ETF Trading Strategies

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Jan 29, 2013

Agenda

Strategies for ETF Trading

- Concepts & Modeling
- Examples
- Testing
- Advanced Models

Part 2

- Tools For ETF Trading
  - To Validate & Implement
- Modeling and Validating in AmiBroker

Trading Strategies

- Non-Systematic Trading a Looser for Average Investor
- Lots of Tools Available, But Key is How to Apply them
- Need to Choose and Follow a Strategy.
- Apply Principles of Portfolio Investing
  1. Design According to the Investor's Risk Tolerance
  2. Allocate Assets to Maximize the Expected Return and Minimize the Risk
  3. Manage Portfolio Utilizing Rules Validated Through Testing

My Objective is To Identify Strategies and Then Cover Some Tools to Implement Them

Portfolio Strategy Concepts

- Buy & Hold – A Passive Strategy
  - Portfolios with Diversified Assets Can Do Well
- Strategic Allocation
  - Allocation Across Non-Correlated Assets/Markets*
  - Rebalance Monthly or Annually to Targets Improves Reward to Risk Ratio
- Tactical Asset Allocation
  - Use Trading to Allocate Assets with Highest Potential Returns and Avoid Those with Potential Losses
  - Select from List of Strategically Selected Assets

*Markowitz, “Modern Portfolio Theory”, 1967

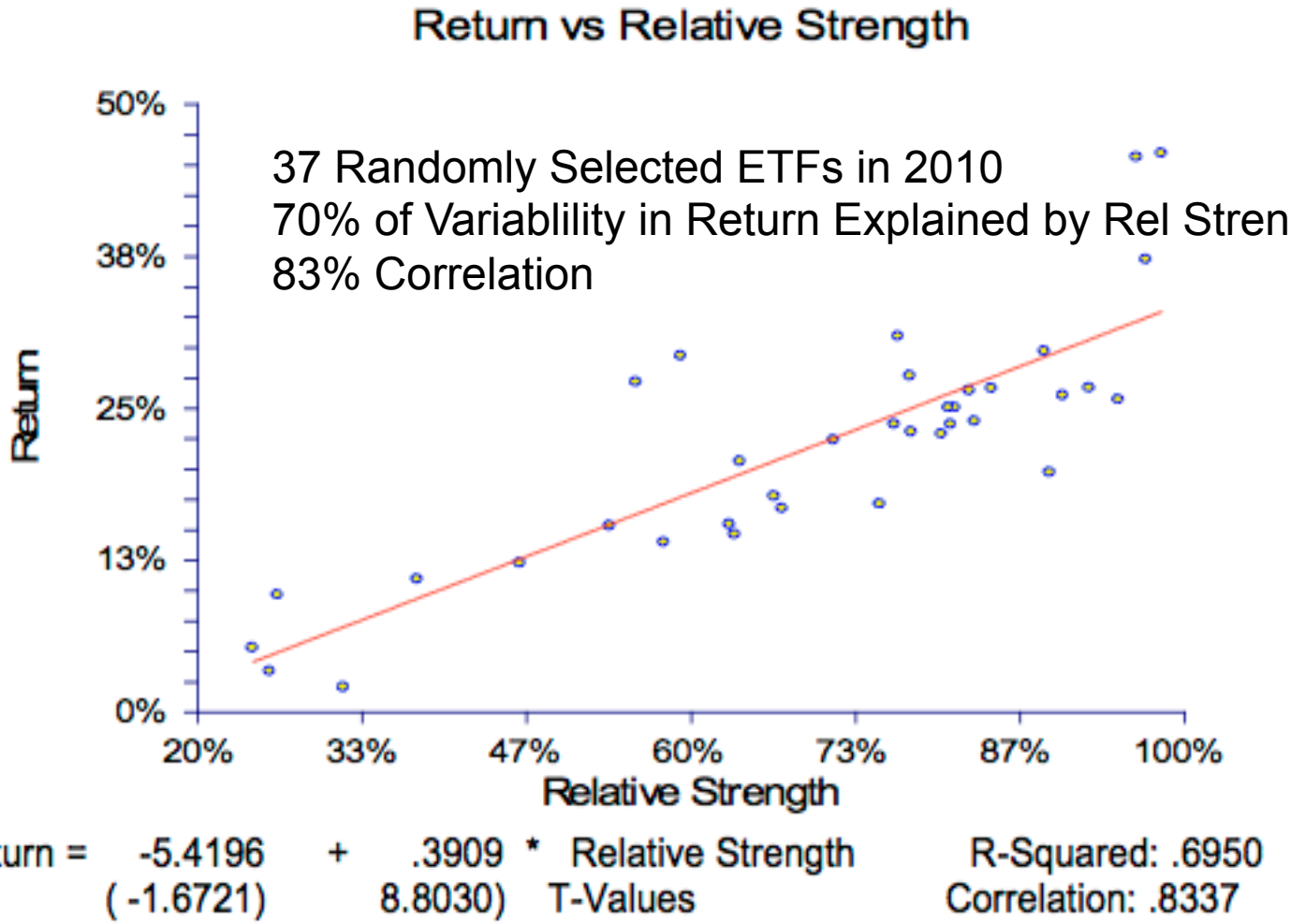
Portfolio Modeling

- Major Problem in Applying Modern Portfolio Theory* is the Use of Static, Long Term Averages for Allocations
  - Allocations Not Updated as Market Changes
- Solution: Evaluate and Apply these Parameters Monthly

- Optimal Portfolios**
  - Based on 4 Parameters:
    - Momentum (Relative Strength)
    - Valuation
    - Volatility
    - Correlation
  - Require Strategic Diversification Across Asset Classes.

- *Markowitz, “Modern Portfolio Theory”, 1967
- ** Butler, “Adaptive Asset Allocation – working paper”, 2012

Momentum – Relative Strength



From Richard Hoyt, Analytics Investment Advisors, 2011

Returns and Risk

- Momentum Only Include Assets Rising in Value
- Value* Select Assets That Are on Low Range of Valuation (i.e Range of OverBought – OverSold)
- Market Risk (price volatility)
  - Diversify: Pick Non-Correlated Markets
