

Unemployment and the Supply of and Demand for Education in Metropolitan America

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Outline of questions

1. Why is skill mismatch worth studying?
2. How can skill mismatch be measured?
3. Is there a mismatch & does it help explain regional unemployment rates?
4. How does skill mismatch compare to cyclical industrial demand and housing market trends in predicting unemployment across metropolitan areas?
5. How does mismatch affect unemployment?

Presentation is based on two related Brookings reports from September of 2011 and August 2012. Both measure skill mismatch, with the first using existing jobs to measure the demand and the second using job openings

Education, Demand, and Unemployment in Metropolitan America

Jonathan Rothwell and Alan Berube

Findings

An analysis of the gap between the supply and demand for educated workers, and its relationship to unemployment, particularly for the 100 largest metropolitan areas in the United States, finds that:

- **The years of education demanded by the average U.S. job grew slowly but steadily from 2005 to 2009 and slightly outpaced growth in educated labor supply during the recession.** At the height of the recession in 2009, the average U.S. job required 13.54 years of education, up from 13.37 in 2005. The increase reflected layoffs in less-education intensive industries such as construction and manufacturing, amid job gains in industries like health care, education, and professional services that demand more education.
- **Metro areas with larger "education gaps"—shortages of educated workers relative to employer demand—had consistently higher unemployment rates than other metro areas from 2005 to 2011.** Metro areas with larger education gaps experienced unemployment rates an average of 1.4 percentage points above metro areas with smaller such gaps. The difference widened to 1.7 percentage points by May of 2011, suggesting that better educated metro areas had a slightly larger advantage in the wake of the recession than they did before.
- **The types of industries in which a metro area specialized also influenced its unemployment trajectory from 2007 to 2009.** Unemployment rates in metro areas with more jobs in industries resilient to the recession increased an average of 1.4 percentage points less than rates in metro areas with more jobs in economically vulnerable industries.
- **Both industry composition and the education gap help explain the differences in unemployment rate increases across metropolitan areas.** In metro areas with both resilient industries and low education gaps like Washington, D.C., unemployment rates rose by roughly 2 percentage points less than in metro areas with vulnerable industries and high education gaps, like Riverside, CA.
- **Metro areas with larger education gaps exhibit greater differences in unemployment rates between highly educated and less educated workers.** In large metropolitan areas, the difference in unemployment rates between workers with bachelor's degrees and those without high school diplomas ranged from 2.8 percentage points in Poughkeepsie, NY to 14.7 percentage points in Detroit.

Inadequate demand and inadequate education, relative to available occupations, are both hampering economic recovery in U.S. metropolitan areas. With a still weakened private sector, strategic public investment and regional economic diversification can help address the first problem. Yet even when the economy recovers, longer-term "structural unemployment" will linger in some metropolitan areas because of mismatches between the supply of, and demand for, educated workers. Solutions to that problem include boosting educational attainment, enhancing the skills of workers, and increasing demand for less educated workers by providing public goods needed by industries like manufacturing and the "green" economy.

Education, Job Openings, and Unemployment in Metropolitan America

Jonathan Rothwell

Findings

An analysis of labor markets using data on adult educational attainment, occupations, and job openings in the 100 largest metropolitan areas from January of 2006 to February of 2012 finds that:

- **Advertised job openings in large metropolitan areas require more education than all existing jobs, and more education than the average adult has attained.** In the 100 largest metropolitan areas, 43 percent of job openings typically require at least a bachelor's degree, but just 32 percent of adults 25 and older have earned one.
- **Metro areas vary considerably in the level of education required by job openings posted online.** Roughly half of openings in San Jose, San Francisco, and Washington, D.C. require a bachelor's degree or higher while fewer than one-third of openings require a bachelor's degree in metropolitan McAllen, TX and Youngstown, OH.
- **Unemployment rates are 2 percentage points higher in large metro areas with a shortage of educated workers relative to demand and have been consistently higher since before the recession.** The gap between education demand and supply is small in Madison, Washington, Raleigh, and Minneapolis, and large in metro areas throughout California's Central Valley. Both less educated and younger workers are much more likely to be working if they live in metropolitan areas with a smaller education gap.
- **Declines in industry demand and housing prices explain most of the recent cyclical increases in metropolitan unemployment rates, but education gaps explain most of the structural level of metropolitan unemployment over the past few years.** Changes in house prices (prompting a reverse wealth effect) and industrial demand explain roughly three-quarters of the trend in unemployment rates across large metropolitan areas since the recession began. However, metropolitan education gaps explain roughly two-thirds of variation in the level of unemployment across metro areas, posing a longer-run challenge for many regional labor markets.
- **Metro areas with higher education gaps have experienced lower rates of job creation and job openings over the past few years.** Educational attainment, overall and relative to existing demand, benefits metro areas by making workers more employable and firms more competitive and entrepreneurial—thus leading to more job openings for less educated workers. By contrast, education gaps do not appear to be related to employer difficulty in filling job openings in metro areas.

In the short-term, unemployment rates are unlikely to come down to their pre-recession levels without improvements in housing markets and consumer demand. Yet high educational attainment is essential for the health of metropolitan labor markets before, during, and after recessions. Educational attainment makes workers more employable, creates demand for complementary less educated workers, and facilitates entrepreneurship. To better train less educated adults, non-profit organizations, community colleges, and governments can use detailed job openings data to align training curricula and certifiable skills with employer demand.

"Inadequate demand and inadequate education, relative to available occupations, are both hampering economic recovery in U.S. metropolitan areas."

"Less educated regional labor markets may lack entrepreneurs who start or expand businesses, leading to fewer overall openings and fewer openings for less educated workers."

