

The Low-Volatility Anomaly, Interest Rates and the Canary in a Coal Mine

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Low-Volatility Anomaly

- » **Low volatility/beta stocks outperform high volatility stocks**
 - » **Direct contradiction to CAPM**
 - » **First researched by Fischer Black in 1972**
 - » **By many others since**

- » **Common explanations related to CAPM assumptions**
 - » **Leverage constraint**
 - » **Shorting constrain**
 - » **Different expectations/utilities**
 - » **Multi-period investment horizon**



Low-Volatility Anomaly and Interest Rates

» Another different explanation

- » Low volatility stocks are bond-like
- » As interest rates have declined, those stocks get additional benefits
- » Muijsson, Fishwick, and Satchell (2014)
- » Baker & Wurgler (2012)

» Across-asset relationships are common

- » Stocks, Bonds, Commodities, Currencies



Canary in a Coal Mine

- » **“Who is smarter?”**
 - » **Stock market or bond market?**
 - » **Samuelson (1966) “The stock market has forecast nine of last five recessions”**
 - » **LEI includes both S&P 500 index and the slope of UST yield curve**
 - » **Star bank analyst Meredith Whitney says the economy is about to sink into a deep recession.**
- » **Does stock market lead bond market or the other way around?**



» Low volatility anomaly

- » Low/High volatility portfolios
- » Beta adjusted returns

» Contemporaneous relationships

- » Low/High volatility returns and change in interest rates

» Lead/Lag relationship

- » Low/High volatility returns and change in interest rates
- » A trading strategy based on the lead/lag relationship



» Low and high volatility portfolios

- » **Universe: Russell 3000**
- » **Risk Model: Barra UB Risk Model**
- » **Test period: 1990 to 2016**
- » **Portfolio Creation**
 - » Double sort by value-growth and market cap into 9 portfolios
 - » Each portfolio roughly has $3000 / 9 = 333$ stocks
 - » Within each portfolio, sort by specific risk
 - » top quintile (~66 stocks) = high vol
 - » bottom quintile = low vol
 - » Both low Vol and high vol portfolios have ~600 stocks

» Low Vol Return

» Cap-weighted return spread

» Beta_highvol = 1.48

» Beta_lowvol = 0.84

» Beta adjustment

» LowVol spread = (ret_lowvol - ret_highvol)
+ (beta_highvol - beta_lowvol) * (ret_sp500 - rf)
+ rf

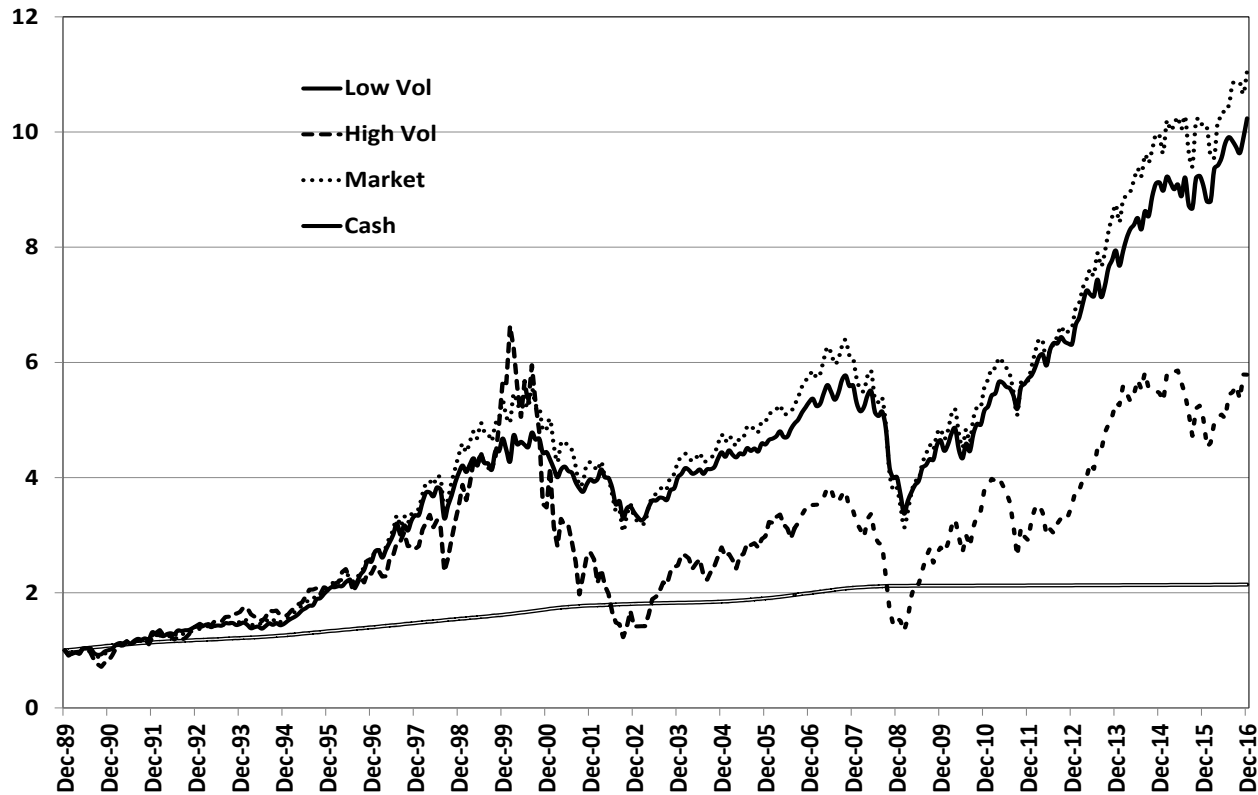
» Low (high) volatility portfolio has high (low) return