  - Diversify - Use ETFs (basket of stocks)
  - Reduce Uncertainty - Avoid New ETFs

Measures

- Compounded Annual Return (CAR)
- Volatility
  - Measured as Annualized Standard Deviation
- Sharpe Ratio (simplified)
  - Measure of Risk Adjusted Return. Good if Above 1.0
  - Portfolio CAR / Standard Deviation
    - Drops Out Risk Free Return Which Currently is About 0.0

* Wang, “Combined Value and Momentum in Tactical Asset Allocation”, 2011

Portfolio Strategies for ETF Trading

Classes of Models Presented	Example Portfolios by Class
1. Fixed Allocation Across Strategic Asset Classes	1. Permanent Portfolio All-Weather ETF Portfolio
2. Fixed Allocation with Timing	2. Faber's Ivy Portfolio
3. Relative Strength (Momentum) Allocation, Equal Weighted ✓ With Filters for Crash Protection	3. Relative Str Ranking Kennedy's Coolcat ETF Model R W Colby"s Top 10 ETF Model Masonson's Buy-Don't-Hold
4. Relative Strength Allocation with Dynamic Weighting ✓ Volatility Weighted ✓ Minimum Variance Weighting	

Model Performance will be compared using results from Testing, since Examples only provide anecdotal figures and are incomplete for comparisons

1 - Fixed Portfolio Example #1

Model Definition

- Portfolio Setup from Mix of ETFs That Would Be Safe and Profitable in Any Kind of Economic Cycle
- Harry Brown's, Permanent Portfolio uses 25% for Each of 4 ETFs – One for Each Part of Economic Cycle
- Buy & Hold, Rebalance Annually

Growth Stocks	for Prosperity	VTI
Precious Metals/Gold	for Inflation	GLD
Govt Bonds	for Deflation	TLT
Cash(ST Bonds)	for Recession	SHY

Results

- **Returned 9.5% over last 40 years**.
- **Mutual Fund (PRPFX) 3yr CAR = 10.6**

AAII, "The Permanent Portfolio / Using Allocation to Build and Protect Wealth", 2011
D Pritch, "Is The Permanent Portfolio ETF A Perfect Choice for the Long-Term Investor",2012

1 - Fixed Portfolio Example #2

Model Definition

- Portfolio Setup to Perform Well Over All Market Environments

Ray Dalio, Bridgwater Assoc. Setup Strategy. His landmark concept was to create a portfolio that would have roughly **equal risk** in four different economic regimes:

1) rising growth
2) falling growth
3) rising inflation
4) falling inflation.

Same As Permanent Portfolio Concept But Different Assets Used.

1 - Fixed Portfolio Examples

Portfolio to Have Equal Risk Over Market Environments Setup Using Weighted Fixed Allocations Based on Risk

	Growth +	Growth -	Inflation +	Inflation -	Total	Fund
Equities	6.25%			12.50%	18.75%	VTI
EM Debt Spreads	6.25%		8.33%		14.58%	EMB
Commodities	6.25%		8.33%		14.58%	DBC,GLD
Corporate Spreads	6.25%				6.25%	HYG
Nominal Bonds		12.50%		12.50%	25.00%	TLT,IEF
TIPS		12.50%	8.33%		20.83%	TIP
					100.00%	

Results for 2005-2012: CAR=8.1%, Sharpe=.83, MDD=-19.7, V=6.1%

1 - Fixed Portfolio Comparison

Test Model

- Fixed 4 Portfolio Setup from Strategic Mix of ETFs That Would Be Safe and Profitable in Any Kind of Economic Cycle, Rebal Annually.
- ETFs Same as Perm Portfolio: VTI, TLT, GLD, SHY
- Model Testing Using ETFReplay 2007-13

Model	CAR	Sharpe	MDD	Volatility
Permanent 4 ETFs 40 yrs	9.5			
Permanent Mut Fund 3 yrs	10.3			
All-Weather 6 ETFs 05-12	8.1	.83	-19.7	6.1
Fixed 4 Test Model 07-13	13.4	.78	-3.5	6.8

2 - Fixed Portfolio with Timing

Model Definition

- Setup List of a Strategic Mix of up to 10 Asset Class ETFs
- Apply Market Timing to Reduce Drawdown
  - Update Monthly – Buy/Sell If Above/Below 200 day
- Example – Faber's Ivy Portfolio [IVY Portfolio Website]

Two Portfolio Implementations In Book

Symbol	Ivy 10 Portfolio
BND	Vanguard Total Bond Market ETF
DBC	PowerShares DB Commodity Index Tracking
GSG	S&P GSCI(R) Commodity-Indexed Trust
RWX	SPDR DJ International Real Estate ETF
VNQ	Vanguard REIT Index ETF
TIP	iShares Barclays TIPS Bond
VWO	Vanguard Emerging Markets Stock ETF
VEU	Vanguard FTSE All-World ex-US ETF
VB	Vanguard Small Cap ETF
VTI	Vanguard Total Stock Market ETF

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VTI	Vanguard Total Stock Market ETF

- * M Faber, "A Quantitative Approach to Tactical Asset Allocation", 2009

2 - Fixed Portfolio with Timing

Faber's Performance Using 10 Mo Timing

- Ivy5 Portfolio 1973-2008 CAR= 11.27%, V= 6.87,MDD=-9.5%,S=.77
  Benchmark B&H No Timing CAR= 9.77%, V=9.73,MDD=-36%,S=.39

Model Runs 2007-13 Using ETFReplay.com

Model	CAR	Sharpe	MDD	Volatility
1-Fixed 4 ETFs (Perm4)	13.4	.78	-3.5	6.8
1-Fixed 5 ETFs (Ivy5)	11.0	.30	-7.1	12.1
1-Fixed 10 ETFs (Ivy10)	10.7	.23	-8.3	13.6
2-Fixed 5 (Ivy5) w Timing4	**9.1**	**.59**	**-13.2**	**10.2**
2-Fixed 10(Ivy10) w Timing4	**8.4**	**.53**	**-12.9**	**10.3**

Results Not Great, But Model Simple – Inspired Many to Improve Model

3 - Relative Strength Asset Allocation

Model Definition

- Setup List of a Strategic Mix of up to 10 Asset Class ETFs
- For Testing & Comparison – Use IVY10 List
- Relative Strength Used to Allocate Assets to Portfolio on a Monthly Basis, .i.e Pick Best Performers
- Use Equal Weighting
- Buy Top x% from Ranked List Using N month Momentum (Rel Strength)
- Optional –
  - Crash Proof Filter Sell/Don't Buy If Rel Strength is Zero or Neg
  - Alternative – Don't Buy if Rel Stength is Less Than Prior Month

3 - Relative Strength Asset Allocation

Model Testing

- Rel Strength Model Testing 2007 – 2013
  - Rel Str Lookback = 4 - 6 months,
  - Select 2 or 3 from 10, Updated Monthly

Model	CAR	Sharpe	MDD	Volatility
1-Fixed 4 (Perm4)	13.4	.78	-3.5	6.8
1-Fixed 5 (Ivy5)	11.0	.30	-7.1	12.1
1-Fixed 10 (Ivy10)	10.7	.23	-8.3	13.6
2-Fixed 5 (Ivy5) w Timing	9.1	.59	-13.2	10.2
2-Fixed 10 (Ivy10) w Timing	8.4	.53	-12.9	10.3
3-RelStr4 2-10 wCP	21.8	.96	-17.3	19.1
3-RelStr6 3-10 wCP	15.5	.75	-18.5	16.7

Results from My Testing*

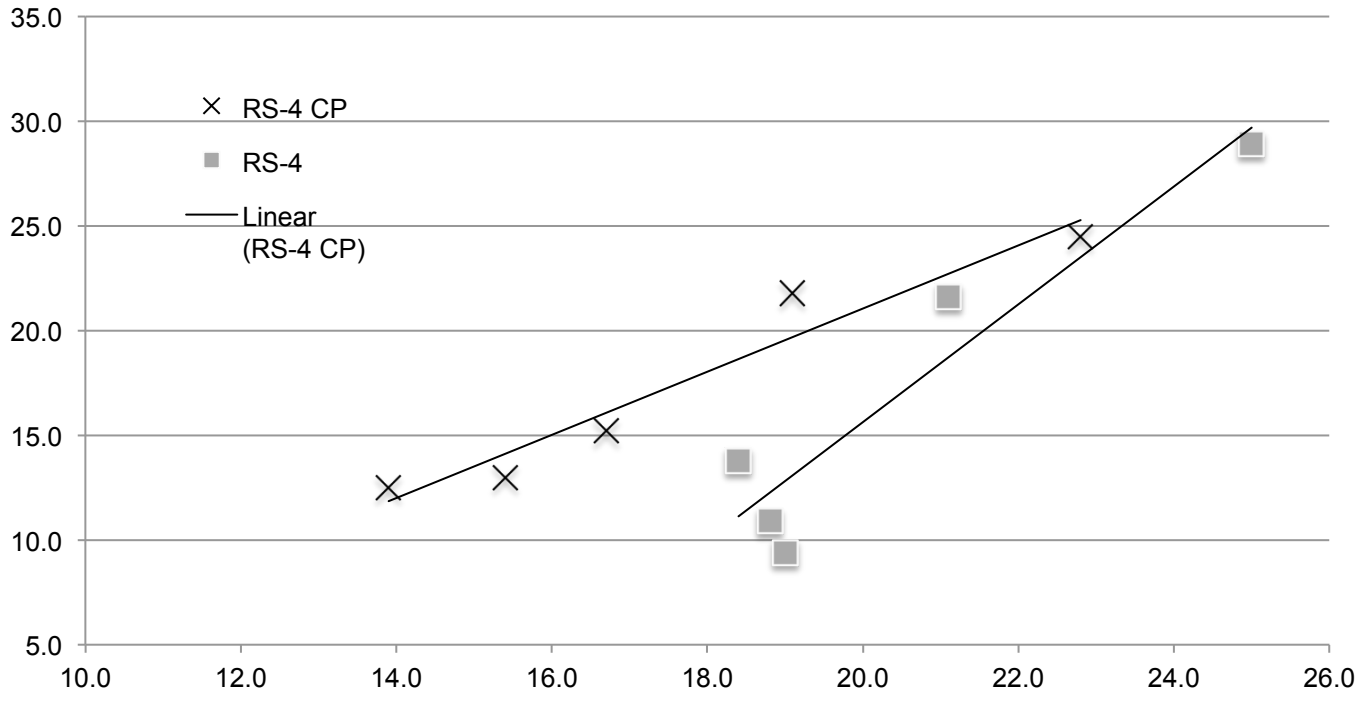
- Relative Strength Ranking Better than Fixed B&H
  - Lookback **Period of 4 months** generally worked best
  - Use of 2 Rel Str Periods in Ranking
    - Mixed Results. Better if Only 1-2 Picks, Worse for 3-5 Picks
  - Monthly Timing & Portfolio Updates
    - Semi-Monthly Failed to Improve Performance in Most Cases
- **Crash Protection** Filter – definite improvement
  - Returns Not always Higher, but Volatility Lower with Higher Sharpe
- Volatility Used for Ranking
  - ETFReplay Ranking Model – Optional Weighting of Volatilty
    - Mixed Results. Better When Picking 4-5 from List, Worse Otherwise
    - Volatility Tested with Equal Weight of Relative Strength.
- Volatility Weighting vs Equal Weighting
  - Tbd. Current Software Tools Not Capable.
  - All Tests Used Equal Weighting

