The Effect of the Energy Boom on Schooling Decisions in the U.S.

Na Zuo  
Ph.D. Candidate, University of Kentucky  
na.zuo@uky.edu

Jack Schieffer  
Assistant Professor, University of Kentucky


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The Effect of the Energy Boom on Schooling Decisions in the U.S.

Na Zuo ¹ and Jack Schieffer ²
¹ Ph.D. Candidate, Department of Agricultural Economics, University of Kentucky
² Assistant Professor, Department of Agricultural Economics, University of Kentucky

Motivation

- Shale gas and oil extraction has surged in the U.S. since late 1990s
- Recent studies have documented the energy boom as a clear local economic shock
- The shale gas boom increases demand for and earnings of low-skilled labor, which could draw teenagers out of school
- Significant counter-cycle correlations between energy boom/bust and schooling decisions during the oil shocks in 1970s to 1980s (Black, McMinnin, and Sanders 2005; Emery 2012)
- Human capital has long been recognized as an important factor for economic growth, and crowding out human capital development (e.g., education) may be a major cause of the resource curse

Objective

- Quantify the impact of the energy boom on aggregate (county level) schooling decisions

Data and Descriptive Analysis

- 1995-2010 annual data of 916 counties from 14 states
- Measures of aggregated schooling decisions at high school level
  - G9−12 Enrollment Rate = G9−12 enrollment students / Population of age 15−19
  - The Average Freshman Graduation Rate (AFGR)

Method and Identification

- Well spud density is better for identifying the boom, compared to oil/gas production
  - Labor requirements are highest during the active drilling years and largely are driven by the number of wells drilled per year (Brundage et al., 2010; Kelsey et al., 2011)
- Further instrument well spud density with the interaction of exogenous geological characteristics, e.g., the proportion of county covering a shale play, and the world energy price index

Primary Results

<table>
<thead>
<tr>
<th></th>
<th>G9−12 Enrollment Rate</th>
<th>AFGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Spud Density (all sample)</td>
<td>0.0472</td>
<td>0.0975**</td>
</tr>
<tr>
<td>Median HH Income (0.0118)</td>
<td>0.0237***</td>
<td>0.0250***</td>
</tr>
<tr>
<td>Median HH Income (0.0732***</td>
<td>0.0681***</td>
<td></td>
</tr>
<tr>
<td>Pupil Teacher Ratio (0.0997***</td>
<td>0.0851***</td>
<td></td>
</tr>
<tr>
<td>School Dropout Rate from Local</td>
<td>0.0339***</td>
<td></td>
</tr>
<tr>
<td>Unemployment Rate (0.0118)</td>
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</tr>
<tr>
<td>Poverty Rate (0.00118)</td>
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</tr>
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</tr>
<tr>
<td>%Hispanic (0.00118)</td>
<td>0.0201***</td>
<td></td>
</tr>
<tr>
<td>%Bachelor's Degree (0.00118)</td>
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<td></td>
</tr>
<tr>
<td>%Property Crime Rate (0.00118)</td>
<td>0.0307***</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.424***</td>
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Note: *p < 0.10, **p < 0.05, ***p < 0.01; robust standard errors are not reported.

Acknowledgements and Contact

The authors acknowledge the Student Sustainability Council and Dept. of Agricultural Economics at University of Kentucky for financial support in this study and conference travel, and Jerrod Penn for helping with maps in the poster. Contact author: Na Zuo, Ph.D. Candidate Email: na.zuo@uky.edu

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Primary Conclusions and Further Work

- The recent shale energy boom negatively affects the high school graduation rate, measured as the Average Freshman Graduation Rate (AFGR), but shows no significant effect on grade 9 to 12 enrollment rate
- The impact of the shale energy boom on the AFGR is conditional on the income level of sample counties: higher drilling rates reduce the AFGR more in counties with lower median household incomes.
- The negative effect on the AFGR is bigger in drilling counties, which in turn requires a higher income level to overcome the negative effect.

Further work: include county fixed effects, gender heterogeneity, and spatial analysis to refine model specification; exclusion of private schools and migration effects could bias the results.

Energy Boom

- Increased demand for & earning of low-skilled labor
- Increased household income

Schooling Decisions

- Measures of the shale energy boom: well spud density
  - The number of oil/gas wells drilled per square miles, county-by-year
  - Source: Comprehensive well records requested from state agencies, such as Dept. of Natural Resources – Oil and Gas Resources, Dept. of Environmental Conservation or Protection, State Oil and Gas Conservation Commission and so on.
- Recent studies have documented the energy boom as a clear local economic shock
  - Increase in local employment and income (Weber 2012 and 2013)
  - Local labor market restructuring (Weber 2014)
  - No local Dutch Disease effects (Allcott and Keniston 2014; Fitzer 2014)
- The shale gas boom increases demand for and earnings of low-skilled labor, which could draw teenagers out of school
- Significant counter-cycle correlations between energy boom/bust and schooling decisions during the oil shocks in 1970s to 1980s (Black, McMinnin, and Sanders 2005; Emery 2012)
- Human capital has long been recognized as an important factor for economic growth, and crowding out human capital development (e.g., education) may be a major cause of the resource curse
  - E.g., Gylfason (1999), Stijns (2006), and Papyrakis and Gerlagh (2007)

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