The Fiscal Effects of Fracking in Otsego County, NY

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Summary

This paper compares the ad valorem taxes payable on gas wells with the lost tax revenue from declining assessed values on real estate – houses, buildings, and land – around those wells. By carefully setting the assumptions, we can assess the future fiscal health of towns that allow hydrofracking.

This analysis focuses on income from taxation. It does not include the public costs of drilling, such as road maintenance and repair, emergency services, police protection, and other costs that drilling companies under today's regulatory regime are not obligated to cover.[1] We also have assumed that there are no spills or serious accidents that require emergency actions or long-term abandonment of domestic water wells. Any such events will have a further negative impact on property values and the town's finances. Finally, quality of life issues are outside this discussion as well.

According to the model developed below, it is likely that town, county and school district revenues from the ad valorem tax will be substantial but will not equal the loss in real estate taxes resulting from declining real property values in the areas surrounding gas wells.

- The deficit will be large and long lasting.
- Local governments and school districts will be faced with either increasing tax rates or decreasing spending to balance their budgets.
- This problem arises due to the conflict between gas drilling and a local economy based upon tourism, recreation, retirement housing, agriculture and other businesses that are incompatible with heavy industry.

Of the 24 towns and one city in Otsego County, 18, or almost three-quarters, will experience significant and long-lasting financial stress. Taking the county as a whole, the net loss would

[1] Towns have the ability to enter into road use agreements with drillers to recover the costs of damage done by drilling truck traffic. These agreements are designed to cover the direct costs of repair and not the indirect costs of inconvenience to local residents, damage to private vehicles, or loss of business due to reduction in other traffic. No such agreements are currently in place in Otsego County.

exceed $133 million during the first 11 years of hydrofracking. This impact is concentrated in Oneonta (both the town and the city). But even for rest of the county, the annual loss would be $3.7 million with an aggregate loss during the first 11 years of $41 million. If gas drilling results in a reduction in real property values of 5% or more over the entire county (excluding Oneonta), then annual losses will exceed the gains from the ad valorem taxes collected from gas production. These stark financial expectations are before accounting for the other public costs that will be experienced with gas drilling.

I. The Value of Gas

It is difficult to predict the success of a gas well given the vagaries of geology, lifting costs, and commodity price fluctuations. Some dry wells or marginal producers can be expected. Given that the depth to the target formations in Otsego County is shallower than that in Pennsylvania and that the actual width of the Marcellus shale formation "pinches out" in Otsego County, we can expect wells in our county to have lower production. We also know that gas wells have their highest production on the first day with declining yields thereafter.

But how steep is the decline and how long is the well productive?

For our analysis, we have chosen to use a Royalty Calculator prepared by Penn State University.[2] This tool was created to help land owners evaluate the potential income from leasing land to drillers. It is a flexible tool, allowing the user to insert different assumptions about the maximum initial productivity of a well, the life span of the well, the decline rate in the well's production, the price of gas, and the landowner's share of royalty income. For our use, we need only look at the well's production over its estimated life. The key assumptions used for the calculator:

- Initial production of 4.0 million cubic feet (4 MM CF) per day of gas.[3]

[2] "What if…Royalty Calculator," created by Ken Balliet, Penn State Cooperative Extension, 2008.

[3]This estimate is based upon recent historical gas production in Tioga and Potter counties, PA provided by PA DEP. During fiscal year ending June 30, 2010 (the most recent reported full year), a total of 61 operating gas wells produced a total of 20 million MCF for an average production rate per well of 306,000 MCF. For the five wells that were started in these two counties during the prior year and were in full production during FY 2010, the average production rate was 422,000 MCF. See Pennsylvania Department of Environmental Protection web site, "Oil and Gas Production Reports by County" [https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Production/ProductionByCounty.aspx]. These two counties were selected because the general thickness of the Marcellus Shale is approximately the same as in Otsego County. However, the depth to the shale is deeper in Tioga and Potter than in Otsego, which should result in lower production experience in Otsego, all other variables held constant. See "Thickness of the Marcellus

- Decline rates of 70% for the first year and varying declines for succeeding years.
- A total productive life of 20 years[4] including one refracking in year 13.

