Oil & Gas Hedging

African Oil and Gas Summit

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KOCH SUPPLY & TRADING LP

OUTLINE

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KOCH

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PART 1

WHAT MEANS HEDGING?

DEFINITION

HEDGING is a FINANCIAL TOOL frequently misunderstood by its users.

HEDGING Oil & Gas Production means favorably narrowing the universe of potential outcomes for oil revenues.

THE CORNERSTONE: OIL FORWARD MARKETS

Today, 7 June 2010, I can find a price for an amount of barrels of oil of my choice to be delivered in 1 week, 1 month, 1 year, 10 years……

✓ *Observable independently…….*

✓ *Tradable ratably….*

✓ *Securely through a clearing mechanism or OTC*

✓*Can be financially settled*

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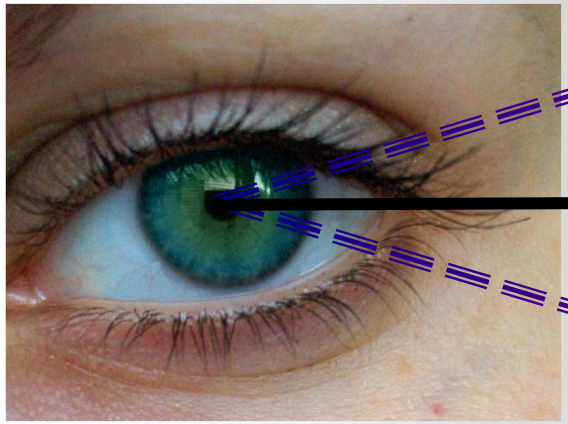
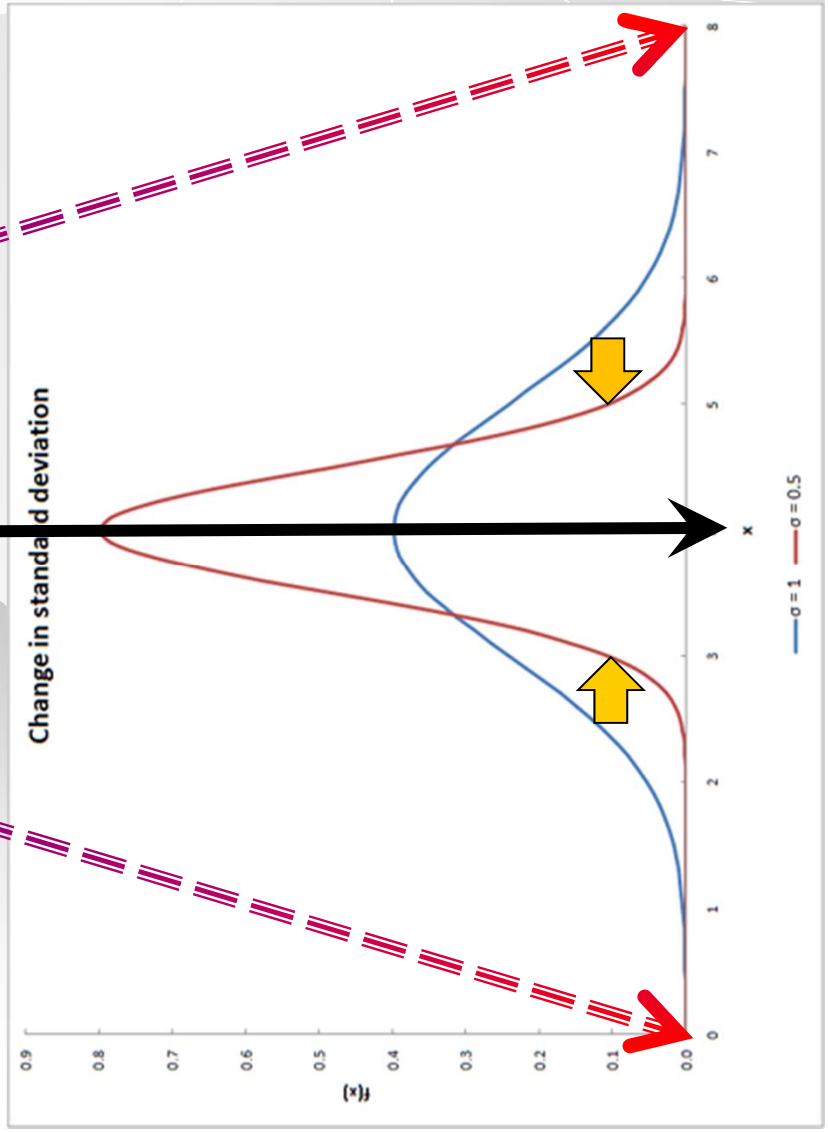
The Spyglass Analogy

