2007

Cluster Analysis of Utah's Cities and Towns

Utah League of Cities and Towns

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Utah League of Cities and Towns
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The mission of the Utah League of Cities and Towns (ULCT) has changed little since 1907. For one hundred years, ULCT has provided a strong, unified advocacy voice for Utah's municipalities. In addition, a key purpose for ULCT is to present information and research regarding demographic and economic trends that potentially impact municipal public policy. Often this analysis requires grouping or clustering of cities. It is challenging to determine which variables should direct this grouping. Often grouping is dictated solely by population size or regional location. However, this surface grouping misses some of the more telling city dynamics. In an attempt to find a more accurate grouping, ULCT, in partnership with the Brigham Young University Romney Institute of Management, University of Utah Center for Public Policy & Administration (CPPA) and Utah State University, have clustered cities together based on demographic, financial, and economic characteristics.[1]

HIGHLIGHTS

- This report clusters together all 243 Utah cities and towns.
- The final result is 11 clusters, with 1 outlying city (Salt Lake City).
- The clusters group cities and towns based on common characteristics across population, residential and commercial property, and tax revenue variables.
- 7 clusters are more urban in make-up (including Salt Lake alone), while 5 are primarily rural.

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How is clustering useful?

The clustering or grouping of cities provides a number of useful opportunities. First, this grouping will fine-tune fiscal policy analysis. For example, often ULCT is asked to identify the fiscal health of Utah's municipalities. The diversity of cities makes it virtually impossible to aggregate the financial health. For instance, the financial health of Utah's cities varies based on the differing levels of property and sales tax dependence. However, a grouping of cities helps pinpoint what factors are contributing to the financial state for a number of cities that share a similar makeup. Thus, this clustering will enhance our understanding of tax dependency in different cities, and likewise our understanding of what implications this dependency creates.

Second, clustering will improve attempts to identify demographic or economic trends. Demographic changes affect Utah statewide, but this changing burden, or benefit, does not individually impact communities the same way. Identifying a number of descriptive characteristics for groups of cities will improve the policymaking discussion as we evaluate legislation that impacts a variety of policy issues. One size fits all policy solutions rarely work for Utah cities and the clustering will improve our ability to anticipate what policies will best suit different types of cities.

[1] The cluster analysis approach is similar to the methodology applied by the League of Minnesota Cities and the Washington Association of Cities. For more detail on the specific methodology or cluster outcomes for these states please visit these websites:
Minnesota: http://www.lmnc.org/pdfs/ClusteringMinnesotaCities0803.pdf
Washington: http://www.awcnet.org/stateofthecities/soc05/cluster_profiles.htm

Third, the clustering of cities lends itself to natural benchmarking or comparison partners. One benefit of clustering is bridging geographic and population divides. As shown in the 12 identified clusters (with the exception of Salt Lake City), cities cluster from various regions of the state. Cities and towns will often be better served comparing their services with cluster neighbors, rather than geographic neighbors. This clustering may also provide a unifying effect by tying communities together that previously saw little in common.

The variables used for clustering are:

- 2005 population
- Percent population change 2000-2005
- Household median income (2000 Census data)
- 2003 Primary residential land value
    - Per capita residential land value
- 2003 Commercial and industrial land value
    - Per capita commercial and industrial land value
- 2003 Property tax revenue
    - Per capita property tax revenue
- 2003 Sales tax revenue
    - Per capita sales tax revenue

Why these variables?

ULCT selected these variables in order to paint a demographic, fiscal, and economic picture for each city. Population is a key variable in determining size of city and overall potential services needed. Population change is an important variable indicating the changing character of a community and likewise the changing role of municipal government. Household median income indicates the economic nature of the community, as well as potential ability for residents to pay taxes. Residential land value and commercial land value are included in the analysis to differentiate the core makeup of the community -- commercial versus residential composition. These variables are also considered on a per capita basis. Finally, to frame the fiscal picture, 2005 property and sales tax revenue (two of three primary municipal tax revenue sources) are included for each city. Similar to the residential and commercial property values, the tax revenue data indicates the economic character of each community.

