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Hedging Oil Revenues: Texas and Alaska

by

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8/30/95

Dear Melissa,

Here's the paper I mentioned. I'd
appreciate it if you make this available
to all Long Range Financial Planning
Commission members.

Thanks!

— Dr. Lindahl

Hedging Oil Revenues: Texas and Alaska

At recent oil production rates, Texas gains or loses \$28 million in annual state revenue with each dollar per barrel change in oil prices while Alaska gains or loses \$130 million. The oil price crash of 1985 - 86 cut both state oil incomes in half and increased legislators awareness of their state's sensitivity to oil price volatility. Both Texas and Alaska investigated the hedging opportunities available with the new crude oil futures, options, and swaps markets to see if they could provide price insurance protection.

Texas authorized a pilot hedging program in 1991 and expanded the program in 1993. Alaska has hosted several education seminars on the possibilities of hedging, but has yet to adopt a formal program. This paper discusses Texas' experience with their pilot program and suggests a strategy for Alaska.

I. The Texas Experience

Severance taxes for Texas are 4.6% of gross revenues. At this rate, 1985 oil production of 870 million barrels valued at \$26.80 per barrel netted the State about one billion dollars, and 1992 oil production of 613 million barrels valued at \$18.32 per barrel netted Texas about \$516 million. The oil price crash of 1985-86 and the Gulf crisis of 1990-91 heightened awareness on the effect of oil price volatility on Texas state revenue.

In 1991, State Senator Teel Bivins introduced Senate Bill 1033 that authorized a two-year pilot hedging program for State oil severance tax revenues. The bill passed with very little debate, likely due to the fact that many State legislators engage in oil-related or agricultural businesses and they were already familiar with the concept of hedging as a risk-reduction strategy. Additional legislation in 1993 enhanced the potential of the hedging program.

Authorizing Legislation

Senate Bill 1033 "relating to the investment of certain state funds in crude oil futures contracts," placed oversight of the hedging program with the State Depository Board. The Board, composed of the Treasurer, the Comptroller, the State Bank Commissioner, and a citizen member, already existed and reviews certain investment areas. The bill defined hedging as the selling of futures or buying of options and that the use of these tools was to act as an insurance policy. The two-year pilot program loss was limited to \$2.5 million and the maximum amount invested at a time was limited to \$500,000. Money held in trust by the State when legal recipients cannot be found funded the program.

The Texas State Legislature passed expanded legislation in 1993. Senator Teel Bivins sponsored Senate Bill 736 "relating to the buying and selling of crude oil and natural gas commodity futures or options," which: (1) Corrected the technical language difficulties of the earlier bill allowing the creation of collar strategies; (2) Replaced the expiration date of the program with a total cumulative loss clause; (3) Raised the loss limit from \$2.5 million to \$5 million; and (4) Added natural gas as a commodity that could be hedged.

Planning and Development Process

On June 17, 1991, the State Depository Board established a task force headed by Linda Patterson, the Assistant Deputy Treasurer and Director of Investments. The task force was charged

with researching safe, conservative implementation of SB 1033. The Treasury staff identified possible strategies and presented alternatives to the Board on August 5, 1991. The Board agreed on the need to amend the bill language and directed the Treasury staff to begin by tracking hedging strategies on paper.

The initial language of the bill specified that the program was to be implemented by "buying options and selling futures" contracts. A literal interpretation would not have allowed the program managers to close out positions by selling the options previously purchased, or by buying back futures contracts already sold. A legal interpretation was provided by staff at the Commodities Futures Trading Commission (CFTC) to work around the specific wording.

On September 27, 1991, an Oil Hedging Advisory Board Meeting was held with members of the State Depository Board, oil industry experts and futures/options experts from brokerage firms. The Treasury Department already had long-term relationships with Goldman Sachs, Merrill Lynch, Paine Webber and Morgan Stanley regarding other financial matters and they continued to advise the State on hedging. New relationships were also created with Gelderman, Inc. and Coquest, Inc. The Advisory Board recommended that the Treasury restrict hedging activity to the purchase of put options, given the language constraints of SB 1033.

