Trading System Design: A Practical Guide

Alan Clement

HelixTrader.com

1. Trading System Design Elements

2. Walkthrough of Trading System Build

Disclaimer

Helix Trader nor any of its affiliates, directors or agents are a financial advisory service, nor a registered financial advisor and does not provide financial advice whatsoever in any financial products. You understand and acknowledge that there is a very high degree of risk involved in trading securities and derivatives. In particular, trading leveraged instruments such as Futures, Contracts for Difference or Spread Betting can amplify the losses as well as gains achieved due to market price fluctuations and you may lose more than your original investment.

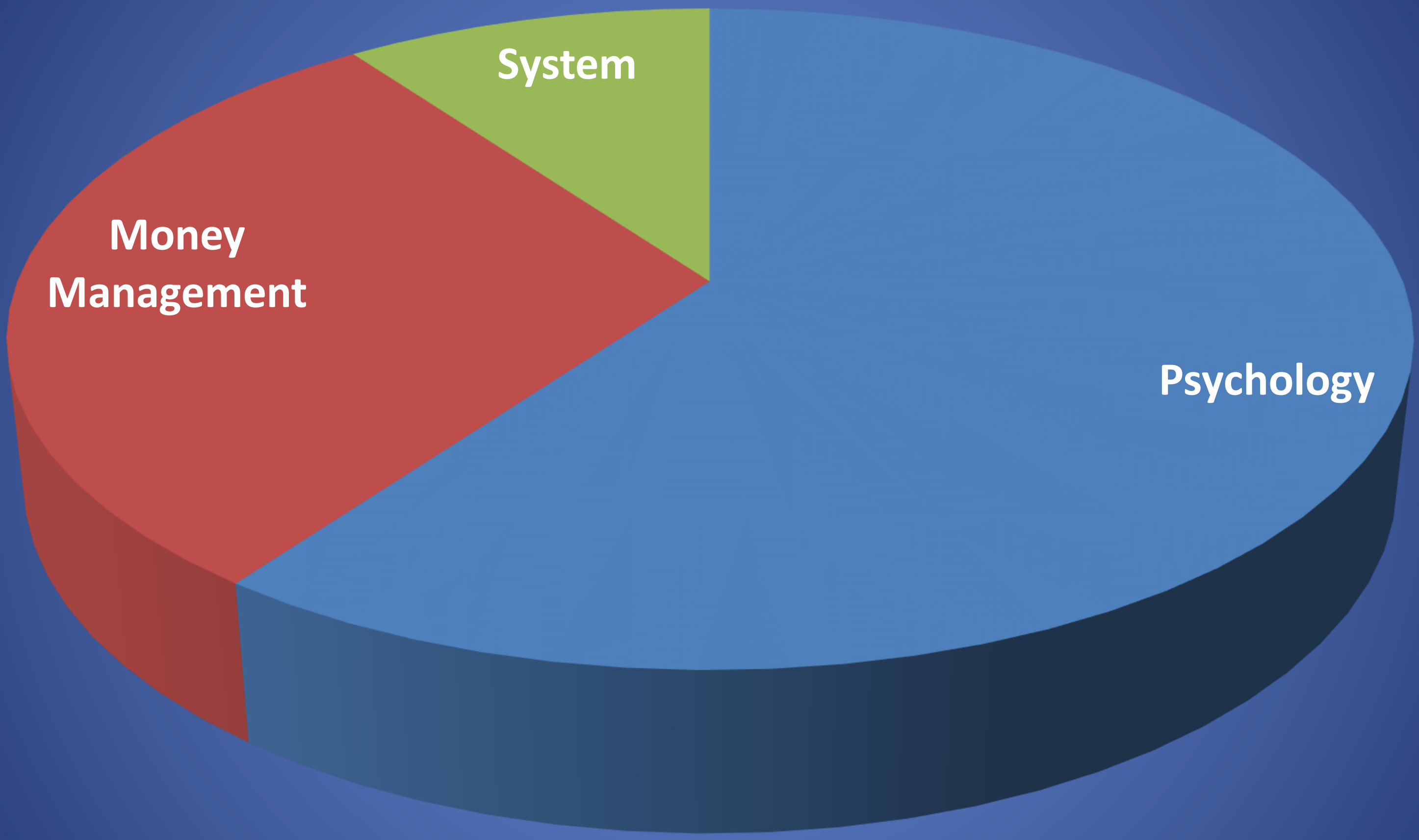
All methods, techniques, charts or analysis presented in Helix Trader Insights are for educational purposes only. The information provided should not be construed in any way as a recommendations to buy or sell any financial instrument. You should always consult with your registered financial advisor and tax advisor to determine the suitability of any investment to your particular financial situation. Helix Trader and its affiliates, directors or agents will not be held liable or responsible for your investment decisions.

