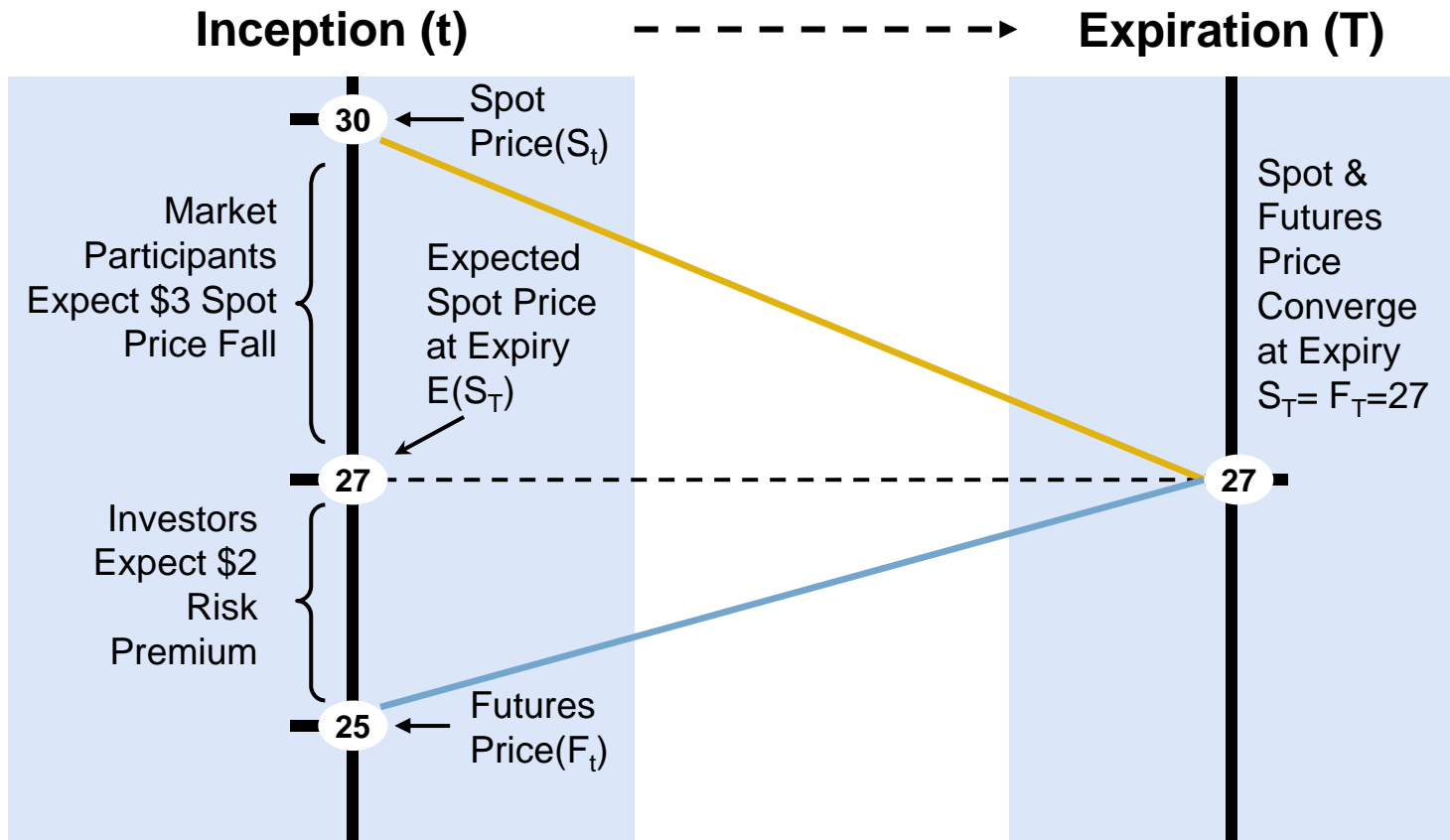


The Long-Term Performance of  
**Commodity Futures**  
Q-Group Seminar, Key Largo April 4, 2005

**Gary Gorton, Wharton, University of Pennsylvania**

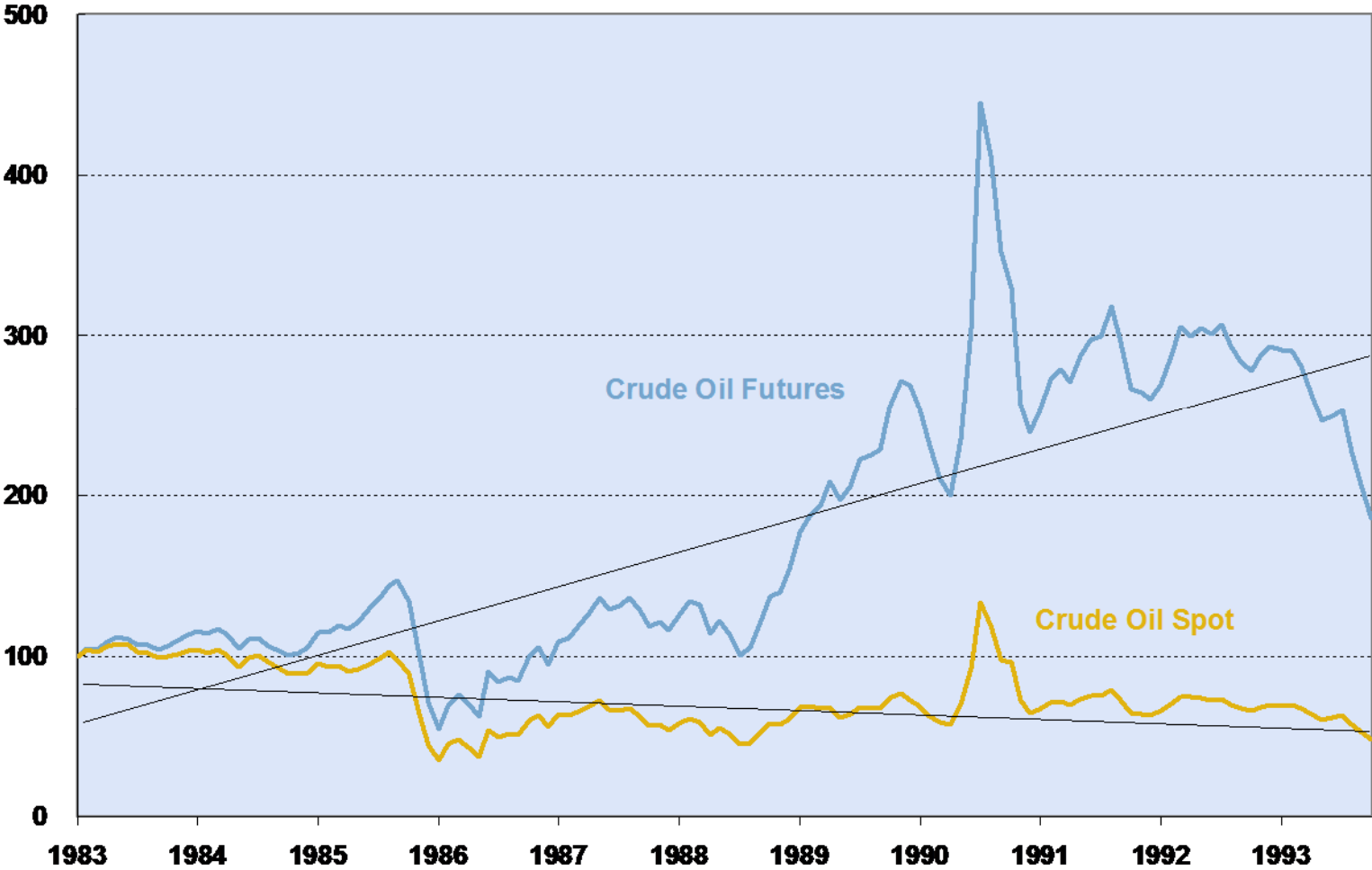
**K. Geert Rouwenhorst, School of Management, Yale University**

# Futures Price vs. Expected Spot Price



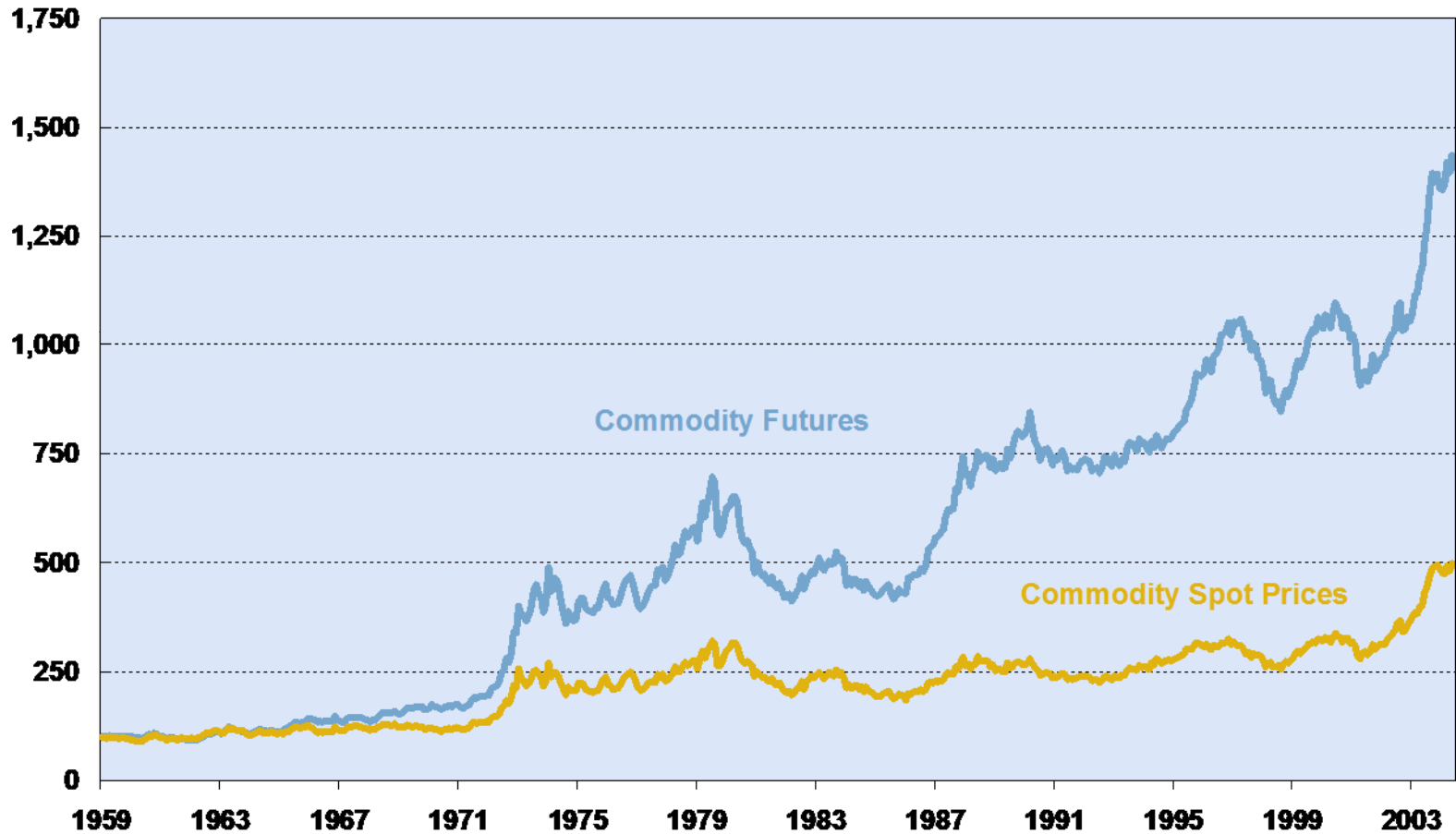
# Collateralized Crude Oil Futures vs. Spot Prices

