

# ***How much do states really tax oil and gas extraction? Effective tax rates across U.S. states***

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## **Overview**

Growth in oil and gas production in the continental U.S. has prompted some states to reconsider their taxation of production. This in turn has led to comparisons of tax policies, with most of the focus centering on the rate at which production is taxed (Press, 2012; IFO, 2014). Although it is easy to find stated tax rates, tax policy specifics vary substantially across states and make comparisons difficult. Some states have high stated tax rates but apply them to only a subset of production. Other states have multiple rates, each of which is applied differently. The diversity of rates and their application muddles policy debates, with proponents and opponents of higher taxes able to make selective comparisons of rates to advance their position. Using state-level data on oil and gas production and the revenue generated by it, we calculate an effective oil and gas tax rate for all states in the continental U.S. that have economically important oil or gas production. The estimates permit a description of the variation and central tendency of effective rates, both for the typical state and for the typical dollar (or British Thermal Unit) of production. By providing transparent measures of taxation, the estimates create a firm empirical foundation for state policy debates.

We also econometrically estimate whether effective rates have increased over our ten year study period (2004-2013) and whether states tax oil and natural gas at different rates. The growth in production over the study period stems from the extraction of oil and gas from shale formations using unconventional methods, namely the use of liquids to fracture shale (“hydraulic fracturing”). To the extent that production taxes are designed to generate revenues to address the public and environmental costs of extraction, we might expect taxes to have increased, since unconventional methods used in shale development involve greater costs than conventional production (e.g. McKenzie et al, 2012; Abramzon et al, 2014). The differential taxation of oil and gas is relevant to climate change and carbon tax policy debates. When burned, oil-based products such as gasoline and heating oil emit about one-third more carbon dioxide than natural gas (EPA, 2015). State tax policy, however, may create more incentives to extract oil than gas.

## **Data & Methodology**

Out of the 34 states with enacted taxes or fees on oil and natural gas production, there are 24 states with non-negligible oil and natural gas production included in the sample. Most states charge a severance tax based on the volume or value of production and one state, Pennsylvania, charges an impact fee on each well drilled. These taxes and fees can be complex, often with many exemptions and rates that vary with a variety of factors, which could make the stated tax rate misleading. Two states may have the same stated tax rate but provide different exemptions for different types of wells. Texas, for example, exempts high-cost wells from severance taxes, and such wells

accounted for 55.1 percent of total natural gas production in the fiscal year of 2009 according to the Legislative Budget Board in Texas<sup>1</sup>.

We define the effective tax rate as the total tax revenue collected from oil and natural gas production by the total value of production. Using revenue and production data, we calculate an effective rate for each state and year and then average across years to obtain each state's average effective tax rate. For the aggregate state tax rate, we aggregate production and revenues across all states and divide revenues by production. For the production value, we exclude Federal offshore production and assign values using the national wellhead price for natural gas and first purchase price for oil. Production and price data come from the Energy Information Administration. Tax revenue data are from state agencies.

Because most states report oil and natural gas tax revenue together, the average effective rate reflects the combination of oil and natural gas production. To test if states tax oil and gas differently, we econometrically estimate the relationship between the effective tax rate and the share of the value of production accounted for by oil. We also test if tax rates have changed over time and if larger producers have higher rates.

## Results

In aggregate, states generate 4 cents in revenue for each dollar of production – a rate that has been roughly constant from 2004 to 2013. Montana had the highest effective state tax rate of 7.8% during the sample year while Virginia had the lowest rate of zero since it has no state tax on extraction. Stated rates often differ from effective rates. Texas, for example, has a stated rate for natural gas and oil of 7.5% and 4.6% while the effective rates are 4.3 and 3.2%. Despite the greater greenhouse gas externalities associated with oil, the extraction of oil is taxed at a rate similar to that of cleaner burning natural gas from a production perspective. There was 1 percentage point increase in the 2009-2013 period relative to the 2004-2008 period

## Conclusions

Growth in oil and gas production in the continental U.S. has generated new interest in state taxation of extraction. Discussion of tax policies have suffered from clear measures of how much states really tax oil and gas. We transparently derive estimates of effective tax rates on oil and gas extraction across U.S. states. Our estimates show substantial variation in effective rates across states, even across major producing states (e.g. Wyoming and Montana). Explaining the reasons for such a divergence in policies is clearly an opportunity for future research. We also provide three measures of central tendency in tax rates, which indicate that the typical state has a 3.4 percent tax rate while the typical dollar of energy is taxed at a higher rate, at 4.0 percent. On average, effective rates have not increased over time despite greater externalities associated with unconventional wells, which are responsible for the growth in aggregate production.

## References

- Abramzon, S., Samaras, C., Curtright, A., Litovitz, A., & Burger, N. (2014). Estimating the consumptive use costs of shale natural gas extraction on Pennsylvania roadways. *Journal of Infrastructure Systems*.
- Environmental Protection Agency (EPA), 2015, “Frequently Asked Questions: How much carbon dioxide is produced when different fuels are burned?” Available at <http://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11>.
- Independent Fiscal Office. 2014. “Natural Gas Extraction: An Interstate Tax Comparison.” Available at [http://www.taxadmin.org/fta/severance/papers/pa\\_gastaxstudy\\_0314.pdf](http://www.taxadmin.org/fta/severance/papers/pa_gastaxstudy_0314.pdf).
- Press, J. 2012. “Oil and Gas Severance Taxes: States Work to Alleviate Fiscal Pressures amid the Natural Gas Boom.” National Conference of State Legislatures, available at <http://www.ncsl.org/research/energy/oil-and-gas-severance-taxes.aspx>.
- McKenzie, L. M., Witter, R. Z., Newman, L. S., & Adgate, J. L. (2012). Human health risk assessment of air emissions from development of unconventional natural gas resources. *Science of the Total Environment*, 424, 79-87.

<sup>1</sup> Legislative Budget Board in Texas.

[http://www.lbb.state.tx.us/Other\\_Pubs/Natural%20Gas%20Tax%20Overview.pdf](http://www.lbb.state.tx.us/Other_Pubs/Natural%20Gas%20Tax%20Overview.pdf) (accessed on 4/30/2015)