Demographics, Skills Gaps, and Market Dynamics

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Demographics, Skills Gaps, and Market Dynamics

Randall Eberts
W.E. Upjohn Institute for Employment Research, USA

July 30, 2013, Washington D.C.
Focus on the question of possible labor shortages
  - Long term: Baby boomers retiring raising the question of enough skilled workers to replace them
  - Short term: Employers complain they can’t find enough qualified workers

Long Term
  - Employment Projections
  - Educational needs projections
  - Educational attainment projections

Short term
  - Evidence of Skill Gaps
  - Market Dynamics
Population Trends

• Population is becoming:
  – Larger
  – Older
  – More diverse with respect to race and ethnicity
• Birth rates expected to continue to fall
• Death rates steady but expected to increase slightly in later years
• Immigration as share of net population increase continues to rise and will overtake natural population increase as a share by 2032
Projected Population and its Components, 2015-2040

Source: U.S. Census Bureau, Population Division, Release Date: December 2012
Education attainment and population change

- Hispanic (17.1%)
- Asian and Pacific Islander (6.3%)
- African American (13.5%)
- White (65.0%)

Source: Census; bubble size reflects share of population
Total Employment 16 and over and Age Components

Source: BLS, selected years, 5-year moving averages
Labor Force Participation Rate by Age, selected years

Source: BLS, selected years
Long-Term Demand and Supply Projections: Putting together the parts

- Demand for skills (educational attainment)
  - Demand for jobs by occupations (BLS projections)
  - Skills requirements of occupations
    - Educational requirements (BLS, O*NET, Job Openings)
    - Current and in the future (examine educational attainment of job holders over time)
  - Adjust for multiple job holders
    - Convert jobs to workers
- Supply of skills (educational attainment)
  - Population trends by race/ethnicity, gender, age group
  - Educational attainment by race/ethnicity, gender, age group
  - Convert population to workers (labor force participation rates)
BLS Occupation Projections

1. Population and labor force
2. GDP and its components
3. Consumers’ final demand for products and services for each industry
4. Output by industry
5. Industry employment: projected using productivity and hours
6. Staffing patterns: projected using qualitative and quantitative analysis
Education Requirements

• BLS (MLR, Sommers and Morisi, April 2012)
  – New BLS education categories provide information on the typical path to enter an occupation
  – Defined as the typical level most workers need to enter; could be multiple paths
  – Examined educational attainment of younger workers (18 to 29)
  – Used O*Net, based on a survey of workers in the occupation and industry experts
  – Interviewed persons who were knowledgeable about education and training requirements
Education Requirements

- O*NET (U.S. Department of Labor)
- Provides required level of education on 950 occupations in US economy
- Asks incumbent worker "If someone were being hired to perform this job, indicate the level of education that would be required"
- Education and training information provided through a survey of targeted job incumbents
Education Requirements

• Web job postings
• A large number of job openings are posted on the internet
• Measure is more like BLS in determining the pathways to the occupation (minimum education requirement)
• Several companies have devised search engines to “spider” the web in search for job postings
• Burning Glass (and others, such as the Conference Board) have developed algorithms to reduce duplication
• Use Burning Glass to glean the educational requirements stated on job postings by occupation
Education Attainment

• American Community Survey (U.S. Census)
• Household survey of sample of US households
• Provides actual education level of individuals holding jobs in each occupation
## Comparison of BLS and O*Net Education Designation
(Number of occupations)

<table>
<thead>
<tr>
<th>O*NET designation</th>
<th>LT</th>
<th>HS</th>
<th>Some college no degree</th>
<th>Assoc. Degree</th>
<th>BA</th>
<th>MA</th>
<th>Doctorate or professional degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than high school diploma</td>
<td></td>
<td>0.441</td>
<td>0.056</td>
<td>0.143</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high school diploma (or GED or HS equivalence cert.)</td>
<td>0.505</td>
<td>0.713</td>
<td>0.143</td>
<td>0.136</td>
<td>0.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-secondary certificate after high school</td>
<td>0.032</td>
<td>0.056</td>
<td>0.143</td>
<td>0.068</td>
<td>0.022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College courses</td>
<td>0.011</td>
<td>0.034</td>
<td>0.143</td>
<td>0.051</td>
<td>0.016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate's degree</td>
<td></td>
<td>0.065</td>
<td>0.143</td>
<td>0.424</td>
<td>0.022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>0.011</td>
<td>0.104</td>
<td>0.429</td>
<td>0.288</td>
<td>0.815</td>
<td>0.118</td>
<td>0.040</td>
</tr>
<tr>
<td>Post-BA certificate</td>
<td></td>
<td></td>
<td></td>
<td>0.005</td>
<td>0.059</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master's degree</td>
<td></td>
<td>0.034</td>
<td>0.076</td>
<td>0.588</td>
<td>0.120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Master Certificate</td>
<td></td>
<td></td>
<td></td>
<td>0.029</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First professional degree requires at least 2 years</td>
<td></td>
<td></td>
<td></td>
<td>0.040</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctoral degree</td>
<td></td>
<td></td>
<td></td>
<td>0.016</td>
<td>0.176</td>
<td>0.400</td>
<td></td>
</tr>
<tr>
<td>Post-doctoral training</td>
<td></td>
<td></td>
<td></td>
<td>0.029</td>
<td>0.400</td>
<td></td>
<td></td>
</tr>
<tr>
<td># occupations</td>
<td>93</td>
<td>356</td>
<td>7</td>
<td>59</td>
<td>184</td>
<td>34</td>
<td>25</td>
</tr>
</tbody>
</table>
## Comparison of BLS and O*Net Education Designation (Number of jobs)