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Unemployment rate

Current unemployment rates result from long-term "structural" factors interacting with short-term "cyclical" dynamics. Change during the recession is used here to illustrate the short-run, while the current level reflects the long-run condition.

May 2012	Change: pre-recession through May 2012
10.2%	+4.9 pct. pts.
Rank: 91/100	Rank: 83/100

[Job openings per unemployed worker >>](#)

Rankings on factors that affect unemployment

Short-run "cyclical" unemployment rate changes are due primarily to demand for industry products, house price changes, and to a lesser extent, the gap in the supply of and demand for educated workers. This *education gap index* largely explains long-run unemployment.

Demand for industry products	Housing price growth	Education gap index
57th	75th	83rd

Rankings are out of the 100 largest metro areas (1st=top performance, contributing to lower unemployment)

[Scatter plot >>](#)

Occupations with the most job openings

January/February, 2012

Title of occupation	Openings
Health Diagnosing and Treating Practitioners	4,965
Computer Occupations	3,159
Other Management Occupations	1,462
Retail Sales Workers	1,431
Information and Record Clerks	1,390
Motor Vehicle Operators	1,222
Financial Specialists	1,076
Sales Representatives, Services	1,058
Supervisors of Sales Workers	1,049
Advertising, Marketing, Promotions, Public Relations, and Sales Managers	1,018

Rate of job openings in 2011 per existing job: 2.8%(rank: 17/100)

Educated worker supply and demand

Share of workers by educational attainment vs. share of job openings by education required

Education Level	Job openings (Jan/Feb 2012)	Unemployed workers (2010)	Adults (all potential workers, 2010)
Bachelor's degree or higher	40.8%	19.1%	28.5%
Associate's degree or some college	32.5%	31.0%	26.0%
High school diploma or less	26.6%	49.8%	45.5%

Definitions and sources

The education gap index is calculated as the years of education required by the average job vacancy in a metro area divided by the years of education attained by the average working-age person in that area.

Demand for industry products refers to predicted job growth during the recovery, based on the metro area's industry mix and national industry growth.

Job openings data are from the Conference Board's Help Wanted Online Series.

Other sources include the Census Bureau's American Community Survey, the Bureau of Labor Statistics, Moody's Analytics, and the Federal Housing Finance Agency. For more, download the report above.

How many job openings could the average unemployed worker apply for in 2011?

All education levels: 1.9 job openings

- Bachelor's degree or higher: 4.4
- Associate's degree or some college: 2.5
- High school diploma or less: 1.4

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How does unemployment relate to the education gap?

• 100 Largest Metro Areas • Selected metro area

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Why look at Skill Mismatch?

- May have cyclical importance.
 - Severe recession with worst recovery since Great Depression; low-skill sectors (manufacturing and construction) disproportionately affected
 - Individual unemployment rates are low for highly educated workers
 - (4.0% for Bachelors vs. 8.2% for High School in Sept 2012)
- May have structural importance:
 - Job growth & college attainment from 1980-2010 lower than 1950-1980
 - College wage premium has steadily increased since 1980 (59% in 2010)

How to measure mismatch: Education Gap Indexes

- Education Gap for filled jobs=
Ave Years of Edu Demanded for filled jobs
Ave Years of Edu Supplied
- Education Gap by vacancies =
Ave Years of Edu Demanded by Vacancies
Ave Years of Edu Supplied

Data Sources

- Education Demand:
 - Jobs by Occupation by MSA
 - BLS OES (roughly 1.5 year delay)
 - Openings from Conference Board HWOL Series (monthly and timely—has SOC codes and MSA data, unlike JOLTS)
 - Educational Requirements of Occupations
 - IPUMS files for Census American Community Survey: Calculate education distribution for each minor occupation (BLS EPP also provides these data)
- Education Supply:
 - Share of working age population by level of educational attainment
 - Census American Community Survey (roughly two year delay)

