



# Fracking and the Housing Market: A Texas Case Study



Henry M. Broeksmit, Samuel P. Jackson, and Robert D. Shill

Sewanee: The University of the South, Sewanee, TN

## INTRODUCTION

We are investigating how the fracking boom has affected the Texas housing market, a state whose economy is heavily dependent on oil production. We are grounding our research in the West Permian Basin in Texas, in the cities of Midland and Odessa, as this area has become the world's largest oil producer (Bartik 2019). The housing markets in Midland and Odessa are central to our project, as they are the most susceptible to oil price and supply fluctuations. We employ a difference-in-differences framework to estimate the true, ceteris paribus, effect of fracking on home values in these towns. To accomplish this, we use housing data from Amarillo and Abilene. These Texas cities are similar in population to Midland and Odessa, but have no meaningful oil production, and are located just outside of the Permian Basin. For these reasons, they serve as viable control groups for our model. As we examine the housing markets of these cities, we aim to discover if fracking in the West Permian Basin has appreciated or depreciated average home values in the mentioned cities.

## BACKGROUND & IMPORTANT LITERATURE

- Hydraulic fracturing (“fracking”) is an oil and gas drilling method that injects water, sand, and other chemicals under extreme pressure into a bedrock formation to extract oil or natural gas.
- In the early 2000s, this method of drilling was introduced to the West Permian Basin as a cheaper means to extract oil and natural gas, allowing the Permian to become the world's top oil producer.
- As oil and natural gas production rose, Midland and Odessa, TX saw significant changes to their local housing markets.
  - Jacobsen (2018), notes that housing values rose roughly 12% between 2007 and 2012 in the Permian Basin.
  - Grossman (2017) explains that historically housing demand has significantly increased during oil booms similar to Permian Basin's.
  - However, Ansari (2017) mentions instances where oil prices have drastically decreased, offsetting these rising home values due to the increased volume of homes for sale.

## DATA

- Our data for the average home prices in Midland, Odessa, Abilene, and Amarillo is derived from Texas A&M's Real Estate Center. This data reaches back to 2006, which provides an ample pre-fracking period as the boom commenced in the later months of 2010 and early months of 2011.
  - Mean: \$185,000; Minimum: \$101,000; Maximum: \$361,000.
- Our data for *Post* indicates that 69.5% of our data is after December 2010. We believe that our data prior to December 2010 provides sufficient data to regress average home price on our independent variables. The *Post* data begins in January 2011, which aligns with the beginning of the fracking revolution in the Permian Basin.
- Our data for GDP comes from the St. Louis Federal Reserve. It is a seasonally adjusted annual rate expressed in billions of dollars, and is represented quarterly. We apply the figure to each month within the quarter.
  - Mean: \$16,799.6 billion

## MODEL

$$AvgPrice = \beta_0 + D_0Permian*Post + \beta_1Permian + D_1Post + \beta_2RealGDP + u$$