* Over a 300 Tests Were Run Using ETFReplay and AmiBroker

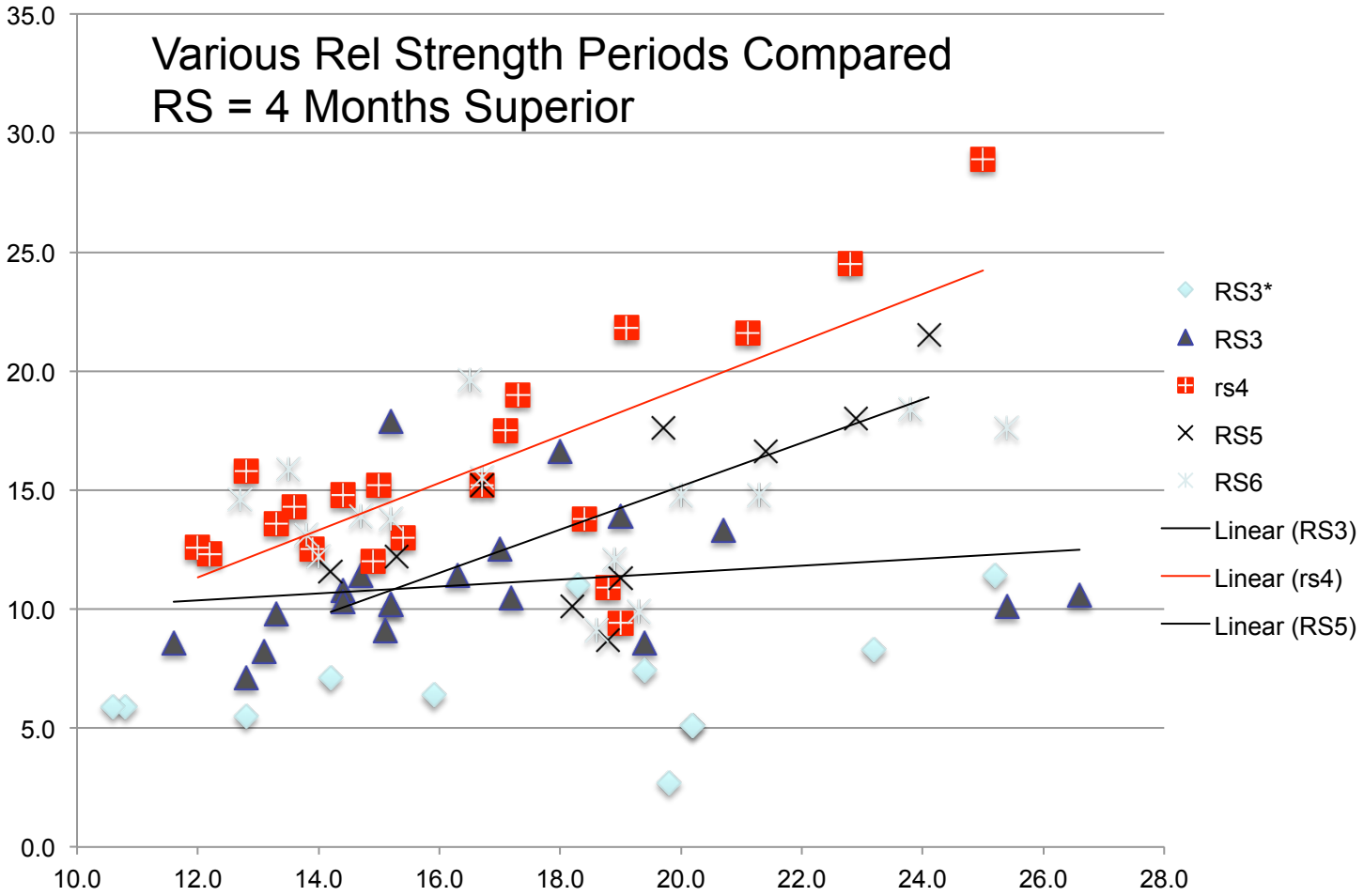
Use of Crash Protection Filtering

CAR Ploted vs %Volatility for RS4 case

CP (Crash Protection) Improved Performance
by Reducing Volatility



Relative Strength Lookback Period



4 - Relative Strength w/ Dynamic Weighting

This Study* Provides Insight Into More Complex Models and What Might Be Gained From Their Use.

