If your jurisdiction is a part of a clear region, it may make sense to look at both the larger area and your jurisdiction for context
  - If your region is small and near a metro, it may make sense to look at clusters in that metro and then see if your industry may be serving that cluster
- Some cluster analysis looks at entire nations (particularly in Europe)
- In most cases, the region of study should be small enough that physical proximity is meaningful
  - Owners, employees, suppliers can meet face-to-face regularly
  - Labor shed (or "laborshed") is one way to understand these boundaries

NOTES ABOUT NAICS

- North American Industry Classification System is the federal standard for defining the industry for each business establishment
- 6-digit code ranging from least to most specific
  - Fewer digits = more variance in company activities but less data suppression in federal sources
  - More digits = companies are more similar but more likely to have data issues, particularly for lower population areas
- Codes change over time => look for revisions when doing historical analysis
- Companies select codes themselves and can make surprising choices
- Best sources are https://www.census.gov/naics/ or https://www.naics.com/search/

LQ DATA TOOLS

- Bureau of Labor Statistics (BLS) Quarterly Census of Employment & Wages
  - One of the best starting points for LQ analysis
  - BLS provides employment LQs pre-calculated in the data viewer tool
  - https://www.bls.gov/cew/
- Drawbacks:
  - Data suppression for both privacy and quality is high and can make it unusable
  - Excludes contractors, self-employed, and some ag and military employment

LQ DATA TOOLS

Source	Geography	Industry	Key Metrics	Timing	Notes
BLS Census of Employment & Wages	U.S. State County MSA	2-6 digit NAICS*	Employment Establishments Wages LQs	Frequency: Quarterly Lag: 5-6 months	• Excludes contractors, self-employed, some ag and military • High data suppression, particularly at detailed NAICS
Census County/ZIP Business Patterns	U.S. State County or ZIP MSA	2-6 digit NAICS	Employment Establishments Payroll	Frequency: Annual (based on Mar. 12) Lag: 18 months	• March-only means poor seasonal coverage & less timely • Less data suppression than CEW
Proprietary (e.g., Lightcast)	Any	2-6 digit NAICS	Above & may have more	Depends on sources	• Typically supplement federal data with job postings, other sources • Can be expensive • May have unsuppressed data
State data portals (e.g., MN LQ Tool)	State County Special?	Variable	Variable	Depends on sources	• Can be handy for local purposes • May be unable to compare to out-of-state peers

CALCULATE LQ

1. Decide on at least one industry you want to test for your region — for now, select the single best NAICS to represent the sector
2. Navigate to source website — e.g., BLS QCEW Data Viewer
3. Access data for your regional industry, regional total, national industry, and national total
   - If your region is comprised of multiple areas or suppressed, select the closest MSA for now
   - In QCEW, you can access the four figures in two views: “all MSAs, one industry” for your selected industry and the same view for “Total, all industries”
4. Calculate LQ — QCEW provides this for employment
5. Is there a high concentration for your region?
6. Repeat the steps to test another industry (or subsector)

SIZE & DATA LIMITATIONS FOR LQ

- Smaller regions could have odd results
  - High LQ based on a few companies
  - Big year-over-year changes possible because of sampling in underlying data
- LQ stability can vary with the level of industry you are measuring (e.g., NAICS 2- vs. 4-digit)
- Be particularly cautious with regions under 100K population

Further Reading

Pominova, M., Gabe, T., & Crawley, A. (2022). The stability of location quotients. *The Review of Regional Studies, 52,* 296-320. https://rrs.scholasticahq.com/article/66197-the-stability-of-location-quotients.pdf.

HOW TO FEEL MORE CONFIDENT IN LQ
(AND GOOD ADVICE FOR ANY DATA ANALYSIS)

- Run LQ with different levels of industry data to see how much LQ changes
- Use historical data to create a trend analysis showing if LQs are consistently concentrated (as well as changes over time)
- Look at the numerator size to see if it is meaningful
- Even if using employment LQ, check establishment score – if your LQs are very different, consider what this means for a cluster
- Access a shift-share analysis to see how your regional industry is expected to change relative to national trends

BROADER SHORTCOMINGS OF LQ

- Regardless of LQ, region must have mass to create the network effects that drive clusters' benefits
- Concentration is not the same thing as a cluster –
  - LQs do not capture the connectedness of companies
  - Data used in LQs rarely measure assets or public resources that often support effective clusters
- Some clusters cannot be readily observed from traditional industry or employment data (e.g., emerging tech sectors that do not yet have a NAICS code; clusters organized around a purpose or theme instead of a type of economic activity, like outdoor recreation)

THE WATER COUNCIL

Milwaukee businesses began recognizing common water tech interests in the mid-aughts. Coincidentally, the region had created a new economic development entity and, in forming its first strategy, identified 50 local companies focused on water. While water tech is not an "industry" with an identifiable NAICS code, the region moved forward with a formal study to assess its place in the broader market. This effort, which used about 36 sector codes (since trimmed down), identified 120 relevant companies in the Milwaukee region and compared its advantages to other global regions with a significant water tech presence. This concentration led the region to identify water tech as a local cluster, ultimately forming The Water Council as a cluster organization to drive a regional development strategy.

* Sources: Interview with The Water Council founding CEO Dean Amhaus; The Water Council's official history; S.B. White et al.'s 2010, *Water Markets of the U.S. and the World;* and a 2018 *Rethinking Cluster Initiatives Case Study: Milwaukee Water Technology* by Brooking's Brad McDearman.

RECONSIDERING LQ SCORES

1. Revisit the LQs you calculated in the previous exercise
2. Consider: How large is your region of interest? How did you define the industries? Do you need to take a deeper dive to be confident in the score?
3. What other evaluations do you want to run on your sector(s) of interest to see whether there is a cluster in your region?
4. Are you interested in a cluster that doesn't have a (single) NAICS? If so, how can you define it?

LOCATION QUOTIENT TAKEAWAYS

- LQ is the primary statistical measure of clusters
- LQ is the ratio of regional industry concentration to national concentration: an LQ > 1.0 signals relative concentration and could indicate a cluster
- LQ shortcomings include instability for small regions (particularly for narrow industry definitions) and reliance on NAICS to define sectors
- Regardless of LQ score, prioritizing public support requires weighing additional factors

WHAT TO DO WHEN LQ FAILS

- If you could access the data you need and your LQs are low:
  - You may not have a cluster — continue building your regional economy through other means and keep an eye on emerging concentration
  - You can use qualitative methods (next session) to see if there is greater connectedness in your region than appears in the data
  - Do not try to force a cluster — top-down cluster creation efforts do not have a strong track record of success
- If you can't measure your industry or region due to data issues:
  - Attempt to get a handle on your economy with the raw data that is available
  - Proceed to the qualitative methods discussed in the next session

NEXT SESSION: QUALITATIVE ASSESSMENT

TOPICS WE WILL COVER

- Hard-to-measure sectors
- Stakeholder engagement
  - Community
  - Economic development
  - Industry

PREP TO MAXIMIZE YOUR TIME

- Brainstorm potential clusters in your region that are outside of standard NAICS codes
- List your region's key stakeholders for the economy

FEEDBACK SURVEY

https://forms.gle/5eBgVba76i5uSu1V6

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