Frackonomics 225: Oil Drilling Revenue in St Tammany Parish

An Estimate

C.E. Kirby

February 2015

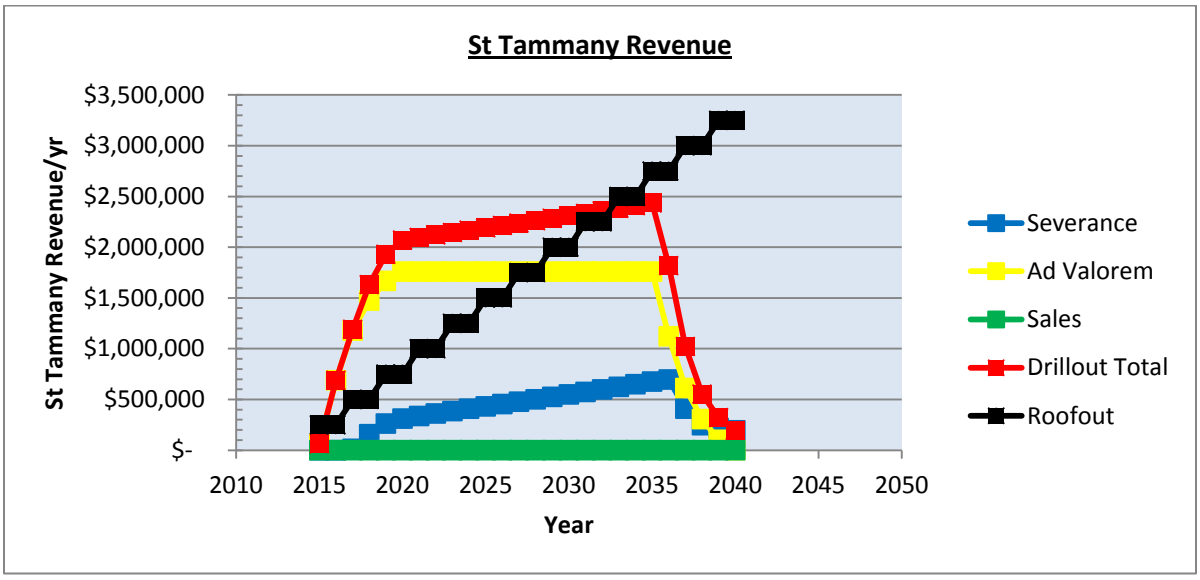
Summary

This report examines possible revenue to St Tammany from the initiation of oil and gas extraction. A single oil well model, called Well1, was developed using fracked well performance data from neighboring Tangipahoa, St Helena, and East Feliciana parishes.

Production from Well1 was projected to 20 years. These data, combined with the best available estimates for future oil prices, was used to generate an estimate of total revenue. All revenue data are current dollars and not adjusted for future value. Revenue distribution follows current tax and financial conventions. Total 20 year oil severance revenue estimated from Well1:

- St Tammany: less than $40,000
- State : about $150,000
- Landholder: about $1,700,000

Well1 was expanded to model a modest St Tammany "Drillout", assuming 10 new Well1s were added every year for 20 years, starting in 2016. Estimates of St Tammany increased ad valorem and sales taxes were also added. Revenue estimates from this scenario for 25 years are shown in the following chart:



Total revenue would be:

- St Tammany: about $46 million
- State: about $42 million (oil severance only)
- Landowners: about $606 million(royalties only)

St Tammany's 25 year revenue could alternatively be replaced by a "Roofout", shown in the above chart. Unlike the oil related revenue, this would continue to provide St Tammany significant income long after the wells are plugged and abandoned.

CEK 2/12/2015

Introduction

By any combination of metrics one can envision, St Tammany is the premier parish in the State of Louisiana in which to live.

To date this has been accomplished without having to rely on oil and gas extraction monies. The curse of St Tammany's geology is that it is not conducive to conventional oil and gas extraction and through the years this has forced St Tammany to utilize alternative development growth strategies. This geologic curse has turned out to be a blessing in disguise: by relying instead on suburban/light industrial/population growth, St Tammany's long term economic progress has been far superior to the oil patch parishes, without having to experience the negative environmental and quality of life issues associated with extensive oil and gas extraction activities.

However, with the advent of new well drilling technology ("hydraulic fracturing"), St Tammany is, once again, facing the prospect of becoming another oil patch parish. Several oil and gas companies have purchased lease options for drilling in St Tammany; Helis Oil and Gas has the first approved St Tammany drill permit from Louisiana DNR; and the Louisiana oil and gas lobby has loudly declared the Tuscaloosa Marine Shale's (TMS) oil deposits beneath St Tammany as the next big oil play in Louisiana.

Supporting this "drilling is good for St Tammany" position are the local business community organizations spokespersons, particularly Greater New Orleans, Inc (GNO), and the Northshore Business Council (NBC). In the NBC's October 2014 press release they declared their support for drilling in St Tammany, citing as the basis that:

"…oil and gas exploration is not only good for our local economy, but also our state and, ultimately, our nation."

GNO's written submission to the LA DNR Hearing on November 12, 2014 indicates: "The oil and gas industry supports over 300,000 jobs…Louisiana is leading America's energy boom…"

While these high level pronouncements may or may not be accurate, what is more important to the citizens, businesses, and elected officials of St Tammany is understanding exactly how oil and gas extraction will specifically impact St Tammany. On this the business organizations say nothing publically; they provide no specific data or analyses, perhaps thinking that the specific benefits to St Tammany from oil and gas extraction are so patently obvious that they need not be stated.

So what are these benefits?

Looking for the specific benefits that oil and gas extraction brings to the oil patch parish's population is a daunting task. Because, in spite of the enormous oil and gas value extracted from the ground over the past decades, relative to St Tammany these parishes have today:

- Lower jobs growth
- Lower household median income
- Significantly lower overall and children population growth
- Higher unemployment
- Lower educational achievement
- Higher poverty levels
- Higher mortality

Thus a data based examination of the oil patch Parishes as described in *Frackonomics 201, 211, or 221* shows that the trickle down benefits or positive impacts to the populace from decades of oil and gas extraction are difficult to identify. So what then could be the benefits to St Tammany from a similar, but more modest, oil and gas extraction activity? If decades of extensive oil and gas extraction monies in the oil patch parishes cannot improve their economic or quality of life such that they are top tier in the state of Louisiana, then what possible benefits could St Tammany's citizens see? Rather than blindly accept the vague pronouncements of the business and oil and gas organizations, let's examine the possible specific economic benefits, that is, the revenue, from oil drilling in St Tammany.