Approval and Implementation

The Board directed the Treasury staff to implement the overall hedging strategy as approved by the Board and to prepare ongoing reports for the Board's review and evaluation. The Board decided to use the same internal system of authorization, confirmation, and accounting that was already in place for securities trading. The Treasurer, Deputy Treasurers and the Assistant Deputy State Treasurer can authorize transactions, and the Treasury's Fiscal Reporting Division keeps the financial records.

For the Texas 1992-93 biennium, oil revenues were budgeted at \$21 per barrel and then decreased to \$20 per barrel for 1993 - '95. The hedging program sought to protect these budgeted revenue figures as much as possible. The market price of oil rose above the \$21 budgeted price from May to September 1992 and then fell below the budgeted price for the remainder of the pilot program.

With Texas State production at about 50 million barrels per month and the severance tax rate of 4.6%, a completely hedged position would call for 2.3 million barrels of oil per month. This translates into 2,300 futures contracts per month since each contract represents 1000 barrels of oil. A fully hedged position using options might require four times as many contracts if the option delta averaged .25 for example.¹ Since the legislation limited exposure to \$500,000 and a short position in futures has unlimited risk if prices rise, the Hedging Task Force and the Depository Board agreed that a futures strategy could not be implemented.

Hedging Strategies

Four strategies were formally presented to the Board: (1) the Option Roll; (2) the Market Timing; (3) the Commodity Swap; and (4) the Straddled Costless Collar. The first two strategies involving the purchase of put options were approved and implemented in April 1992. The Commodity

¹The number of option contracts to fully hedge a position is equal to the number of futures contracts for a fully hedged position divided by the option delta. Delta is the amount by which an option premium changes relative to a change in the price of the underlying futures contract. The delta for a strike price closest to the underlying futures price is usually about 0.5. Delta ranges from zero to one, with out-of-the-money strike prices approaching zero and in-the-money strike prices approaching one.

Swap strategy could not be legally implemented but was tracked on paper. The Straddled Costless Collar was also tracked on paper until the expanded legislation was passed in 1993. The Treasury began actual trading of the Straddled Costless Collar in November 1993. A description of each of the strategies follows:²

Strategy #1: Option Roll

This strategy involves purchasing put options with 65-70 calendar days remaining until expiration, selling them four or five weeks later, and rolling the hedge by purchasing new puts again with 65-70 days until expiration. The revenues from the sale help to purchase the new put options. In times of rising oil prices, additional money is needed to roll the hedge. In times of declining oil prices, the revenues from the sale could more than cover the cost of the roll.

The \$500,000 loss limit practically allows an options position of 1000 - 2000 contracts, assuming out-of-the-money put options with premiums averaging between \$0.25 and \$0.50. The Treasurer's office chose to begin more modestly with 50 option contracts. Table I shows five cycles of an option roll strategy that Ms. Patterson and her staff tracked on paper before actual trading began:

Table I: The Option Roll

<u>Date</u>		<u>Size</u>	<u>Contract</u>	<u>Strike</u>	<u>Premium</u>	<u>Total</u>	<u>Cumulative profit (loss)</u>	<u>WTI price</u>
8/30/91	Buy	50	Nov '91 Put	\$21	\$0.24	(\$12,000)		\$22.14
9/30/91	Sell	50	Nov '91 Put	\$21	\$0.02	\$1,000	(\$11,000)	\$22.23
9/30/91	Buy	50	Dec '91 Put	\$21	\$0.21	(\$10,500)		\$22.13
10/31/91	Sell	50	Dec '91 Put	\$21	\$0.01	\$500	(\$21,000)	\$23.37
10/31/91	Buy	50	Jan '92 Put	\$22	\$0.22	(\$11,000)		\$23.15
11/29/91	Sell	50	Jan '92 Put	\$22	\$0.68	\$34,000	\$2,000	\$21.48
11/29/91	Buy	50	Feb '92 Put	\$20	\$0.25	(\$12,500)		\$21.31
12/31/91	Sell	50	Feb '92 Put	\$20	\$0.99	\$49,500	\$39,000	\$19.12
12/31/91	Buy	50	Mar '92 Put	\$17	\$0.24	(\$12,000)		\$19.12
1/31/92	Sell	50	Mar '92 Put	\$17	\$0.02	\$1,000	(\$28,000)	\$18.90

When oil prices were flat or increasing (the 1st, 2nd and 5th cycles), the options were sold at a lower premium than their cost. When oil prices decreased significantly (the 3rd and 4th cycles), the options were sold at a profit. Ms. Patterson's strategy was to buy out-of-the-money put options with strike prices \$1-\$2 below prevailing oil prices to minimize the cost. She chose options with a delta close to .25 which usually carried a premium cost between \$0.25 and \$0.35. Higher strike prices carry more expensive premiums and give greater protection. Choosing the optimal strike price is similar to choosing a deductible on an insurance policy. More protection results in higher insurance premiums.

