



MACQUARIE

Building Blocks for Risk Management

April 2010

ENERGY MARKETS DIVISION



Macquarie Group

A DIVERSIFIED, GLOBAL FINANCIAL SERVICES ORGANIZATION

MACQUARIE GROUP AT A GLANCE

- Global provider of banking, financial advisory, investment and funds management services in all major financial markets
- Macquarie Group Limited, Australian Securities Exchange-listed (ASX: MQG)
- Total assets under management ~ \$US299 billion¹
- More than 14,600 employees in over 28 countries globally
- Macquarie Group comprises Macquarie Bank Limited and its affiliates and subsidiaries



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Building Blocks

DESIGNING A HEDGE STRATEGY



- Swaps and options are paper transactions which overlay the underlying physical contract to yield the desired hedged profile
- A hedge strategy can combine swaps and options to fit the risk preferences of the hedge counterparty
- Considerations for determining an appropriate hedge strategy are:
 - Degree of protection required
 - Degree of up-side participation required
 - Balance of cost of up-side participation with cash resources
 - Balance of quantum and tenor of hedge with credit availability
 - Balance of quantum and tenor of hedge with reserves and projected production
 - Margined credit lines

Two key questions to ask when considering a hedging strategy

1. What protection do you require? (opportunity gain)
2. What are you prepared to commit? (opportunity loss)

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Building Blocks

SUMMARY CHARACTERISTICS OF COMPONENTS



SWAPS

- Fixed price at settlement
- An obligation
- Zero-cost
- 100% protection
- 0% participation
- Credit intensive

OPTIONS

- Variable price at settlement
- A right
- Up-front cost
- 100% protection
- 100% participation
- Bought options use no credit

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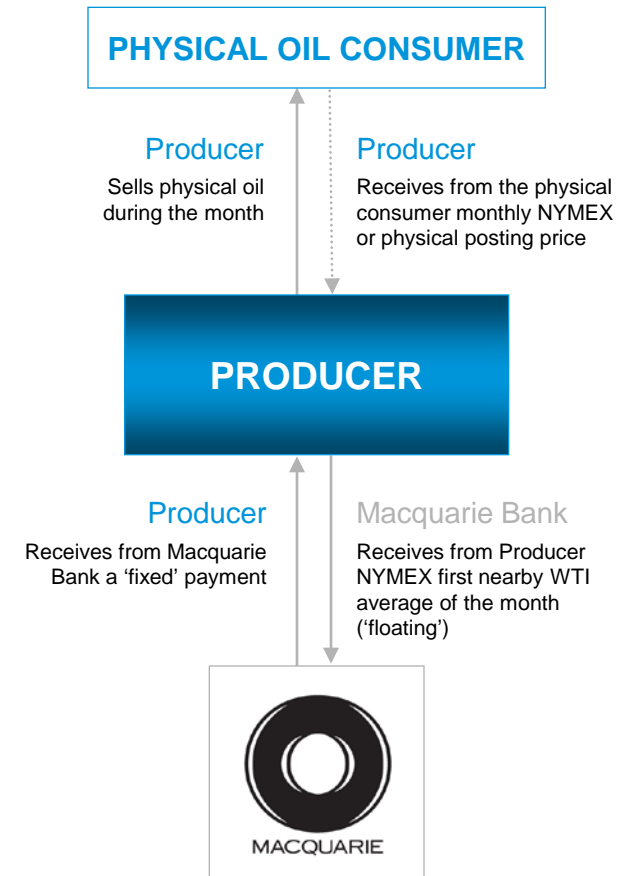


Building Blocks: Vanilla Swap

DEFINITION – PRODUCER SWAP



- A swap is a contract that involves the exchange, or ‘swap’, of periodic payments between two parties over a pre-determined period of time
- A producer swap involves the agreement of a **‘fixed’ price** which **Macquarie pays to the producer**
- The **producer pays the market or ‘floating’ price to Macquarie.**
- At each pre-agreed settlement date, the net **difference** between the ‘fixed’ and ‘floating’ cash flow is paid
 - If the ‘floating’ price is lower than the ‘fixed’, then Macquarie pays the net difference to the producer
 - If the ‘floating’ is higher than the ‘fixed’, then the producer pays the net difference to Macquarie



