

Where are the Legacy Cities?

Framing Urban Growth and Decline within the Regional Economy

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Outline

1 Setup

- Motivation
- Legacy Cities
- Problem

2 Model

- Cluster-Discriminant Analysis
- Discussion



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Motivation

- **Purpose:** to test the construct of the ‘legacy city’
- **Method:** cluster-discriminant analysis
- **So What?:** the “Legacy City” label is being used by mayors, advocates, and philanthropy as a rhetorical tool in policy discussions. This study provides an empirical application of the construct, whereby places with similar sets of assets and challenges may be identified.



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Legacy Cities



¹ legacy 
noun | leg·a·cy | \le-gə-sē\

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Definition of LEGACY

plural legacies

- 1 : a gift by will especially of money or other personal property : BEQUEST • She left us a *legacy* of a million dollars.
- 2 : something transmitted by or received from an ancestor or predecessor or from the past • the *legacy* of



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Legacy Cities

- **Legacy cities:** places where a complex mixture of *assets* and *challenges* provide a unique variety of opportunities and hurdles
- The strategy that follows is that older industrial cities have assets whose value is being limited by the wider urban context (of decline). By reinvesting in those assets, they can meet a set of demands that the current economy is generating.



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Legacy Cities

Conceptual Framework

Legacy City Assets	Legacy City Challenges
Traditional downtowns	Population and employment decline
Anchor institutions	Vacancy, low property values
Historic industrial clusters	Crime
Large nonprofits, foundations	Poverty, poor health, and inequality
Extensive transportation networks	Deteriorating infrastructure
Historic neighborhoods and architecture	Brownfields and environmental distress



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Legacy Cities

Conceptual Framework

Assets	Legacy inherited from
Traditional downtowns	Density
Anchor institutions	Wealth
Historic industrial clusters	Entrepreneurs
Large nonprofits and foundations	Philanthropy
Extensive transportation networks	Infrastructure
Historic neighborhoods and architecture	Settlement



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Legacy Cities

Conceptual Framework

Challenges	Legacy inherited from
Population and employment decline	Competitive regions
Vacancy, blight, and low property values	Low growth
Crime	Lack of opportunity
Poverty and inequality	Labor market mismatches
Deteriorating infrastructure	Lack of wealth
Brownfields and environmental distress	Abandonment



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Problems

- Legacy cities are a ‘fuzzy’ concept (Markusen 1999) designed more to attract participants than to provide a model for development.
- Popularly branded constructs can become rhetorical tools but are not necessarily public policies
- The legacy city framework is poorly operationalized:
 - ① An ex post rationalization from a list (or image)
 - ② A category that a place cannot ‘graduate’ from
 - ③ Spatial unit of analysis is mis-specified from an economic perspective



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Research Objective

- **Purpose of Analysis:** “...to add an *empirical backbone* to the construct of legacy cities by concretely distinguishing them from their peer cities throughout the US.”
- **Universe:** 354 metropolitan areas
- **Anticipated Output:** groups of metro area clusters, identified by a combination of their assets and challenges



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Cluster-Discriminant Analysis

- **Cluster analysis:** mathematical technique that generates homogeneous groups of MSAs
- **Discriminant analysis:** tests the statistical validity of the cluster homogeneity



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Cluster-Discriminant Analysis

Discriminant Analysis

- Discriminant analysis uses cluster group assignments as ‘priors’
 - A function’s “discriminant power” tells us how well it separates cases into groups.
 - The “hit ratio” describes how closely the statistical predictions match the mathematical priors.
- Dimensionality reduction: 33 variables → 12 discriminant functions
- Discriminant functions are used to characterize the differences among the clusters of MSAs

Number of clusters in solution (K)	5	8	13
Hit ratio from the discriminant analysis	89.3%	87.3%	90.7%