Consider the 4th cycle in Table I. Fifty put options with a strike price of \$20 were purchased on November 29, 1991 with a February '92 expiration month. This position locked in a sales price of \$20.00 for 50,000 barrels of oil. Crude oil prices were trading at \$21.31 and the option

² For more details on the Texas strategies, see Linda Patterson's paper, "Oil Hedging Program, State of Texas," presented to the New York Mercantile Exchange's Managing Energy Price Risk Conference, April 21-22, 1994.

premium cost was \$0.25 per option. The position was offset on December 31, 1991 when oil prices had dropped to \$19.12. Since oil was trading below the strike price, the options had intrinsic value equal to the strike price of \$20.00 - \$19.12 = \$0.88. The options were sold for \$0.99, the extra \$0.11 reflecting the time value remaining in the options. The net result was a profit of \$37,000 which more than paid for the \$12,000 cost of the roll into the fifth cycle.

The cumulative paper trading profit for the five cycles in Table I totalled \$28,000. However, when this strategy was actually implemented from April 1992 through April 1993, a loss of about \$35,000 was accumulated. The automatic option roll strategy proved to be too costly to administer in its rigid format and was discontinued. The strategy worked well during sharply declining price periods; but when prices were less volatile, the strategy effectively followed the market due to the strict rollover requirement and the near expiration date.

Strategy #2: Market Timing

The Market Timing strategy is similar to the Option Roll strategy as it also involves setting an oil price floor by purchasing put options. But this strategy allows flexibility in the timing of the trades and the quantity of options traded. The State Depository Board limited the number of barrels of oil to be hedged by this strategy to no more than 100,000 barrels (100 contracts) during the pilot program.

Trading began in April 1992 and usually involved 20 contracts per trade. The Treasury staff bought and sold options based on their best assessment of current events, industry information, and oil price projections. If oil prices were above the state budgeted level and expected to stay above, no puts were purchased. If concern over falling oil prices increased, three month contracts on out-of-the-money puts with an option delta close to .25 were purchased. If oil prices fell, more contracts were added which provided multiple protection points utilizing the three current contract months. Positions were monitored daily; sometimes the options were sold to recoup part of the cost and sometimes the options were held until expiration.

The first six trades were allowed to expire thereby compiling net losses of \$44,697. The trading strategy then shifted toward shorter times to expiration and shorter holding periods as the Treasury staff learned how to read the market more effectively. During October through January, crude oil prices fell sharply and about half of the initial losses were recovered by selling the options at higher premiums than their original costs.

The Treasury Department received approval to continue this strategy beyond the pilot period. For the period April 1992 through March 1994, the average cost of options purchased was \$0.34 and the average price received from offsetting the options was \$0.50, a gain of \$0.16 per barrel. For the 60,000 barrels of oil that were hedged, Texas essentially received an average net sales price of \$19.11 rather than the marketplace average price of \$18.95.

Strategy #3: Commodity Swap

In October 1991, the average price of oil was \$23.23 and long term swaps could be made locking in oil prices above the state budgeted amount of \$21.00 per barrel. In this paper trade, Texas theoretically had a swap contract with First Chicago on 100,000 barrels per month (100 contracts) at a price of \$21.05 for the period March 1992 to September 1993. Texas would have benefited greatly from this swap as market oil prices fell and averaged \$20.20 during this period. For the 18 months, a total of 1,800,000 barrels would have been sold at \$0.85 above the market average for that time period bringing a net increase in revenue to the State of \$1,530,000.

If the Treasury Department had begun the swap paper trade when option trading began in April 1992, the swap price would have been lower. The best price that could have been achieved would likely have been around \$20.00. By June of 1992, however, oil prices were again higher and a swap

price of \$21.05 or more could likely have been locked in.