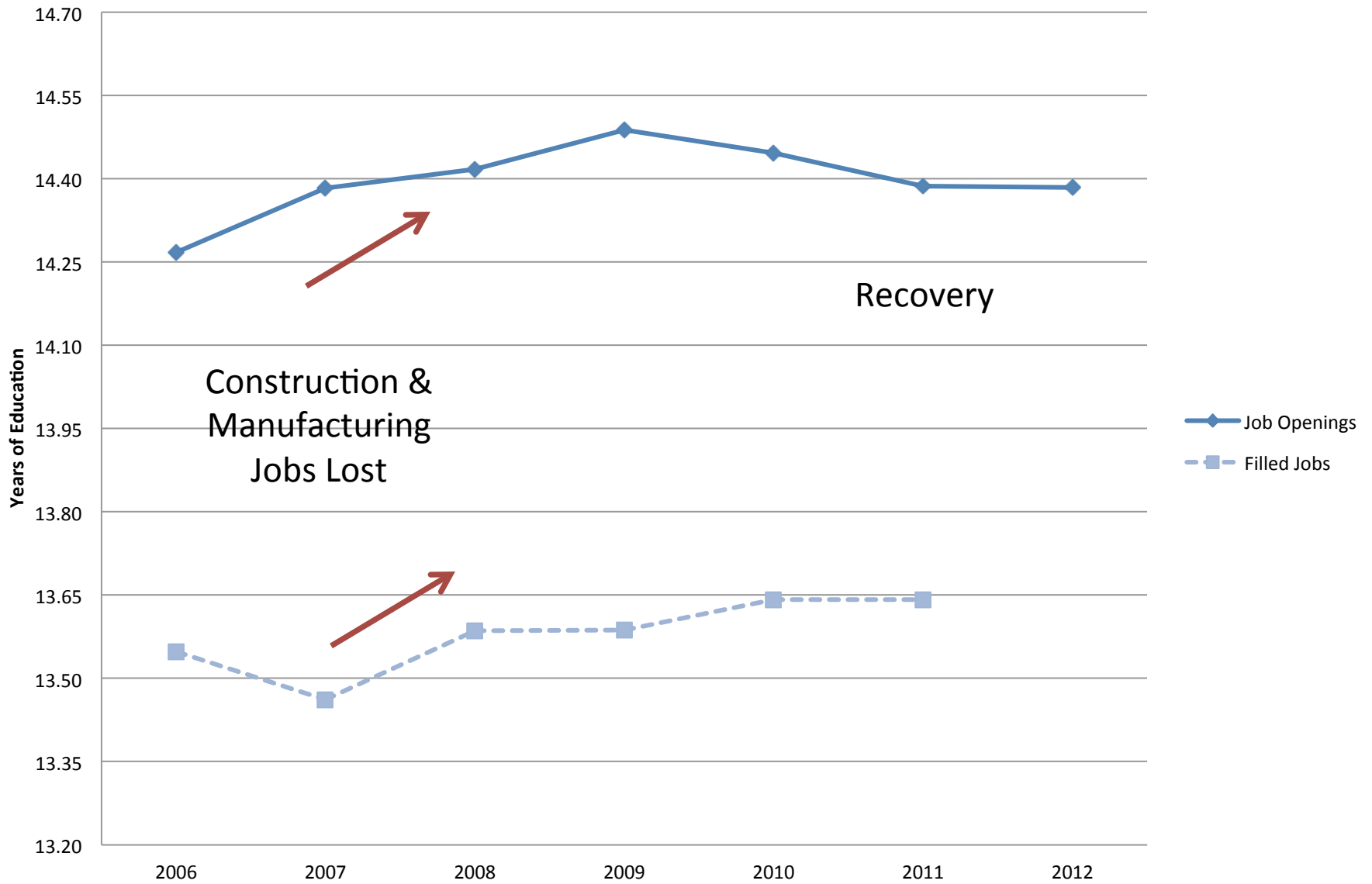
Online Data versus JOLTS Survey Data

Occupations with the Largest Discrepancies in Share of All Occupations Across Databases, Comparing HWOL Openings to JOLTS Openings for January and February of 2012

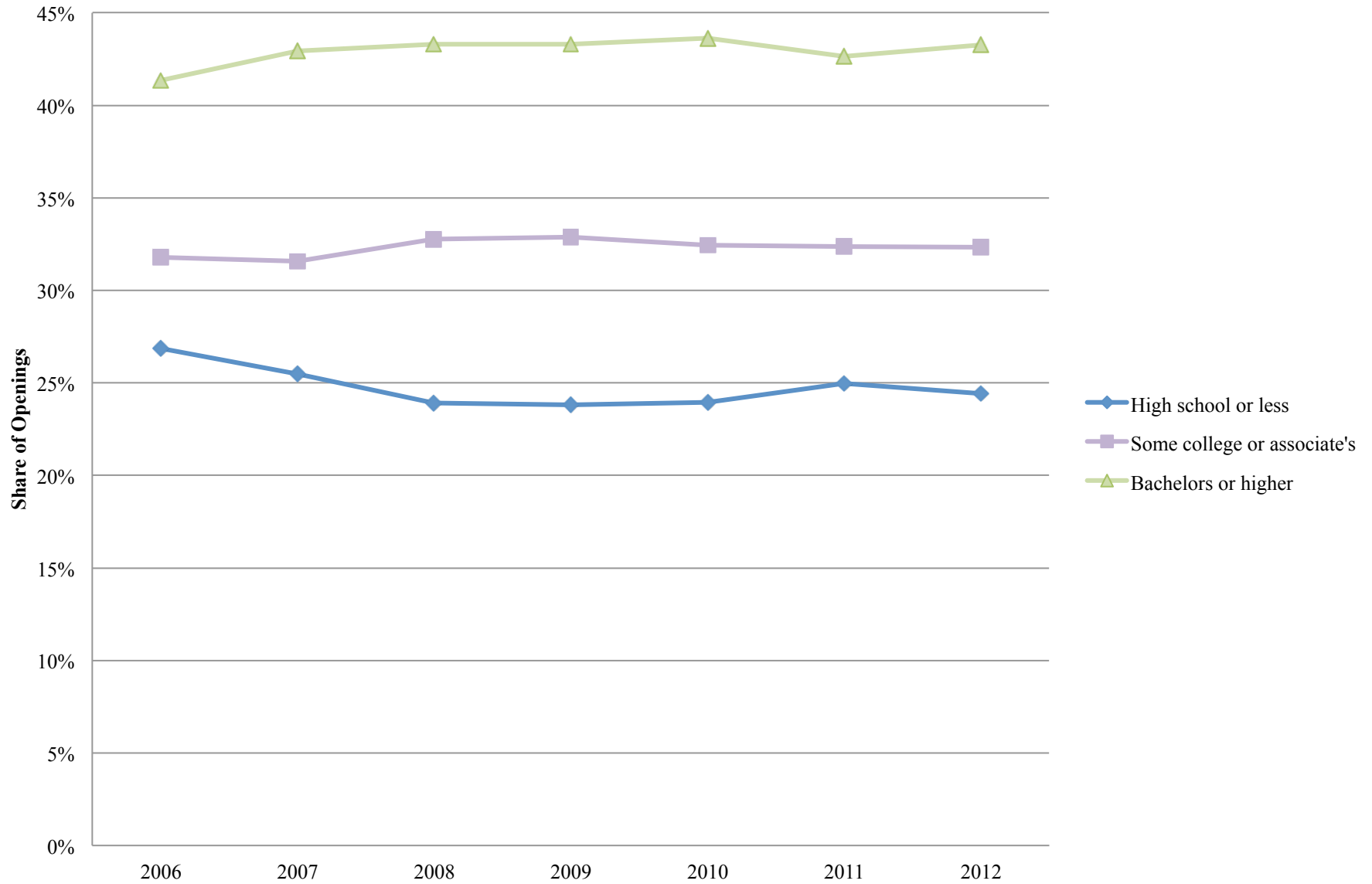
Minor Occupation Title	HWOL Openings, Jan-Feb 2012	JOLTS Openings, Jan-Feb 2012	Share of HWOL	Share of JOLTS
Large potential over-estimation of openings by HWOL compared to JOLTS				
Computer Occupations	859,833	388,006	16%	5%
Health Diagnosing and Treating Practitioners	443,611	303,059	8%	4%
Advertising, Marketing, Promotions, Public Relations, and Sales Managers	168,646	43,303	3%	1%
Other Management Occupations	196,199	111,653	4%	1%
Supervisors of Sales Workers	164,610	70,737	3%	1%
Sales Representatives, Services	178,859	123,054	3%	2%
Operations Specialties Managers	161,686	103,064	3%	1%
Large potential under-estimation of openings by HWOL compared to JOLTS				
Material Recording, Scheduling, Dispatching, and Distributing Workers	59,235	189,850	1%	3%
Material Moving Workers	34,980	166,637	1%	2%
Retail Sales Workers	163,735	361,769	3%	5%
Other Office and Administrative Support Workers	46,874	240,868	1%	3%
Food and Beverage Serving Workers	59,719	361,020	1%	5%