Futures Up 87% While Spot Prices Decline 53%

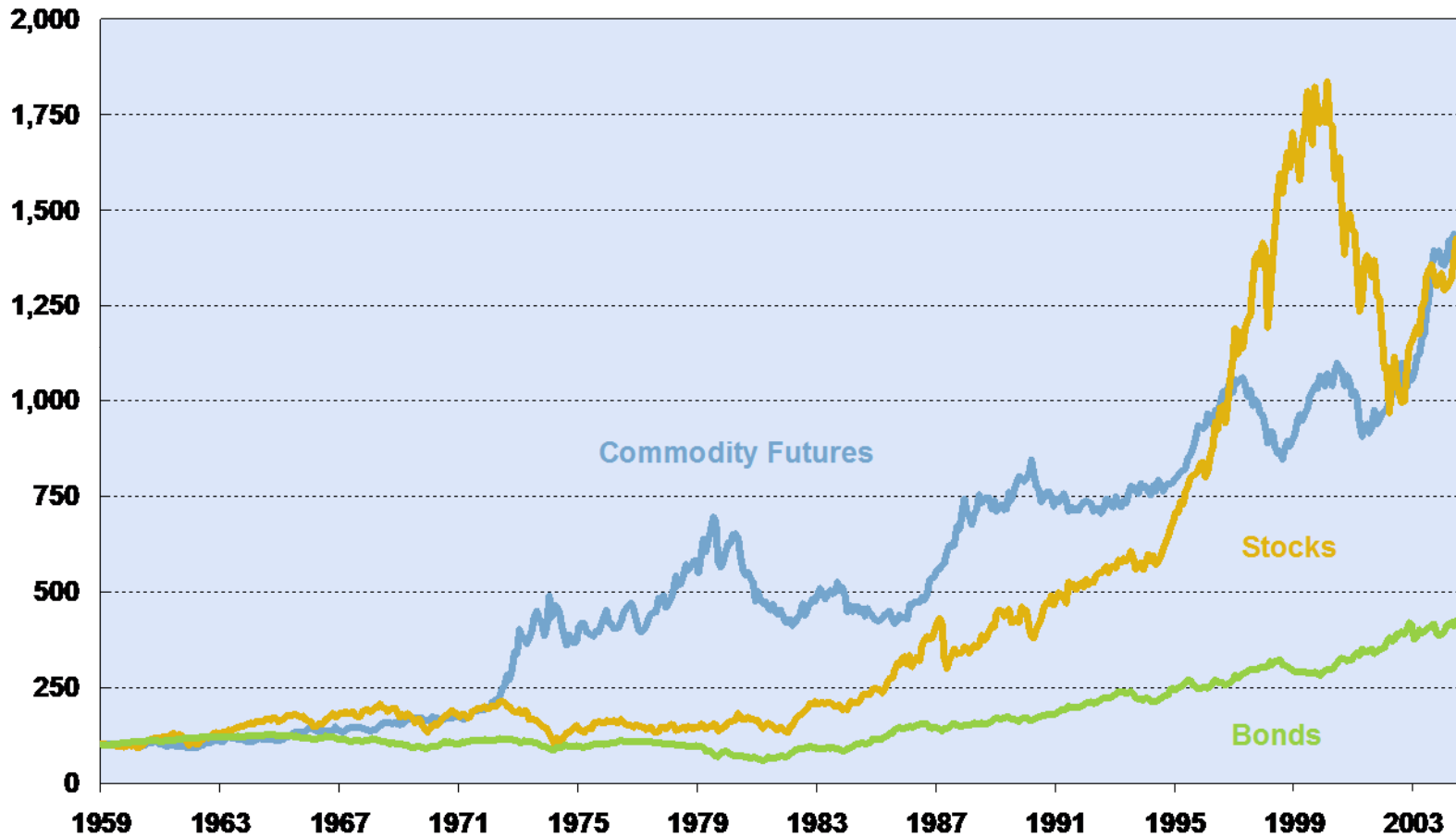


# Spot vs. Futures Returns

## Inflation Adjusted Performance From 1959 to 2004

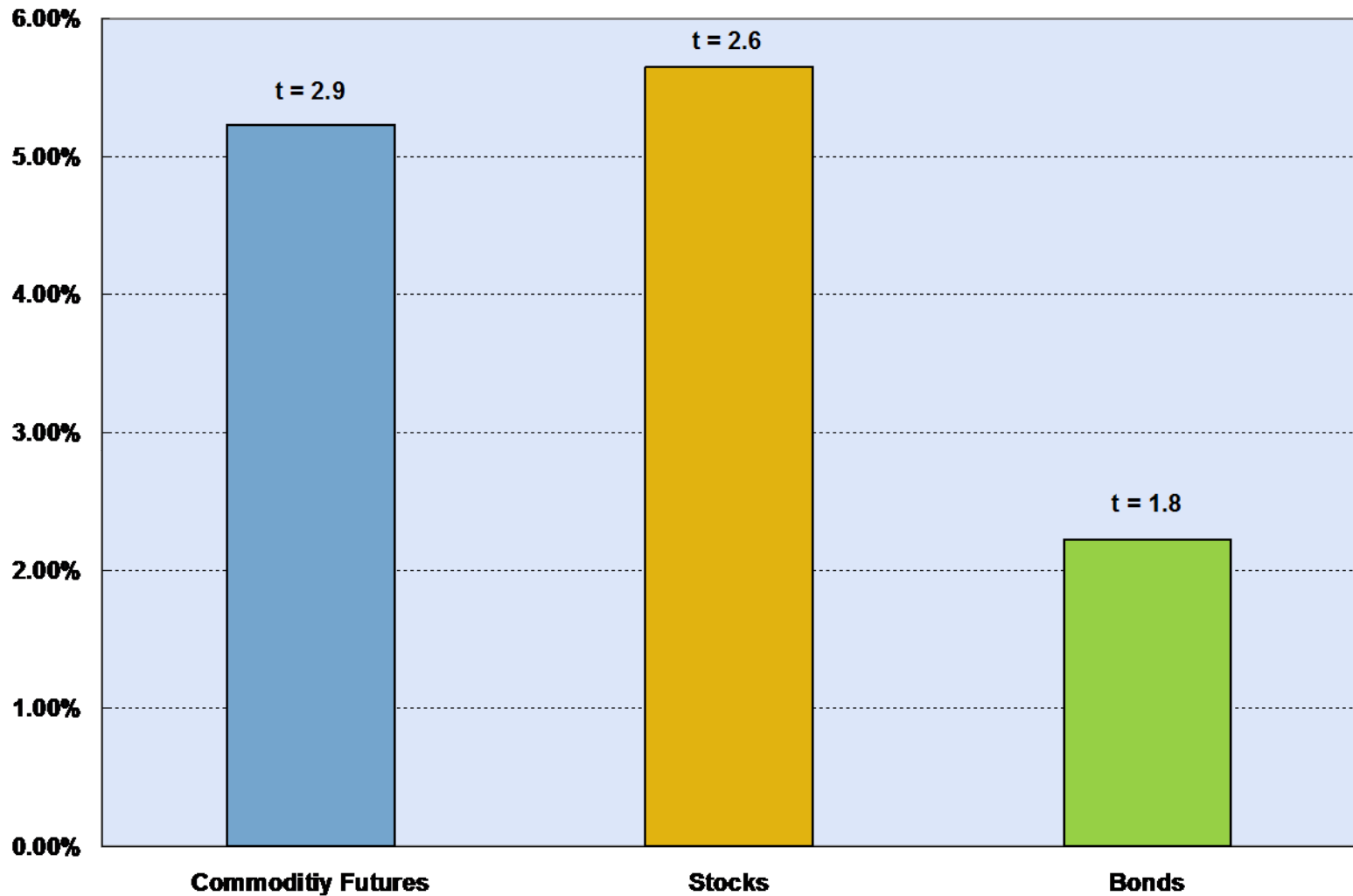


# Commodity Futures, Stocks and Bonds Inflation Adjusted Performance From 1959 to 2004



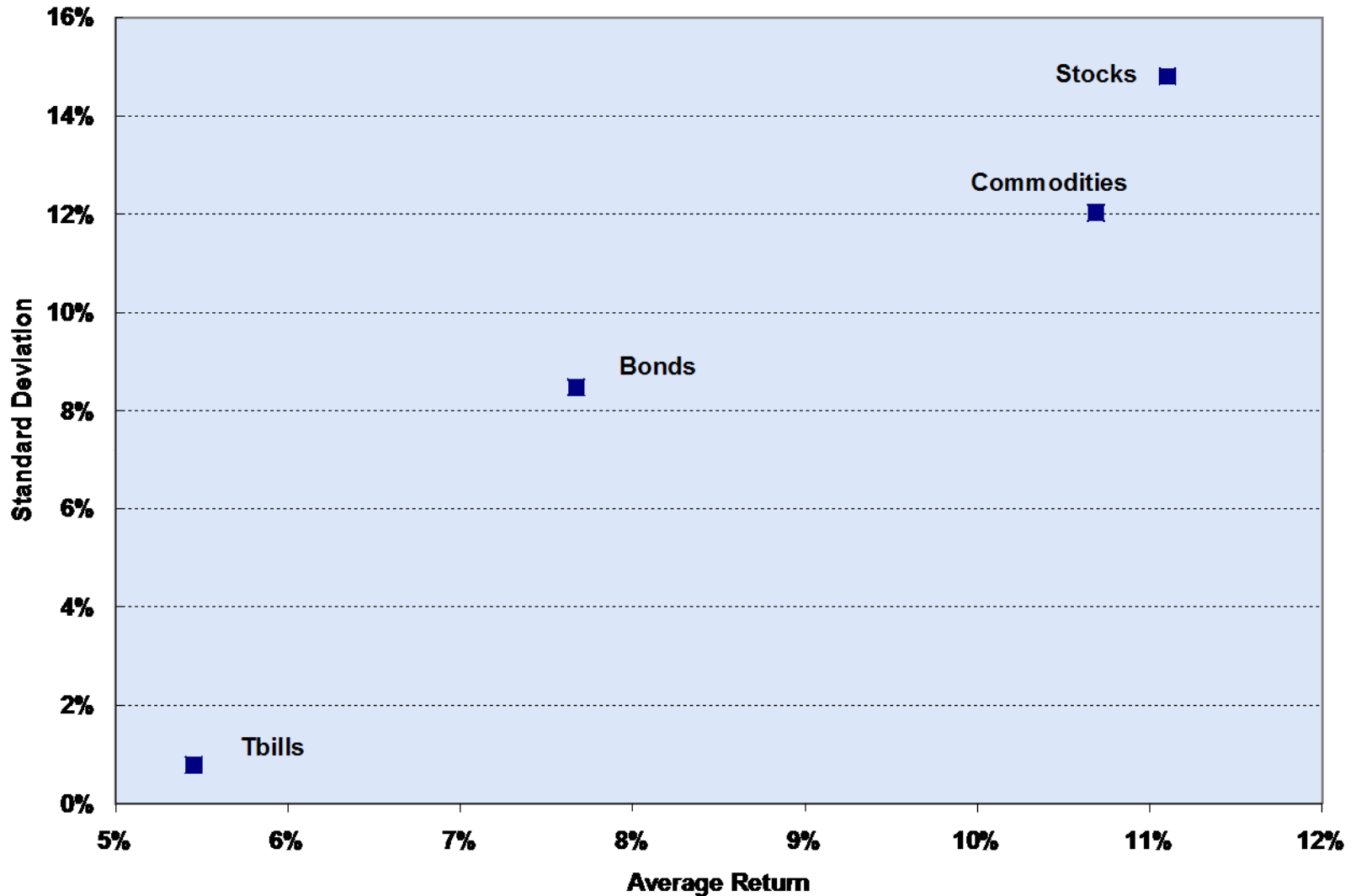
