
OPEC's One-Way Option: Investors and the Price of Crude Oil

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Theme

- After ten years, commodities have finally become a suitable investment class for pension funds.
- The billions pushed into funds have contributed to the 12-month rise in crude prices.
- OPEC's insistence on keeping markets in backwardation offers investors a "one-way option."
- More money will pour into oil and prices will be pushed higher...
- Until the bubble deflates.

Commodities as an Investment Class

- Investment banks have pushed commodities as an investment class for 14 years.
- Academic research shows returns on collateralized commodities match or exceed equities and bonds while being negatively correlated with these assets.
- Research was ignored until recently.
 - No more than \$5 billion invested until end of 2003.
 - Now probably more than \$75 billion invested.

New Research by Gorton and Rouwenhorst

- Returns to futures exceed returns to spot commodities.
- Commodity investments “outpace” inflation.
- Return on futures matches S&P 500.
- Commodity returns are negatively correlated with equities and long-term bonds.
- Commodity futures have opposite exposure to inflation compared to equities and bonds.
- Commodity futures provide a diversification against systematic risk.
- Commodity returns outperform “matching equities” three to one.

Stock, Bond, and Individual Commodity Future Performance over the Business Cycle – July 1959 to March 2004 (Average Monthly Annualized Returns, Percent)

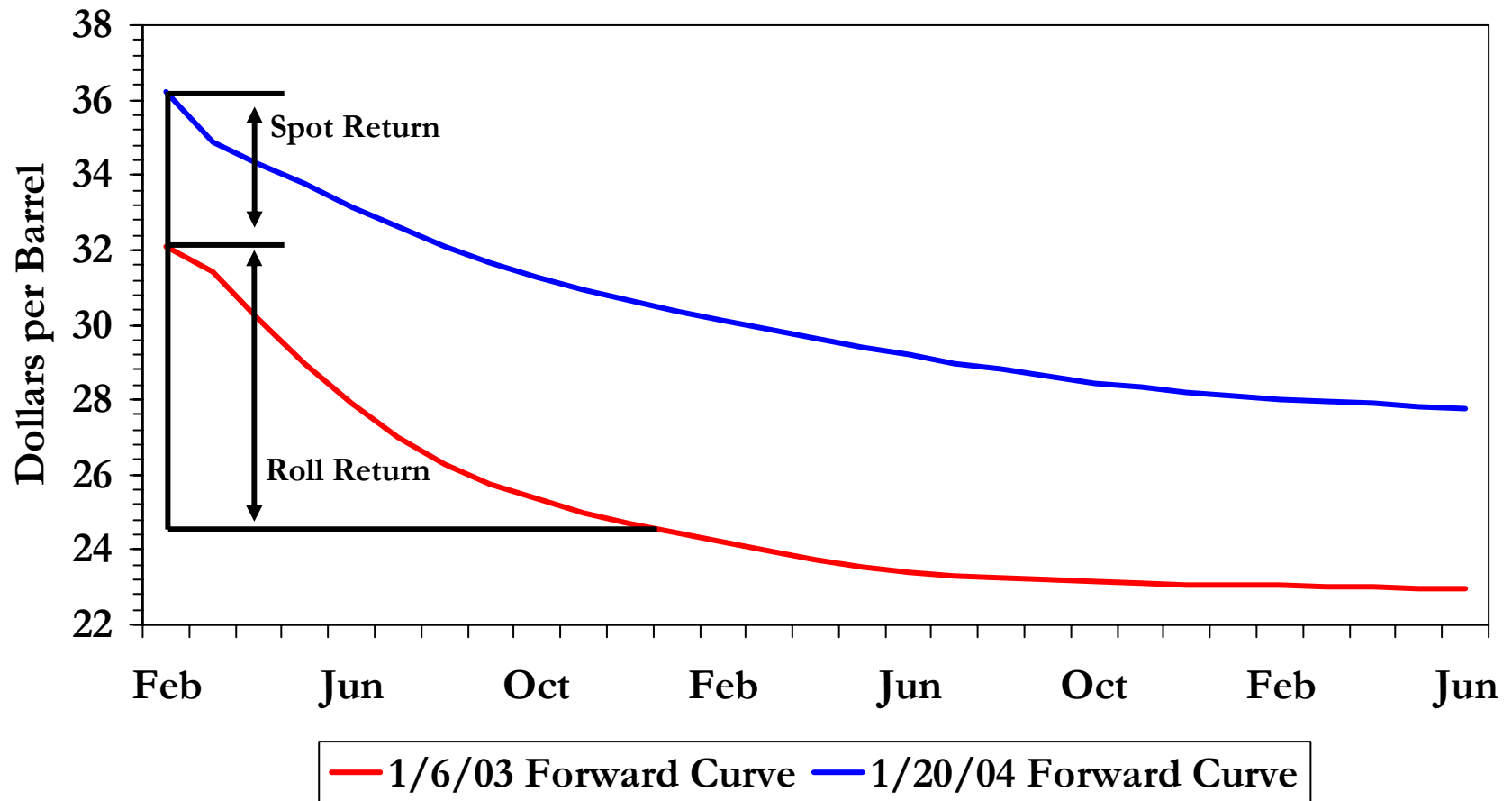
Data Series Returns	Overall Average	Expansion Period Average	Recession Average
S&P Total	11.1	13.1	1.7
Corporate Bonds	7.7	7.2	12.1
Equal-weighted Futures	11.0	13.4	0.9
Crude Oil Futures	19.1	13.1	4.5
Natural Gas Futures	16.4	11.3	-31.0
Unleaded Gasoline Futures	21.0	14.4	4.4
Heating Oil Futures	16.4	12.5	6.1