Brookings analysis of data from the BLS, JOLTS, and Conference Board HWOL. All 3-digit (minor) occupations are shown if the difference in the occupational-share of job openings between the two series is greater than 1.5 percentage points. The HWOL data include new openings and those re-announced after being posted the previous month. Data on only “new” openings are available as well but JOLTS does not make that distinction.

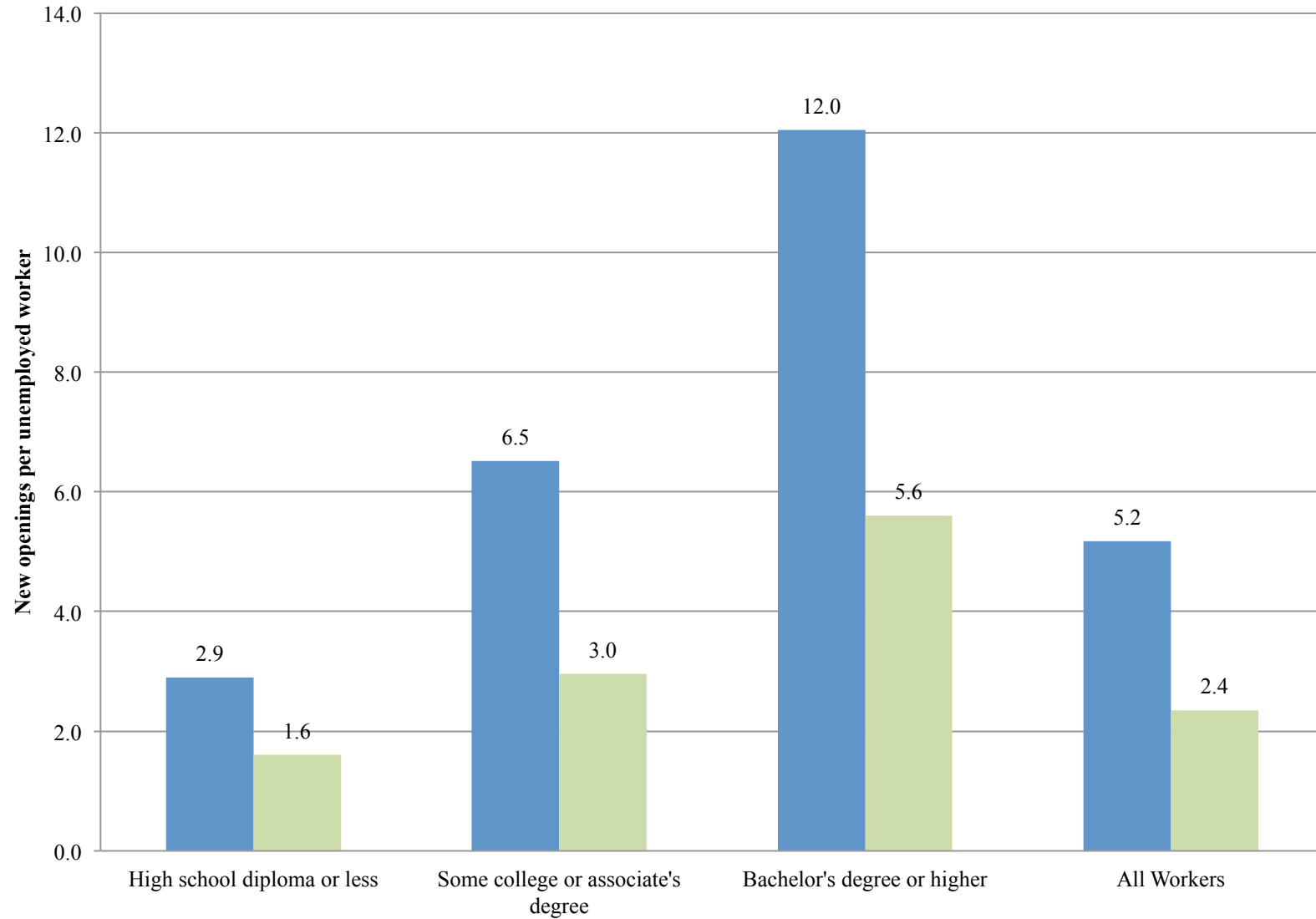
Population-weighted Years of Education Required by Average Job Opening and Filled Job in 100 Largest Metropolitan Areas, 2006-2011



