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Using the American Community Survey to Build a Dashboard of Regional Economic Indicators

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Using the **American Community Survey** to Build a Dashboard of Regional Economic Indicators

Presentation to:
National Association of Business Economics
Professional Development Seminar

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Introduction

- Consortium of foundations in Northeast Ohio asked us to build a Dashboard of Regional Economic Indicators
- A Dashboard is a set of factors strongly associated with metropolitan economic performance
- Provides a framework for understanding the regional economic process and for prioritizing economic development initiatives
- Tracks the progress of regional strategies

Data Requirements

- A set of variables that is broad in scope and includes household and population characteristics
- Includes broad geographical areas
- Frequently updated to monitor region's progress
- Ability to drill down and conduct more detailed analysis
- Easily merged with other data bases

American Community Survey

- Rich set of variables covering population and housing characteristics (>50 variable categories)
- Released annually with only one-year lag
- Covers all metro areas each year
    - Smaller areas and Census tracts with 3-year and 5-year estimates
- Public Use Microdata Sample (PUMS) files for detailed analysis

ACS: Population

- Age and date of birth
- Ancestry
- Citizenship
- Class of worker
- Disability
- Educational attainment
- Employment Status
- Families
- Fertility
- Food Stamps
- Foreign born status
- Health insurance
- Household type and relations
- Income
- Industry
- Journey to work
- Language spoken at home
- Labor force status
- Marital history and status
- Mode of transportation to work
- Occupation
- Place of birth
- Place of work
- Poverty
- Race
- Residence one year ago
- School enrollment
- Travel time to work
- veteran
- Work status last week
- Workers in family

ACS: Housing

- Acreage
- Bedrooms
- Business on property
- Condo status and fee
- Contract rent
- House heating fuel
- Housing units
- insurance
- Kitchen facilities
- Mobile home costs
- Mortgage status/payment
- Occupancy status
- Plumbing facilities
- Real estate taxes
- Rooms
- Second mortgage
- Selected monthly owner costs
- Telephone service availability
- Tenure
- Units in structure
- Utilities
- Value of housing units
- Vehicles available
- Year householder moved in
- Year structure built