Cluster Analysis

The purpose of statistical clustering determines common traits across a variety of factors. This SPSS analysis grouped each city and town with like communities, within the framework of twelve distinct clusters. Salt Lake City remained the only outlying city not clustering with any like cities. This city stands alone as *cluster L* or simply as the *Capital City*. Of the twelve clusters, seven share a dominant urban dynamic, while the other five are primarily rural. Many of these clusters, both within the urban and rural description, cross geographical boundaries.

The figure below indicates the list of clusters falling within a larger categorization of urban and rural. However, this categorization cannot be limited to on or off the Wasatch Front. The high levels of population growth off the Wasatch Front are changing the urban structure of Utah. For example, a recent US Census Bureau report rated St. George City as the fastest growing metro area in the United States from April 2000 to July 2006.[2]

[2] U.S. Census Bureau, April 2007.

What are the clusters?

A. *Major Population Centers* (10 Cities)
These cities represent major economic and residential communities. These communities are older, established cities and together represent 30% of the entire state population. These cities have a much larger population density compared to the other clusters. The economies in these cities are diversified, offering a range of service-oriented professional jobs to manufacturing employment. In addition, most of these cities function as large retail hubs. Higher education institutions are also a unique economic factor shared by many of these cities

B. *Commercial Centers* (17 Cities)
The commercial property per capita ($6,133) in these cities is second only to the major city cluster. These cities are diversified cities that have a larger population and function as both residential and commercial centers for their surrounding region. Many of these are communities are growing at a modest rate. These cities largely have older established downtowns that have provided retail opportunities to neighboring communities for years.

C. *High Growth Communities* (10 Cities)
The incredible rate of growth from 2000 to 2005 is the primary variable linking these communities together. The overall household median income for these cities is also relatively high. Most of these high growth communities are newly incorporated cities that have changed dramatically in a short period of time. The economy in these cities varies significantly, however most have very low commercial sales and sales tax revenue.

D. *Residential Transitioning Communities* (33 Cities)
Low commercial property along with relatively high residential property value per capita cluster these communities together. Many of the residents of these communities commute to larger neighboring

cities. Traditionally these cities have a rural or agricultural heritage; however many in this cluster are now transitioning into urban outskirt communities with growing populations and moderately increasing commercial property.

E. *High Income Residential* (20 Cities)
These communities represent the highest median household incomes in the state of Utah. The income level, along with residential property tax value, are the two most significant variables tying these cities together. Most of these residents commute to a neighboring major city. Geographically this cluster is unique because of the Wasatch Front dominance, each city in this group except Oakley are along the Wasatch Front.

F. *Urban Edge Cities* (12 Cities)
This group represents a wide variance along most of the clustering variables. However, the one consistent factor is the close geographic proximity each of these cities share with a larger central city. This cluster is distinctive from the other clusters due to its high commercial and industrial property value, along with high sales tax revenue per capita. Overall these cities have a moderate population size and have experienced moderate growth since 2000. On average these communities have very low square mile land area and high population density.

G. *Resort Communities* (6 Cities)
These communities are identified by unique geographic location, proximity to either mountain ski resorts or National/State parks. These communities are all relatively small in population, but serve a much larger daytime population especially during heightened tourist seasons. Each of these communities currently assesses an additional 1.0% resort community sales tax. The cities in this cluster are grouped together for two primary reasons: high commercial and industrial property value and sales tax revenue per capita.

H. *Natural Resource/Mining Based Communities* (26 Cities)
Many of these communities are located across central Utah. In addition, these cities and towns have an economic history steeped in a mining or natural resource based industry. Overall these cities are smaller in population with stagnant population growth (overall average growth from 2000 to 2005 is 1.5%). These communities still have moderate commercial and industrial property value. Additionally, many share incorporation dates during WWI era when mining was critical to the Utah economy.