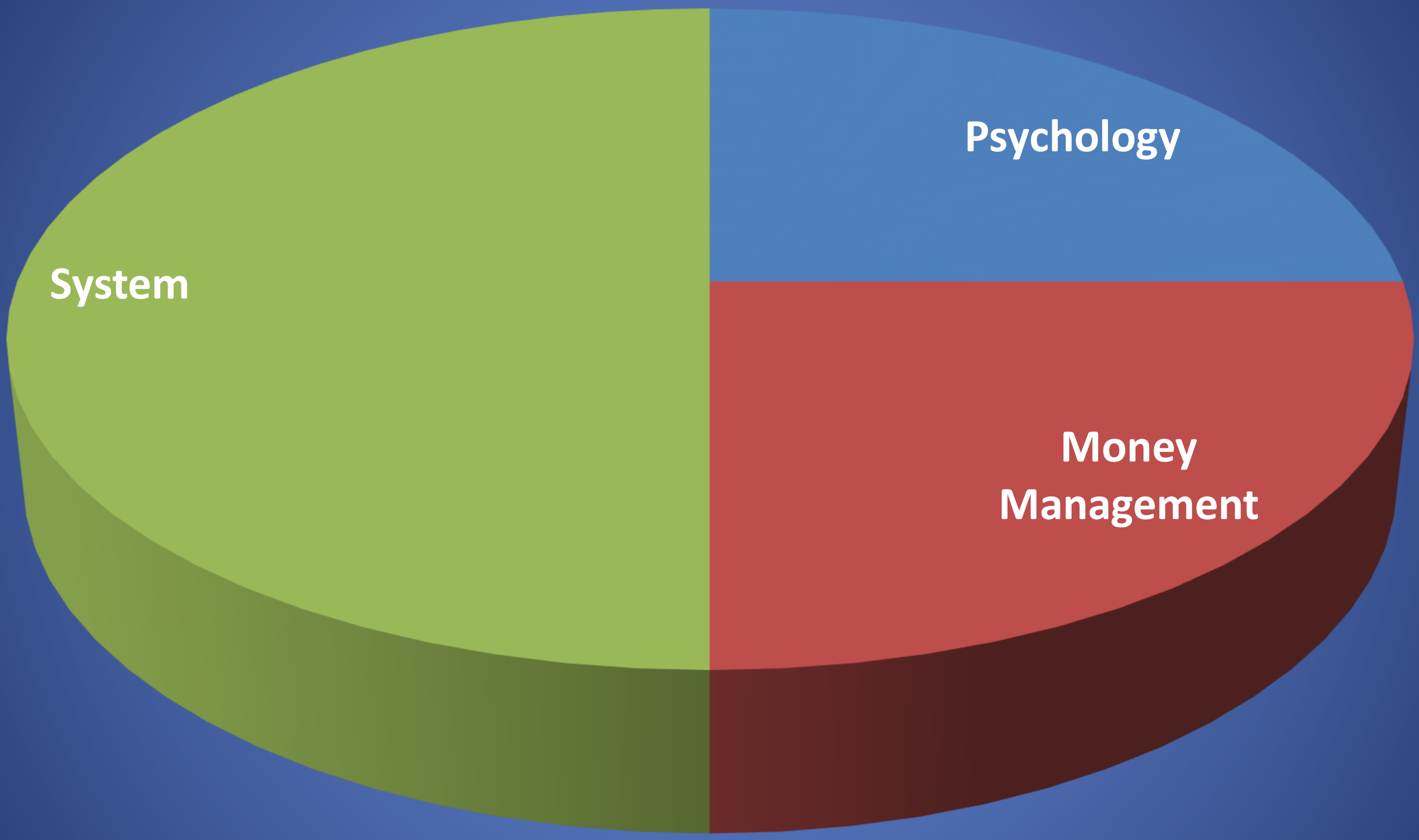
You agree not to re-publish, re-distribute or share any information from Helix Trader Insights, or Helix Trader Insights website content without expressly acknowledging Helix Trader Insights and providing a link back to helixtrader.com.

