Changing Employer Skill Requirements Over the Business Cycle

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Context: Work-in-Progress

How much of the change in employer skill requirements that is observed over the business cycle is related to the increased availability of workers?

**Upskilling: Do Employers Demand Greater Skills When Workers Are Plentiful?**
(Federal Reserve Bank of Boston, 2014; Revise and Resubmit, RESTAT)
(Funded by Russell Sage Foundation, Future of Work program, 2014-16)
- Using a “big” database of online job postings, we demonstrate that employers raised education and experience requirements within middle-skill occupations in response to increases in the supply of relevant job seekers during the Great Recession.

**Downskilling: Changes in Employer Skill Requirements Over the Business Cycle**
(Labour Economics, 2016)
- Using an “even bigger” database of 66.8 million online job postings, we show that employer skill requirements fell as the labor market improved from 2010-2014. This pattern is established using multiple measures of labor availability and is bolstered by similar trends in other skills such as leadership, technical knowledge, and software skills.

**Changing Employer Skill Requirements During the Great Recession:**
*Why do Employers Demand Greater Skill When Workers are Plentiful?*
(Funded by Russell Sage Foundation, Future of Work Program, 2016-18)
- We will extend our earlier work to explore the mechanisms behind rising employer skill requirements. Specifically, we will address the Foundation’s interest in developing qualitative evidence to uncover the determinants of employer hiring behavior and how these shift over the business cycle.
The shift in the Beveridge curve during the Great Recession has highlighted the need to focus not just on the number of vacancies, but on their composition and requirements as well.
Motivation

Perhaps less well-known is the fact that employer skill requirements for education and experience rose considerably during the Great Recession and then fell during the recovery.

Trends in Employer Requirements for Education and the Unemployment Rate

Source: Authors’ analysis using job vacancy data from Burning Glass Technologies between 2007 and 2014.
Motivation

During a recession, the college wage premium for newly hired workers falls as the unemployment rate rises, incentivizing employers to switch from low- to high-skill labor.

Trends in the College Wage Premium and the Unemployment Rate Over Time

Motivation

This same pattern is also observed for other dimensions of skill, such as specialized skills and software skills.

Trends in Employer Requirements for Education and the Unemployment Rate

Source: Authors' analysis using job vacancy data from Burning Glass Technologies between 2007 and 2014.
Contribution to the Literature

The finding that employer skill requirements are driven in part by the available supply of labor has important implications for understanding the dynamics of the labor market.

We document a novel feedback mechanism between labor supply and the selectivity of vacancies that operates within detailed occupations.

• This feedback mechanism is consistent with macroeconomic models of employer search decisions (Davis et al. 2012) and heterogeneous workers (Shimer 2005, Albrecht and Vrooman 2002) and helps explain recent labor market trends such as rising vacancies and lackluster hiring.

• These changes in employer requirements over the business cycle serve to reinforce studies which find that workers match at lower entry wages during recessions and have less steep wage trajectories over time (Kahn 2010, Oreopoulous et al. 2012, Moscarini, 2001).

Our findings indicate that a significant portion of the observed increase in skill requirements within detailed occupations is correlated with the business cycle and are subject to reversion as the labor market tightens.

• This reversion in skill requirements confirms the findings of many studies in the economics literature finding that the weak labor market is largely not due to skills mismatch or other structural factors, but rather weak aggregate demand that increased unemployment across worker types, industry sectors, and occupation groups (Ghayad and Dickens 2012; Daly et al. 2012; Lazear and Spletzer 2012; Rothwell 2012; Carnevale et al. 2012; Sahin et al 2014, Capelli 2014; Osterman and Weaver 2014).
We seek to test whether firms respond to the greater availability of unemployed job seekers by increasing their selectivity on worker skills.

Research Questions

- Did employer requirements within occupations increase during the Great Recession?

- If so, to what degree has this shift occurred and along what dimension has the demand for skill increased (i.e. education and/or experience)?

- To what degree are rising employer requirements related to supply versus demand factors?

- What mechanisms might be driving this shift in hiring behavior on the part of employers?

- Do employer requirements reverse as the labor market tightens?
Theoretical Framework

We use a simple partial equilibrium model as a theoretical framework to convey the intuition behind the relationship between employer skill requirements and slack labor markets.