Strategy #4: Straddled Costless Collar

The costless collar uses a combination of put and call options that yields an insurance policy with a minimal cost. The collar refers to a range of oil prices with a put floor and a call ceiling. The revenue from the sale of the call option defrays the cost of the put option and the combination can be near costless, hence the name.

In a standard collar, the put option establishes a minimum price for oil while selling the call option gives away the upside potential. The *straddled costless collar* downsizes the range of the collar and uses some of the proceeds from the sale of a call to purchase a second call above the first call's strike price. The upside potential above the higher call's strike price is thus recaptured. The maximum loss is limited to the difference between the strike prices of the calls.

Texas traded a straddled costless collar on paper from September 1991 to April 1993. Selling an out-of-the-money call was used to finance the purchase of an out-of-the-money put and a long out-of-the-money call. The long call strike price was usually set one dollar higher than the collar's short call. A market timing approach was used to place about 50 collars each month. If oil prices stayed within the collar, the long call and long put could be left to expire worthless, but the short call needed to be closed out. If oil prices fell below the floor established by the put option, or above the long call's strike price, the options could be sold for a profit. Of the 22 collars that were placed, the majority generated a positive cash flow, meaning the revenue from the short call exceeded the combined cost of the long call and long put. The sum of the placement revenues for all collars totalled \$27,500. The returns from all liquidated and expired positions totalled \$241,500. For an average of 50,000 barrels of oil that were hedged each month for 19 months, the returns were \$0.25 per barrel. If all of the State's severance revenue had been hedged, the strategy would have returned \$11 million.

Actual trading of the Straddled Costless Collar began in the fall of 1993 during sharply falling oil prices. Table II illustrates a collar that was placed on November 10, 1993 when crude oil was \$16.93 per barrel.

Table II

Date		Size	Contract	Strike	Premium	Total	Cumulative profit (loss)	WTI price
11/10/93	Sell	100	Jan '94 Call	16.50	0.95	95,000		\$16.93
11/10/93	Buy	100	Jan '94 Put	16.00	0.23	(23,000)		
11/10/93	Buy	100	Jan '94 Call	17.00	0.63	(63,000)	9,000	
12/10/93	Buy	100	Jan '94 Call	16.50	0.00	0.00		\$14.52
12/10/93	Sell	100	Jan '94 Put	16.00	1.48	148,000		
12/10/93	Sell	100	Jan '94 Call	17.00	0.00	0.00	157,000	

The Treasury Department sold 100 January call options with a strike price of \$16.50 for a total premium of \$95,000. They bought 100 put options with a \$16.00 strike price for \$23,000 and 100 call options with a \$17.00 strike price for \$63,000. The net placement proceeds totalled \$9,000. By December 10th, oil prices had dropped to \$14.52 and the hedge was offset. The premiums on both calls had fallen to zero and the puts were sold for \$1.48 each. Thus, for the 100,000 barrels of oil that were hedged, an effective sales price of \$16.00 (the \$14.52 spot price plus the \$1.48 put premium) was achieved. The placement proceeds of \$9,000 plus the revenue from the sale of the put options yielded a cumulative profit of \$157,000.

Evaluation of the four strategies

At the end of the pilot program, Ms. Patterson summarized the four strategies as follows:

- #1 Option Roll: Inflexible, structured, and ineffective. Discontinue.
- #2 Market Timing: Flexible, provides price floor insurance, and utilizes market decisions. Continue.
- #3 Commodity Swap: Guarantees a fixed price, but eliminates upside potential. Continue to monitor. Has potential especially when combined with other tools.
- #4 Straddled Costless Collar: Sets a price floor, captures upside potential, flexible, and cost effective. Continue.

The Treasury staff discontinued the Option Roll strategy in the Spring of 1993 and continued with the Market Timing purchase of puts. They implemented the Straddled Costless Collar in the fall of 1993. The program lost some momentum in the Spring of 1994 when Linda Patterson left the Treasury to begin her own consulting business. John Massey has recently taken over the program and pledges to once again put it on a front burner.