Information provided in this correspondence is intended solely for informational purposes and is obtained from sources believed to be reliable. Information is in no way guaranteed. No guarantee of any kind is implied or possible where projections of future conditions are attempted.

Why Listen To Me?

- IFTA Certified Financial Technician
- Professional background in Financial Industry
- Independent Trader for 15 years
- Technical Analysis column in national press
- Quantitative Trading System Designer
- Provide Personalised Training and Mentoring


System
Money
Management
Psychology


Psychology
System
Money
Management

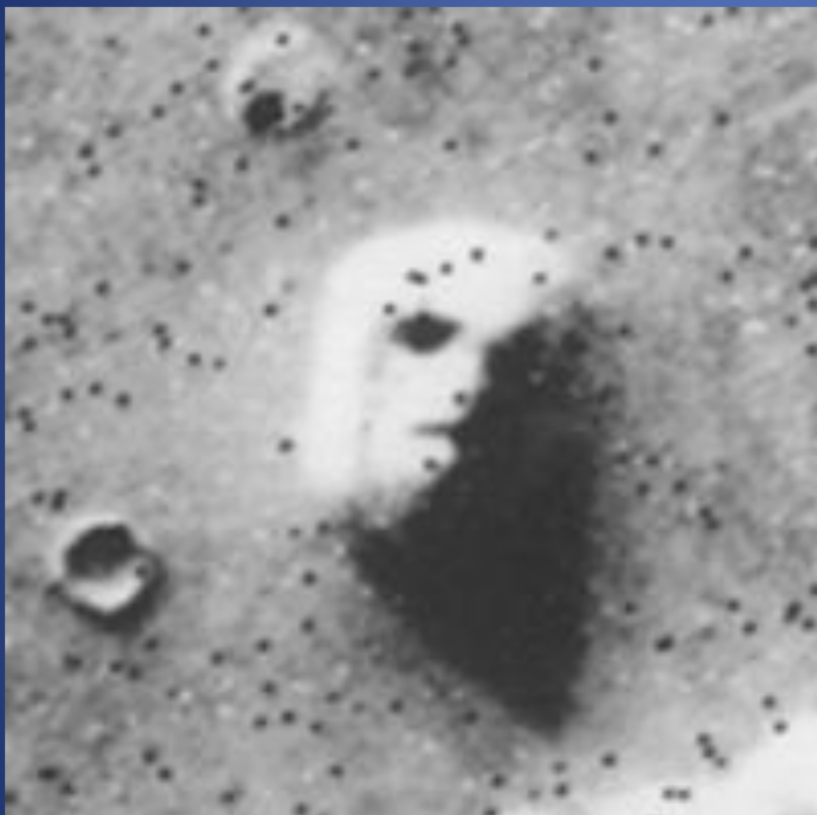
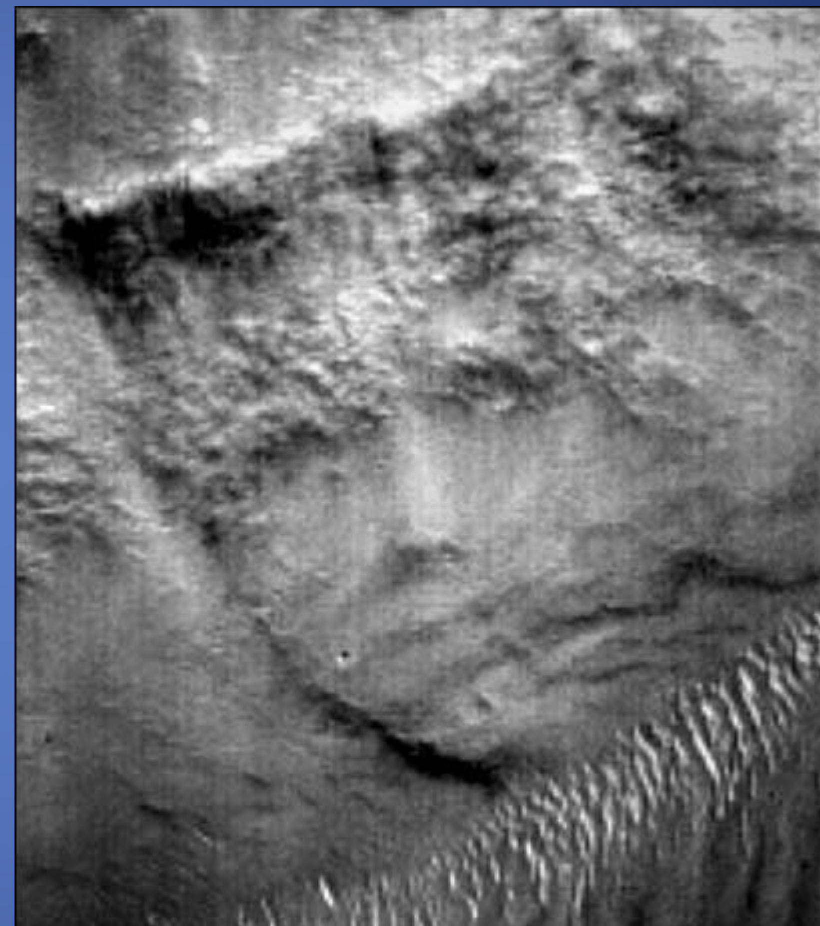
Quantify!