I. *Old Established Communities* (19 Cities)
One common characteristic tying together these cities and towns is their historic nature. The "youngest" community (Lewiston) in this cluster incorporated in 1921. A majority of these communities are also located in central Utah. Most of these communities experienced a slight decline in population between 2000 and 2005.

J. *Traditional Agricultural* (30 Cities)
This cluster represents the most geographically diverse grouping, ranging from cities in Iron or Washington County to Box Elder and Cache County. This cluster is unique from the other rural clusters due to their increasing populations. Unlike the old established communities (of similar size) these cities grew by an average of 11% from 2000 to 2005. Most of these cities are towns are traditional agricultural communities that are transitioning more toward a residential makeup. Many residents in these communities rely less on the agricultural economy, but are commuting to a neighboring economic or commercial center.

K. *Small Towns* (61 Cities)
These towns represent the unique and diverse small towns in Utah. Many of these towns are located in either Western or Central Utah. These towns have very little commercial and industrial property, representing the smallest per capita commercial land in the state. The population in these towns is stable -- either reporting slight decline or increase in the past five years.

L. *Capital City* (1 City)
Salt Lake City is the capital and most populated city in Utah. Salt Lake City is the economic headquarters for the Wasatch Front, providing a balance of industrial, service-oriented, professional, and business industries. Salt Lake City, known as the "Crossroads of the West" is also a key transportation hub for the state of Utah and the larger western Rocky Mountain region. For these reasons, Salt Lake City is an outlier that does not cluster with any other city.

Table 1: Description of each cluster

	Cluster Name	Description	No. of Cities	Example City
A	**Major Population Cities**	Largest population base, minimal growth, established communities, large commercial centers	10	Provo, St. George
B	**Commercial Centers**	Larger population, significant commercial and industrial regional centers, growing communities,	17	Cedar City, Logan
C	**High Growth Communities**	Communities with highest growth rates, high household income, low commercial	10	Cedar Hills, Syracuse
D	**Residential Transitioning**	Modest commercial property, increasing growth, many transitioning communities	33	Providence, Midway
E	**High Income Residential**	Highest median household income, moderate growth, low commercial	20	Farmington, Bountiful
F	**Edge Cities**	High per capita commercial and industrial property, moderate population size and population growth	12	North Logan, South Ogden
G	**Resort Communities**	Low population, high commercial property, high per capita revenue	6	Park City, Alta
H	**NR/Mining Based**	Older, low growth rural communities, small commercial property	26	Duchesne, Castle Dale
I	**Old Established Communities**	Older communities, low or declining population, some commercial component	19	Escalante, Manti
J	**Traditional Agricultural**	Traditional agricultural communities, primarily residential with increasing population, some growing commercial element	30	Hyrum, Fillmore
K	**Small Towns**	Smallest population, older established communities with low or declining growth, low commercial property	61	Hatch, Scofield
L	**Capital City**	Economic center of the state	1	Salt Lake City

Demographics

Understanding demographic trends is essential to both policymaking and policy review. The demographics of Utah are especially unique compared to national averages. Utah currently has the highest fertility rate and the highest household size in the nation.[3] In addition, Utah has the lowest median age, but maintains the third highest life expectancy in the nation.[4] Utah overall is unique from the national average; however, there is significant demographic diversity locally. For example, table 2 indicates that some cities in Utah have nearly twice the population percentage of residents over the age of 64. This demographic diversity has implications to both municipal finance and services. In addition, due to the aging baby boomers and increasing life expectancy, the over 64 population is becoming a more significant percentage of the state's population. The aging boom is creating new challenges and opportunities for municipal government. The Utah Governor's Office of Planning and Budget predicts that by 2040 Utah's over 65 dependency ratio will double. This increase will be felt statewide, but will impact individual cities differently.