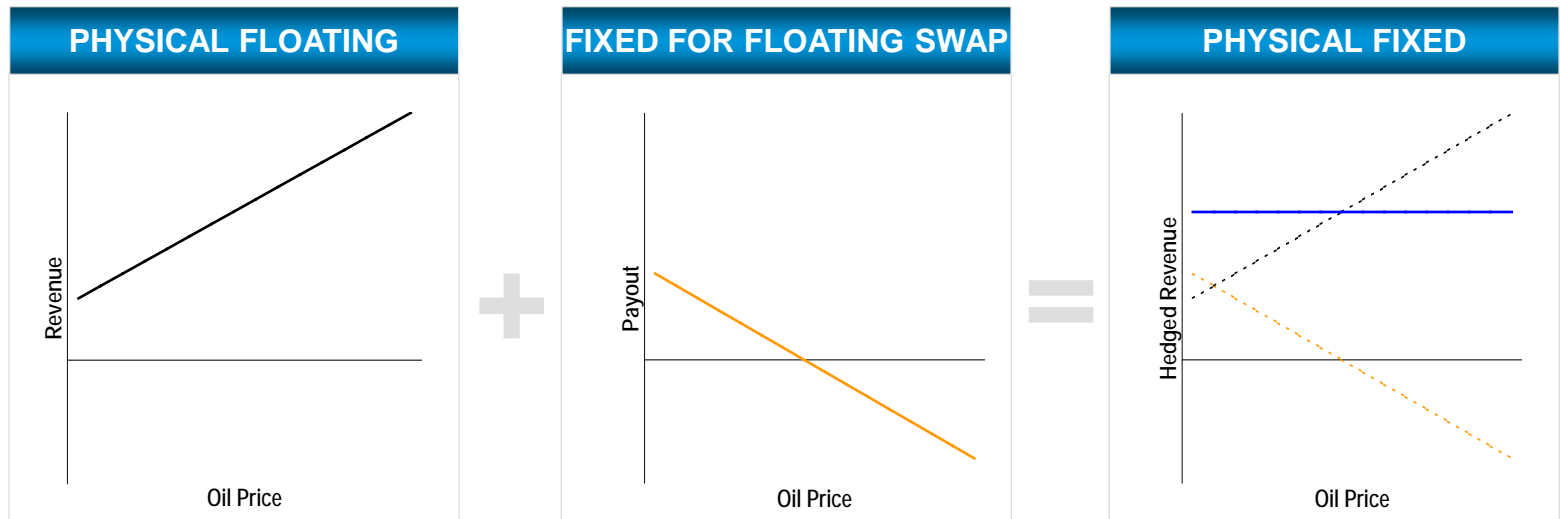
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Building Blocks: Vanilla Swap

PAYOUT DIAGRAM – VANILLA PRODUCER SWAP



- When considering the impact of a hedging strategy, the physical exposure and the derivative payout are combined to determine the overall hedged position



- Entering into a fixed-for-floating swap provides certainty of (net) revenue
- There is no net cost to the producer – the value of the downside protection gained is equivalent to the value of the upside participation foregone



Building Blocks: Option Strategies

BASIC DEFINITIONS



Put Option

- The buyer of a Put Option obtains the right, but not the obligation, to **SELL** at the pre-agreed strike price. For this right, a premium is paid to the seller of the put option
 - The buyer of a put option would exercise their right to sell at the pre-agreed strike price if the market is **lower** than the strike

In-the-money (ITM)

- A Put option is considered to be ITM, if the market price is **below** the strike price
- A Call option is considered to be ITM, if the market price is **above** the strike price