Source: Gorton and Rouwenhorst, p. 23.

Goldman Sachs Initiative

- Goldman Sachs led in developing the idea.
 - Created a diversified index in 1991
 - Introduced idea of “roll” and “spot” returns
 - Did not go far until 2003 and 2004
- At the end of 2004, perhaps \$40 billion invested, 90 percent from pension funds.

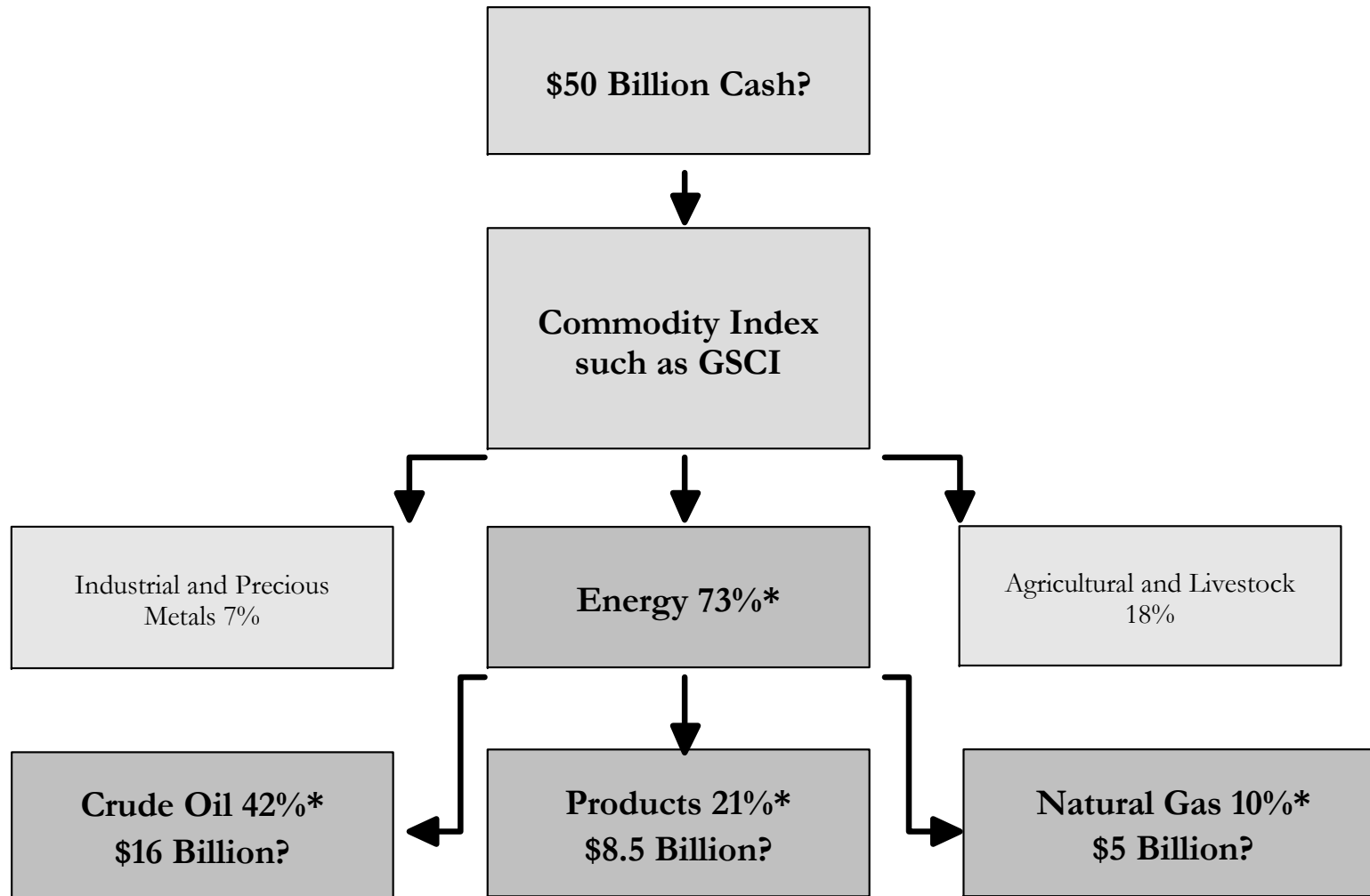
Realized WTI Spot Return vs. Roll Return Earned on Feb 2004 Crude Oil Future Purchased on 12/6/03 and Held to Maturity



