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Will Talent Attraction and Retention Improve Metropolitan Labor Markets? The Labor Market Impact of Increased Educational Attainment in U.S. Metropolitan Regions 1990–2010

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Abstract: Since the early 1990s, metropolitan entities and local governments have focused incentives, policies, and investments on getting highly educated and skilled workers to locate in their communities. In particular, these metro areas and governments want to attract workers who hold a bachelor's degree or higher and have had a profound effect on the form and management of metropolitan areas. However, there is no clear evidence that growth in bachelor's- or higher-degree (BA+) attainment improves metropolitan labor market outcomes. I use an outcomes-based cluster-discriminant analysis to test whether or not metropolitan areas with growth in BA+ attainment from 1990 to 2010 that is above the national average experienced improvements in the local labor market. Increased BA+ attainment leads to two distinct set of local labor market outcomes: one in which earnings per job increase but inequality, unemployment, and poverty rates rise, and the other in which income inequality growth is low and unemployment and poverty rates decline but earnings per job are stagnant or negative. I find evidence that "educational segregation," restrictive land-use policies, crime, and changes in military employment all predict outcomes.

JEL classification: J10, O21, R11

Key words: educational attainment, metropolitan labor markets, labor market outcomes, talent attraction and retention

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WILL TALENT ATTRACTION AND RETENTION IMPROVE METROPOLITAN LABOR MARKETS? THE LABOR MARKET IMPACT OF INCREASED EDUCATIONAL ATTAINMENT IN U.S. METROPOLITAN REGIONS 1990-2010

Education is our poverty reduction strategy. It's also our crime reduction strategy, our employment strategy, our growth strategy. Education is central to everything we're striving to achieve in Philadelphia.

- **Mayor Michael A. Nutter, Philadelphia**

Shocked by the Great Recession of 2008, national unemployment sat at over 7 percent and GDP growth hovered around 1-2 percent in 2013. Despite the emergence of some positive economic indicators over the past four years, the recovery has been slow and "jobless." Notably, workers who held bachelor's or higher (master's, doctorate, or other professional) ("BA+")[1] degrees participated in the recovery much more quickly than those without college degrees. According to Bureau of Labor Statistics data, the annual average unemployment rate in 2013 for those with BA+ degrees was 3.7 percent, while for workers without college degrees, it stood at 8 percent. (Bureau of Labor Statistics 2013). During the first quarter of 2014, the unemployment rate was 3.3 percent for those with BA+ degrees and 7.4 percent for those without (Bureau of Labor Statistics 2014).

The National Talent Dividend Prize Competition

The importance of a BA+ degree is clear. Individuals who hold degrees are more likely to succeed economically and socially. A college degree or higher is both an investment and a signal of one's human capital, skills, and ability to get along and be a productive worker. Municipalities, local organizations, and metropolitan entities (metropolitan economic development organizations for example) have begun to develop plans and strategies to attract and retain residents with BA+ degrees. Non-profit organizations such as Campus Philly, a group that works to convince college students to stay in or move to the Philadelphia area after graduation, are becoming more and more prevalent across the country.

[1] Throughout this paper I will use the abbreviation "BA+" as shorthand to refer to all degrees at the bachelor's and or higher level. This includes bachelor's of arts, science or other bachelor's degrees, as well as graduate and professional degrees.

In a similar development, CEOs for Cities, an organization that works on various urban issues, initiated the Talent Dividend Prize competition as a part of its City Dividends initiative. The competition rewarded $1 million to the city that was able to exhibit the greatest increase in the number of postsecondary degrees held per one hundred thousand residents over a four-year period.[2] Fifty-seven cities across the country have enrolled in the competition, which ended in 2014. Akron, Ohio won the competition. While the Talent Dividend Prize competition is not strictly about retaining and attracting workers to municipalities, it underscores how seriously municipalities and other urban organizations are focusing on BA+ attainment growth.

Does Growth in Bachelor's or Higher Degree Attainment Improve Metropolitan Labor Market Outcomes?

Just as Mayor Michael Nutter in Philadelphia has, many officials in cities, municipalities and metropolitan areas have assumed that the individual benefits of improving educational attainment map onto their places. A significant amount of economic and sociological research literature suggests that individuals who have higher levels of educational attainment are paid more, less likely to be unemployed, less likely to be in poverty or homeless, less likely to be in the penal system, healthier, more likely to have health insurance and more civically engaged (McKinsey and Company Social Sector Office 2009; Hanushek 2011; Card 1999; Perna 2003; Leslie and Brinkman 1988).

But are the individual benefits of increased educational attainment transitive to places? Does having a higher proportion of BA+ workers in a metropolitan area lead to better labor market outcomes for the metropolitan area as a whole? The budding literature on the place-based benefits of high proportions of BA+ holding residents does not address this. This is partly due to a focus on single labor market outcomes rather than on combinations of labor market outcomes (per capita income, for example, or unemployment rates). It also comes from using microeconomic cost-benefit analysis to sum potential benefits (as the Talent Dividend Prize does), rather than exploring place-based changes.

[2] The competition also gives cities credit for increasing the number of associate degrees, but such degrees are a significantly smaller emphasis in the competition.

This analysis considers four metropolitan labor market indicators: earnings per job, the unemployment rate, the poverty rate, and relative changes in the levels of income inequality. These indicators encompass growth (earnings per job), opportunity (unemployment and poverty) and equality (income inequality). The analysis attempts to address whether the many individual benefits of increased educational attainment are similar at the metropolitan level. It asks:

1. Does increased BA+ degree attainment *at the metropolitan level* lead to positive labor market outcomes – better equity and opportunity (lower earnings inequality, reduced unemployment, and reduced poverty) and increased earnings?
2. Under what metropolitan demographic, industrial, and economic conditions does increased degree attainment lead to positive labor market outcomes -- increases in earnings per job, more equitable wage distribution, and decreases in poverty and unemployment (together "positive labor market outcomes") -- across a metropolitan labor market?

The study looks at the metropolitan areas across the country that had the highest absolute growth in the proportion of the population with a bachelors degree or higher. These metropolitan areas represent the group that should *per se* see the greatest labor market improvements if the individual benefits of increased degree attainment map onto places. Instead, this analysis will show a wide range of different outcomes.