Call Option

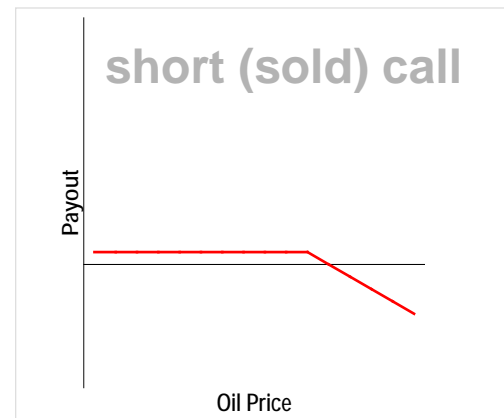
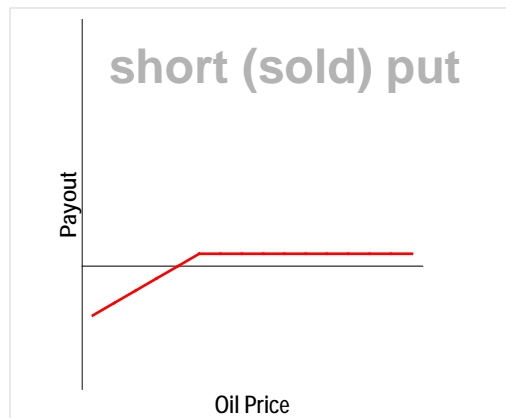
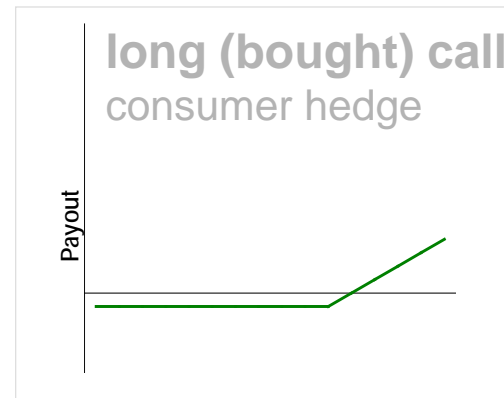
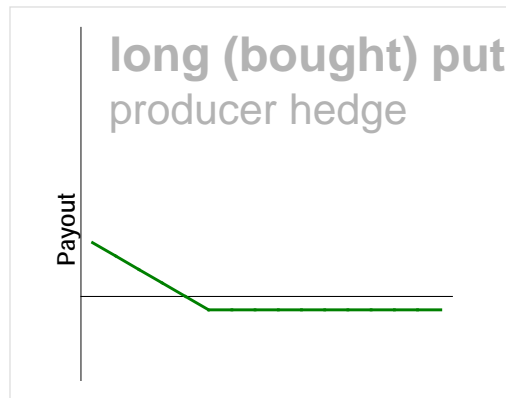
- The buyer of a Call Option obtains the right, but not the obligation, to **BUY** at the pre-agreed strike price. For this right, a premium is paid to the seller of the put option
 - The buyer of a call option would exercise their right to buy at the pre-agreed strike price if the market is **higher** than the strike

Out-of-the-money (OTM)

- A Put option is considered to be OTM, if the market price is **above** the strike price
- A Call option is considered to be OTM, if the market price is **below** the strike price



- Sold options raise money up front (via the premium cost) but carry large contingent liabilities
- Bought options are in the nature of an insurance premium – an up-front cost, but a potentially large payoff

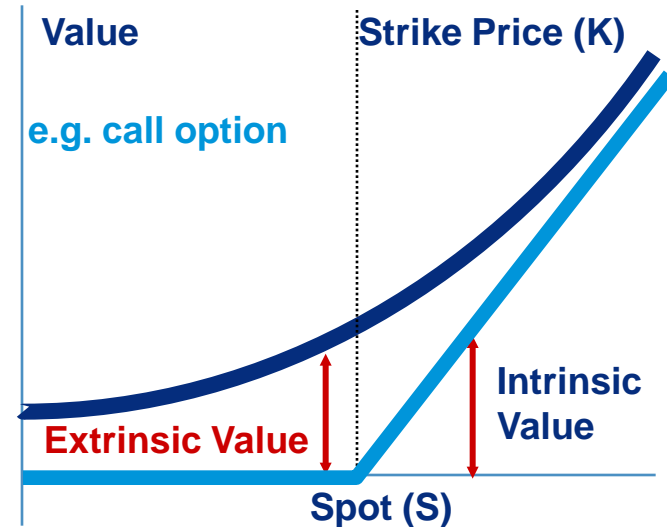


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The value of an option has two parts

- **Intrinsic value:** how much you would get if it was exercised today at prevailing prices
- **Extrinsic value:** represents premium value attributable to uncertainty, funding costs and time to expiration of the option. (aka “hope value”)