The Basic Set-Up

Consider employers in labor market i choosing between
• posting a vacancy with a minimum skill requirement
• accepting a low-skill worker

Each employer has a stochastic cost $c$ of leaving the vacancy unfilled drawn from a uniform 0-1 distribution.

These costs may vary across firms due to a number of factors such as:
• the premium employers attach to high skilled workers over low skilled workers
• the turnover rate of employment relationships
• the urgency of their hiring need modeled via their discount rate

We normalize the value of having a vacancy filled with a low-skilled worker equal to 1.

The value of having a vacancy filled with a high-skilled worker is set equal to $\theta > 1$, which is constant across labor markets.
Theoretical Framework

*We use a simple partial equilibrium model as a theoretical framework to convey the intuition behind the relationship between employer skill requirements and slack labor markets.*

**Dynamics:**
Each period, the employer is matched with a high skilled worker stochastically with some probability: \( p_i = \theta U_i^Y \) that depends positively on the value placed on having a high-skill worker \( \theta \) and the local unemployment rate \( U_i \).

We assume employers have a constant discount factor \( \delta \) such that employers in labor market \( i \) have the following value function:

\[
V_i = \max \left\{ \frac{1}{1-\delta}, -c + p_i \frac{\theta}{1-\delta} + (1-p_i) V_i \right\}
\]

This yields a cutoff rule \( c_i^* \) such that **employers with costs below the cutoff post minimum skill requirements** and employers with costs above the cutoff do not.

Since costs are drawn from a uniform distribution, \( c_i^* \) (when scaled) is also the fraction of employers posting skill requirements. We can decompose changes in this fraction as relating to **structural versus cyclical factors**:

\[
\Delta c_i^* = \alpha \times \Delta \theta + \beta \times \Delta U_i + \varepsilon_i
\]

where \( \alpha \) captures the structural change in the relative value of hiring a high versus low skilled worker and \( \beta \) *measures the cyclical component* where more slack labor markets raise the probability of hiring a high skilled worker.
Endogeneity Concerns

What other factors might explain the rise in employer skill requirements within occupations during the Great Recession?

Demand-Side Factors
Factors that differentially affect the demand for low- versus high-skilled jobs, thereby affecting the composition of vacancies within occupations.

- Local demand shocks
- Credit market constraints
- Changes in technology
- Changes in policy
Endogeneity Concerns

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Factors that differentially affect the supply of low- versus high-skilled workers, affecting the composition of applicants within occupations.
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- Local demand shocks
- Credit market constraints
- Changes in technology
- Changes in policy

**Supply-Side Factors**
Factors that differentially affect the supply of low- versus high-skilled workers, affecting the composition of applicants within occupations.

- Increased supply of labor (e.g. number of applicants)

“When I started recruiting in ’06, you didn’t need a college degree, but there weren’t that many candidates. When you get 800 resumes for every job ad, you need to weed them out somehow.”

– Suzanne Manzagol, Atlanta recruiter for administrative positions.
Endogeneity Concerns

What other factors might explain the rise in employer skill requirements within occupations during the Great Recession?

Demand-Side Factors
Factors that differentially affect the demand for low- versus high-skilled jobs, thereby affecting the composition of vacancies within occupations.
• Local demand shocks
• Credit market constraints
• Changes in technology
• Changes in policy

Supply-Side Factors
Factors that differentially affect the supply of low- versus high-skilled workers, affecting the composition of applicants within occupations.
• Increased supply of labor (e.g. number of applicants)
• Changing composition of the workforce (e.g. the skill mix of applicants)

“The recession is a wonderful opportunity to acquire top talent.”
– Barry Deutsch, chief executive of Impact Hiring Solutions
Baseline Empirical Methodology

We seek to measure the degree to which the increase in employer skill requirements is related to changes in labor market slack during the recession.