Narrowing the potential future band of “hedged” revenues

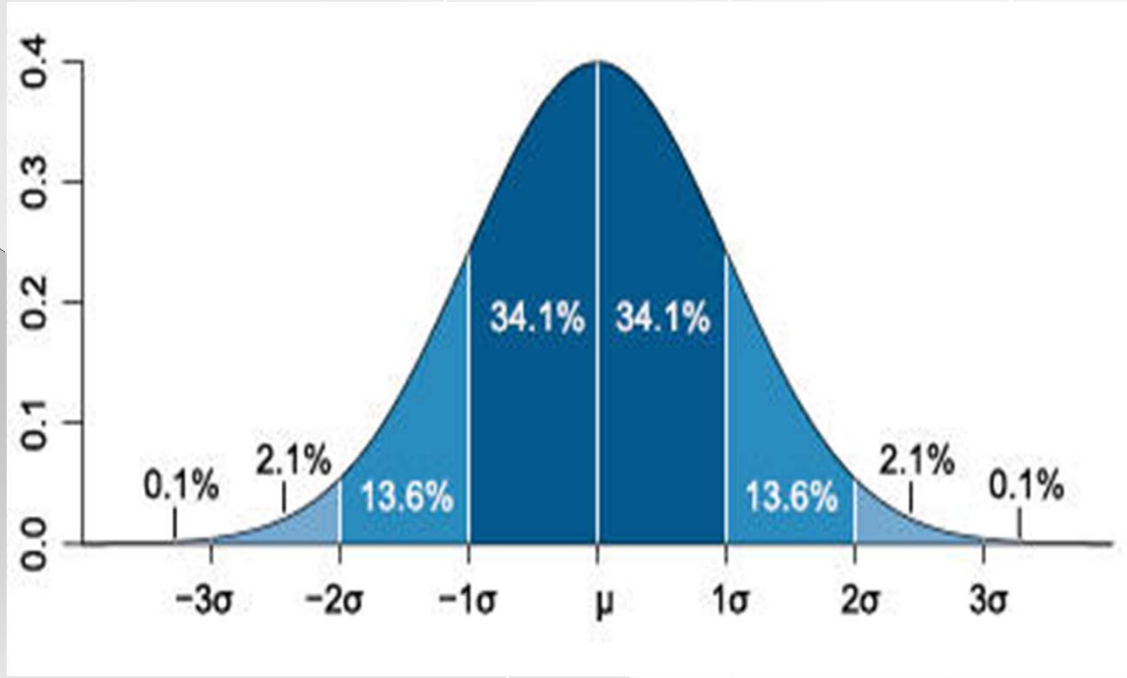




HEDGE EFFECT ON THE RANGE OF OUTCOMES

Final Objective is not Profit as a standalone trade!

«The objective of hedging is not to directly profit from a fall in the price of oil, but to curb one's exposure to the oil price variability»



Remove downside tail risk

HEDGING can have many faces

- INSURING against a price drop at a cost
- BRACKETING prices between a ceiling and a floor
- FIXING the future price of the production at today's forward market value.
- …hundreds of more bullet points if you let me…

But there are some immutable rules of thumbs:

1. YOU CAN ONLY CAPTURE TODAY'S FORWARD MARKET VALUES in any hedging structures.

2. FINANCIAL PERFORMANCE OF A HEDGE IS ONLY RELEVANT ONCE YOU PAIRED IT WITH YOUR PHYSICAL INCOME. (ONE COIN, TWO SIDES)

3. THERE IS NO FREE LUNCH! (IF IT LOOKS TOO GOOD TO BE TRUE, IT'S NOT)

PART 2

OIL FORWARD SHAPE, WHY IS IT PARAMOUNT?

Producer and Speculator: Keynes' Theory of Normal Backwardation (1930)

- Commodity markets are long, dominated by producers
- Producers sell forward at the discount to incentivize speculators
- Futures prices are biased expectations of future spot prices
- The bias is the risk premium speculators require to take on the risk from hedgers
- The natural state of commodity markets is backwardation
- Futures prices is expected to roll-up over the life of the contract

Producer Hedging in Practice

- US / Canadian independent producers have 700-800 mm bbl hedged
- Mexico reduced hedging to 230 mm bbl for 2010
- Other sovereign hedgers (Egypt, Angola) but smaller size
- Preferred hedge instrument is buying puts sometimes wholly or partly financed by selling calls
- Dealers carry large credit exposure in high price environment (right-way exposure)
- Credit exposure is typically collateralized by the reserves rather than cash

The Stress Risk of Regulation

- Upcoming mandatory clearing is nearly certain
- Large producers could be classified as major swap participants (MSP)
- MSP will have to post cash collateral unless exempt
- Producers not able to post collateral will have to curtail hedge programs
- The ultimate liquidity provider could be forced out of the market
- Short-term spikes in prices could be magnified by producers covering the hedges and buying back short calls
- Alternatively, producers will have to buy puts without call financing
- Dealers will be in a short gamma position and delta-hedging will further increase upward pressure on prices
- The tail risk is the highest when the market runs out of sellers