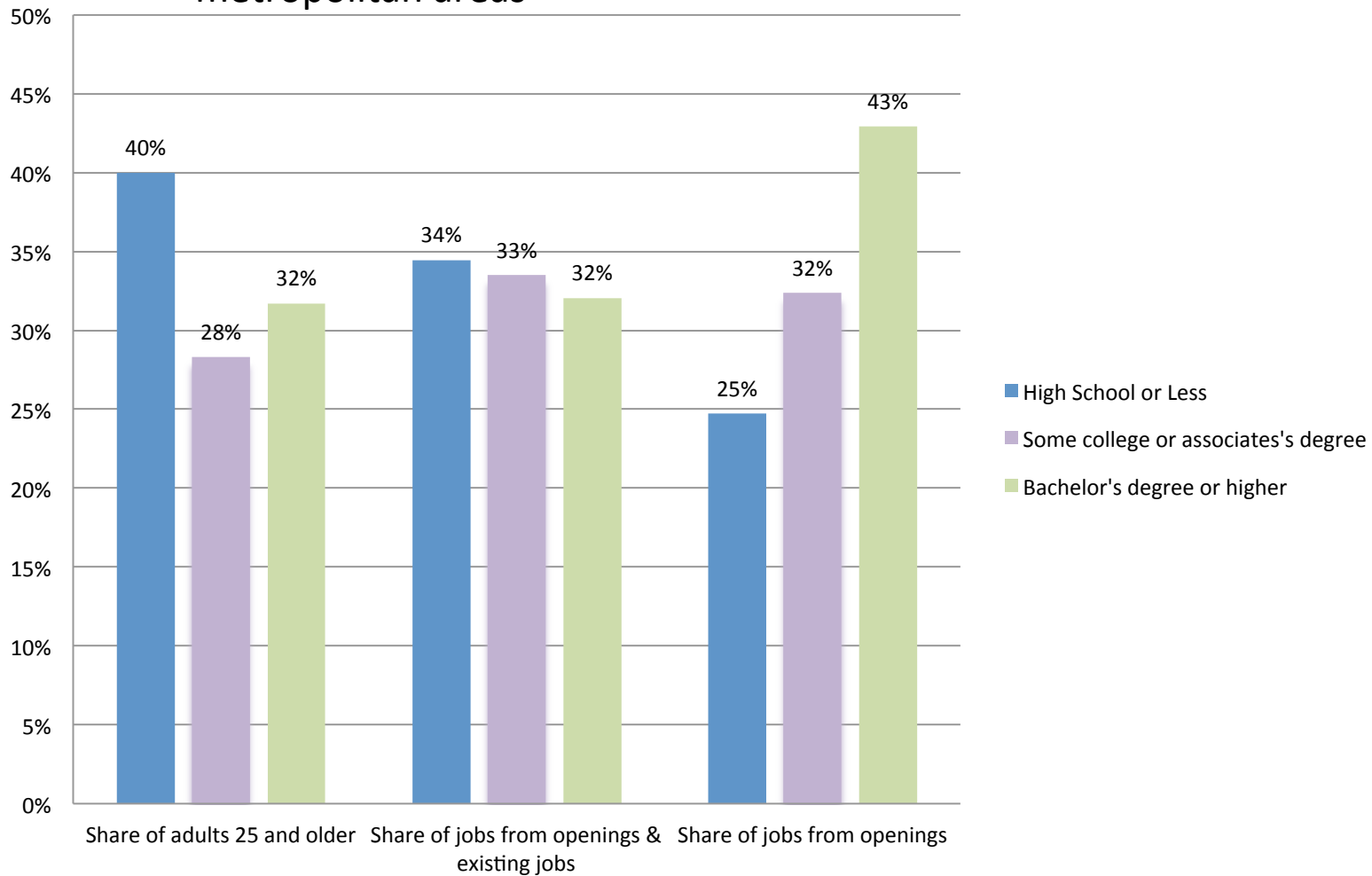
Share of Job Openings in 100 Largest Metropolitan Areas by Level of Education, 2006 to February of 2012



New Annual Job Openings per Unemployed Worker by Education Level in 100 largest metropolitan areas, 2007 and 2011