Five factors contribute to an option's value / premium

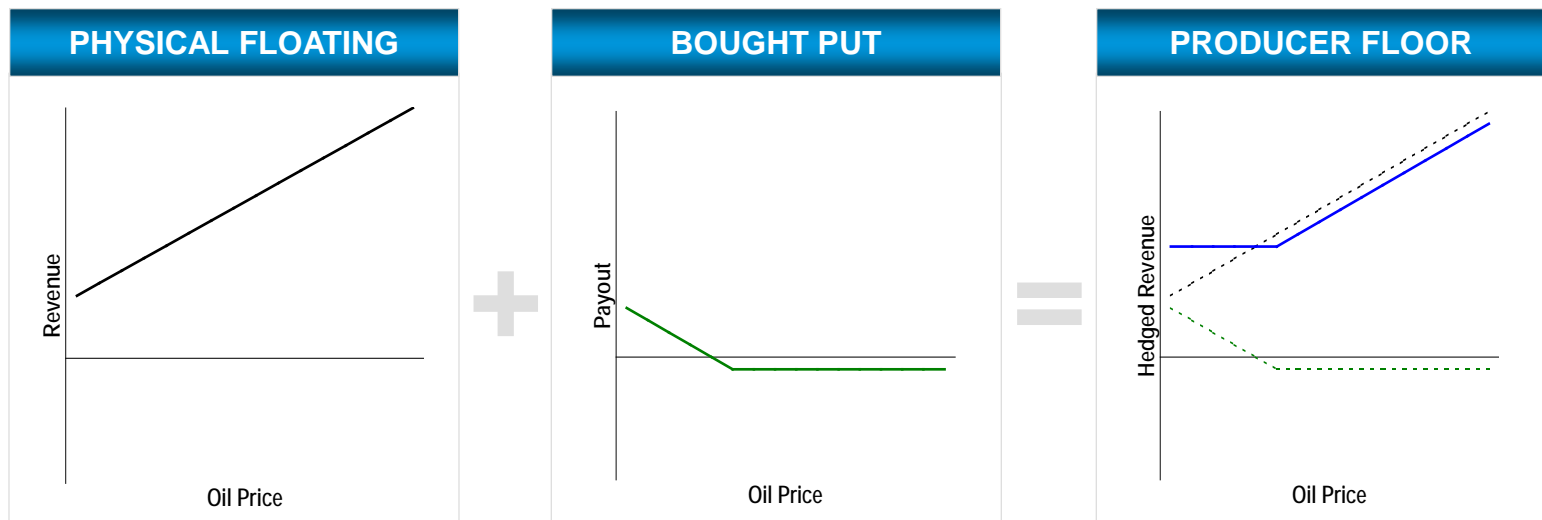
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|-------------------------|-----------------|--------|---------------------------|
| 1. Underlying Price (S) | Intrinsic Value | S ↑ => | Call Value ↑, Put Value ↓ |
| 2. Strike Price (K) | Intrinsic Value | K ↑ => | Call Value ↓, Put Value ↑ |
| 3. Volatility (σ) | Extrinsic Value | σ ↑ => | Call Value ↑, Put Value ↑ |
| 4. Time to Expiry (t) | Extrinsic Value | t ↑ => | Call Value ↑, Put Value ↑ |

Building Blocks: Option Strategies

PAYOUT DIAGRAM – BOUGHT PUT OPTION



- When considering the impact of a hedging strategy, the physical exposure (the potential of suffering a gain or loss) and the derivative payout are combined to determine the overall hedged position