Cluster-Discriminant Analysis

Discriminant Function Correlations

	Function 1	Function 2	Function 3	Function 4	Function 5	Function 6	Function 7	Function 8	Function 9	Function 10	Function 11	Function 12
DECDS_SNC_PEAK	.577*	-0.23	0.014	0.053	-0.274	0.218	-0.112	-0.04	0.219	0.056	-0.109	0.068
HOME_OLDR1940_C	.496*	-0.183	0.01	0.066	-0.109	0.106	-0.199	-0.164	-0.082	-0.141	0.182	0.076
DECL_SNC_PEAK	-.493*	0.239	-0.035	-0.038	0.3	-0.253	0.153	0.061	-0.324	-0.095	0.17	0.248
HNSG_STOCK_AGEb	.473*	-0.138	-0.014	0.041	-0.182	0.133	-0.179	-0.068	-0.111	-0.048	0.175	0.167
POP_MMNTM	-.288*	0.228	-0.003	0.015	-0.044	-0.17	0.179	-0.143	0.107	-0.285	-0.208	-0.19
AGE	.281*	0.176	-0.019	0.065	-0.098	-0.003	-0.1	-0.038	-0.06	-0.074	-0.277	0.174
BAD_BRIDGEb	.264*	-0.14	0.051	0.076	-0.077	0.06	-0.107	-0.116	-0.073	-0.045	0.012	0.061
FLIGHTS	0.164	.466*	0.054	-0.092	-0.13	-0.443	0.245	-0.073	0.128	0.346	-0.2	-0.15
TRANSP	0.293	.463*	-0.189	-0.221	0.256	0.237	-0.217	0.321	-0.078	-0.267	0.076	-0.197
R1	0.231	.404*	-0.111	-0.054	0.364	0.107	-0.079	-0.035	0.214	-0.047	-0.082	-0.027
DENSITY	0.307	.375*	-0.114	-0.158	0.065	0.178	-0.031	0.014	-0.001	-0.035	-0.001	0.197
BELOW_DIPLO	-0.231	0.021	-.544*	0.017	-0.333	0.123	0.021	0.339	0.331	-0.029	0.226	0.359
IMMIGRANT	-0.111	0.462	-.531*	-0.037	-0.114	0.225	0.148	-0.331	0.143	0.206	0.146	0.03
PCT_UNDR18	-0.152	0.081	-.315*	0.15	-0.251	-0.239	-0.028	0.245	-0.11	-0.193	-0.13	-0.146
ST_CAP	-0.007	0.41	0.352	.641*	-0.139	0.105	-0.318	0.01	0.072	0.157	-0.044	0.13
LOW_INC_HSING	0.152	0.022	-0.095	.303*	0.072	0.142	0.197	0.221	-0.047	0.154	-0.049	0.244
PCT_65OVR	0.028	-0.082	0.381	-0.292	-0.148	.439*	0.191	-0.016	0.045	0.022	0.351	0.094
VACAN_C	0.027	-0.06	0.214	-0.153	-0.111	.295*	0.2	0.056	0.266	-0.005	0.153	0.074
CHRASTS	0.231	0.184	-0.021	0.39	0.205	0.198	.419*	0.016	-0.03	-0.077	-0.069	-0.066
BACH_PLUS	0.082	0.248	0.128	0.063	0.455	-0.019	-0.036	-.600*	-0.026	0.014	-0.211	0.116
PCT_OBESEx	0.04	-0.259	0.061	0.094	-0.105	-0.081	-0.105	.501*	0.092	0.064	0.185	0.062
PCT_SMOKEb	0.031	-0.199	0.152	-0.112	-0.087	-0.064	-0.017	.399*	0.017	0.001	0.056	0.06
INF_MR	-0.04	-0.235	0.114	0.022	0.205	-0.03	-0.105	.369*	0.173	0.212	0.223	0.061
PROP_CRP1K	-0.131	0.018	0.045	0.008	-0.077	-0.088	0.042	.339*	0.133	0.015	-0.214	0.175
POVERTY	-0.186	-0.128	-0.225	0.02	0.074	-0.008	-0.07	0.194	.584*	-0.096	0.07	-0.026
CIV_LFPR	0.152	0.172	-0.013	0.193	0.112	-0.347	-0.131	-0.297	-.426*	-0.012	-0.025	0.182
GINI	-0.031	0.08	-0.07	-0.108	0.202	0.128	-0.005	-0.035	.400*	0.04	-0.098	0.326
LAND_USE_MIXb	-0.034	-0.015	0.142	0.049	0.045	0.08	0.013	-0.156	-.162*	-0.064	-0.088	0.076
MED_VALUE_C	-0.063	0.269	-0.159	-0.107	0.224	0.326	0.039	-0.329	-0.255	.547*	-0.328	0.022
GMP_MFG_LQ	0.051	-0.196	-0.015	-0.038	0.061	-0.086	-0.139	0.202	-0.054	.205*	0.171	0.197
H2O_VIOL	-0.069	0.033	-0.081	-0.018	-0.089	0.025	0.069	0.019	0.021	-.176*	-0.169	0.061
SFUND	0.185	0.103	-0.057	-0.103	0.028	0.028	-0.088	-0.019	-0.212	-0.068	.276*	0.093
HIST_PROP	0.174	0.059	0.025	-0.046	-0.009	0.05	-0.074	-0.118	0.061	-0.061	-0.185	.429*

