THE ECONOMIC IMPACT OF THE HORIZONTAL WELL

SEVERANCE TAX INVESTMENT INCENTIVE

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I. Introduction

For FY2012 the State of Louisiana is facing an estimated $1.6 billion budget shortfall. Legislators and the Administration are now tasked with finding new sources of revenue or must make significant cuts to the budget in order to balance the fiscal shortfall. One of those areas being examined is various tax exemptions and investment incentives provided by the state.

One investment incentive in particular that has drawn notice is the incentive to promote the exploration and development of oil and gas wells that involve horizontal drilling. In order to encourage more job-creating and state-revenue-producing exploration activity in the state, Louisiana grants a horizontal drilling investment incentive which provides a reprieve from severance taxes paid to the state, but only for the first two years of production or until revenues are enough to cover the cost of drilling the well, whichever comes first. It's important to note that after the costs of drilling have been recuperated, all future production will be subject to taxation at the current severance tax rate.

Exploration companies that are operating in the newly discovered Haynesville Shale in Northwestern Louisiana are particularly concerned about a possible attack on this incentive. The technological change that made production of natural gas from the Haynesville Shale possible involves drilling down vertically approximately two miles, running a pipe about 5,000 feet horizontally through the shale, and then fracking the shale

with chemicals and water under high pressure. As we will argue below, the existence of the horizontal well severance tax investment incentive is critical to continued activity in the Haynesville Shale.

Why might legislators consider eliminating this investment incentive? One reason is the amount of revenue involved. According to the Louisiana Department of Revenue's Tax Exemption Budget for 2010-2011, over the 4-year period from FY08 through projected FY11, total severance taxes lost via this incentive total almost $266 million, with the peak year being FY10 at $167.5 million.[1] The estimated revenue loss for FY12 is projected to be much lower at $83 million, primarily because of an expectation of reduced drilling activity in the Haynesville Shale in that fiscal year.

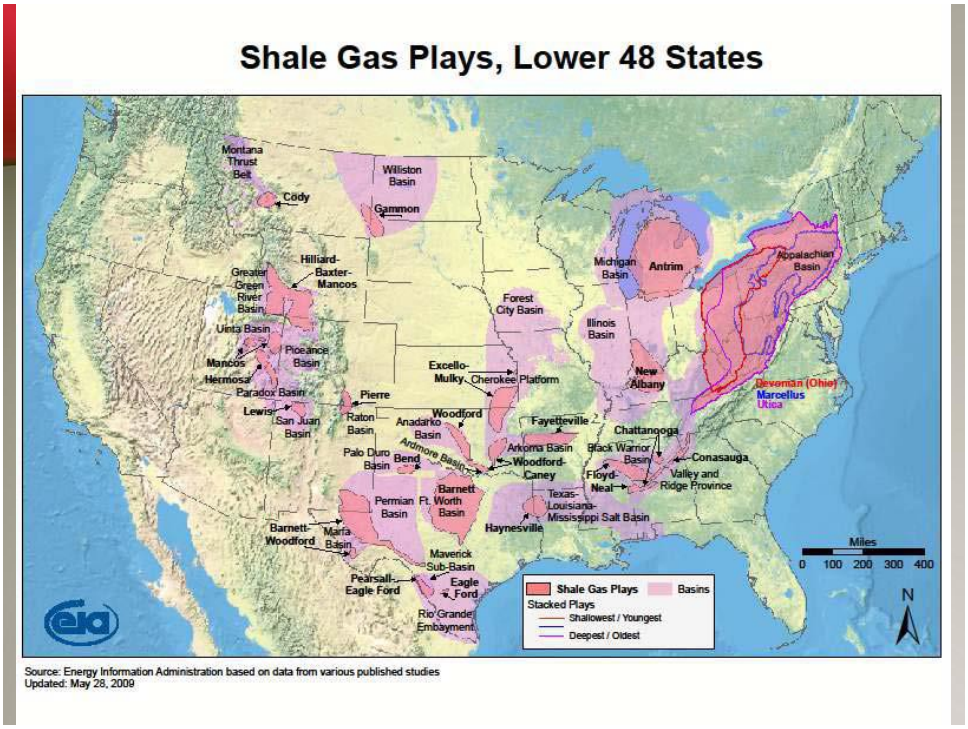
On the surface, it is hard for a legislator to ignore that revenue loss. The key phrase in that last sentence is "on the surface". The object of this report is to get below the surface and to consider factors that make the retention of this incentive very good public policy. We will first address the "competition factor"---that we cannot view the Haynesville Shale in isolation, but rather understand that this shale competes with a number of other shale plays in the nation for the attention of the exploration companies. We will then look at some estimates the author has made of the Haynesville Shale's impact on the Louisiana economy in 2008 and 2009. Finally, we will use sensitivity analysis to demonstrate the impact on the Louisiana economy if the investment incentive is remove and exploration activity starts to move away from the Haynesville Shale to other shale plays.