Why Quantitative Analysis?

- Test whether an idea has worked or might work in the future
- Backtest / Forward Test / Validate
- Tailor system to your own objectives
- Build confidence before trading
- Compare systems
- Monitor results and system health ongoing
- It's the future!

What Makes a Good Trading System?

- One that makes lots of money!
- Trade Frequency
- Holding Period
- Win / Loss Ratio
- Return to Drawdown Ratio
- Smooth Consistent Returns
- **One that meets our objectives and fits our personality and lifestyle.**

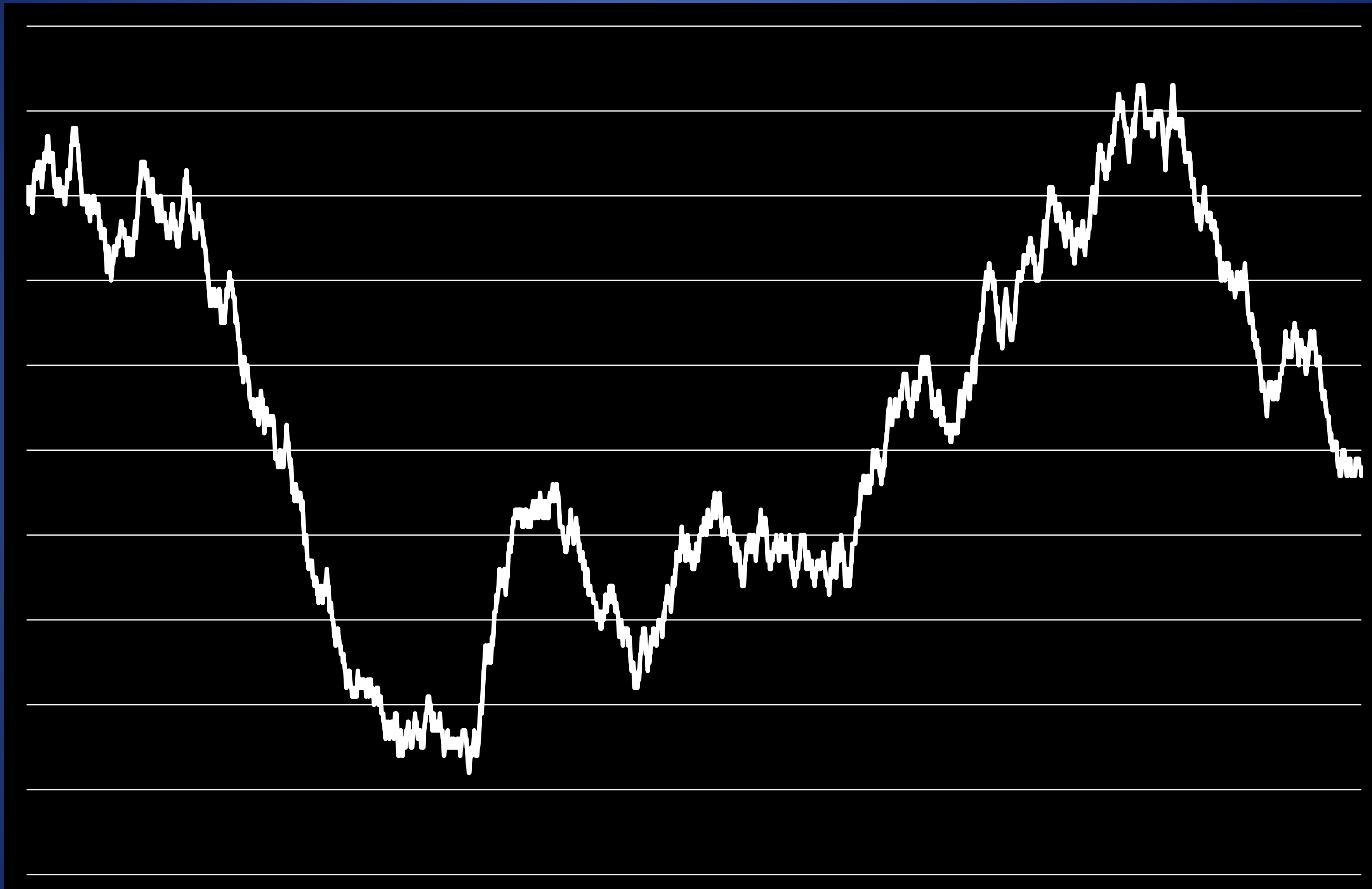
1	2	3	4	5	6	7	8	9	10
T	H	H	H	T	H	T	T	H	H
	W		W		W		L		W