# Risk Premium by Asset Class

## Annualized Monthly Excess Returns From 1959 to 2004



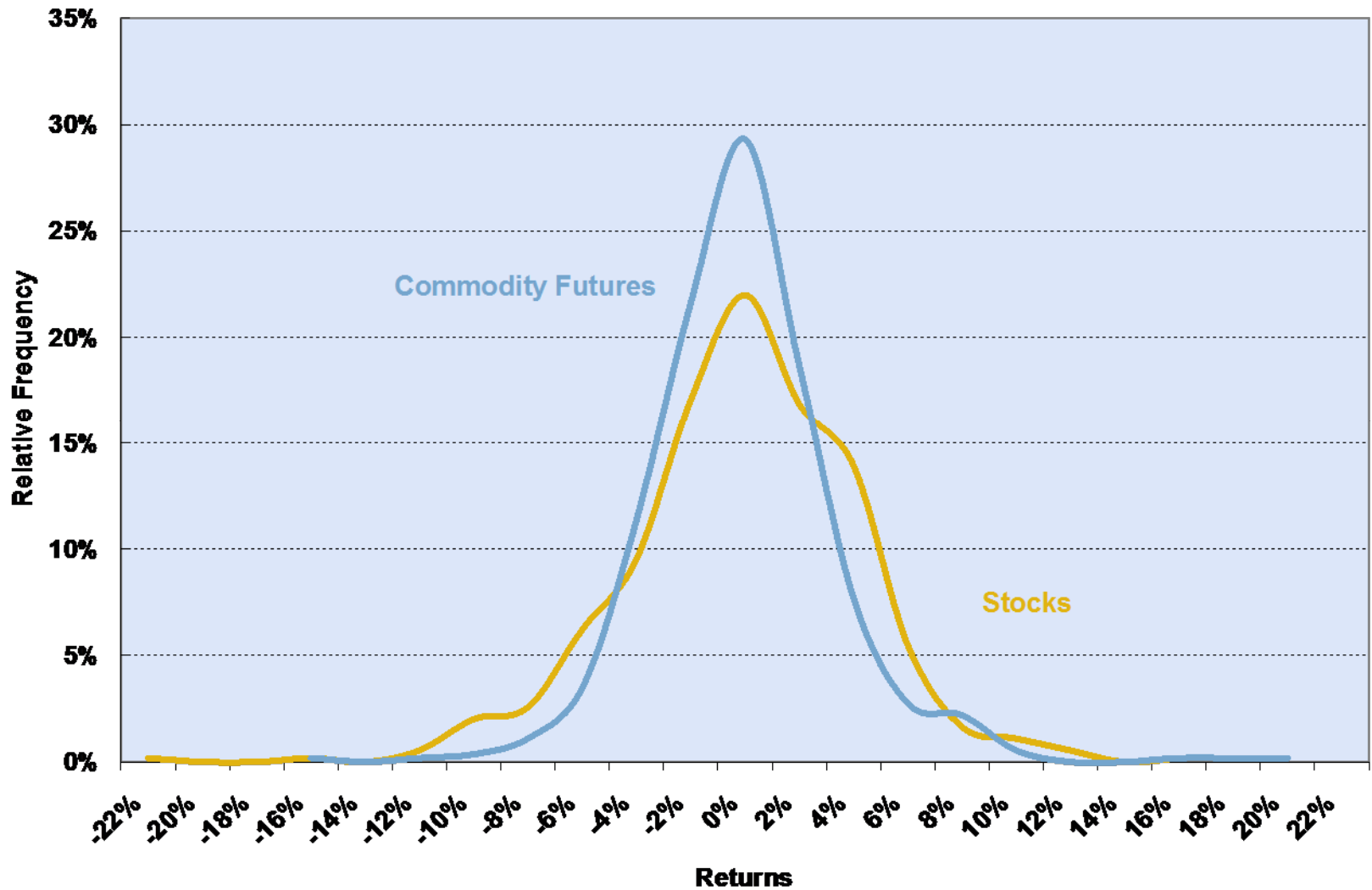
# Risk and Return by Asset Class

## Annualized Monthly Returns From 1959 to 2004



# Commodity Futures and Stocks

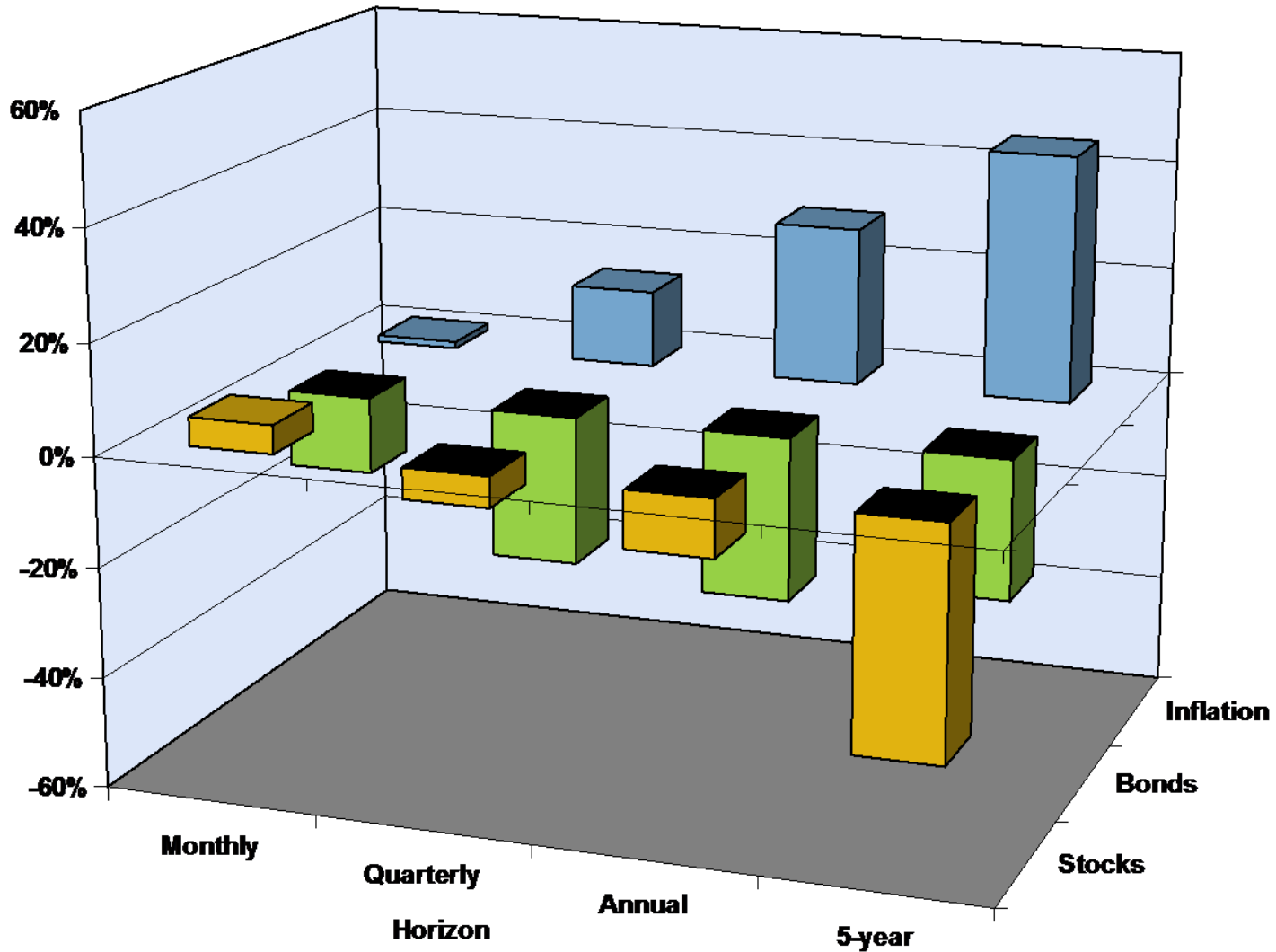
## Distribution of Monthly Returns From 1959 to 2004