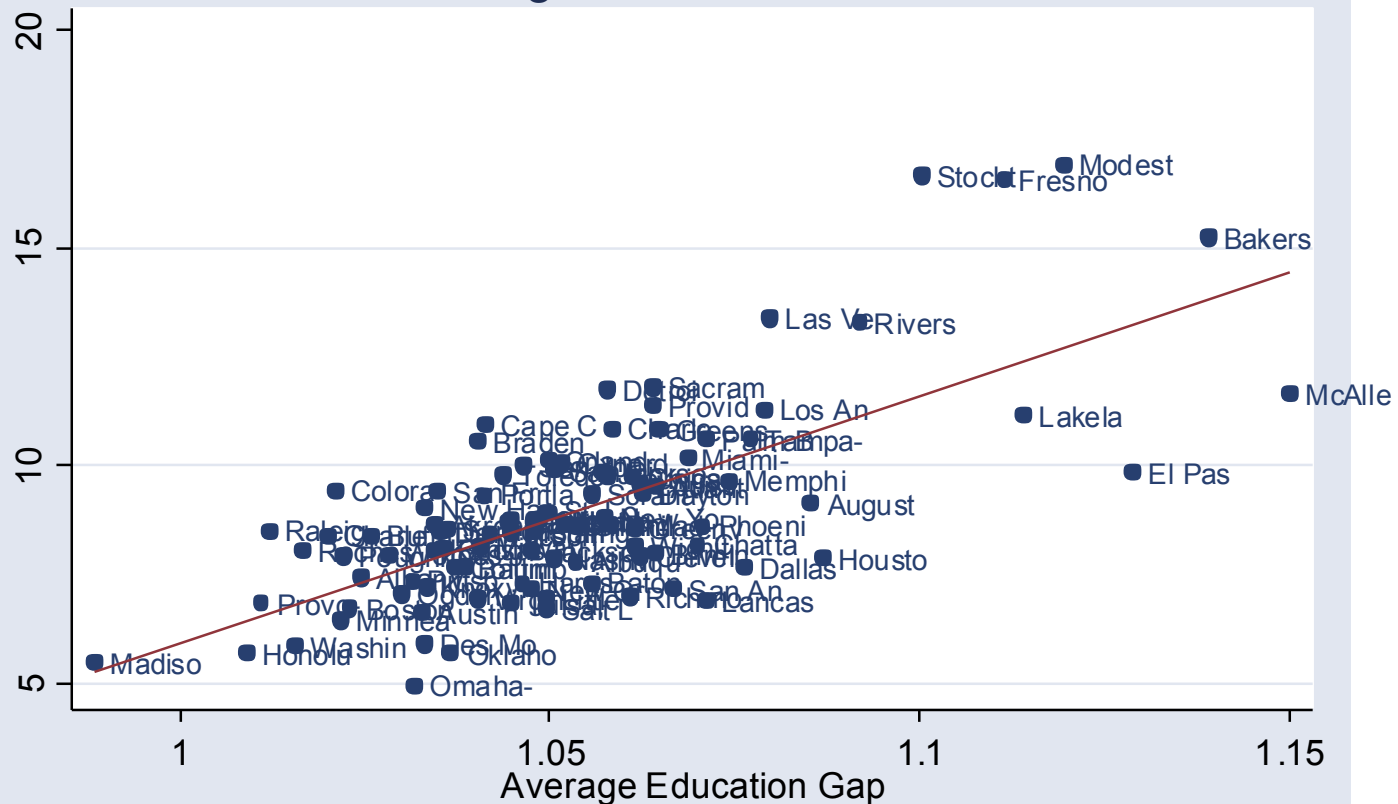


The share of adults aged 25 and older by level of education in large metro areas compared to the share of 2012 job opening by level of education, 100 largest metropolitan areas



Does Skill Mismatch Help Explain Metropolitan Unemployment Rates?

The Education Gap and Unemployment In Large MSAs, 2010-2012



Brookings analysis of Conference Board & BLS

The education gap and unemployment rates for all workers, less educated workers, and youth by large metro area, 2010

	Education gap for openings, 2012	Unemployment rate, January 2012	Less educated unemployment rate, 2010
Metro areas with smallest education gap for job openings			
Madison, WI	-1.1%	5.3	9.2
Honolulu, HI	0.2%	5.7	8.9
Provo-Orem, UT	0.5%	5.9	12.8
Raleigh-Cary, NC	1.3%	8.4	14.6
Washington-Arlington-Alexandria, DC-VA-MD-WV	1.4%	5.7	10.6
Average of 10 metro areas with smallest gap	1.3%	7.1	11.4
Metro areas with largest education gap for job openings			
Fresno, CA	11.0%	16.9	18.7
Modesto, CA	11.8%	16.9	20.1
El Paso, TX	13.0%	10	9
Bakersfield-Delano, CA	13.7%	15	17.4
McAllen-Edinburg-Mission, TX	13.9%	11.7	11.9
Average of 10 metro areas with largest gap	11.0%	12.7	15.8
Average of 100 largest metro areas	5.1%	8.7	13.5

Source: Brookings analysis of Conference Board HWOL, BLS, and 2010 American Community Survey. Unemployment rate of less educated workers refers to those with a high diploma or less education. Youth refers to adults between and including the ages of 18 and 24.

Formal analysis of mismatches' role

- Methods
 - Distinguish between short-term and long-term by looking at level of unemployment and annual changes in unemployment
 - Control for housing market and exogenous industry trends
 - Control for metropolitan fixed effects to pick up institutions and geography
 - Control for time effects to capture broad macroeconomic trend

Regression equation

- Level of Unemployment in a given year (2006-2012)

$$\text{UNEMP}(m,t) = \alpha + \beta(1)*\text{EDU}(mt) + \beta(2)*\text{IND}(mt) + \beta(3)*\text{HOUSING}(mt) + t + m + e$$

