

Derivatives and Risk Management in the Petroleum, Natural Gas, and Electricity Industries

Table S1. Spot Market Price Volatility for Selected Commodities

Commodity	Average Annual Volatility (Percent)	Market	Period
Electricity			
California-Oregon Border	309.9	Spot-Peak	1996-2001
Cinergy	435.7	Spot-Peak	1996-2001
Palo Verde	304.5	Spot-Peak	1996-2001
PJM	389.1	Spot-Peak	1996-2001
Natural Gas and Petroleum			
Light Sweet Crude Oil, LLS	38.3	Spot	1989-2001
Motor Gasoline, NYH	39.1	Spot	1989-2001
Heating Oil, NYH	38.5	Spot	1989-2001
Natural Gas	78.0	Spot	1992-2001
Financial			
Federal Funds Rate	85.7	Spot	1989-2001
Stock Index, S&P 500	15.1	Spot	1989-2001
Treasury Bonds, 30 Year	12.6	Spot	1989-2001
Metals			
Copper, LME Grade A	32.3	Spot	January 1989-August 2001
Gold Bar, Handy & Harman, NY	12.0	Spot	1989-2001
Silver Bar, Handy & Harman, NY	20.2	Spot	January 1989-August 2001
Platinum, Producers	22.6	Spot	January 1989-August 2001
Agriculture			
Coffee, BH OM Arabic	37.3	Spot	January 1989-August 2001
Sugar, World Spot	99.0	Spot	January 1989-August 2001
Corn, N. Illinois River	37.7	Spot	1994-2001
Soybeans, N. Illinois River	23.8	Spot	1994-2001
Cotton, East TX & OK	76.2	Spot	January 1989-August 2001
FCOJ, Florida Citrus Mutual	20.3	Spot	September 1998-December 2001
Meat			
Cattle, Amarillo	13.3	Spot	January 1989-August 2001
Pork Bellies	71.8	Spot	January 1989-August 1999

Sources: Data from Commodity Futures Trading Commission. Calculations by Energy Information Administration staff.

Table S2. Example of an Oil Futures Contract

Date	Prices per Barrel		Contract Activity	Cash In (Out)
	WTI Spot	December Future		
January	\$26	\$28	Refiner "buys" 10 contracts for 1,000 barrels each and pays the initial margin.	(\$22,000)
May	\$20	\$26	Mark to market: (26 - 28) x 10,000	(\$20,000)
September	\$20	\$29	Mark to market: (29 - 26) x 10,000	\$30,000
October	\$27	\$35	Mark to market: (35 - 29) x 10,000	\$60,000
November (end)	\$35	\$35	Refiner either: (a) buys oil, or (b) "sells" the contracts. Initial margin is refunded.	(\$350,000) \$22,000

Source: Energy Information Administration.

Table S3. Petroleum and Natural Gas Price Risks and Risk Management Strategies

Participants	Price Risks	Risk Management Strategies and Derivative Instruments Employed
Oil Producers	Low crude oil price	Sell crude oil future, buy put option
Petroleum Refiners	High crude oil price	Buy crude oil future or call option
	Low product price	Sell product future or swap contract, buy put option
	Thin profit margin	Buy crack spread ^a
Storage Operators	High purchase price or low sale price	Buy or sell futures
Large Consumers		
Local Distribution Companies (Natural Gas)	Unstable prices, wholesale prices higher than retail	Buy future or call option, buy basis contract ^b
Power Plants (Natural Gas)	Thin profit margin	Buy spark spread ^c
Airlines and Shippers	High fuel price	Buy swap contract

^aEssentially, buy crude oil future and simultaneously sell product future.

^bA basis contract fixes the transportation cost between Henry Hub and a local market.

^cBuy natural gas future and sell electricity future.

Source: Energy Information Administration.