This will be accomplished as follows:

- Develop a hypothetical, "what if? " model of a single oil well, the first in St Tammany
- Expand this model to examine a possible St Tammany "Drillout"
- Examine the revenue streams in these scenarios

[Author's Note: To facilitate reading, an attempt was made to move the bulk of the technical and calculation detail to the Appendices and these are footnoted. However, some detail was retained in the body of the report where it was felt necessary for good comprehension]

Well1 Model Basis

How much oil and how long will an oil well in St Tammany parish produce? There are no wells in St Tammany to examine for comparison but there are producing, fracked wells of various ages in neighboring Tangipahoa, St Helena, and East Feliciana parishes[1] we can use for data since these are tapping the same TMS that exists below St Tammany. For those that are interested, Appendix 1 covers in detail the basis and assumptions used to develop a model of these wells, called Well1, shown in Figure 1 below:

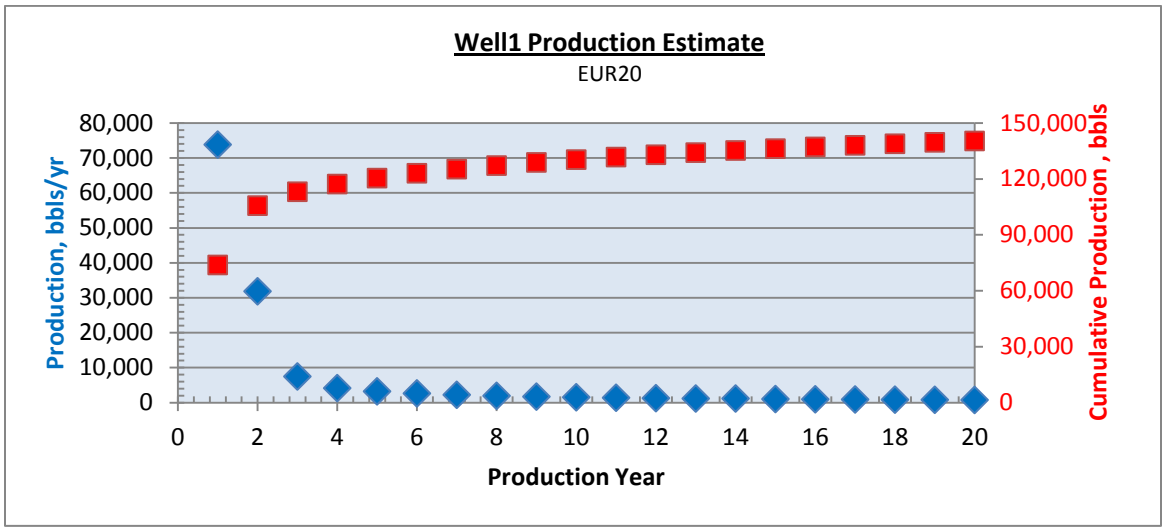
Briefly, the data used for Well1were as follows:

- Early ($\leq$ 37 month) TMS well data provided production decline rates and range of estimated ultimate production or EUR (the total amount of oil a well produces).
- From these Well1's EUR20 was assumed to be 140,000 bbls; initial production (IP) was assumed at 16,000 bbls/month1.

[1] See Appendix 1 for a complete listing of these wells

A curve was manually fitted between these beginning and end points (36 months and 240 months) as shown in Figure 1:

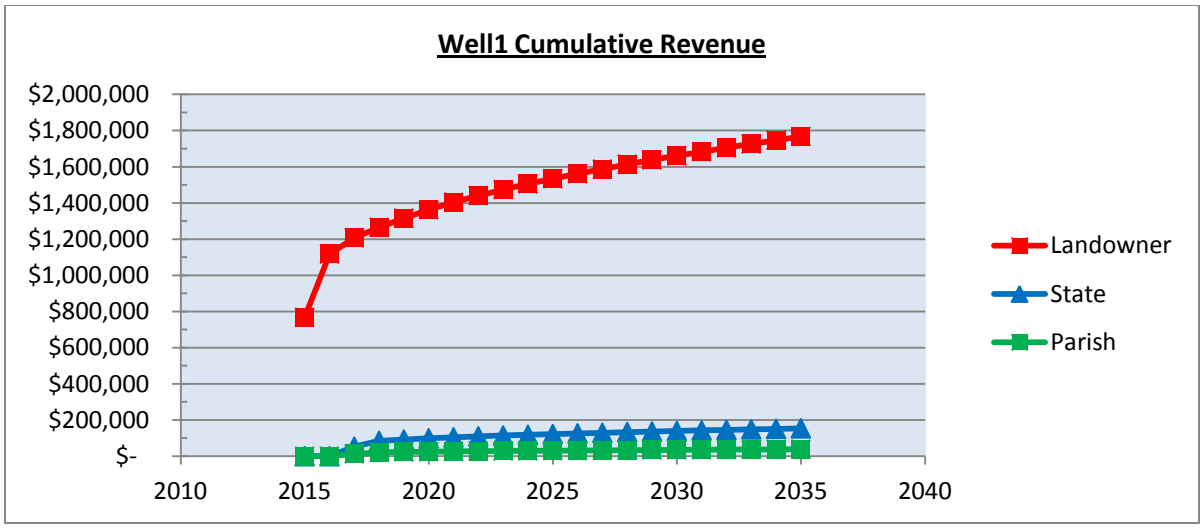
Figure 1



Well1 Revenue

Figure 2 shows the estimated cumulative oil revenue[2] for the Landowner, State and St Tammany from a single Well1, assuming it is/was drilled January 1, 2015 and it is productive for 20 years. To keep the discussion straightforward note that all revenue discussed hereafter will be in current dollars; no present value adjustments were made to compensate for devaluation of money over time.

Figure 2



[2] See Appendix 2 for oil price assumptions

Note that from Well1 cumulative revenue[3] for 20 years is:

- St Tammany Parish : $38,000
- The State: $155,000
- The Landowner: $1,700,000
- The Oil Company (net severance and royalties): $8,300,000 (not shown)

Likely is that St Tammany has already spent more in personnel time, meetings, and preparations[4] than their estimated 20 year oil severance income from Well1.

The Oil Company does receive the lion's share of the well's revenue, in the case of Well1 about $8.3 million after severance and royalties. But from this it must pay expenses and try to manage a profit. A deep, fracking well's drilling and completion (D&C) costs alone are significant, reported to be in the $5 million to $10 million range. Additional costs could include loan interest, production and transportation costs, additional fracking costs, taxes, insurance, lease costs, well services subcontractor costs, and other miscellaneous costs.

Also, note that even doubling of the oil prices used in this estimate only doubles the estimated St Tammany revenue (to about $76,000) and, in the absolute, this still remains a rather small amount. Thus the magnitude of St Tammany's revenue from Well1 is not an artifact of the current (about $50.00/bbl) oil price.

Well1 Revenue Alternatives

For perspective, consider the following Well1 alternative revenue scenarios:

- Addition: The addition of 1 new, modest single family home will generate more revenue to St Tammany parish in property tax in 20 years (20yr X $2,500/yr= $50,000) than Well1's oil severance taxes ($38,000). And that single home will still be generating revenue for St Tammany decades after the well is capped, abandoned, and no longer a revenue stream for St Tammany parish.

- Subtraction: The out migration of 1 St Tammany household living in a modest single family home due to proximity to Well1 will cause the loss of more income to St Tammany than it will gain from the Well1's oil severance taxes.

St Tammany Drillout

The above analysis shows that the incremental oil income to St Tammany from Well1 is not significant at all, certainly in comparison to a Parish with a 2013 $116+ Million revenue[5].