Source: PKVerleger LLC.



Various Market Allocations following the Goldman Sachs Commodity Index Formula



*Percent of total allocation to commodities.

Source: PKVerleger LLC.



Inflow of Funds Exceeds Energy Market Capacity

- Swaps and futures market is too small for amount of cash flowing into it.
- Result has been rapid escalation of forward prices.
- Investors accept story that commodity demand will remain strong.

Required Futures Contract Purchases to Match a \$50 Billion Investment Increase in Collateralized Futures*

	GSCI Percentage Weight	Number of Contracts	Percentage of December 31, 2004 Open Interest
Crude Oil	28.78	328,464	49.9
Brent Crude Oil	13.74	179,655	55.4
Gasoline	8.30	81,661	49.9
Heating Oil	8.54	90,774	58.5
Gasoil	4.48	64,073	38.5
Natural Gas	9.58	77,634	12.8

*Using GSCI weights and assuming all collateralized instruments are purchased on futures markets.

Spot Prices: Crude oil (\$/bbl); gasoline and heating oil (\$/gal); gasoil (\$/tonne); natural gas (\$/mmBtu).

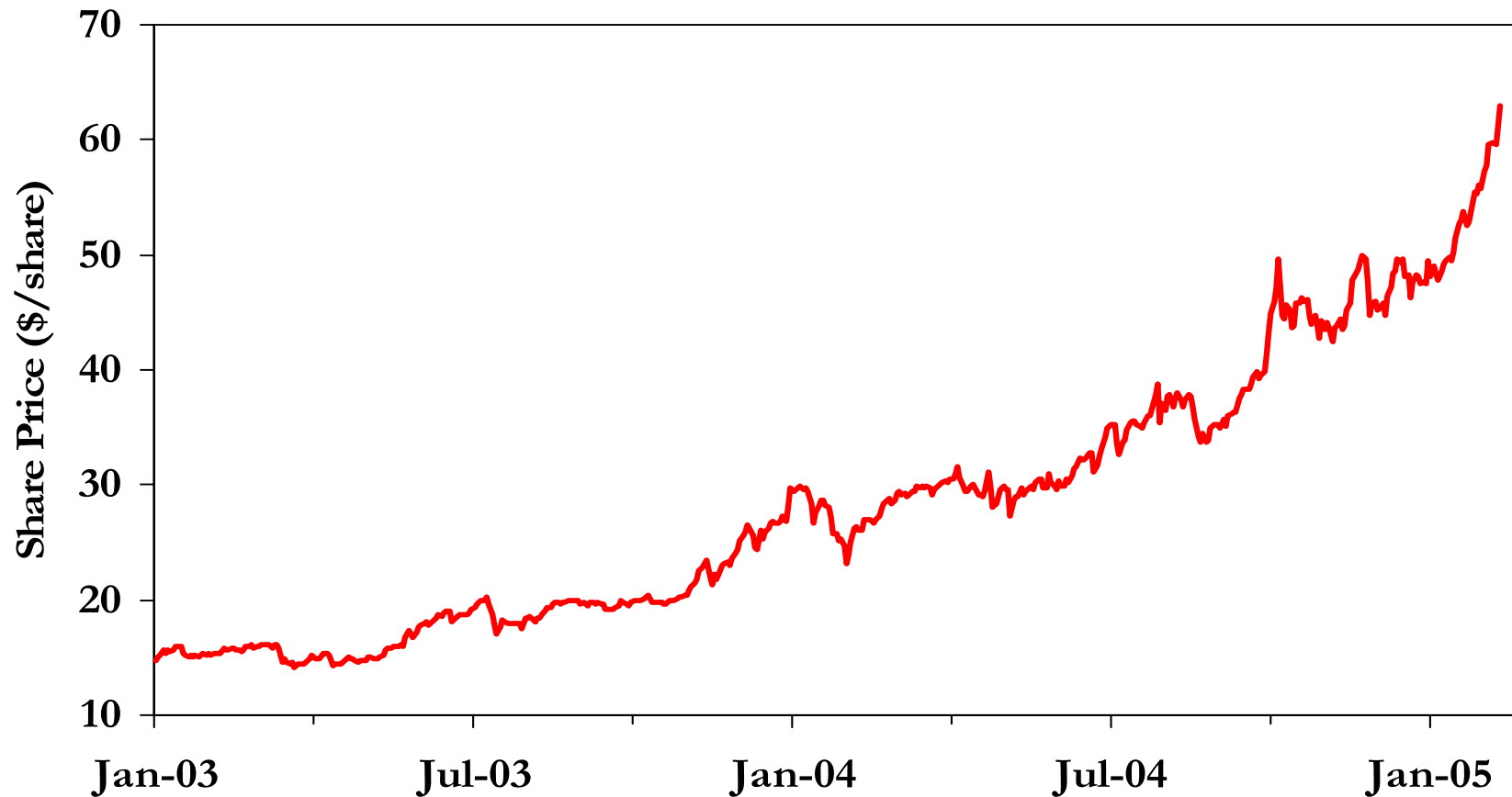
Note: Natural gas open interest includes futures contracts and NYMEX Henry Hub swaps.

Source: PKVerleger LLC.

BP Prudhoe Bay Royalty Trust – A Key Indicator

- A pure price play
 - Trust owns 16 percent of first 90,000 barrels per day of production.
 - Fixed-cost schedule – no unexpected adjustments.
 - 24 million shares
- Increase in share price reflects securitization demand.

Share Price of BP Prudhoe Bay Royalty Trust, 2003 to 2005



Source: NYSE.