II. The Competition Factor

[1] Louisiana Department of Revenue, Tax Exemption Budget 2010-2011, p.35.

One might argue that the state is expecting an $82 million severance tax loss in FY12 and that the incentive should be removed so that the state could reap that bounty. However, it's important to note that the Haynesville Shale is in competition with several prolific shale plays across the U.S. that compete for exploration activity and capital investment dollars. Figure 1 is a map of the U.S. showing where some of these plays are.

Map 1



The stated competition for exploration companies might be no big deal if the Haynesville Shale had a major competitive advantage over the other plays. In fact, just the opposite is the case. The Haynesville Shale comes up short for at least three reasons.

Costs of Drilling

First, the wells in the Haynesville Play are typically deeper than those in other shale plays, like the Marcellus Shale located in the Appalachia area. According to surveys we have conducted a typical Haynesville Shale well cost $9.0-$9.7 million to

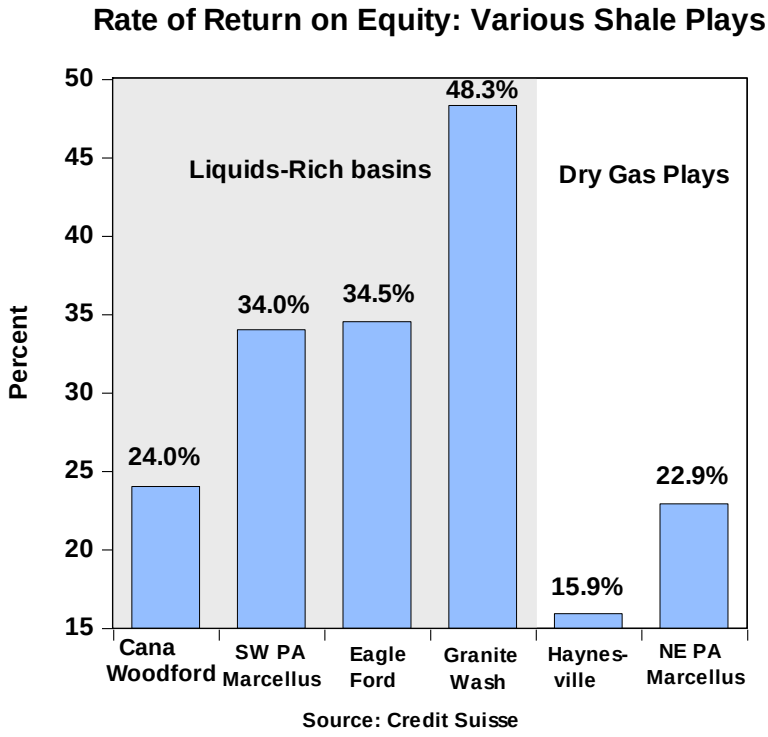
drill. In the Marcellus Shale, a well cost considerably less at $5.8-$6.4 million. In the Eagle Ford Play in South Texas, a typical well costs about $6 million. Credit Suisse analysts have estimated the "service intensity" of wells in various shale plays versus conventional wells. Of the ten plays Credit Suisse investigated, **the typical Haynesville Shale well had the highest service intensity** (i.e., costs) at over seven times a conventional well. A Marcellus well came in at about 4.8 times a conventional well.[2]

Return on Investment

It might cost more to drill a Haynesville Shale well, but perhaps this is offset by much greater production per well so that the rate of return on investment (ROI) is higher. Unfortunately for Louisiana, this is not the case as seen in Figure 1 where Credit Suisse has compared the ROI across six major plays.[3]

[2] Credit Suisse European Gas Seminar, "The Impact of Shale Gas", Jon Wolff, September 24, 2010. Power point presentation.
[3] Ibid.

Figure 1



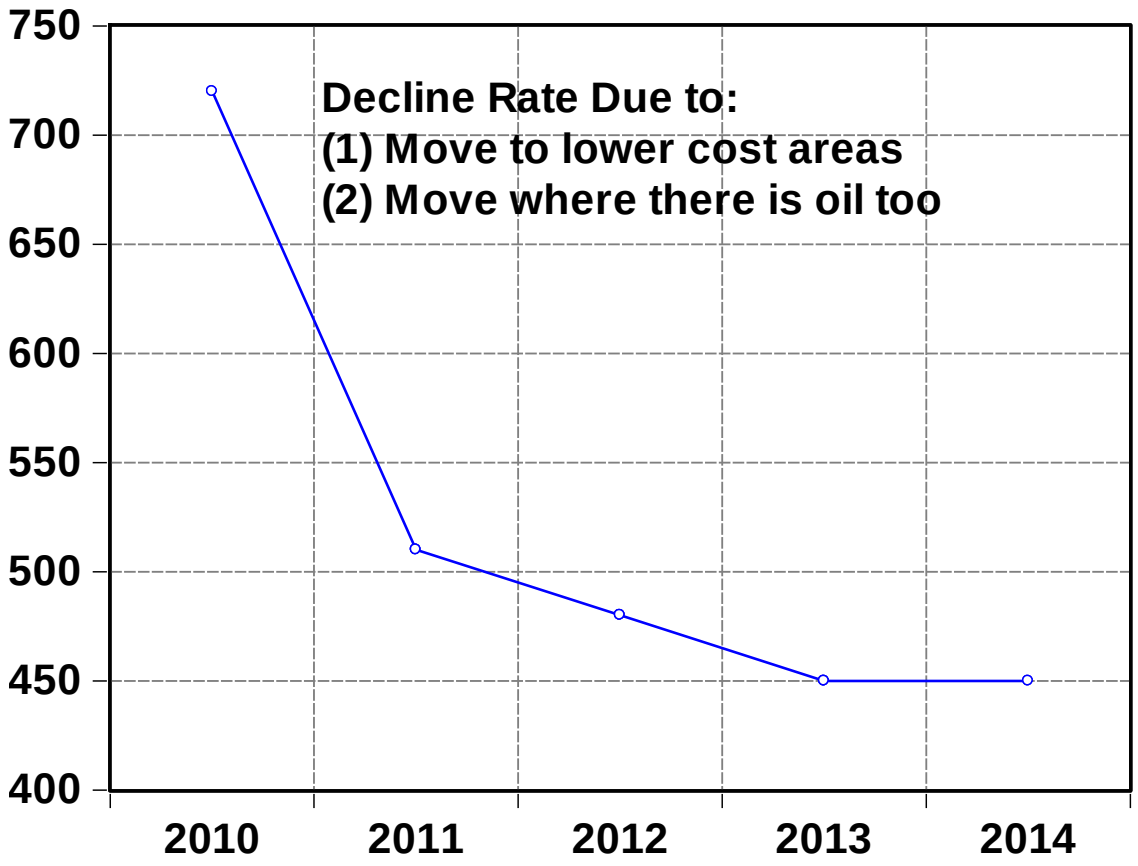
Note that the ROI is in fact much lower in the Haynesville Shale play than in the other five plays. Partly that is because Haynesville Shale wells are more expensive to drill than in the Northeast Pennsylvania Marcellus play.

But there is a second factor putting the Haynesville Shale at a competitive disadvantage. A noteworthy fact is that wells developed in the Haynesville Shale primarily consist of dry-gas production, Notice that the first four bars in Figure 1 are much higher than the bar for Haynesville because wells in, say, the Eagle Ford Shale produce both natural gas **and oil**. Since oil prices are both relatively high compared to natural gas and oil prices are rising while natural gas prices are stabilizing, the prospect of getting both commodities in the liquid-rich basins is already drawing rigs away from the Haynesville Shale play.

In fact, when the author of this study wrote an economic impact study of the Haynesville Shale activities on the state in 2009, he also provided forecasts of activity in the Haynesville Shale out to 2014. That forecast is recreated in Figure 2. In that study, the author argued that 2010 would be the peak year for drilling activity in the Haynesville Shale because of leakage of rigs to the cheaper Marcellus market and the liquids-rich Eagle Ford market.[4] Indeed, rig count data show this is happening. The week of February 26, 2010 the North Louisiana rig count was 137; by the week of February 25, 2011 it had fallen to 115.[5]

[4] The Economic Impact of the Haynesville Shale on the Louisiana Economy in 2009, prepared for the Louisiana Oil and Gas Association, April 2010.
[5] Baker Hughes website

Fig. 2: Projected Haynesville Shale Wells: 2010-14



Relative Drilling Success Rate

One might suggest that though the ROI is much lower for a Haynesville Shale well, this play is enhanced because of the remarkable success rate in hitting a producing well in this play versus others. Credit Suisse has also examined this issue as well. The success rate in the Haynesville Shale is a remarkable 98 percent. However, the success rate in the Marcellus, Eagle Ford, Barnett, Fayetteville, and Woodford plays are also at 98 percent.[6] **The Haynesville Shale has no advantage on the success rate score over other regions.**

[6] Credit Suisse, September 24, 2010 power point presentation.

Our conclusion? **Not only does the Haynesville Shale have a large number of other plays to compete with for exploration activity, it also is at a considerable competitive disadvantage relative to these other plays. Removing the horizontal severance tax investment incentive would sharpen Haynesville Shale's competitive disadvantage and hasten the movement of exploration firms from the area**.

III. Impact of the Haynesville Shale on the Louisiana Economy

On the surface, one might ask what is the impact to the state if the Haynesville Shale becomes less competitive and exploration firms choose to drill elsewhere? In order to address that question the author conducted two studies on the impact of the Haynesville Shale on the Louisiana economy. One was done for the Louisiana Department of Natural Resources that analyzed the impact of the play on the economy in 2008,[7] and the second was done for Louisiana Oil and Gas Association (LOGA) that analyzed the impact of the play on the economy in 2009.[8]

Total Direct Spending

Table 1 reveals how much exploration companies pumped directly into the Louisiana economy over 2008-09. **A remarkable $11.5 billion dollars was spent in the state just over that 2-year period**.

[7] The Economic Impact of the Haynesville Shale on the Louisiana Economy in 2008", prepared or the Louisiana Department of Natural Resources, April 2009.
[8] The Economic Impact of the Haynesville Shale on the Louisiana Economy in 2009, prepared for the Louisiana Oil and Gas Association, April 2010.

Table 1
Annual Expenditures, Taxes and Direct Employment
From Extraction Activity by Firms Operating
In the Haynesville Shale, 2008-09

Category	2008	2009
Mineral Lease Payments	$3,152,276,305	$957,321,967
Royalty Payments	$93,788,467	$305,928,166
Rental & Surface Lease Payments	$18,221,292	$23,119,348
Wages and Salaries	$31,879,630	$52,324,181
Other Administrative Expenses	$3,645,552	$45,395,079
Direct Drilling Expenditures	$1,081,620,980	$4,441,562,223
Infrastructure Spending	$75,350,000	$975,068,176
Direct Taxes	$3,962,000	$139,473,958
State Taxes	$13,992,034	$41,147,385
Local Taxes	$38,302,276	$35,646,398
Total Expenditures	**$4,513,038,536**	**$7,016,986,881**
Direct Employment	318	1,299
Contract Employment	113	3,019
Total Direct Employment	**431**	**4,318**

Source: See footnotes 7 and 8.

Note one key difference between the 2008 and 2009 data. In 2008, the exploration companies were primarily focused on securing mineral leases in the shale, spending almost $3.2 billion on lease payments. Drilling activity had just begun, so the drilling expenditures were about $1.1 billion. By 2009, that ratio had been reversed. The companies spending shifted from mineral lease payments (almost $1 billion) to drilling activity where a whopping $7 billion was spent.

Multiplier Effect of 2008-09 Spending

Think of the Louisiana economy like one large economic pond. Into this pond is dropped a rock of $11.5 billion by the Haynesville Shale direct spending. That rock is so big that it makes quite a splash on its own. However, once hitting the pond it causes ripple effects out to the edge of the pond, creating new jobs in construction, retail trade, health care, etc.---what economists call the multiplier effect.

We used an input-output table generated by the U.S. Bureau of Economic Analysis to estimate the multiplier effect of the Haynesville Shale spending in 2008-09 on business sales, household earnings, jobs, local taxes, and state taxes. The results are summarized in Table 2.

Table 2

Total Direct & Indirect Impact of Haynesville Shale Spending: 2008-09

Type	**2008**	**2009**
Business Sales	$2.4 Billion	$10.6 Billion
Household Earnings	$3.9 Billion	$5.7 Billion
Jobs	32,742	57,637
Local Taxes	$80.6 Million	$338.8 Million
State Taxes	$68.8 Million	$573.5 Million

By any measure these are very large impact estimates, and not surprising in their size given that $11.5 billion in new money was suddenly pumped into the economy. A couple of points about these numbers bear highlighting. First, note the **household earnings impact of $5.7 billion in 2009**. As a way of reference:

- This represents about 3.6 percent of the personal income produced in the state in 2009.
- Louisiana's personal income actually fell by almost $1.2 billion or 0.7 percent in 2009. Had it not been for the Haynesville Shale activity the decline would have been 4.3 percent.
- There are 64 parishes in Louisiana. In only nine parishes did total personal income exceed $5.7 billion in 2007. The total personal income in the Monroe MSA (Ouachita and Union Parishes) totaled $5.4 billion in 2007.

Secondly, notice the number of **jobs** created in 2009 by Haynesville Shale activity---57,637. By way of reference:

- As a reference point, there were 59,500 people employed in all of Louisiana's finance and insurance companies in February 2010.

- Louisiana lost 38,500 jobs in 2009, a decline of -2 percent. Had it not been for the Haynesville Shale activity, the decline would have been 96,137 jobs or -5 percent.

- When there is a recession as deep as the recent "Great Recession", the durable-goods-dominant Shreveport MSA is hit harder and deeper than the national economy. For example, during the post 9-11 recession, the national economy last 1.4 percent of its jobs over a 2-year period. The Shreveport MSA lost 2.3 percent of its jobs over a 3-year period. In the Great Recession, the U.S. economy lost 6.4 percent of its jobs over a 2-year period; the Shreveport MSA only lost jobs in 2009, a drop of 2.7 percent. The Haynesville Shale activity saved Shreveport-Bossier from a major economic blow from the Great Recession.

Impact on the State Budget

Finally, one of the most important pieces of data in Table 2 is the row for state taxes. Earlier, we pointed out that the Department of Revenue estimated that over the 4-year period of FY08-FY11, the state lost $266 million in severance taxes due to the horizontal severance tax investment incentive. **At first glance, it appears the Haynesville Shale produced a net loss of $266 million to the state budget. In fact, over the shorter 2-year period from 2008-09, the $11.5 billion in Haynesville Shale activity generated $642.3 million for the state treasury.**

The South-to-North migration Issue

We should point out one other important fact about the impact of the Haynesville Shale play on the state budget. There have been suggestions made that the horizontal incentive caused natural gas exploration companies to move activity from the southern part of the state---where natural gas exploration is more conventional and does not rely on horizontal drilling---to the Northern part of the state where the incentive is utilized, and that this south-to-north migration is largely behind the recent sharp drop in state severance tax collections.

To address this issue, we conducted a survey of firms operating in the Haynesville Shale play. Seven companies representing 85 percent plus of the exploration activity in the shale responded to the survey. We asked these firms how many wells they drilled in South Louisiana over 2000-10. **Only one firm had done any drilling in South Louisiana over that 10-year time frame, and that company had drilled only seven wells over 2000-10**. Whatever the reason for the protracted decline in severance tax revenues recently, the south-to-north shift of firms drawn by the horizontal incentive is not the culprit.

IV. Consequences of Repeal

What would be the impact on the state if the horizontal severance tax investment incentive were repealed? In the sections above, we hope we have presented data showing (1) that the Haynesville Shale play has many competitors for exploration activity and (2) is in fact is at a competitive disadvantage relative to these other plays when it comes to cost of drilling a well and expected ROI. Indeed, the rig count in North Louisiana is already dropping---as we had predicted---due to shifting of drilling activity to lower-cost plays or plays that also produce higher-priced oil.

Doing away with the horizontal severance tax investment incentive will clearly further exacerbate Haynesville's competitive disadvantage and hasten the exodus of drilling activity away from the Haynesville play. How much business it will drive away from North Louisiana is difficult to measure with any precision. What we will do in this section is employ **sensitivity analysis** to give the reader a sense of what might happen if the tax incentive is repealed. **Here we consider what the consequences would be if exploration activity was reduced by 25 percent or 50 percent**.

Earlier Estimates of Haynesville's Impacts: 2010-14

In our study of the impact of the Haynesville shale on the Louisiana economy in 2009, we also included an appendix that provided estimates of the play on the economy over 2010-14. Those estimates on the state economy and state budget are shown in Tables 3 and 4.

Table 3
Projected Economic Impact of Haynesville Shale Activities: 2010-14

Year	Business Sales	Household Earnings	Jobs
2010	$16,922,746,986	$4,309,405,111	111,329
2011	$11,989,513,898	$3,053,243,027	76,339
2012	$11,281,082,402	$2,872,718,682	69,424
2013	$10,580,655,696	$2,694,525,036	62,883
2014	$10,580,655,696	$2,694,525,036	60,637

The projected impacts on the state and local government treasuries are shown in Table E-2:

Table 4
Estimated Local & State Taxes: 2010-14[9]

Year	Total Local Taxes	Total State Taxes
2010	$288,157,823	$367,745,393
2011	$205,274,374	$272,460,715
2012	$193,149,633	$269,420,747
2013	$181,150,750	$292,354,137
2014	$181,150,750	$323,844,137

Assumptions on which these estimates were based are detailed in that report.[10] One of the key assumptions was that there would be a decline in economic activity in the Haynesville Shale due to competitive disadvantage the play has relative to other plays.

[9] These numbers are higher than those reported in our 2010 study because we omitted direct taxes paid by the industry in that earlier work.
[10] The Economic Impact of the Haynesville Shale on the Louisiana Economy in 2009, prepared for the Louisiana Oil and Gas Association, April 2010.

Impact on State Revenues of Repeal of Incentive

How might state revenues be impacted if the horizontal severance tax incentive were repealed? We are confident that exploration activity in the play will decline faster, because now the play is even less competitive relative to other plays.

How great will the decline be? That is uncertain, so we use sensitivity analysis to give decision makers a feel for the order of magnitude of impacts. We show scenarios for both a 25 percent reduction and a 50 percent reduction in activity. We also start with the Department of Revenue's estimate for FY12 of how much is lost to the state treasury directly due to the incentive----$90 million. This number will decline with the reduction in exploration activity as the repeal's effects take place. We also conservatively assume that the effects of the repeal of the incentive will not take place until calendar year 2012.

Table 5 shows what the impact of the repeal over 2012-14 would be under a 25 percent and a 50 percent decline in activity in the play. Column one in the table reproduces the last column from Table 4---the projected state revenues collected if the incentive is continued. Column two shows our estimates of state revenue collections if the incentive is repealed and the result is a 25 percent decline in activity in the play, and column three shows our estimates of state revenue collections if the incentive is repealed and the result is a 50 percent decline in activity in the play.

Table 5

Impact on State Revenues of Repeal of Horizontal Incentive
(Millions of Dollars)

Year	Continue Incentive	Repeal & 25% Reduction in Play	Repeal & 50% Reduction in Play
2012	$269.4	$265.9	$177.2
2013	$292.4	$279.3	$186.2
2014	$323.8	$302.9	$201.9

Note that i**n all years, under both scenarios, that the state budget is more negatively affected by repealing the investment incentive than by continuing it**. At first glance, these numbers may not make sense because under either scenario the state is raising its severance tax rate. The reason for this differentiation is that the loss of tax revenues from the earnings losses caused by less economic activity overshadows the gains in direct severance tax collections. Recall all those sales, earnings, and job benefits detailed back in Table 3? We are not talking about small numbers here. They are huge. Take those numbers and first reduce them by 25 percent and then by 50 percent. We are talking about a serious amount of money and jobs vanishing from the Louisiana economy---which in turn means a serious amount of tax revenue vanishing simultaneously. It is enough to offset any gains in severance taxes from repealing the incentive.