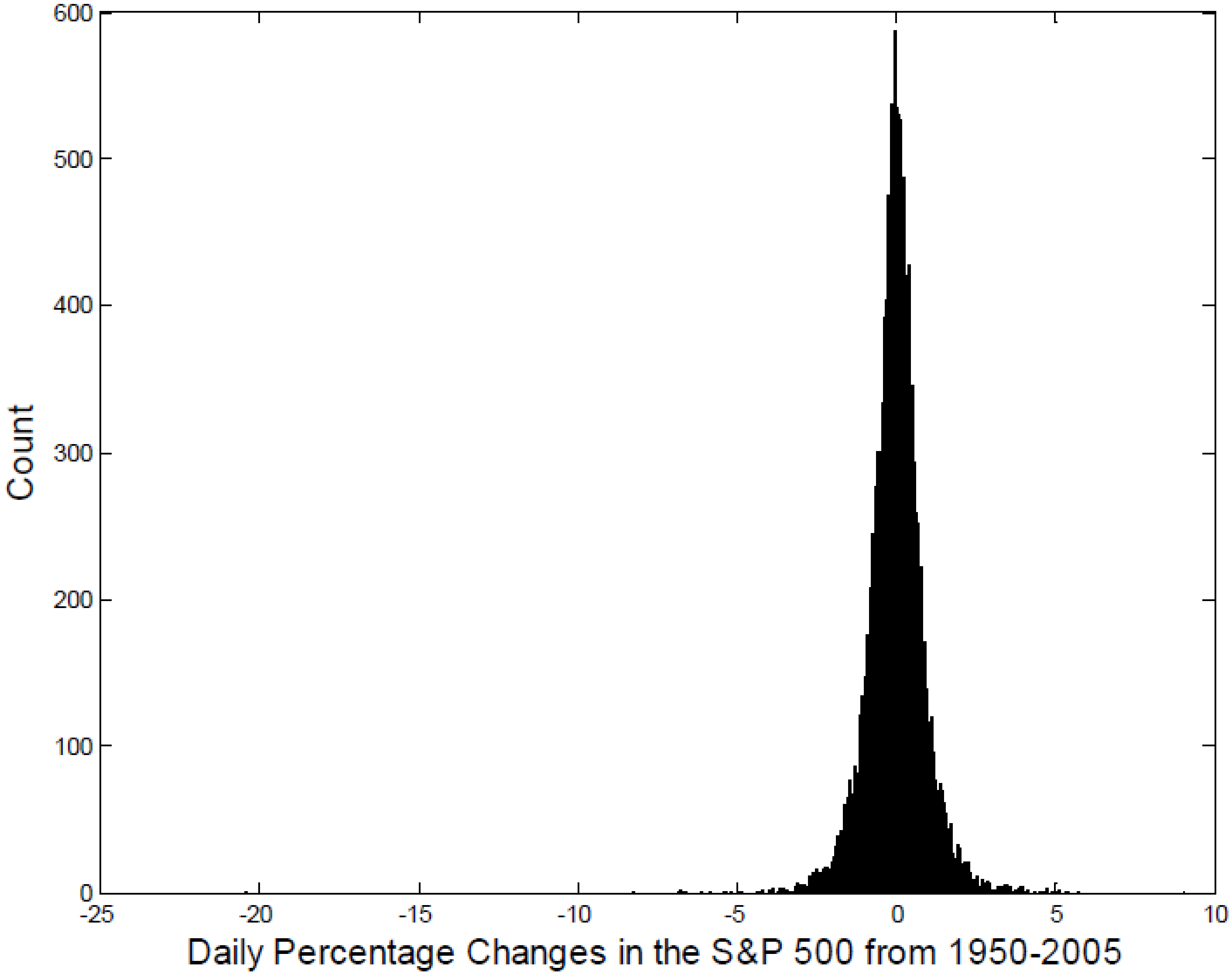
Bet Heads on every even numbered flip. Win Rate 80%!

11	12	13	14	15	16	17	18	19	20
X	?								

Common Development Mistakes

- Sample size too small
- Curve Fitting / Over Optimisation
- Failure to validate results
- Not testing for the system being lucky
- Believing results that are too good to be true
- Finding predictive signals where none exist




600
500
400
300
200
100
0
Count
-25
-20
-15
-10
-5
0
5
10
Daily Percentage Changes in the S&P 500 from 1950-2005

Skill v Luck

Days	Players Remaining	Dollars Per Person
	22,000,000	$1

Skill v Luck

Days	Players Remaining	Dollars Per Person
	22,000,000	$1
1	11,000,000	$2

Skill v Luck

Days	Players Remaining	Dollars Per Person
	22,000,000	$1
1	11,000,000	$2
2	5,500,000	$4
3	2,750,000	$8
4	1,375,000	$16
5	687,500	$32
6	343,750	$64
7	171,875	$128
8	85,938	$256
9	42,969	$512
10	21,484	$1,024

Skill v Luck

Days	Players Remaining	Dollars Per Person
	22,000,000	$1
1	11,000,000	$2
2	5,500,000	$4
3	2,750,000	$8
4	1,375,000	$16
5	687,500	$32
6	343,750	$64
7	171,875	$128
8	85,938	$256
9	42,969	$512
10	21,484	$1,024
11	10,742	$2,048
12	5,371	$4,096
13	2,686	$8,192
14	1,343	$16,384
15	671	$32,768
16	336	$65,536
17	168	$131,072
18	84	$262,144
19	42	$524,288
20	21	$1,048,576