	Low Vol	High Vol	Market
Return	9.00%	6.72%	9.31%
Standard Deviation	11.93%	26.82%	14.44%
Sharpe	0.50	0.14	0.42
Average Beta	0.84	1.48	

Low Volatility Anomaly

Return Statistics

» Cumulative wealth



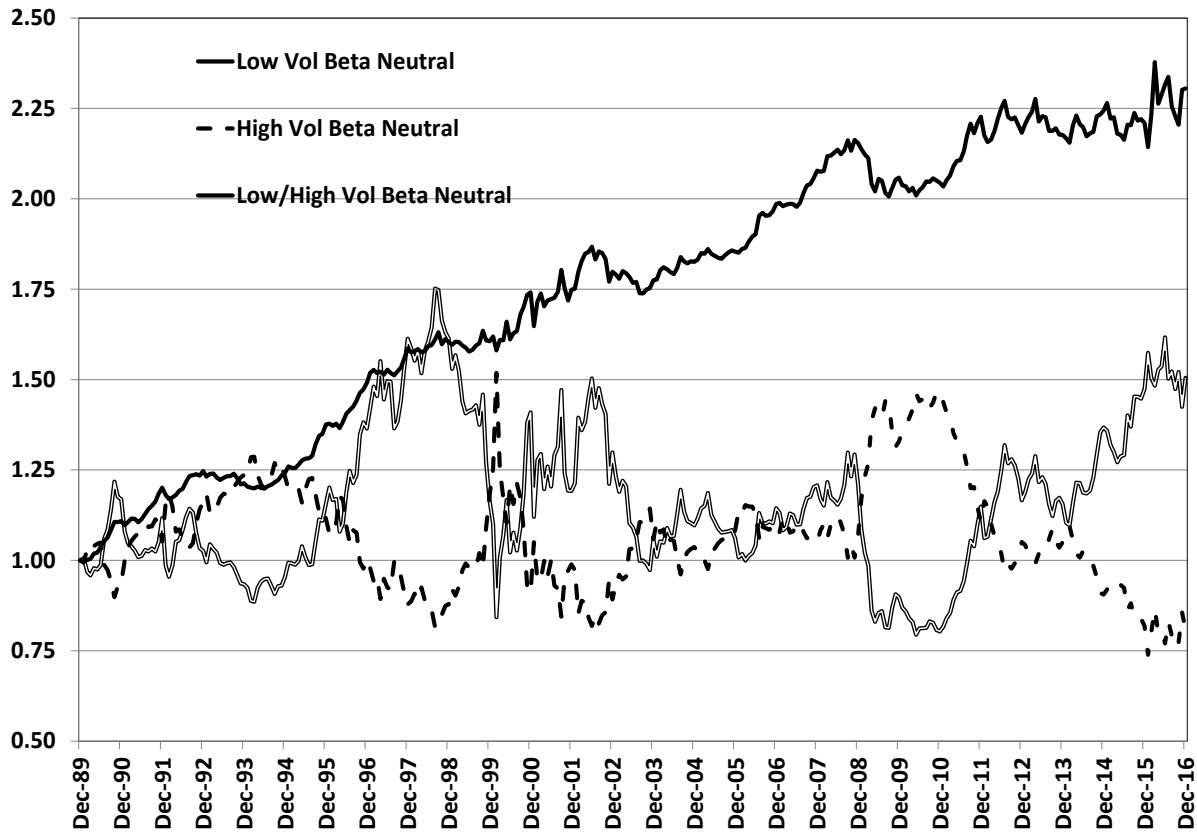
» Beta-neutral portfolio returns

	Low Vol (adj.)	High Vol (adj.)	Low - High (adj.)
Return	3.14%	-0.78%	1.52%
Standard deviation	4.42%	14.41%	16.79%
Information ratio	0.71	-0.05	0.09
Corr w/ market	-0.22	0.06	-0.11

Low Volatility Anomaly