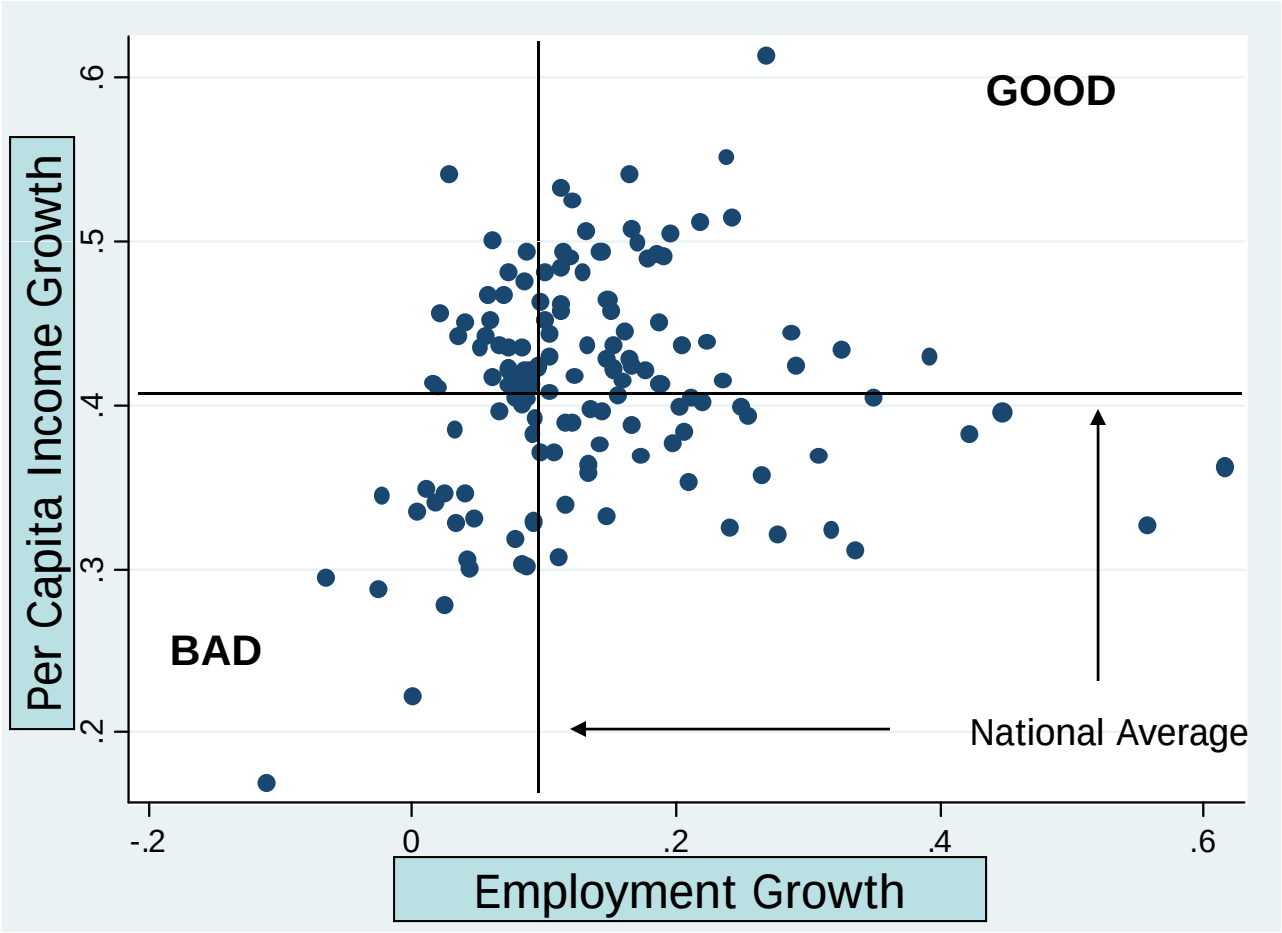
Dashboard

- Step 1: Select broad measures of regional economic growth
- Step 2: Assembled variables that characterize regions and that can potentially relate to regional growth
- Step 3: Use statistical methods (factor analysis) to reduce the large set of variables to a handful of factors that identify structural relationships among variables that actually occur in metropolitan areas
- Step 4: Use statistical methods (regression analysis) to relate factors to measures of economic growth

Measures of Economic Growth

- Per capita personal income
  - Approximates regional standard of living
- Employment
  - Measures job opportunities
- Gross Metropolitan Product
  - Value added output; comprehensive measure of regional economy
- Productivity
  - GMP per employee; approximates regional competitiveness

Regional Well-Being



VARIABLES	DATA SOURCE
Economic Growth Variables	
Per capita income	Bureau of Economic Analysis (BEA)
Employment	Economy.com
Gross metropolitan product	Economy.com
Productivity	Economy.com
Factor 1: Skilled Workforce and R&D	
Pct. with professional and managerial occupation	U.S. Census, American Community Survey (ACS)
Pct. with graduate or professional degree	U.S. Census, American Community Survey (ACS)
Pct. with bachelor's degree	U.S. Census, American Community Survey (ACS)
Private R&D 3 year average per employee	Economy.com
Total SBIR & STTR awards per employee	U.S. Small Business Administration, ACS 2005
Population dependency	American Community Survey (ACS) 2005
University R&D 3 year average per employee	National Science Foundation, Economy.com
Factor 2: Legacy of Place	
Business churning in all establishments	U.S. Census LEEM
Climate	Places Rated Almanac (Savageau, D. 2000)
Pct. of houses built before 1940	U.S. Census, American Community Survey (ACS)
Dissimilarity index for black population	National Center for Educaton Statistics
City poverty ratio	U.S. Census, American Community Survey (ACS)
No. of government units per population	U.S. Census of Governments
Pct. of manufacturing employment	Economy.com
Factor 3: Urban Assimilation	
Pct. of Hispanic	U.S. Census, American Community Survey (ACS)
Share of minority business employment	U.S. Census, County Business Pattern
Pct. of foreign born	U.S. Census, American Community Survey (ACS)
Productivity in information sector	Economy.com
Pct. of Asian	U.S. Census, American Community Survey (ACS)
Factor 4: Racial Inclusion and Income Equality	
Pct. of Black or African American alone	U.S. Census, American Community Survey (ACS)
Isolation index for back population	National Center for Educaton Statistics
Income inequality	Housing and Urban Development
Pct. students at schools with 70%+ free lunches	National Center for Educaton Statistics
Violent Crime per 100,000 population	Federal Bureau of Investigation, States of the Cities Data System
Factor 5: Locational Amenities	
Transportation index	Places Rated Almanac(Savageau, 2000), Cities Ranked and Rated (Sperling and Sander, 2004)
Arts index	Places Rated Almanac(Savageau, 2000), Cities Ranked and Rated (Sperling and Sander, 2004)
Recreation index	Places Rated Almanac(Savageau, 2000), Cities Ranked and Rated (Sperling and Sander, 2004)
Health index	Places Rated Almanac(Savageau, 2000), Cities Ranked and Rated (Sperling and Sander, 2004)
Factor 6: Technology Commercialization	
Venture Capital per employee	Thomson Financial Venture Economics
Number of patents per Thousand employee	U.S. Patent and Trademark Office
Cost of Living Index	Economy.com
Factor 7: Urban/Metro Structure	
Share of city population	U.S. Census, American Community Survey (ACS)
Property Crime per 100,000 population	Federal Bureau of Investigation, States of the Cities Data System
Factor 8: Individual Entrepreneurship	
Self employed all industries except ag & mining	U.S. Census, American Community Survey (ACS)
Share of Business Establishments with under 20 workers	U.S. Census, County Business Pattern
Variable: Business Dynamics	
Business births and deaths ratio in single establishments	U.S. Census LEEM

Methodology: Identify Factors

- Assembled data on over 40 variables that measure regional economic and social characteristics for 136 metropolitan areas with population between 300,000 and 3.5 million
- Conducted a factor analysis to reduce the number of variables to a smaller set of related factors
  - Too many indicators obscure what's important for economic growth
  - Allowed the "experience of regions" through statistical analysis to identify the relationship among the various variables
- Identified factors and named them