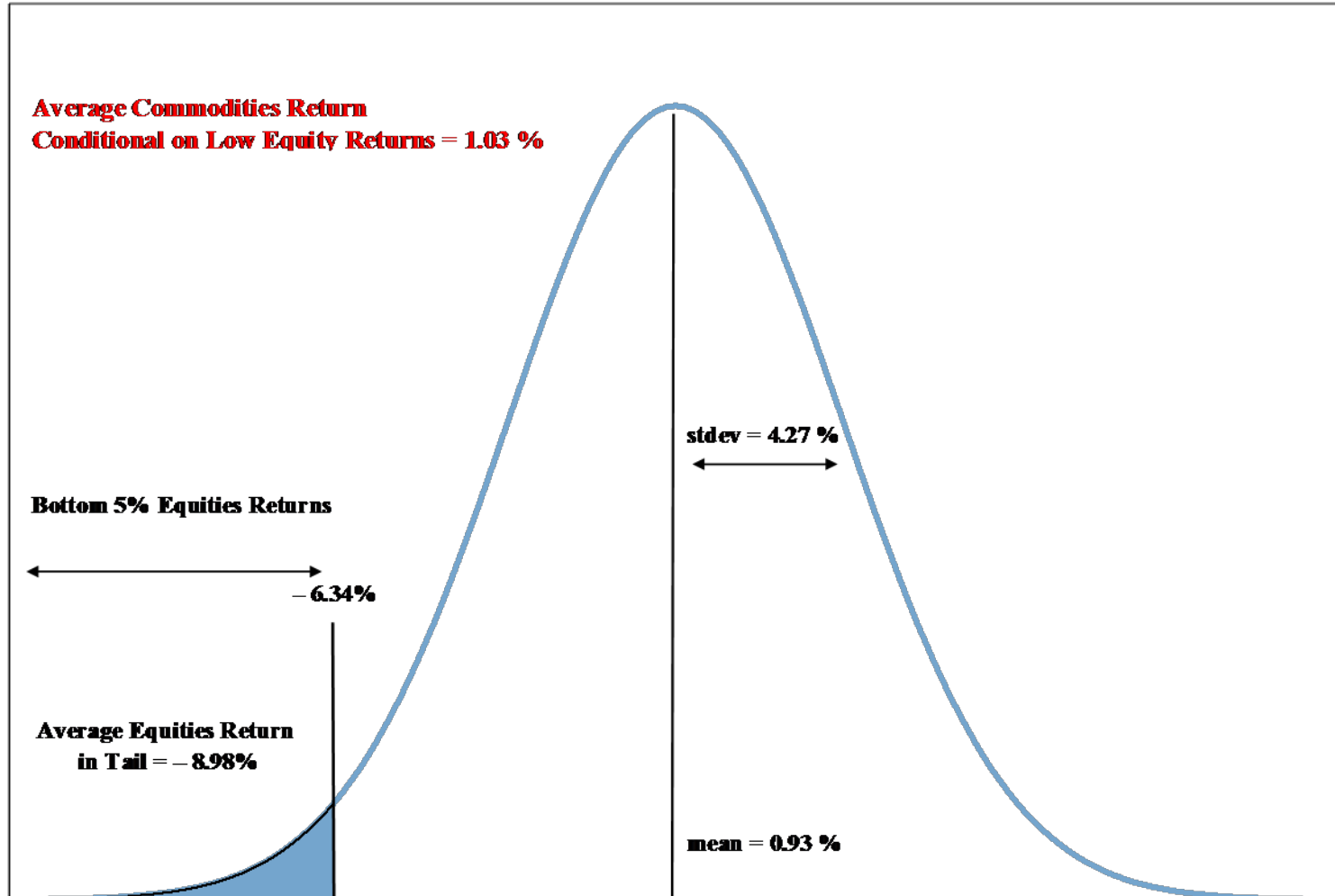


# Correlation of Commodity Futures With Other Financial Assets

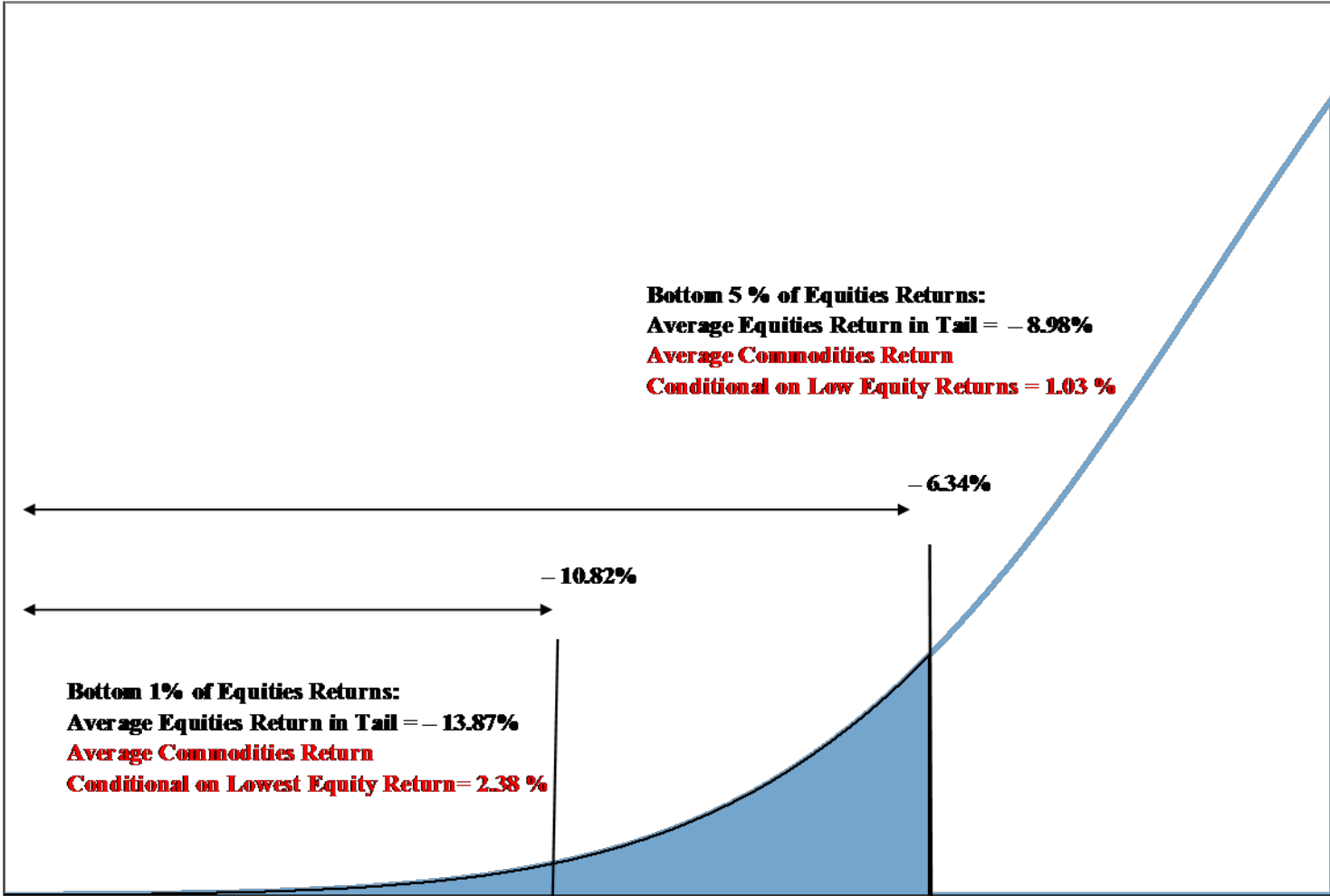
## Overlapping Return Data From 1959 to 2004



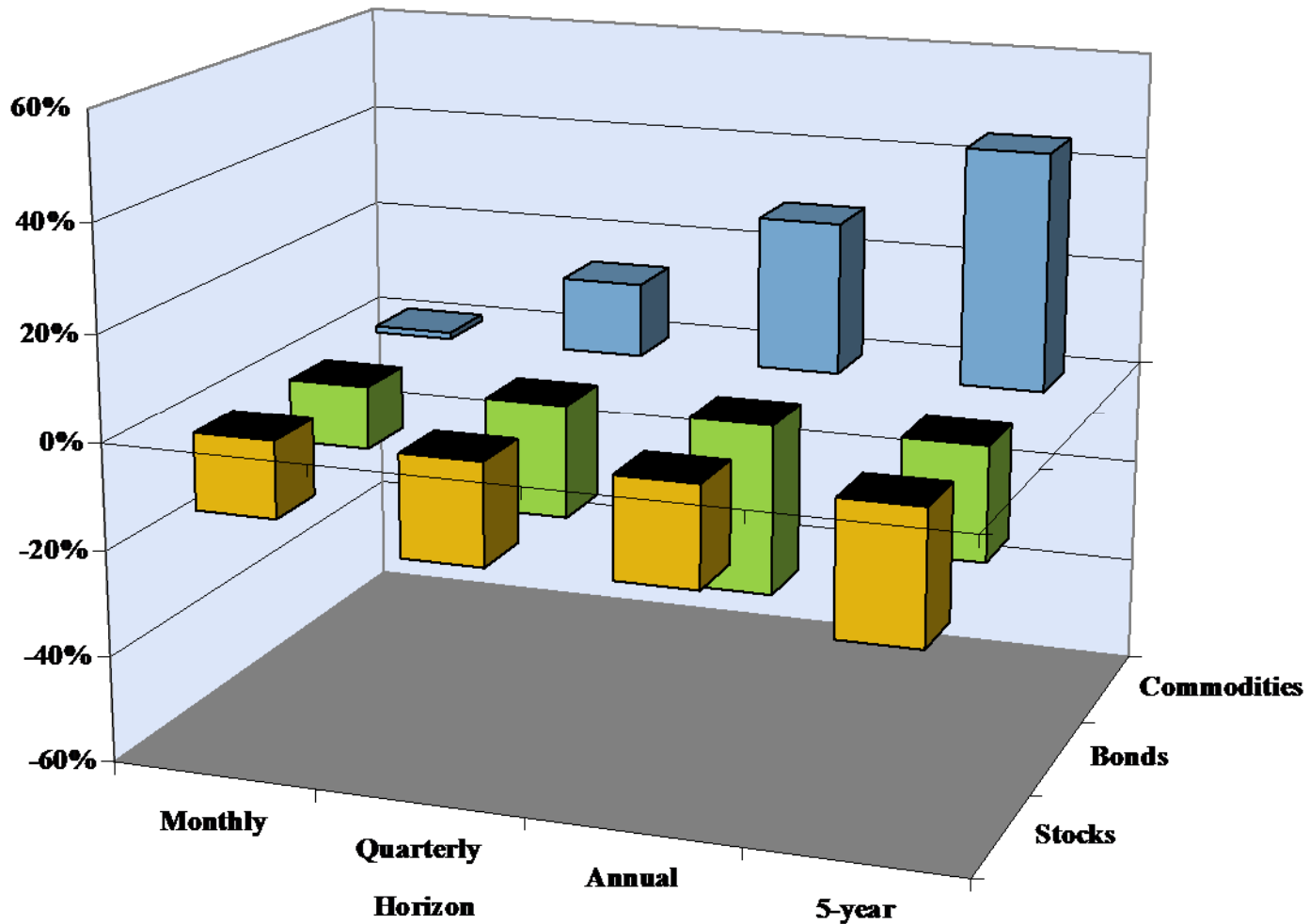
# Distribution of Monthly Equity Returns



