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Kem C. Gardner
POLICY INSTITUTE
THE UNIVERSITY OF UTAH
DAVID ECCLES SCHOOL OF BUSINESS

Measuring Economic Diversity: The Hachman Index, 2017

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The Hachman Index is a measure of economic diversity. Using indicators such as gross domestic product (GDP) or employment, the index measures the mix of industries present in a particular region relative to a (well-diversified) reference region. Hachman Index scores are normalized from 0 to 100. A higher score indicates more economic diversity, while a lower score indicates less economic diversity. The Hachman Index is often applied at the national level allowing for comparison between individual states. With reliable data, the index may also be applied to measure industrial distribution across counties as well. This brief examines the results of a Hachman Index analysis at the state and county level for 2017.

Utah Was One of the Most Diverse States in the Country in 2017

Utah and Missouri lead the nation in industrial diversity.[1] According to a Hachman Index analysis using 2017 GDP data from the Bureau of Economic Analysis (BEA),[2] Utah's industrial distribution is very similar to that of the U.S., and is one of the most diverse in the nation (see Figure 1). The Hachman Index is not an exact measure, and because Utah and Missouri have near identical scores—96.9 and 96.8, respectively—it is not definitive that Utah is more economically diverse than Missouri.

Utah is not only a clear leader in the nation, but is also a standout in the West. Arizona, Colorado, and California are the only other western states to have scores above 90. Utah's industrial composition is more diverse than the largest western states, including California. This despite Utah only having the 31st largest state GDP. California (1st), Colorado (19th), and Arizona (21st) all have larger economies than Utah.[3]

About the Hachman Index

Frank Hachman was an economist and Associate Director of the forerunner to the Kem C. Gardner Policy Institute (the Bureau of Economic and Business Research) from the mid-1960s to the late 1990s. While at the Bureau, Hachman, with the help of colleagues, developed the Hachman Index. The Hachman Index is a measure of the economic diversity of a region based on how closely the composition of industries matches that of a larger and well-diversified reference region. In its most general form, the Hachman Index is a measure of similarity between a subject area and a reference region.