Factor Analysis: Reducing Variables to Common Factors

	Factor										
Variable	Skilled Workforce & R&D	Legacy of Place	Urban Assimilation	Racial Inclusion & Income Equality	Locational Amenities	Technology Commercialization	Urban/ Metro Structure	Individual Entrepreneurship			Business Dynamics
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12
pct. of population in professional occupations	0.9434	0.0448	-0.0111	-0.0197	0.1877	0.1021	0.0084	0.0010	0.0531	-0.0283	0.0715
pct. of population with graduate or professional degree	0.9344	0.0604	-0.0556	-0.0048	0.1000	0.0613	0.0591	0.0981	0.0304	-0.0502	0.0253
pct. of population with bachelor's degree	0.8194	-0.1672	-0.2006	0.1266	0.2983	0.0816	0.0023	0.0297	0.0928	-0.0177	0.0715
industry R&D	0.7223	0.0095	0.1621	0.0612	-0.0405	0.3785	0.0315	-0.0401	0.0852	-0.0274	-0.1250
SBIR & STTR awards	0.5242	-0.0692	0.1143	0.0738	-0.0619	-0.0156	0.0415	0.0243	-0.0095	-0.0890	-0.1793
population dependency	-0.5942	0.0878	0.3368	0.0745	-0.1053	-0.0406	0.1132	0.3179	-0.0846	0.3817	0.0275
university R&D	0.4867	-0.0284	0.0043	-0.0525	0.1281	-0.0444	-0.0722	-0.0990	-0.0795	-0.1924	0.0000
business churning	0.1342	-0.8479	0.1313	0.0464	0.0526	-0.0041	0.0009	0.1355	-0.0707	0.0865	0.2656
climate	-0.0781	-0.5485	0.4416	-0.0588	-0.1411	0.1226	-0.0767	0.2889	0.2223	-0.1203	-0.0752
pct. of houses built before 1940	0.0435	0.8579	-0.1738	0.2114	0.1457	0.0311	0.1474	-0.0581	-0.1004	0.0108	0.0583
dissimilarity index for black population	0.0874	0.6879	-0.1595	-0.3824	0.2106	-0.1075	0.1585	-0.0513	-0.0566	0.1626	0.0785
city poverty ratio	0.1674	0.5727	-0.1571	0.0093	0.1505	0.0115	0.4095	-0.1117	-0.0755	0.1977	0.0333
No. of government units per capita	-0.1360	0.5401	-0.1885	0.2867	-0.1070	-0.0217	-0.2580	0.0145	-0.1142	0.1277	0.1978
share of manufacturing employment	-0.1053	0.3918	-0.2592	0.2329	-0.0631	0.3852	0.0090	-0.3076	-0.1237	0.1219	-0.3124
pct. of hispanic population	-0.1329	-0.1702	0.9184	0.1435	-0.1354	0.0198	-0.0966	0.0581	-0.0891	-0.0629	0.0139
share of minority business employment (in total emp)	-0.0459	-0.2056	0.7908	-0.0489	-0.0406	-0.0615	-0.1095	-0.1330	0.4109	0.0648	-0.0866
pct. of foreign-born population	0.0791	-0.2380	0.7640	0.1891	-0.0843	0.2732	0.1075	0.1711	0.2606	-0.1512	0.1168
productivity in information sector	0.0530	0.1061	0.4006	0.0394	-0.0481	0.0755	0.1406	0.1931	0.0878	-0.2675	0.0324
pct. of asian population	0.1775	-0.0619	0.2161	0.0907	0.0309	0.1625	-0.0040	-0.0276	0.8779	-0.1224	0.0259
pct. of black population	0.0365	-0.1537	-0.2567	-0.8754	0.0201	-0.0499	-0.0301	-0.1882	-0.0243	-0.0287	-0.0801
isolation index for black population	0.0605	0.1996	-0.3380	-0.8216	0.1686	-0.0902	0.0414	-0.1557	-0.0351	0.1581	-0.0241
income inequality	-0.1273	-0.1582	0.4501	-0.6672	-0.0311	0.0192	-0.1280	0.1729	-0.0528	-0.1776	-0.0056
share of students at schools with more than 70% free lunches	-0.2470	0.0744	0.3827	-0.6596	-0.1375	-0.0686	-0.1830	0.1139	-0.0677	-0.1388	-0.0200
violent crime rate	-0.1685	-0.2594	0.0722	-0.5020	0.1805	-0.0416	-0.3598	0.0524	-0.0233	0.0552	0.1988
transportation index	0.2537	0.1571	-0.0937	-0.0599	0.7792	-0.0226	-0.0851	-0.0922	-0.0495	-0.0992	0.1073
arts index	0.4485	0.1683	-0.1245	-0.0009	0.6887	0.1056	0.0027	-0.0669	0.0950	-0.0054	-0.0545
recreation index	0.1962	-0.0651	-0.1686	-0.1084	0.6323	-0.0323	0.2323	0.0738	0.0826	0.2259	0.0053
health index	0.3866	0.1429	-0.2261	-0.1703	0.5429	0.0542	-0.0940	0.0855	-0.0426	-0.0871	-0.1832
venture capital per employee	0.4382	-0.0427	0.1530	0.0499	0.0756	0.7306	0.0262	-0.0064	0.1882	0.0147	0.0157
number of patents per employee	0.5072	0.0891	0.0382	0.2027	-0.0592	0.5913	0.0530	-0.0421	0.0465	0.0960	0.1016
cost of living	0.3916	-0.2393	0.1380	0.1008	0.1072	0.5281	0.1956	0.3200	0.3314	-0.1188	0.0187
share of city population in MSA population	0.0986	-0.2455	0.2145	-0.0812	-0.0276	-0.0285	-0.6519	-0.1581	0.0347	-0.2763	-0.1115
property crime rate	-0.1294	-0.2794	0.0467	-0.3794	0.0920	-0.2156	-0.5789	-0.0610	-0.0235	0.1338	-0.0022
pct. self employed (all industries except ag & mining)	0.0775	-0.4358	0.1020	0.2370	-0.0278	0.0392	0.0841	0.7343	-0.0777	0.0971	-0.0420
share of business establishments with under 20 workers	-0.0177	-0.2343	0.0751	0.2045	-0.1931	-0.0684	0.0444	0.4556	0.0149	0.0518	0.2246
pct. of homeownership	-0.3118	0.1029	-0.3117	-0.0053	-0.0276	0.0484	0.1216	0.0848	-0.2722	0.6871	-0.1023
business openings over business closings	0.2402	-0.1557	0.0186	0.3103	0.0372	0.1336	0.1531	-0.0322	0.0770	-0.2027	0.5486
university enrollment	0.2114	0.0142	-0.0677	-0.2042	-0.2144	-0.0679	-0.1826	-0.0201	-0.0183	-0.0734	-0.0459

