



## SERCNote #7

### What the Real Estate Market Tells Us about the Downside of Shale Energy Development

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With very few exceptions, natural resource development creates economic benefits that are readily identified, such as payments to resource owners. Costs, however, are often difficult to gauge. This asymmetry can easily lead to inefficiency, with development proceeding because costs are not counted accurately and therefore are not fully weighed against benefits that are apparent to one and all.



The extraction of oil and natural gas from shale deposits deep underground is certainly consistent with the general pattern of benefits that are more easily measured than costs. In the Utica play of eastern Ohio, for instance, the gains are unmistakable for landowners who lease subsurface mineral rights for production royalties after being paid up-front bonuses of \$5,000 or more an acre. Similarly unmistakable are the additional taxes collected by local governments and the new hiring by trucking companies, restaurants and hotels, and other businesses. In contrast, the negative consequences of shale energy development, not least its environmental risks, are hard to express in monetary terms.

Economists employ various techniques to evaluate environmental risks and disamenities. One approach is to analyze real estate values, which decline as ambient quality deteriorates. This analysis is hardly a straightforward exercise, since real estate prices are affected by a host of factors, environmental as well as non-environmental. For example, higher prices might be observed in an area with oil and gas drilling because the disutility that buyers associate with diminished ambient quality is outweighed by the value they place on the upgrading of roads and bridges, which frequently coincides with resource development. Under these circumstances, it would be erroneous to infer that an increase in real estate values somehow proves that landowners care nothing about possible damage to the environment.

Unlike many settings where environmental change is hard to disentangle from other factors influencing real estate prices, Washington County in southwestern Pennsylvania has provided us with a good opportunity to evaluate the adverse environmental impact of shale development. Few such studies have been published in peer-reviewed outlets; our findings are reported in the January 2014 issue of the *American Journal of Agricultural Economics*.

Horizontal drilling for shale energy began no more than a decade ago in southwestern Pennsylvania and by 2008 was ramping up quickly. Moreover, a large portion of Washington County is within commuting



distance of Pittsburgh, just to the northeast, so population density is much higher than in most rural settings where natural gas and other fossil fuels are extracted. Under these circumstances, we were able to investigate how far from active drilling sites real estate values might be driven down by subsurface energy development. We were also able to examine the persistence of these effects after the cessation of active drilling, which lasts several weeks to a few months.

The sample used in our study comprised 3,646 arm's-length transactions of residential property in Washington County between January 2008 and October 2010. Detailed information was gathered about each property: its sales price, of course, as well as lot size and how far the property is from Pittsburgh, the house's age and square footage, and other characteristics that matter to buyers. Also identified were the boundaries of public water districts, so that houses on public systems could be distinguished from those that rely on private well water. Additionally, data on horizontal drilling were obtained from the Pennsylvania Department of Environmental Protection: the permitting date for each well, its spud date (when drilling commenced at the site), and its specific location. Comparing this information with the data on land transactions, we found that 486 wells were located within two miles of a residential property sold between January 2008 and October 2010.

In a multiple regression analysis, we found that the existence of a horizontal well depressed the values of residential properties located less than 0.75 miles away during the six months following the issuance of a permit for the well. This impact was greatest – a decline of 21.7 percent, on average – for properties relying on well water and located very close to an active horizontal drilling site. However, real estate prices a little farther from shale gas wells were less affected; to be specific, the negative impact for residences located a full mile from a well permitted within the previous six months was only 5.6 percent. Likewise, price effects attenuated quickly with the passage of time. For example, no impact on real estate values was registered for properties located a mile away and permitted twelve months earlier.

Various factors bear on the relationship between shale energy development and the prices of residential properties. For example, proximity to major roads and highways depresses prices because of the noticeable increase in truck traffic that accompanies drilling and hydraulic fracturing. We also found that the price impact was greater for properties surrounded by agricultural land rather than forests, which tend to hide the noise, nighttime light, etc.

Future investigation of the linkage between residential property values and the impact of shale leasing payments as well as increased economic activity resulting from gas extraction remain important for policymakers and the general public. Our research, however, suggests that the enthusiasm to identify the winners from shale energy development should not overwhelm potential environmental concerns. While we leave much of the discussion on winners to future research, it is safe to draw two conclusions from our research. First, the geographic scope of shale development's impact on housing values is limited, not extending much more than a mile from active drilling sites. Second, that impact does not last long – certainly not more than a year or two following the issuance of a permit and the beginning of drilling. As gas extraction expands over time, local communities will certainly adapt to both environmental risks and potential rewards.

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