<table>
<thead>
<tr>
<th>% educational attainment</th>
<th>LT HS</th>
<th>HS</th>
<th>Postsec non-degree award</th>
<th>Some college no degree</th>
<th>Associate degree</th>
<th>BA</th>
<th>MA</th>
<th>Doctorate or professional degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT HS</td>
<td>9445</td>
<td>6732</td>
<td>0</td>
<td>12</td>
<td>169</td>
<td>273</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>HS</td>
<td>17249</td>
<td>24768</td>
<td>0</td>
<td>61</td>
<td>1072</td>
<td>2086</td>
<td>94</td>
<td>4</td>
</tr>
<tr>
<td>Postsec non-degree award</td>
<td>0</td>
<td>0</td>
<td>69</td>
<td>1520</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Some college no degree</td>
<td>8573</td>
<td>20266</td>
<td>0</td>
<td>25</td>
<td>1081</td>
<td>3741</td>
<td>179</td>
<td>11</td>
</tr>
<tr>
<td>Associate degree</td>
<td>2351</td>
<td>7066</td>
<td>0</td>
<td>70</td>
<td>1602</td>
<td>2089</td>
<td>128</td>
<td>15</td>
</tr>
<tr>
<td>BA</td>
<td>3321</td>
<td>12228</td>
<td>0</td>
<td>19</td>
<td>416</td>
<td>12412</td>
<td>638</td>
<td>191</td>
</tr>
<tr>
<td>MA</td>
<td>498</td>
<td>2834</td>
<td>0</td>
<td>3</td>
<td>101</td>
<td>6021</td>
<td>1008</td>
<td>238</td>
</tr>
<tr>
<td>Doctorate or professional degree</td>
<td>137</td>
<td>578</td>
<td>0</td>
<td>3</td>
<td>101</td>
<td>1053</td>
<td>217</td>
<td>911</td>
</tr>
</tbody>
</table>

### Median Annual Wage

<table>
<thead>
<tr>
<th></th>
<th>21359</th>
<th>37518</th>
<th>35617</th>
<th>36682</th>
<th>65515</th>
<th>66482</th>
<th>61737</th>
<th>95571</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Workers</td>
<td>41,561</td>
<td>74,473</td>
<td>-</td>
<td>259</td>
<td>5,957</td>
<td>27,674</td>
<td>2,281</td>
<td>1,372</td>
</tr>
</tbody>
</table>
Projected Growth in the Demand for Education Requirements

Based on BLS Employment projections 2010-2020 and various sources of education requirements
# Projected Supply and Demand for Education

## Year 2020

<table>
<thead>
<tr>
<th></th>
<th>HS or less</th>
<th>Some college</th>
<th>Associate’s degree</th>
<th>Bachelor’s degree</th>
<th>Master’s degree</th>
<th>Doctorate/professional degree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply</strong></td>
<td>59548</td>
<td>44437</td>
<td>16096</td>
<td>34795</td>
<td>13622</td>
<td>5338</td>
<td>173837</td>
</tr>
<tr>
<td><strong>Demand</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLS</td>
<td>97100</td>
<td>7603</td>
<td>9123</td>
<td>24981</td>
<td>2338</td>
<td>5112</td>
<td>146257</td>
</tr>
<tr>
<td>O*NET</td>
<td>83464</td>
<td>14957</td>
<td>3431</td>
<td>34176</td>
<td>4203</td>
<td>2284</td>
<td>142515</td>
</tr>
<tr>
<td>Burning Glass</td>
<td>65702</td>
<td>16618</td>
<td></td>
<td>42118</td>
<td></td>
<td>18305</td>
<td>142743</td>
</tr>
<tr>
<td>2010 Actual</td>
<td>55871</td>
<td>34667</td>
<td>13993</td>
<td>29639</td>
<td>11546</td>
<td>5255</td>
<td>150970</td>
</tr>
</tbody>
</table>