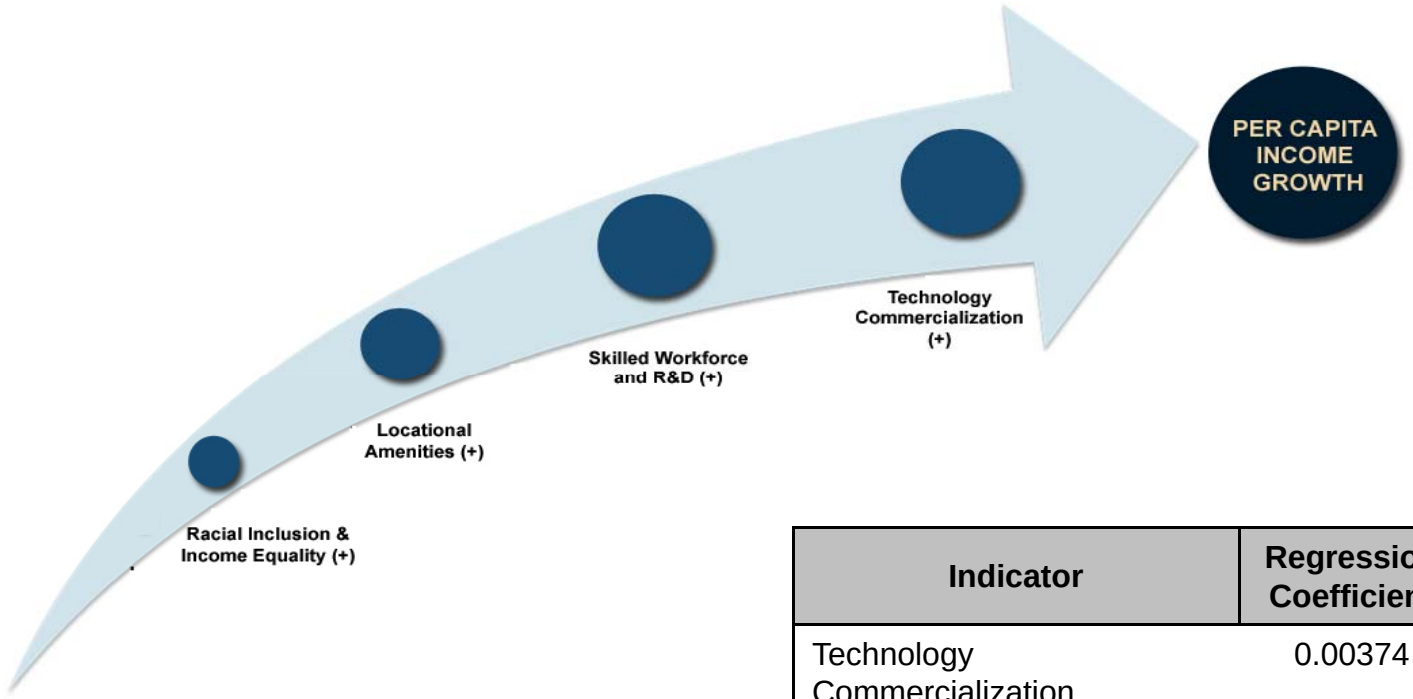
Dashboard Factors

- Skilled Workforce and R&D
- Technology Commercialization
- Racial Inclusion & Income Equality
- Business Dynamics
- Urban Assimilation
- Individual Entrepreneurship
- Locational Amenities
- Urban/Metro Structure
- Legacy of Place