Table 2: Cluster Population Demographics

CLUSTER TYPE	Incorporation Data	Population % Growth 00-05	% Population under 5-17	% Population over 64
		Urban		
Major Cities	1902	12.2%	22.0%	8.0%
Commercial Centers	1882	20.4%	22.4%	9.1%
High Growth	1963	194.4%	28.0%	4.2%
Residential Transitioning	1913	10.0%	26.3%	10.1%
High Income	1938	22.3%	27.8%	6.5%
Urban Edge Cities	1945	13.8%	24.3%	9.7%
Capital City	1851	-2.0%	15.7%	11.0%
		Rural		
Resort Communities	1939	2.6%	16.8%	10.4%
NR/Mining Based	1912	1.5%	27.2%	10.4%
Old Established	1884	-2.1%	26.6%	11.9%
Traditional Ag.	1918	10.7%	26.3%	10.2%
Small Town	1932	-0.4%	24.4%	14.8%
Total Average	**1915**	**23.6%**	**24.0%**	**9.7%**

Source: **2000 U.S. Census Bureau; 2005 Population estimates Governor's Office of Planning and Budget**

In 2006, Utah's population grew by 2.7% or by an increase of 67,000 new Utahns. The above table indicates the types of cities that are absorbing most of this growth. Projections indicate that Utah's population will continue to grow at near the same rate or higher. The population growth has largely occurred in booming suburbs, or 'boomburbs', where cities have grown by incredible portions in a short period of time. Most of these booming areas transition from once farmland to incredible residential neighborhoods.

[3] 2007 Economic Report to the Governor (ERG). Utah Governor's Office of Planning and Budget.
[4] 2007 ERG.

Economy

It is difficult to capture the economy of a city through a single variable. Often the economic industries are varied and complicated to quantify. However, a simple variable is overall commercial and industrial property value within a city. This number provides a general representation of the city's economy, without getting to the details of what type of services or professions occupy the commercial property. In addition, to the commercial and industrial land value sales tax revenue data indicates the amount of retail available in a city. See table 3 for the cluster averages across these variables.

Table 3: Economic Factors

CLUSTER TYPE	Commercial and Industrial Property	Commercial and Industrial *Per Capita*	Sales Tax Revenue	Sales Tax Revenue *Per Capita*
		Urban		
Major Cities	$912,407,721	$11,773	$12,727,315	$165
Commercial Centers	$249,280,237	$10,599	$3,617,223	$165
High Growth	$48,257,016	$5,187	$1,146,280	$113
Residential Transitioning	$7,880,196	$4,120	$211,389	$104
High Income	$82,195,543	$3,732	$1,544,002	$90
Edge Cities	$95,738,690	$13,959	$1,445,081	$256
Capital City	$5,395,609,980	$30,296	$42,756,404	$240
		Rural		
Resort Communities	$76,569,265	$39,036	$1,065,027	$786
NR/Mining Based	$9,680,462	$3,623	$271,195	$120
Old Established	$6,947,705	$2,619	$239,020	$115
Traditional Ag.	$10,819,791	$5,018	$265,215	$111
Small Town	$2,149,349	$9,342	$31,033	$116
Total Average	**$574,794,663**	**$11,609**	**$5,443,265**	**$198**

Source: **Utah Tax Commission, Utah League of Cities and Towns, Utah State Auditor**

The overall economy of Utah has been incredibly strong the last three years. The strength of this economy is not limited to one industry or one region. In 2006, job growth in Utah was at 5.2%, the highest rate since the mid 1990s.[5] Financial activities and professional or business services continue to lead all industries as a percent of gross domestic product. Around one third of the state GDP is a result of financial activity or professional service industries.[6]

Total construction value reached an all-time high statewide in 2006. In addition, mining and natural gas related jobs increased by 18.0% in 2006. Cash receipts from agricultural production also continue to increase. Agriculture cash receipts increased by 5.7% from 2004 to 2005 and economic forecasts predict continued growth. Tourism, another key economic industry to many communities, increased in 2006. Total spending by travelers and tourists increased to $5.8 million in 2006, a 7.7% increase from 2005. All of these industries have strengthened state and municipal government.