Model Definitions

- Setup List of a Strategic Mix of 10 Asset Class Funds
  - US, Europe, Japan, Emerg Mkt Stocks, US & Intl REITS, Long & ST US Treas, Commodities, Gold
- Six Models Analyzed:
  - Equal Weight
  - Volatility Weighted
  - Top 5 Momentum Ranked, Equal Weight
  - Top 5 Momentum Ranked, Volatility Weighted
  - Top 5 Having Minimum Volatility & Correlation
  - Optimized & Integrated Use of Momentum, Volatility, Correlation
- Tests Run over Period 2002-12

*Based on Paper by A. Butler,"Adaptive Asset Allocation – A Primer", 2012

4 - Relative Strength w/ Dynamic Weighting

From 1995 to 2011 (16 Years)

Model	CAR	Sharpe	MDD
1.Equal Weight B&H, Rebal Mo	8.36	.66	-44
2.Equal Volatility Weight, Rebal Mo	8.88	1.23	-19
3.Top 5 Rel Str Rank, Equal Wt	14.3	1.23	-26
Models Requiring Specialized Software			
4.Top 5 Rel Str Rank, Volatility Wt	13.9	1.53	-15.9
5.Top 5 Rel Str Rank, Minimum Variance	15.4	1.71	-15.8
6.Optimized (R,V,C) Weekly Rebalanced	16.9	2.51	-9.6

Models 1-3 Similar to those Previously Presented.

Models 4-6 Show Potential for Improved Portfolio Performance But More Complexity, Requiring Specialized Software

*Based on Paper by A. Butler,"Adaptive Asset Allocation – A Primer", 2012

What's Required for More Complex Models

- Models 4 thru 6 Achieve Superior Results But
  - Custom Software Required
  - Ranking Algorithm Must Use Data from all Rows to Compute Score for Each Row
  - Optimization Model required for Last Model

- One Approach is the Use of Monte Carlo Methods
  - See Quantext by Gauss

More On Strategies

- *evidence suggests that a simple asset class ETF momentum strategy beats an equal-weighted benchmark over the past nine years under conservative assumptions, adding value to simple diversification...*
- *evidence indicates that strategies setting portfolio-level volatility targets for a set of global stock indexes easily outperform equal weighting based on gross Sharpe ratio and maximum drawdown.*

CXOAdvisory.com

References

1. M. Faber, “A Quantitative Approach to Tactical Asset Allocation”, 2009
2. H. Browne, “Fail-Safe Investing: Lifelong Financial Security in 30 Minutes”, 1999
3. W. ThorpeAAII, “Using Relative Strength Analysis to Invest in ETFs”, 2011
4. R. Colby, “Introduction to the Screening Method for Analysis of Relative Strength”,2009
5. Seeking Alpha, “All Weather ETF Portfolio”
6. Bridgwater Assoc., “The All Weather Story”
7. K. Kennedy Coolcat.com, “The Coolcat ABCs of ETFs”, 2005
8. L. Masonson, “Buy Don’t Hold: Investing with RTFs Using Relative Strength to Increase Returns with Less Risk”, 2010
9. L. Herr, “Modeling the Faber-Richardson Ivy Portfolio, 2012
10. A Butler, “Adaptive Asset Allocation – A Primer”, 2012
11. W. Keller,”Generalized Momentum and Flexible Asset Allocation, 2012
12. Gauss, “Reducing Risk Using Modified Ivy Portfolio”,2011
13. CXOAdvisory, “Asset Allocation Combining Momentum, Volatility, Correlation and Crash Protection”, 2012
14. CXOAdvisory, “Diversifying Across Strategic Allocation Strategies”, 2012
15. CXOAdvisory, “Combining SMA Crash Protection and Momentum in Asset Allocation, 2012