Factors' Correlation with Regional Economic Growth Measures

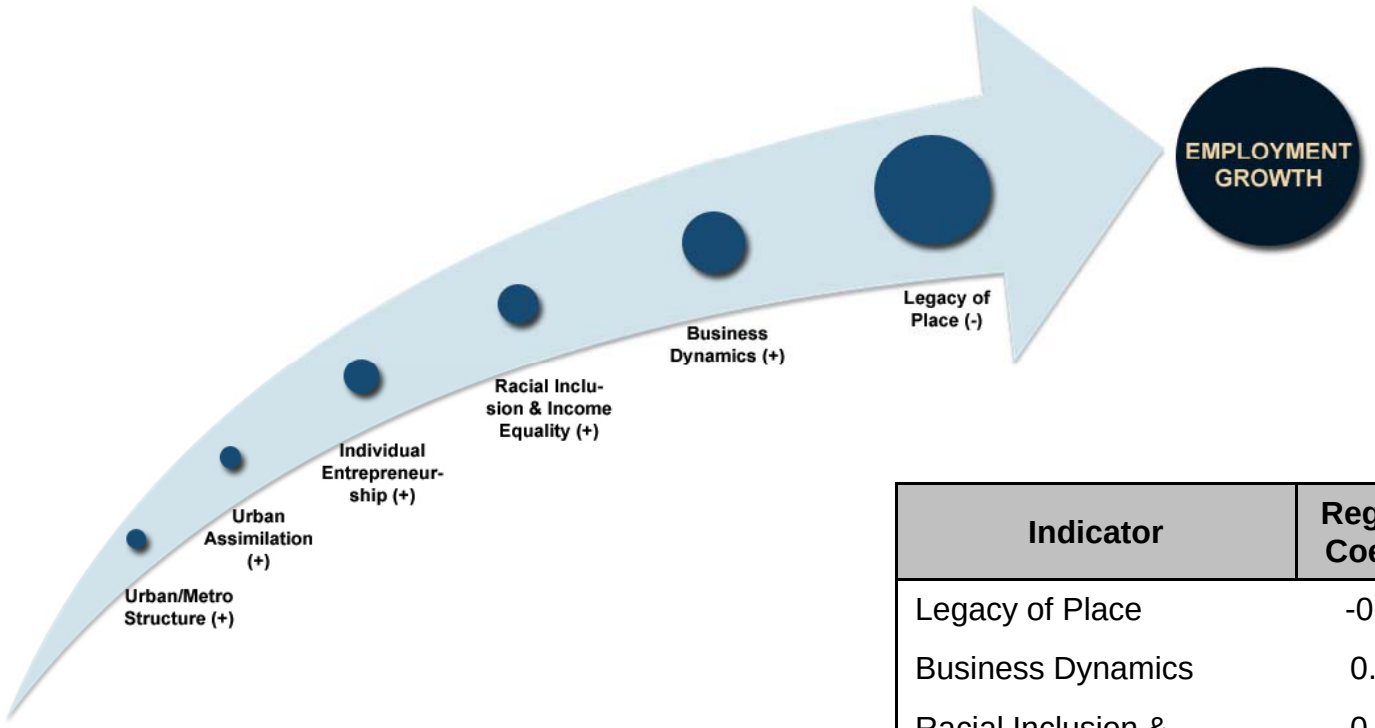
Factor	Per Capita Income	Employment	GMP	Productivity
Skilled Workforce and R&D	**0.00333**			**0.00134**
Technology Commercialization	**0.00374**		**0.00211**	**0.00232**
Racial Inclusion & Income Equality	**0.00104**	**0.00208**	**0.00357**	**0.00138**
Urban Assimilation		**0.00143**	**0.00276**	**0.00126**
Legacy of Place		**-0.00748**	**-0.00917**	**-0.00136**
Business Dynamics		**0.00237**	**0.00281**	
Individual Entrepreneurship		**0.00200**	**0.00180**	
Locational Amenities	**0.00222**			
Urban/Metro Structure		**0.00129**	**0.00218**	

Factors Correlated with Per Capita Income Growth



Indicator	Regression Coefficient
Technology Commercialization	0.00374
Skilled Workforce and R&D	0.00333
Locational Amenities	0.00222
Racial Inclusion & Income Equality	0.00104

