Distributional Equity in the Employment and Wage Impacts of Energy Transitions

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Proposal: NBER Distributional Consequences of New Energy Policies

Introduction

The US energy production landscape has changed dramatically in the last few decades. The share of US electricity generation from wind increased from 1% to 8.4% over the past three decades (Wind Explained: History of Wind Power, 2021). Although declining since 2020, U.S crude oil and natural gas production nearly doubled between 2000 and 2020 (EIA 2022, (a) and (b)). To whom do the labor market benefits of these changes accrue? Which communities are most impacted by energy development? In this paper, we use confidential geocoded data on the universe of workers and establishments from 23 states who participated in their state's unemployment insurance program in order to estimate heterogeneous employment and wage impacts of energy development. Our data allow us to estimate differences in the regional employment and wage impacts between white and non-white workers, men and women, workers in different income quantiles, and establishments and workers located in disadvantaged communities. We will further estimate the extent to which heterogeneous effects differ for wind development versus oil and gas.

Data and Methodology

Working in conjunction with the US Census Bureau's Federal Statistical Research Data Centers, we use disaggregated data detailing employment and payroll history for workers and establishments in 23 US states, from 2000-2015. We combine data from the Longitudinal Employer Household Dynamics (LEHD) database with data on wind plant locations, capacity, and year of installation from the US Wind Turbine Database (USWTDB), and data on oil and gas well locations and production from Enverus. The LEHD contains confidential geocoded information on all firms and individuals who participate in unemployment insurance programs, either by paying payroll taxes or receiving unemployment insurance benefits. Such detailed data allows us to consider differences in economic impacts of energy development for historically disadvantaged groups, low income groups, and disadvantaged neighborhoods. Investigating these effects is more difficult using publicly available county-level or IPUMS data.

Using this individual-level data, we aggregate employment and wage outcomes among subgroups of interest to increasing 20-mile rings around the locations of each wind or oil and gas development. We then regress these "correct" spatial aggregates on production at the development site and on control sites without energy development in a difference-in-differences framework with continuous treatment. This approach is similar to James and Smith (2020), with the important difference that we use "correct" spatial aggregates of geocoded raw data rather than county centroids. We will use stacked control sites in order to avoid biases from differential timing and dynamic treatment effects (Cengiz et al, 2019), and instrument for continuous variation in the energy development treatment variables using average wind speed or in-situ resources interacted with national energy development trends in a shift-share-type framework, similar to Feyrer et al (2017)'s county-level analysis of oil and gas.

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Results

Preliminary results suggest that wind energy development has positive, statistically and economically significant impacts for US households and establishments located near wind energy facilities that are quite larger than previous literature. Our initial findings also suggest that these impacts are larger for non-white workers than for white workers. We also find that, conditional on employment, wages do not significantly increase in response to wind development, implying that the impact occurs through new or reallocated jobs. The employment effects are almost entirely captured within 20 miles of the plant and dissipate quickly across space, becoming zero between 40 and 60 miles. While these results are preliminary, we hope to further unpack the difference between white and nonwhite workers in order to understand whether it comes from a differential impact on industries which have preexisting differences in racial composition, and to investigate impacts on more detailed race and gender subpopulations.

Contribution and Future Research

The geographic detail on individual worker and establishment outcomes provided by the US Census LEHD allows for a uniquely detailed examination of economic impacts of energy development; indeed, to our knowledge, this is the first study to use a near population of worker- and establishment-level data to estimate regional economic impacts of energy development. As such, we will contribute to the understanding of the spatial propagation of impacts from energy development and how they differ between worker type.

Understanding the distributional impact of energy development on labor market outcomes can inform policy decisions regarding where and how to invest in alternative energy sources in US communities. This analysis provides a more granular assessment of this impact, which in turn allows for a more nuanced discussion regarding energy development and equity. We hope to shed light on the employment dimensions of so-called energy justice research questions, whereas much current literature on the distributional impact of energy transitions focuses primarily on energy access.

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