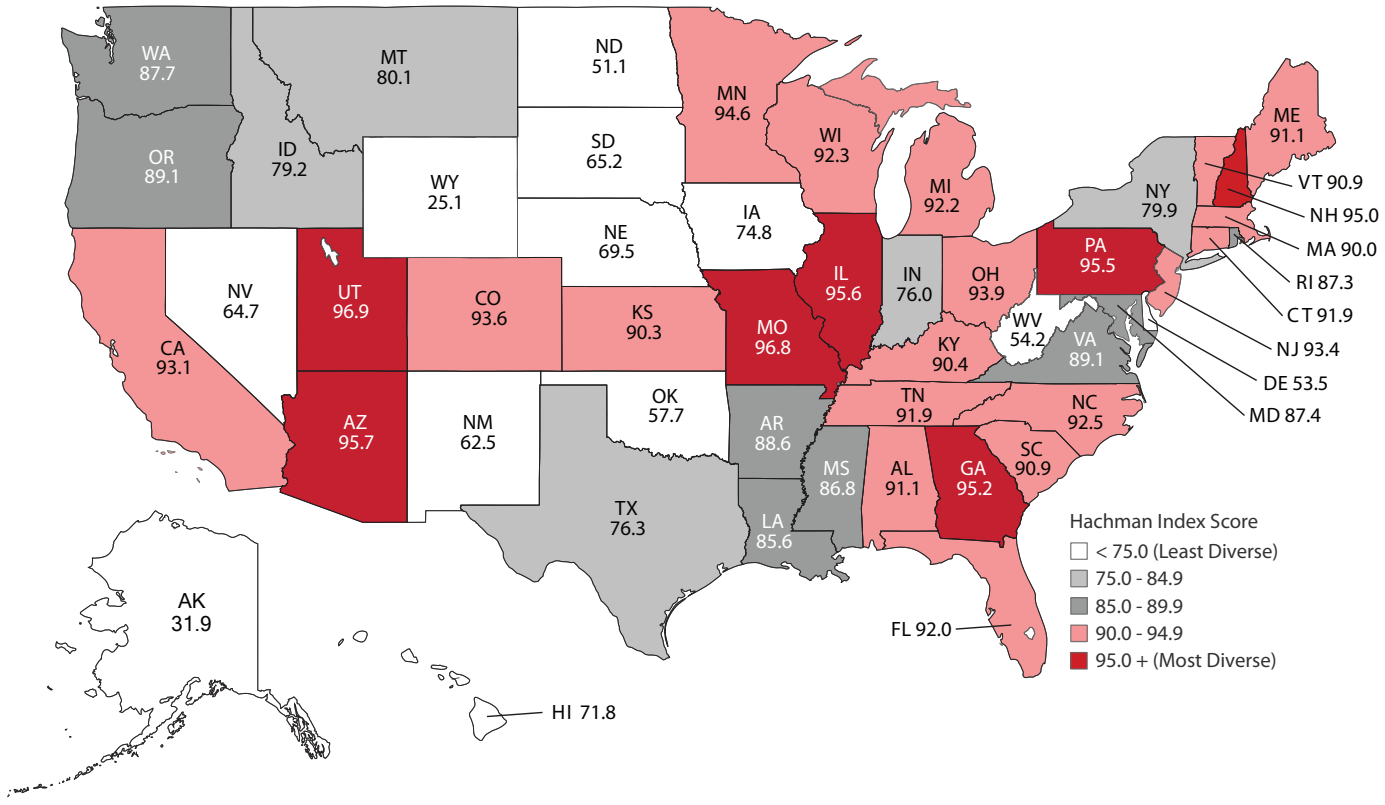
Originally developed for the 1995 *Economic Report to the Governor* as an adjustment to the "Diversity Index" then being utilized by the Utah Office of Planning and Budget,[4] the Hachman Index has become nationally recognized as a measure of regional economic specialization or diversity. To measure the economic diversity of a region, the Hachman Index uses the largest geographic area as a reference region and assumes this region (e.g., the United States) is the most economically diverse. This approach is used by the Federal Reserve Bank of Kansas City with the "national diversity index," the Regional Financial Associates in their industrial diversity index, and by Moody's Analytics' industrial diversity index.[5]

Urban Counties Have Diversified Economies While Rural Counties Are More Specialized

Davis, Salt Lake, Washington, and Weber counties are the most economically diverse within Utah. Salt Lake, Davis, and Weber counties include three of Utah's five metropolitan areas, and are three of the four largest counties in the state. Urban counties tend to have more diverse economies with a larger variety of economic opportunities and a wider range of industry sectors available to the population. Washington County contains the St. George metropolitan area and is the most populated county outside of the Wasatch Front.

Utah County and some of the more populated ring counties also have relatively diverse economies, with Hachman Index scores in the 70s (see Figure 2). A notable exception is Summit County, which has a high concentration of industries related to arts, entertainment, and recreation.[6] This is due to the concentration of ski resorts and the resulting tourism-based economy around Park City.