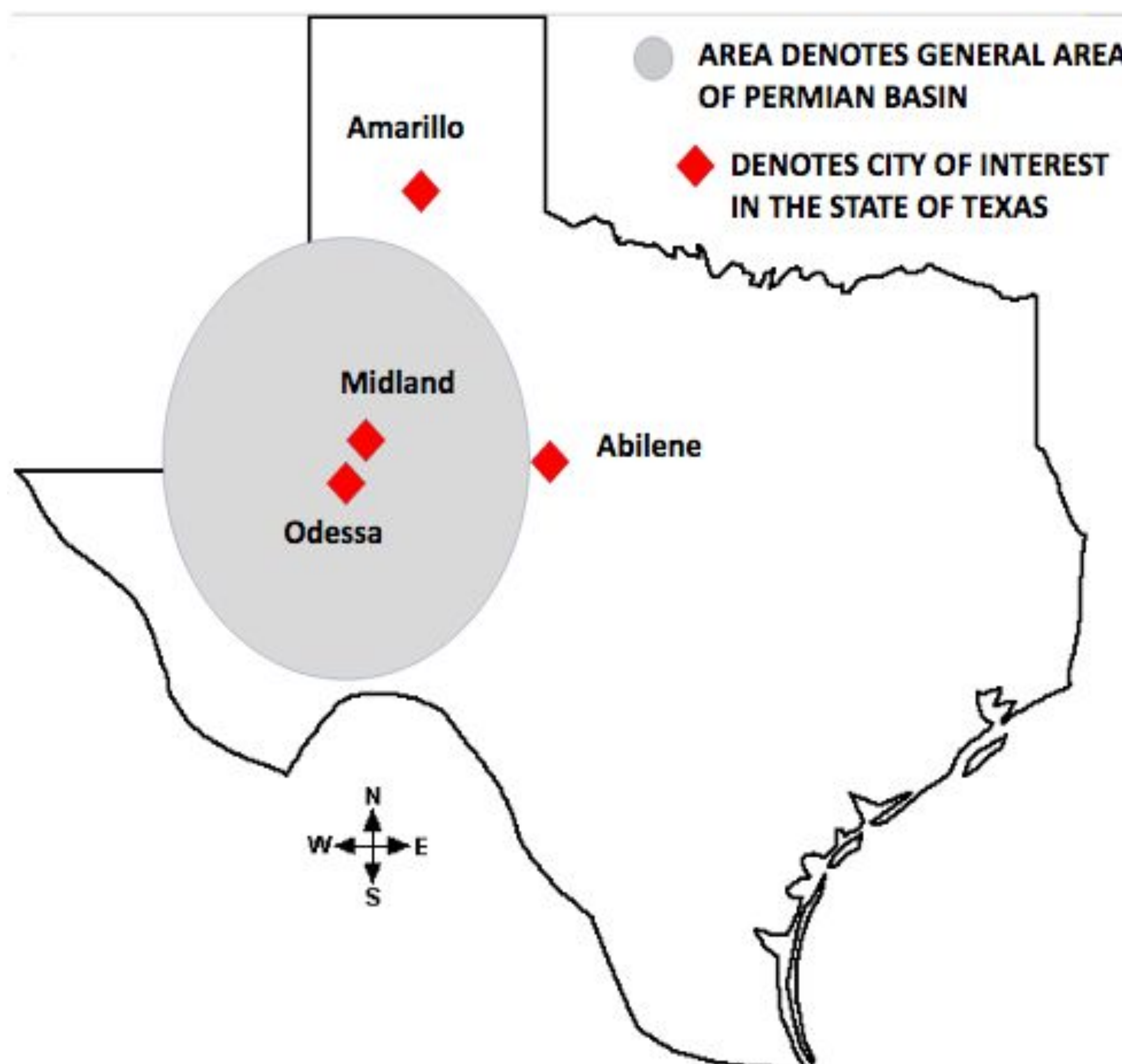
*AvgPrice* is the dependent variable, representing mean home values.

*Permian* is a dummy variable, equal to 1 if Midland or Odessa and 0 if Abilene or Amarillo. It captures baseline home values in Midland and Odessa relative to those of Abilene and Amarillo.

*Post* is a dummy variable equal to 1 for each city after the start of the fracking boom and 0 for each city prior to the boom. It captures the changes in home values outside of the Permian basin after the boom as compared to their values prior to the fracking revolution.

*Permian\*Post* is an interaction term and our independent variable of interest. It shows the relative changes in home values in the Permian Basin relative to those of the two cities outside of the Permian formation, as compared to before the fracking boom.

*RealGDP* represents the United States quarterly real GDP applied monthly. This variable accounts for changes in home values on a national scale due to fluctuations in Gross Domestic Product.



## RESULTS

Linear Regression			
Avg_Price	Coef. (St.Err.)	Sig	
Permian_Post	37423.720 (5708.127)	***	
Permian	27971.146 (4749.449)	***	
Post	-13300.000 (4899.037)	***	
Real_GDP	21.750 (1.490)	***	
Constant	-198000.000 (23352.981)	***	
Mean dependent var	185383.992	SD dependent var	51939.363
R-squared	0.601	Number of Obs	624.000
F-test	233.305	Prob > F	0.000
Akaike crit. (AIC)	14756.743	Bayesian crit. (BIC)	14778.924

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

- The coefficient on our variable of interest, *Permian\_Post*, tells us that, on average, relative to towns outside of the Permian Basin, compared to prior to the fracking boom, housing values in the Permian Basin increased by \$37,423.72
- This shows that fracking has had a statistically significant impact on appreciation in Midland and Odessa home values as compared to the home values of neighboring cities
- This is a significant discrepancy in average price which we attribute to heightened economic activity and housing demand caused by the fracking boom in the Permian Basin

## CONCLUSION

- Our results indicate that the Permian Basin's oil boom has disproportionately increased home values in the Permian as compared to those outside of the oilfield
- Homes in Midland and Odessa have appreciated dramatically compared to both the control group and the pre-boom period
- Home values in Abilene and Amarillo, serving as the control group, have declined, on average, over the same period
- We find that this stark contrast has emerged via two main channels:
  - i) heightened housing demand
  - ii) increased purchasing power

## REFERENCES

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