Increasing Cost of Hedging for Consumers

- Consumer hedging is widespread but more fragmented
- Airlines industry that operates on thin (or zero) commercial margin, is the largest corporate hedger
- Global airline industry hedges around 300-400 mm bbl
- Preferred hedge instrument often depends on credit environment
- Dealers charge premium for credit exposure on swaps causing airlines to buy more call options
- The lack of volatility sellers from producers and more stringent margin/capital requirements will lead to higher option premia
- Consumers will ultimately pay the costs of revised regulation

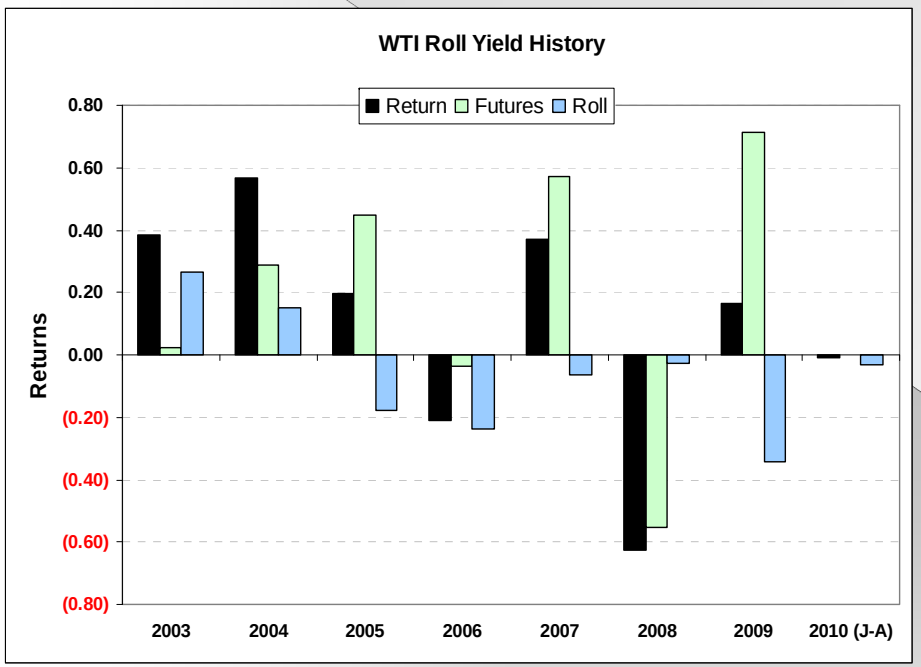
Investors: Applying Keynes' Theory

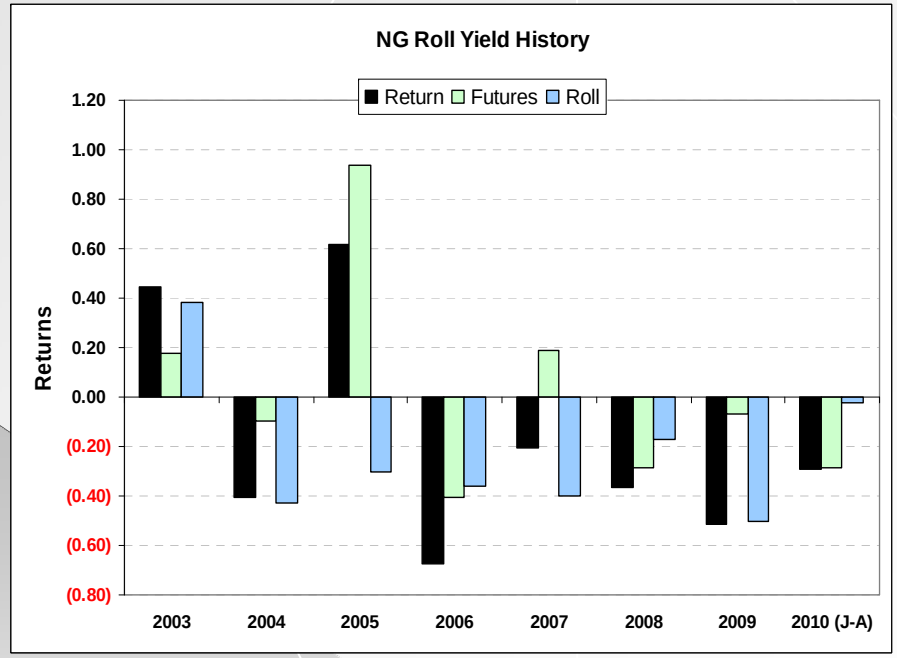
- Investors were attracted to commodity by backwardation
- Investments are linked to futures which have to be rolled prior to expiry
- Backwardation leads to positive roll-yield
- Consistently with Keynes, most of investors' returns came from positive roll-yield rather than price appreciation
- Attractive roll-yield and diversification properties caused explosive growth in commodity investments
- Commodities became a new investment class
- Nearly 800-900 mm bbl of petroleum products are held by commodity investors in GSCI and DJ-AIG indices (record high)
- Many other commodity indices exist
- Financial demand for commodities could grow much larger

The Modern Theory of Normal Contango

- Commodity markets are today dominated by investors
- Forward prices must trade at the premium to incentivize producers to sell!!
- The roll-yield is negative, commodity investment became very expensive
- Investors' objectives changed. The focus now is on hedging inflation/dollar hedge. Investor must pay premium to execute.
- Regulation will not be able to constrain investments in "paper" commodities but could hurt the liquidity providers
- The market forces will balance out unless intervened by regulation
- The risk premium will be paid by investors to warehouse oil until it becomes economical for investor to buy the warehouse
- New investment products will be developed to facilitate investors' access to the warehouse by-passing roll costs and regulatory constraints

“Costs” to Invest in Commodities





2009: speculator paid 34% and 50% to invest in WTI and NG

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Storage as Balancing Mechanism…Cash & Carry

- Investment in commodities exacerbates contango and incentivizes storage.
- Storage/warehouse owner is now the one who collects Keynes' risk premium from inflation hedgers. The less space in the storage, the higher the premium.
- Storage/inventory hedgers are marginal liquidity providers
- Owning a storage is equivalent to owning put on front-back spread. The strike price is the storage cost.
- The market developed financial instruments to balance supply and demand faster: CSO – calendar spread options
- Investors buy CSO as a hedge against negative yield roll
- Storage companies sell CSO, collect premium to finance physical assets
- Some investors are looking to buy CSO as synthetic storage to capitalize on high expected volatility and minimize own costs of investing in commodities

Investing in Other Real Options

- Many other commodity assets are similar to financial options:
- Production is a call option on crude oil, or natural gas (the choice to produce)
- Refining is a call option on product cracks
- Fractionation is a call option on NGL/gas spread
- Blending is a call option on products/NGL
- Storage is a put option on term-structure
- Pipelines/shipping are options on location spread

- Asset prices tend to lag financial options with similar cash flows. Opportunities will exist to structure the ownership of “paper” assets at attractive price. Valuation of assets will be closer tied to the prevailing volatility in the marketplace.

