Illuminating Policy Implications in Appalachia: Satellite Imagery Responses to Natural Gas Development

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THE RESEARCH
An analysis of nightlights data to quantify sub-national economic development in response to natural gas activities and natural gas policies to determine if state approaches limit or encourage regional economic growth.

Three states
9.8 trillion ft³ of natural gas *2017 estimates
85,000* jobs *2018 estimates

THE DATA
Derived from remote sensing imagery, more precise, high spatial resolutions and wide geographic coverage have enabled scholars to derive information on areas where information on economic development is available. Nighttime lights serves as a proxy for settlement patterns, wealth and economic development at high spatial resolutions.

THE METHODS
Nightlight Analysis
Analysis of luminosity emitted per county over time
Simple regressions run between luminosity and drilling activity, measured by wells drilled and natural gas production per year to verify proxy measure for development

Labor Statistic Correlation
Statistical analysis comparing socio-economic indicators including mean income, general employment and poverty

Policy Analysis
Evaluation of individual state policies to determine clarity, level of effectiveness, equity and cost
Cross comparison analysis of natural gas policies

THE PRELIMINARY RESULTS

Pre-boom (2000)

Boom (2008)

Post-boom (2016)

Here, we will correlate labor statistics and natural gas production data with light density to determine if nightlights data can serve as a valid proxy measure for regional natural gas related development.

We couple this data with an institutional and policy analysis analysis to approach our second hypothesis: States that allocate taxation funding to municipalities will experience greater spatial economic development and spillovers when compared to states that limit or withhold funding from municipalities.

THE NATURAL GAS POLICY ANALYSIS

Local powers
The growing structures of Ohio, West Virginia, and Pennsylvania are complex entities important in understanding the local government’s influence on hydraulic fracturing regulation. There are two forms of governing structures influencing municipalities: Dillon’s Rule and Home-Rule. Dillon’s Rule limits the taxing abilities of local government to those explicitly granted by state constitution. Under Home-Rule, municipalities have the ability to exercise power not explicitly stated in constitution. Home-rule charters are only present in 2% of Ohio municipalities and 10% of Pennsylvania municipalities. The rest fall under Dillon’s Rule.

PA OH WV

Tax rates for Companies occur at the corporate, property, county, and state level. Companies must adhere to a water management and soil erosion plan as well as be subject to a horizontal well fee.

MUNICIPAL REVENUE AND TAX

Pennsylvania
Impact fee money - 60% money back in the hands of localities

Ohio
Municipalities do not vary in terms of fiscal task components but rather, use consumption fees.

West Virginia
Municipalities receive 50% of severance tax

REFERENCES:


