Executive Summary

Brett, **O**wen, **M**att, **B**rett, and **S**teve **C**onsulting **C**ompany (**BOMBS CC**) was hired to analyze past data from both gas and oil production from three different wells and determine which well (Exxon, Shell, or BP) would be the most profitable investment. Through data analysis, using Excel, and forecasting, using the hyperbolic decline formula, we determined that the BP well is the well you should invest in.

Introduction

First of all the whole class was divided into eight consulting companies. We named our group BOMBS CC that is the acronym of our first names (Brett, Owen, Matt, Brett, and Steve Consulting Company). Everyone in the class was initially given a Madina Data Set, which is an Excel spreadsheet of the past gas and oil production of forty-six different wells month by month. From this data set BOMBS CC was given the data from three of the forty-six original wells (BP, Shell, Exxon) to analyze with the help of others in the group and determine which well would be the most profitable investment over the next three years.

Methodology

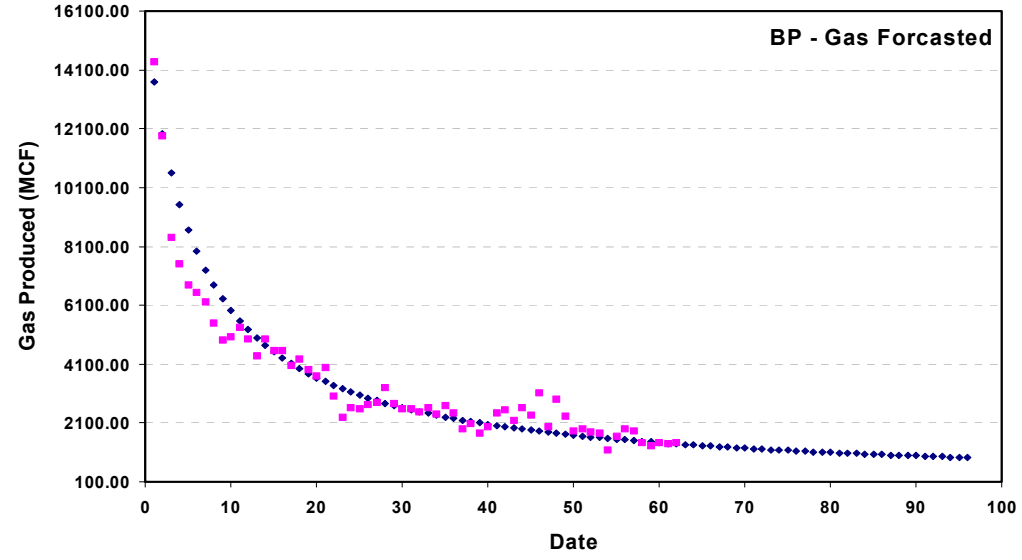
First, graphs of the oil production, in barrels (bbls), and gas production, in thousands of cubic feet (MCF), were made for all three wells using the given data. Using the hyperbolic decline formula **(**q=qi*(1+b*Di*t)^(-1/b)**)** and changing the values of the initial rate (qi), the decline exponent (b), and the initial decline (Di), where (t) is the number of the month, until it closely resembled the curve of the graph of the original data, we could add thirty-six more months onto the end where the original data ended which in affect forecasted the behavior of the oil or gas production for the next three years. This process was repeated for gas and oil production for all three wells.