The Literature on Educational Attainment and Metropolitan Labor Markets

The economic literature on the individual and national benefits of increased education is quite deep. Additionally, members of the economic, labor, and urban policy communities have called for increasing BA+ attainment (Reich 1991; B. Katz and Bradley 2013; B. Katz 2013). As can be seen with the participants in the CEOs for Cities Talent Dividend Prize, municipalities and their leaders are paying attention and working to find ways to become more attractive to BA+ holding workers because of the purported benefits to their cities and metro areas.

The focus on and efforts to increase BA+ attainment at the regional level beg the central question of this research: to what degree will increasing the number of BA+ holding residents result in positive

metropolitan labor market outcomes? Or more simply stated: does an increasing level of BA+ attainment within a metropolitan area's population result in lower rates of unemployment, poverty, earnings inequality and higher earnings for all?

In economic development practice, strategies for increasing BA+ holding workers are referred to in several ways. Richard Florida's influential argument that regions, cities, and neighborhoods that are more highly concentrated with creative residents will be more vibrant and economically successful has dominated planning practice and economic development strategy for the last decade.[3] Florida's "creative" label should more properly be "educated." His (2002) two-level classification, the "super creative" (e.g., artists, designers, and performers) and the "creative" (e.g., lawyers, doctors, and accountants) includes a broad swath of professionals who require BA+ degrees. As further evidence that creative really means having high BA+ degree attainment, a review of Florida's (2002) work shows that compared against educational attainment levels in simple regression models, measures of creativity are insignificant and explained by educational attainment (Glaeser 2004). A similar analysis found that more traditional measures of economic competitiveness (educational attainment, number of new business starts, and manufacturing employment) were better predictors of job growth than were creative measures (Donegan et al. 2008). The following sections will outline results of empirical studies that provide evidence about the labor market outcomes associated with high BA+ attainment at the metropolitan level.

Attainment and Economic Growth, Incomes, and Earnings

Earnings, income, and economic growth are probably the most commonly associated metropolitan or urban outcomes associated with increased BA+ attainment. High concentrations of BA+ degree-attaining workers are also associated with regional economic growth (Gottlieb and Fogarty 2003). Gottlieb and Fogarty's study tested whether BA+ attainment rates at the metropolitan level were associated with annual economic growth rates for two decades afterwards. The results suggested that places with higher levels of BA+ attainment in 1980 experienced higher economic growth, implying that increasing BA+ attainment will lead to economic growth in subsequent years at a rate significantly higher

[3] Glaeser (2004) notes that Florida's *The Rise of the Creative Class* is a best seller and "the most popular book on regional economies in the last decade (1)."

than metropolitan areas with lower levels of BA+ attainment. Additional studies find similar results (Higgins, Levy, and Young 2006). Others identify links between education and economic resilience (Glaeser and Saiz 2003). The presence of high skill levels is also linked to spillover income benefits (Moretti 2004; Moretti 2012).

Attainment and Employment, Unemployment, and Poverty

While economic growth, earnings, and income are the most commonly studied outcomes of increasing BA+ attainment at the metropolitan or sub-national level, others see employment growth in conjunction with higher levels of BA+ attainment (Wolf-Powers, 2013).[4] Other studies find similar results: workforce characteristics (BA+ attainment, age, and English proficiency) are strong predictors of unemployment rates over time (Rappaport 2012).

Some see educational attainment as a key determinant of in intra-metropolitan economic opportunity. Those with social networks that include people who have earned college degrees are more likely to make choices that improve their socioeconomic status – both in terms of ultimately finding employment and moving beyond poverty wages (Galster and Killen 1995; South and Crowder 1997).

Attainment and Metropolitan Earnings Inequality

Earnings inequality is one of the more contested outcomes of increased BA+ attainment. Some research results suggest that increased BA+ attainment increases inequality and others find that increased BA+ attainment decreases inequality. There is also disagreement about the appropriateness of the distribution of income as a public policy outcome or concern. Some argue that only extreme poverty should be of concern to public policy (suggesting support for programs like the earned income tax credit or other negative income taxes). Others see the gap in incomes between the rich and the poor as a public policy issue. Many see education as a way to narrow income inequality (Krueger 2001).

Earnings inequality has expanded significantly over the last 20 years and has been exacerbated by the Great Recession, during which 95 percent of all income gains since 2007 went to the top one

[4] Somewhat confounding though is that high levels of BA+ attainment during the period led to higher levels of unemployment (regardless of growth in BA+ attainment).

percent of earners (Saez 2013). Income inequality has been linked to decreased ability to move up the socioeconomic strata (Krueger 2001; Benner and Pastor 2013). Many cities and metropolitan areas have seen increasing educational attainment as a way to reduce inequality, but this is far from proven. The existing research on the question is mixed.

At the metropolitan level, there is evidence that higher levels of BA+ attainment (and knowledge-based industries) are associated with higher levels of inequality (Perry and May 2010). As noted above, there is substantial evidence that increased BA+ attainment is associated with income inequality between those with and without a degree (Goldin and Katz 2008). Donegan and Lowe (2008) found that high numbers of "creative" workers predicted higher income inequality.

Researchers have also recently come to the conclusion that successful creative class strategies are likely to result in increases in income inequality. Florida has acknowledged that the creative class strategy and its resultant residential segregation will likely increase inequality and income stratification rather than improve conditions for lower-skilled workers (Florida 2002b; Florida 2013; Florida 2014).[5] Florida has also acknowledged that increases in the number of educated workers in a city is likely to create higher housing costs across a metropolitan area that will likely affect middle and lower income workers disproportionately to creative workers (Florida 2013; Florida 2014). These issues are often thought of as necessary "side effects" of other improvements in the economy, urban revitalization, or neighborhood changes.

Other research finds the opposite relationship between BA+ attainment and inequality. In a longitudinal study of economic growth and changes in income inequality, BA+ attainment (along with other factors like geographically expansive [or monopolistic] local governments and concentrations of workers in construction) was found to be a determinant of lower levels of inequality (Benner and Pastor 2012). In addition to finding that BA+ attainment was a predictor of lower inequality, Pastor et al. (2000) found that inequality can dampen long term economic growth and income growth.

[5] Florida has acknowledged the issue of increasing inequality since he first published *The Rise of the Creative Class,* but readers often overlook that acknowledgement.

The link between economic growth and inequality should situate the role of inequality in metropolitan growth as an important concern for metropolitan and local policy. This investigation hypothesizes that increased BA+ attainment will lead to lower levels of metropolitan inequality, but as the literature shows, this a far from proven relationship.