We initially test:
(1) whether there is an increase in employer skill requirements within occupations
(2) whether this increase is related to the increased availability of workers

We estimate regressions of the form:

$$
\Delta \text{Share of Vacancies Requiring Skill } S_{ijt} = \alpha + \beta \Delta UR_{jt} + \gamma X_{i,t} + \delta i + I_j + \tau_t + \epsilon_{ijt}
$$

Where:
- $i = occupation; j = geography; t = time$
- $\Delta S_{ijt} = percentage point change in either education or experience requirements$
- $\Delta UR_{jt} = percentage point change in the state unemployment rate$
- $X_{i,t} = vector of control variables related to state occupation and population characteristics$
- $O_i = occupation fixed effects$
- $I_j = state fixed effects$
- $\tau_t = time dummy within periods$
- $\epsilon_{ijt} = error term$
Baseline Empirical Methodology

Our key identifying assumption is that states were differentially affected by the Great Recession, thereby allowing us to exploit the variation in local labor markets across states and time periods.

Although the baseline specification may indicate a positive correlation between changes in employer requirements for skill and the availability of skilled labor, we still need to address several econometric concerns to reliably establish a causal relationship.

1. Changes in the composition of postings over time may be changing.
   - Use geographic variation across localities while controlling for time trends.
   - Use a state job vacancy survey as a robustness check.

2. Changes in employer skill requirements and the unemployment rate are likely to be endogenous.
   - Use the variation within states across broad occupation groups to include states fixed effects to control for local demand conditions.
   - Compare changes in employer requirements within firms and job titles over the business cycle.

3. Variation over the business cycle may be correlated with other factors that are beyond our control.
   - Use a natural experiment that represents an exogenous shock to labor supply: Troop withdrawals from Iraq and Afghanistan that increased the supply of labor in particular occupations.
“Big Data” Overview

We explore this mechanism using a novel comprehensive dataset of 70 million online job vacancy postings provided by Burning Glass Technologies (BGT).

Advantages

• Allows analysis of more detailed occupations, at more refined geographies, and with more information than employer surveys such as the JOLTS or other online aggregators such as HWOL.
• Scrapes data daily on more than 7 million online job openings from over 40,000 sources including job boards, newspapers, and employer sites.
• Employs a proprietary algorithm to remove duplicate ads.
• Codes over 70 text fields including employer name, job title, location, education and experience requirements, and occupation down to the 6 digit SOC code level.
• Contains additional information on other skills listed in each job posting that is collected from the original text of the advertisement.
  ➢ Baseline skills (e.g. leadership, project planning and development)
  ➢ Specialized skills (e.g. information security)
  ➢ Software skills (e.g. Adobe Dreamweaver).

Disadvantages

• Does not capture all job openings, although a recent report from Georgetown University estimates that between 60 and 70 percent of job postings are now posted online
• Does not fully capture low-skill jobs or jobs in rural areas, although exhibits similar trends and are closely correlated with data from state job vacancy surveys over time.
• Data are not available for 2008 and 2009.
“Big Data” Overview

Our dependent variable is the change in the share of job postings in a given occupation and location requiring a particular skill.

Administrative Assistant

Basic Qualifications:
6+ years professional administrative experience
Experience with Lotus Notes, Microsoft Office suite tools
Experience planning and organizing schedules and events and interacting with clients
High school diploma or equivalent

Desired Qualifications:
AS degree preferred
Knowledge of Raytheon’s business
Qualified Six Sigma Specialist
Flexibility and willingness to support a variety of tasks needed to keep the office running
Demonstrated experience with APEX Time Recording, Expense Reporting System
Professionalism, Discretion, Sensitivity with excellent communication skills
Demonstrated ability to prioritize work in a multi-tasking environment with minimal supervision

We construct our dependent variables by aggregating the data into occupation/state/year cells and then measuring required skill qualifications based on BGT classifications.

Experience: BGT classifies the maximum requested experience into six categories:
>0 but <= 2 years, > 2 years but <=5 years, >5 years but <=8 years, and >8 years

Education: BGT classifies both basic and desired education qualifications into categories.
We use the maximum requested level of education (e.g. AS degree preferred)
Results are similar if we use the minimum requested (e.g. HS diploma or equivalent).
### "Big Data" Overview