Factors Correlated with Employment Growth



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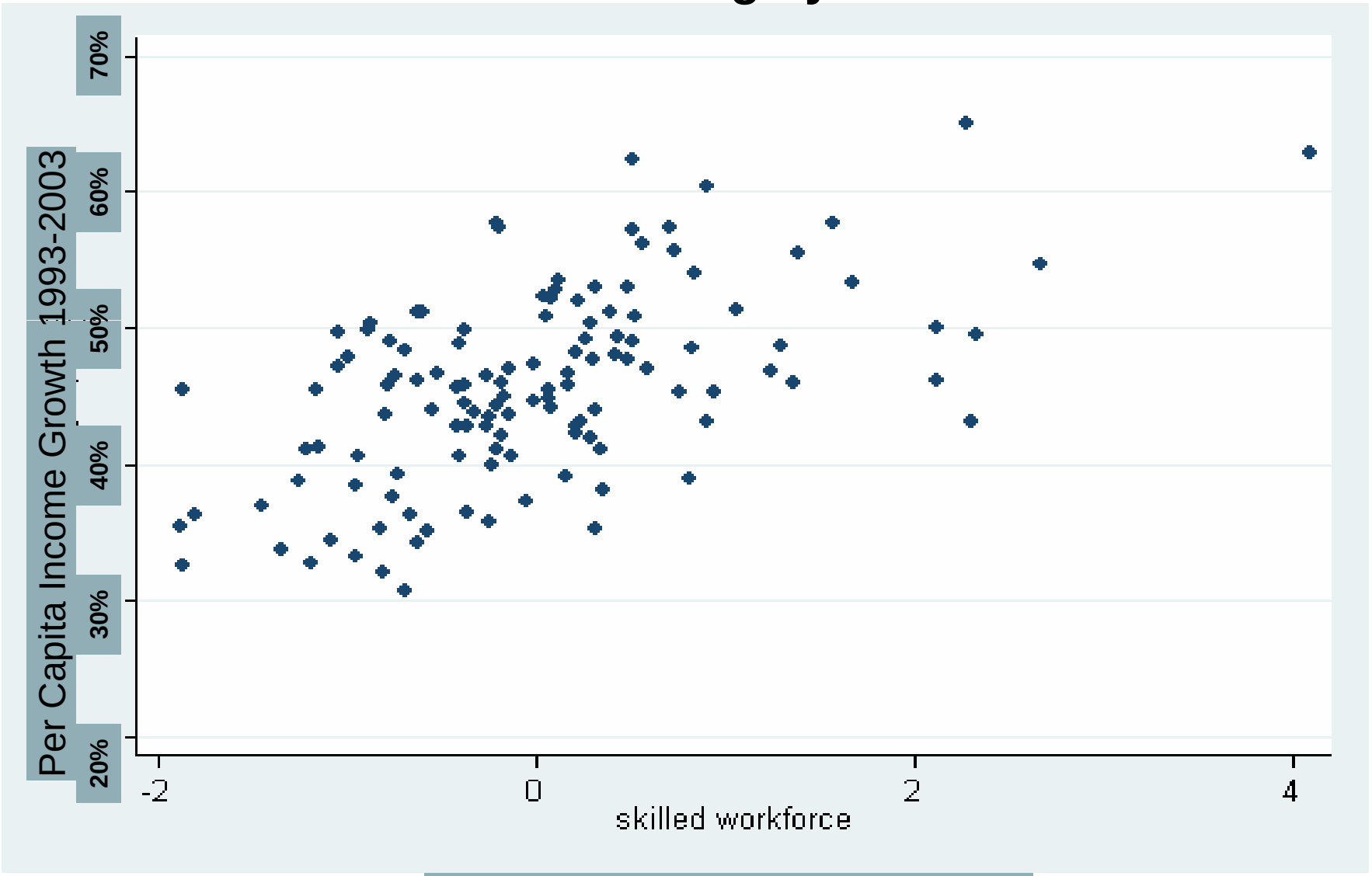
Business Dynamics	0.00237
Racial Inclusion & Income Equality	0.00208
Individual Entrepreneurship	0.00200
Urban Assimilation	0.00143
Urban/Metro Structure	0.00129

Skilled Workforce and R&D Indicators

- % of population in professional occupations
- % of population with graduate/professional degree
- % of population with bachelor's degree
- Industry R&D per employee
- SBIR & STTR awards per employee
- Population dependency (-)
- University R&D per employee

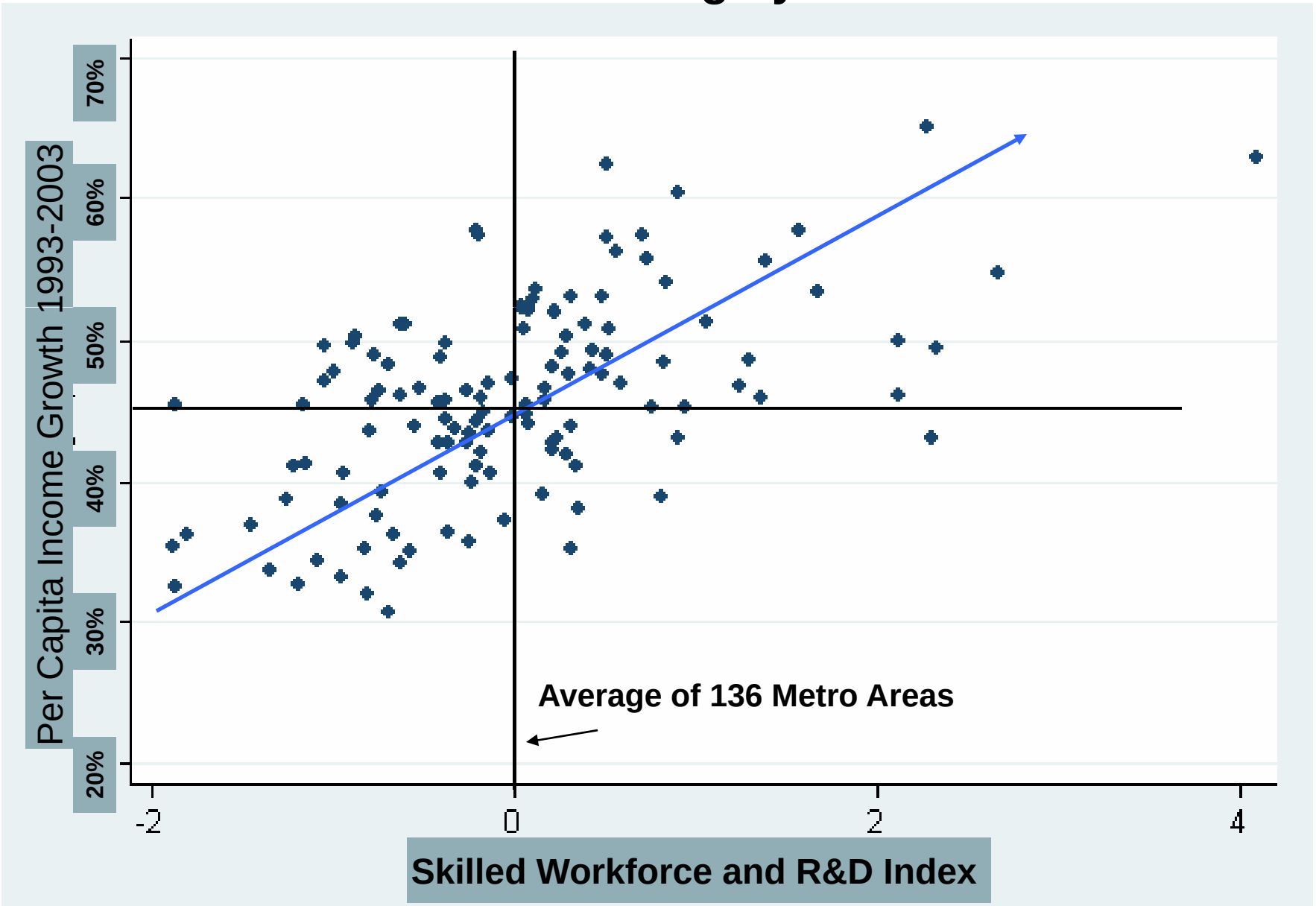
Lesson: Improving educational attainment and enhancing research capacity is linked to regional competitiveness (per-capita income and productivity)