II. A Hedging Strategy for Alaska

If hedging is good for Texas, it must be even that much better for Alaska, since Alaska's exposure to oil price volatility is greater. The statistics are sobering. At current oil prices, oil revenues fund 75 percent of the state's budget and a \$1 change in the price of oil over a year's time period affects state revenue by \$130 million. The Department of Revenue estimates FY 1995 oil production at 1.572 million barrels per day and an average sales price for ANS oil of \$16.84. This combination should yield \$1.423 billion in oil revenues out of expected total revenues of \$1.893 billion.

Alaska's relationship with the major oil companies is unique, because the state owns most of the land that produces oil. About half of Alaska's oil revenue comes from its royalty ownership interest and the other half is derived primarily from severance (or production) taxes. Property taxes and state income taxes also contribute modestly to the total oil revenue. Alaska's revenues are collected at the petroleum production wellhead which subtracts transportation costs (tanker costs and TAPS tariff) from the sales price.³

Legislative history

The Alaska State Legislature held its first oil hedging seminar 1985. At that time, oil experts commended the State for being so forward thinking but warned that the crude oil futures market was not yet developed enough to hedge a position the size of Alaska's. They also explained that basis risk might be a problem as futures trading was based on West Texas Intermediate (WTI) oil, not ANS oil and the two oil prices don't always track together.

Alaska continued to monitor hedging possibilities as the oil futures market expanded and as the options and swaps markets developed. Hedging a position the size of Alaska's is no longer a problem with any of these tools. Basis risk remains a concern, but studies indicate that oil price level risk is significantly greater than basis risk and that Alaska can indeed benefit from a hedging strategy. Alaska held hedging seminars during the 1993 and 1994 legislative sessions and a resolution to create an Oil Hedging Task Force was drafted towards the end of the '94 session. While the resolution was never introduced, several legislators remain supportive of hedging and are encouraging the newly established Long Range Financial Planning Commission to consider hedging as part of an overall

³ For more details, see Chuck Logsdon's paper, "Alaska's Relationship With The Major Oil Producers."

financial plan.

Learning from the Texas Experience

Alaska can learn a great deal by studying the Texas experience. The Texas Legislature and the Treasury Department are to be commended for making a cutting edge move. Problems are also evident, however. The program: (1) does not utilize the most effective hedging tool; (2) is too complex; and (3) is too speculative.

Futures are more effective than options

A futures strategy is more effective than an options strategy for state budgeting purposes. Each futures contract that is sold guarantees the price that will be received from 1000 barrels of oil. Instead of purchasing insurance on that oil in the form of options, the actual sales revenue is known to the penny with futures. The other main advantage is that futures contracts can be sold for several years into the future, whereas options contracts are only liquid for the near six months.

While SB 1033 allowed for the sale of futures contracts, the exposure limit of \$500,000 and the loss limit that was raised to \$5 million effectively disallows hedging through futures. A futures hedging strategy requires looser reins as margin calls may need to be met. An exposure limit or a loss limit could force the liquidation of futures contracts at the worst possible time, like being forced to sell a stock portfolio just after a market crash. If a futures strategy is adhered to for the long run, however, the net effect of the cash inflows and outflows resulting from changing oil prices is expected to be near zero. Although a futures strategy involves larger cash flows than an options strategy, a long run time horizon reduces the risk of the strategy, just as a long run horizon reduces the risk of investing in a portfolio of stocks.

Keep it Simple

The Texas program is too complex. Note that the program lost its momentum due to staffing changes in the Treasury Department. Turnover can always be expected in Government, and a hedging strategy should be kept simple enough that it can easily continue despite staffing changes. Another advantage of a futures strategy is its simplicity. Selling futures contracts simply means that a future sales price of oil is being guaranteed. Hedging with futures can be easily explained and administered. Rather than the daily monitoring required of the Texas program, a futures strategy could be as simple as one trade per month.

Don't Speculate

Another word for the market timing philosophy of the Texas program is speculation. No one has a crystal ball. The administrators of a state hedge program are not likely to be able to forecast future oil prices better than the futures prices of the commodities exchanges. An attempt to do so is speculative, and the purpose of a state hedge program is to *hedge*, not to *speculate*.