This methodology is adequate to estimate the one source of revenue that towns, counties and school districts in the state of New York are now entitled to receive: ad valorem tax. Under NYS law, gas wells are not real estate and therefore pay no real estate taxes. However, the State has instituted an ad valorem tax on gas production. The State's Office of Real Property Services uses a formula to calculate the Unit of Production Value (UPV) for each active gas well.[5] This UPV is multiplied by the annual production from the previous year (as reported by the driller) to arrive at a value of the well. Then the local assessor applies the equalization rate and the mil rate to arrive at the amount of tax due. It is fairly straight forward to take the Penn State calculator, the UPV, and local assessor's data to determine the amount of tax to be collected from the gas producer.[6]

For an example: if a well in its first day produced 4 MM CF, then it produced 438,000 MCF over the first year.[7] The Unit of Production Value issued by NYS ORPS has not yet been determined for Marcellus Shale due to lack of historical data but is set at $9.80 per thousand cubic feet (MCF) for all unspecified formations which would include the Marcellus formation.[8] The resulting value for the well is $4,292,000. If the equalization rate is 0.50 (assessed value = 50% of full market value), then the taxable value of the well is $2,146,000. If the town's tax rate is

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Shale in PA in feet," Matthew Kelso, Data Manager, Center for Healthy Environments and Communities, University of Pittsburgh Graduate School of Public Health, February 17, 2011. http://data.fractracker.org/cbi/snapshot/page?concept=~014f5fdd5ca34911e093dffc6b80437eef

[4] "Insiders Sound an Alarm Amid Natural Gas Rush," Ian Urbino, The New York Times, June 26, 2011: "Our engineers here project these wells out to 20-30 years of production and in my mind that has yet to be proven as viable," wrote a geologist at Chesapeake in a March 17 [2011] e-mail to a federal energy analyst. "In fact I'm quite skeptical of it myself when you see the % decline in the first year of production."

[5] See New York State Office of Real Property Services, State Valuation Services, "Overview Manual for Valuation and Assessment of Oil and Gas Producing Property in New York State," January, 2010.

[6] In New York State, the ad valorem tax is payable by the owner of the gas and not by the owner of the property from which the gas is taken.

[7] According to the Penn State Royalty Calculator, decline rates in the Barnett Shale, Texas were 70% during the first year. We used this same decline curve for Otsego County. Penn State is now in the process of analyzing historical data to determine if adjustments should be made to this decline curve for use in Pennsylvania.

[8] New York State, Department of Taxation and Finance, Office of Real Property Tax Services, Certificate of Final Oil and Gas Unit of Production Values, April 1, 2011.

$43/$1000, then the ad valorem tax payable would be $92,300. A very nice check to be received by the town. Of course, it must be shared with the county, the school district, the fire district, and the public library. But all in all, it's a nice pay day to help with the cost of running government.

Since current technology allows multiple wells at a well pad, we also assumed that there would be six wells drilled on a pad. So we multiplied the ad valorem income by six: $554,000 per year payable to the local tax collector for distributing to the various governmental units. An even better pay day!

II. The Loss of Real Property Taxes

Otsego County has a stable economy that is grounded in tourism, sustainable agriculture, second homes, medicine, retail, education, light manufacturing, and retirement housing. Business tends to be light industry or white collar and the services that support all these activities. Given this profile, gas drilling seems incompatible with the current economy of the county. That is, what is good for drilling is probably not good for most existing businesses.

With the arrival of drilling rigs, many people will choose to leave the area, putting their homes on the market. Some businesses that depend on tourism will be forced to close or relocate as tourists select other vacation spots. The rate at which newcomers arrive will slow down or come to an abrupt halt (except for temporary gas employees). Mortgage lenders will shy away from providing capital to buyers of homes near gas wells. Current residents, when given the choice of locating near a well or far away, are likely to choose the second option (consider the effects of truck traffic and 24-hour noise from a compressor station).