#### Summary Statistics for Job Posting Skill Requirements by occupation/state/year cell

<table>
<thead>
<tr>
<th>Variable</th>
<th>2007</th>
<th>2010</th>
<th>2012</th>
<th>Δ 2007-10</th>
<th>Δ 2010-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of job postings</td>
<td>598.87</td>
<td>525.57</td>
<td>539.19</td>
<td>-73.3</td>
<td>79.88</td>
</tr>
<tr>
<td>Share of postings requesting:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>10.53</td>
<td>17.41</td>
<td>18.60</td>
<td>6.88</td>
<td>1.46</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>3.41</td>
<td>5.85</td>
<td>6.46</td>
<td>2.44</td>
<td>0.57</td>
</tr>
<tr>
<td>Bachelor’s degree or greater</td>
<td>13.95</td>
<td>23.26</td>
<td>25.06</td>
<td>9.32</td>
<td>2.03</td>
</tr>
<tr>
<td>Share of postings requesting:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than two years</td>
<td>6.28</td>
<td>10.94</td>
<td>12.63</td>
<td>4.66</td>
<td>1.68</td>
</tr>
<tr>
<td>Two to five years</td>
<td>11.11</td>
<td>19.28</td>
<td>20.21</td>
<td>8.17</td>
<td>1.06</td>
</tr>
<tr>
<td>Five to eight years</td>
<td>5.01</td>
<td>8.64</td>
<td>9.06</td>
<td>3.63</td>
<td>0.56</td>
</tr>
<tr>
<td>Greater than eight years</td>
<td>2.31</td>
<td>3.55</td>
<td>3.46</td>
<td>1.25</td>
<td>-0.04</td>
</tr>
<tr>
<td>Average years of experience</td>
<td>0.96</td>
<td>1.63</td>
<td>1.70</td>
<td>0.67</td>
<td>0.09</td>
</tr>
<tr>
<td>Number of observations</td>
<td>17657</td>
<td>17657</td>
<td>18113</td>
<td>17657</td>
<td>18113</td>
</tr>
</tbody>
</table>

### “Big Data” Overview

#### Summary Statistics for Measures of Labor Market Slack by occupation/state/year cell

<table>
<thead>
<tr>
<th>Variable</th>
<th>2007</th>
<th>2010</th>
<th>2012</th>
<th>∆ 2007-10</th>
<th>∆ 2010-12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State Unemployment Rates:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All workers</td>
<td>4.43</td>
<td>9.10</td>
<td>7.61</td>
<td>4.67</td>
<td>-1.51</td>
</tr>
<tr>
<td>Workers with a Bachelor’s degree or higher</td>
<td>2.62</td>
<td>4.75</td>
<td>3.99</td>
<td>2.13</td>
<td>-0.75</td>
</tr>
<tr>
<td>Workers age 35 years or more</td>
<td>3.12</td>
<td>7.19</td>
<td>5.83</td>
<td>4.07</td>
<td>-1.36</td>
</tr>
<tr>
<td><strong>Supply / Demand Ratios:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HWOL board occupation group (reported)</td>
<td>5.44</td>
<td>9.10</td>
<td>5.35</td>
<td>3.66</td>
<td>-3.94</td>
</tr>
<tr>
<td>BGT broad occupation group (constructed)</td>
<td>10.89</td>
<td>16.62</td>
<td>11.72</td>
<td>5.73</td>
<td>-5.24</td>
</tr>
<tr>
<td>Number of observations</td>
<td>17657</td>
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</tbody>
</table>

“Big Data” Overview

The sample shows quite a bit of heterogeneity among our occupations in the degree to which employer requirements have shifted over time.

Change in Employer Requirements by Initial Share, 2007–2010

We find a large, positive and significant relationship between changes in employer requirements for education and experience and the degree of labor market slack.

Baseline OLS Results


<table>
<thead>
<tr>
<th>Percentage Point Change in the Share of Postings Requesting:</th>
<th>No Educ. Requested</th>
<th>Bachelor's Degree</th>
<th>Grad/Prof Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ State UR</td>
<td>-1.627***</td>
<td>0.778***</td>
<td>-0.0848</td>
</tr>
<tr>
<td>(0.651)</td>
<td>(0.187)</td>
<td>(0.132)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No Exp.</th>
<th>&gt;0 to ≤ 2 Yrs.</th>
<th>&gt;2 to ≤ 5 Yrs.</th>
<th>&gt;5 to ≤ 8 Yrs.</th>
<th>&gt;8 Yrs.</th>
<th>Avg Num Yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>-2.224***</td>
<td>0.663**</td>
<td>0.840**</td>
<td>0.500***</td>
<td>0.221***</td>
<td>0.0862***</td>
</tr>
<tr>
<td>(0.673)</td>
<td>(0.290)</td>
<td>(0.333)</td>
<td>(0.112)</td>
<td>(0.0644)</td>
<td>(0.0211)</td>
</tr>
</tbody>
</table>

Observations: 18886

Source: Author's calculations using data from Burning Glass Technologies, 2007-2010.

