Drivers of Royalty Rates and Primary Terms in Private U.S. Mineral Leases

Mark Agerton
magerton@rice.edu

center for ENERGY STUDIES
Rice University's Baker Institute for Public Policy

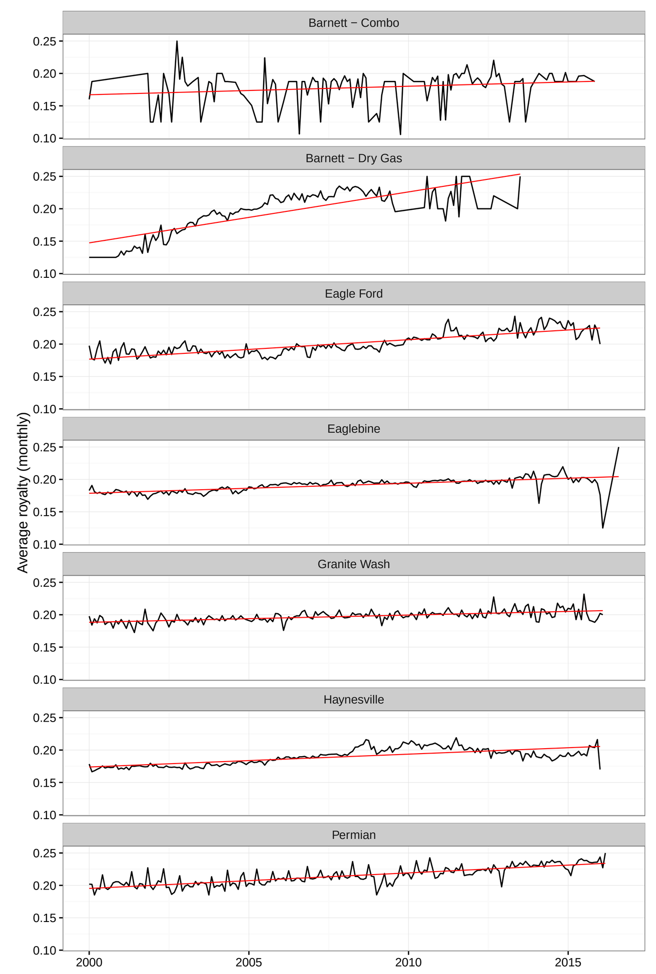
RICE

Research question:

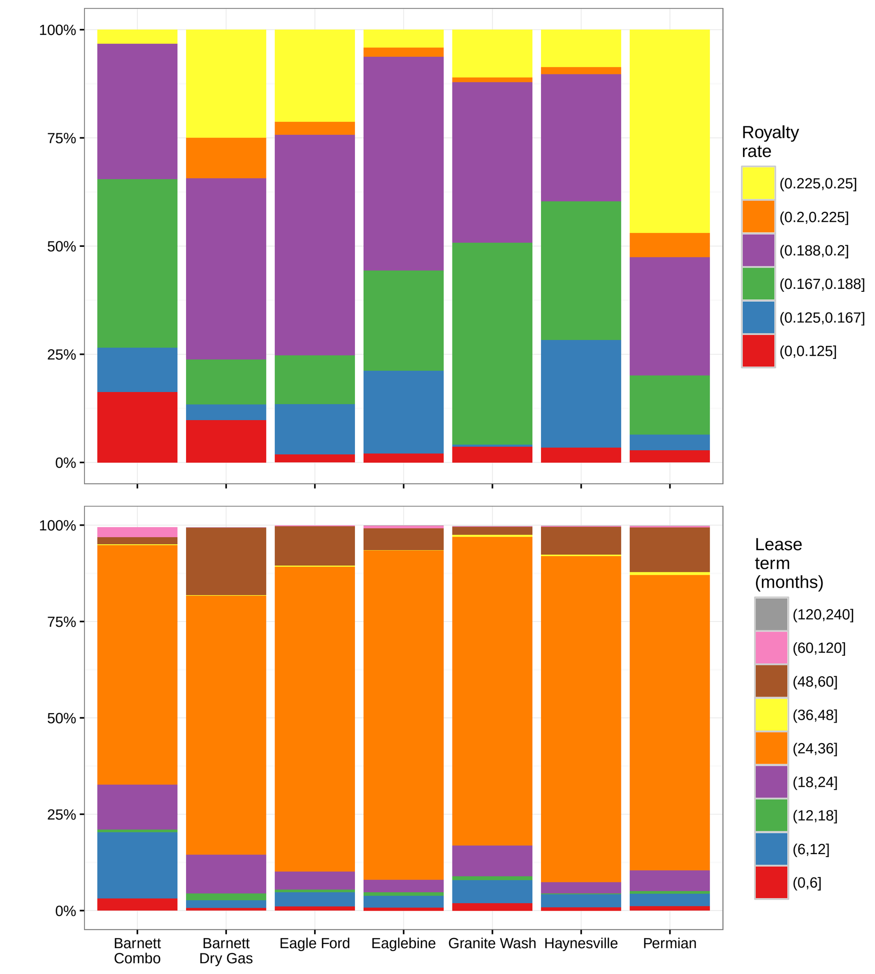
Oil and gas royalties are a major source of income for rural communities. Brown et al. (2016) estimate that 2011 Texas oil & gas royalties were $15.9 billion. However, lease terms vary over time and space.