Methodological Gaps in the Metropolitan BA+ Attainment Literature

The literature on the relationship between BA+ attainment and metropolitan economies has two important gaps. First, it treats BA+ attainment as a static predictor of labor market outcomes. While BA+ attainment at a given point in time will predict outcomes in the future, it is less policy relevant than understanding how change in BA+ attainment will affect labor market outcomes. Second, these studies assume that there are few differences between metropolitan areas and the composition of their economies, but metropolitan areas are diverse. They range significantly in population size and are different industrially, geographically, and socially. These studies assume that small metros are comparable to larger ones or they develop findings based on a selected number of geographic units (for example, the 100 largest metros).

Using point-in-time comparisons can overemphasize the importance of BA+ attainment and improperly identify it as a causal dynamic in economic growth. For example, Gottlieb and Fogarty (2003) used BA+ attainment in 1980 as a predictor of economic growth rates and concluded that higher BA+ attainment concentrations meant higher growth rates. This is an explanation that assumes that the supply side of a region's labor market determines the equilibrium at some later point in time, implying that increasing BA+ attainment will lead to higher economic growth. An alternative explanation comes from the demand side of a metro's labor market. This is that places that had strong demand for skilled labor in 1980 attracted highly skilled workers and continued to grow after 1980. The policy conclusion from this type of research suggests increasing BA+ attainment to improve economic growth (as Moretti's work does as well), but these point-in-time comparisons may simply be the results of economic geography and show a hierarchy of economic activity in metropolitan areas rather than identify true policy mechanisms.

This study aims to address this gap by selecting those metropolitan areas with highest BA+ attainment *growth* rather than those that have the highest proportions, or levels, of their adult workforce

with BA+ attainment. If the changes in the labor market outcomes are determined by changes in the supply of workers with BA+ levels of educational attainment, then these places should show positive labor market changes, no matter their initial or ending endowments of highly educated adult workers.

Even if BA+ attainment does drive positive labor market change on average, it may affect different types of metropolitan areas in different ways. Past studies have implicitly assumed that the effects of BA+ attainment are relatively uniform from one city or metropolitan area to the next. But this is likely not the case as cities are heterogeneous, have different assets, and face different challenges (E. W. Hill, Brennan, and Wolman 1998). BA+ attainment may influence small metropolitan areas differently than larger metropolitan areas, for example. Degree attainment may also exert different impacts on metropolitan areas with different industrial bases. Furthermore, different metropolitan labor markets have widely varying educational attainment and skill demands for workers (Rothwell 2012). This suggests that increasing BA+ attainment may be very helpful in one labor market, but not as effective in a labor market based on lower-skill work. This study aims to address some of these concerns by taking a research approach that tests for the mediating effect of increased educational attainment in different types of metropolitan areas.

Summary of Metropolitan and Municipal BA+ Attainment Literature

Recent literature in economics has elevated the importance of educational attainment, especially BA+ attainment. The urban and regional economics literature has advanced the idea that there is a positive association between a metropolitan area's rate of growth and the proportion of its working-age residents with bachelor's degrees. There is an ongoing debate about the relationship between a metro's level of economic inequality and the proportion of its residents who have bachelor's degrees, but the preponderance of current evidence suggests that BA+ attainment is a mechanism that lowers inequality while reinforcing long-term metropolitan economic growth. For the most part, however, these links have only been established cross-sectionally, or at points in time. The nature of these studies, along with the literature on the incontrovertible returns to education at an individual level, have potentially created an over confidence in the potential for increasing BA+ attainment at the metropolitan level to help

economically lagging metropolitan areas regain growth momentum and, moreover, to solve labor market problems in metros with high rates of poverty and unemployment.

Combined Cluster-Discriminant Analysis

Cluster analysis is an analytical technique that identifies whether observations (in this case, of MSAs) can be divided into similar groups (Kachigan 1991). Cluster analysis does not explicitly determine why the observations are similar, which is why pairing it with discriminant analysis is helpful. Discriminant analysis is a statistical technique that is used to identify independent variables that influence ordinal, nominal, and sometimes non-random outcomes as opposed to continuous outcomes.[6] Cluster group assignments from the cluster analysis can be used as the ordinal or nominal outcome measure in a discriminant analysis, which is the approach I have taken to this analysis. Cluster analysis allows one to identify the similar outcomes in the labor market and discriminant analysis helps to identify why metros experienced those outcomes.

Many researchers have combined the two statistical techniques and used them in earlier settings to identify drivers of industrial competitiveness and workforce strengths (Hill, Brennan, and Wolman 1998; Hill and Brennan 2000; Fagan 2000; Feser and Luger 2003; Reid, Smith, and Carroll 2008; Held 2004; Peters 2005). The joined cluster-discriminant analysis (which was developed by Hill, Brennan, and Wolman 1998) has become a central tool in identifying metropolitan industrial clusters and explaining why the clusters are "competitive" in a given metro.

One of the main attractions of the combined cluster-discriminant technique is that it makes no *a priori* assumptions about the most important clustering or discriminating variables, which allows multiple hypotheses to be tested at the same time. The method suggests that an analyst collect all of the theoretically justifiable quantitative data that could potentially drive some condition about which knowledge is desired – in this case, labor market outcomes -- and add it to the model. The two-stage method groups similar outcomes together in the cluster analysis, and then, in the discriminant analysis, identifies which (of the numerous) variables drive those outcomes.

[6] Some consider these "qualitative" outcomes because they are not continuous numeric measurements (Kachigan 1991).

Hill and Brennan (2000) note that one of the major challenges with the technique is including the correct information in the model. Like many statistical analyses, the cluster-discriminant analysis can produce misleading results when vital information is left out of the model or when data is included in the model that does not hold theoretically or is unnecessary. The theoretical justification for the interactions that are being modeled in cluster-discriminant analysis is key. In an effort to meet this test, in the study of changes in the labor market in metros with above average BA+ attainment growth, I modified the structure of the cluster-discriminant analysis to ensure that the results more closely align with policy evaluation.