Note: All specifications include a set of baseline controls: the initial (2007) share of postings requiring the skill measured; change in the number of total postings 2007-2010 as a share of total employment in 2000; and the share of the state population with a Bachelor's Degree or greater in 2000 (education specifications) or the average age of the population in 2000 (experience specifications). Observations are state/occupation cells containing at least 15 job posting (for both years over which the change is measured) and are weighted by the occupation's share of each state's total postings. Standard errors (in parentheses) clustered by state.

* p<0.10, ** p<0.05, *** p<0.01
Baseline OLS Results

*Using our preferred specification, we find that occupations in states with worsening labor markets experienced an increase in the share of postings requiring a BA Degree or 2+ Years Experience.*

| Source: Author’s calculations using data from Burning Glass Technologies, 2007-2010. Note: Standard errors (in parentheses) clustered by state. * p<0.10, ** p<0.05, *** p<0.01 |

<table>
<thead>
<tr>
<th>Δ State UR</th>
<th>Change in Share of Postings Requesting a Bachelor’s Degree or Greater</th>
<th>Change in Share of Postings Requesting 2 or More Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change in Share of Postings requesting a Bachelor's Degree or Greater</td>
<td>Change in Share of Postings Requesting 2 or More Years of Experience</td>
</tr>
<tr>
<td></td>
<td>0.693**</td>
<td>0.617***</td>
</tr>
<tr>
<td></td>
<td>(0.263)</td>
<td>(0.196)</td>
</tr>
<tr>
<td>Occ Fixed Effects</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Baseline Controls</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
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<td>17657</td>
<td>17657</td>
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Source: Author’s calculations using data from Burning Glass Technologies, 2007-2010.
Note: Standard errors (in parentheses) clustered by state. * p<0.10, ** p<0.05, *** p<0.01

- These results using the full set of occupations are remarkably similar to (and even larger in magnitude than) those obtained just using our original sample of 74 middle-skill occupations.
A 1 percentage point increase in the state UR raises the share of jobs requiring a BA degree by 0.62 percentage points and the share requiring 2+ years experience by 1.4 percentage points.
Accounting for Local Demand Shocks

We find positive and significant effects when using alternative measures of labor market slack and controlling for both occupation and state fixed effects.

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</tr>
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<td>Bachelor’s Degree or Greater</td>
<td></td>
</tr>
<tr>
<td>( \Delta \text{ State UR} )</td>
<td>0.617*** (0.196)</td>
</tr>
<tr>
<td>( \Delta \text{ State UR: Bachelor’s or Greater} )</td>
<td>1.131*** (0.244)</td>
</tr>
<tr>
<td>( \Delta \text{ in HWOL Sup/Dem Rate} )</td>
<td>0.183*** (0.0391)</td>
</tr>
<tr>
<td>( \Delta \text{ in HWOL: Workers 35 Plus} )</td>
<td>0.0322 (0.0547)</td>
</tr>
<tr>
<td>( \Delta \text{ in HWOL Sup/Dem Rate} )</td>
<td>0.470*** (0.110)</td>
</tr>
<tr>
<td>( \Delta \text{ State Fixed Effects} )</td>
<td>X</td>
</tr>
<tr>
<td>( \Delta \text{ State Fixed Effects} )</td>
<td>X</td>
</tr>
<tr>
<td>Observations</td>
<td>17657</td>
</tr>
</tbody>
</table>

Source: Author’s calculations using data from Burning Glass Technologies, 2007-2010.

Note: All specifications include the previous set of baseline controls. Standard errors (in parentheses) clustered by state. * p<0.10, ** p<0.05, *** p<0.01
Accounting for Local Demand Shocks

Upskilling has occurred across both traded and non-traded industries, suggesting that our results are not driven by changes in local demand conditions.

