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Willingness to Pay and Willingness to Accept Shale Drilling: A Survey of Ohio Residents

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Background

- Shale gas drilling activities present many opportunities as well as potential environmental costs, both perceived and realized, to homeowners located near those activities. As shale gas drilling and exploration moves forward, it is important to understand the economic and behavioral impacts on nearby residents.
- In this paper, we utilize a newly developed stated preference survey to examine both willingness to pay (WTP) and willingness to accept (WTA) measures associated with shale gas development and its associated activities.



- Marcellus and Utica shale deposits, along with other shale deposits across the country, have the potential to alter energy use and production across the United States. Horizontal drilling and hydraulic fracturing have prompted the recent increase in drilling, and these activities introduce unique externalities on areas near the drilling sites.
- Previous research has shown the increased gravel roadway development associated with these wells are likely to increase sediment loading in surrounding waterways (Grayson et al. 1993), and that shale drilling may impact the aquatic environment and water level in underground aquifers (Eddlemon and Tolbert 1983; Veil and Puder 2006).
- The use of a stated-preference survey improves our understanding of this decision making process, allowing us to overcome the possibility of partial identification that may exist with revealed preference methods that struggle to discriminate between potential mineral rights owners and other residents.

Survey

The survey used in this paper implements a conjoint analysis to determine how homeowners respond when faced with a variety of proposed location choices and varying levels of shale gas activity.

A series of Likert scale questions follow the conjoint section of the survey. We also ask the respondents their demographic information, and predictions on the impacts of shale drilling on local communities. The survey follows the best practices outlines by Dillman (2000) to maximize response rates.

1. Drilling rights under the home

Attributes of New Home...	Before Accepting any Firm's Offer	After Accepting...	
	Firm C's Offer	Firm D's Offer	Firm E's Offer
Water Source to Home	Well	Well	Well
Monthly After-tax Payment to You	\$0	100 for 15 years	80 for 15 years
Distance from Your Home to Shale Activity	No shale activity	0.5 miles	1 mile
Number of Shale Wells	0	2	7
Daily Large Truck Traffic Increase	0	20 trucks/day	20 trucks/day

The offers from Firms C and D are identical except for the differences listed in the table. Which offer would you be more likely to choose?

☐ Firm C's Offer ☐ Firm D's Offer

2. Competing homes for hypothetical move

	Current Home	House C	House D
Housing Attributes			
Water Supply	Municipal	Municipal	Municipal
Monthly Housing Cost (all mortgage/rent, taxes, fees included)	\$400	\$540	\$560
Shale Gas Site Attributes			
Distance from Home to shale activity	0.5 miles	2 miles	2 miles
Number of Wells on Site	7	2	8
Daily Large Truck Traffic	20 trucks / day	15 trucks/day	15 trucks/day

House C and House D are identical except for the differences listed in the table on the previous page. Keeping in mind the monthly price of living in each house and your current budget, which house would you be more likely to choose?

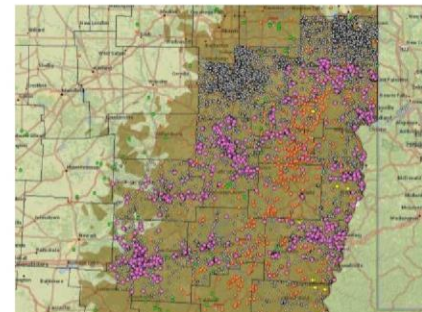
☐ House C ☐ House D

Data

- Test survey sent to 1,000 single family homeowners across eight northeastern Ohio counties
- Response rate of 10.2%
- Average age of respondents is 51
- Associates degree is the mean and median education level
- Mean self reported income level is nearly \$50,000
- \$900 mean housing cost per month
- Majority of respondents strongly support or somewhat support the extraction of natural gas from shale deposits in Ohio

Results

- Logit model with the choice from each scenario presented in the survey representing an observation
- Scenarios for the WTA have positive estimates on the payment made for drilling rights under a home
- There is a negative estimate on WTP for homes with higher monthly housing costs
- Signs on the estimated coefficients are consistent across WTA and WTP models
- Municipal water and drilling distance have positive coefficients in each model
- Number of wells and number of trucks per day have negative estimates for WTP and WTA



Green are active wells, yellow are the Marcellus well permits, and red are the Utica well permits. Purple are the sample homes, and gray are the non-sample homes (including the large cities).

Conclusions

Variable	Sign	Relationship
muni. water	+	WTA < WTP
drilling distance	+	WTA = WTP
# of wells	-	WTA > WTP
# of trucks/day	-	WTA > WTP

- The impact of drilling distance from the home is constant across models
- The effect of water source, number of wells, and number of trucks per day is less under the WTA scenario than in the WTP scenario
- Under both scenarios, the ranking and relative magnitude of drilling distance, number of wells, and number of trucks per day is similar
- Residents are more willing to receive direct payments than to be compensated through lower housing prices
- Future rounds of surveys should improve statistical significance and allow the stratification of results into different demographics categories to test for heterogeneity in the results

Bibliography

- Dillman, D. (2000). Internet, Mail and Mixed-Mode Surveys: The Tailored Design Method John Wiley and Sons, New York.
- Eddlemon, G. K. and V. R. Tolbert (1983). "Chattanooga Shale Exploitation and the Aquatic Environment: The critical issues." *Environment International*. 9(2): 85-95.
- Grayson, R. B., S. R. Haydon, et al. (1993). "Water Quality in Mountain Ash Forests — Separating the impacts of roads from those of logging operations." *Journal of Hydrology*, 150(2-4):459-480.
- Muehlenbachs, L., E. Spiller, and C. Timmins. 2012. Shale Gas Development and Property Values: Differences Across Drinking Water Sources. NBER Working Paper #18390.
- Veil, J. A. and M. Puder (2006). Potential Ground Water and Surface Water Impacts from Oil Shale and Tar Sands Energy-Production Operations, prepared by the Environmental Science Division, Argonne National Laboratory, U.S. Department of Energy, Oklahoma City, Oklahoma.