Cluster-Discriminant Analysis

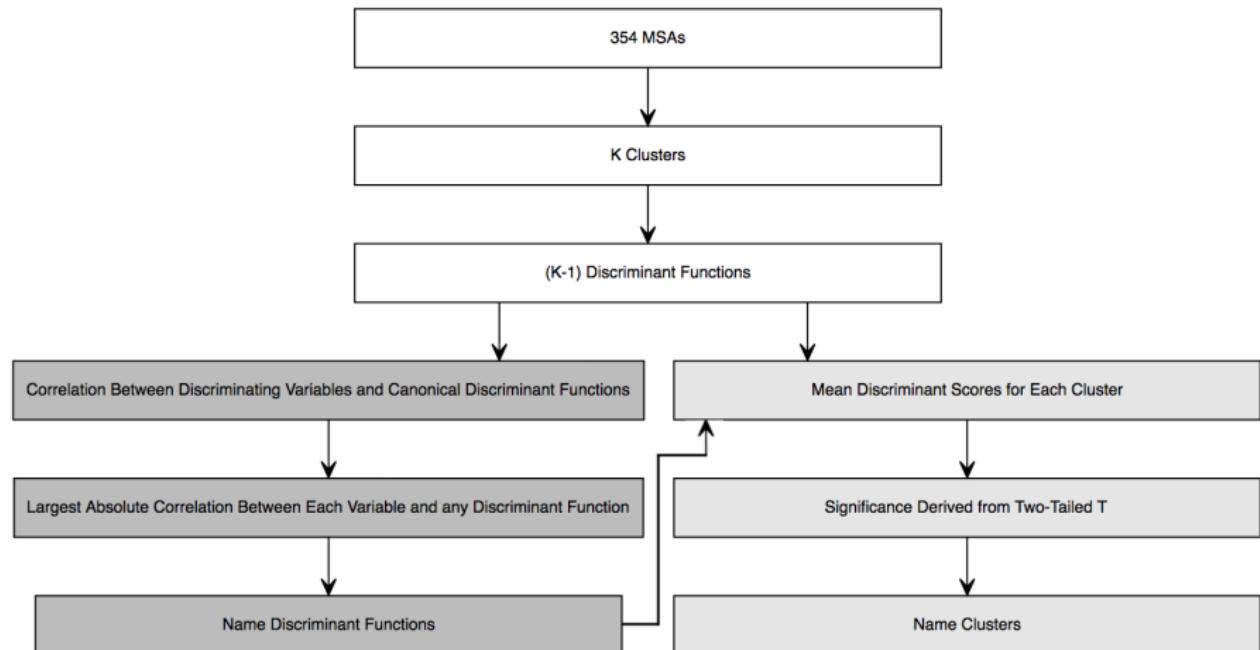
Cluster Means at Each Function

Cluster	Function 1: Old Central City, Prolonged Decline	Function 2: Connected & Strong Anchors	Function 3: Low School Dropouts, Few Kids, High Nativity	Function 4: State Capitals	Function 5: College Educated	Function 6: Older Residents, Vacant Homes	Function 7: Anchored Philanthropy	Function 8: Low Educational Attainment, Poor Health	Function 9: Poverty, Low LFPR, High Inequality	Function 10: Expensive Central City Homes	Function 11: Superfund Sites	Function 12: Historic Preservation
1. Young Central City, Growing Metro	-1.41**	-0.08	0.32	-0.77	0.09	-0.46	0.32	0.12	-0.37	-0.60	-0.76	-0.28
2. Old Central City, Declining Metro	3.41**	-0.82	-0.06	0.02	-1.07	0.14	-0.38	-0.96	0.24	-0.38	-0.42	0.58
3. Weak Assets, Low Human Capital	-1.13	-1.33***	0.09	-0.31	0.68	-0.09	0.17	1.91***	0.19	0.53	0.08	0.51
4. State Capitals, Undiversified Economic Base	4.36	1.69	-0.59	7.34***	2.71*	1.94	5.86***	0.55	-0.18	-0.24	-0.31	-0.22
5. Low Economic Distress	0.78	-0.73	0.17	-0.03	0.20	-1.21	0.15	-0.44	-1.82**	-0.18	0.92	-0.06
6. Old Central City, Declining, Weak Assets	2.63**	-2.74***	0.38	0.06	-0.96	0.71	-0.64	0.63	0.82	0.66	0.20	-0.80
7. Unconnected College Towns	-1.19	-0.89*	-0.19	0.04	3.73***	-0.43	-0.61	-1.81	1.66	-0.01	0.29	-0.03
8. Connected, with Strong Anchors	1.21	5.43***	0.88	-1.45	-1.54	-3.00	1.61	-0.35	1.45	1.61	0.10	-0.07
9. Healthy State Capitals	-1.92**	2.74**	2.69***	3.26***	-0.67	0.49	-1.97**	0.07	-0.14	0.05	0.05	0.02
10. Low-Skill, Low Nativity, Growing City	-2.93***	0.54	-4.95***	0.97	-2.11**	0.25	0.14	-0.09	0.83	-0.67	0.54	-0.03
11. Retirement and Vacation Communities	-2.64**	0.90	3.97***	-3.58***	-1.28**	3.98**	2.19**	-1.10	0.42	-0.45	0.96	0.15
12. Poster Child Metros	6.55***	8.79**	-3.30*	-3.71*	3.45	2.35	-2.27	2.48	-0.50	-1.26	0.34	-0.26
13. High Human Capital, Young, Migrant	-1.82**	0.82	-3.77**	-0.66	0.65	2.71*	-0.48	-2.07***	-2.53***	3.37	-0.95	0.02

*p <.05; **p <.01; ***p <.001 (two-tailed)