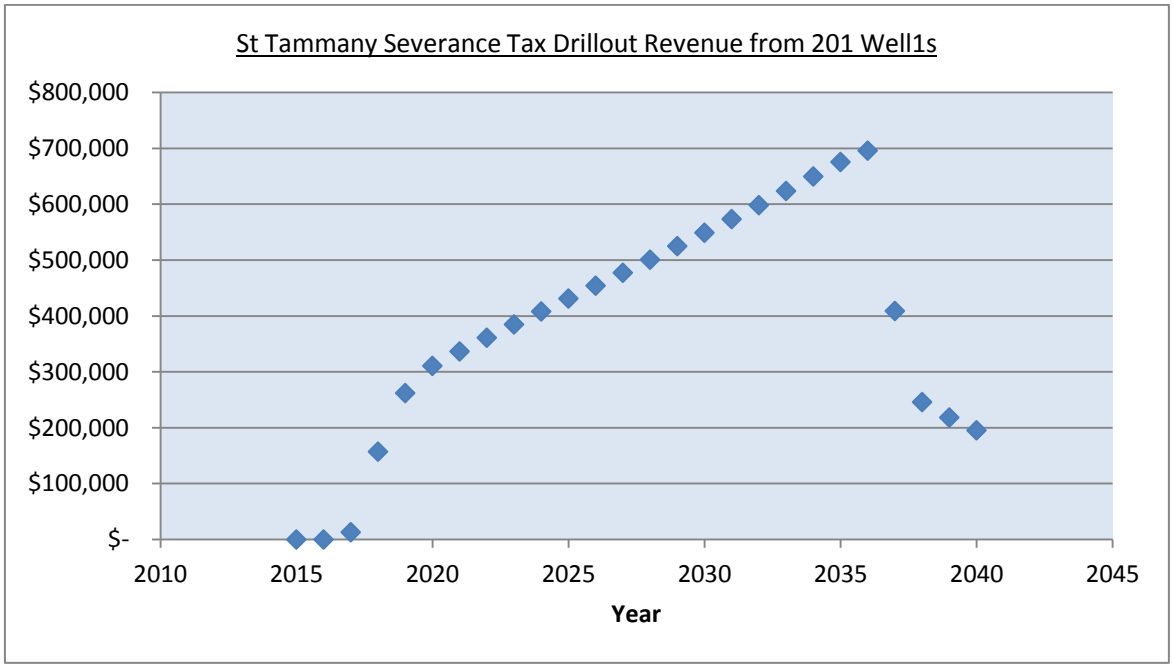
[3] See Appendix 3 for data
[4] See Louisiana DNR Hearings, Nov 12, 2014, Written Statements, Nov 12, 2014, P. Brister, page 630
[5] See St Tammany Parish 2013 Annual Report

But drilling the TMS in St Tammany isn't about 1 well. The oil and gas industry's vision for the TMS, including St Tammany, is a "Drillout" where wells are being brought on line about as fast as they can be drilled. Let's therefore estimate Drillout revenue using multiples of Well1 per the following scenario:

- In January 2015 Well1 is drilled and performs as shown in table 1 for 2015. Other wells follow.
- In January every year thereafter until 2035 10 new Well1s come on line, totaling 201 wells in 2035
- 100% of the wells are represented by Well1: they are all average: no dry holes or gushers.
- From 2036 to 2040 no new wells are added; revenue from existing wells declines per production decline

Figure 3 below shows the estimated Drillout revenue to St Tammany Revenue from this scenario in $/yr:

Figure 3



Other data from this 25 year Drillout scenario[6]:

- The Oil Companies would receive about $2,600,000,000 in total, net of royalties and severance but including all other expenses.
- The Landholders would receive about $610,000,000 in total royalties
- The State would receive about $42,000,000 in oil severance
- St Tammany would receive about $10,600,000 in oil severance

Again, all amounts are 2015 dollars.

[6] See Appendix 4 for data table

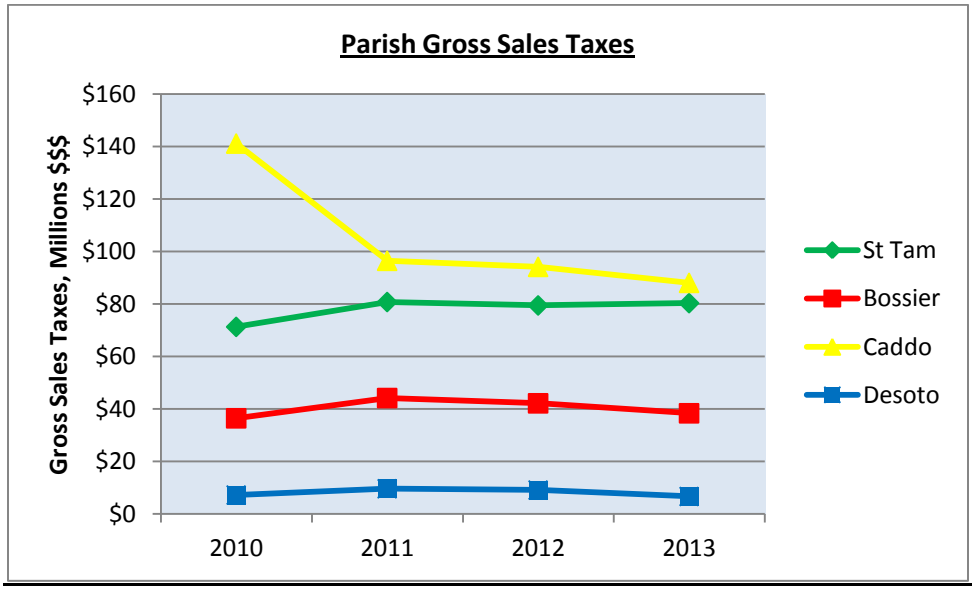
One can see the motivation for the Landowners to eagerly support unbridled "property rights" and fracking.

Other St Tammany Revenue

Both incremental sales taxes and ad valorem taxes associated with a Drillout may provide some additional revenue to St Tammany. Let's examine these.

Incremental Sales Taxes: To better understand the possible impact a Drillout could have on St Tammany's sales tax revenue let's look at several oil patch parishes that experienced the Haynesville Shale natural gas frenzy from 2009 to 2012. An examination of the changes in their sales tax revenue[7] will provide an estimate of the possible benefit to St Tammany's (more modest) Drillout. Figure 4 shows the gross sales tax receipts for Bossier, Caddo and Desoto parishes. In spite of adding about 2,500 wells from 2010 to 2013[8], while the Haynesville shale natural gas activity was going full blast, Bossier, Caddo and Desoto parish sales taxes changed +5.3%, -37.6%, -7.6% respectively while St Tammany's reported sales taxes increased +12.7%.

Figure 4



Based on these data it is difficult to make a case that adding 2,500 wells had a significant sales tax impact in the oil patch parishes over these 4 years. So it is therefore unlikely that St Tammany will experience any measurable incremental sales tax revenue due to adding 201 Well1s over 20 years.