Part 2, Annex

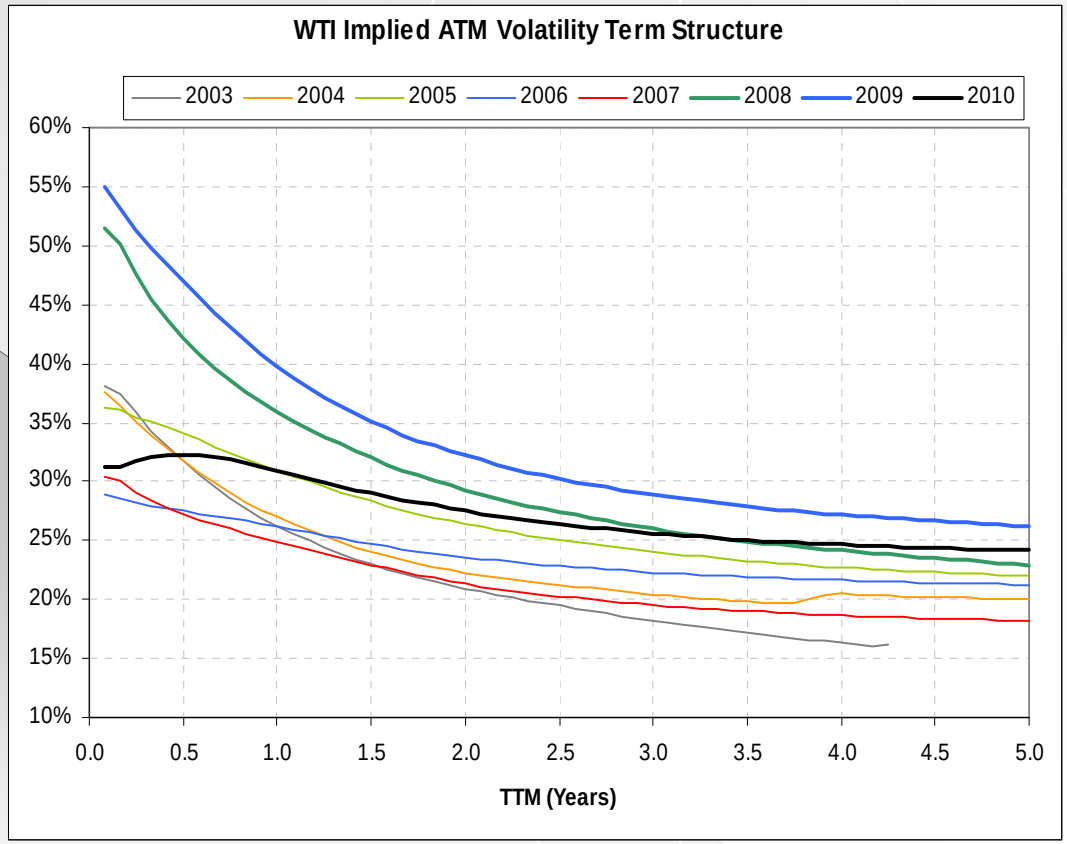
A WORD ABOUT VOLATILITY

The Theory of Normal Volatility Backwardation

- Commodity spot prices are assumed to be mean-reverting because of supply and demand balances
- Mean-reversion assumption is mathematically equivalent to exponentially decreasing term-structure of futures volatility
- The speed of mean-reversion determines the slope of the volatility term-structure
- Fast mean-reverting commodities (electricity, natural gas) have the steepest volatility curves
- Financial markets with no mean-reversion imply flat volatility curves
- Investors' domination of commodity markets is leading to profound changes in the volatility term-structure

Volatility Term-Structure Flattened

- Global de-leveraging in 2009 led to lower short-term volatility across asset classes
- Consumers bought less options as their own credit improved
- Forward volatility remains supported and reflect higher asset prices, lack of sellers, and high forward volatility driven by investor flows
- Volatility term-structure is flat which implies less long-term mean-reversion in the underlying commodities
- Regulation could cause volatility to be undersupplied