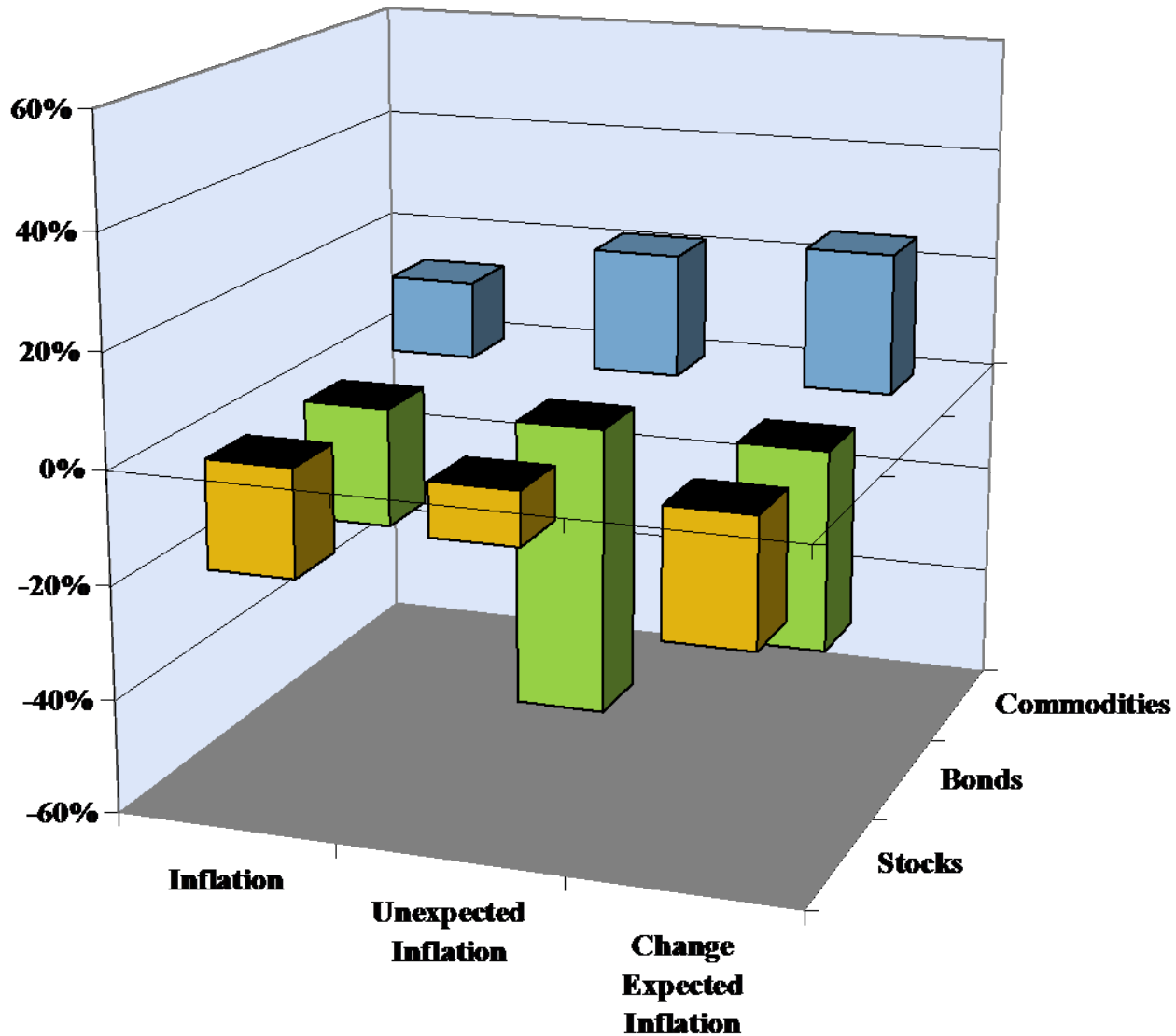
# Tail Distribution of Monthly Equity Returns



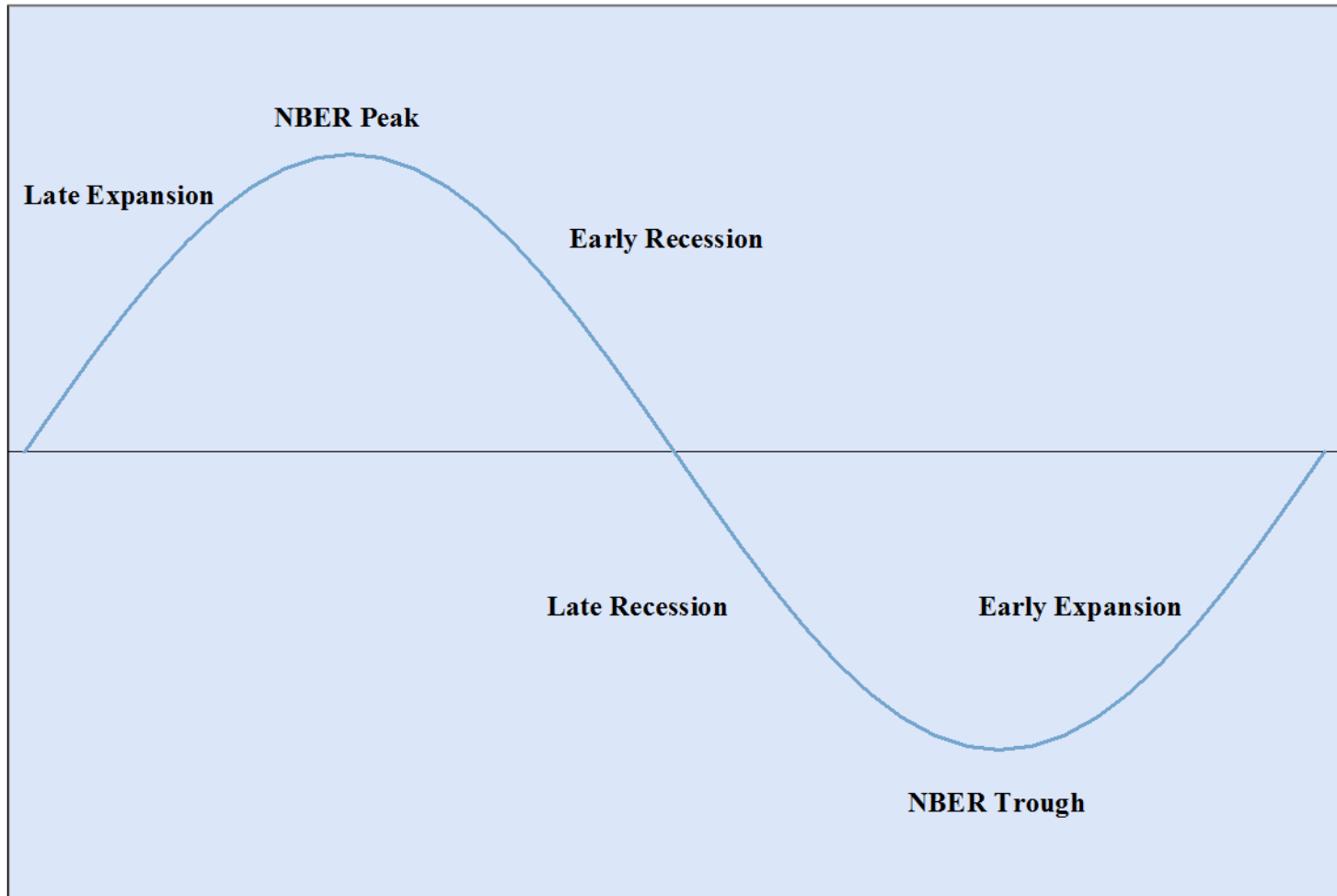
# Correlation of Asset Classes With Inflation Overlapping Returns From 1959 to 2004