Ad ValoremTaxes : Improvements to land that raise the value are taxable by a Parish, and that includes oil and gas drilling site "improvements". State tax laws as to what constitutes improvements and how to value those as they depreciate are very complex. Additionally, Oil Companies are constantly looking for

[7] Louisiana Department of Revenue, Annual Tax Collection Reports, "Sales and Use taxes" tables
[8] Sonris Lite, Wells by Parish

ways to minimize these taxes, such as using "roll on" equipment to avoid being classified as an "improvement". Thus an accurate treatment of this revenue stream is beyond the scope of this report. But to get some order of magnitude estimate of the possible ad valorem tax revenue from Well1, let's assume the following:

- The taxable improvements in year 1 for Well1 totals 33% of a well cost of $7.5Million
- Taxable Improvements Value = $2,500,000
- Assessed Value = 15% of Value = $375,000[9]
- St Tammany millage[10] = 170

Assuming[11] straight line depreciation and a 5 year life, total ad valorem taxes could total about $176,000 over these 5 years….much greater than the 20 year oil revenue of about $38,000.

This suggests the ad valorem revenue from Well1 is larger and not inconsequential relative to the estimated severance tax revenue.

Drillout Severance and Ad Valorem Revenue for St Tammany

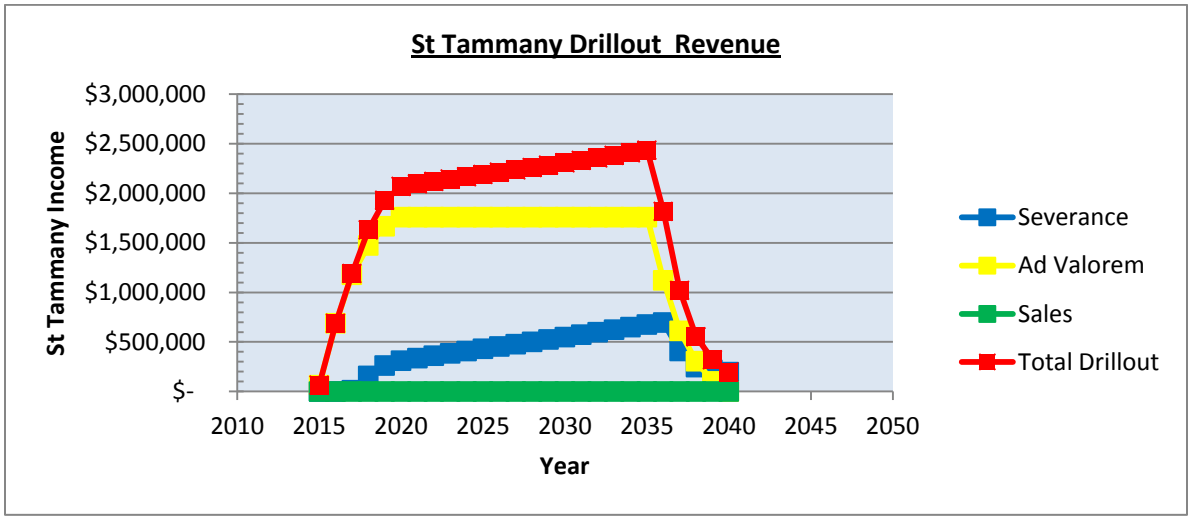
Figure 5[12] shows the estimated 25 year St Tammany combined Total revenue for a 201 Well1 "drillout" shown in Figure 3, adding severance, ad valorem, and sales tax. This suggests Drillout revenue to St Tammany to be:

- Peak total revenue about $2.0 to $2.5 Million/yr starting about 2021
- Ad valorem, not oil severance, is the largest revenue stream
- Revenue will decline rapidly past 2035 as well production declines and assets fully depreciate
- Total Drillout St Tammany revenue from 2015 through 2040 is about $46 Milllion

Again, these data are all 2015 dollars.

[9] This number is reasonable: the average assessed value of each oil and gas rig in Tangipahoa, St Helena, and East Feliciana in 2013 was $352, 988 (n = 33), Table 39, Louisiana Tax Commission Annual Report, 2013
[10] ibid
[11] Additional data in Appendix 2
[12] Data in Appendix 5

Figure 5



Note this assumes a 20 year well life; this not assured for fracked wells, as discussed in Appendix 1, in the "EUR20" subsection.

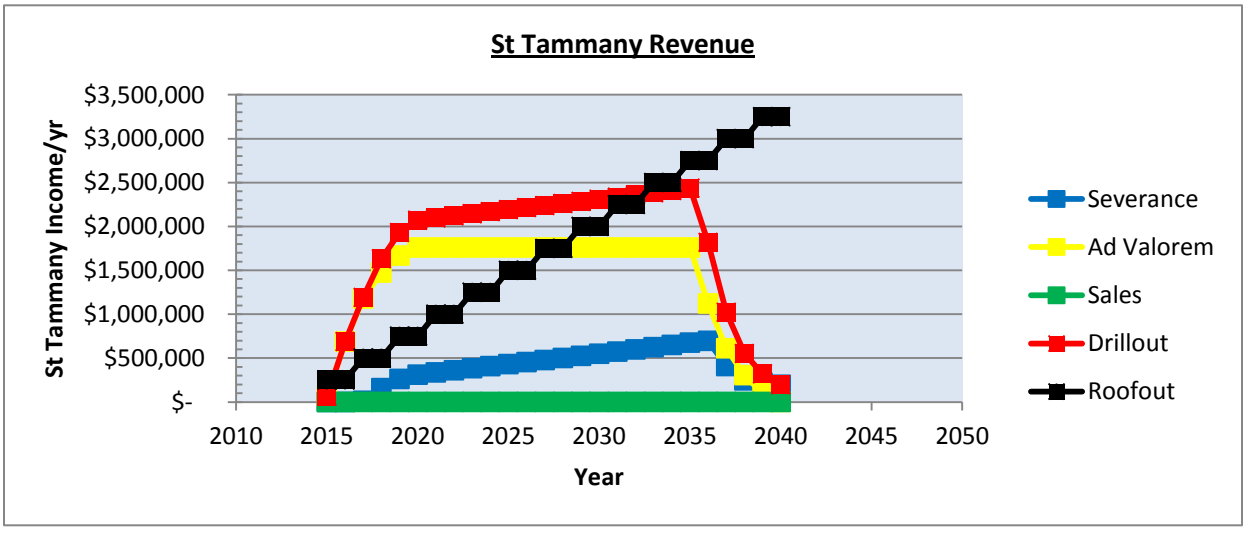
Drillout Revenue Alternatives

Let's reexamine the concept discussed above where the oil revenue from Well1 was equivalent to the ad valorem taxes from one modest home over 20 years. Applying this same concept to the Drillout shown in Figure 3, this same $46 Million could also be obtained by St Tammany from a modest "Roofout" as follows:

- Add 100 incremental modest, new homes every other year through 2040
- Each home pays St Tammany about $2,500 in ad valorem taxes

Adding this "Roofout" revenue stream to Figure 5 we see in Figure 6:

Figure 6



Note that the when the oil wells are capped and abandoned, the revenue equivalent homes will still be in place generating over $3,000,000/yr in revenue to St Tammany. Unlike the Drillout wells, the homes legacy will be a steady income stream for St Tammany with no long term environmental, water supply[13], social, health and safety, or quality of life risks, costs or consequences.