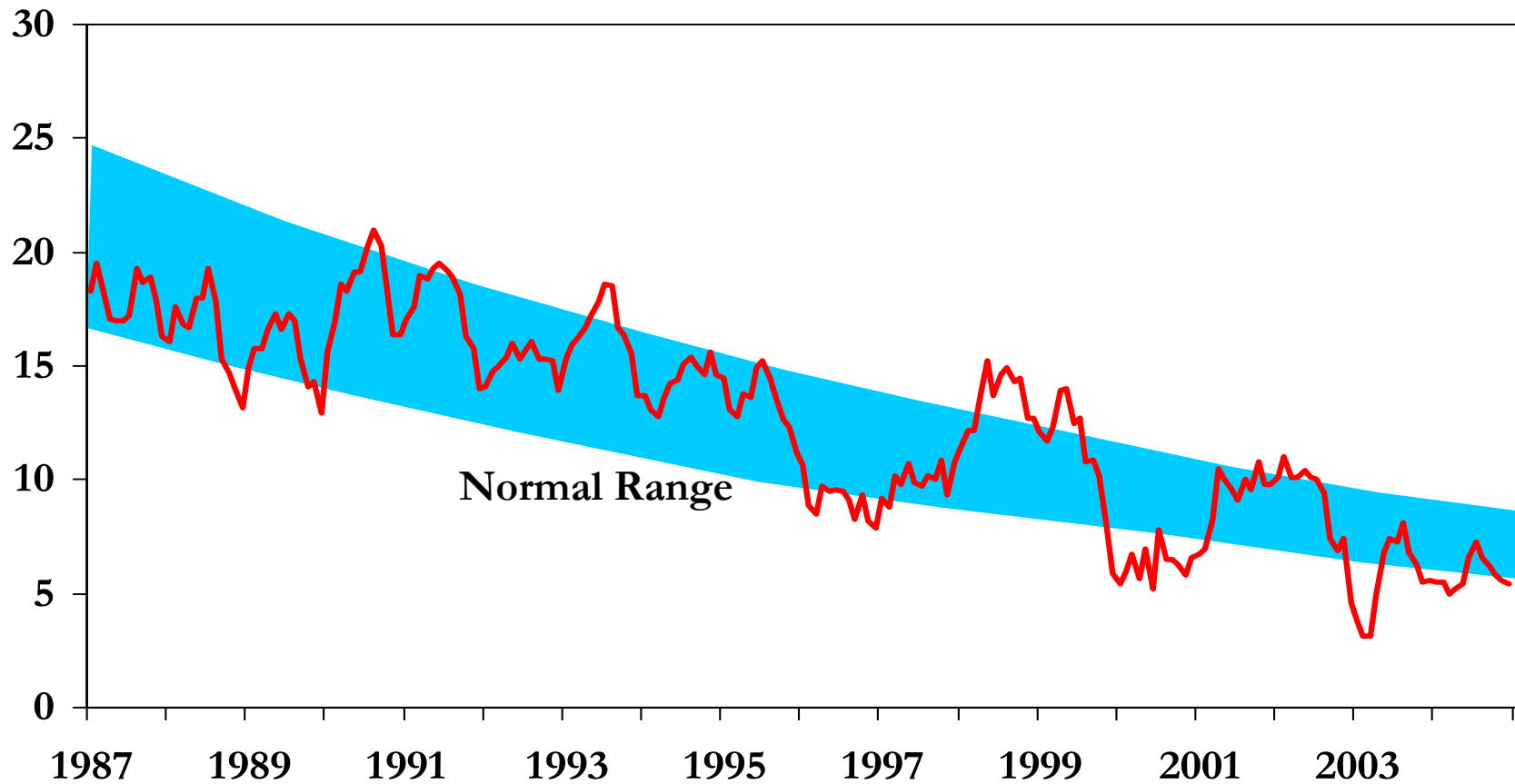
OPEC and Oil Industry Offer Investors a One-Way Option through their Inventory Policy

- One-way option: a guarantee to investors that they will not lose money
 - Term originated in currency markets during fixed-exchange regimes.
 - Investors short currency of country with serious international imbalance.
 - Country can either raise interest rates or lower exchange rates.
 - Investors do not lose if interest rates raised but do profit with lower exchange rates.
 - OPEC creates the one-way option by managing inventories.

OPEC Policy to Keep Inventories Low

- Policy originated in March 1999.
- Goal is to keep stocks low and markets in backwardation.
- Companies have supported the effort by cutting stocks.
- Result is backwardation.