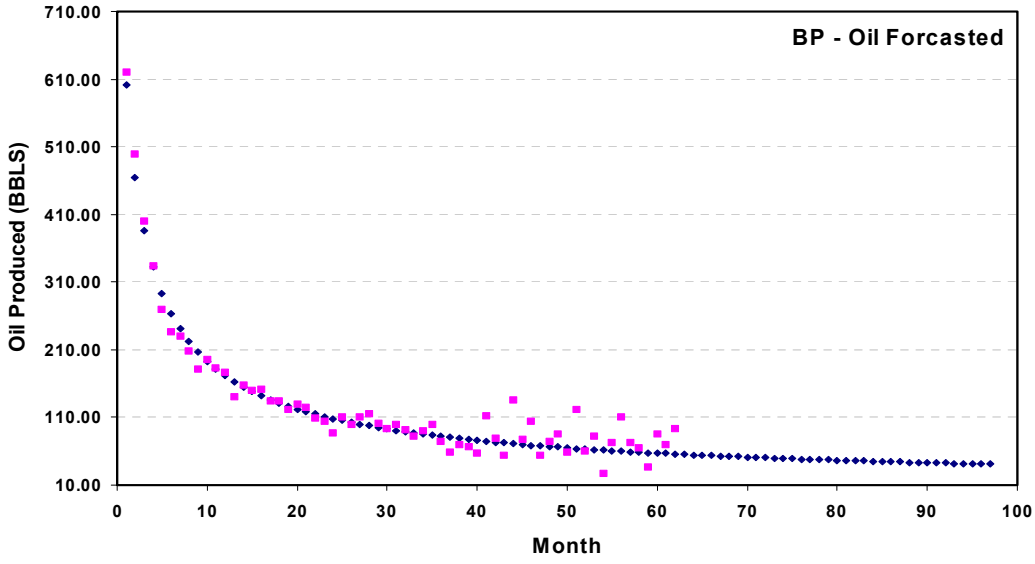
Next we began calculating the financial aspects of each well. First we had to determine the price of gas and oil by looking at trends from the Internet and decide on an appropriate price for them both. After that we did certain calculations to find revenue, cost, tax, net cash flow, and present value. We calculated the present value using the

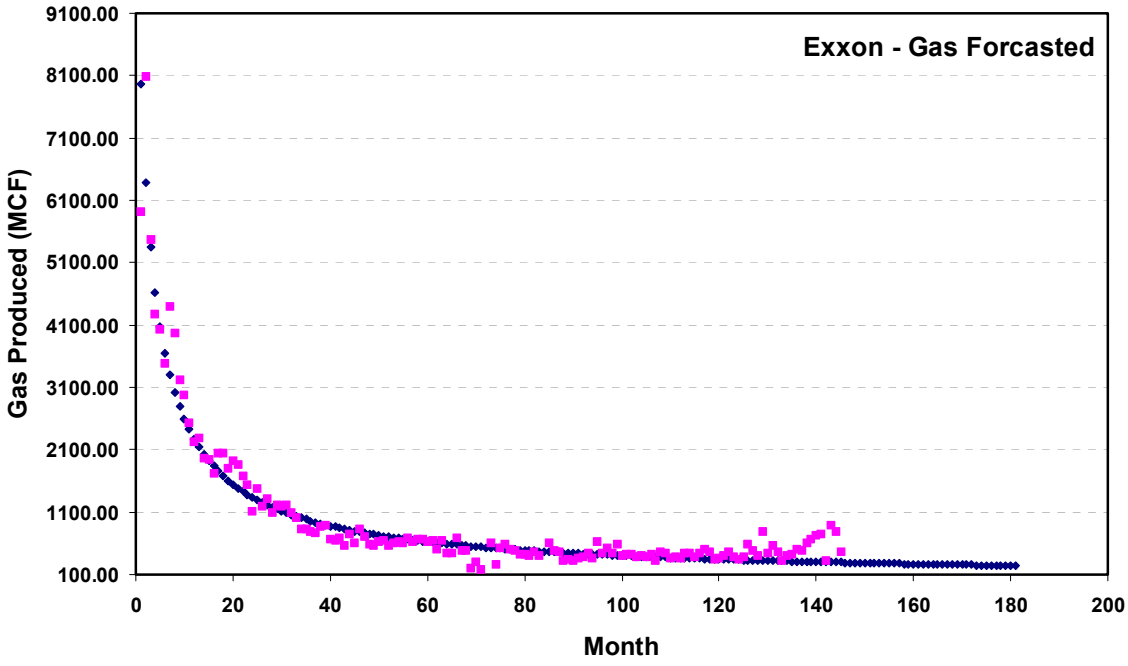
formula **(**P=F/(1+i)^n**)** where (P) is present value, (i) is interest, (F) is net cash flow, and (n) is number of months.

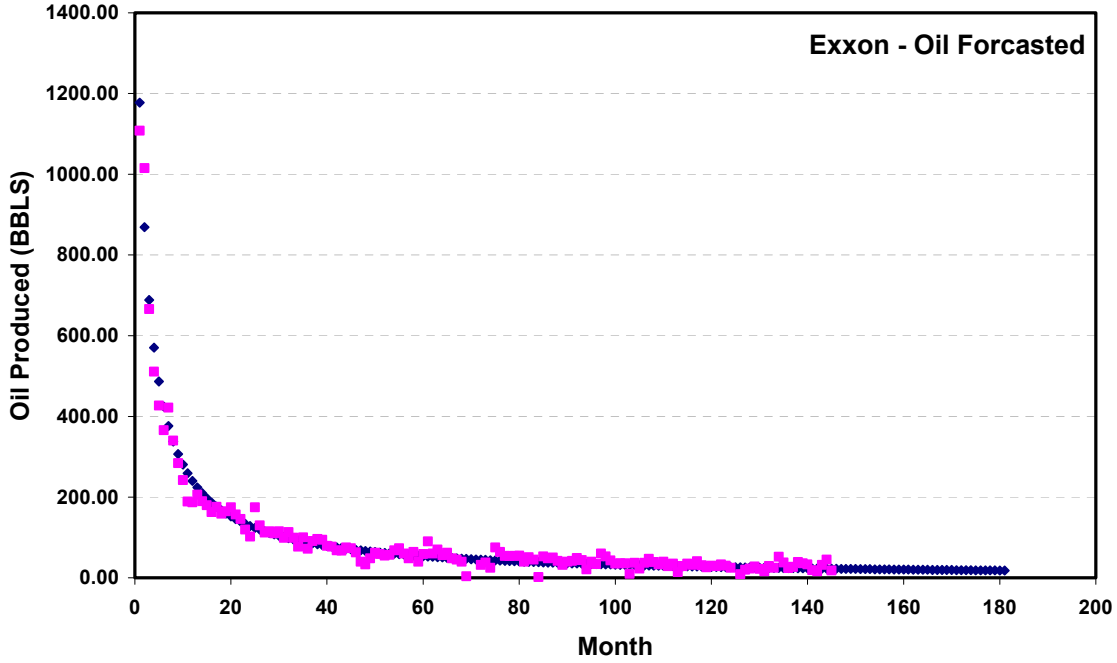
Results and Discussion

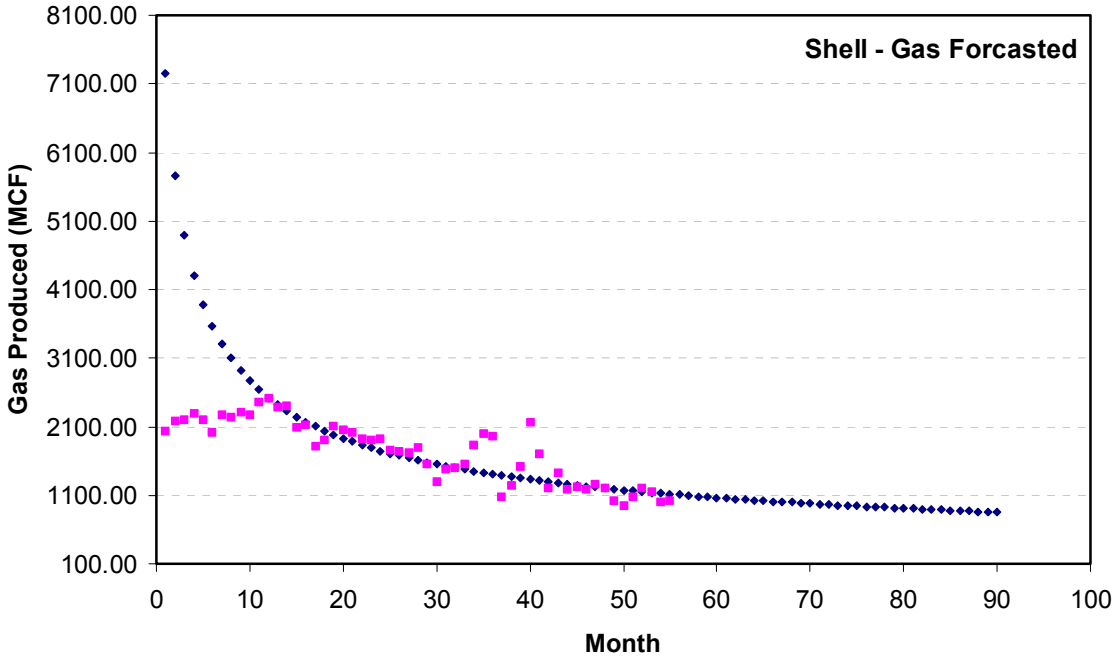
These are the curves that display the original data (pink) and the data gathered by the hyperbolic decline formula (blue). This is where we changed the values of the variables of the hyperbolic decline formula until the curves were as similar as possible. Where the pink curve stops and the blue curve continues is the forecasted three years of production.

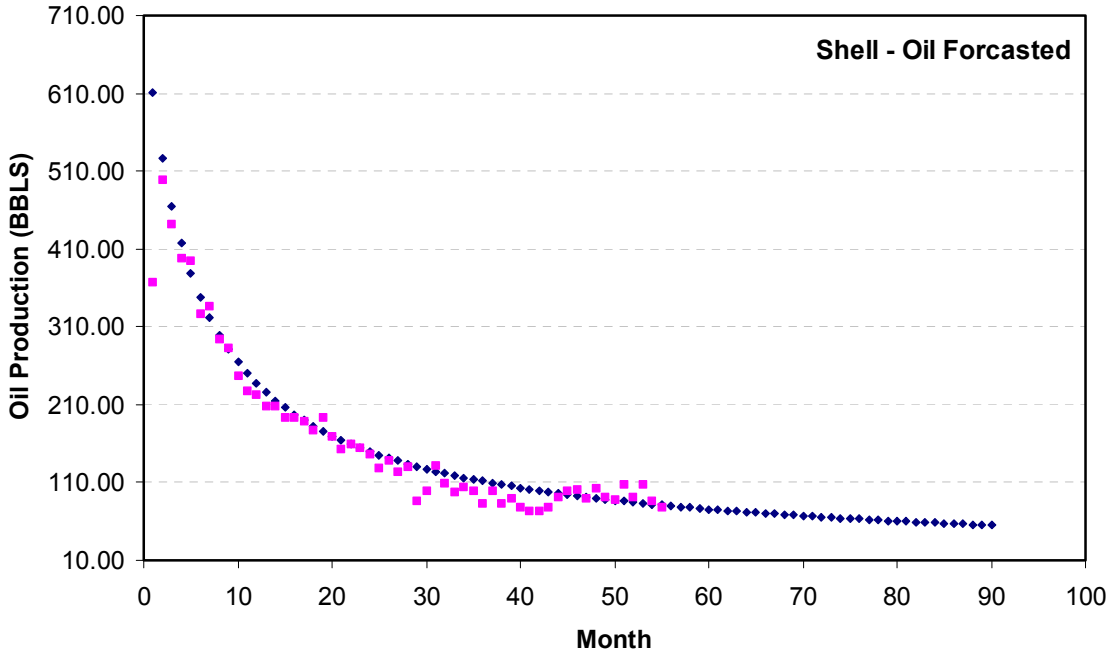





Exxon - Gas Forcasted
Gas Produced (MCF)
9100.00
8100.00
7100.00
6100.00
5100.00
4100.00
3100.00
2100.00
1100.00
100.00
0
20
40
60
80
100
120
140
160
180
200
Month


Exxon - Oil Forcasted
Oil Produced (BBLS)
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
0
20
40
60
80
100
120
140
160
180
200
Month


Shell - Gas Forcasted
Gas Produced (MCF)
8100.00
7100.00
6100.00
5100.00
4100.00
3100.00
2100.00
1100.00
100.00
0
10
20
30
40
50
60
70
80
90
100
Month


Shell - Oil Forcasted
Oil Production (BBLS)
710.00
610.00
510.00
410.00
310.00
210.00
110.00
10.00
0
10
20
30
40
50
60
70
80
90
100
Month

(***Table 1***) Here is a table of the exact values that we used in our calculations.

	Year		
	1st	2nd	3rd
Oil Price/Bbls	$ 29.40	$ 29.96	$ 30.80
Direct Cost/Bbls	$ 4.35	$ 4.35	$ 4.35
Gas Price MCF	$ 6.67	$ 6.79	$ 6.99
Direct Cost	$ 0.65	$ 0.65	$ 0.65
Tax Rate	48%	48%	48%
Interest Rate	1%	1%	1%
Direct Cost Increase	5%	7%	10%

The gas prices for each year were found by taking the original gas price of $6.35/MCF and adding 5% for the first year, 7% for the second year, and 10% for the third year. The oil prices were found similarly except the original oil price was $28.00/bbls. The reason that we added the 5%, 7%, and 10% increase in prices for oil and gas each year were because that was the prospected rate of increase of the price of gas and oil.

(***Table 2***) This chart is a shortened visual example of the process that we went through in finding all of the financial aspects of gas and oil production. This example came from the forecasted first 12 months of BP oil production. The actual charts have thirty-six months of data but just for explanation purposes I used the first 12 months.

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						4
						.58
3	55.94	$ 1,644.72	$ 243.35	$ 672.66	$ 728.71	$ 707.28
4	55.32	$ 1,626.28	$ 240.62	$ 665.12	$ 720.54	$ 692.43
5	54.71	$ 1,608.34	$ 237.97	$ 657.78	$ 712.59	$ 678.01
6	54.11	$ 1,590.85	$ 235.38	$ 650.63	$ 704.85	$ 664.00
7	53.53	$ 1,573.82	$ 232.86	$ 643.66	$ 697.30	$ 650.38
8	52.97	$ 1,557.22	$ 230.40	$ 636.87	$ 689.94	$ 637.15
9	52.42	$ 1,541.03	$ 228.01	$ 630.25	$ 682.77	$ 624.28
10	51.88	$ 1,525.23	$ 225.67	$ 623.79	$ 675.77	$ 611.77
11	51.35	$ 1,509.82	$ 223.39	$ 617.48	$ 668.94	$ 599.59
12	50.84	$ 1,494.77	$ 221.17	$ 611.33	$ 662.28	$ 587.74

Oil Produced – How much oil is produced. These are the numbers that were generated by the hyperbolic decline formula after the graph was adjusted to be very similar to the graph of the original data. These values are the blue values on the graph and the first month is the first blue dot after the pink dots cease.

Revenue – All funds that are taken in before expenses are taking out. These values were calculated by multiplying the oil prices in *table 1* by the oil produced. Since *table 2* just shows the first year of production we used the first oil price in *table 1*. For the second year though it is necessary to use the send price and for the third year we used the third. Of course for the gas calculations it is necessary to use the gas prices instead of the oil prices.

Cost – All expenses incurred by the operation to extract and process oil. To find cost we multiplied the oil produced by direct cost of oil in *table 1*, which is $4.35 for oil and $0.65 for gas.

Tax – How much funds are owed and paid out to state, federal, and local government. Tax is found by subtracting the cost from the revenue and then multiplying by the tax rate, which is 48% as you can see in *table 1*.

Net Cash Flow – How much money is actually made from the well. We subtracted the cost and the tax from the revenue to get net cash flow (revenue-cost-tax = net cash flow). Adding up all of the net cash flow values for gas and oil for each individual well gives you the total net cash flow for that particular well. It is necessary to compare the total net cash flows of each well to determine which well would be the best investment.

Present Value – The value in today's dollars assigned to an amount of money in the future. So our present value is how much the net cash flow is in today's dollars. The reason present value is even a factor is because the price of the dollar is constantly changing due to inflation. We found present value using the formula **(**P=F/(1+i)^n**)** where (P) is present value, (i) is interest, (F) is net cash flow, and (n) is number of months. We found total present value the same way we found total net cash flow. Total present value is also a legitimate way to compare productivity of the wells.

(*Table 3*)

Net Cash Flow (gas)	$ 90,007.09	$ 60,056.70	$ 30,504.43
Net Cash Flow (oil)	$ 23,202.50	$ 14,942.69	$ 9,451.98
Total Net Cash Flow	$113,209.59	$ 74,999.39	$ 39,956.40

With *table 3* you can compare the total net cash flow of each individual well. As you can see in this table the total net cash flow for the BP well is significantly higher than that of the Shell and Exxon wells.

These tables show the net cash flow and the production of oil and gas for each month for the BP well over the entire forecasted time interval.

(***Table 4***)

BP Oil								
Month	**Oil Produced**	**Net Cash Flow**	**Month**	**Oil Produced**	**Net Cash Flow**	**Month**	**Oil Produced**	**Net Cash Flow**
1	57.25	$ 745.73	13	50.34	$ 670.43	25	45.14	$ 620.89
2	56.59	$ 737.10	14	49.85	$ 663.92	26	44.77	$ 615.71
3	55.94	$ 728.71	15	49.38	$ 657.57	27	44.40	$ 610.63
4	55.32	$ 720.54	16	48.91	$ 651.36	28	44.03	$ 605.65
5	54.71	$ 712.59	17	48.46	$ 645.29	29	43.68	$ 600.76
6	54.11	$ 704.85	18	48.01	$ 639.36	30	43.33	$ 595.97
7	53.53	$ 697.30	19	47.57	$ 633.55	31	42.99	$ 591.27
8	52.97	$ 689.94	20	47.15	$ 627.86	32	42.65	$ 586.65
9	52.42	$ 682.77	21	46.73	$ 622.30	33	42.32	$ 582.13
10	51.88	$ 675.77	22	46.32	$ 616.85	34	42.00	$ 577.68
11	51.35	$ 668.94	23	45.92	$ 611.52	35	41.68	$ 573.31
12	50.84	$ 662.28	24	45.53	$ 606.29	36	41.37	$ 569.03
						Total Net Cash Flow		$ 23,202.50

(***Table 5***)

BP Gas								
Month	**MCF**	**Net Cash Flow**	**Month**	**MCF**	**Net Cash Flow**	**Month**	**MCF**	**Net Cash Flow**
1	906.00	$ 2,834.97	13	812.18	$ 2,595.04	25	735.97	$ 2,424.43
2	897.36	$ 2,807.94	14	805.23	$ 2,572.84	26	730.26	$ 2,405.62
3	888.89	$ 2,781.42	15	798.40	$ 2,551.01	27	724.64	$ 2,387.10
4	880.57	$ 2,755.40	16	791.69	$ 2,529.55	28	719.10	$ 2,368.86
5	872.41	$ 2,729.86	17	785.08	$ 2,508.45	29	713.65	$ 2,350.90
6	864.40	$ 2,704.79	18	778.59	$ 2,487.70	30	708.28	$ 2,333.21
7	856.53	$ 2,680.17	19	772.20	$ 2,467.29	31	702.99	$ 2,315.78
8	848.81	$ 2,656.00	20	765.92	$ 2,447.21	32	697.78	$ 2,298.61
9	841.22	$ 2,632.26	21	759.73	$ 2,427.46	33	692.64	$ 2,281.70
10	833.77	$ 2,608.94	22	753.65	$ 2,408.02	34	687.58	$ 2,265.03
11	826.45	$ 2,586.03	23	747.66	$ 2,388.89	35	682.59	$ 2,248.60
12	819.25	$ 2,563.52	24	741.77	$ 2,370.06	36	677.68	$ 2,232.41
						Total Net Cash Flow		$ 90,007.09

Conclusion

We were asked to find which of the three wells to spend your hard earned money. Through forecasting with the hyperbolic decline formula and then plenty of financial calculations I have concluded that you should invest in the BP well. There is no doubt in my mind that the BP well would be your best investment. First of all it produced more oil and gas than Shell and Exxon, and after doing all of the financial calculations the numbers also backed up my conclusion. The total net cash flows of Exxon and Shell combined were just a little bit larger than the total net cash flow of BP. Once again definitely invest you money in the BP well.

Engineering 101

Three Wells

by
Owen Clark
&
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