Modifications to the Hill and Brennan Method of Cluster-Discriminant Analysis

Hill, Brennan, and Wolman's methods were used to identify competitive industrial clusters. Their analysis contained no assumptions about why a place might or might not be competitive.[7] This analysis aimed to identify local economic and demographic conditions that drove specific labor market outcomes in a given MSA. The four outcomes of interest were:

1. An increase in earnings per job relative to the national average
2. A decrease in the unemployment rate relative to the change in the national unemployment rate
3. A decrease in poverty rates relative to the change in the national average
4. Below national average growth in income inequality as measured by change in metropolitan Gini coefficients relative to the national average

Because these indicators are used to measure specific outcomes, in comparing MSAs it is reasonable to limit the initial cluster analysis to just these variables. In contrast, when rooting out industrial competitiveness (as Hill and Brennan did) it is important to take a broader view (as they did). My main modification to the method is to restrict the initial cluster analysis to only the labor market

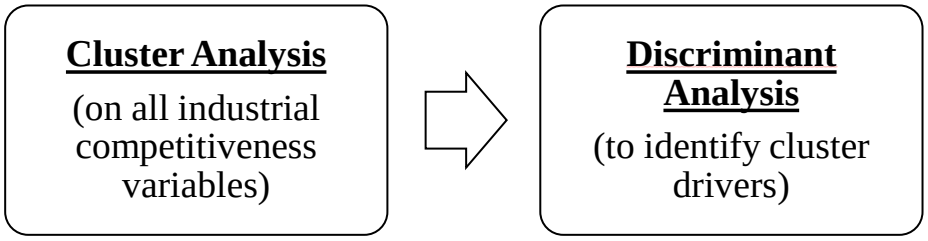
[7] There are obviously some foundational assumptions, but most statistical analyses encounter this dilemma. The authors (as I do as well) made a decision about what data to include in the model of industrial cluster competitiveness. The decisions about what to include are driven by economic development theory and literature. They do not assume before the analysis that one variable is more important than another.

outcome variables. This is why I refer to my modified cluster-discriminant analysis as the "outcomes-based cluster-discriminant analysis."

The modified approach also includes a second stage discriminant analysis using only the outcome variables in order to assist in "naming" the clusters appropriately. These steps in a discriminant analysis helps to show which variables are responsible for creating the most variation *between* groups.

Figure 1 below diagrams the different stages of the outcomes-based cluster-discriminant and the stages of the Hill and Brennan method of cluster-discriminant analysis.

Combined Cluster-Discriminant Analysis Hill, Brennan, and Wolman (1998):



Outcomes-Based Cluster-Discriminant Analysis Andreason (2014):

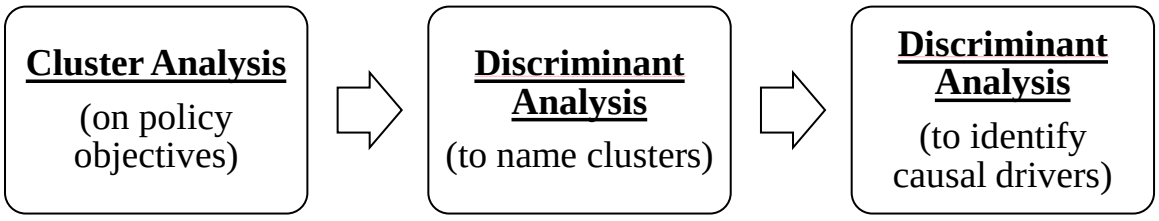


Figure 1 – Schematic Approaches to Cluster and Discriminant Analysis

Metro Areas Included in the Analysis

Seventy-eight metropolitan areas out of 283 metropolitan areas in America experienced higher than national average growth in the proportion of the population that held a bachelor's degree or higher between 1990 and 2010. In 1990, 20.3 percent of Americans over the age of 25 held a bachelor's degree or higher. By 2010, the percent of the adult population with a BA+ grew to 28.2 percent, or a growth of

7.9 percentage points. This study looks at the metropolitan areas that were above the 7.9 percentage point growth cut point, as they represent the group of metropolitan areas that should have experienced the greatest labor market improvements in conjunction with BA+ attainment growth in the population. The range of places above this 7.9 percentage point growth was wide. Some metros like Detroit and Cleveland had very low starting proportions of BA+ residents and others like San Jose and Washington, DC had quite high starting proportions. By studying the absolute change in the proportion of the population with a BA+ this study aims to focus on the effects of increased BA+ attainment as an "input" for labor market improvement. The selection of the 78 metropolitan areas with the above national growth in BA+ attainment also aims to look at the changes in labor markets of metro areas that should have the most labor market improvements in conjunction with BA+ attainment growth. Ultimately, the study will show the wide variation in labor market outcomes among metros with the greatest BA+ attainment improvements.

Cluster Analysis Results

The outcomes-based cluster analysis shows that leader metros experienced two distinct changes along the four labor market outcome measures.[8] Some became more prosperous and unequal, while others become more equal in terms of their income distribution relative to the national average, but experienced weakening earnings. While the cluster analysis does not identify the reasons *why* leader metros experienced these different equilibria, identifying the different outcomes adds to the understanding of what happens in metropolitan areas that grow the share of their workforce that is highly educated.

Proponents of dual labor market theory have identified concentrations of knowledge workers and industries as drivers of inequality because knowledge-based industries pull wages up for workers, but much of the induced demand from these higher wages generates only low paying service and retail work (D. H. Autor, Katz, and Kearney 2006). The link between BA+ growth in a metropolitan area's workforce and knowledge-based industries is often explored through the assessment framework of Florida's creative class hypothesis. Critics of Florida's creative class assertion have identified that higher concentrations of creative workers means higher earnings inequality (Donegan and Lowe 2008). I find

[8] The following analysis will discuss three clusters, two of which are "inequality" clusters, and one is an equality cluster.

that this assessment holds in some places, but not in many others. In general, the assessment holds for larger, more productive leader metros. However, smaller leader metros and those with lower total factor productivity show different results. In the smaller leader metros, increased BA+ attainment is associated with lower unemployment, lower poverty, and significantly lower earnings inequality growth.[9] However, these results were at the cost of growth in earnings per job relative to the nation.

Candidate Cluster Solutions

Following Hill and Brennan's method, I use the agglomeration schedule to identify the appropriate number of clusters. This agglomeration schedule suggests that there are three potential solutions: a seven-cluster, a three-cluster, or a two-cluster solution. Table 1 shows the final stages of the cluster analysis and highlights the steps that represent the seven-, three-, and two-cluster candidates.