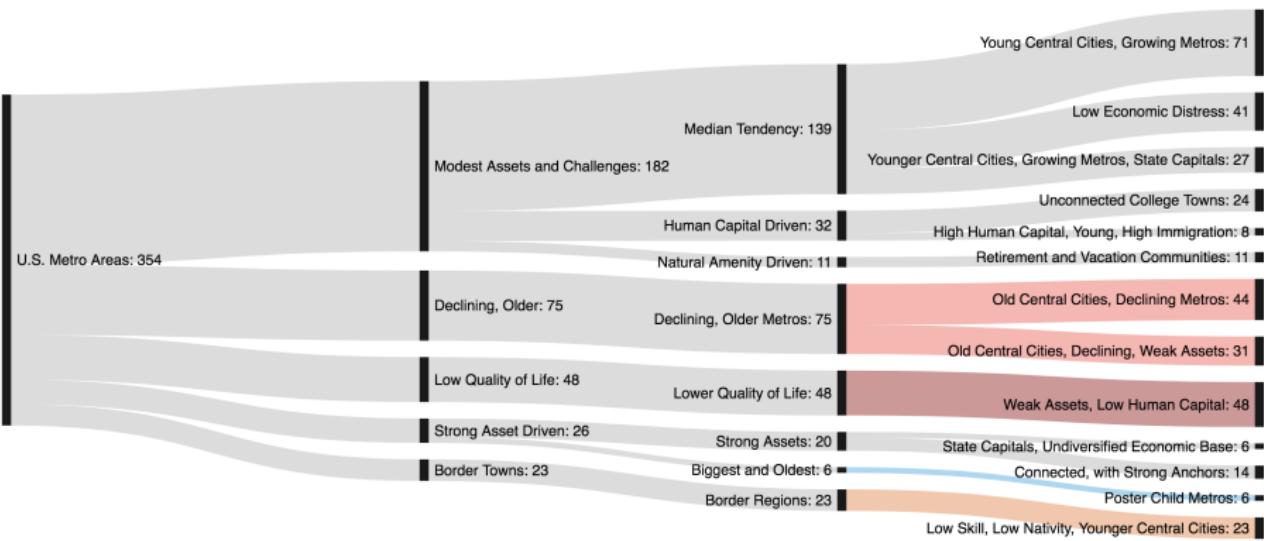
Cluster-Discriminant Analysis

Workflow



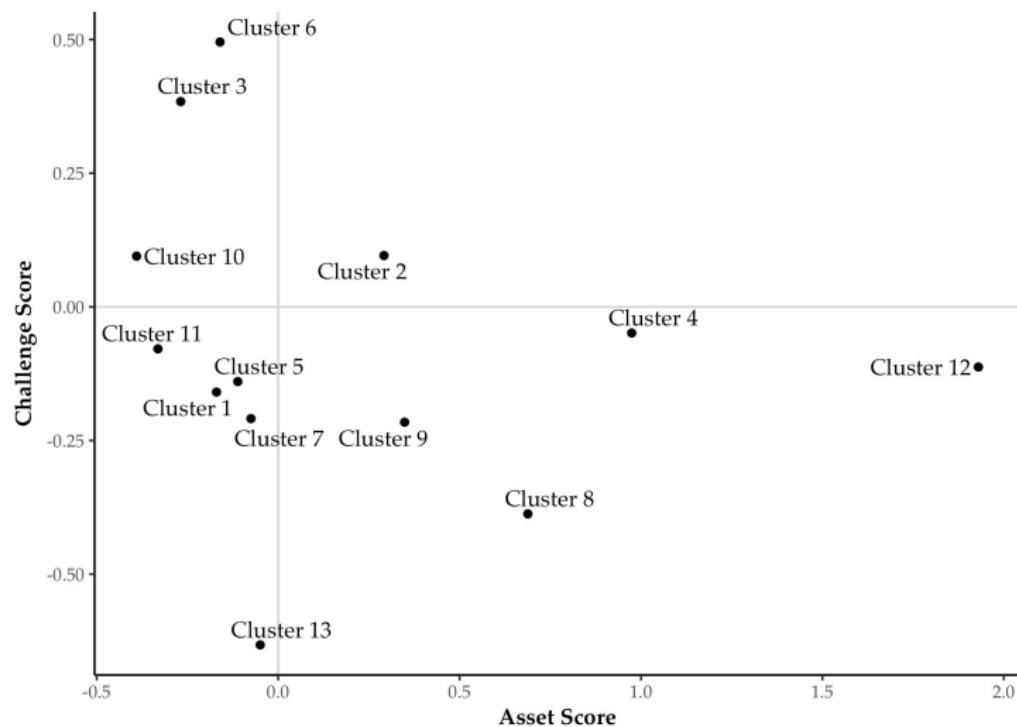
Findings

Cluster Tree



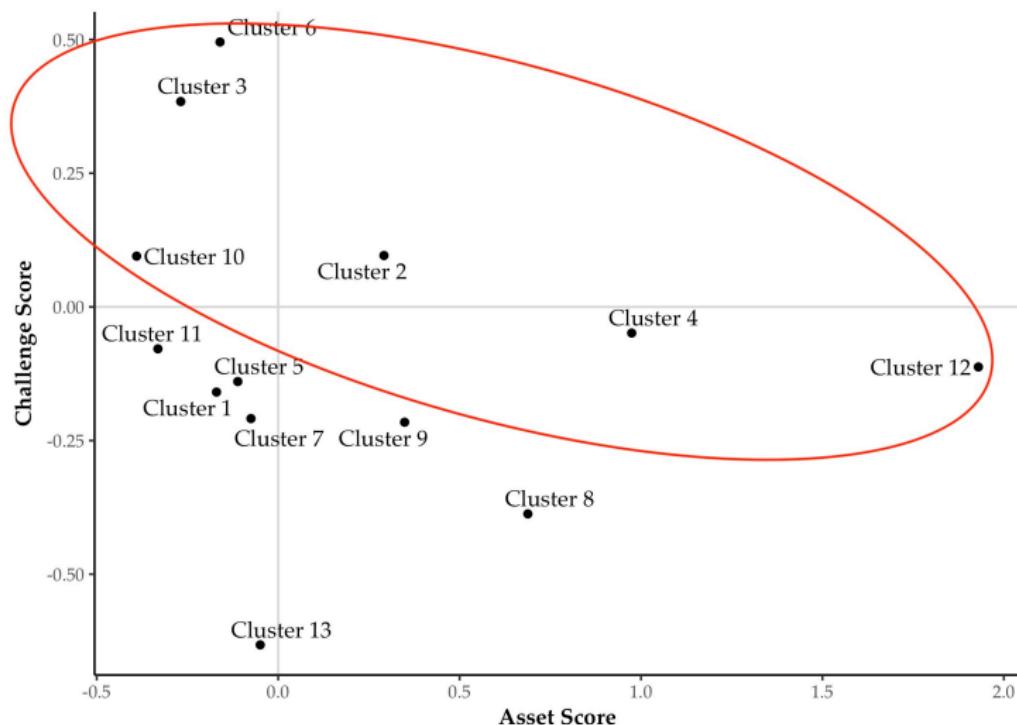
Findings

2x2 Matrix



Findings

2x2 Matrix: Clusters of Interest



Findings

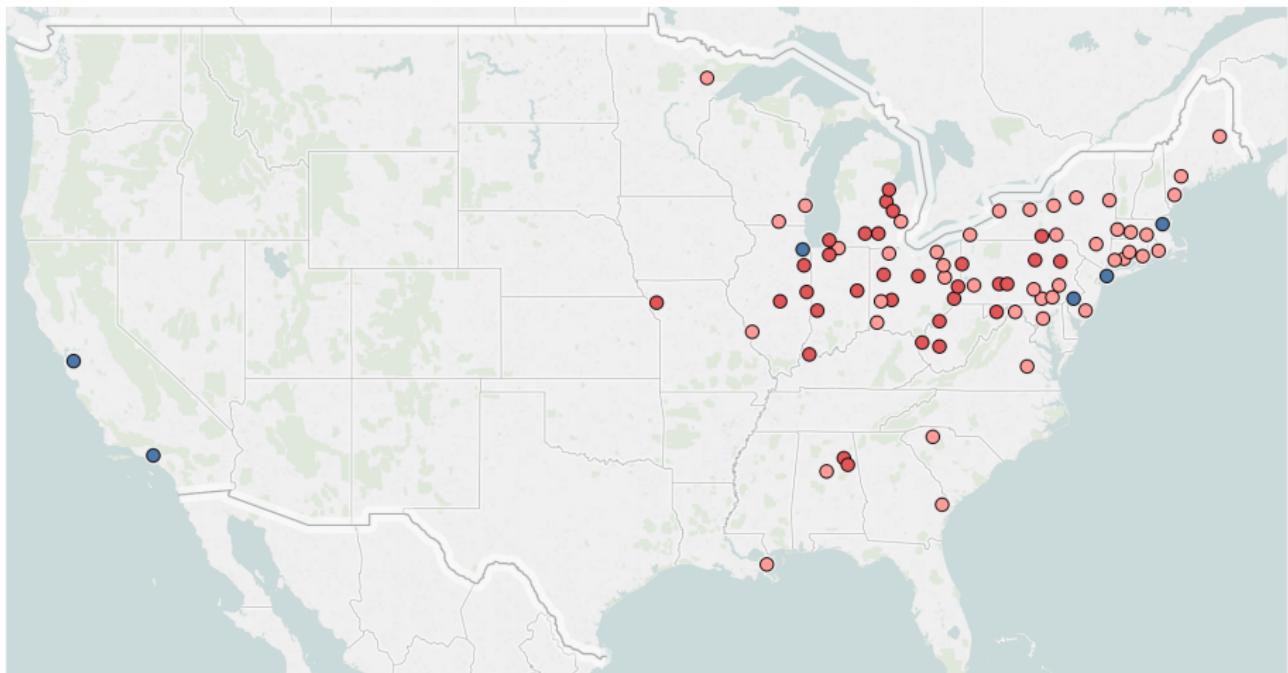
- Population loss from peak is represented by discriminant Function 1
- The coefficient is positive (meaning older, past-peak, declining) for clusters 2, 6, and 12
- Each of these three clusters is different from one another in the *other* dimensions that define legacy cities:
 - ① **Cluster 2:** Old Central City, Declining Metro (**St. Louis, MO; Akron, OH; and Rochester, NY**)
 - ② **Cluster 6:** Old Central City, Declining, Weak Assets (**Scranton, PA; Decatur, IL; and Jackson, MS**)
 - ③ **Cluster 12:** Poster Child Metros (**Boston, Chicago, NYC, etc.**)