Skill v Luck in Trading

		Outcome	
		Profit	Loss
Decision	Correct	Skill	Unlucky
	Wrong	Lucky	Stupidity

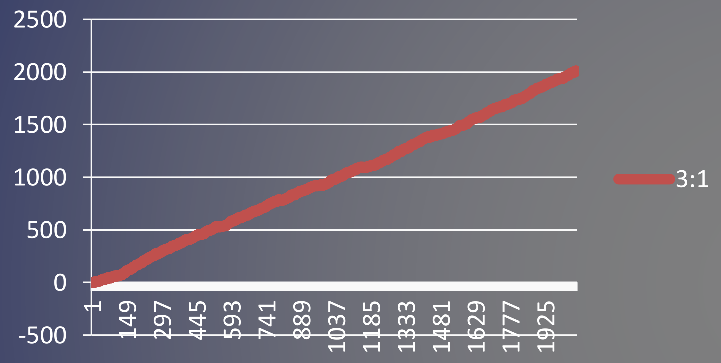
Selecting a Strategy

Market Inefficiency	Strategy
Momentum	Trend Following
Mean Reversion	Swing Trading
Seasonality	Cycles
Volatility	Options
Price Asymmetry	Statistical Arbitrage

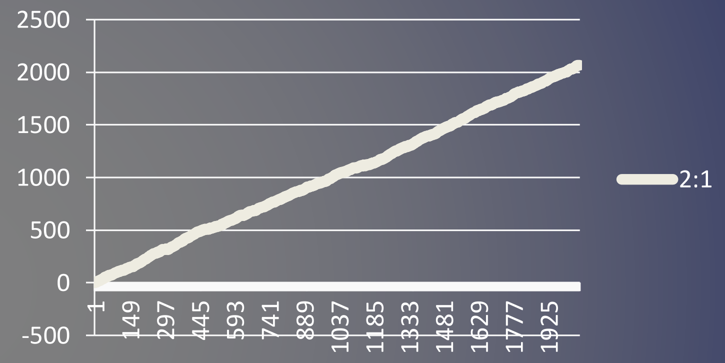
No Free Lunch

Profit Factor v Win Rate

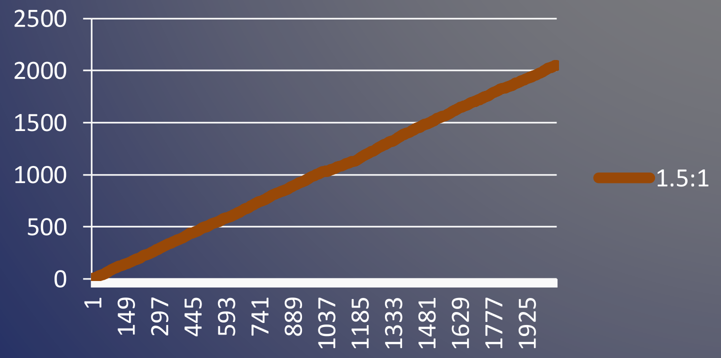
50% **3:1**



66% **2:1**



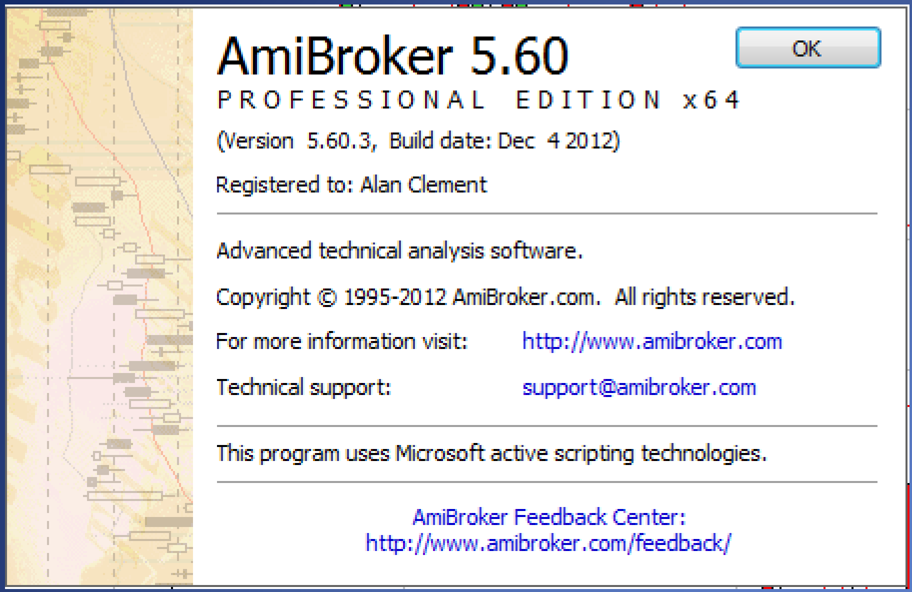
85% **1.5:1**