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<th>Change in Share of Postings Requesting 2 or More Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traded</td>
<td>Non-traded</td>
</tr>
<tr>
<td>Δ State UR</td>
<td>1.138***</td>
</tr>
<tr>
<td>(Traded Share)*(Δ State UR)</td>
<td>(0.294)</td>
</tr>
<tr>
<td>Occ Fixed Effects</td>
<td>X</td>
</tr>
<tr>
<td>Observations</td>
<td>4171</td>
</tr>
</tbody>
</table>

Source: Author’s calculations using data from Burning Glass Technologies, 2007-2010.

Notes: The sample for columns (1) and (4) includes occupations with 75 percent or more of employment concentrated in traded industries and the sample for columns (2) and (5) includes the occupations with less than 75 percent of employment concentrated in traded industries. Trade industry share of occupation employment is constructed at the minor occupation code level using the American Community Survey 2007 3yr PUMS. Traded industries are defined at the 2-digit NAICS level as agriculture, forestry, fishing, and hunting; mining; manufacturing; and wholesale trade.
Accounting for Local Demand Shocks

Employer skill requirements increase significantly with the local unemployment rate—even when controlling for the same job title at the same employer—using an actual job vacancy survey.

Changes in Employer Requirements and Labor Market Slack, 2001-2012
Using within Firm and Job Title Variation

<table>
<thead>
<tr>
<th>Requires a College Degree</th>
<th>Requires Related Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Regional Unemployment Rate</td>
<td>0.487***</td>
</tr>
<tr>
<td></td>
<td>(0.104)</td>
</tr>
<tr>
<td>Employer/Job Title Effects</td>
<td>Yes</td>
</tr>
<tr>
<td>Job Characteristic Controls</td>
<td>No</td>
</tr>
<tr>
<td>Employee Benefit Controls</td>
<td>No</td>
</tr>
<tr>
<td>Observations</td>
<td>205860</td>
</tr>
</tbody>
</table>

Source: Authors' analysis using data from the Minnesota Job Vacancy Survey, 2001-2012.

Note: Dependent variables is a binary indicator for whether the job opening requires a college degree or “related” experience. The regional unemployment rate covariate is reported at the Minnesota Economic Development Region level of variation. Job characteristic controls include indicator variables for full or part time position and if the position requires a certificate/licensure. Employee benefit controls include indicator variables for health insurance, retirement, and paid time off benefits. All specifications include a linear time trend.
Natural Experiment: Troop Withdrawals

We make use of a natural experiment resulting from a surge in the veteran labor force following troop withdrawals from 2009-2012.
Natural Experiments: Troop Withdrawals

Veteran employment is concentrated among occupations that typically make use of the skills that come from serving in the military.
Natural Experiment: Troop Withdrawals

Among veteran concentrated occupations, there is a positive and significant relationship between skill requirements and the change in the number of veterans.

Logistician:
The job: As commerce becomes increasingly global, the demand for logistics experts will increase, too. Military experience in managing supply chains, including tracking inventory and transporting supplies efficiently, can easily be transferred to many industries, from manufacturing to food.

How to switch: Your experience is your ticket, particularly if you were a manager. Search VetJobs.com for companies that specifically recruit military vets for logistics jobs -- many do.

Natural Experiment: Troop Withdrawals

There is a significant and positive relationship between the increased supply of vets and the change in employer requirements.

Relationship Between the Change in Employer Requirements and Veteran Supply Shocks

Panel A: OLS Results, Veteran Supply Shocks

<table>
<thead>
<tr>
<th>Change in Share of Postings Requesting a Bachelor’s or Greater</th>
<th>Change in Share of Postings Requesting 2 or More Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Log Difference in Number of Veterans in State</td>
<td>1.254*** (0.338)</td>
</tr>
<tr>
<td>Δ Veteran Labor Supply/Demand Ratio</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>State Fixed Effects</td>
<td>No</td>
</tr>
<tr>
<td>Observations</td>
<td>6733</td>
</tr>
</tbody>
</table>

Panel B: OLS Results, Veteran Supply Shocks (continued)

<table>
<thead>
<tr>
<th>Change in Share of Postings Requesting 2 or More Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4)</td>
</tr>
<tr>
<td>Log Difference in Number of Veterans in State</td>
</tr>
<tr>
<td>Δ Veteran Labor Supply/Demand Rate</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>State Fixed Effects</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

Source: Authors’ analysis using BGT data, 2007–2012.