[5] 2007 ERG.
[6] Source: U.S. Bureau of Economic Analysis

Residential

The residential makeup of a city is also significant in determining city types. Cities often balance the priorities of open space, affordable housing, and new development. Residential property indicates the character of community. The clustering analysis considered primary residential land and building value for each city. This analysis also considered the residential property value per capita for each community. Property tax revenue for 2005, aggregate and per capita, shapes the land and residential features of a city. This property tax number indicates both the residential and commercial value component. Salt Lake City and resort communities are especially high along these variables. Residential transitioning and traditional agricultural communities are the lowest per capita property tax generating cities. The natural resource/mining based communities have the lowest residential property value among the clusters.

Table 4: Residential Property Factors

CLUSTER TYPE	Primary Residential Property Value	Property Value *Per Capita*	Property Tax Revenue	Property Tax Revenue *Per Capita*
		Urban		
Major Cities	$1,743,796,191	$22,287	$6,094,930	$77
Commercial Centers	$435,554,653	$17,853	$1,548,705	$60
High Growth	$232,982,487	$22,201	$559,125	$52
Residential Transitioning	$52,589,283	$24,284	$108,293	$46
High Income	$416,325,016	$29,481	$1,012,286	$64
Edge Cities	$163,504,271	$21,605	$493,664	$58
Capital City	$5,055,390,082	$28,386	$61,511,360	$345
		Rural		
Resort Communities	$155,049,925	$43,308	$1,255,870	$671
NR/Mining Based	$21,981,073	$11,567	$105,694	$53
Old Established	$30,400,517	$17,404	$117,222	$65
Traditional Ag.	$40,388,453	$16,029	$125,289	$46
Small Town	$4,275,562	$15,140	$16,643	$205
Total Average	**$696,019,793**	**$22,462**	**$6,037,964**	**$145**

Source: **Utah Tax Commission, Utah League of Cities and Towns, Utah State Auditor**

Residential properties accounted for nearly 70% of all new construction statewide. In 2006, construction activity for residential properties reached an all-time high of $5.1 billion, a 9.4% increase from 2005.[7] Residential homes are often divided into two groups: single family units and multifamily units. Single family units continue to make up most of the new residential development, outnumbering new multifamily units 3.6 to 1 (20,500 to 5,700).[8] Sixty percent of all new residential growth occurred in Salt Lake, Utah, and Washington County. In 2006, the cities leading the way in new single family home construction were Lehi (1,649 new homes), South Jordan (1,088), St. George (1,078), Eagle Mountain (893), and Riverton (716).[9] Affordable housing is becoming an increasingly important issue for municipal government. This issue is

[7] Source: University of Utah, David Eccles School of Business, Bureau of Economic and Business Research (BEBR)
[8] Source: 2007 Economic Report to the Governor, pg. 159.
[9] BEBR Construction Information Database

especially significant in the Wasatch Front, where a once under-valued real estate market is beginning to catch-up in appreciation.

Summary

Each city and town in Utah is unique and diverse. The unique character of our cities is what makes Utah a great place to live. This high quality of life in Utah largely depends on the strength of statewide municipal government. No cluster or grouping is perfect. This ULCT analysis groups cities based on common characteristics across all variables, yet there are still some outliers within clusters. However, each of these clusters provides an interesting picture of city types in Utah. This picture is helpful in determining demographic and economic statewide trends. Primarily this clustering increases the ability to evaluate potential policy implications through a better understanding of common city compositions.

Methodology

The analytical methodology employed for this is a two-way cluster analysis in SPSS. Individual city name operated as the categorical variable. A predetermined set of clusters was specifically fixed at 12, after a trial run of 8 and 15 cluster analyses. The eleven used variables were standardized, none were weighted. The SPSS output provided a descriptive by cluster, cluster frequencies, and created a new cluster membership variables. Salt Lake City is the only Utah city that operated as a complete outlier and did not cluster with any other cities. ULCT staff reviewed cluster memberships and identified additional outliers within clusters. A small number of outlying cities were moved to a new cluster membership that appeared to represent a more broad and consistent grouping (this occurred for Springdale, Panguitch, Moab, and Vernal).