Doubtless there are other revenue options.

What are St Tammany Costs ?

A big word of caution: this analysis has focused entirely on possible St Tammany revenue for two scenarios: from 1 oil well and 201 oil wells and has purposefully omitted discussion of any costs. A complete cost/benefit analysis would follow the general form :

Net Benefits = (Short + Long Term Benefits) – (Short + Long term Costs)

And make no mistake: the costs for oil and gas extraction can be significant and significantly higher than the revenue. However, to do justice to Costs in this report would require much additional verbiage and so this will be reserved for another time. Appendix 6 has a brief list of costs and peer reviewed references for those interested in exploring this area. The author apologizes for leaving this task but half discussed but hopes this will create anticipation for the next report in this series.

Conclusions and Recommendations

This analysis examines possible revenue streams from the initiation of oil and gas extraction in St Tammany Parish. From this analysis it can be concluded:

For One Well:

1. St Tammany will receive very little in revenue from one well over 20 years.
2. St Tammany's one well revenue for 20 years will be lower than the ad valorem taxes for one modest new home over this same period.
3. The Landholder's one well 20 year revenue will be about 45X St Tammany's revenue

For a 201Well Drillout:

4. A 201 well Drillout as described herein could provide St Tammany with about $46million in revenue over 25 years, assuming an average well EUR20 of about 140,000 bbls
5. Ad valorem taxes, not oil severance, could be the largest revenue stream

[13] See Jackson, "The Integrity of Oil and Gas Wells, Proceedings of the National Academy of Sciences, at www.pnas.org/cgi/doi/10.1073/pnas.1410786111

6. The Landholder's income could be in excess of $600,000,000
7. St Tammany's'25 year revenue could be surpassed by the ad valorem revenue from an incremental about 1,300 new homes and would provide significant revenue after the oil wells are capped and abandoned

TMS Well Productivity(from Appendix 1):

8. Early TMS well performance data in neighboring parishes shows lower than desired performance and suggests the longevity of TMS wells may be lower than 20 years.

Recommendations:

1. It is recommended that St Tammany elected officials and civic leaders conduct their due diligence regarding the expected revenue from oil and gas extraction and not rely solely on talking points from industry advocates or business organization spokespersons.
2. There are alternatives to revenue from oil and gas extraction that, in the long term, could provide St Tammany with larger and more stable income streams. St Tammany's elected officials should, in their quest to protect the health, safety, and welfare of the citizens of St Tammany, fully evaluate these options.

C.E. Kirby 2/12/2015

About the Author: C.E. "Chuck" Kirby has a B.S. in Chemical Engineering from New Jersey Institute of Technology and 35 years of Research and Development work experience. He has been a resident of St Tammany parish since 2009 and retired in St Tammany for its natural beauty and its friendly people.

Previous Reports: *Frackonomics 201: St Tammany and the Wizard,* November 2014

Frackonomics 211: Children and the Wizard, December 2014

Frackonomics 221: *St Tammany as the Jobs Goose*, January 2015

Previously Shared: as Frackonomics 101: *Shale and Wall Street: Was the Decline in Natural Gas Prices Orchestrated ?* by Deborah Rodgers, February 2013

On the Cover: The image is a version of the famous Parker Brothers "Monopoly Man" used on the Monopoly board game, circa. 1935.

Appendix 1

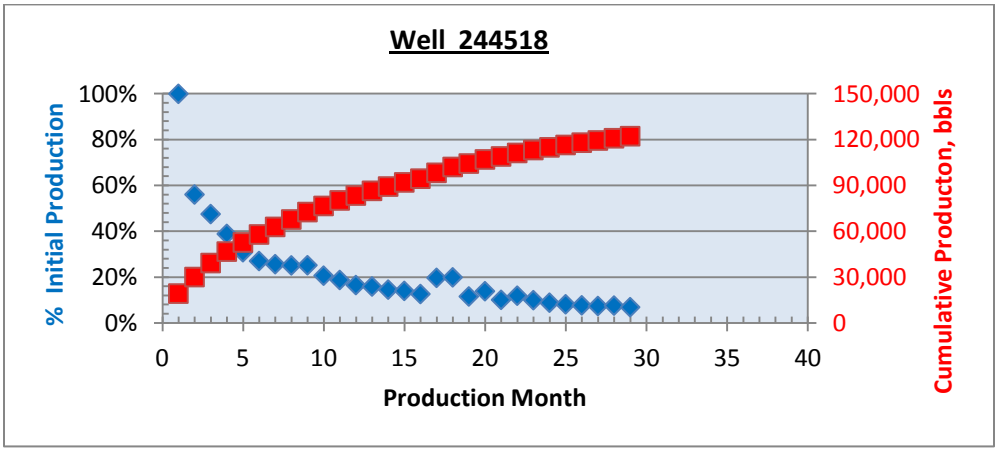
Model Data, Process, and Construction

Data: TMS well data

Well Number	Parish	Company	Initial Production, bbls	Months production,	% of IP at Months,	Cumulative production at Months, %	Estimated EUR20, bbls
243414	St Hele	Encana	18,036	36	3.72	99,586	124,000
244934	St Hele	Encana	19,394	21	15.5	129,577	156,000
243765	Tangi	Goodrich	3,995	33	11.0	34,776	45,000
244870	Tangi	Goodrich	14,592	26	10.4	92,948	113,000
247207	Tangi	Goodrich	23,811	8	32.0	104,805	181,000
244518	St Hele	Goodrich	19,289	29	6.93	122,279	151,000
245147	St Hele	Goodrich	8,372	21	10.1	47,389	61,000
243337	E. Felic	Goodrich	2,305	37	2.13	15,495	16,000
244122	E. Felic	Goodrich	8,563	31	14.9	78,708	106,000
TMS Avg			13,146				106,000
TMS Avg w/0 lows			16,008				127, 429
Well1			16,000 bbls/month1			assume	140,000 bbls

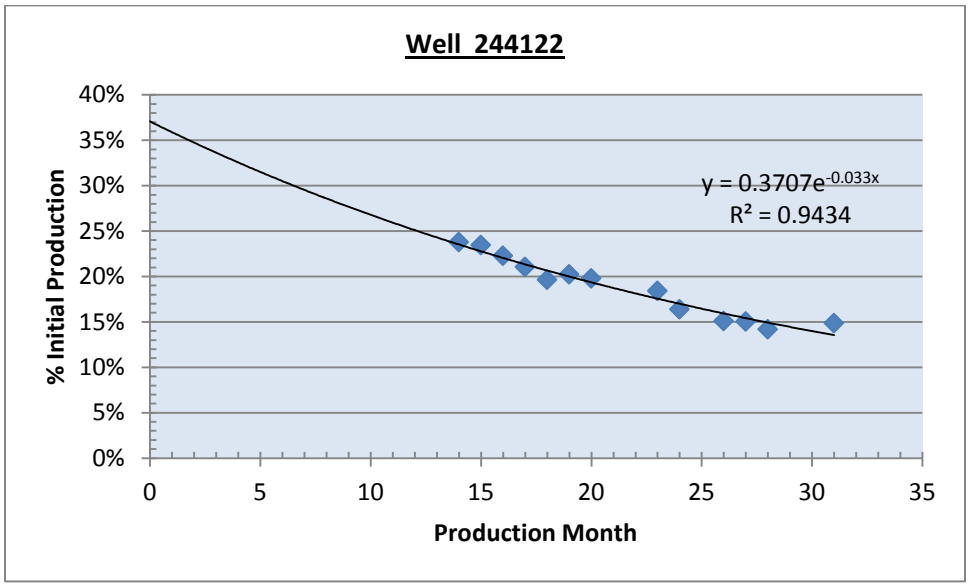
Notes: These fracked wells were selected for the maximum length of their fracked production life. All production data are from Sonris Lite, date of access: 1/15/2015: date of latest data: 11/1/2014.