Per Capita Income Growth and Skilled Workforce are Highly Correlated



Skilled Workforce and R&D Index

Per Capita Income Growth and Skilled Workforce are Highly Correlated



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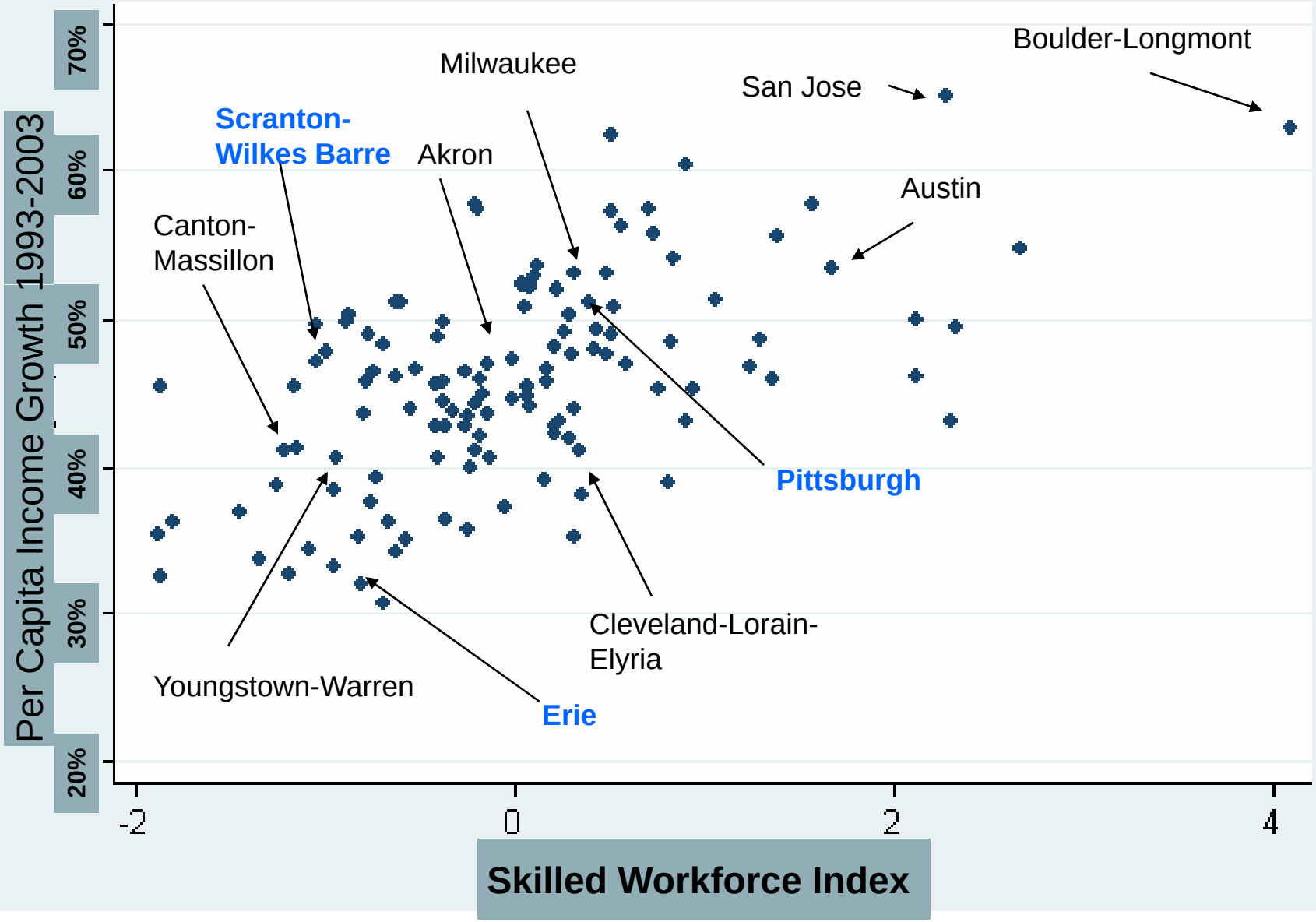

