Non-Market Valuation of Hydraulic Fracturing
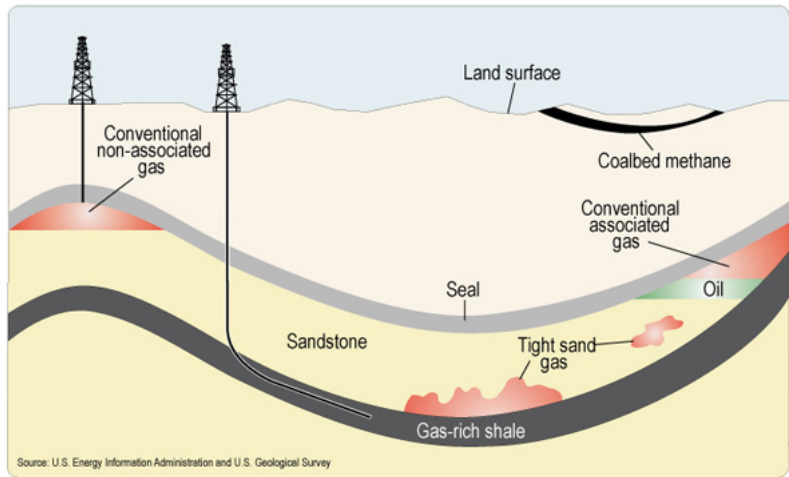## Beyond Hedonic House Prices

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Hydraulic Fracturing: A Diagram
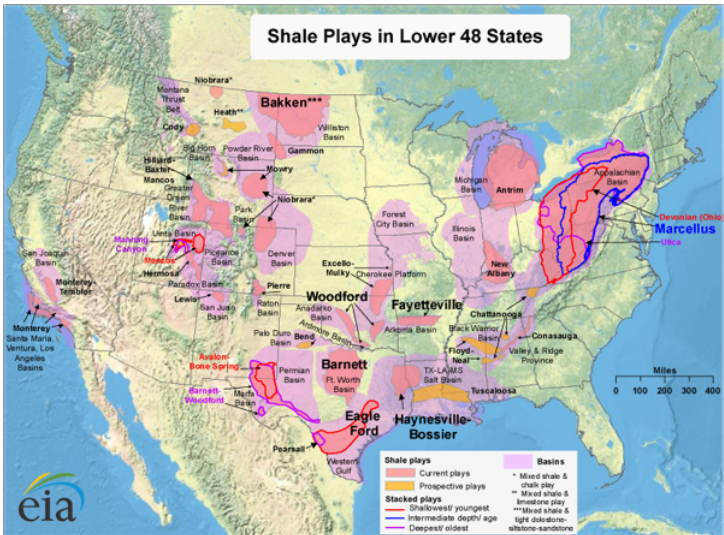
Intro: shale oil & gas exploration

- The good: relatively abundant, easily accessible fuels.
- The bad: potential environmental consequences like hazardous chemical spills; possible contamination of drinking water supplies; heavy truck traffic clogs roads and wears down pavement.
- The academic side: few studies to date on economic impacts, including valuation of changes in environmental quality. This is growing, however!

Literature (a selection)

- Hedonic home-price studies: Klaiber and Gopalakrishnan (2012); Muehlenbachs, et. al.(2013a, 2013b, 2014)
- Surface water impacts: Olmstead, et. al. (2013)
- Resource boom effects: Allcott and Keniston (2014); Weber (2014)

Wide Scope

Shale Plays in Lower 48 States

Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

Hedonic Wage Model

- Wages are affected by amenities.
- In theory, regulation can influence environmental amenities.
- Can variation in regulations help identify compensating wage differentials?

$$w_{ijl} = \alpha_j + \gamma_j \underbrace{\delta_{ijl}}_{\Pr[death]} + \rho \underbrace{\theta_{ijl}}_{\Pr[injury]} + \sum_{k=1}^{K_{jl}} \beta_{jk} q_{ijkl} + \sum_{n=1}^{N_i} \zeta_n s_{in} + \epsilon_{ijl}$$

Quality-of-Life framework

- Let y represent either wages w or rent r in location j at time t. Then we can estimate:

$$y_{jt} = \alpha + \beta_1 x_{jt} + \beta_2 WELLS_{jt} + \sum_{k \in K} \beta_{3k} R_{kjt} + \beta_4 SHALE_j + \epsilon_{jt}$$

  for $y = w$ and $y = r$.

- x_{jt} is a vector of demographic variables and other controls.
- $WELLS$ is the number of shale wells in location j at time t.
- R is a dummy for the kth regulatory policy (e.g. fluid content disclosure), where K is the set of all fracking regulations.
- $SHALE$ is a dummy equal to 1 if location j is inside a shale play.

Other ideas

- Livestock health survey
  - Collect veterinary data, geographic data
- Cost-function estimation of ag operations
  - Estimate lost economies of scale from infrastructure changes
  - Are agricultural operators being fully compensated?

THANKS!!!

Comments, questions and–especially–suggestions are welcome!