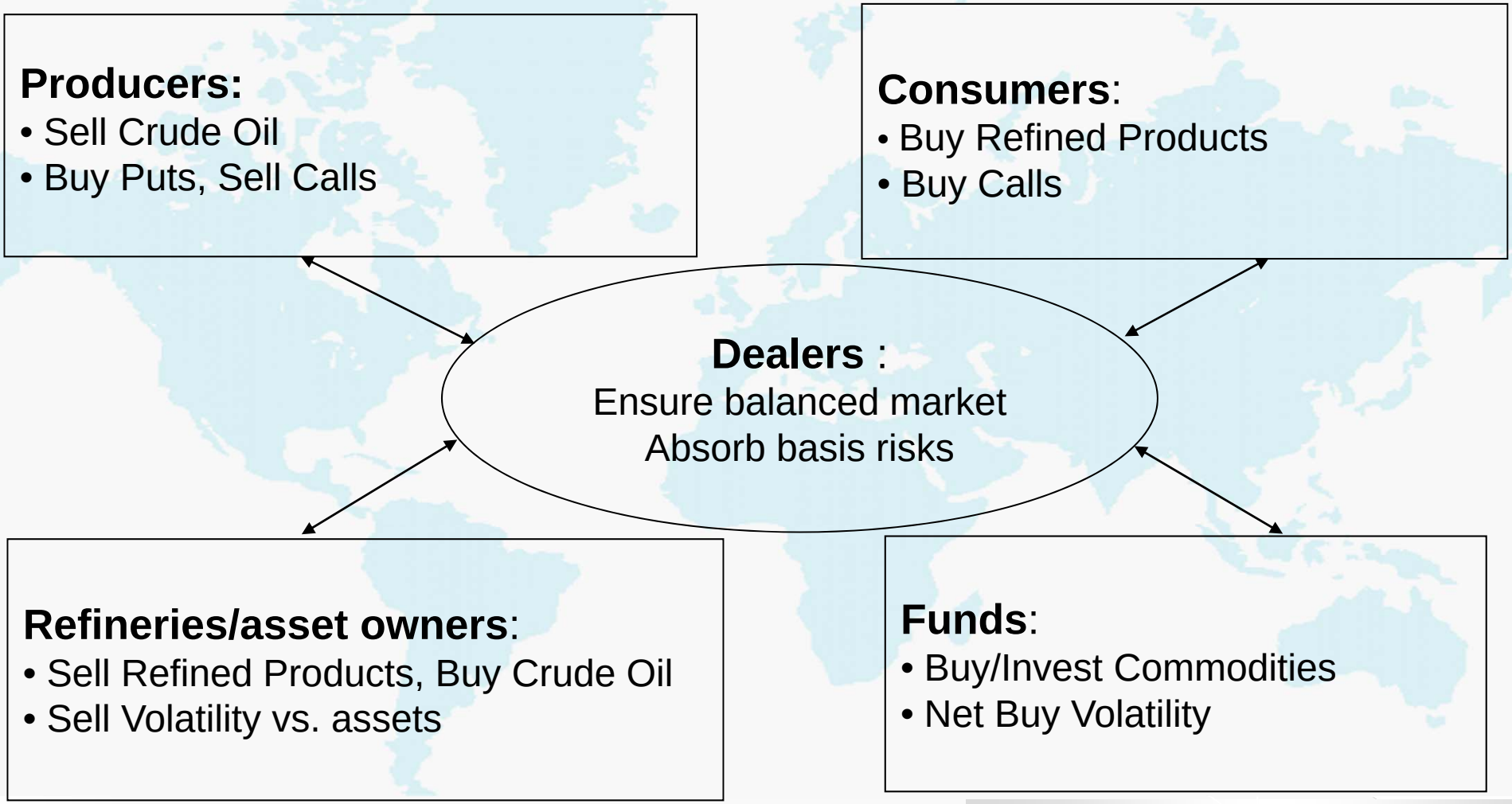
PART 3

WHY PRODUCERS HEDGE?

Energy Derivatives Market Participants

- Commercial risk managers
  - Producers (oil, gas, biofuels)
  - Refiners, storage operators, and transporters
  - Consumers
    - Airlines, shipping companies, freight railroads, trucking companies
    - Industrials, utilities and mining companies
    - Local distribution companies, retailers
- Non-commercials (speculators)
  - Global macro hedge funds (mostly discretionary)
  - Commodity trading advisors (mostly non-discretionary)
  - Index funds (passive, generally non-discretionary)
- Banking institutions – net liquidity providers, the earliest developers
  - Money-center and regional commercial banks
  - Broker-dealers (Wall Street firms), now mostly owned by bank holding companies
- Energy trading companies – net liquidity providers, more active in past decade
  - Non-regulated entities owned by utilities
  - Other physical traders (mostly owned by refiners and transporters)
- Credit intermediaries and advisors – no liquidity provision, more active recently
  - Aggregators
  - Risk-management consultants

Balanced Market Among End-Users



MARKET INCENTIVES FOR PRODUCERS

- Quasi-structural contango in oil forwards in recent years due to overcrowding of investors is only the beginning of the story:
- The nature itself of oil consumption global pattern are UNSTABLE:
- China, India and a few neighbors are undergoing their “industrial revolution” i.e. literacy, urbanization, infrastructure and logistical network building…which imply a volatile consumption pattern…
  - China has a strong flat price sensitivity (buy and store vs. keep quiet)
  - The car Discontinuity: once a threshold is reached on disposable income, the car consumption booms and with it many energy intensive secondary ricochets: asphalt building, motor gasoline consumption divergence…

The March EASTWARD

- Oil price elasticity depends strongly from world economic growth and its relative energy intensity.
- What is striking today is the massive dominance of China and India in oil consumption Growth versus RoW. This in turn implies deep rerouting of the physical oil flow patterns…creating further uncertainty…why?
- Re-routing from market-based pricing driven areas into “administered price driven zones ” through subsidies, imports licenses or duties, quotas, discriminatory taxation…..
  - e.g. Chinese and Indian refineries tax regimes (domestic vs. imports)
  - e.g. Russian Black vs. White products segregated export duties.

New Market Prices Imbalances

- Globally oil trade remains essentially market (price-) driven but across a narrower base for equilibrium purposes.
  - e.g. WAF grades alternative feast or famine depending on Asian pull
  - e.g. Sour grades relative strengths when OPEC tweaks quotas
- The trick is that all crude markers are by design in market-based zones!
  - And the LAST (Marginal) barrel prices ALL barrels

Fighting these destabilizing factors is pure illusion

- The US shale gas induced effect on Gazprom pricing through LNG balancing factor. Spot NG fell dramatically below FO/GO delayed formulas.
- Large European utilities hold hybrid supply portfolios (mix of long term contracts with some shoulder and crest take-or-pay contracts.
- When conjointly 2008 economic crises hit + US natural gas supply turned the country to the brink of re-exporting NG through LNG regasification facilities, European legacy Utilities had to honor the P part of the Take-or-Pay schemes which made them even more uncompetitive.
- It became so bad that Gazprom had to amend its pricing policy and consent to drop sacrosaint oil linkage for 15% of ToP flows for a FEW select Utilities!!

The OPEC factor, the delegates side.

- Striving to satisfy individual members goals while dampening naturally increasing oil price volatility in so far as
  1. Excess production capacity that can be ramped and supplied within 30-60 days is available
  2. Doing so doesn't cost an arm and a leg in terms of state budgets or market share versus other competitors (Russia 1986 KSA netbacks, etc…)

- 2007-2008: forget it. We reached $140/bbl Brent equivalent

- Good incentive to act as balancing agent to avoid 1998 precarious situation ($10-$12/bbl) or extremely high prices that foster investments in alternatives and raise the risk of emergence of disruptive alternative technology:
  - Oil Sands
  - Deep offshore
  - Bio-energy frenzy.

The OPEC factor, the NOCs side.