Source: Supply, extrapolate Neumark et al. 2011 from 2018 to 2020
Demand, BLS (Sommers and Morisi, MLR, April 2012)
O*Net (U.S. Department of Labor)
Actual (ACS, U.S. Census)

Note: Number of workers in 1000s

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### Supply minus Demand for Education, Projection to Year 2020

<table>
<thead>
<tr>
<th>Source</th>
<th>HS or less</th>
<th>Some college</th>
<th>Associate’s degree</th>
<th>Bachelor’s degree</th>
<th>Master’s degree</th>
<th>Doctorate/Professional degree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BLS</strong></td>
<td>-37551</td>
<td>36834</td>
<td>6973</td>
<td>9814</td>
<td>11285</td>
<td>226</td>
<td>27581</td>
</tr>
<tr>
<td>% diff</td>
<td>-63.1%</td>
<td>82.9%</td>
<td>43.3%</td>
<td>28.2%</td>
<td>82.8%</td>
<td>4.2%</td>
<td>15.9%</td>
</tr>
<tr>
<td><strong>O*NET</strong></td>
<td>-23915</td>
<td>29480</td>
<td>12665</td>
<td>619</td>
<td>9420</td>
<td>3054</td>
<td>31323</td>
</tr>
<tr>
<td>% diff</td>
<td>-40.2%</td>
<td>66.3%</td>
<td>78.7%</td>
<td>1.8%</td>
<td>69.1%</td>
<td>57.2%</td>
<td>18.0%</td>
</tr>
<tr>
<td><strong>Burning Glass</strong></td>
<td>-6153</td>
<td>-43916</td>
<td>-7232</td>
<td></td>
<td>656</td>
<td></td>
<td>31095</td>
</tr>
<tr>
<td>% diff</td>
<td>-10.3%</td>
<td>72.6%</td>
<td>-21.1%</td>
<td></td>
<td>4.81%</td>
<td></td>
<td>17.9%</td>
</tr>
<tr>
<td><strong>2010 Actual</strong></td>
<td>3678</td>
<td>9770</td>
<td>2103</td>
<td>5156</td>
<td>2077</td>
<td>83</td>
<td>22867</td>
</tr>
<tr>
<td>% diff</td>
<td>6.2%</td>
<td>22.0%</td>
<td>13.1%</td>
<td>14.8%</td>
<td>15.24%</td>
<td>1.56%</td>
<td>13.2%</td>
</tr>
</tbody>
</table>

Source: See previous slide
# Projected Supply and Demand for Education, Year 2020

Share of total number of workers

<table>
<thead>
<tr>
<th></th>
<th>HS or less</th>
<th>Some college</th>
<th>Associate’s degree</th>
<th>Bachelor’s degree</th>
<th>Master’s degree</th>
<th>Doctorate /professional degree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply</strong></td>
<td>0.343</td>
<td>0.256</td>
<td>0.093</td>
<td>0.200</td>
<td>0.078</td>
<td>0.031</td>
<td>1</td>
</tr>
<tr>
<td><strong>Demand</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLS</td>
<td>0.664</td>
<td>0.052</td>
<td>0.062</td>
<td>0.171</td>
<td>0.016</td>
<td>0.035</td>
<td>1</td>
</tr>
<tr>
<td>O*NET</td>
<td>0.586</td>
<td>0.105</td>
<td>0.024</td>
<td>0.239</td>
<td>0.029</td>
<td>0.016</td>
<td>1</td>
</tr>
<tr>
<td>Burning Glass</td>
<td>0.460</td>
<td>0.116</td>
<td>0.295</td>
<td></td>
<td>0.128</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2010 Actual</td>
<td>0.370</td>
<td>0.230</td>
<td>0.093</td>
<td>0.196</td>
<td>0.076</td>
<td>0.035</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: See previous slide
## Supply Share minus Demand Share

<table>
<thead>
<tr>
<th>Source</th>
<th>HS or less</th>
<th>Some college</th>
<th>Associate’s degree</th>
<th>Bachelor’s degree</th>
<th>Master’s degree</th>
<th>Doctorate/professional degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLS</td>
<td>-0.321</td>
<td>0.204</td>
<td>0.030</td>
<td>0.029</td>
<td>0.062</td>
<td>-0.004</td>
</tr>
<tr>
<td>O*NET</td>
<td>-0.243</td>
<td>0.151</td>
<td>0.069</td>
<td>-0.040</td>
<td>0.049</td>
<td>0.015</td>
</tr>
<tr>
<td>Burning Glass</td>
<td>-0.118</td>
<td>0.232</td>
<td>-0.095</td>
<td></td>
<td></td>
<td>-0.019</td>
</tr>
<tr>
<td>2010 Actual</td>
<td>-0.028</td>
<td>0.026</td>
<td>0.000</td>
<td>0.004</td>
<td>0.002</td>
<td>-0.004</td>
</tr>
</tbody>
</table>