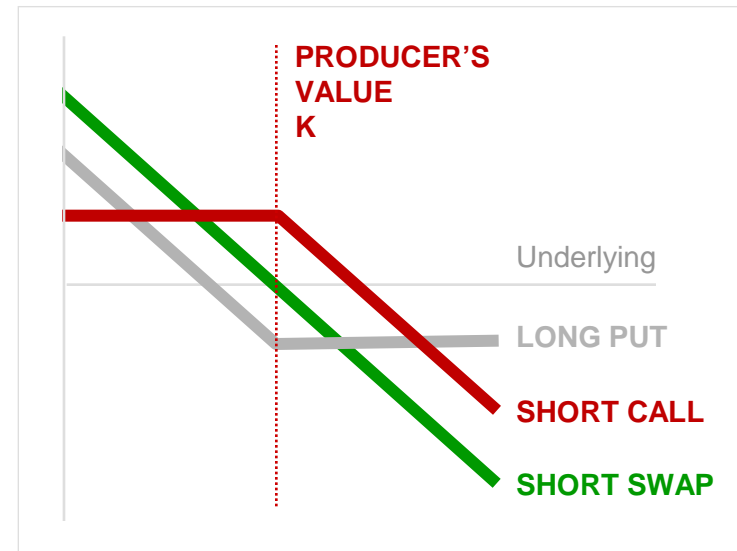
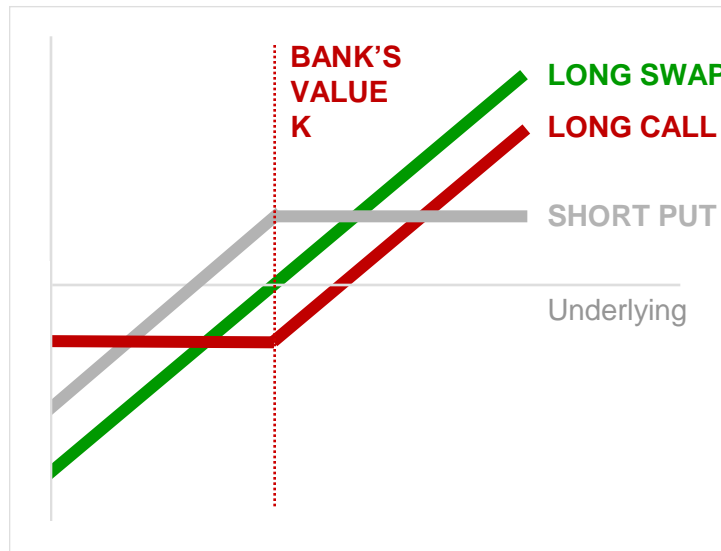
- Purchasing a put option protects against downwards movements in oil price



Building Blocks: Vanilla Swap

RELATIONSHIP TO OPTIONS: PUT – CALL PARITY

- The value of a Put and Call with the same strike price are related.
- Simple way of thinking about it:
 - **Long call** (@ Strike K) + **Short put** (@ strike K) = **Long Swap** (@ K): Bank's situation
 - **Short call** (@ Strike K) + **Long put** (@ strike K) = **Short Swap** (@ K): Producer's situation



- The underlying structure of a fixed-for-floating (producer) swap (at price K) can be thought of as:
 - Producer buys a put from Macquarie at strike K
 - Producer sells a call to Macquarie at strike K

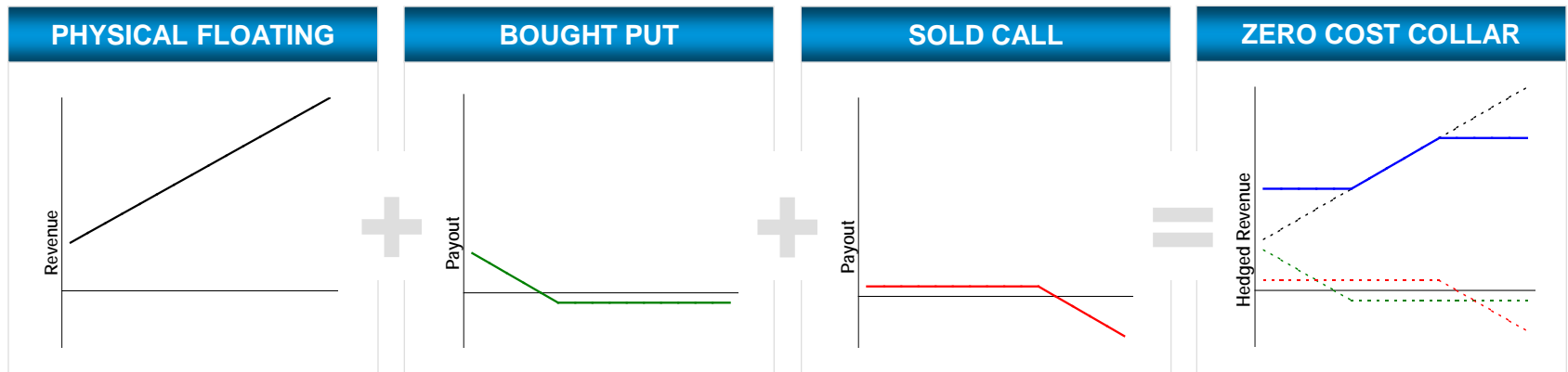
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Building Blocks: Zero Cost Collar