- In the background, nurturing of NOCs as the more credible “bras armé” of each participants with a view to autonomously develop domestic reserves.
- The side-effects are the internationalization of NOCs and the increased competition to go up the value chain to anchor developments for the local populations: starting with industries with high energy intensity or easily combinable with oil production:
  - Refining
  - Petchems
  - Al and other smelters
- Consequence: a quick elimination of C2-C3-C4 surpluses and a further imbalancing effect on the production side this time around.

Conclusion

- Consumption patterns and Production patterns both contribute to heighten oil price volatility and contributes to investment budgeting headaches, i.e.

    1. Wider price ranges
    2. Quickening pace of price changes
    3. No longer a straight mean-reversal price process for forward oil prices similar to what happened in 1985-2005

- Investors-induced contango a boon for producers hedging

- Hedge becomes a key ingredient of oil producer management policy:

PART 3 ANNEX

WHY DO SOVEREIGN DECIDE TO HEDGE?

Budgetary Process

Revenues are tied to oil prices whether directly by being physically allocated a portion of the oil production (in kind) or through earning royalties and taxes corresponding to dollar amounts paid when oil prices are in excess of a given threshold.

In both cases, it leaves the income fully exposed to the wide variation of oil prices. What do you do when you plan for the next year after oil hits successively $147 then $35 within a 6-month period?

Mexican hedging program part of 3-part public finance strategy

- Guaranteeing Sustainability
- Ensuring adequate Liquidity Management
- *Financial risk management*

Mitigate the effect of negative shocks, such as oil price volatility to fiscal revenues.

Forecasting, not entirely science yet, but no longer just an art.

Use all available information:

- Futures forward curves
- Implied traded volatilities and skew maps
- Historic pricing data reweighted by age
- IEA and other economic forecasts bracketed by confidence intervals.

the output is to determine a range of likely oil price averages

Mexican 2010 budget based on $59/bbl oil forecast

- Let's not forget the quality differential to the benchmarks and their own volatility…For example when OPEC cuts production sweet/sour balance gets affected and sour crude discounts usually tighten…

- Hedge conducted in 2009 for fiscal 2010 budget covers 230 million barrels (100% of net exports) at $57, a decision that cost just over $1 billion. PEMEX produced 2.6m barrels per day in 2009, but shipped abroad 1.2m barrels per day.

Term-settled put options

Put options because these are the options that give you the right to sell at a pre-determined price.

Average price options because Sovereign hedge their average income with a view to protect yearly budget revenues.

Term-settled options are cheaper to buy than monthly averages because a yearly average is less volatile than a monthly average.

PART 4

HOW PEOPLE HEDGE?

Choosing an appropriate hedge index

- Transparent index reference is required for binding financial contract
- Brent Dated is transparent and conventional, but actual commercial contracts may stipulate other indices (e.g. regional sub-indices)
  - Inappropriate hedge index introduces basis risk
  - Basis risk retention may be suitable when alternative index hedge is too expensive
- Need to estimate potential hedge effectiveness using historical data
  - Compare actual costs/revenues with benchmark indices
  - This is prerequisite among public companies choosing to use hedge accounting for risk-management programs
- Strike an appropriate balance between index liquidity and effectiveness (correlation)

Establishing and executing target hedge ratio

- Combine analysis of
  - exposure to commodity prices, and
  - potential hedge effectiveness

  to set a volumetric hedge target for a given tenor (time period)
- Implement hedging program via competitive bidding process
- May choose to execute via series of tranches, depending on size of transactions and structure

Maintaining target hedge ratio

- Monitor physical exposures through time to determine whether volumes need to be calibrated
- Exposures may change abruptly via acquisition or divestiture
  - This is often the impetus for a new series of hedges, or the closing out of existing ones
- Typically, hedge ratios do not exceed 50% of physical exposure
  - Higher ratios can strain cash resources if hedge loses money (see credit discussion)
  - Higher ratios can also rise above physical exposure if operations are curtailed for any reason

Documentation – importance of standards

- Most derivatives contracts have standardized features regarding pricing conventions and settlement
- Protect both parties in the transaction while maintaining uniformity among portfolio of positions
- International Swaps and Derivatives Association (ISDA) maintains and refines industry standards
  - Index definition
  - Settlement calculations
  - Credit terms
  - Payment instructions

Credit considerations

- Bilateral transactions involve credit exposure
- All dealers and most large institutional users of bilateral derivatives maintain a credit evaluation capability to monitor their counterparties
- Credit exposure managed primarily via stated credit thresholds either in confirmations or in ISDA Credit Support Annexes
- Cash or securities can be used to guaranty performance on derivative settlement
- Other clauses may allow parties to close out of transactions if sufficient evidence exists that a counterparty may default

Above all else…

- Have a clear policy
- Communicate the policy to senior executives and shareholders from the beginning
- Communicate any aberrations from the stated hedge policy and processes
  - Nobody likes surprises; especially ones they can't explain easily