Well production Curves: Production charts were constructed for each well, example below. The % IP (Initial Production- blue) is declining towards 0% as the well ages and produces less and less per month, causing the CP (CumulativeProduction- red) line to flatten out. These data can be mathematically extended years out and an estimate of the wells eventual ultimate production (EUR) can be calculated.



Appendix 1 (Continued)

For simplicity it was assumed that an exponential decay curve would fit all wells. The chart below shows an example exponential decay equation and "fit" of the trendline (black) curve used to predict EUR. Typically, outlier points were removed from the data to maximize fit. In most cases only the last 8-12 data points of a well's %IP were utilized, eliminating the early, steep decline data. The below graph shows all the data prior to month 14 were removed, as was data about month 21 and 29.

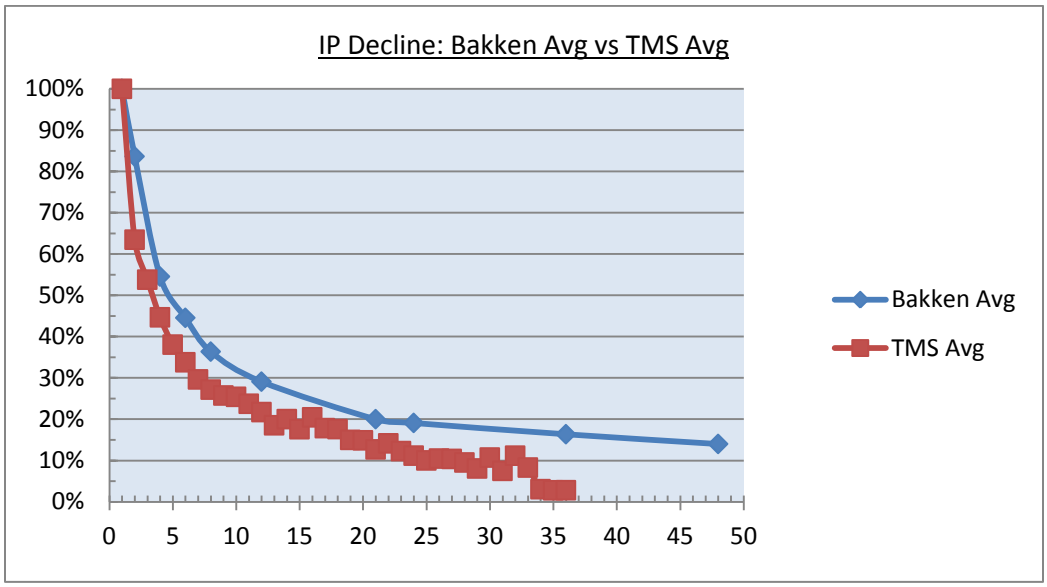


EUR20: Expected well life is a contentious issue for fracked wells due to their high early production rates and steep production decline. While it was assumed these hypothetical wells would produce for 20 years, in fact the long term production of fracked wells is currently a matter of much conjecture and speculation by oil industry professionals[14]. How long TMS fracked oil wells will produce or at what rate is uncharted territory and won't be truly understood for the TMS until there is good production. To make matters more complicated, well life is specific to the field, making the well life in older plas such as Eagle Ford TX, or the Bakken in ND, for example, not directly applicable to the TMS and its unique geology. Likely it will be years before we precisely know what TMS well life and average EURs could be. In the meantime much caution should be exercised in evaluating financial and economic data of TMS well life estimates and EURs…particularly those making investment grade decisions.

[14] See" Drilling Deeper, Part 2 Tight Oil", 2014, page 46, J David Hughes, Post Carbon Institute re: Bakken wells: "The lifespan of [fracked]wells… is conjectural at this point given the lack of long term well performance data.".

Appendix 1 Continued

The following chart of actual TMS well data shows the unusual decline in IP for the TMS vs the Bakken[15] in North Dakota:



The TMS Avg values plotted here are the 9 well average values. What is striking is the consistency of all the data to fall below the Bakken avg.

It is difficult to see how these TMS wells in particular will be productive at 120 months, let alone 240 months, with any sort of "normal" % IP decline with time. Even though the Bakken is not a perfect model for the TMS, this trend cannot be comforting for Oil Companies drilling the TMS today.

The larger implication for St Tammany is that individual well severance revenue may not last 20 years. However, the impact on these total revenue estimates would be minimal since the EUR was assumed. Totals would be as predicted, but the shape of the revenue curves would be different with an earlier expiration and all revenue "squeezed" into a shorter duration.

Early Production Adjustment: Cummulative Production on the model was adjusted in years 1 and 2 to insure a maximum of 75% of total production occurring in this 0% severance period.

Validation: Unlike vertical oil wells, there is little long term data on any fracked wells, including TMS wells, to validate predictive models. However, since the purpose of this report is "what if?" learning and not an investment grade decision, the precision required is less critical.

[15] Ibid, page 43

Appendix 1 (Continued)

Well1 Assumptions: Wells 243765 and 243337 were eliminated from the data pool (see above: TMS Well Data table) as being "too low" for a representative model for IP and EUR estimates. This raised the TMS average IP to about 16,000 bbls/month and the average estimated EUR20 to about 127,000 bbls. For modeling purposes a EUR20 of 140,000 bbls was chosen and 16,000 bbls as the IP. With these data and year 1 and 2 average production data the following curve was constructed:

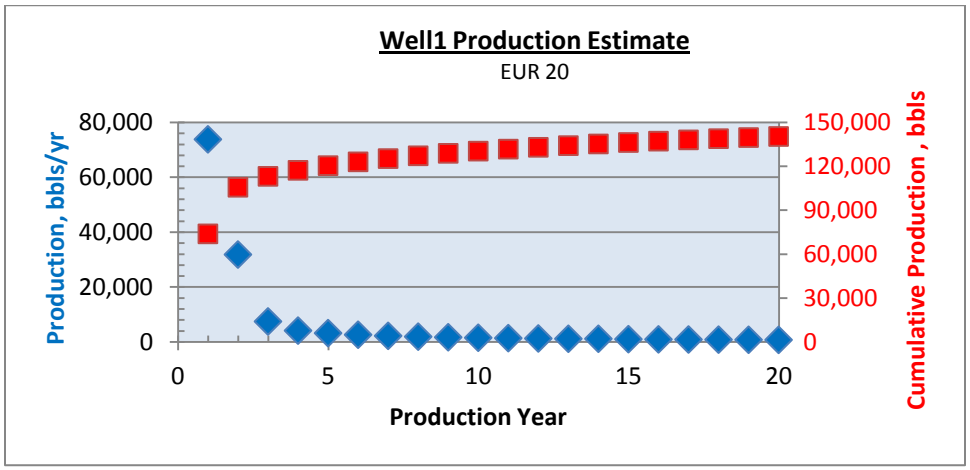


Chart data:

	Well1 year	bbls/yr	Cumm. Prod.
2015	1	73,803	73,803
2016	2	31,832	105,634
2017	3	7,453	113,087
2018	4	4,119	117,206
2019	5	3,195	120,401
2020	6	2,610	123,011
2021	7	2,207	125,218
2022	8	1,912	127,130
2023	9	1,686	128,816
2024	10	1,508	130,325
2025	11	1,365	131,689
2026	12	1,246	132,935
2027	13	1,146	134,081
2028	14	1,146	135,227
2029	15	988	136,215
2030	16	924	137,139
2031	17	868	138,006
2032	18	818	138,825
2033	19	774	139,599
2034	20	734	140,333

Appendix 2

Financial Assumptions

Oil Prices: With a 20 year oil flow estimated, gross revenue was estimated using the oil price data in Appendices 3 and 4. Sources for these estimates were based on :

- 2015, 2016: Jan 2015 EIA estimates were $55/bbl, $71/bbl
- World Bank Commodity Forecast Price data, January 2015

Avg. spot price (Brent, Dubai, WTI)

Nominal US Dollars									
Real 2010 US Dollars									
2013	2014	2015	2016	2017	2018	2019	2020	2025	
		2013	2014	2015	2016	2017	2018	2019	2020	2025
Nominal US Dollars		104.1	96.2	53.2	56.9	60.8	65.0	69.4	74.1	103.4
Real 2010 US Dollars		98.1	90.9	50.3	52.9	55.6	58.4	61.4	64.6	82.9

2026 –and beyond: price increases of 3.0%/yr were assumed

The inconsistency between these two data sources highlight the uncertainty in oil price expert guessing. The prices used in this report are higher than WB's for 2025 but lower than EIA's for 2015 and 2016.

While the oil prices are economically critical, within reason, they have little bearing on the broad learning.

Tax and Royalty Rates: State and St Tammany Severance taxes were calculated as follows:

- 0% severance tax for years 1 and 2
- At 25 months a rate of 12.5% was used until production declines to 10 bbls/day
- At 10 bbls/day severance lowers to 3.125% (stripper status)
- St Tammany receives 20% of the State Severance, capped at $2,850,000/yr

Royalty rates were assumed to be 20% of the wellhead value of all production, less a $10/bbl fee for transportation and handling.

Calculations were done on Excel by segregating the various pools of data (0% severance oil, 12.5% oil, 3.125% oil, royalties/ total oil.

Appendix 2 Continued

Financial Assumptions

Well Depreciation and Ad Valorem: As the oil well assets are depreciated St Tammany would receive less and less ad valorem taxes on each well. Simplistically assuming straight line depreciation, a 5 year life, and 0% floor, total Property Tax revenue for St Tammany from Well1 could look like the below table:

Year	Assessed Value Well1	Estimate of Well1 Ad Valorem
1	$375,000	$63,750
2	$300,000	$51,000
3	$180,000	$30,600
4	$120,000	$20,400
5	$60,000	$10,200
	total	$175,950

Other Assumptions :

- All current tax rates, rules, and conventions remain unchanged
- Current drilling technology remains in place with modest evolutionary changes
- No wells are dry holes or gushers
- All well performance is, on average, close to the IP and EUR20 assumptions
- And, one more time, all revenue is in 2015 dollars only

[Authors Note: Every attempt has been made to provide a transparent, reasonable, "what if ?" analysis using the best available data. However, the author makes no claims about special expertise in petroleum engineering, oil and gas accounting, or St Tammany Parish finances. And so if there are egregious errors in this report that would substantially alter the broad learnings within, the author welcomes constructive feedback on these matters at: kirby.da.ce@gmail.com.]

Appendix 3

Data for Figure 2:

Oil revenue from Well1

Well1 $/bbl	1 well year	Production	Oil Company	Landowner	State	Parish
$ 62	2015	73,803	$ 3,808,218	$ 767,548	$ -	$ -
$ 65	2016	31,832	$ 1,718,911	$ 350,148	$ -	$ -
$ 70	2017	7,453	$ 367,054	$ 89,435	$ 52,170	$ 13,043
$ 80	2018	4,119	$ 230,650	$ 57,662	$ 32,950	$ 8,237
$ 90	2019	3,195	$ 227,426	$ 51,116	$ 7,188	$ 1,797
$ 100	2020	2,610	$ 205,887	$ 46,985	$ 6,526	$ 1,631
$ 103	2021	2,207	$ 179,165	$ 41,050	$ 5,683	$ 1,421
$ 106	2022	1,912	$ 159,741	$ 36,740	$ 5,070	$ 1,268
$ 109	2023	1,686	$ 145,027	$ 33,481	$ 4,607	$ 1,152
$ 113	2024	1,508	$ 133,533	$ 30,939	$ 4,244	$ 1,061
$ 116	2025	1,365	$ 124,337	$ 28,909	$ 3,955	$ 989
$ 119	2026	1,246	$ 116,842	$ 27,258	$ 3,719	$ 930
$ 123	2027	1,146	$ 110,640	$ 25,896	$ 3,524	$ 881
$ 127	2028	1,146	$ 113,890	$ 26,742	$ 3,629	$ 907
$ 130	2029	988	$ 101,053	$ 23,801	$ 3,222	$ 806
$ 134	2030	924	$ 97,310	$ 22,988	$ 3,104	$ 776
$ 138	2031	868	$ 94,098	$ 22,293	$ 3,004	$ 751
$ 143	2032	818	$ 91,331	$ 21,698	$ 2,917	$ 729
$ 147	2033	774	$ 88,937	$ 21,187	$ 2,842	$ 710
$ 151	2034	734	$ 86,861	$ 20,747	$ 2,777	$ 694
$ 156	2035	700	$ 85,238	$ 20,412	$ 2,726	$ 682
		bbls	$$$	$$$	$$$	$$$
	totals	141,033	$ 8,286,149	$ 1,767,034	$ 153,857	$ 38,464