Usable Commercial Stocks in OECD Countries

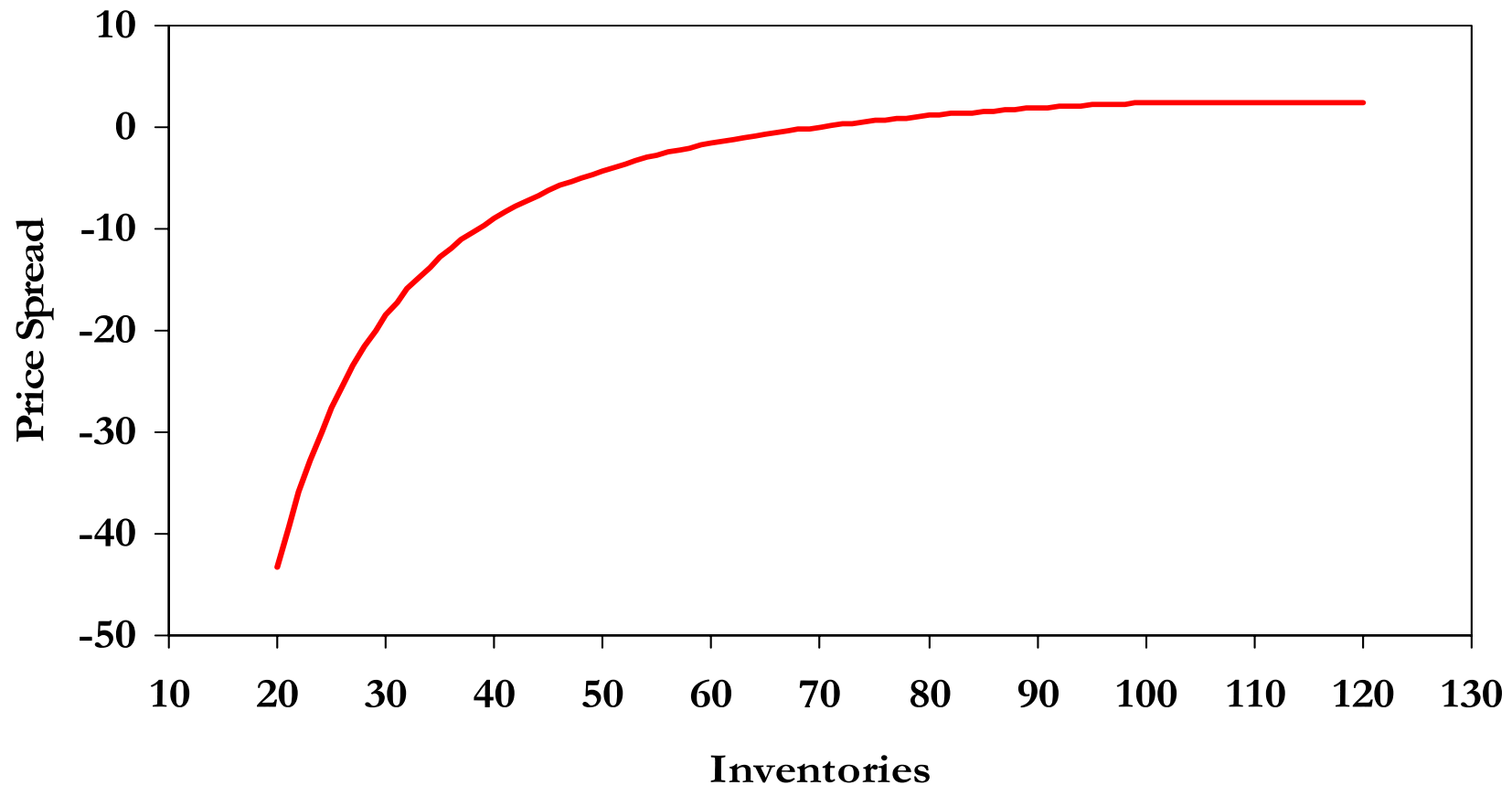


Source: EIG; PKVerleger LLC.