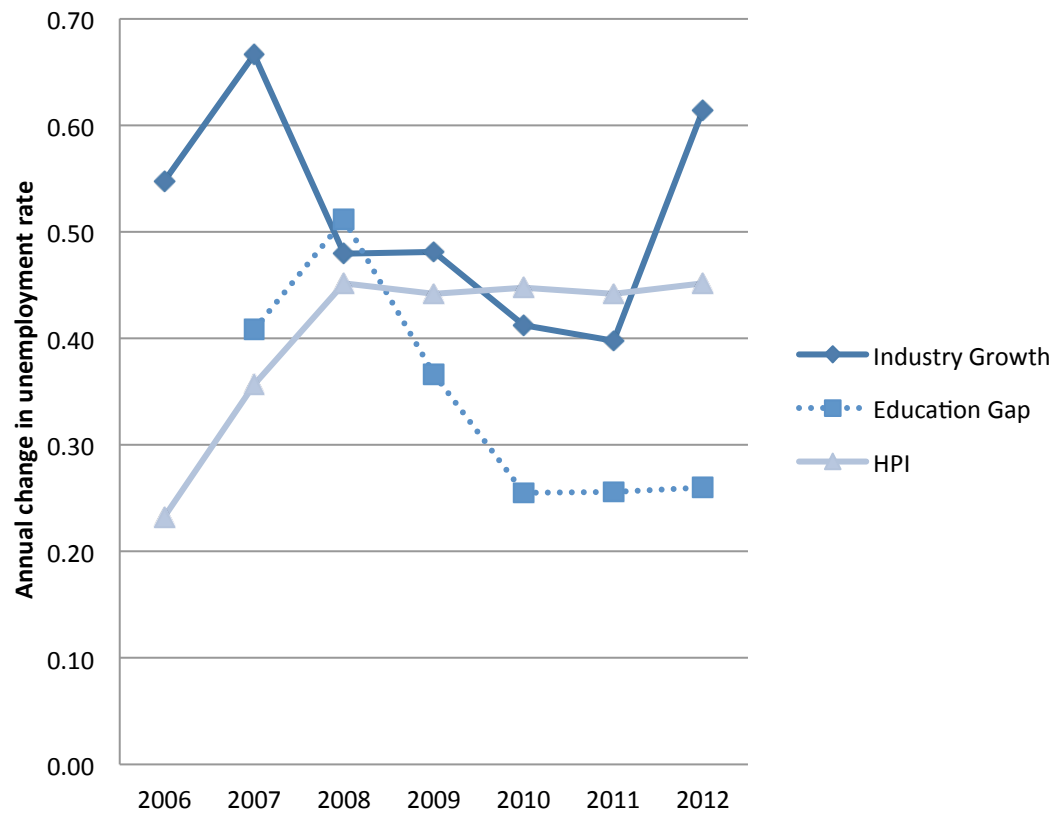
- Change in unemployment from previous year
 - Repeat equation with change in unemployment rate as dependent variable and add change in education gap and lagged education gap

Calculating effect

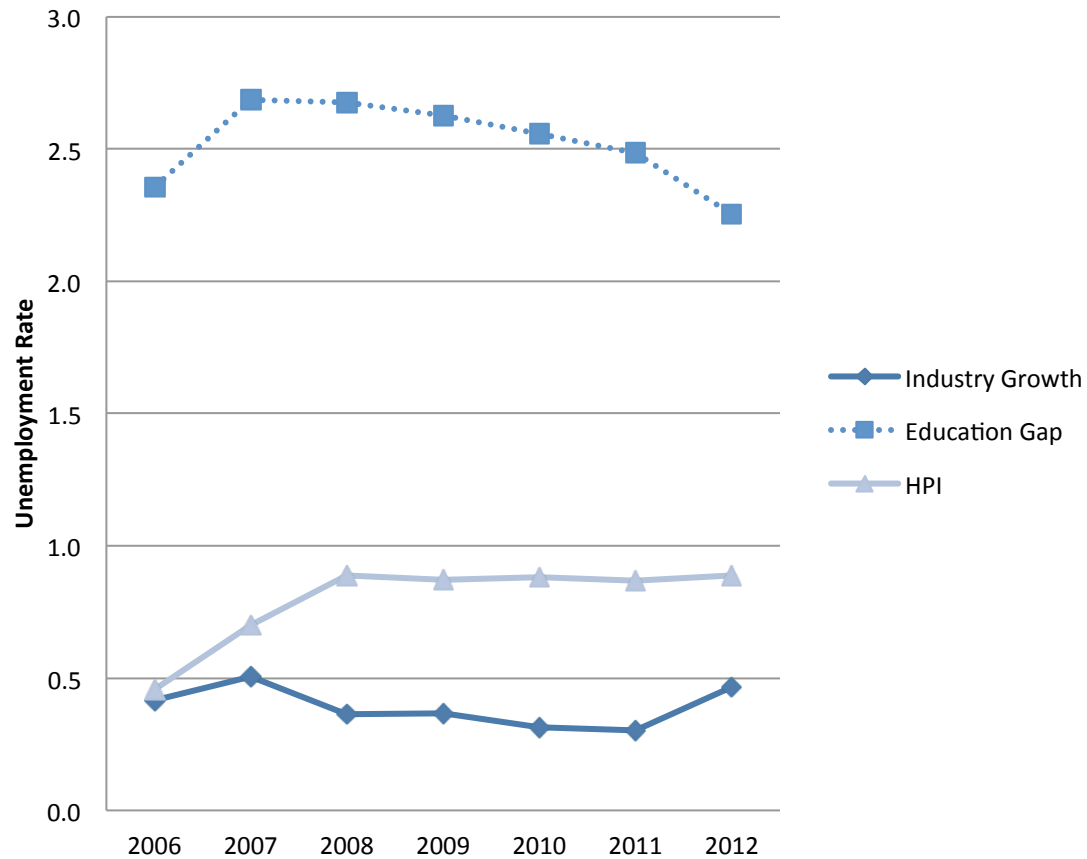
1. Effect of variable on low-scoring metros= E
 $[B * X]$ if $X > \text{Mean}$
2. Effect of variable on low-scoring metros= E
 $[B * X]$ if $X < \text{Mean}$

Effect of scoring high versus low= Difference
between 1 & 2

Cyclical Unemployment: Estimated effect of industry demand, education matching, and housing markets on annual changes in metro area unemployment rates by percentage point, 2007-2012



Structural Unemployment: Estimated effect of industry demand, education matching, and housing markets on metro area unemployment rates by percentage point, 2006-2012