Figure 1: Hachman Index for States, 2017



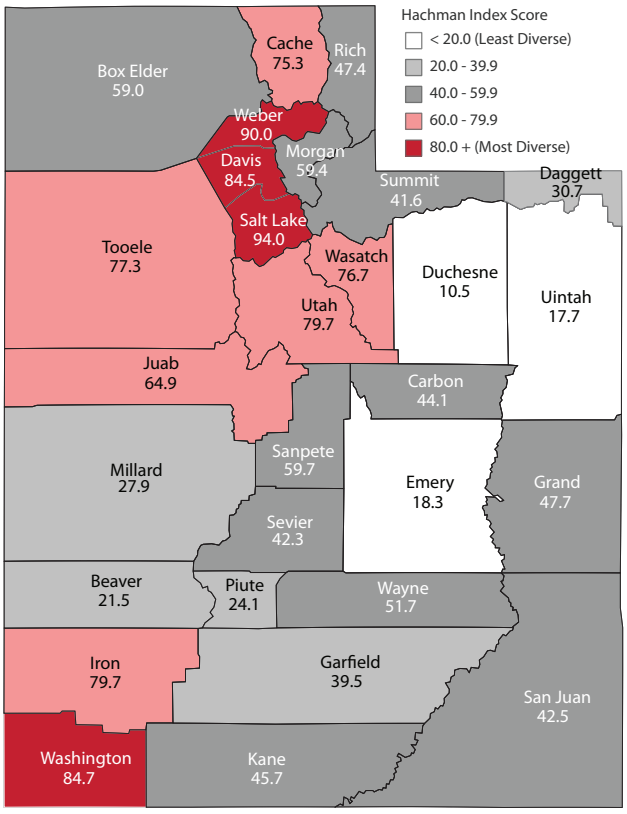
Source: Gardner Policy Institute analysis of U.S. Bureau of Economic Analysis GDP data

Box Elder, Morgan, and Rich counties also have scores below 60, but are much less populated with smaller economies. However, their proximity to the more diversified ring counties may lead many residents to cross county borders for employment opportunities.

Natural resources like those found in the Uintah Basin can also create a concentration in specialized industries for counties. Duchesne, Emery, and Uintah counties all have very low index scores because they are heavily concentrated in the extractive industries. Other rural counties are agriculturally dominant (Beaver and Piute counties), while some are concentrated in accommodations (Garfield County), public administration (Daggett County), or other industries.

In Utah's rural counties the population is significantly smaller than in the metropolitan counties, and their economies are more concentrated in specialized industries. While a more diversified industrial distribution could be beneficial to the long-term stability of these counties, some will remain strong due to intrinsic qualities of the county, e.g. geography, natural resources, or other non-replicable qualities unique to the area.

Figure 2: Hachman Index for Utah Counties, 2017



Source: Gardner Policy Institute analysis of Bureau of Labor Statistics (United States) and Utah Department of Workforce Services (Utah counties) employment data

State and County Scores

Table 1: Hachman Index Scores for the States, 2017

State	Hachman Index	State	Hachman Index
Alabama	91.1	Montana	80.1
Alaska	31.9	Nebraska	69.5
Arizona	95.7	Nevada	64.7
Arkansas	88.6	New Hampshire	95.0
California	93.1	New Jersey	93.4
Colorado	93.6	New Mexico	62.5
Connecticut	91.9	New York	79.9
Delaware	53.5	North Carolina	92.5
District of Columbia	48.0	North Dakota	51.1
Florida	92.0	Ohio	93.9
Georgia	95.2	Oklahoma	57.7
Hawaii	71.8	Oregon	89.1
Idaho	79.2	Pennsylvania	95.5
Illinois	95.6	Rhode Island	87.3
Indiana	76.0	South Carolina	90.9
Iowa	74.8	South Dakota	65.2
Kansas	90.3	Tennessee	91.9
Kentucky	90.4	Texas	76.3
Louisiana	85.6	Utah	96.9
Maine	91.1	Vermont	90.9
Maryland	87.4	Virginia	89.1
Massachusetts	90.0	Washington	87.7
Michigan	92.2	West Virginia	54.2
Minnesota	94.6	Wisconsin	92.3
Mississippi	86.8	Wyoming	25.1
Missouri	96.8		

Source: Gardner Policy Institute analysis of U.S. Bureau of Economic Analysis GDP data

Table 2: Hachman Index Scores for Utah Counties, 2017

County	Hachman Index	County	Hachman Index
Beaver	21.5	Piute	24.1
Box Elder	59.0	Rich	47.4
Cache	75.3	Salt Lake	94.0
Carbon	44.1	San Juan	42.5
Daggett	30.7	Sanpete	59.7
Davis	84.5	Sevier	42.3
Duchesne	10.5	Summit	41.6
Emery	18.3	Tooele	77.3
Garfield	39.5	Uintah	17.7
Grand	47.7	Utah	79.7
Iron	79.7	Wasatch	76.7
Juab	64.9	Washington	84.7
Kane	45.7	Wayne	51.7
Millard	27.9	Weber	90.0
Morgan	59.4		