BUY A PUT, SELL A CALL, DIFFERENT STRIKES

- The ZCC payoff includes downside protection (via a put option) but has zero net cost:
 - Producer sells a call option (of value equivalent to the put option) at a higher price, thus capping upside
 - The result is similar to the relationship between a swap and a bought put / sold call – except the strike prices are spread away from the basic swap price, providing a degree of price participation



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Building Blocks: Other Simple Structures

COMBINATIONS OF PUTS & CALLS



- Zero Cost Structures
 - Three-Way
 - Buy a put, sell a call, buy a higher strike call
 - Producer receives a ZCC, but reparticipates in upside above higher strike call
 - Participation Swaps
 - Buy a put on X volume, sell a call at the same strike on a % of X volume
 - Producer receives a swap on desired volume, but participates in as % of the upside above that swap level
 - Participation Collars
 - Buy a put, sell a call, buy a higher call on a % of volume
 - Producer receives ZCC, but reparticipates in the upside on a % of the volume above the higher strike call

- Lots of different combinations of simple building blocks - ie puts, calls, swaps- can be done to meet specific needs

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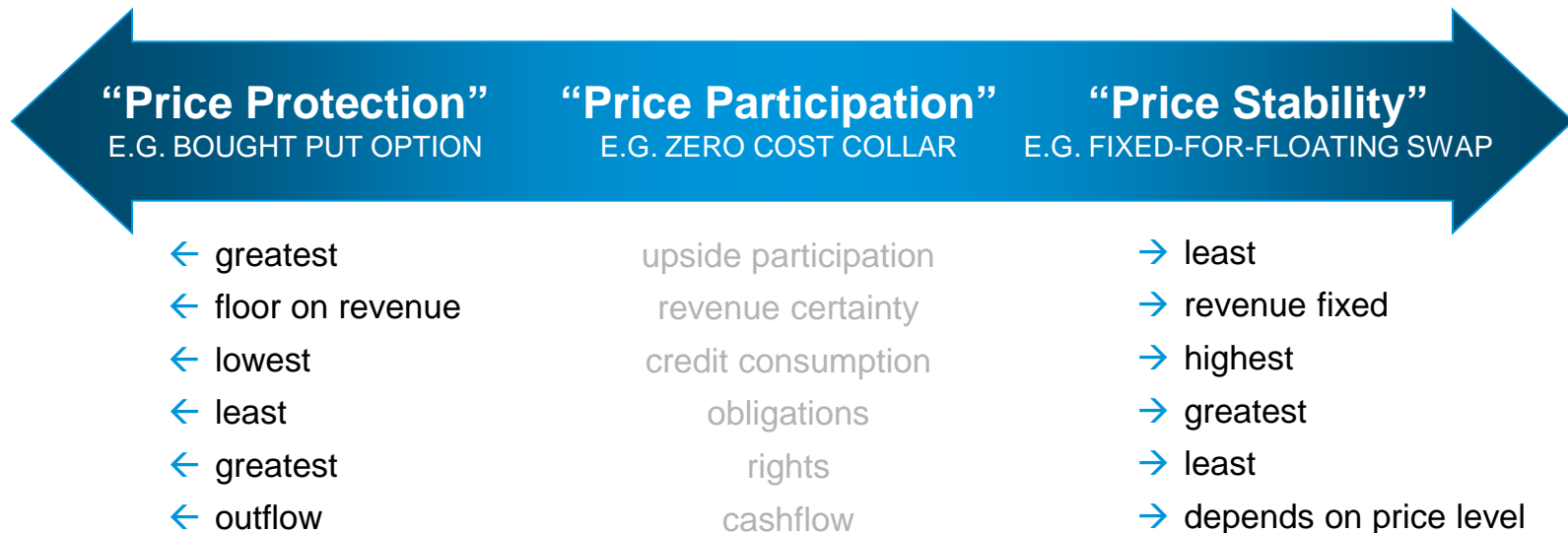


Building Blocks: Styles of Hedging

SPECTRUM FOR VANILLA PRODUCTS



From a producer's perspective, basic hedging products fall into three categories:



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Banks providing hedging services to producers consider the risks and obligations associated with the style of product in a credit analysis process:



- Establishing a line of credit with a hedge provider provides advantages:
 - Ability to enter into a hedge transaction at opportunistic moments – when prices high, or when an acquisition finalised
 - Equivalent to putting an overdraft or revolving line of credit in place with a lending bank

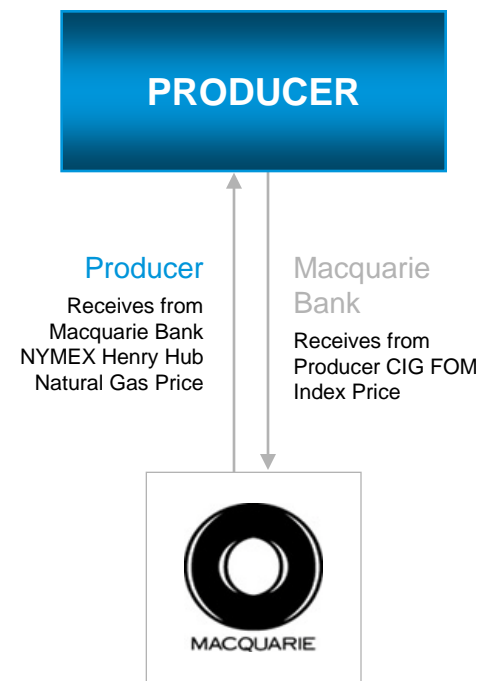


Building Blocks: Basis Hedging-

A NECESSITY IN THE ROCKIES



- Natural Gas – Basis very volatile, but markets developed to mitigate basis risk
 - Hedging products are available at major Rockies locations - CIG, NW Pipe- for 3-5 years
 - Simple building blocks of Swaps, Puts, Calls, and various combinations available on these basis locations
- Another Option – Basis Swaps
 - Same as vanilla swap except:
 - Producer receives floating NYMEX Henry Hub Price
 - Producer pays floating basis location price
 - If combined w/ Vanilla Swap then:
 - Floating NYMEX piece from Vanilla Swap & Basis Swap CANCEL each other
 - Producer receives fixed price, pays basis location price that matches physical sales
- Advantages
 - Potentially offered at more locations
 - Flexibility in designing NYMEX hedge program



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Building Blocks: Basis Hedging-

A NECESSITY IN THE ROCKIES



- Crude Oil – Very hard to hedge basis risk - traditionally basis has been stable in the Rockies – last 12 months not the case
 - Wyoming / WTI Basis “blew out” to more than – \$30.00/bbl!
 - California & Canadian Heavy Crude can be hedged, but there is a price

- How can you mitigate Crude Oil Basis?
 - Utilize hedge products w/ upside participation
 - Floors, Collars, Participation Swaps, Three-Ways, etc.
 - “Self” Hedge basis risk
 - Perform data/statistical analysis
 - Most heavy crudes trade as a % of WTI
 - If XYZ Crude historically = 80% of WTI, hedge a % of 80% of WTI
 - Solutions not perfect, but significantly better

Hedging in the Rockies can be very dangerous w/o basis hedging

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PHYSICAL

- Can be more attractive from accounting perspective
- Credit Benefits – Producers can net off physical accounts receivable against long term credit exposure
- Basis/Field Differential Risk Mitigated as hedge is a forward physical sale at location

VS.

FINANCIAL

- Generally better credit quality counterparties
- More liquid longer term markets
- Increased Product Offering
- Lending banks seek hedging business

→ BASIC DERIVATIVE PRODUCTS PROVIDE RISK MANAGEMENT ASSISTANCE TO OIL & GAS PRODUCERS

- put option – purchase an insurance policy
- fixed-for-floating swap – certainty of revenue at no up-front cost
- put/call combinations (zero-cost collar, etc.) – combination of participation and protection at zero up-front cost

→ A HEDGING FACILITY IS A IMPORTANT SOURCE OF CREDIT

- obligations and contingent risks on the producer represent a credit risk to the hedge provider
- an open line of credit provides a producer with flexibility to act
- Without an appropriate hedging facility producers may expose themselves to liquidity risks if the market moves significantly above hedge levels

→ HEDGING CAN BE A VERY VALUABLE TOOL, BUT MUST BE UTILIZED PRUDENTLY

- Many pitfalls exist – credit, basis, appropriate volume, understanding and utilizing the proper hedging tools



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