For Otsego County, an area that is economically based on tourism and certain occupations that are not compatible with the heavy industry of gas drilling[9], the value of property near an active

[9] Over 275 businesses in Otsego County have joined together to support a statement opposing natural gas drilling. These companies include breweries, dairies, doctors, medical societies, conventional farms, organic farms, lawyers, manufacturers of many kinds, restaurants, cattle raising operations, management companies, hotels, architects, artists, historic associations, historic sites, alpaca ranches, museums, landscape firms, engineers, musicians, cheeseries, wineries, B&Bs, inns, rental property owners, real estate agents, nurses, antique stores, baseball interests, and others. Source: Larry Bennett, VP, Brewery Ommegang, email dated June 29, 2011.

well will decrease.[10] For this analysis, we assumed that any property located within a one-mile radius of a drilling pad will be severely affected with value declining by 50%. Property located between one and two miles from the well pad will also be affected, so we estimated 25% decline in value in this location. And property between two and three miles will have losses as well (12.5%).[11] The analysis ignores the impact on properties beyond three miles.[12]

We took a sample Otsego County town (Worcester) and determined its average assessed property value per square mile and then assumed that a well was placed right in the middle of this "average" town. From there it was simple to calculate the lost real estate tax revenue for the town.

If the town has an average assessed value of $1,800,000 per square mile, the one mile circle around the well contains about three square miles of land valued (in aggregate) at $5,400,000. If the loss in value is 50% in this area, then the taxable value will decline to $2,700,000. In Worcester, the mil rate is about $43 per thousand so the resulting loss in collected tax will be $116,000 -- a bearable loss when compared to the ad valorem tax of $554,000 collected from the wells. But we must also reflect reduced real estate taxes in the secondary and tertiary circles which amount to about $460,000.[13]

Although the ad valorem taxes collected for this first year of production ($554,000) significantly exceed the expected loss of real property taxes ($460,000, the decline in real estate values will

[10] One important factor supporting this statement is that many mortgage lenders will not make loans on property that is either subject to a gas lease or near a property that is a potential well drilling location. According to Greg May, Vice President of Tompkins Trust Company ("Gas and Oil Leases Impact on Residential Lending," March 24, 2011), Wells Fargo, First Place Bank, Bank of America, Provident Funding, Fidelity Bank, FHA, and other lenders will not make such loans. The lack of mortgage financing alone will drive down property values.

[11] These losses in value are consistent with a study done in 2006 for residential land in the area around Glenwood, Colorado. Garfield County Land Values and Solutions Study, BBC Consultants.

[12] Since gas drilling involves transmission pipe lines, compressor stations, truck traffic, and other ancillary activities al of which are not necessarily compatible with residential property, it is likely that real property value reductions will be much wider than this three mile area.

[13] The area in the second ring is the difference between the area of a circle with a radius of two miles and the area of the circle with a one mile radius: 12.56 sq. mi. less 3.14 sq. mi. = 9.42 sq. mi. A taxable value of $1.8 million per square mile produces a value in this two mile ring of $17 million. A 25% loss in this value equates to a $4.2 million loss. The real property tax revenue from this loss in value (at $43 per thousand of taxable value) will be $182,000. The same process is applied to the third ring between two miles and three miles from the well. This third ring has an area of 15.7 square miles. At a 12.5% value reduction, the loss in tax revenue will be $160.000. The sum of the losses from the three concentric circles will be $458,000.

probably occur well before the lagging payment of the ad valorem tax is received, creating a short term problem for the town.

However, in the second year, the ad valorem tax will have diminished by about 25% due to the rapid production decline profile of shale gas wells, while the loss in real estate taxes will not have recovered and in fact may have become worse. Second year revenue from the ad valorem tax falls short of replacing the decline in real property taxes.

As the well loses productivity, this trend will continue with the possible exception of year 14 (when a refracking might have occurred).

Eventually, those people who are directly or indirectly employed by the gas industry will begin to support housing prices. And those who don't mind locating in a town filled to capacity with drilling rigs will buy property. We have therefore forecast that property values recover after year 11 by 10% per year until fully recovered in year 21. Whether or not housing prices fully recover will be determined by the differing values placed on shelter by the new buyers that replace the former home owners.