PART 5

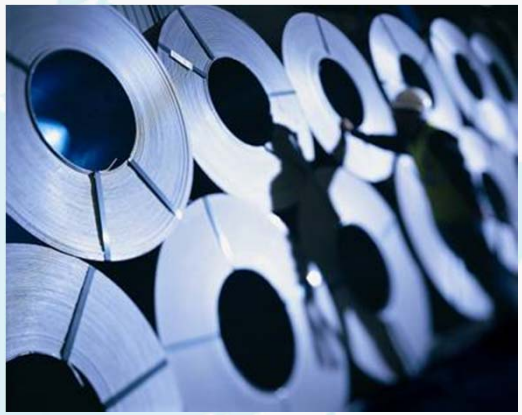
WHAT IS KOCH SUPPLY & TRADING ?

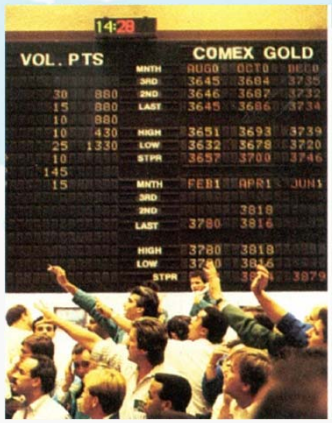
FROM KOCH INDUSTRIES..... TO

.... KOCH SUPPLY & TRADING

Koch's Derivatives Milestones

- Active oil trader for 25+ years
- 1986 – First oil swap
- 1997 – First weather derivative
- 2001 – First oil volatility swap
- Leading market-maker and quant trader in commodities





Koch Industries - Overview

- Koch Industries is among the world's largest private companies. Founded in 1940, it is owned and managed by Charles and David Koch. Koch companies operate in nearly 60 countries and employ about 70,000 people.
- Koch has interests spanning involvement in commodities (metals, petroleum, minerals etc.) trading through to owning and operating refining and manufacturing facilities. Our global refining throughput is currently 800,000 bpd.
- As evidence of its financial strength Koch Resources, LLC maintains a long-term S&P A+ and Moody's Aa3 credit rating, unaffected during last year's financial turbulences.
- Trading operations located in London, Geneva, Singapore, Houston, New York, Wichita, Kansas (Corporate Headquarters), Rotterdam and Mumbai.
- **Information:** ***www.kochind.com*** ***www.ksandt.com*** ***www.kochmetals.com*** ***http:/derivatives.kochind.com*** ***www.kochsteel.com*** ***www.kochbullion.com***

Diversity of Industry Areas

A Diversity of Industry Areas

Koch companies supply communities with energy to heat and cool buildings, fibers for superior carpets and garments, chemicals used in manufacturing, process and pollution control equipment, fertilizer, forest and consumer products, financial services and more.

Koch Industries:

in stores near you…

Koch Business Groups

Koch Industries owns a diverse group of companies that exercise capabilities in trading, operations excellence and investments on a global scale in core industries that include: trading; petroleum; asphalt; natural gas; gas liquids; chemicals ;metals, plastics and fibers; chemical technology equipment; minerals; fertilizers; ranching; pipelines; pulp; securities and finance, as well as a range of other ventures and investments. Some of the principal companies include:

Koch Supply & Trading, LP

Koch Supply & Trading, Sàrl

Koch Metals Trading Limited

Flint Hills Resources

Koch Mineral Services, LLC

Koch Capital Markets

Koch Ventures

Koch Financial Corporation

Koch Materials Company

Koch Chemical Technology Group

KoSa

INVISTA

Georgia-Pacific

Koch Supply & Trading - Overview

- Koch Supply & Trading, LP (KS&T) is a global supply, marketing, trading and risk management group conducting business in crude oil, refined petroleum products, petrochemical feedstock, freight, base metals, steel and other commodities.
- Today KS&T is among the world's top five crude oil traders and actively trades about 50 types of crude oil around the world.
- KS&T trades in physical commodity markets and is also an active market-maker of innovative risk management solutions for a wide range of customers, including several large oil producers
- KS&T emphasizes a disciplined, strategic approach, with a focus on customer needs, market analysis and risk-management capabilities.
- **Information:** ***www.ksandt.com*** ***http:/derivatives.kochind.com***

Koch Supply & Trading: Activities

- Worldwide trading and risk management activities in crude oil, refined petroleum products, metals and other commodities:
  - **Global Crude Oil (trading some 50 different types of crude)**
  - **Light Products and Chemicals**
  - **Natural gas and gas liquids**
  - **Heavy Products (e.g. industrial and bunker fuels)**
  - **Base Metals (Al, Cu, Zn, Pb, Ni, Sn and brass) incl. online trading**
  - **Steel (hot and cold rolled coils)**

- For additional information see: www.kochmetals.com

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