Table 1 – Agglomeration Schedule for Final Stages of Modified Cluster Analysis

Stage	Number of Clusters	Coefficient	Slope	Acceleration
63	15	950.00	1.37	0.02
64	14	1244.00	1.31	-0.04
65	13	1584.00	1.27	-0.03
66	12	1979.00	1.25	-0.02
67	11	2526.00	1.28	0.02
68	10	3270.00	1.29	0.01
69	9	4101.00	1.25	-0.03
70	8	5394.00	1.32	0.05
71	**7**	**7058.00**	**1.31**	**-0.01**
72	6	10849.00	1.54	0.17
73	5	18678.00	1.72	0.12
74	4	34026.00	1.82	0.06
75	**3**	**69619.00**	**2.05**	**0.12**
76	**2**	**130100.00**	**1.87**	**-0.09**
77	1	303600.00	2.33	0.25

I prefer the three-cluster solution because it yields increased analytical accuracy in the discriminant analysis that follows (an added benefit is that it is easier to understand three combinations of

[9] Almost every metropolitan area in America saw growth in earnings inequality from 1990 to 2010. The results here are indexed to identify places that experienced relatively less growth in inequality.

policy outcomes than a larger number). The groupings in the seven-cluster solution presented an analytical challenge because, while they were distinct clusters, they presented an interpretation that was about "degrees of difference" rather than a set of distinct differences. The two-cluster solution acts as the basic framework for this analysis and represents the two broad outcomes described above. The three-cluster solution also exhibits the largest change in the slope and acceleration statistics in the agglomeration schedule, suggesting that it presents the greatest and most significant differences among cluster groupings.

The three-cluster solution has a "hit ratio" of just over 78 percent and it exhibits the largest increase in the acceleration statistic. The hit ratio is a measure of fit between the cluster assignment and the related discriminant analysis. The measure means that the discriminant analysis correctly predicted the cluster membership for 78 percent of the cases, or of 61 of the 78 metropolitan areas in the universe.

Labor Market Outcomes in the Clusters

The cluster analysis highlights the variation on the four labor market outcomes, or dependent variables: growth in earnings per job, reduction in the unemployment rate, reduction in the poverty rate, and change in relative income inequality. For example, among all leader metros, changes in unemployment ranged from a 3 percentage-point reduction to a 3 percentage-point increase relative to the nation from 1990 to 2010. Table 2 shows the mean labor market trends by cluster membership.

Cluster One and Cluster Two consist of leader metros that outpaced the nation in BA+ growth and experienced increasing earnings per job relative to the nation. However, this result was accompanied with worsening unemployment rates and poverty rates, and increased income inequality relative to the nation. Cluster Three is also made up of leader metros, but these experienced the opposite labor market trends: decreases in earnings per job relative to the national average, but lower than average income equality growth and decreased unemployment and poverty rates relative to the national average.

Table 2 – Summary of Mean Changes in Labor Market by Cluster

Cluster	Growth in Earnings per Job	Change in Gini Coefficient	Unemployment Rate Change	Poverty Rate Change
1	$+18,022	143.6%	+0.03%	+0.84%
2	$+1,454	102.6%	+0.06%	+0.59%
3	$-4,316	73.9%	-1.30%	-0.24%

The size and productivity of leader metros is non-random in the cluster membership in this analysis. Broadly speaking, more populous and more productive metros became more unequal and smaller metros became more equal over the 20-year period examined.

Cluster One, the greatest gainers in earnings per job with worsening unemployment and poverty, is made up of five of the largest and most knowledge-economy-focused regions in the nation – New York City, Boston, Washington DC, San Francisco, and San Jose. These metros have economic bases in industries that rely heavily on knowledge workers. Given that these industries capitalize ideas, many create products with increasing returns to knowledge (Warsh 2006). For example, new software products have increasing returns because increasing sales have very low – or no – marginal costs. Increasing returns to scale implies that high sales growth rates does not necessarily increase employment. Instead, increasing returns to scale result in increasing income inequality, as returns are concentrated among a small number of workers. This is seen in Cluster One, which I have named the "Hyper Growth, High Inequality" cluster.

The metros in Cluster Two (which include Charlotte NC, Portland OR, and San Diego, CA) show some of the same characteristics as the metros in Cluster One, but to a much lesser extent. Growing or promoting inequality is often a first step in economic recovery, especially in the short and medium terms (Ostry, Berg, and Tsangarides 2014; Krueger 2001).[10] The size and variety of metropolitan areas in Cluster Two suggest that many leader metros that experienced earnings increases during the 1990-2010 period also had high growth in unemployment, inequality and poverty relative to the national average. This is likely the product of broad-based economic changes that advantage a smaller group of workers

[10] Some argue that long term inequality dampens economic growth (Benner and Pastor 2012).

within a metropolitan area that have with high levels of educational attainment and skills. Additionally, it could emanate from economic development policies focused on attracting knowledge workers and improving job opportunities for the highly educated.[11] Given the diversity of the metropolitan areas in this cluster these high skill positions may be in many different types of industries. These changes are not simply a function of employment growth in STEM occupations or high-tech business.

While the leader metros in this cluster may not have similar economic bases in terms of products or industries, they may be similar in terms of the mix of skill or levels of human capital demanded by employers. These communities may pursue extremely high skilled work without regard for the impact on lower skilled work or the employment needs of adults that have not earned BA+ degrees. I have named this group of leader metros the "High Growth, Increasing Inequality" cluster.

Cluster Three shows places that, on average, experienced declining earnings per job relative to the national average, but that have achieved solid improvement in the other labor market outcomes. These places are weaker-market, older-industrial metropolitan areas like Cleveland or Buffalo, as well as a number of metros that have a disproportionately large portion of their employment in higher education—they are university towns and higher education is a key traded sector in their economies. These metros tend to have smaller populations and lower total factor productivity. Collectively, they exhibit high performance on the equity measures *i.e.,* reductions in their poverty and unemployment rates, and lower income inequality growth, but significantly lower growth than their peers in earnings per job. I have named Cluster 3 the "Low Growth, Increasing Equality" cluster (see Table 3).

[11] This assessment applies to Cluster One as well, but the industrial makeup of Cluster One likely accounts for the magnitude of the difference.