Appendix 4

Data for Figure 3: Drillout Oil Revenue Distribution by Year

Drillout $/bbl	year	Parish	State Net	Landowner	Oil Company
$ 62	2015	$ -	$ -	$ 767,548	$ 3,808,218
$ 65	2016	$ -	$ -	$ 8,468,443	$ 41,572,356
$ 70	2017	$ 13,043	$ 52,170	$ 12,765,558	$ 61,634,982
$ 80	2018	$ 157,295	$ 629,181	$ 15,889,876	$ 74,122,940
$ 90	2019	$ 262,159	$ 1,048,635	$ 18,804,074	$ 85,658,047
$ 100	2020	$ 310,889	$ 1,243,557	$ 21,719,117	$ 97,388,198
$ 103	2021	$ 336,760	$ 1,347,040	$ 22,921,101	$ 102,323,776
$ 106	2022	$ 361,301	$ 1,445,203	$ 24,101,136	$ 107,138,960
$ 109	2023	$ 385,042	$ 1,540,169	$ 25,274,512	$ 111,902,678
$ 113	2024	$ 408,331	$ 1,633,323	$ 26,451,342	$ 116,660,406
$ 116	2025	$ 431,406	$ 1,725,623	$ 27,638,786	$ 121,444,212
$ 119	2026	$ 454,443	$ 1,817,771	$ 28,842,205	$ 126,277,972
$ 123	2027	$ 477,575	$ 1,910,300	$ 30,065,811	$ 131,180,312
$ 127	2028	$ 500,975	$ 2,003,901	$ 31,315,032	$ 136,174,791
$ 130	2029	$ 525,221	$ 2,100,883	$ 32,607,316	$ 141,335,713
$ 134	2030	$ 549,220	$ 2,196,882	$ 33,910,885	$ 146,528,130
$ 138	2031	$ 573,643	$ 2,294,570	$ 35,245,882	$ 151,837,848
$ 143	2032	$ 598,542	$ 2,394,168	$ 36,614,420	$ 157,273,803
$ 147	2033	$ 623,969	$ 2,495,874	$ 38,018,479	$ 162,844,296
$ 151	2034	$ 649,968	$ 2,599,872	$ 39,459,944	$ 168,557,171
$ 156	2035	$ 675,903	$ 2,703,611	$ 40,920,269	$ 174,334,888
$ 160	2036	$ 696,180	$ 2,784,719	$ 20,021,804	$ 83,259,376
$ 165	2037	$ 717,065	$ 2,868,261	$ 10,776,426	$ 42,990,271
$ 170	2038	$ 421,376	$ 1,685,505	$ 8,731,989	$ 35,545,679
$ 175	2039	$ 253,462	$ 1,013,846	$ 7,648,223	$ 31,638,313
$ 181	2040	$ 225,002	$ 900,010	$ 6,801,427	$ 28,073,952
		$ 10,608,768	$ 42,435,073	$ 605,781,605	$ 2,641,507,288

Appendix 5

Data for Figure 5 and Figure 6

Year	Severance	Ad Valorem	Sales	Drillout	Roofout	homes
2015	$ -	$ 63,750	$ -	$ 63,750	250,000	100
2016	$ -	$ 688,500	$ -	$ 688,500	$ 250,000	100
2017	$ 13,043	$ 1,178,100	$ -	$ 1,191,143	$ 500,000	200
2018	$ 157,295	$ 1,473,900	$ -	$ 1,631,195	500,000	200
2019	$ 262,159	$ 1,667,700	$ -	$ 1,929,859	$ 750,000	300
2020	$ 310,889	$ 1,759,500	$ -	$ 2,070,389	$ 750,000	300
2021	$ 336,760	$ 1,759,500	$ -	$ 2,096,260	1,000,000	400
2022	$ 361,301	$ 1,759,500	$ -	$ 2,120,801	1,000,000	400
2023	$ 385,042	$ 1,759,500	$ -	$ 2,144,542	1,250,000	500
2024	$ 408,331	$ 1,759,500	$ -	$ 2,167,831	1,250,000	500
2025	$ 431,406	$ 1,759,500	$ -	$ 2,190,906	1,500,000	600
2026	$ 454,443	$ 1,759,500	$ -	$ 2,213,943	1,500,000	600
2027	$ 477,575	$ 1,759,500	$ -	$ 2,237,075	1,750,000	700
2028	$ 500,975	$ 1,759,500	$ -	$ 2,260,475	1,750,000	700
2029	$ 525,221	$ 1,759,500	$ -	$ 2,284,721	2,000,000	800
2030	$ 549,220	$ 1,759,500	$ -	$ 2,308,720	2,000,000	800
2031	$ 573,643	$ 1,759,500	$ -	$ 2,333,143	2,250,000	900
2032	$ 598,542	$ 1,759,500	$ -	$ 2,358,042	2,250,000	900
2033	$ 623,969	$ 1,759,500	$ -	$ 2,383,469	2,500,000	1000
2034	$ 649,968	$ 1,759,500	$ -	$ 2,409,468	2,500,000	1000
2035	$ 675,903	$ 1,759,500	$ -	$ 2,435,403	2,750,000	1100
2036	$ 696,180	$ 1,122,000	$ -	$ 1,818,180	2,750,000	1100
2037	$ 717,065	$ 612,000	$ -	$ 1,329,065	3,000,000	1200
2038	$ 421,376	$ 306,000	$ -	$ 727,376	3,000,000	1200
2039	$ 253,462	$ 102,000	$ -	$ 355,462	3,250,000	1300
2040	$ 225,002	$ -	$ -	$ 225,002	3,250,000	1300
	$ 10,608,768	$ 35,365,950	$ 0	$ 45,974,718	45,500,000	

Appendix 6

1. Short Term Costs and Risks: Short term, readily identifiable direct costs associated with initiating oil and gas extraction as a development strategy include, but are not limited to:

    - Costs for parish officials time and resources to "manage" drilling related activities
    - Incremental social , health, and educational system costs
    - Incremental public safety costs
    - Incremental emergency response costs
    - Incremental infrastructure costs (To provide specifics in one case: Desoto Parish added about 1,500 new wells from 2009 to 2012. In 2011 Desoto spent $30,000,000 for road repairs and in 2015 Desoto will spend an additional $5,000,000[16]. Desoto, however, only received about $1,400,000 in severance taxes in 2013, about 4% of their road repair expenditures from 2011 to 2015.)
    - Management of spills and accidental emissions
    - Increased heavy truck accidents with local automotive traffic

2. Long Term Costs and Risks: These could include but are not limited to:
    - Decline in assessed property value in proximity to well sites
    - Decrease in population growth and non oil and gas business growth
    - Loss of value in St Tammany brand image
    - Catastrophic oil spill, blowout, transportation events
    - Reduction in HS graduation rates
    - Higher infant mortality and children population reduction
    - Higher incidence of inhalation afflictions
    - Aquifer contamination due to poor well construction, aged well integrity, or poor DNR oversight of orphaned wells[17]
3. References:
    - Barth, JM, New Solutions, Vol.23, 2013, *The Economic Impact of Shale Gas Development on State and Local Economies: Benefits, Costs, and Uncertainties*
    - Haggerty, et al, Headwaters Economics, Journal of Energy Economics, *Long term Effects of Energy Specialization in Oil and Gas Extraction*
    - CaRDI Reports, Cornell Department of Development Sociology, *The Economic Consequences of Shale Gas Extraction: Key Issues,* September 2011
    - Steele, et al, *Duke Environmental Law & Policy Forum Symposium 2012,* Workshop Report, Vol. 22: 245, Spring 2012

[16] Welborn, Jan 13, 2015, shreveporttimes.com

[17] See Louisiana Legislative Auditor Report, *Regulation of Oil and Gas Wells and Management of Orphaned Wells,* issued May 28, 2014