# Correlation With Inflation Components Overlapping Returns From 1959 to 2004

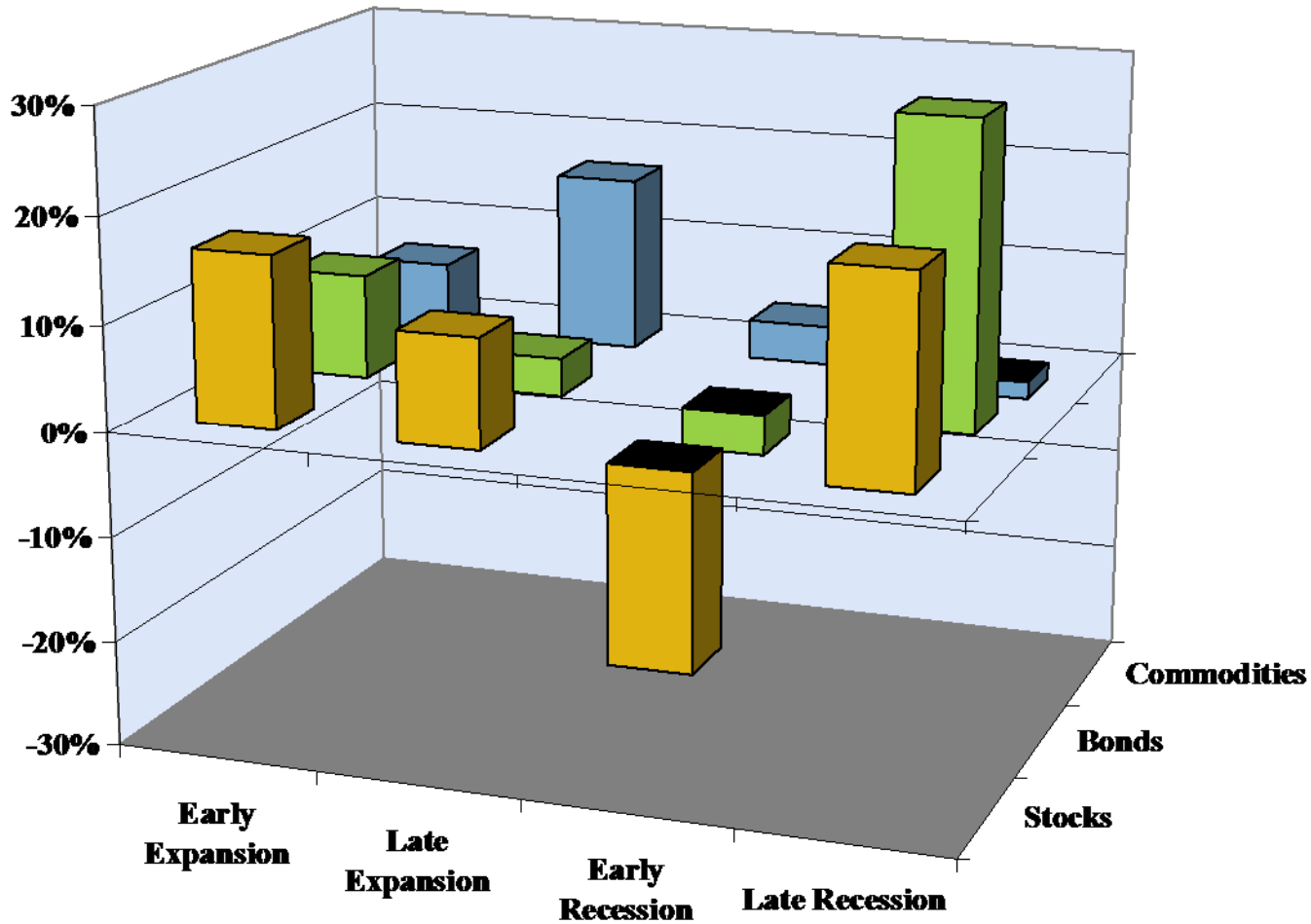


# Phases of the Business Cycle



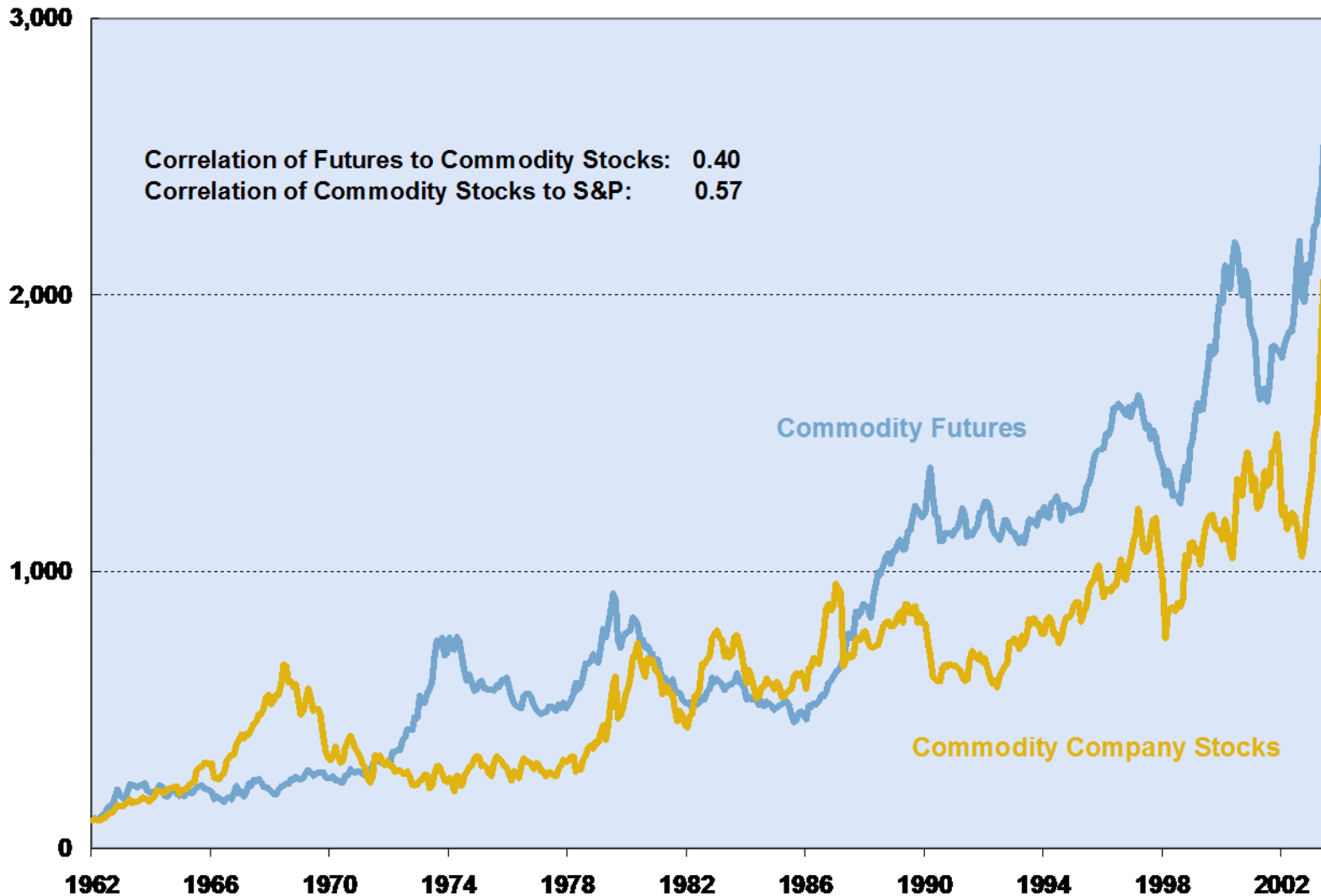
# Commodity Futures, Stocks and Bonds

## Average Returns by Business Cycle Stage From 1959 to 2004



# Commodity Futures vs. Shares in Commodity Companies

## Inflation Adjusted Performance From 1962 to 2003





# Summary

## Returns

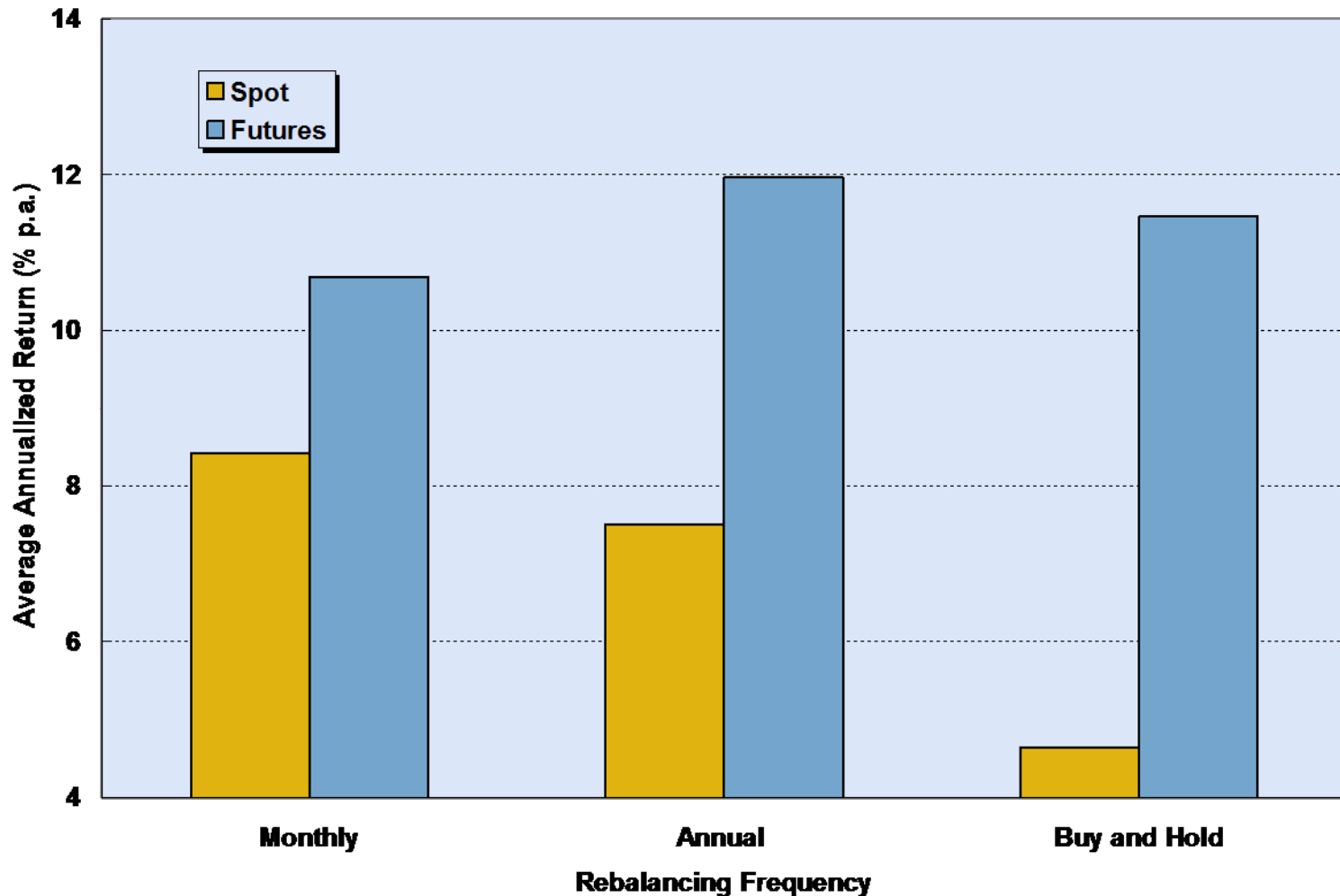
- **The historical risk premium of commodity futures is comparable to the risk premium of stocks and exceeds the risk premium of bonds.**
- **Stocks of commodity companies are a poor substitute for investments based on commodity futures.**