An Aside – Two Views on Commodity Prices and Backwardation

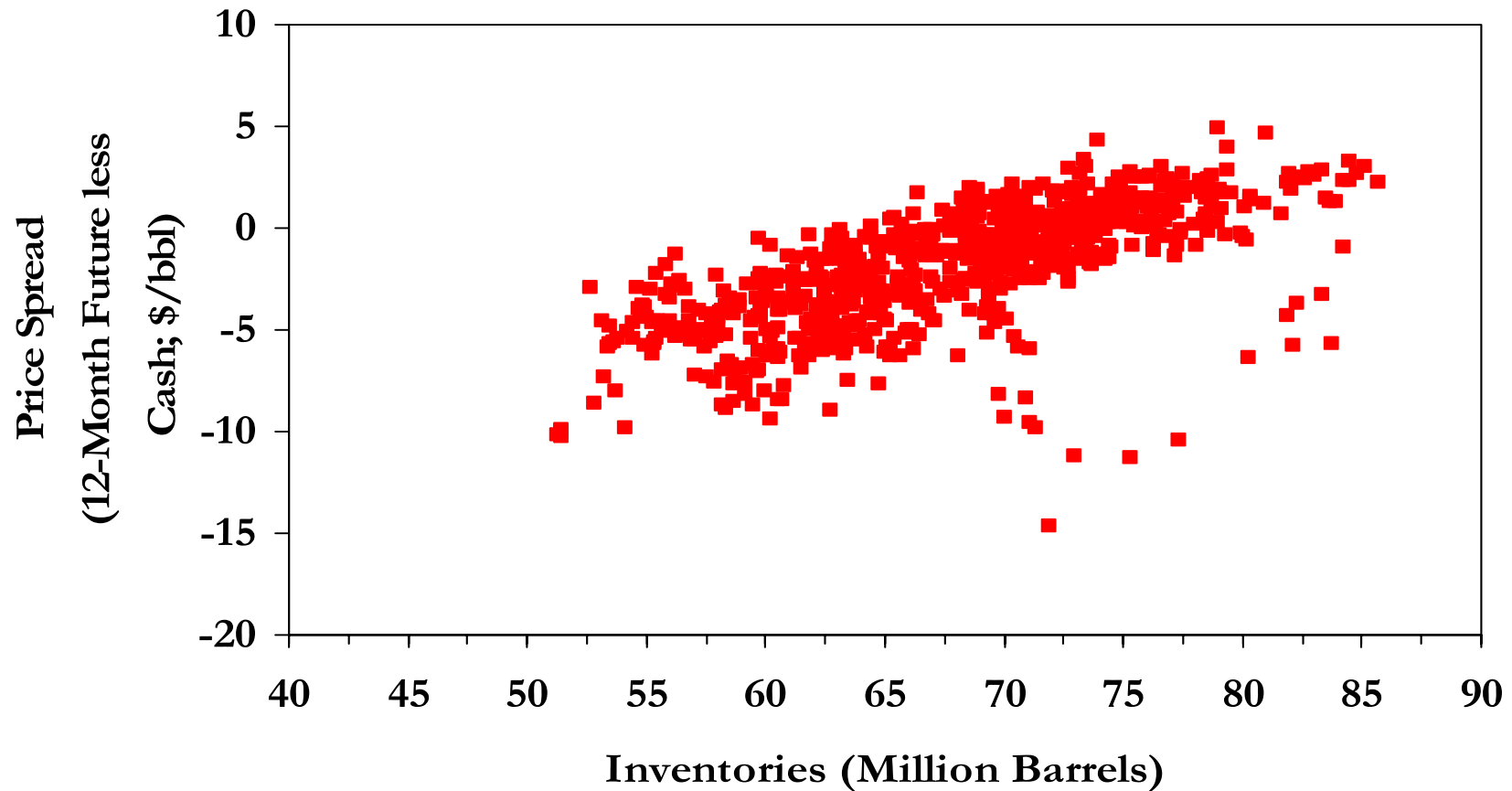
- Financial economics
 - Prices mean-reverting
 - Backwardation represents a “risk premium”
- Agricultural/commodity economics
 - Backwardation/contango determined by inventory levels
 - Relationship observed in every commodity examined
 - Working labeled relationship “supply of storage”
- Supply of storage observed in every energy market if the econometrics are done right.

Theoretical Supply of Storage — Relationship between Inventories and Price Spreads



Source: Jeffrey C. Williams, *The Economic Function of Futures Markets* (Cambridge, England: Cambridge University Press, 1986.)

Mid-continent U.S. Inventories vs. Cash/Futures Price Spread, 1990 to 2004



Source: PKVerleger LLC.



The Impact of OPEC's One-Way Option

- OPEC keeps inventories low – causing backwardation.
- Cash flows into commodities – lifting forward prices.
- Low inventories cause cash prices to rise relative to forward prices.
- More cash flows in, causing prices to rise.
- In theory, the cycle is never ending.
- The result is a bubble.

Definitions of a Bubble

- “A situation in which temporary high prices are sustained largely by investors’ enthusiasm rather than consistent estimation of real value.”
- “An unsustainable increase in prices brought on by investors’ buying behavior rather than by genuine, fundamental information about value.”

Robert Shiller, *Irrational Exuberance*

Bubbles Can Last a Long Time

- Greenspan warning of “irrational exuberance” was made in December 1996.
- Market collapse did not come until March 2000.
- Some bubbles deflate slowly – or are superseded by later events.
- The oil bubble could be perpetuated by bombing Iran.