The Dollar Value of the Severance Tax Investment Incentive

What is the payoff to the state for every dollar of incentive offered? That depends on the year considered, the price of natural gas, the split of expenditures between mineral lease purchases and drilling expenditures, and other factors. Consider the calendar year

2010. We estimated back in Table 4 that the state collected about $367.7 million in revenues from all the activities associated with the Haynesville Shale. How much did the state forego in severance taxes due to the incentive in that calendar year? According to the Louisiana Department of Revenue's 2010-11 Tax Exemption Budget, the state gave up $167.5 million in FY10 and projected $83.0 million in losses in FY11. If we assume half the losses in FY10 and half the losses in FY11losses occurred in calendar year 2010, that means a total loss from the incentive in calendar year 2010 of $125.3million. **Thus, for every dollar of severance taxes given up under the horizontal incentive the state gained $2.94 ($367.7 million divided by $125.3 million) in revenues to the treasury**, and the state got $16.9 billion in business sales, $4.3 billion in new household earnings, and 111,329 jobs to boot (see Table 3).

Executive Summary

Louisiana provides an incentive to exploration firms that use horizontal drilling to extract oil and gas in the state. This incentive provides a reprieve from severance taxes for the first two years of production or until revenues are enough to cover the cost of drilling the well, whichever comes first. In the face of Louisiana's budget shortfall, some have recommended removing this incentive. We argue **removing the incentive would actually cause state revenues to <u>decline</u>**, not increase. Why?

- The Haynesville Shale Play is **one of many such plays** in the U.S. and Canada----such as the Marcellus Shale, the Eagle Ford Shale, the Woodford Shale to name a few--- competing for exploration activity.

- Among the shale plays, the Haynesville Shale is (1) **one of the most expensive** to drill at $9-$9.7 million per well versus $5.8-$6.4 million in the Marcellus Shale or $6 million in the Eagle Ford, (2) **produces only natural gas**, whereas the Eagle Ford, Woodford, and parts of Marcellus produce higher-valued oil, and (3) has one of the **lowest rates of return on investment** of any of the shale plays---15.9% versus 34.5% in the Eagle Ford, 34% in the Southwest Marcellus, and 24% in the Cana Woodford.

- Because of its relatively uncompetitive position, the Haynesville Shale is already losing rig activity to other shale plays---the rig count in that region has already declined from 137 to 115 February over February. **Removing the horizontal tax incentive would make the Haynesville Shale even less competitive and hasten the exodus of exploration activity out of Northwest Louisiana**.

- Exploration companies have pumped **huge amounts of money into Northwest Louisiana**. Over 2008-09, they spent over <u>$11.4 billion</u>. We estimate in 2009 alone, this spending generated $573.5 million in revenues for the state treasury.

- Using the Department of Revenue's Tax Exemption Budget data, we estimate that in 2010, the state gave up $125.3 million, but it gained $367.7 million in revenues from all the economic activity caused by drilling in the Haynesville Shale. Thus, **for every dollar the state gave up via the horizontal tax incentive it gained $2.94 in revenues** from the vast amount of money exploration firms pumped into the state.

- We used sensitivity analysis to determine what would happen to the state budget if removing the horizontal incentive caused activity in the Haynesville Shale to drop by 25% or 50%. For every year from 2012-14, **the state treasury ended up collecting less money from removing the incentive, not more**. The reason for this somewhat counter-intuitive conclusion is that the loss of tax revenues from the earnings losses caused by less economic activity overshadows the gains in direct severance tax collections.

- Finally, it has been suggested that the recent decline in state severance tax collections was due to the shift of exploration firms from south Louisiana----where drilling is basically not horizontal---to north Louisiana where firms enjoy the horizontal tax incentive. Our survey of 7 firms that conduct over 85% of the exploration activity in the Haynesville Shale reveal that only one firm ever operated in South Louisiana, and that firm only drilled seven wells over 2000-10. **A south-to-north shift was not the cause of the recent severance tax decline**.