Table 3 – Descriptive Names of Clusters

Cluster	Descriptive Name
1	Hyper Growth, High Inequality
2	High Growth, Increasing Inequality
3	Low Growth, Increasing Equality

Table 4 – Cluster Membership

Cluster 1 (5 Metros)	Cluster 2 (39 Metros)	Cluster 3 (34 Metros)
Boston, MA	Albany, NY	Allentown, PA
New York City, NY	Baltimore, MD	Appleton, WI
San Francisco, CA	Bloomington, IL	Asheville, NC
San Jose, CA	Bremerton, WA	Athens, GA
Washington, DC	Charleston, SC	Bellingham, WA
	Charlotte, NC	Billings, MT
	Charlottesville, VA	Bismarck, ND
	Chicago, IL	Buffalo, NY
	Cincinnati, OH	Cleveland, OH
	Colorado Springs, CO	Columbia, MO
	Columbus, OH	Dubuque, IA
	Des Moines, IA	Duluth, MN
	Detroit, MI	Eau Claire, WI
	Hartford, CT	Fargo, ND
	Indianapolis, IN	Fort Collins, CO
	Jacksonville, FL	Greenville, SC
	Kansas City, MO	Hagerstown, MD
	Los Angeles, CA	Harrisburg, PA
	Madison, WI	Johnson City, TN
	Manchester, NH	Johnstown, PA
	Miami, FL	Knoxville, TN
	Milwaukee	La Crosse, WI
	Minneapolis-St. Paul, MN	Lawrence, KS
	Naples, FL	Louisville, KY
	Nashville, TN	Provo, UT
	Norwich-New London, CT	Roanoke, VA
	Omaha, NE	Rochester, NY
	Peoria, IL	Savannah, GA
	Philadelphia, PA	Scranton, PA
	Pittsburgh, PA	Sioux Falls, SD
	Portland, OR	Springfield, MA
	Providence, RI	State College, PA
	San Diego, CA	Wilmington, PA
	Seattle, WA	York, PA
	Springfield, IL	
	St. Louis, MO	
	Tampa, FL	
	Virginia Beach, VA	
	Worcester, MA	

Identifying the Drivers of Labor Market Outcome Divergence

The naming analysis suggests that metropolitan areas that have very high earnings growth experience worsening income equity, a slight increase in the proportion of the population unemployed, and a slight negative change in the poverty rate (Cluster One). The average metropolitan area – the moderate wage growth and moderate inequality growth metropolitan areas – saw similar changes. The final cluster (Cluster Three) saw essentially the opposite combination of labor market outcomes. These metropolitan areas saw declines in earnings per job, but experienced stronger performances on the equity and opportunity based measures.

The modified cluster-discriminant analysis is designed to identify why this is the case. The final stage of the modified discriminant analysis is very similar to the Hill-Brennan method of cluster-discriminant analysis. The major variation in the discriminant analysis is that this model does not include the outcome, or clustering, variables.[12] This analysis aims to identify the role of economic base and industry, macro metropolitan economic conditions (such as metropolitan GDP size and metropolitan economic growth), educational segregation (measured as the level of spatial clustering of BA+ holders from non-holders), urban form and land policy (including density, residential land use regulation, and residential density restrictions), and demographic characteristics (such as age makeup, racial composition, and proportions of foreign-born residents) in distinguishing Hyper-Inequality and Inequality metropolitan metros from Equality, Weak Market regions. The discriminant analysis tests whether the following factors play a role in the performance of these metropolitan labor market outcomes: [13]

- **Demand for Labor**
- **Industrial Mix**
- **Anchor Institutions**
- **Demographics and Community Characteristics**
- **Pro-Growth State Labor Policies**

[12] If the outcome variables are included in the discriminant analysis they are the only variables that end up functionally involved in the discriminant analysis. This would be akin to using a dependent variable as an independent variable in regression analysis.
[13] Appendix A includes a longer list and discussion of the variables that are entered into the discriminant model.

- **Land Development Patterns and Regulations**
- **Greater Degree of Residential Integration of BA+ Holders with other workers**

Discriminant Analysis Results

The results of the discriminant analysis suggest that six variables are crucial in determining a leader metro's tendency toward the outcomes associated with Clusters One and Two, namely, growth in earnings per worker and intensified unemployment, poverty, and inequality, versus the outcomes associated with Cluster Three, namely stagnant earnings but improvement on equity and opportunity measures. The variables are:

- Population density in 1990
- GDP growth from 1990 to 2010
- Change in percent of the population 18-34 y/o
- Residential segregation of BA+ holders from non-BA+ holders
- Change in military employment
- Violent crime per 100,000 residents

Table 5 shows the discriminant functions and their importance in predicting cluster membership.

Discriminant Function One, which is made up of the metropolitan population density in 1990 and the level of educational segregation in the metropolitan area, describes 83.9 percent of the variation among the three clusters, making it the strongest predictor. Discriminant Function Two explains the remainder of the variation (16.1 percent). The discriminant function correctly predicts group membership for 61 of the 78 leader regions, which equates to a "hit ratio" of 78 percent. This represents a high level of agreement between the cluster and discriminant analysis.[14]

[14] The Hill and Brennan (2000) analysis had slightly higher hit ratios of roughly 89%. Kachigan (1991) suggests that the percentage of correct predictions is akin to r-squared measures in regression. The higher the percentage, the better the fit.

Table 5 – Correlations between Discriminant Functions and Discriminating Variables

Functions	% Variation Explained	Correlation Coefficients
Function 1	**83.9**	
Population Density 1990		**.654**
Educational Segregation		**.373**
Number of National Universities*		.361
Wharton Land Use Regulation Index*		.272
R-1 Status*		.246
Function 2	**16.1**	
Violent Crime per 100K Residents		**.542**
Change in 18-34 year old population		**-.439**
Property Crime per 100K*		.343
Foreign Born Population Growth*		.318
Regional GDP 1990*		-.315
Military Employment Change		**.311**
Percent Foreign Born 1990*		-.284
Population Density 2010*		-.237
Regional GDP Change 1990-2010		**.007**

*Correlation to discriminant function, statistically significant, but not included in stepwise model. Statistically significant correlations below .225 outside of the model are not included in this summary
**The percentage explained column corresponds to the power of the discriminant function. The correlation coefficients in the third column are between the variable and the discriminant function with which it is associated.
A closer look at the averages for each cluster provides a clearer picture of how the variables interact with

each other and what leads to the divergent labor market outcomes in each cluster.