## Risks

- **Commodity futures historically have been less risky than stocks, both in terms of volatility and downside risk.**
- **Commodity futures historically have been negatively correlated with stocks and bonds. The negative correlation is stronger over longer holding periods.**
- **Commodity futures have performed better in periods of inflation (especially unexpected inflation), when stock and bond returns have generally disappointed.**
- **Commodities may diversify the cyclical variation in stock and bond returns.**

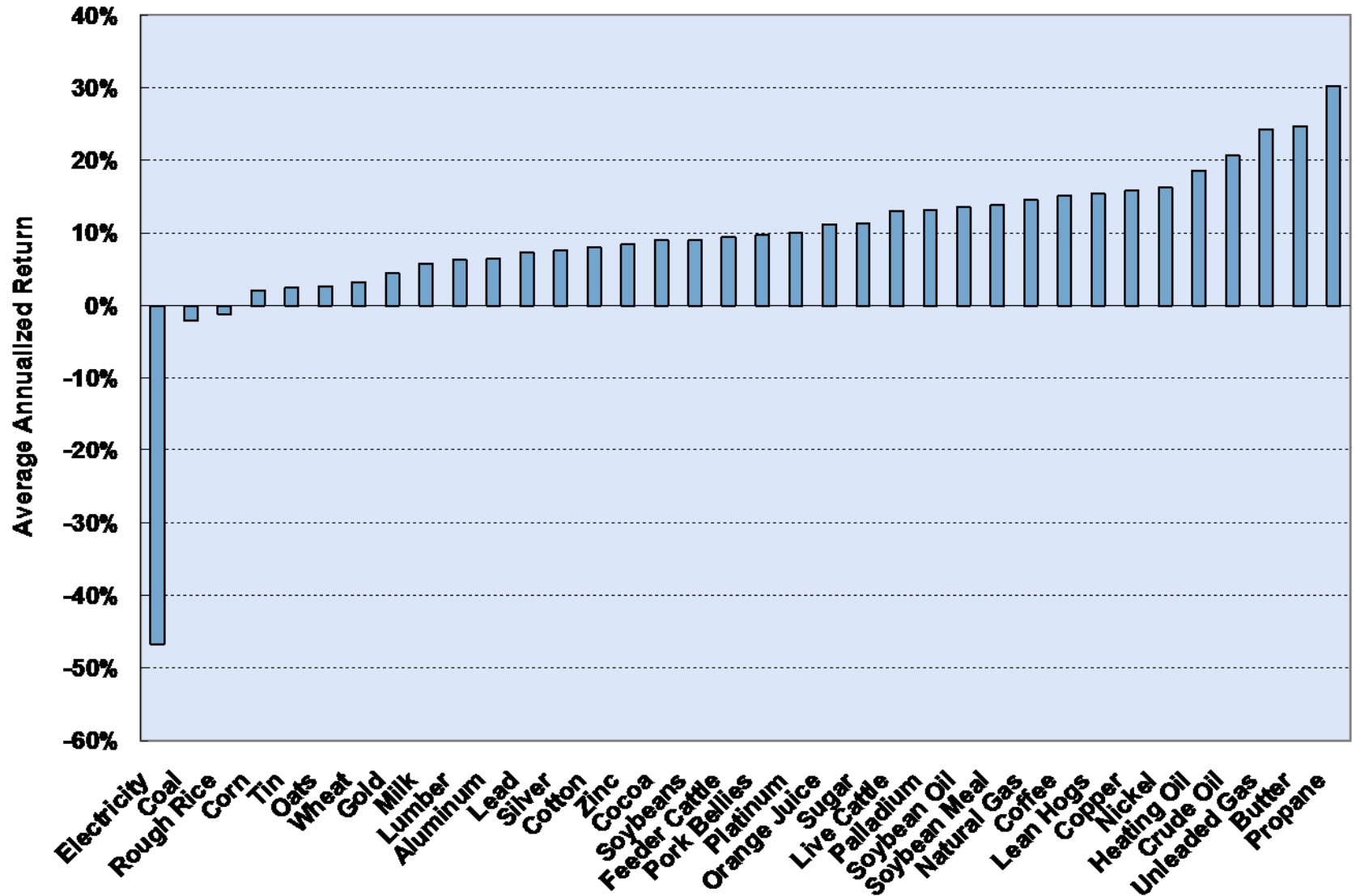
# Sensitivity of Equally-Weighted Commodity Indices to Rebalancing Assumptions

## Data From 1959 to 2004



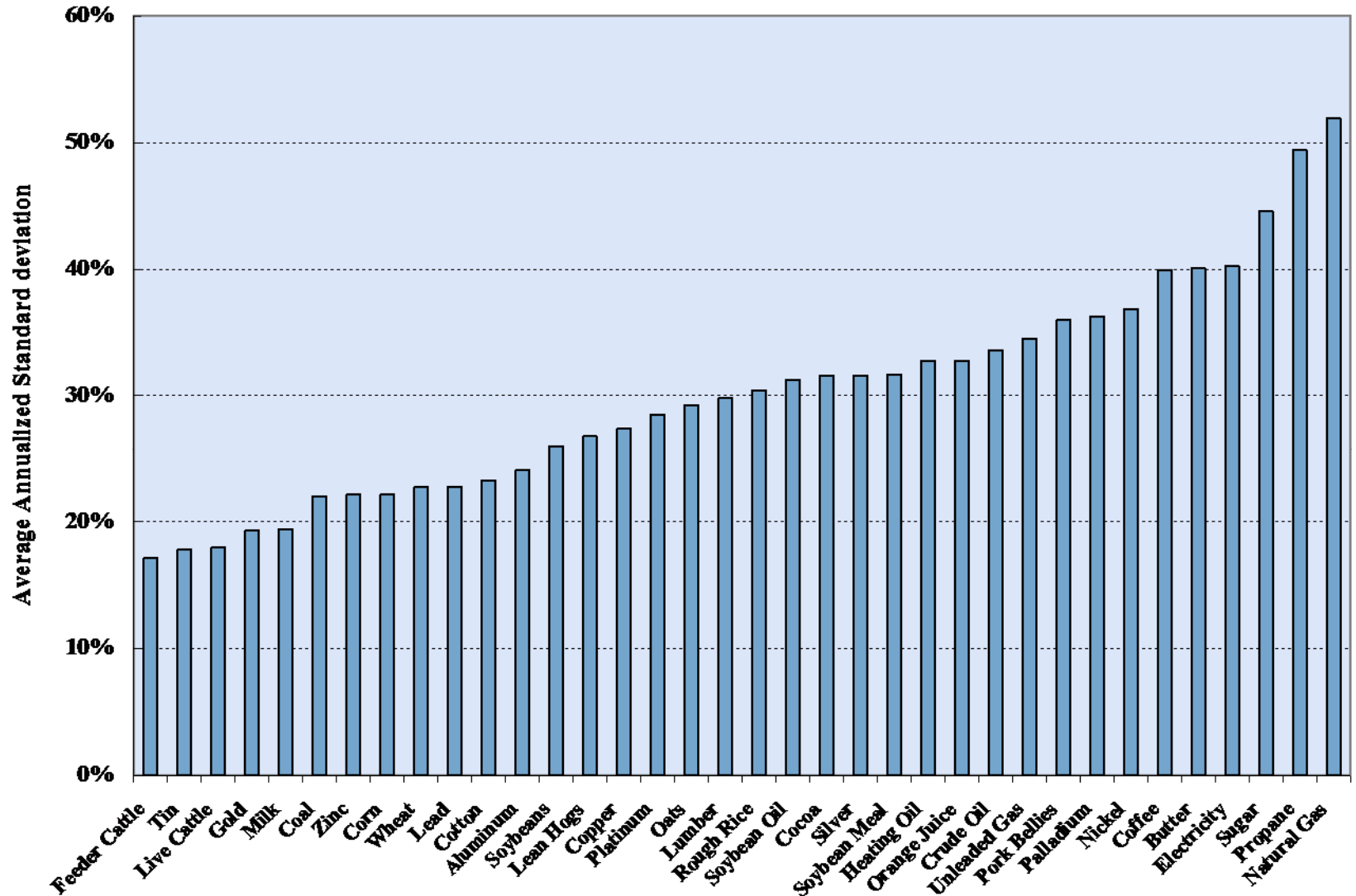
# Average Historical Returns to Individual Commodity Futures