III. Comparing New Tax Revenue from Gas Production with the Loss of Real Property Taxes

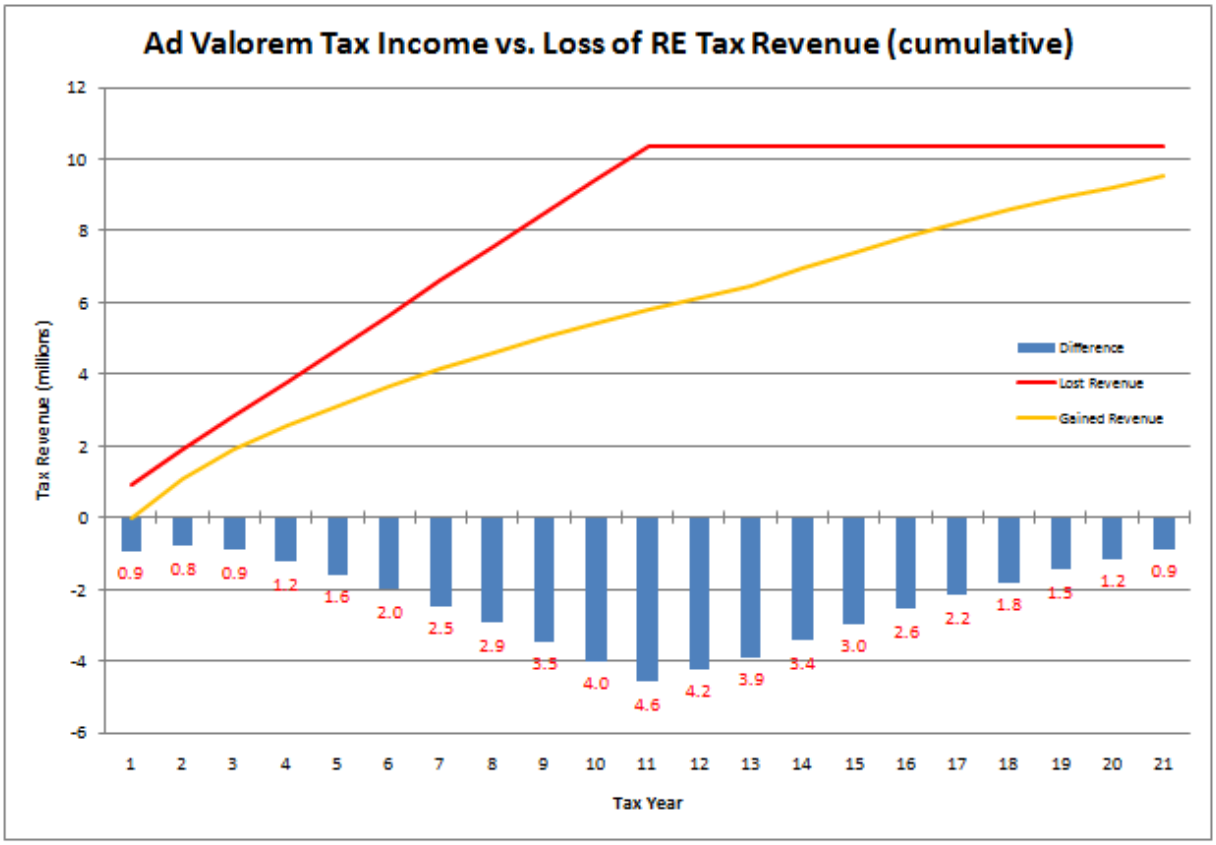
Worcester has a land area of about 28,000 acres (or about 44 square miles).[14] About 1,300 acres are now leased for drilling. The town's population of about 2200 has an older median age (41) than the average for NYS (36) while its median household income ($40,000) falls below the NYS average ($55,000) for 2009. Its taxable assessed value is $82 million throughout the entire town, and this figure creates an equalization rate of 57.5%. The average tax rate is about $43.71 per thousand of full value (there are multiple school districts, fire districts, libraries, each having somewhat different mil rates).[15]

Our chart forecasts the ad valorem income for 21 years (including a first year when there are no tax receipts from gas production) using the PSU model multiplied by 6. We then estimated an

[14] All demographic information about towns is from Wikipedia.