Table 6 - Cluster Means on the Primary Discriminant Variables

Cluster	Population Density 1990	Educational Segregation	Rate of Change in Young Adult Population, 1990-2010	Violent Crime per 100K	Military Emp. Change	Regional GDP Change
1	1,342.8	0.368	-21.6%	394.2	-18.9%	1.66%
2	516.1	0.266	-20.4%	411.1	18.0%	1.67%
3	265.2	0.152	-15.5%	293.0	21.6%	1.66%
Mean	**459.8**	**0.223**	**-18.4%**	**358.5**	**17.2%**	**1.67%**

Table 7 - Correlated Discriminant Variables with Function One

Cluster	Number of National Universities	WRLURI	R-1 Status
1	7.4	0.712	1.00
2	1.9	0.181	0.48
3	0.5	-0.202	0.35
Mean	**1.6**	**0.048**	**0.46**

Table 8 Correlated Discriminant Variables with Function Two

Cluster	Property Crime per 100K	Percent Foreign Born 1990	Foreign Born Change Rate	Regional GDP 1990 (in billions)	Population Density 2010
1	2,364.8	26.0%	47%	$196.0	1,488.0
2	516.1	9.2%	97%	$48.1	699.5
3	265.2	4.3%	98%	$8.0	251.0
Total	**459.8**	**8.1%**	**58%**	**$40.0**	**554.7**

The analysis then identifies the statistically significant differentiators among the BA+ leader metros. Using the discriminant function scores (at the cluster means), I determine how far from the entire sample of BA+ leader metropolitan areas average each cluster is. Using z-scores as the measure of statistical significance, I identify which clusters are statistically different from the entire group of leader metros based on each discriminant function. This identifies the factors that bind each cluster together (Hill, Brennan, and Wolman 1998).

Table 9 – Standardized (Z-Score) Cluster Averages on Each Discriminant Function

	Function	
Cluster	**1**	**2**
1	**5.68*** **	-.46
2	0.49	-.31
3	**-1.48***	0.35

* - Significant at the 85% confidence level
*** - Significant at the 99% confidence level

Table 9 shows that Function One is the strongest predictor of labor market outcomes. Cluster One has a very high z-score, suggesting that the five metropolitan areas in the cluster are denser and more segregated, and that they have more restrictive land use regulations, higher crime rates, larger GDPs, and more foreign-born residents Relative to other metropolitan areas, these five metros also saw young adults decrease as a proportion of their populations and saw their foreign-born populations grow more in terms of absolute numbers, but with lower growth rates.

The table shows the opposite relationship for Cluster Three. The leader metros in Cluster Three were much less dense than their counterparts in Clusters One and Two. The level of residential land

regulation in these leader metro areas was below the WRLURI and leader metro averages, suggesting that land use regulation in these metros was permissive and encouraged development (and affordability). The metros in Cluster Three had more residential integration between BA+ holders and non-BA+ holders. Relative to other leader metros, those in Cluster Three saw very fast growth of foreign-born residents, but in small absolute numbers and percentages. These metros had the largest growth of young adults.[15]

Conclusion: Thinking Beyond the Education–Economic Development Fad

This research shows that increasing the proportion of the BA+ holding population in a metropolitan area does not promise broad improvement in labor market outcomes. Some metropolitan areas see earnings growth but worsening opportunity and equality; other metropolitan areas see reductions in the proportion of workers who are unemployed and in poverty and experience lower income inequality growth, but see declining relative earnings. Increasing BA+ attainment is one of the clearest investments that individuals can make in themselves to improve their socioeconomic prospects, but this does not appear to be the case for metropolitan areas or for place-based labor market change. Wolf-Powers (2005) and Giloth (2012) suggest that talented-worker attraction and retention may be the newest version of inefficient "buffalo-hunting" in economic development. This research supports these assertions by calling into question the place-based benefits of increased BA+ attainment at the metropolitan level. Cost-benefit analyses that map the individual benefits of increased BA+ degree attainment onto metropolitan areas to support talent attraction and retention programs are misleading. This type of cost-benefit social benefit accounting is happening in many cities and metropolitan areas though, but it is more appropriate to national-level than metropolitan- and local-level economic development strategy.

Economic development has had many "fads" throughout its history. Tax increment financing, industrial parks, enterprise zones, financial regulation through the Community Reinvestment Act, "Silicon Valleys," and "Creative Class" strategies have waxed and waned in popularity. Recently, the promotion of college attainment and the attraction of college-educated workers has emerged and gained momentum. Economic development practitioners have tended to assume that growing their college-

[15] The statistical power is not as strong in this at only the 85% confidence level, but given the relatively small sample size this still seems to be a valid finding.

educated populations will lead to broad improvements and unlock challenges in other policy areas. This type of "silver bullet" thinking has led economic development astray.

This analysis suggests that as with previous "silver bullet" policies increasing educational attainment will not solve local economic development and labor market problems at the metropolitan level. The Creative Class theory (which I argue is very closely related to or the same as the current bachelor's or higher degree promotion) has identified its effectiveness in revitalizing small areas – neighborhoods – but even its strongest proponents suggest that it will not lead to broad labor market improvement and instead is likely to increase segregation and inequality as well as raising housing costs (Florida 2013; Florida 2014). Practitioners should take the same lesson from this analysis as they should take from evidence that "Creative Class" strategies possess a limited scope. Policymakers should understand that when they work to revitalize a neighborhood through talent attraction and retention, they might be further enforcing a hierarchy of neighborhoods and places within a metropolitan area rather than "lifting all boats."

Policies that promote increasing educational attainment and BA+ attainment proportions within the population or the labor force are likely to lead to some labor market improvements, but should be considered as a part of a broader strategy. Economic development and urban policymakers should think comprehensively about the different ways that they can promote job growth, employment growth, and improved labor market conditions. I suggest that these may happen through market mechanisms as well as government interventions and transfer programs. In order for BA+ attainment growth to lead to broad labor market improvement, economic development professionals need to work in close collaboration with community development groups and consider who may benefit from interventions. Are interventions making a difference in the community or population that practitioners had hoped would benefit? In this analysis, I suggest a method based on the Hill and Brennan cluster-discriminant analysis that takes into account historic trends over time to identify policy tradeoffs and potential unintended consequences. Future use of this method may help policymakers understand tradeoffs and to project what those tradeoffs may be.

Educational and workforce policies and programs cannot be limited to college-for-all or college-only strategies. Even the most optimistic projections suggest that only 40 percent of future jobs will require a college degree or higher. Sixty percent (or more) will require less than a college degree (of the remaining 60 percent, 30 will require some postsecondary training). This is a significantly understudied and underappreciated area of economic development policy. The jobs that require some postsecondary training represent the middle skill jobs of the future, but there is a significant skill gap between middle skill job training and middle skill job requirements (Holzer et al. 2011). A more comprehensive "education for economic development" policy agenda would cover these middle skill jobs as well as entrepreneurship training and basic skills for low-skilled jobs and training for jobs that require a BA+ degree.