Return Statistics

» Cumulative wealth (beta-neutral)



Contemporaneous Relationship

» Correlations with yield changes

	Chg in 10y	Chg in 2y	Chg in 3m	Chg in 10y/3m
Low Vol	-0.20	-0.12	-0.04	-0.16
High Vol	0.23	0.19	0.02	0.20
Low/High	-0.25	-0.19	-0.03	-0.21

Contemporaneous Relationship

» Correlations with other assets

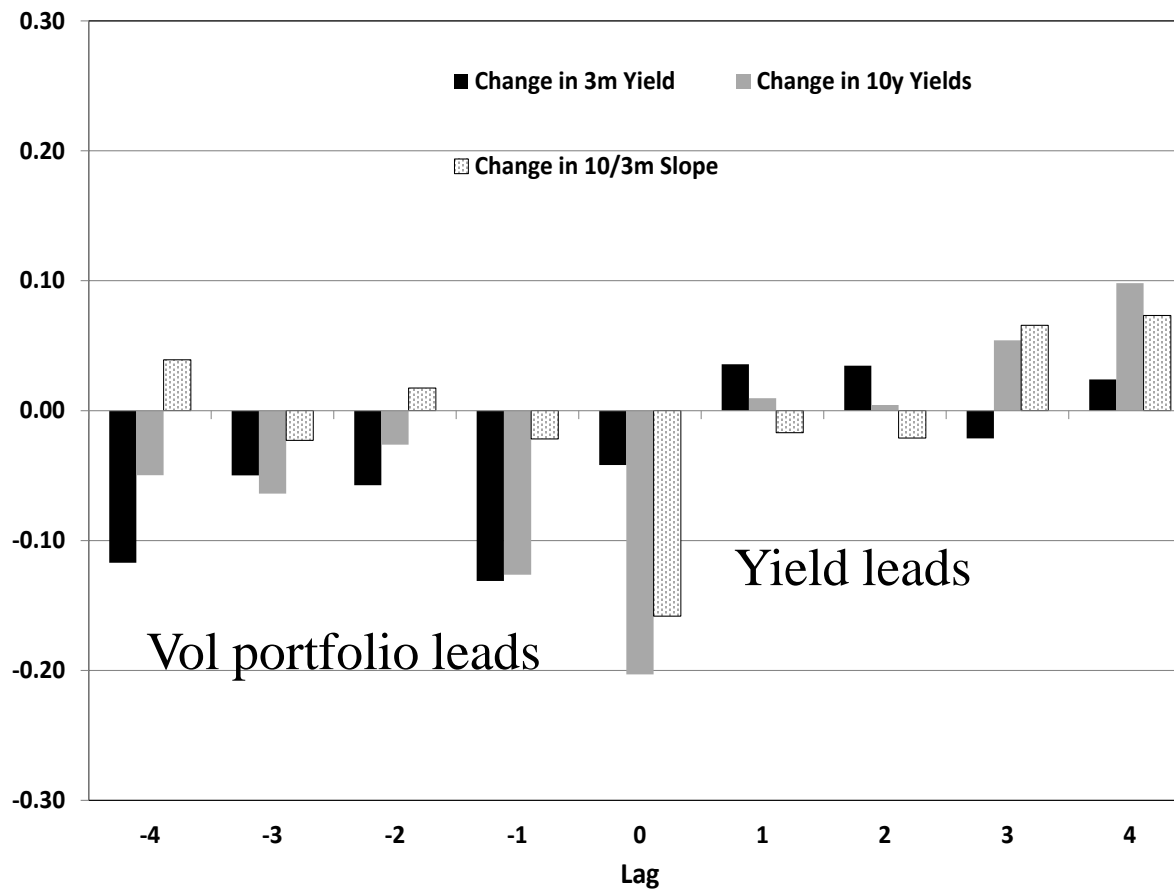
	S&P 500	US Treasury	Credit less UST	Small Less Large	Commodity
Low/High	-0.14	0.25	-0.22	-0.60	-0.07