Source: See previous slide
The projections point to a shortage in 2020 of:

- **Workers with BA degrees**
  - O*Net and Burning Glass

- **Workers with Doctorate or professional degrees** could be in short supply when measured as share of projected workforce in 2020 (BLS and Actual) but in terms of numbers of workers a slight surplus in 2020

- **Workers with only a high school degree** (BLS and O*Net)
  - Some of this shortage may be due to how multiple job holders are factored into the projections
Change in Education Requirements

• Methodology for education projections assumes education requirements by occupation are unchanged between 2010 and 2020

• Is this a fair assumption?

• Track actual education attainment by age and occupation from 1980 through 2011
Education attainment is trending upward as standard deviation is declining.

Source: Analysis of ACS holding years constant
Education attainment declines with age while the dispersion of education within occupations increases.

Source: Analysis of ACS holding years constant
Weighting does not make much difference in terms of trends or age profile of education attainment.
Except for a catching up period by older workers in the 1980s and 90s, education attainment has remained fairly steady. Education attainment of those first entering the labor force is particularly steady except for the recession period in which poor job prospects may be a factor.

Source: Analysis of ACS for selected age groups
## Change in Years of Education by Age Cohort from 1990 to 2010

<table>
<thead>
<tr>
<th>Age/Period</th>
<th>1990-2000</th>
<th>2000-2010</th>
<th>1990-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>unwgt</td>
<td>0.020</td>
<td>0.270</td>
</tr>
<tr>
<td></td>
<td>wgt</td>
<td>0.217</td>
<td>0.456</td>
</tr>
<tr>
<td>40-44</td>
<td>unwgt</td>
<td>-0.067</td>
<td>0.128</td>
</tr>
<tr>
<td></td>
<td>wgt</td>
<td>-0.124</td>
<td>0.396</td>
</tr>
<tr>
<td>55-59</td>
<td>unwgt</td>
<td>0.553</td>
<td>0.290</td>
</tr>
<tr>
<td></td>
<td>wgt</td>
<td>0.864</td>
<td>0.500</td>
</tr>
</tbody>
</table>

Source: American Household Survey, U.S. Census
Short-term Shortages?

• Seems like growing complaints from employers that they can’t find qualified workers
• Surveys point to shortages
• New York Fed study concluded that mismatch accounted for up to a third of the 5.4 ppt. increase in unemployment rate during recession
• Structural changes (decline in construction during recession); lack of mobility due to housing slump; reluctance to hire unemployed workers
• Question should be “can’t find qualified workers at such-and-such wage”
Economics of Labor Shortage

In the graph, the supply curve (S) and the demand curve (D) intersect at a point Wo (the equilibrium wage) on the wage axis. The area between the curves represents the labor shortage, indicating that the demand for labor exceeds the supply. Hence, the wage rises to Wo to clear the market.
Percentage of employers reporting difficulty filling jobs

Source: 2012 Talent Shortage Survey Research Results, Manpower
Top 10 jobs employers are having difficulty filling

1. Skilled trades workers
2. Engineers
3. IT staff
4. Sales representatives
5. Accounting and finance
6. Drivers
7. Mechanics
8. Nurses
9. Machinists/machine operators
10. Teachers

Source: 2012 Talent Shortage Survey Research Results, Manpower
Difficulty finding qualified workers

Reasons for difficulty finding qualified workers
• Lack of available applicants (36%)
• Lack of technical competencies (36%)
• Lack of experience (31%)
• Looking for more pay (19%)
• Lack of employability skills (15%)

Strategies to address difficulty finding qualified workers
• Provide additional training (37%)
• Broadening search outside of local region (14%)
• Focusing on staff retention (13%)
• Increasing starting salaries (11%)
• Partnering with education institutions (10%)

Manpower Survey 2012
Income of Full-Time Production Workers (2011 Dollars)
Summary

• Fastest projected growth is for higher education degrees—master’s and doctorate degrees

• Still high demand for high school education, leading to projected shortages in workers with only a high school education

• Slight increase in education attainment, but much could be the result of surplus labor during the recession

• Employers complain of short-term shortages, which may not be surprising as real wages remain stagnant or are even decreasing
Contact:

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(eberts@upjohn.org)