Source: Gardner Policy Institute analysis of Bureau of Labor Statistics (United States) and Utah Department of Workforce Services (Utah counties) employment data

About the Hachman Index

The Hachman Index is the reciprocal sum, or mean location quotient, of the study area across all industries where the mean is generated by weighting the respective sectors' location quotients[7] by the sector shares in the region.[8] The Hachman Index for a given time period is calculated as follows:

$$HI = \frac{1}{\left(\sum_i \left(\frac{E_{Si}}{E_{Ri}} \right) x \left(E_{Si} \right) \right)}$$

E_{Si} is the share of the subject area employment in industry *i*.
E_{Ri} is the share of the reference region employment in industry *i*.

A Hachman Index score ranges from 0 to 100. A higher score indicates that the subject area's industrial distribution more closely resembles that of the reference geography, and is therefore diverse. A lower score indicates a region is less diverse than the reference area, and more concentrated in fewer industries. Diversity in economic opportunities, as represented by a diverse set of industries, is generally considered a positive contributor to a region's economic stability.

The Hachman Index is not without its shortcomings. For one, the subject area is contained within the reference region, i.e. Utah is included in the U.S., and so, to some degree, the subject area is being compared to itself. Another limitation of the Hachman Index is that it does not account for potential competitive advantages of a region. A region may have an advantage specializing in a specific industry, making a concentration in that industry economically justifiable over a more diversified economy.

Although diversification is usually considered a positive attribute for an economy, an increase in diversity may not be good for the labor market. As discussed in the 1995 *Economic Report to the Governor*, Utah had specialized in metal mining industries. In the mid-1980s Kennecott experienced major layoffs, which decreased its share of the overall Utah economy and therefore raised the measure of diversity in Utah. However, the effect on the labor market was negative, with lower employment levels. In essence, an increase in industrial diversity does not directly result in improvements for residents of the state, or imply economic growth.[9]

The Hachman Index is also affected by the measures used. The value of the Hachman Index will be affected if broader measures are used. For example, an index calculated from employment by industry will behave differently over time from one calculated from GDP, due to changes in labor productivity that lead to increasing production using fewer employees.

Endnotes

1 As shown in Table 1: Hachman Index Scores for the States, 2017, Utah has a Hachman Index score 0.1 point higher than Missouri. However, the Hachman Index is not an exact measure and when comparing states the exact score is less important than the rank and range of scores across the country.
2 The Hachman Index was calculated using 2-digit North American Industry Classification System (NAICS) Sector Codes.
3 Bureau of Economic Analysis, Gross Domestic Product by Industry and State, 2017.
4 Frank Hachman, 2002, "The Degree of Similarity Index: A Measure of Diversification Superior to the Hachman Index," unpublished manuscript.
5 1995 *Economic Report to the Governor*; Moody's Analytics; "Industrial Diversity, Growth, and Volatility in the Seven States of the Tenth District," by Alison Felix, 2012. https://www.kansascityfed.org/publicat/econrev/pdf/12q4Felix.pdf.
6 As defined by the North American Industry Classification System (NAICS) Sector 71: Arts, Entertainment, and Recreation.
7 A location quotient measures the relative concentration of an industry in one area compared to another. The Bureau of Labor Statistics defines it as a "ratio that compares the concentration of a resource or activity, such as employment, in a defined area to that of a larger area or base. For example, location quotients can be used to compare state employment by industry to that of the nation." It is calculated by dividing an industry's share of the total (employment, GDP, etc.) in the study region by its share in the reference region.
8 Hachman, 2002.
9 1995 *Economic Report to the Governor*, pages 207–214.

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