Why do some landowners get better terms? Use an ordered logit regression model and data from Texas to find out.

Mean royalty rates rise…



…and terms vary by play



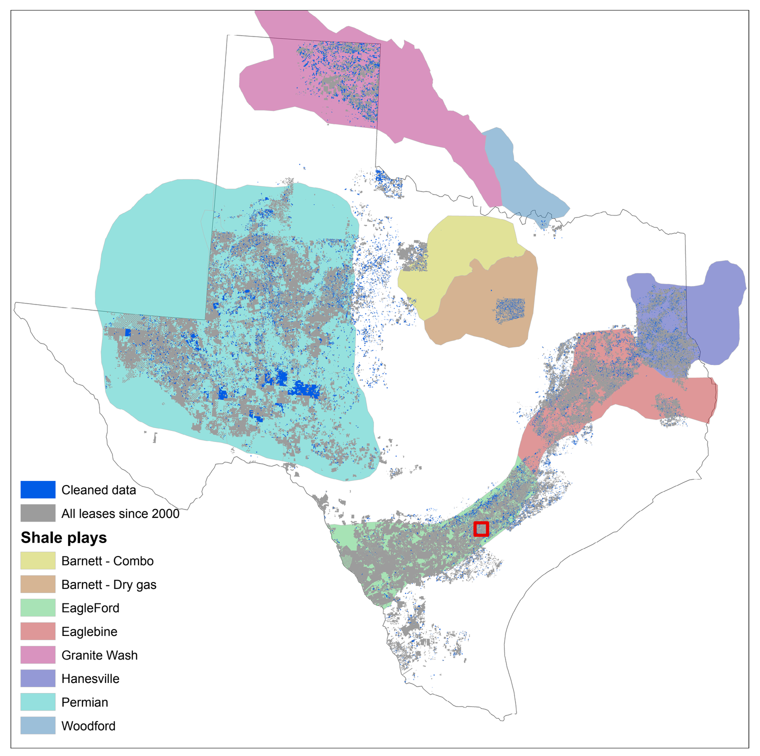
Leasing data

- ≈ 458k lease polygons from Drillinginfo have total area of 523k sq km, but only cover 133k sq. km of land.
- Calculated aggregate statistics by downweighting areas by degree of duplication
- Isolated clean sample of 28k de-duplicated leases covering 16k sq km. Used geoprocessing, large database operations, and graph theory tools.
- Measured scarcity and market power as percent of 1km spaced grid-points within given radius that also lie within previously executed lease.