Note: Log difference in the number of veterans in the labor force is estimated using the ACS 1yr. PUMS. The Veteran Labor Supply/Demand Rate is an annual, state-level measure for the average number of veterans per job posting within six broad occupation groups. This measure is constructed by taking the state level estimate for the number of veterans in the labor force multiplied by a national estimate for each broad occupation's share of veteran employment and dividing this estimate by the average monthly count of job postings reported by BGT within a broad occupation group for a given year.
Natural Experiment: Troop Withdrawals

Veteran choice of location upon returning to the U.S. might be endogenous to local economic conditions, so we instrument for current state of residence with state of birth.
Natural Experiment: Troop Withdrawals

**Instrumenting for state of residence reduces the downward bias of location choice, increasing the impact of post-911 veterans returning to the labor force on employer requirements.**

<table>
<thead>
<tr>
<th>Relationship Between the Change in Employer Requirements and Veteran Supply Shocks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel B: IV Results, Veteran Birthplace Instruments</strong></td>
</tr>
<tr>
<td><strong>Change in Share of Postings Requesting a Bachelor's or Greater</strong></td>
</tr>
<tr>
<td>(1)</td>
</tr>
<tr>
<td>Log Difference in Number of Veterans in State</td>
</tr>
<tr>
<td>(3.884)</td>
</tr>
<tr>
<td>Δ Veteran Labor Supply/Demand Ratio</td>
</tr>
<tr>
<td>(0.609)</td>
</tr>
<tr>
<td>Δ BGT Labor Supply/Demand Ratio</td>
</tr>
<tr>
<td>(0.0830)</td>
</tr>
<tr>
<td>F-Test of Exc. Instruments</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>153.1</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>26.13</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>6629</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

Source: Authors’ analysis using BGT data, 2007–2012.

Note: we instrument for these two veteran supply shock by estimating each measure analogously using veteran's birthplace, rather than current residence, as reported in the ACS. In columns (3) and (6) we use the change in the veteran birthplace labor supply/demand rate measure to instrument for the change in the BGT broad occupation group labor supply/demand rate reported in Table 2.
Conclusions

We find that employer requirements rise for both education and experience when workers are more plentiful and also reverse when labor markets tighten (in a subsequent paper).

- This is true even when controlling for time, occupation, and state fixed effects, is found using multiple measures of labor availability and occurs even within firm-job title pairs.
- It appears that firms increase their skill requirements when they can hire new talent “on the cheap” as the college wage premium for new hires falls when unemployment rises.
- Our results indicate that roughly 30 percent of the observed increase in skill requirements within occupations is correlated with the availability of workers during the business cycle.
- Upskilling is more prevalent when turnover rates are lower, when time-to-start horizons are more delayed, when skill premiums are higher, and when wages are constrained.
- Moreover, downskilling during the recovery period 2010-2014 reduced employer requirements for education and experience by roughly one-third of the amount by which they increased over the Great Recession.
- As such, we document a novel feedback mechanism between labor supply and the selectivity of vacancies that may be relevant for reconciling the economics literature with reports of employer skills mismatch as well as modifying existing macroeconomic models.
Policy Recommendations

Our results have important implications for labor market policy that is currently being shaped by federal requirements and state reform efforts.

Our results indicate that a significant portion of the observed increase in skill requirements within detailed occupations is correlated with the business cycle and subject to reversion as the labor market tightens.

- This suggests that what is sometimes labeled as a structural mismatch in the labor market is actually cyclical as not all vacancies represent the same urgency to hire.

- Instead of adopting a “college for all” mentality, perhaps we should develop alternative labor market credentials that can better signal the skills that employers are looking for.

Our findings also indicate that the demand for skilled workers is perhaps more dynamic and responsive to labor market conditions than previously thought.

- This suggests that along with job search assistance and re-training, better targeting of extensions of UI benefits is warranted for less-skilled populations.

- At the same time, worker training and education programs need to become increasingly targeted and nimble and make use of more localized real-time labor market information to better inform jobseekers.
Thank You!

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Associate Director, Dukakis Center for Urban and Regional Policy