## Data From 1959 to 2004

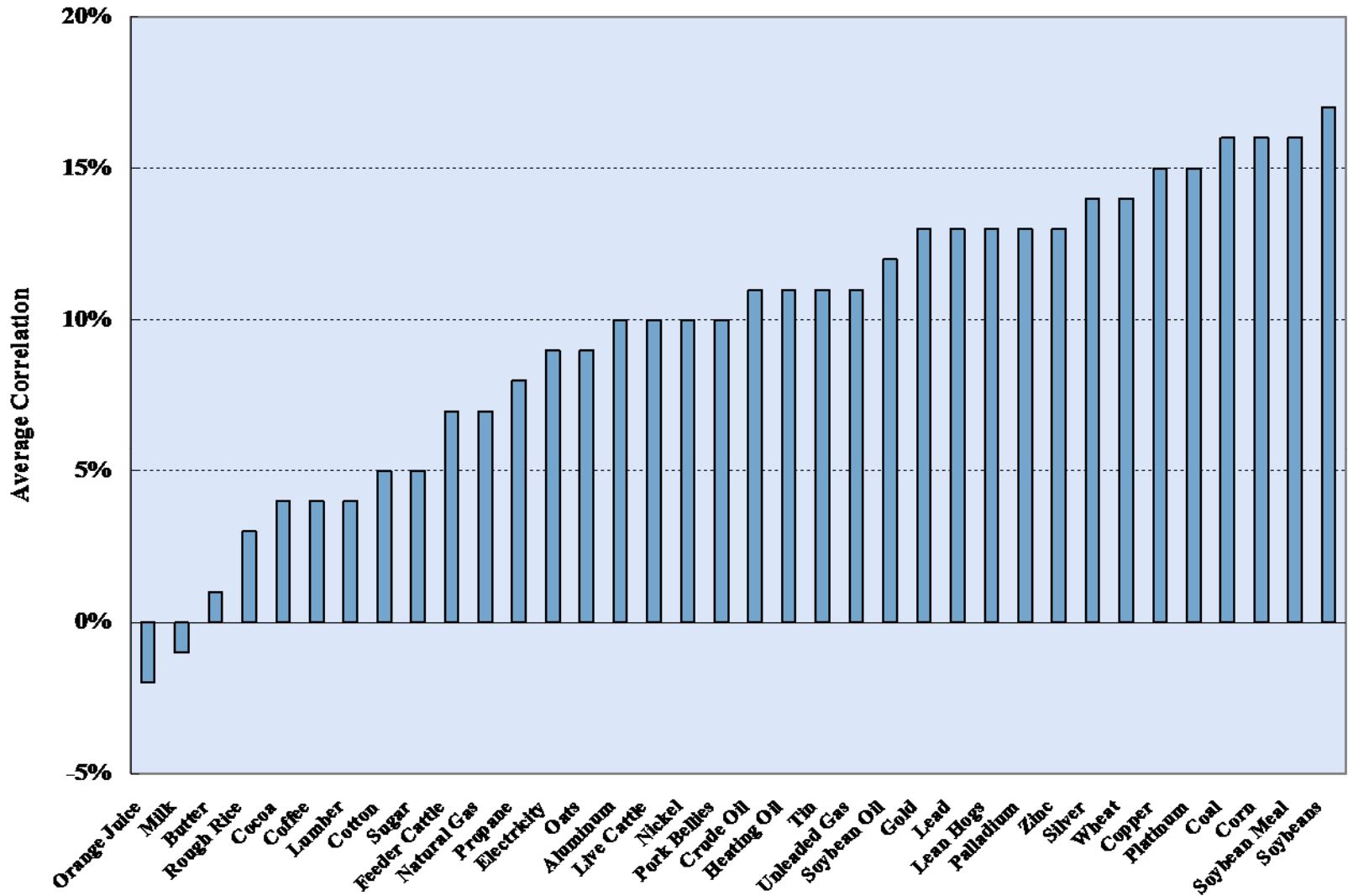


# Average Historical Standard Deviation of Return to Individual Commodity Futures

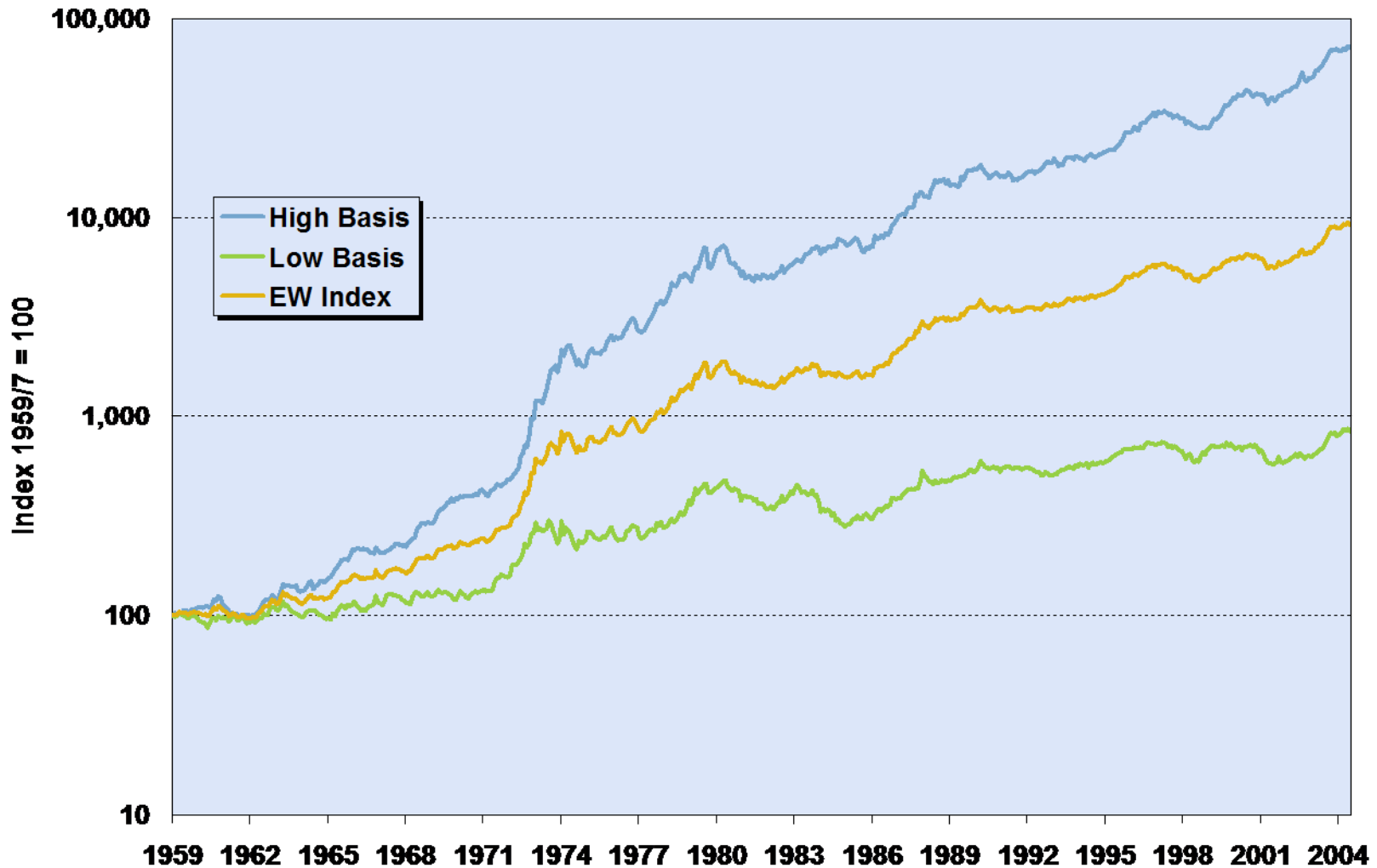
## Data From 1959 to 2004



# Average Historical Pair Wise Correlation of Individual Commodity Futures Data From 1959 to 2004



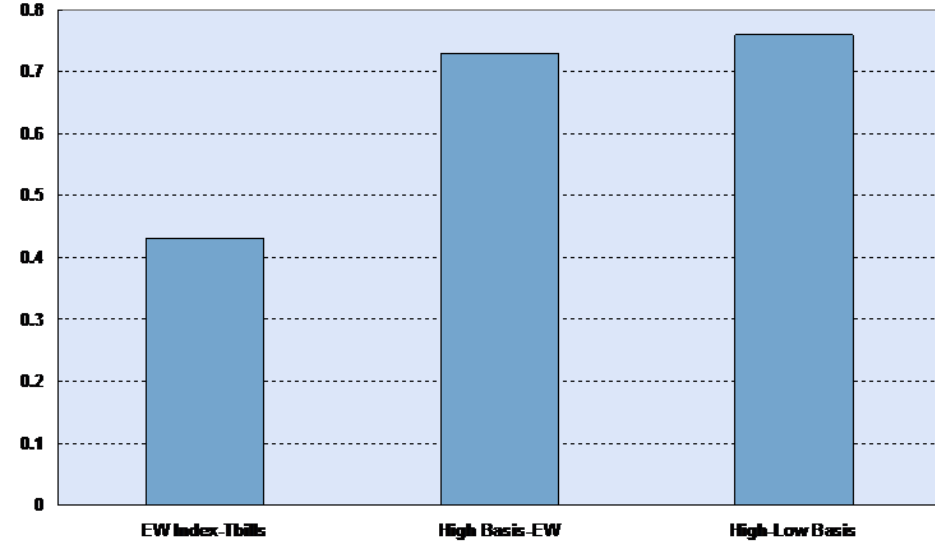
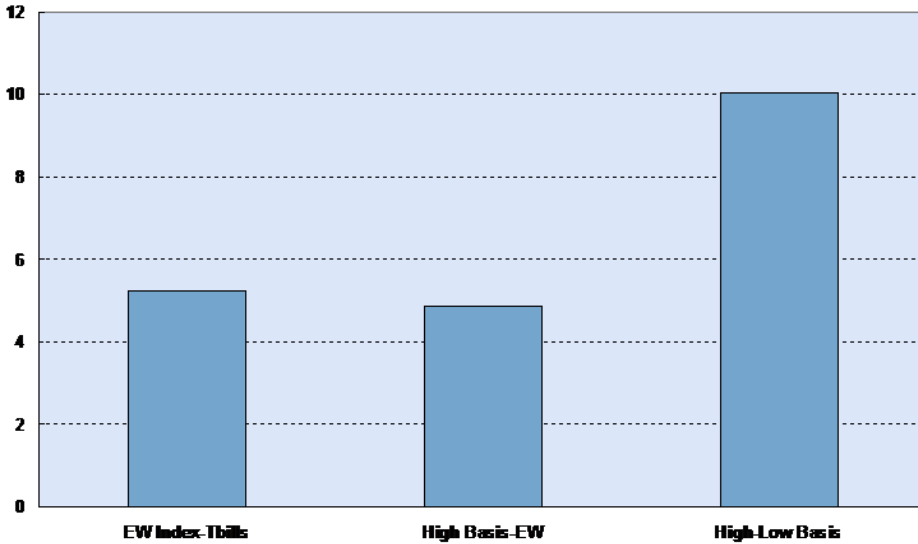
# Cumulative Total Return of Commodity Futures Monthly Re-Sorted Portfolios According to Basis Data From 1959 to 2004



# Monthly Excess Returns of Commodity Futures Portfolios Selected According to Futures Basis Monthly Data From 1959 to 2004

**Average Returns**

**Sharpe Ratio**



**% of Non-negative Returns**