Rank of MSAs According to Skilled Workforce and R&D, 2000 and 2005

Metro Areas	2000 Rank	2005 Rank
Ann Arbor, MI	1	1
Durham, SC	2	2
San Jose-Sunnyvale-Santa Clara, CA	3	3
Lancaster, PA	109	104
ABE, PA	90	80
Harrisburg, PA	69	57
Pittsburgh, PA	68	55
Reading, PA	114	106
Scranton, PA	121	113
York, PA	112	114
Canton, OH	119	117
Des Moines, IA	45	37
Flint, MI	125	124
New Haven, CT	17	13
Peoria, IL	102	102
Wichita, KA	84	91

Comparison of Factor Rankings of Northeast Ohio MSAs

	Akron				Canton			
Indicator	**2000**	**2005**	**2006**	**2007**	**2000**	**2005**	**2006**	**2007**
Skilled Workforce and R&D	74	58	68	58	119	117	123	113
Technology Commercialization	36	60	58	53	91	97	83	76
Racial Inclusion and Income Equality	69	76	79	74	40	37	41	41
Urban Assimilation	126	125	125	131	136	135	135	136
Legacy of Place	30	30	32	31	17	15	16	19
Business Dynamics	89	93	129	130	81	112	128	121
Individual Entrepreneurship	104	101	114	104	100	81	82	73
Locational Amenities	71	49	66	66	110	62	112	112
Urban/Metro Structure	38	66	65	60	32	42	42	42

	Cleveland				Youngstown			
Indicator	**2000**	**2005**	**2006**	**2007**	**2000**	**2005**	**2006**	**2007**
Skilled Workforce and R&D	66	64	65	61	128	129	127	124
Technology Commercialization	35	57	98	68	125	134	133	135
Racial Inclusion and Income Equality	119	119	121	121	81	83	84	80
Urban Assimilation	77	87	89	93	133	134	136	134
Legacy of Place	16	17	17	16	6	8	4	5
Business Dynamics	100	127	122	124	104	123	107	135
Individual Entrepreneurship	102	94	95	91	87	74	72	95
Locational Amenities	3	16	1	1	114	74	113	113
Urban/Metro Structure	35	23	33	31	18	16	17	17

Drill Down: Metro skill differentials

The difference between unadjusted and adjusted indicates that the higher skills of San Jose workers account for an additional 15.7 percentage points above the average sample wage.

Rank	Metro #	Name	Unadjusted	Adjusted	Difference
1	7400	San Jose, CA	0.3765	0.2193	0.1572
2	7600	Seattle-Everett, WA	0.2171	0.0972	0.1199
3	4720	Madison, WI	0.0235	-0.0845	0.1080
4	440	Ann Arbor, MI	0.0475	-0.0585	0.1060
5	8480	Trenton, NJ	0.2304	0.1257	0.1047
16	3480	Indianapolis, IN	0.0349	-0.0120	0.0469
19	1840	Columbus, OH	0.0386	-0.0044	0.0430
21	1640	Cincinnati, OH/KY/IN	0.0362	-0.0023	0.0385
28	640	Austin, TX	0.0477	0.0180	0.0297
37	1680	Cleveland, OH	-0.0238	-0.0418	0.0180
44	80	Akron, OH	-0.0841	-0.0967	0.0126
85	1320	Canton, OH	-0.1621	-0.1236	-0.0385
98	9320	Youngstown-Warren, OH-PA	-0.2241	-0.1618	-0.0623

The bundle of skills considered includes a person's educational attainment, experience (proxied by age) and measures of mental and physical skills.

Supply of and Demand for Educational Attainment

Supply-- American Community Survey

Summary: 25 and older	Akron	Canton	Cleveland	Youngstown
High School Dropout	9.9%	11.8	12.9	12.8
High School (or GED)	36.6%	41.7%	32.8%	44.2%
Associate Degrees	6.8%	7.2%	7.3%	5.7%
Some college	18.7%	18.0%	20.3%	18.3%
Bachelors degree	17.8%	14.0%	16.3%	12.8%
Graduate or professional degrees	10.2%	7.3%	10.4%	6.2%
Demand - ONET				
High School Dropout	15.9%	17.4%	14.8%	17.6%
High School (or GED)	36.5%	38.8%	36.2%	39.0%
Associate Degrees	8.7%	8.6%	9.1%	8.2%
Some college	8.8%	8.6%	8.9%	8.3%
Bachelors Degrees	13.8%	11.1%	14.3%	10.9%
Graduate or professional degrees	6.2%	4.7%	6.5%	5.5%

We compare the supply of skills, as represented by educational attainment levels, with the educational requirements of a job, as assessed by O*Net.

Conclusion

- Framework for Insights: Evidence-based approach of developing indicators offers insights for local stakeholders to structure an economic development agenda that focuses on issues and initiatives that are directly related to growth
- Align Resources: Helps a region align resources by offering a way to prioritize factors and thus initiatives
- Tracks Progress: The indicators allow the region's stakeholders to track their progress in transforming their region not only in terms of economic growth but also with respect to improving its civil society

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