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Visualization

Clusters 2, 6, and 12



Findings

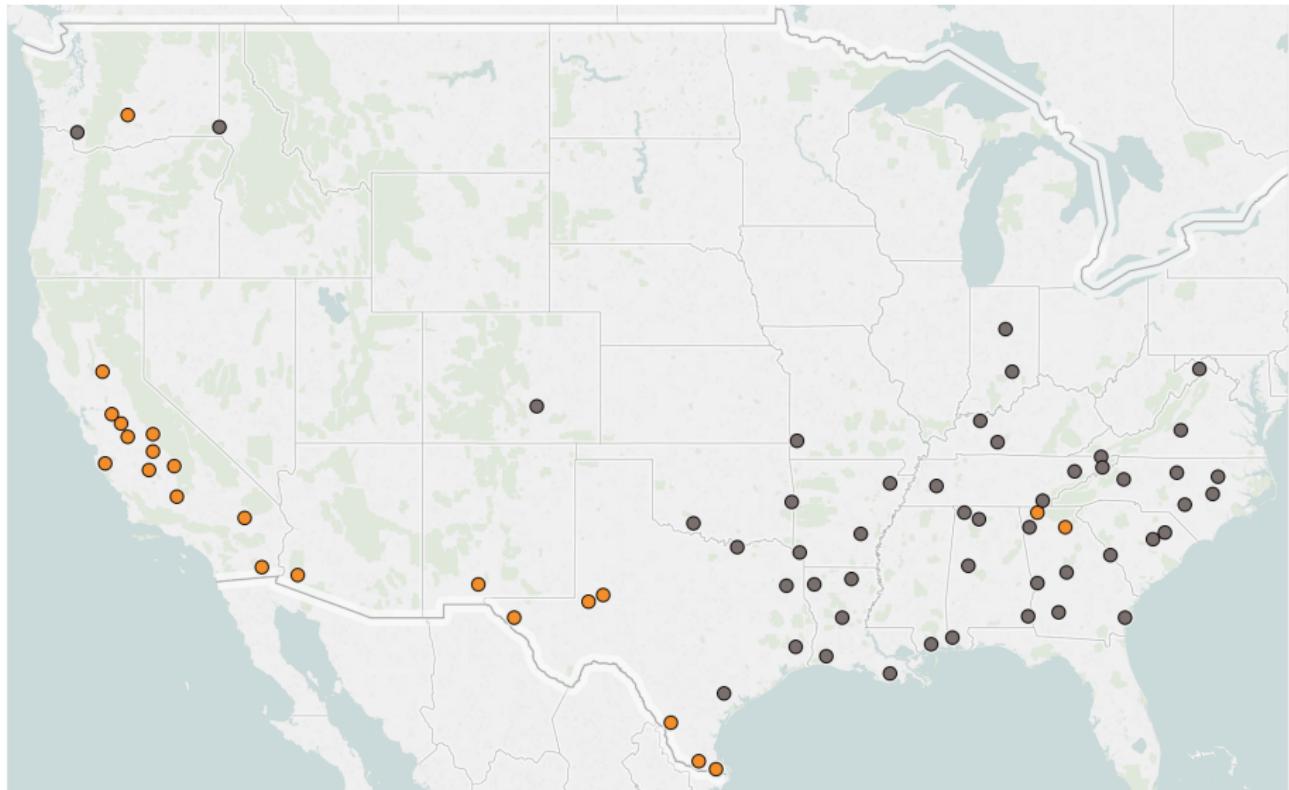
- Function 1 had to do with population decline and an old central city.
- Function 2 deals more with assets (or the lack thereof)
- Other clusters in the northern (challenged) quadrants need to be addressed
 - ① **Cluster 3:** Weak Assets, Low Human Capital ([Shreveport, LA](#); [Mobile, AL](#); and [Lynchburg, VA](#))
 - ② **Cluster 10:** Low Skill, Low Nativity, Younger Central Cities ([El Paso, TX](#); [Stockton, CA](#); and [Yuma, AZ](#))



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Visualization

Clusters 2, 6, and 12



Discussion

- The term “legacy cities” is a fuzzy policy buzzword.
 - Testing the construct removes the fuzziness
 - The *region* is a preferable unit of analysis over the *city*. A “legacy region” reflects the challenges of its housing and labor markets while highlighting the revitalization potential of its central city
 - The added clarity provides a firmer basis for differentiated regional development strategies...most important however, is to *get the science right*.
- **But what about public policy?**



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Public Policy Implications

- **Cluster 2:** the formula suggested by the legacy city framework makes sense (community development)
- **Cluster 6:** same as Cluster 2, but traditional (luck-based) anchors are lacking...find anchors that work
- **Cluster 12:** the path dependency of history and agglomeration transitioned the economy (avoiding many post-industrial challenges)
- **Cluster 3:** still have their 1950s-60s employment bases, but they're threatened (and vulnerable without strong assets)
- **Cluster 10:** geographically cohesive set of MSAs (Southwest border cities); employment bases not challenged but not places of growth



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Conclusion

Thank you!