» Correlations with other equity factors

	earnPred	B2P	CFO2P	Momentum	DivYield
Low/High	0.57	-0.32	0.29	0.29	0.56

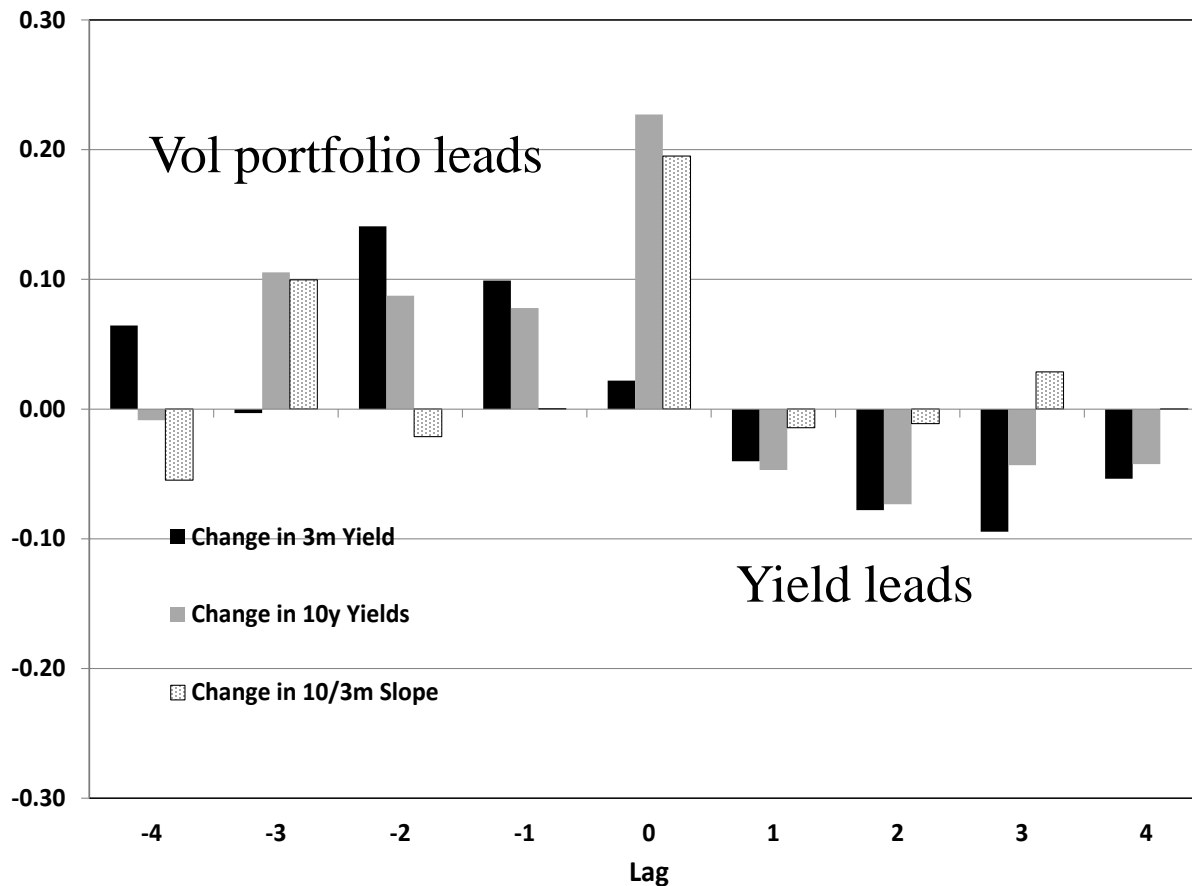
Lead/Lag Relationship

» Low volatility portfolio and change in interest rates



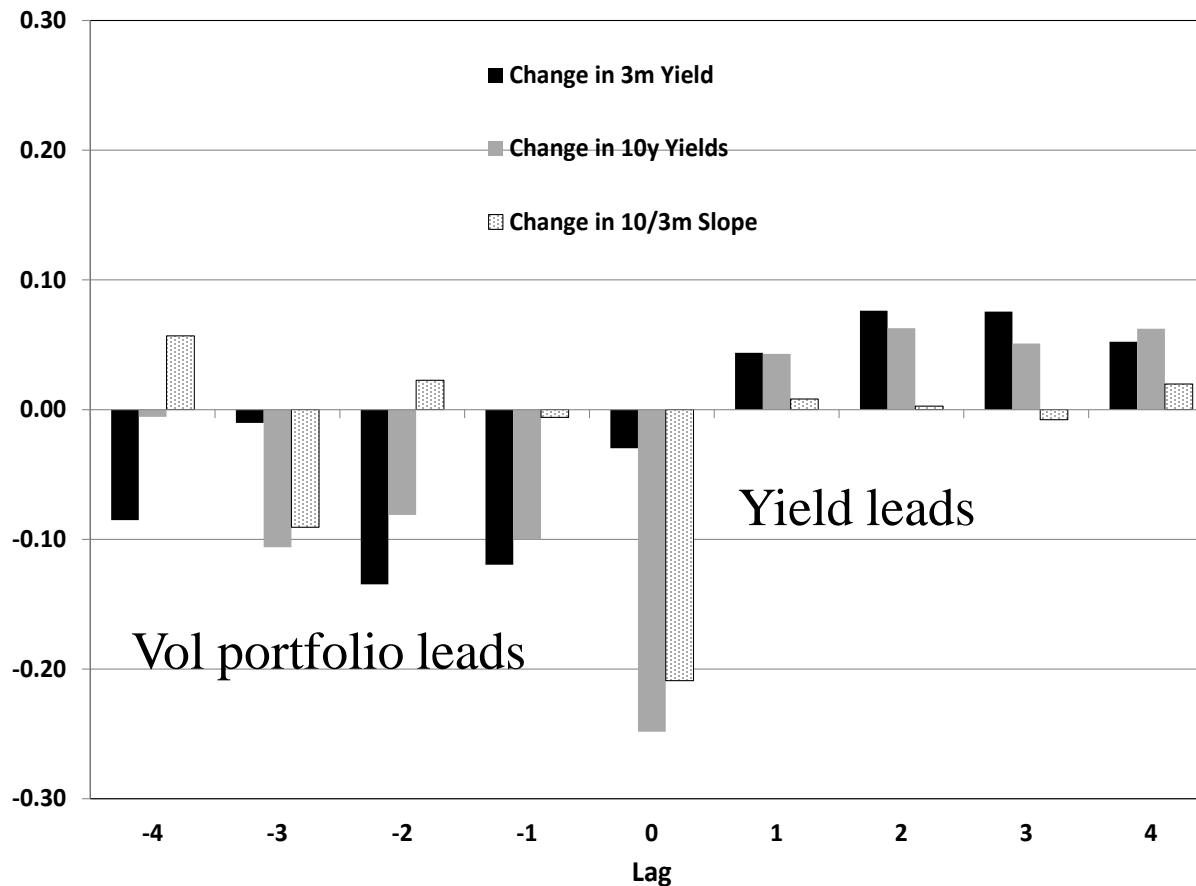
