



# Modeling S&P 500 Sector Weights: The Case for Inverse Relative Price Strength



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## Background

In this study I developed a portfolio of 10 S&P sector ETFs (exchange-traded funds) and then compared them to the S&P 500 ETF, SPY. I used an inverse relative price strength (IRPS) weighting method as a proxy for the return/risk optimizing process developed by Markowitz et.al. The time period analyzed is the highly volatile market period of 2008-2012.

## Hypothesis

The hypothesis tested is that sectors with lower relative prices compared to the market will have high excess returns (alpha).

## Portfolio Weighting Models

IRPS Buy & Hold

IRPS Rebalance

Equal Weight Buy & Hold

Equal Weight Rebalance

## IRPS Model Specifications

t = time period in years

$$R_{it} = \frac{P_{it}}{P_{mt}}$$

R = relative strength  
Pi = price of ith sector  
Pm = price of market

$$IR_{it} = \frac{1}{R_{it}}$$

IR = inverse relative price strength

$$W_{it} = \frac{IR_{it}}{\sum_{i=1}^{10} IR_{it}}$$

Weight assigned to the sectors

Yearly Returns by Weighting Strategy					
Year	IRPS Buy & Hold	IRPS Rebalance	Equal Weight Buy & Hold	Equal Weight Rebalance	S&P 500
2008	-37.64%	-37.64%	-37.59%	-31.41%	-38.28%
2009	24.04%	25.24%	23.35%	12.93%	23.49%
2010	13.38%	13.38%	13.72%	13.78%	12.84%
2011	0.21%	0.97%	0.59%	-0.22%	-0.20%
2012	13.22%	14.85%	11.92%	12.36%	13.47%
2008-2012	-0.72%	2.88%	-1.94%	-6.49%	-2.60%

Excess Returns (Alpha) by Weighting Strategy					
Year	IRPS Buy & Hold	IRPS Rebalance	Equal Weight Buy & Hold	Equal Weight Rebalance	S&P 500
2008	0.64%	0.64%	0.69%	6.87%	n/a
2009	0.55%	1.74%	-0.15%	-10.56%	n/a
2010	0.54%	0.54%	0.88%	0.94%	n/a
2011	0.41%	1.17%	0.79%	-0.02%	n/a
2012	-0.25%	1.38%	-1.55%	-1.11%	n/a
2008-2012	1.88%	5.48%	0.66%	-3.89%	n/a

## Conclusion for 2008-2012 Period

- Both IRPS weighting models outperformed the S&P 500 over the specified time period
- IRPS Rebalance model was only model to have a positive alpha each year
- Both IRPS models outperformed Equal Weight models over the specified time period
- Both IRPS models had positive cumulative returns
- Results of this study support hypothesis than an IRPS strategy provides higher excess returns in volatile markets