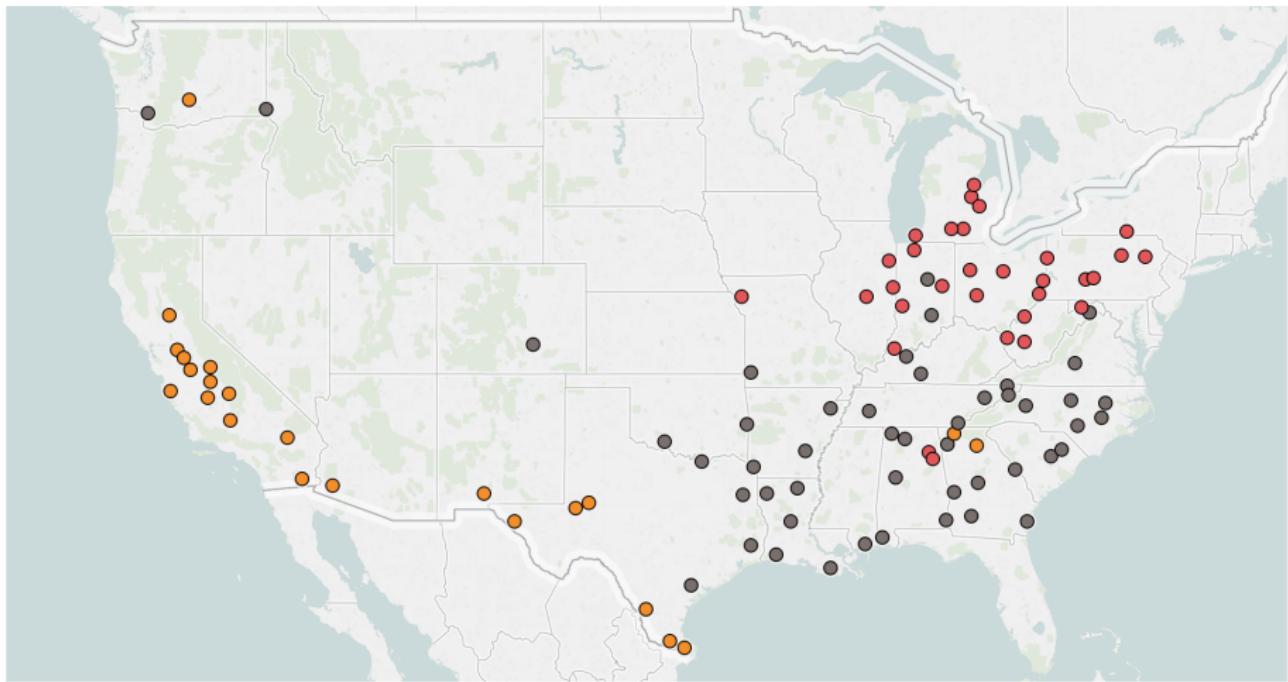
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Visualization

Clusters 2, 6, and 12



Cluster-Discriminant Analysis

Partial Agglomeration Schedule

Stage	Clusters	Agglomeration Coefficient	First Derivative (%)	Second Derivative (%)
340	14	18.035	0.00	-0.91
341	13	18.060	0.00	-0.69
342	12	19.315	0.07	48.81
343	11	21.758	0.13	0.82
344	10	22.027	0.01	-0.90
345	9	23.059	0.05	2.79
346	8	23.082	0.00	-0.98
347	7	25.236	0.09	94.94
348	6	27.898	0.11	0.13
349	5	28.047	0.01	-0.95
350	4	30.393	0.08	14.70
351	3	33.964	0.12	0.40
352	2	41.762	0.23	0.95
353	1	48.198	0.15	-0.33

Cluster-Discriminant Analysis

Discriminant Function Correlations

	Function 1	Function 2	Function 3	Function 4	Function 5	Function 6	Function 7	Function 8	Function 9	Function 10	Function 11	Function 12
DECDS_SNC_PEAK	.577*	-0.23	0.014	0.053	-0.274	0.218	-0.112	-0.04	0.219	0.056	-0.109	0.068
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PCT_65OVR	0.028	-0.082	0.381	-0.292	-0.148	.439*	0.191	-0.016	0.045	0.022	0.351	0.094
VACAN_C	0.027	-0.06	0.214	-0.153	-0.111	.295*	0.2	0.056	0.266	-0.005	0.153	0.074
CHRASTS	0.231	0.184	-0.021	0.39	0.205	0.198	.419*	0.016	-0.03	-0.077	-0.069	-0.066
BACH_PLUS	0.082	0.248	0.128	0.063	0.455	-0.019	-0.036	-.600*	-0.026	0.014	-0.211	0.116
PCT_OBESEx	0.04	-0.259	0.061	0.094	-0.105	-0.081	-0.105	.501*	0.092	0.064	0.185	0.062
PCT_SMOKEb	0.031	-0.199	0.152	-0.112	-0.087	-0.064	-0.017	.399*	0.017	0.001	0.056	0.06
INF_MR	-0.04	-0.235	0.114	0.022	0.205	-0.03	-0.105	.369*	0.173	0.212	0.223	0.061
PROP_CRP1K	-0.131	0.018	0.045	0.008	-0.077	-0.088	0.042	.339*	0.133	0.015	-0.214	0.175
POVERTY	-0.186	-0.128	-0.225	0.02	0.074	-0.008	-0.07	0.194	.584*	-0.096	0.07	-0.026
CIV_LFPR	0.152	0.172	-0.013	0.193	0.112	-0.347	-0.131	-0.297	-.426*	-0.012	-0.025	0.182
GINI	-0.031	0.08	-0.07	-0.108	0.202	0.128	-0.005	-0.035	.400*	0.04	-0.098	0.326
LAND_USE_MIXb	-0.034	-0.015	0.142	0.049	0.045	0.08	0.013	-0.156	-.162*	-0.064	-0.088	0.076
MED_VALUE_C	-0.063	0.269	-0.159	-0.107	0.224	0.326	0.039	-0.329	-0.255	.547*	-0.328	0.022
GMP_MFG_LQ	0.051	-0.196	-0.015	-0.038	0.061	-0.086	-0.139	0.202	-0.054	.205*	0.171	0.197
H2O_VIOL	-0.069	0.033	-0.081	-0.018	-0.089	0.025	0.069	0.019	0.021	-.176*	-0.169	0.061
SFUND	0.185	0.103	-0.057	-0.103	0.028	0.028	-0.088	-0.019	-0.212	-0.068	.276*	0.093
HIST_PROP	0.174	0.059	0.025	-0.046	-0.009	0.05	-0.074	-0.118	0.061	-0.061	-0.185	.429*