A Plan for Alaska

For Alaska to derive the most benefit from hedging, the State should sell futures contracts at least 18 months into the future. This way, the legislative budget planning and revenue forecasting processes can be integrated. The Alaska State Legislature convenes for 120 days from mid-January through mid-May. A significant amount of time is wasted during the session since the budget for the upcoming fiscal year (July through June) depends on future uncertain revenue. In March, a future expected (but often inaccurate) revenue figure is usually agreed upon and the budget deliberations then begin in earnest. Imagine the savings of time that would occur if the revenue for the upcoming fiscal year could be accurately forecast in January.

A futures example

On an annual budget of about \$2 billion, unexpected oil price decreases can erase one-fourth of the state budget. This occurred in fiscal year '94 which began July 1993. In March 1993, the Alaska Legislature budgeted operating and capital expenses for the upcoming fiscal year based on a mid-case oil price forecast of \$18.38 per barrel. But by mid-December, Alaska North Slope (ANS) prices had dipped to \$9.76. When the legislature convened in January, they were faced with an expected deficit of more than \$500 million. Most of the deficit could have been avoided if oil prices had been hedged with futures at the time the legislature voted on the budget.

In March of 1993, crude oil futures prices based on West Texas Intermediate oil varied from \$19.90 to \$19.98 for Alaska's upcoming 1994 fiscal year. To lock in those prices, Alaska could have sold futures contracts for each month in the coming fiscal year. As ANS oil is sold in the normal way, the futures contracts would be purchased to offset the previous sales. The profit on the difference between the sales and purchase prices of the futures contracts then offsets the loss Alaska experiences when oil prices decrease. Consider what could have happened had Alaska sold 12,000 futures contracts for each month in the '94 fiscal year (12,000 contracts represents 12 million barrels, Alaska's approximate monthly position in oil) and repurchased the contracts month by month at the monthly average price.

Futures Contract Month	Futures Sales Price	Futures Purchase Price	\$ Profit per Barrel	\$ Profit for 12,000 contracts	\$ Cumulative Profit
July '93	19.93	17.91	2.02	24,240,000	
August	19.98	18.23	1.75	21,000,000	45,240,000
Sept.	19.98	18.71	1.27	15,240,000	60,480,000
Oct	19.98	16.92	3.06	36,720,000	97,200,000
Nov	19.97	15.43	4.54	54,480,000	151,680,000
Dec	19.96	14.13	5.83	69,960,000	221,640,000
Jan '94	19.94	15.42	4.52	54,240,000	275,880,000
Feb	19.92	14.48	5.44	65,280,000	341,160,000
March	19.91	14.88	5.03	60,360,000	401,520,000
April	19.90	16.40	3.50	42,000,000	443,520,000
May	19.90	17.88	2.02	24,240,000	467,760,000
June	19.91	19.07	0.84	10,080,000	477,840,000

Alaska could have earned profits up to \$5.83 per barrel on the difference between the sales prices and the purchase prices which could total approximately \$478 million by the end of the fiscal year. This profit on the futures contracts would go a long ways toward offsetting the reduced oil revenue from the physical sales of ANS oil.

Keeping the Strategy Simple

The above example glorifies the hedging concept in that all months in the upcoming fiscal year were hedged at once and in an advantageous market timing way. An ongoing hedging plan for Alaska is not structured this way. Rather, once the plan is ongoing, only one month (the farthest one out) is hedged at a time. As each near month expires, the one 18 months out is hedged. This structure has several advantages: (1) Simplicity; (2) Eliminates market timing; and (3) Averages out price volatility.

The plan is simple as only one trade per month need occur. When each near month expires, the one 18 months out is hedged which eliminates any market timing. Rather, the strategy is on auto pilot. Because the month that is hedged is 18 months out, the strategy also automatically smooths out oil price volatility. Consider the following three snapshots in time to see that more distant futures

contracts are not as volatile as near contracts.

Falling

October 9, 1990

ANS cash 34.77
WTI cash 38.72

WTI futures for...

Nov 38.69
Dec 37.30
Jan 91 35.85
Feb 34.46
Mar 33.13
Apr 31.88
May 30.73
June 29.68
July 28.75
Aug 27.95
Sept 27.27
Oct 26.77
Nov 26.35
Dec 26.02
Jan 92 26.02
Feb 25.47
Mar 25.22
Apr 24.99

Flat

March 22, 1993

ANS cash 16.65
WTI cash 19.53

WTI futures for...