About the League

The Utah League of Cities and Towns (ULCT) initially was organized in 1907. ULCT serves 243 incorporated municipalities in the state of Utah. ULCT represents municipal government's interests with a strong, unified voice at the state and federal levels and provides information, training, and technical assistance to local officials on municipal issues in order to create a greater public awareness and understanding of municipal responsibilities, governance, and administration.

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Appendix A:

CLUSTER A: Major Cities
Layton
Murray
Ogden
Orem
Provo
Sandy
St. George
Taylorsville
West Jordan
West Valley City

CLUSTER B: Commercial Centers
American Fork
Brigham City
Cedar City
Clearfield City
Hurricane
Lehi
Logan
Midvale
Payson
Pleasant Grove
Roy
South Salt Lake
Spanish Fork
Springville
Tooele
Vernal
Washington

CLUSTER C: High Growth Communities
Cedar Hills
Centerville
Clinton
Eagle Mountain
Harrisville
Herriman
Lindon
Saratoga Springs
Syracuse
West Haven

CLUSTER D: Residential Transitioning
Amalga
Bear River
Cedar Fort
Charleston
Deweyville
Elwood
Francis
Garden City
Huntsville
Hyde Park
Ivins
Laketown
Leeds
Mantua
Mendon
Millville
Morgan
Paradise
Perry
Plain
Providence
River Heights
Salem
Santa Clara
Stockton
Sunset
Uintah
Wallsburg
Wellsville
West Bountiful
West Point
Willard

CLUSTER E: High Income Residential
Alpine
Bluffdale
Bountiful
Cottonwood Heights
Draper
Elk Ridge
Farmington
Fruit Heights
Highland
Holladay
Hooper
Kaysville
Mapleton
North Ogden
Oakley
Pleasant View
Riverton
South Jordan
South Weber
Woodland Hills

CLUSTER F: Urban Edge Cities
Farr West
Heber City
Marriott-Slaterville
Naples
North Logan
North Salt Lake
Riverdale
Smithfield
South Ogden
Tremonton
Washington Terrace
Woods Cross

CLUSTER G: Resort Communities
Alta
Brian Head
Moab
Panguitch
Park City
Springdale

CLUSTER H: Natural Resource/Mining Based
Blanding
Castle Dale
Cleveland
Duchesne
East Carbon
Enterprise
Eureka
Ferron
Gunnison
Helper
Hildale
Hinckley
Huntington
Levan
Minersville
Monticello
Myton
Oak City

Orangeville
Price
Roosevelt
Spring City
Wellington
Wendover

CLUSTER I: Old Established Communities
Annabella
Aurora
Centerfield
Clarkston
Elsinore
Escalante
Fairview
Fountain Green
Garland
Lewiston
Manti
Monroe
Moroni
Mt. Pleasant
Newton
Parowan
Richfield
Richmond
Salina

CLUSTER J: Traditional Agricultural
Ballard
Beaver
Coalville
Corinne
Delta
Enoch
Ephraim
Fillmore
Genola
Goshen
Grantsville
Green River
Henefer
Honeyville
Hyrum
Kamas
Kanab
La Verkin
Milford
Mona
Nephi
Nibley
Orderville
Redmond
Rush Valley
Santaquin
Toquerville

CLUSTER K: Small Towns
Altamont
Alton
Antimony
Bicknell
Big Water
Boulder
Cannonville
Castle Valley
Circleville
Clawson
Cornish
Elmo
Emery
Fayette
Fielding
Glendale
Glenwood
Hanksville
Hatch
Henrieville
Holden
Howell
Joseph
Junction
Kanarraville
Kanosh
Kingston
Koosharem
Leamington
Loa
Lyman
Lynndyl
Manila
Marysvale
Mayfield
Meadow
New Harmony
Ophir
Paragonah
Plymouth
Portage
Randolph
Rockville
Rocky Ridge
Scipio
Scofield
Sigurd
Snowville Town
Sterling
Sunnyside
Tabiona
Torrey
Trenton
Tropic
Vernon
Vineyard
Virgin
Wales
Woodruff