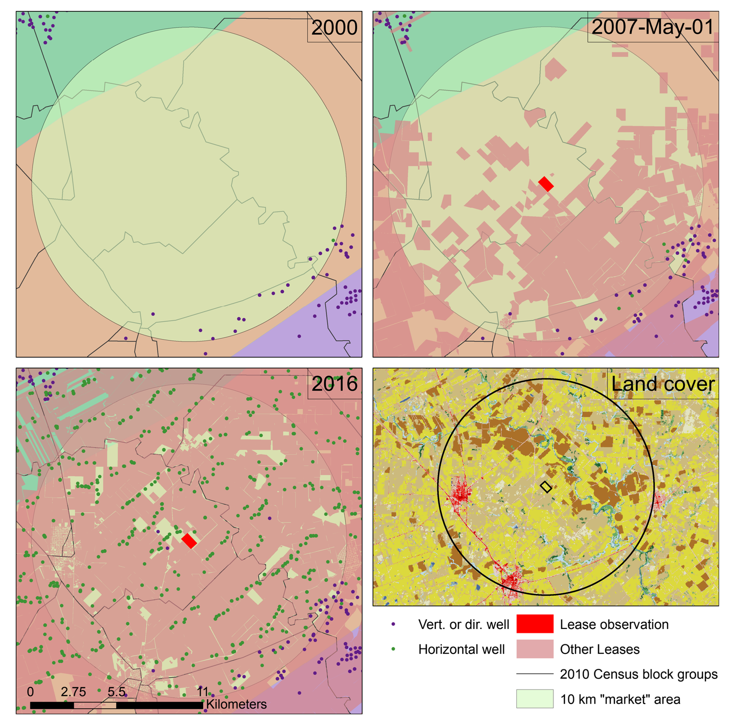
Other data

- All wells in Texas (from Drillinginfo) within 10km of each lease center.
- Land classification relative to mean land use from land cover satellite data at 30m × 30m.
- Census block group summary data from 2006–2010.