[15] All tax information is from Otsego County, Office of Real Property Services web site which publishes 2011 tentative assessments and equalization rates. Tax rates are 2011 for county and towns and 2010 for school districts and libraries. The assumptions in the previous example were based upon the actual information from Worcester but have been rounded to make it easier to follow.

11 year reduction in property taxes followed by a gradual recovery by calculating the average loss in taxable property values in each of the three one-mile concentric rings surrounding our imaginary well pad. The yellow line in the graph below represents the cumulative income from the ad valorem tax while the red line represents the cumulative loss of real estate taxes. For all time periods, the net cumulative impact of gas drilling is negative, as represented by the blue bars at the bottom of the graph.



Observations

Clearly the income from ad valorem taxes is a gain for the town. However, the losses in property taxes due to declining market values more than offset this gain. From this one well pad (albeit with 6 wells), the town will lose about $1,800,000 over the 20 year period (assuming no change in the tax rate). Most of this loss comes in the early years. This deficit must be

covered by either increasing the tax rate[16] (which will further exacerbate the decline in housing values and start a downward spiral in real property tax receipts) or by cutting the cost of public services. Since the most significant costs in governmental spending are for schools and roads, any cuts in these areas will have another indirect negative impact on housing values and once again result in a downward spiral.

Only if and when the real estate market recovers does the situation improve for the town,[17] and it is quite possible that the recovery will not be as rosy as we forecast, depending on whether or not the new buyers are willing to pay as much for shelter as the former residents.

What if the reduction in property values is not as severe as we forecast? The ad valorem tax revenue we estimate to be about $342,000 per year on average over the first 10 years of the productive life of these wells, and the current receipts from real estate taxes in Worcester are about $3,600,000. A town-wide reduction in property values of less than 10% will mean that more property taxes are lost than ad valorem taxes are gained.

What happens if more than one well pad is developed in Worcester? The town has about 42 square miles and spacing units for the Marcellus are one square mile each. Theoretically, the town can have as many as 42 well pads just like the one we have modeled. What did not work for one sample well will not work for 42 wells using the same parameters. The problem for the town will actually be worse: every property would likely be within one mile of a well pad and therefore all property in town would suffer severe valuation losses. The initial year would look bad and then subsequent years would get worse. The spiral effect would kick in and the town would be transformed into a company town.

This graph is a stark warning signal for the town of Worcester.

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[16] When the tax rate increases, the ad valorem tax from the gas production will also increase, resulting in the gas producer bearing a proportionate share of the deficit problem. The amount of this sharing will be directly related to the value of the gas well in comparison to the total value of taxable property in the municipality. As the value of the well decreases year to year due to the expected decline curve in volume of gas produced, this ameliorating effect will diminish.

[17] Susan Christopherson, professor in the Department of City and Regional Planning of Cornell University has said, "… after fracking, there is no other industry. That will be all there is economically for the next ten to twenty years. Forget about agriculture, tourism, wine, tourism, and anything else besides energy. After a decade or two, or more, things might return to normal..." Source: A webinar hosted by Cornell University's Community and Regional Development Institute (CaRDI) on May 9, 2011.

Other Communities

Is the case of Worcester unusual? What might be expected in other towns in the county?

We ran the numbers for each of the other 23 towns in the county and the City of Oneonta. The gas production remained as estimated for Worcester while the property values and tax rates were adjusted for each community. For 18 of the 24 towns and the City of Oneonta, the loss of real estate taxes exceeded the aggregate income from ad valorem taxes during the first 11 years. Taking the county as a whole, the net loss would exceed $133 million during the first 11 years (an annual loss of $12 million).[18]

This impact is concentrated in Oneonta (both the town and the city). But if the impact in Oneonta is ignored, the annual loss for the rest of the county would be $3.7 million with an aggregate loss during the first 11 years of $41 million. If gas drilling results in a reduction in real property values of 5% or more over the entire county (excluding Oneonta), then annual losses will exceed the gains from the ad valorem taxes collected. The warning signs that appeared in the Worcester analysis exist for the rest of the county. The drain on the local treasuries due to gas drilling is significant and long-lasting and it is worse in towns with higher property values per square mile.