Apr 19.52
May 19.76
June 19.86
July 19.93
Aug 19.98
Sept 19.98
Oct 19.98
Nov 19.97
Dec 19.96
Jan 94 19.94
Feb 19.92
Mar 19.91
Apr 19.90
May 19.90
June 19.91
July 19.91
Aug 19.90
Sept 19.98
Dec 19.87
Mar95 19.86
June 19.85
Dec 19.90

Rising

December 17, 1993

ANS cash 9.94
WTI cash 13.91

WTI futures for...

Jan 94 13.91
Feb 14.42
Mar 14.83
Apr 15.15
May 15.44
June 15.72
July 15.96
Aug 16.17
Sept 16.38
Oct 16.58
Nov 16.77
Dec 16.92
Jan 95 17.06
Feb 17.21
Mar 17.36
Apr 17.51
May 17.66
June 17.81
Sept 18.11
Dec 18.41
Ju 96 18.83
Dec 19.29

Futures prices are similar to the forward yield curve on interest rates in that they can be falling, flat, or rising. The drop in oil prices during the fall of 1993 created a rising futures curve. While the nearest futures contract dropped by \$6, the contracts two and a half years out decreased by less than one dollar. Flat futures prices exist when oil prices are neither expected to increase nor decrease. On March 22, 1993, for example, most of the contract months were within pennies of each other. Falling oil prices existed in the fall of 1990 when near term prices were inflated during the Persian Gulf crisis. While the nearest WTI contract sold for \$38.69, the farthest out contract sold for almost \$14 less at \$24.99.

Getting started

Once a futures hedging program is in place, it is easy and low risk to maintain one month at a time. Getting started with the program is riskier. Hedging all 18 months at once introduces market timing and is speculative. This would be similar to investing all your money in the stock market at one time not knowing if you're investing at a market peak or trough or somewhere in between. To reduce this risk, the investment strategy of dollar cost averaging could be simulated. During the first year of the program, 5-10% of the total amount to be hedged could be added each month until the desired hedge ratio is achieved.

Deciding on the long term desired hedge ratio is one of the few decisions that must be made in this strategy. Hedging 100% of expected production is usually not advised. Actual production can be less than expected and might leave an overhedged position. Following strategies that have been

developed in the agricultural commodities markets for more than a century suggest hedging about 75% of expected production.

Basis risk

Basis risk (the risk that ANS and WTI oil prices do not track exactly together) was mentioned as a concern by the experts that spoke to the Alaska Legislature in 1985. At that time, oil prices were in the mid-thirties. By the summer of 1986, oil prices had dipped below \$10 per barrel and the experts were apologizing for their exaggerated concern over basis risk. Price level risk has continued to dominate basis risk since then. Oil prices have ranged from \$9 to \$41 per barrel whereas the basis difference has ranged from \$0.80 to \$4.20. In other words, relative to price level risk, basis risk is unimportant in the long run. The long run view reduces basis risk as positive changes in the basis average out negative changes in the basis.

Concern over basis risk should not keep Alaska from hedging. Now, Alaska is totally speculating in oil and experiences both price level risk and basis risk. A futures hedging program at least eliminates price level risk.

Concluding Comments

Alaska should follow the cutting edge example set by Texas and implement a hedging strategy, since Alaska is even more exposed to oil price volatility. The futures, options and swaps markets in crude oil have grown substantially and any of these tools could now hedge an exposure the size of Alaska's. A hedging strategy based on any of these tools or a combination of these tools could vastly improve the budgeting process of the State.

The Texas program is currently based on options strategies which can be compared to the insurance concept. The Texas strategy of the Straddled Costless Collar is innovative and meets many of the needs of the State. However, the strategy is complex, time consuming, and speculative.

A futures strategy is judged to meet state needs better than either options or swaps. Swaps have been recommended to Alaska as a hedging tool by previous consultants since the terms of the contract can be customized. Swaps have the following disadvantages, however, when compared to futures: (1) higher transactions costs; (2) no anonymity; (3) little liquidity; and (4) exposure to the credit risk of the swap partner.

Alaska should make a long term commitment to a hedging policy with as few restrictions as possible. Taking a long run view reduces much of the risk of a futures hedging program. Over a five to ten year time horizon, positive and negative changes in the price level of oil will average out and positive and negative changes in the basis relationship will average out.

III. References

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