Lead/Lag Relationship

» High volatility portfolio and change in interest rates



Lead/Lag Relationship

» Low-High volatility portfolio and change in interest rates

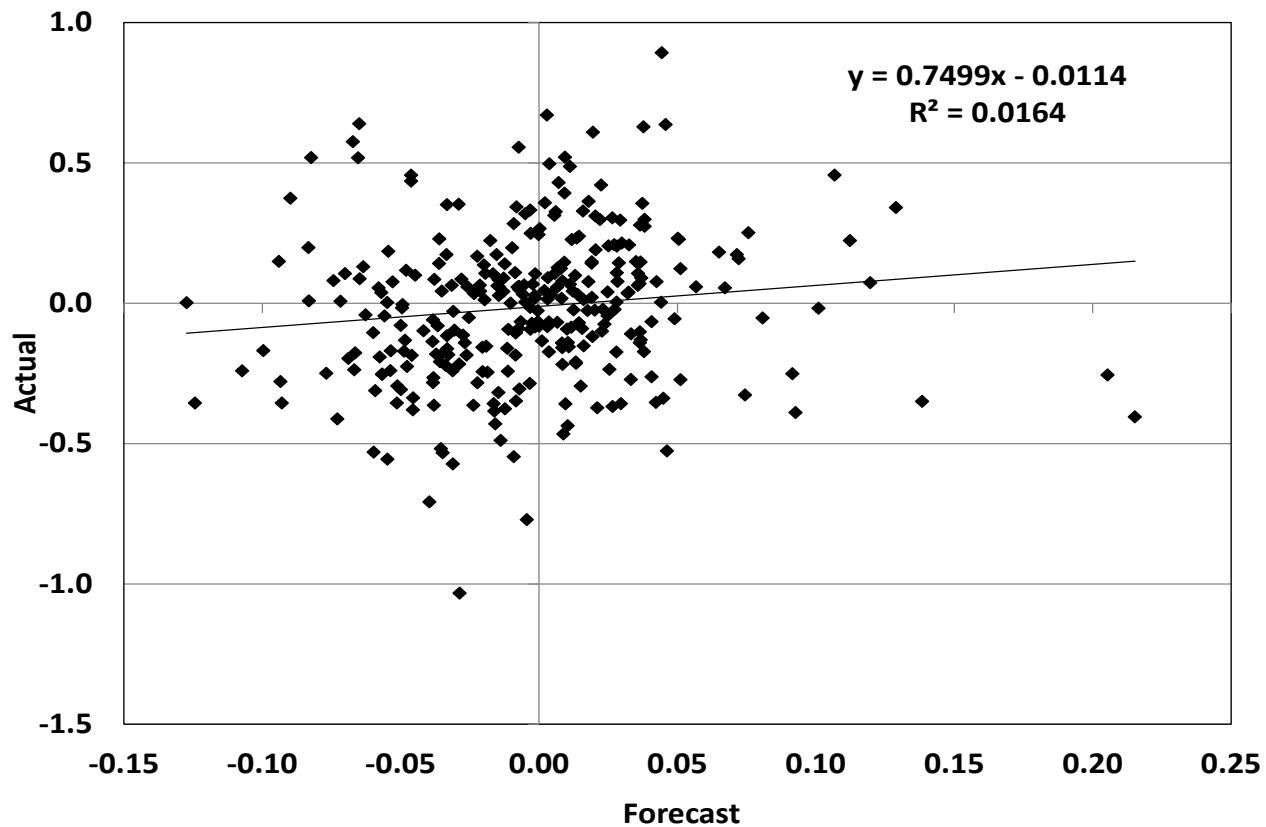


» Predicting change in 10-year yield with low/high vol return

	M1	M2	M3	M4	M1-4
Alpha	-0.013 (-0.90)	-0.0153 (-1.05)	-0.019 (-1.31)	-0.029 (-1.99)	-0.025 (-1.75)
Low/High Vol	-1.665 (-3.14)				-1.520 (-2.75)
10y Chg Lag(1)		0.096 (1.70)			0.053 (0.97)
10y Chg Lag(2)			-0.113 (-2.06)		-0.138 (-2.56)
S&P 500 Lag(1)				1.423 (4.16)	1.221 (3.58)
R ²	0.029	0.0092	0.0125	0.0495	0.089