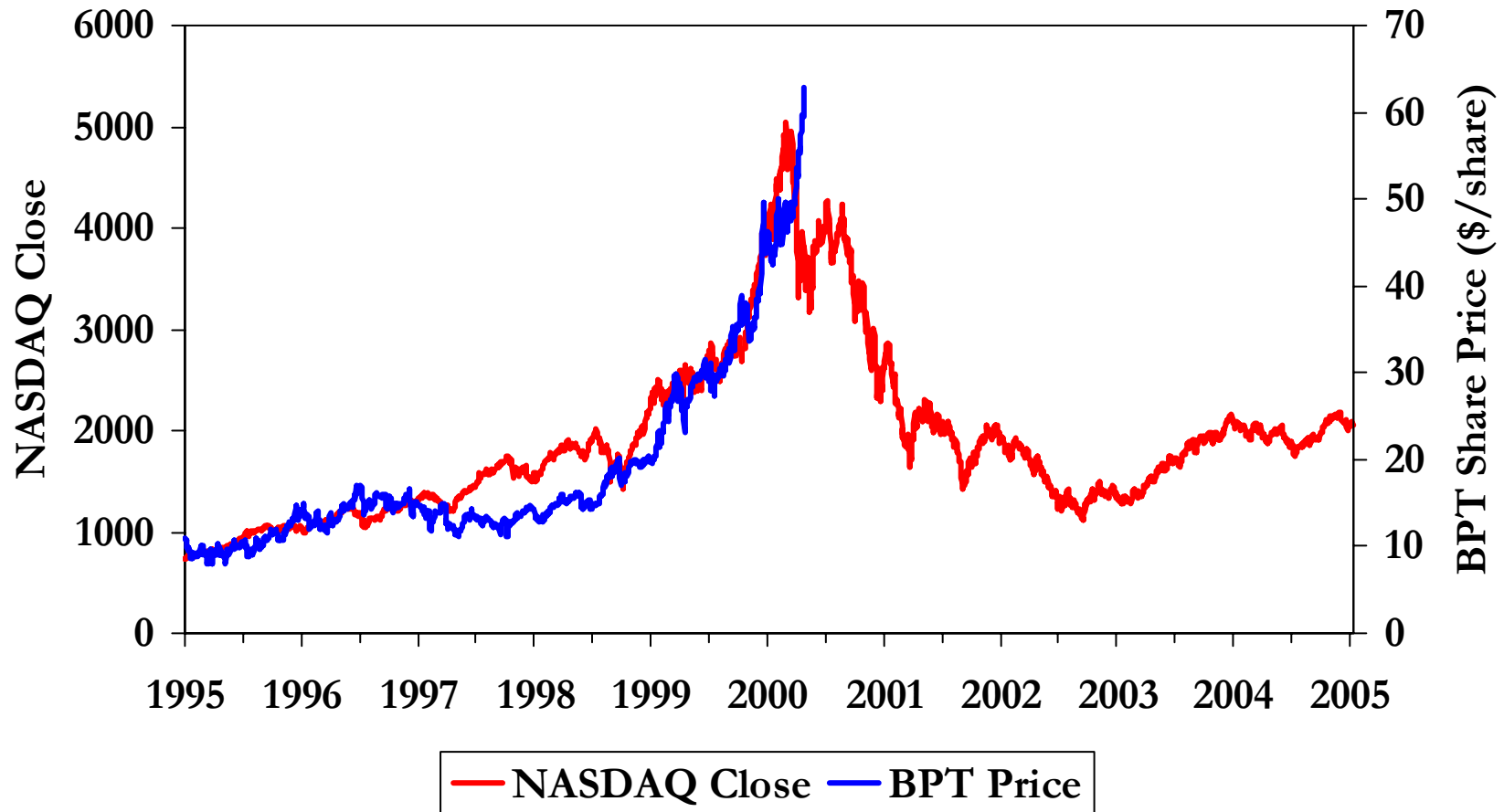
Governments Can Intervene to Break Bubbles

- The Federal Reserve Board broke the silver bubble in 1980.
- Governments may be forced to break the current energy bubble if prices rise to excessive levels. However, tools are limited.
 - Swaps of strategic reserves
 - Recession induced by higher interest rates
 - Imposition of regulation on hedge funds
- Central banks will act if oil prices are seen to boost inflationary expectations.

The Price Cycle Will Likely Swing above \$60

- Crude prices could rise well above \$60 per barrel.
- The higher prices are allowed to rise, the greater the risk of an energy derivative debacle that takes prices to unexpectedly low levels.

Comparing Bubbles — NASDAQ Daily Close, 1/95 to 12/04 vs. BP Royalty Trust Closing Price, 10/99 to 2/05



Note: Time scale for BP Trust is 51 months later than NASDAQ closing.

Source: PKVerleger LLC.