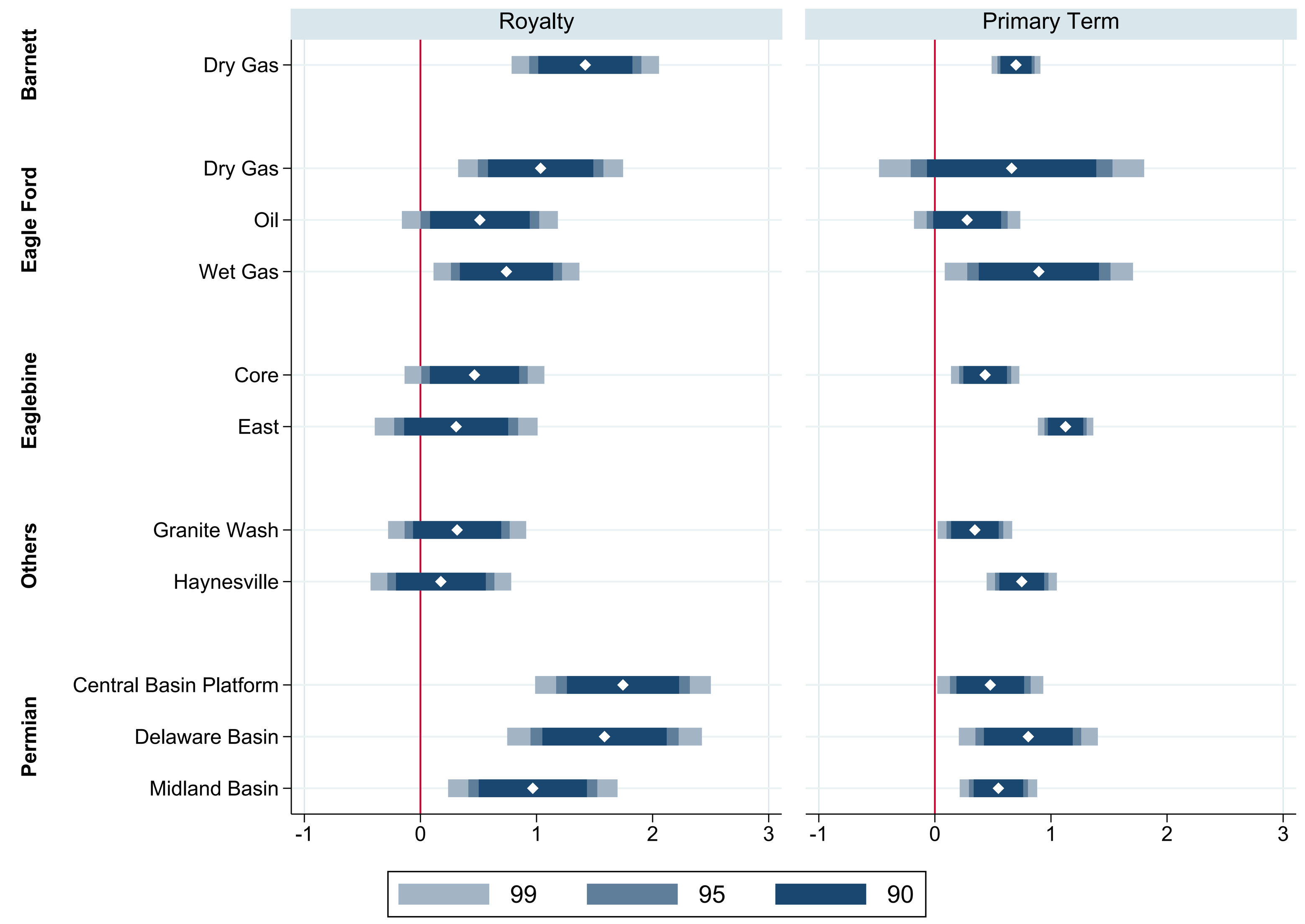
Data extent



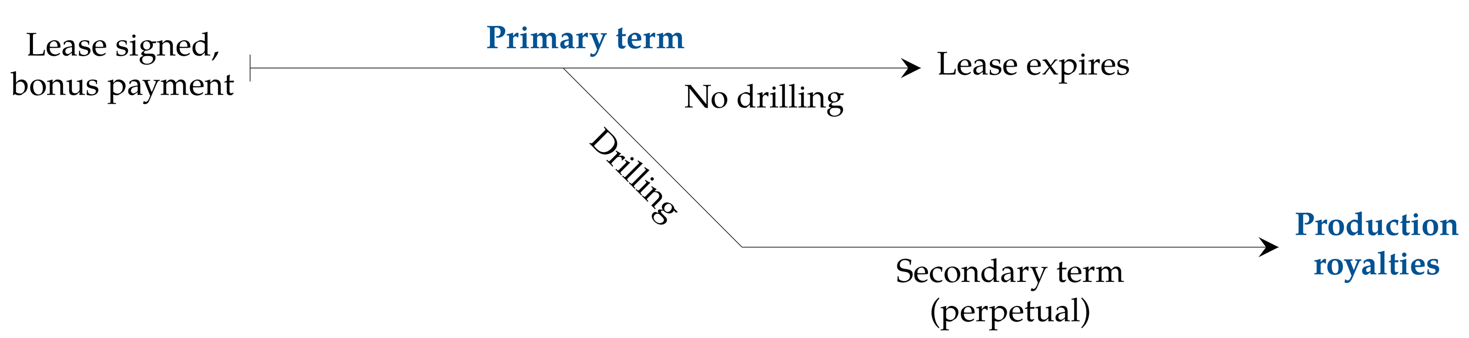
An Eagle Ford lease



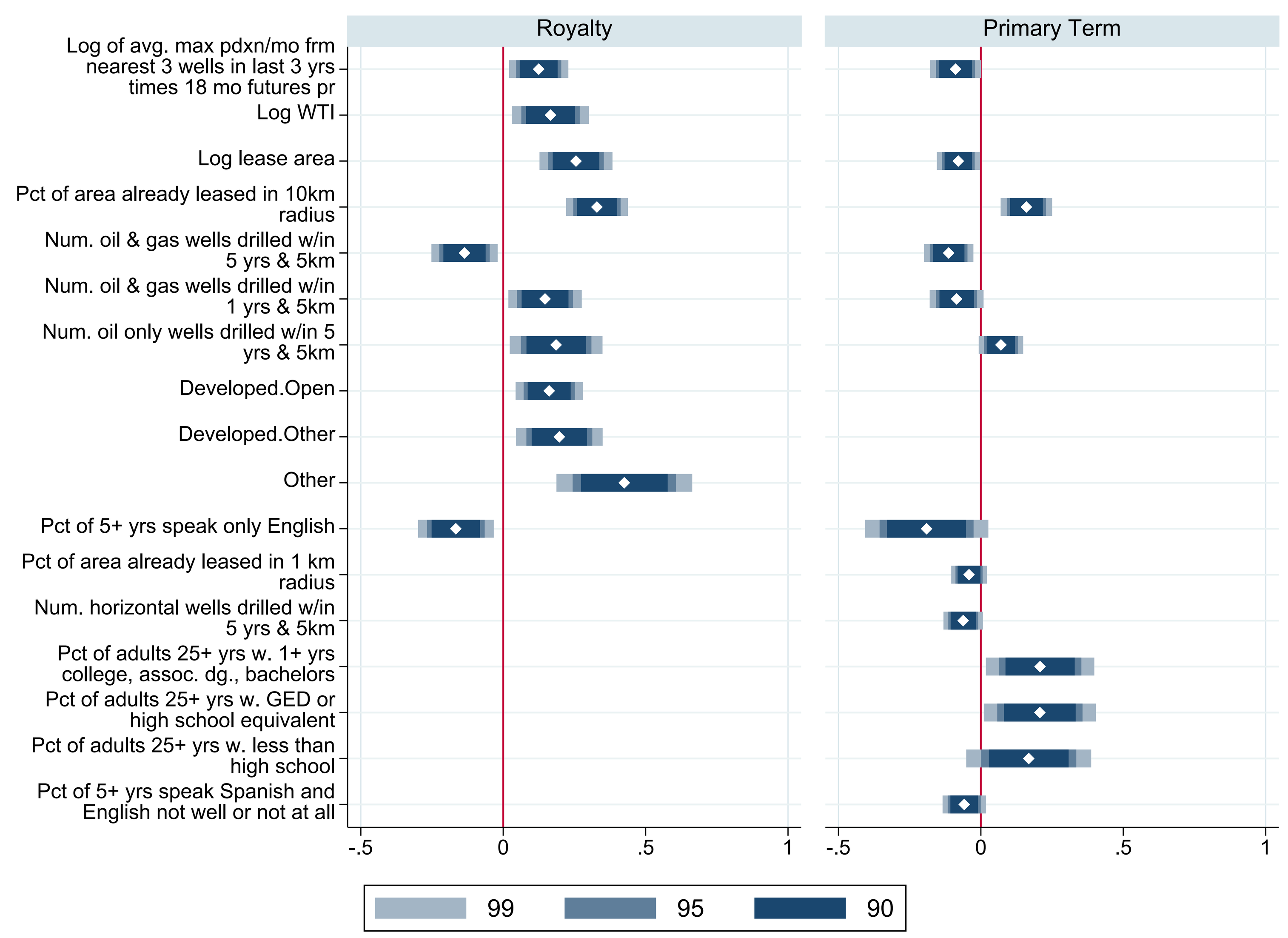
Play fixed effects



Structure of lease contract



Coefficients for ordered logit regressions with clustered SEs by county



Incentives in leasing

- **Landowners** want *high royalty rates* and *short lease lengths (primary terms)* to increase revenues and shorten payback periods.
- **Firms** want the opposite.
- Royalties can't be too high, or the firm won't drill.

Drivers of lease terms: hypotheses

- Agerton (2016) shows why landowners' royalties increase with expectations of future lease scarcity, resource prices, and firms' productivity.
- Brown et al. (2016) find absentee landowners get higher royalty rates.
- Timmins and Vissing (2014) and Vissing (2015, 2016) find lower socio-economic status and firms' market power worsen landowner outcomes.

Conclusions: What drives mineral lease terms?

- **Firms' valuations drive lease terms.**
  - ✓ Better geology, technology, and higher prices increase royalty rates, as do
  - ✓ Bigger leases,
  - ✓ Recent drilling activity (also affects primary term), and
  - ✓ Prior leasing activity
- **Landowner characteristics don't.**
  - × Census block group socioeconomic status (race, income, education) have little effect, as do
  - × Absentee ownership, and
  - × Firm market power.
  - **?** Shorter primary terms may be more prevalent in lower-educated areas that are not bilingual.
- **Economic value of land may.**
  - ✓ Developed lands and shrubland recieve higher royalties than cultivated land.
- **Scarcity favors landowners.**
  - – Scarcity is correlated with firms' valuations, so identifying causality is problematic.
- **This is consistent with a competitive market for leasing.**