These stark financial expectations are before accounting for the other public costs that will be experienced with gas drilling.

[18] Assuming that each town has one well pad with six wells aggregating 150 wells in the entire county (138 wells when the city and town of Oneonta are excluded).

Projected Gain (Loss) by Town[19]

Town	Net Total Revenue Yrs 1-11	Net Total Revenue Yrs 1-21	Average Annual Net Revenue Yrs 1-11	Average Annual Net Revenue Yrs 1-21
Worcester	(1,842,698)	(1,815,594)	(167,518)	(86,457)
Burlington	575,929	1,484,565	52,357	70,694
Butternuts	(685,012)	(223,662)	(62,274)	(10,651)
Cherry Valley	(2,935,920)	(1,745,202)	(266,902)	(83,105)
Decatur	1,337,968	2,718,735	121,633	129,464
Edmeston	(466,227)	36,162	(42,384)	1,722
Exeter	274,771	1,084,614	24,979	51,648
Hartwick	(4,772,009)	(6,149,134)	(433,819)	(292,816)
Laurens	(2,043,459)	(2,012,044)	(185,769)	(95,812)
Maryland	(758,747)	(361,184)	(68,977)	(17,199)
Milford	(3,093,128)	(3,750,695)	(281,193)	(178,605)
Middlefield	(2,372,907)	(2,986,505)	(215,719)	(142,215)
Morris	(1,146,603)	(860,303)	(104,237)	(40,967)
New Lisbon	(51,433)	590,807	(4,676)	28,134
Oneonta	(31,328,771)	(42,943,481)	(2,848,070)	(2,044,928)
City	(61,374,390)	(85,511,199)	(5,579,490)	(4,071,962)
Otego	(3,624,440)	(4,367,678)	(329,495)	(207,985)
Otsego	(10,408,292)	(14,248,208)	(946,208)	(678,486)
Pittsfield	194,195	977,671	17,654	46,556
Plainfield	127,960	822,914	11,633	39,186
Richfield	(4,220,621)	(5,214,430)	(383,693)	(248,306)
Roseboom	738,899	1,767,035	67,173	84,145
Springfield	(3,835,785)	(4,553,789)	(348,708)	(216,847)
Unadilla	(2,227,044)	(2,392,608)	(202,459)	(113,934)
Westford	292,819	1,134,053	26,620	54,003
Otsego County	(133,644,945)	(168,519,160)	(12,149,540)	(8,024,722)
Ostego County w/o Oneonta	(40,941,784)	(40,064,480)	(3,721,980)	(1,907,832)

Averages used where more than one taxing district in a town.

Sources: Otsego County Office Real Property Services web page
Wikipedia for land area and population (2000)

Some Caveats

- Our estimated initial production from the typical gas well is generous. Otsego County is at the northern edge of the Marcellus play. Bonus payments to landowners executing leases have been a fraction of the payments reported farther south. We believe that drillers are estimating much lower production for this area.

[19] The model developed here highlights the net loss in tax revenue. In actual practice, towns, school districts, and the county must operate under balanced budgets and therefore will either raise mil rates or reduce expenditures to balance their budgets.

- Penn State based its model on researching actual experiences in the Barnett Shale play in Texas. Located at the northern edge of the Marcellus shale formation, Otsego County should experience lower initial production rates and may experience more dramatic decline rates.
- Estimates of the productive life of a well vary widely and are dependent on many factors. For this analysis, 20 years seemed a reasonable time frame to use that would give the benefit of doubt to the driller.
- For this paper, we assumed that property values will decline between 50% and 12.5% in concentric rings around a well pad with a maximum radius of three miles. We also looked at more general value declines and found that any decline above 5% would completely offset the gross gains from ad valorem tax income for the county as a whole.
- If several wells are drilled in the town, then these concentric rings will tend to overlap creating larger losses than have been estimated here.
- We did not attempt to distinguish property by type, condition, occupants, or other variables. Our data are gross averages. It may be true that industrial values will not decline at all while single-family values may decline more severely and for longer than 10 years.

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