Predicting Yield Changes

» Forecasted yield change versus actual yield change

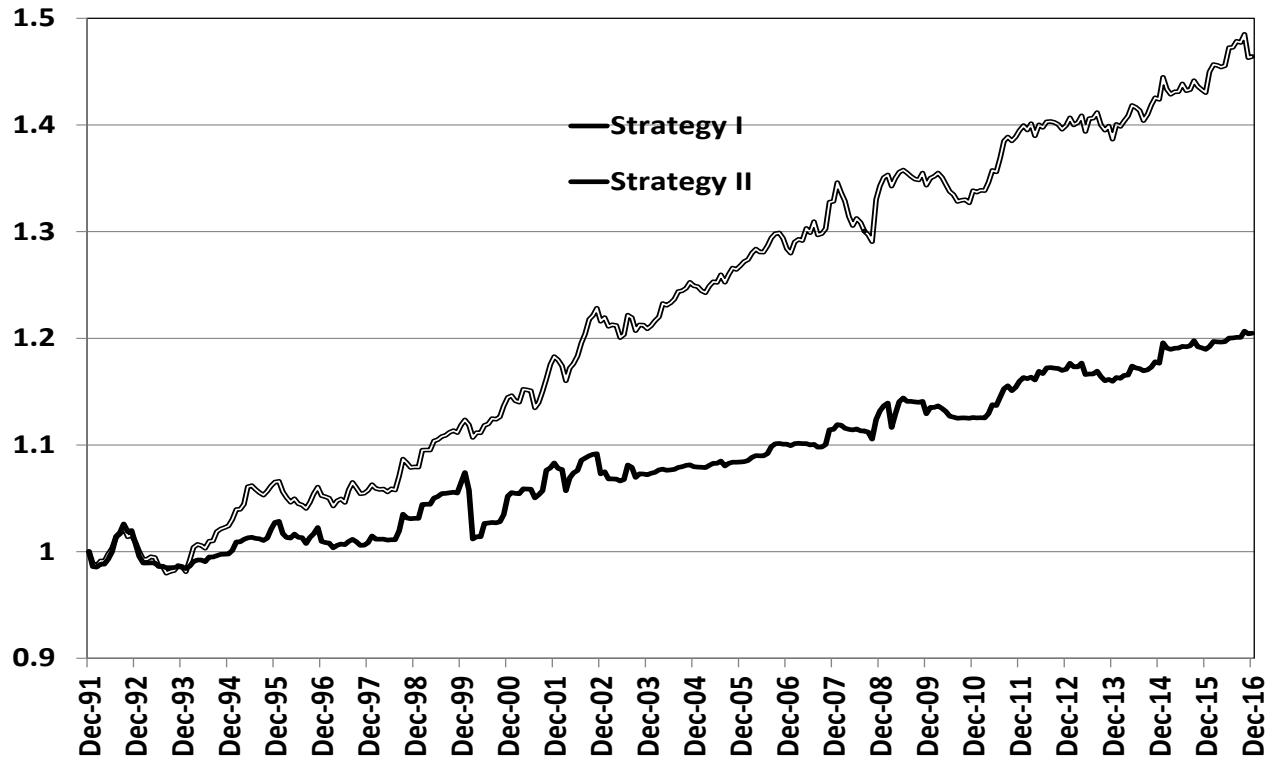


» Trading strategies on UST 10-year futures

	Strategy I	Strategy II
Return	0.76%	1.55%
Risk	1.90%	2.04%
Information Ratio	0.40	0.76
Skewness	-1.78	0.45
Kurtosis	15.48	1.83
Corr w/ 10y Futures	0.13	0.20

Predicting Yield Changes

» Cumulative alpha



Summary

- **Low volatility anomaly is related to changes in interest rates**
 - **Strong contemporaneous relationship**
- **Lead/lag relationship also exists**
 - **Low volatility returns lead changes in yields**
 - **Less evident in the other direction**
- **The relationships can be used to trade UST 10-year bond futures**
 - **Information ratios vary: 0.4 to 0.75**
- **Further research – relationship between other equity factor returns and bond markets**