Summary of Regression Results

- Short-term/cyclical:
 - roughly $1/4$ of unemployment changes due to education gap
 - Roughly $3/4$ of unemployment changes due to industry demand and housing
- Long-term/structural
 - Roughly $2/3$ of unemployment explained by education gap
 - Roughly $1/3$ related to housing and industry demand

Large metro areas with most recession resilient *short-term* labor markets based on education matching, housing market performance, and industry demand

	Average education gap, 2010-2012	Housing Price Growth, 2006-2012 Q1	Predicted Industry Growth, 2010Q1-2012Q1	Change in unemployment rate since pre-recession minimum	Predicted change in unemployment rate since pre-recession minimum
10 metro areas with most resilient labor markets based on predicted change in unemployment rate					
Pittsburgh, PA	3.1%	7.3%	3.0%	2.3	1.6
Tulsa, OK	4.5%	6.1%	3.3%	1.6	1.6
Oklahoma City, OK	3.7%	5.8%	3.0%	0.7	1.8
Buffalo-Niagara Falls, NY	2.6%	9.1%	2.6%	3.6	1.9
Houston-Sugar Land-Baytown, TX	8.7%	9.1%	3.6%	2.6	1.9
Average of strongest metros	4.3%	6.3%	2.9%	2.5	1.9
10 metro areas with least resilient labor markets based on predicted change in unemployment rate					
Riverside-San Bernardino-Ontario, CA	9.2%	-48.3%	2.3%	6.9	6.0
Bakersfield-Delano, CA	13.9%	-49.9%	2.6%	6.1	6.5
Stockton, CA	10.0%	-58.6%	2.0%	7.1	6.9
Fresno, CA	11.1%	-48.0%	1.6%	6.9	6.9
Modesto, CA	11.9%	-59.7%	2.1%	7.6	7.1
Average of weakest metros	9.3%	-51.0%	2.3%	6.4	6.1
Average of 100 largest metro areas	5.3%	-15.1%	2.6%	3.5	3.5

Source: Brookings analysis of Conference Board HWOL, BLS, Moody's Economy.com, the Federal Housing Finance Agency and 2010 American Community Survey. Metro areas are ranked according to the predicted change in unemployment from each metro area's pre-recession minimum annual unemployment rate to the most current rate as of writing (May of 2012). The education gap measure displayed here uses 2010, 2011, and 2012 openings data but only 2010 educational attainment data.

The *long-term* strongest and weakest large metro areas based on education matching, housing market performance, and industry demand

	Average education gap, 2010-2012	Housing Price Growth, 2006-2012 Q1	Predicted Industry Growth, 2010Q1-20 12Q1	Unemploy ment Rate, May 2012	Predicted Unemploy ment Rate, May 2012
10 metro areas with the strongest labor markets based on predicted unemployment rate					
Rochester, NY	1.6%	4.0%	2.6%	8.0	5.5
Pittsburgh, PA	3.1%	7.3%	3.0%	6.6	5.5
Madison, WI	-1.2%	-4.3%	1.8%	4.9	5.6
Buffalo-Niagara Falls, NY	2.6%	9.1%	2.6%	8.5	5.7
Raleigh-Cary, NC	1.2%	0.4%	2.3%	7.7	5.8
Average of strongest metros	2.1%	1.5%	2.6%	6.3	5.8
10 metro areas with the weakest labor markets based on predicted unemployment rate					
Lakeland-Winter Haven, FL	11.4%	-43.2%	2.6%	9.2	11.6
Stockton, CA	10.0%	-58.6%	2.0%	14.5	12.2
Fresno, CA	11.1%	-48.0%	1.6%	14.9	12.6
Bakersfield-Delano, CA	13.9%	-49.9%	2.6%	13.6	12.8
Modesto, CA	11.9%	-59.7%	2.1%	15.6	13.0
Average of weakest metros	11.0%	-40.9%	2.2%	12.2	11.6
Average of 100 largest metro areas	5.3%	-15.1%	2.6%	7.9	7.9

Source: Brookings analysis of Conference Board HWOL, BLS, Moody's Economy.com, the Federal Housing Finance Agency and 2010 American Community Survey. Predicted unemployment is based on regression of actual unemployment rates on the variables in the first three columns. The education gap measure displayed here uses 2010, 2011, and 2012 openings data but only 2010 educational attainment data.

How Education Gap Affects Unemployment

Two Hypotheses:

1. Efficiency of matching is hindered when workers have less education in high-demand markets, so unemployed workers stay unemployed longer
2. Fewer jobs are created when workers are under-educated

Evidence against the matching efficiency hypothesis

- Short-term changes are better explained by industry demand and housing markets
- Jobs are not harder to fill.
 - Share of jobs going unfilled in 100 largest MSAs after one month is lower in recession and recovery than before recession (41% vs. 34%).
 - Unfilled opening ratio was similar in 1966 (31%) (NBER analysis)
 - U.S. Hiring/Opening Ratio is unchanged (JOLTS data)
 - Before Recession: Feb 2002-2007=1.3
 - Recovery: July 2009-May 2012: 1.4
 - No correlation between share unfilled at MSA level and unemployment rate in recent years

Evidence in favor of entrepreneurship hypothesis

- There is a significant cyclical effect from under-education
- College educated workers are twice as likely to own businesses that employ workers (Census data)
- U.S. job growth has fallen along with U.S. college attainment growth since 1980
- Metros with lower education gaps have more openings per worker and had fewer job losses during recession

Conclusions

- Skill mismatch can be measured and used to predict changes in labor markets
- An “education gap index” explains most of the variation in unemployment rates between metro areas, but only one quarter of the change from year to year.
- The education gap lowers the number of job openings but does not seem to make them harder to fill
- There are too few job openings, especially for less educated workers

For More Information

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