Ultimately, support for BA+ attainment growth and support should be one part of an economic development policy strategy that works comprehensively to stimulate demand for labor as well as enhancing labor supply. This strategy should incorporate perspectives from aligned fields such as community development. This analysis shows that increasing bachelor's or higher degree attainment is only one input into creating broad labor market improvement as measured by earnings growth, reductions in unemployment and poverty, and low inequality growth. The other inputs include promoting educationally-integrated neighborhoods, reducing excessive land use regulations that limit the development of affordable housing, and advocating for outside investments from larger entities like the federal government. The most reliable strategy to improve labor market outcomes at the metropolitan level surely involves increasing BA+ attainment, but it does not rely solely on that lever.

Appendix A – Predictor Variables and Data Source

Table A1 – Variables in the Analysis

Name	**Definition**	**Hypothesis**	**Source**
Industrial Employment Location Quotient 1990; (Two-Digit NAICS Codes) from 11-81 and Government, Military, and Private Household	Location Quotient of every two-digit NAICS code industry in 1990. Reference area is national employment, local employment area is the MSA.	Industrial Mix	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Industrial Employment Growth (as a rate of change) 1990-2010; (Two-Digit NAICS Codes) from 11-81 and Government, Military, and Private Household	Rate of change in employment (derived by change in the location quotient) of two-digit NAICS codes from 1990 to 2010.	Industrial Mix	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Percent of Population 18 to 34 in 1990	Percent of population ages 18 to 34 in 1990	Demographics	U.S. Decennial Census, 1990; Downloaded from Social Explorer
18 to 34 Population Change Rate 1990 – 2010	Change rate in population age 18 to 34 between 1990 and 2010	Demographics	U.S. Decennial Census 1990, U.S. Census American Community Survey Five-Year Estimates 2010; Downloaded from Social Explorer
Percent of Population 65+ in 1990	Percent of population ages 65+ in 1990	Demographics	U.S. Decennial Census, 1990; Downloaded from Social Explorer
65+ Population Change Rate 1990 –	Change rate in population age 65+	Demographics	U.S. Decennial Census 1990, U.S.

2010	between 1990 and 2010		Census American Community Survey Five-Year Estimates 2010; Downloaded from Social Explorer
Percent Foreign Born 1990	Percent of the population born outside of the U.S. in 1990	Demographics	U.S. Decennial Census, 1990; Downloaded from Social Explorer
Foreign Born Change Rate 1990 – 2010	Change rate in population born outside of the U.S. between 1990 and 2010	Demographics	U.S. Decennial Census 1990, U.S. Census American Community Survey Five-Year Estimates 2010; Downloaded from Social Explorer
Percent African-American 1990	Percent of the population African American in 1990	Demographics	U.S. Decennial Census, 1990; Downloaded from Social Explorer
Percent African-American Change Rate 1990 – 2010	Change rate in African-American population between 1990 and 2010	Demographics	U.S. Decennial Census 1990, U.S. Census American Community Survey Five-Year Estimates 2010; Downloaded from Social Explorer
Right to Work Status	Location in a state with or without right to work legislation	State Labor Policy	National Right to Work Legal Defense Fund
Public Sector Bargaining	Location in a state with either required, allowed, or illegal public sector bargaining	State Labor Policy	National Council on Teacher Quality
Unemployment Change 1990 – 2010	Unemployment level relative to U.S. unemployment in 1990 differenced from relative unemployment in	Outcome Variable	U.S. Decennial Census 1990, U.S. Census American Community Survey Five-Year Estimates 2010; Downloaded

	2010, expressed in absolute percentage change		from Social Explorer
Per Capita Wage (PCW) Change 1990 – 2010	Metro PCI relative to U.S. PCI in 1990 differenced from relative PCI in 2010, expressed in absolute dollar change (real 2010 dollars)	Outcome Variable	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Poverty Rate Change 1990 – 2010	Poverty rate relative to U.S. poverty in 1990 differenced from relative poverty in 2010, expressed in absolute percentage change	Outcome Variable	U.S. Decennial Census 1990, U.S. Census American Community Survey Five-Year Estimates 2010; Downloaded from Social Explorer
Indexed Gini Coefficient of Earnings Inequality Change	Gini Coefficient of earnings inequality change indexed to 100 (national average) below 100 is considered a equitable change	Outcome Variable	U.S. Census American Community Survey Five-Year Estimates 2010; Downloaded from Social Explorer 1990 Gini Coefficients are calculated through weighted averages based on county level coefficients provided by ASU Geoda Center
Productivity in 1990	Economic Output (Gross metro product) divided by total employment	Strong Demand	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Productivity Change 1990 – 2010	Change in productivity 1990 – 2010	Strong Demand	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Per Capita Wages	Wages divided by	Outcome	Moody's Analytics Economy.com U.S.

1990	total employment	Variable	Employment, Output, and Wages Estimates and Forecasts
Employment Per Capita 1990	Total employment divided by total population over 25 years	Strong Demand	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts; U.S. Census American Community Survey and Decennial Census
Employment Per Capita Change	Rate of change in employment per capita	Strong Demand	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts; U.S. Census American Community Survey and Decennial Census
Productivity to Wage Ratio 1990	Ratio of productivity to wages	Strong Demand	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Productivity to Wage Ratio Change	Rate of change in productivity to wage ratio	Strong Demand	Moody's Analytics Economy.com U.S. Employment, Output, and Wages Estimates and Forecasts
Educational Segregation	Value of Moran's I Spatial Autocorrelation analysis of the percent of a population within a census tract that holds a BA+	Segregation and Social Capital	U.S. Census American Community Survey TIGER File Data
Wharton Residential Land Use Regulatory Index	Indexed value based on a number of metrics related to residential land use and development	Land Use Patterns	Gyourko, Saiz, and Summers (2008)

	regulation		
Residential Density	Nominal variable identifying if at least one third of municipalities have minimum lot sizes of at least 1 acre	Land Use Patterns	Gyourko, Saiz, and Summers (2008)
Property Crime per 100K residents	The number of property crimes defined as burglary, larceny-theft, and motor vehicle theft per 100K residents	Segregation and Social Capital	FBI Crime in the United States 2010
Violent Crime per 100K	The number of violent crimes defined as murder, non-negligent manslaughter, forcible rape, robbery, and aggravated assault per 100K residents	Segregation and Social Capital	FBI Crime in the United States 2010
Total Number of National Universities	Count of national universities	Anchor Institutions	U.S. News and World Report, 2010
Presence of at least one R-1 University	Nominal (yes/no) status of location of at least one R-1 “High Research Activity” university in the region.	Anchor Institutions	Carnegie Classifications of Institutions of Higher Education, 2010

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