Cluster-Discriminant Analysis

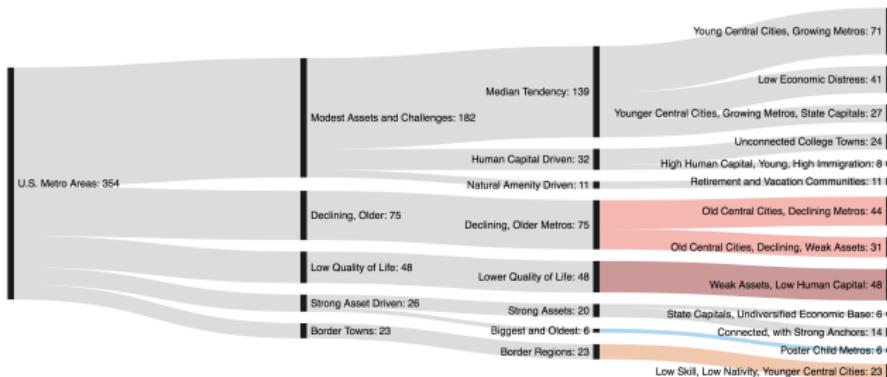
Cluster Means at Each Function

Cluster	Function 1: Old Central City, Prolonged Decline	Function 2: Connected & Strong Anchors	Function 3: Low School Dropouts, Few Kids, High Nativity	Function 4: State Capitals	Function 5: College Educated	Function 6: Older Residents, Vacant Homes	Function 7: Anchored Philanthropy	Function 8: Low Educational Attainment, Poor Health	Function 9: Poverty, Low LFPR, High Inequality	Function 10: Expensive Central City Homes	Function 11: Superfund Sites	Function 12: Historic Preservation
1. Young Central City, Growing Metro	-1.41**	-0.08	0.32	-0.77	0.09	-0.46	0.32	0.12	-0.37	-0.60	-0.76	-0.28
2. Old Central City, Declining Metro	3.41**	-0.82	-0.06	0.02	-1.07	0.14	-0.38	-0.96	0.24	-0.38	-0.42	0.58
3. Weak Assets, Low Human Capital	-1.13	-1.33***	0.09	-0.31	0.68	-0.09	0.17	1.91***	0.19	0.53	0.08	0.51
4. State Capitals, Undiversified Economic Base	4.36	1.69	-0.59	7.34***	2.71*	1.94	5.86***	0.55	-0.18	-0.24	-0.31	-0.22
5. Low Economic Distress	0.78	-0.73	0.17	-0.03	0.20	-1.21	0.15	-0.44	-1.82**	-0.18	0.92	-0.06
6. Old Central City, Declining, Weak Assets	2.63**	-2.74***	0.38	0.06	-0.96	0.71	-0.64	0.63	0.82	0.66	0.20	-0.80
7. Unconnected College Towns	-1.19	-0.89*	-0.19	0.04	3.73***	-0.43	-0.61	-1.81	1.66	-0.01	0.29	-0.03
8. Connected, with Strong Anchors	1.21	5.43***	0.88	-1.45	-1.54	-3.00	1.61	-0.35	1.45	1.61	0.10	-0.07
9. Healthy State Capitals	-1.92**	2.74**	2.69***	3.26***	-0.67	0.49	-1.97**	0.07	-0.14	0.05	0.05	0.02
10. Low-Skill, Low Nativity, Growing City	-2.93***	0.54	-4.95***	0.97	-2.11**	0.25	0.14	-0.09	0.83	-0.67	0.54	-0.03
11. Retirement and Vacation Communities	-2.64**	0.90	3.97***	-3.58***	-1.28**	3.98**	2.19**	-1.10	0.42	-0.45	0.96	0.15
12. Poster Child Metros	6.55***	8.79**	-3.30*	-3.71*	3.45	2.35	-2.27	2.48	-0.50	-1.26	0.34	-0.26
13. High Human Capital, Young, Migrant	-1.82**	0.82	-3.77**	-0.66	0.65	2.71*	-0.48	-2.07***	-2.53***	3.37	-0.95	0.02

*p <.05; **p <.01; ***p <.001 (two-tailed)

Findings

Cluster Tree



Number of clusters in solution (K)

5

8

13

Second derivative from the cluster analysis

14.7%

95%

48.8%

Hit ratio from the discriminant analysis

89.3%

87.3%

90.7%

Visualization

Clusters 2, 3, 6, 10, and 12: Tableau Viz

MSA Clusters