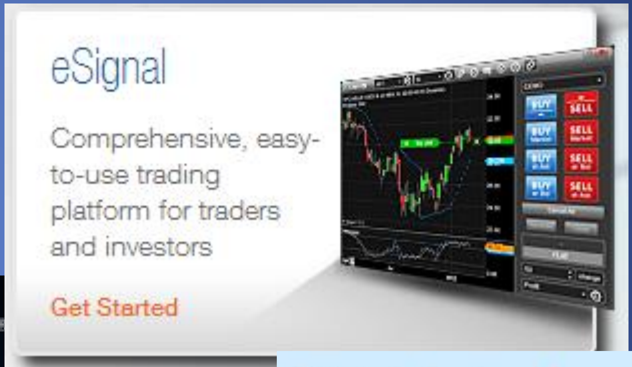


WARNING:
Stop Losses Can Be Bad For Your Wealth

Comparing Exit Strategies

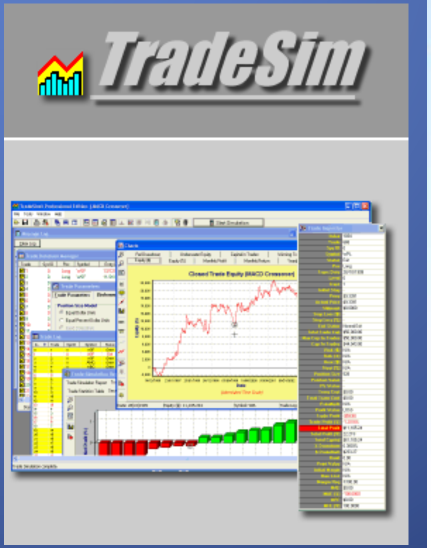
Stop Type	Trend Following	Mean Reversion
Max Loss Stop	✘	✘
Trailing Stop	✘	✘
Time Stop	✘	✘
Fixed Profit Target	✘	✘
Dynamic Profit Target	✘	✓
Volatility Limit	✓	✘
Stock Rotation	✓	✘
Momentum Stop	✓	✘





Amibroker

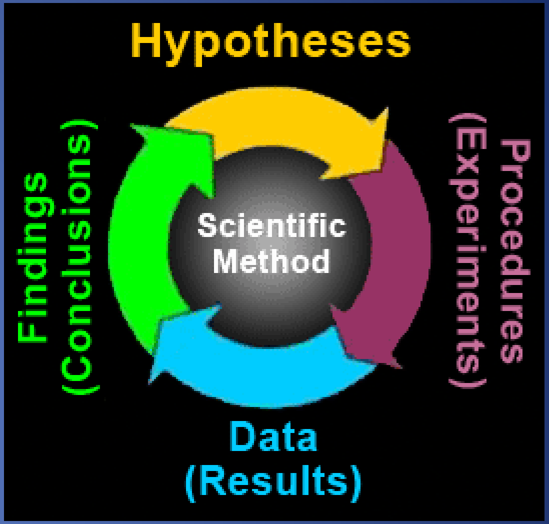
- ✓Highly Flexible
- ✓Feature Rich
- ✓Customisable Reporting
- ✓Fastest Backtesting
- ✓Walk-Forward Validation
- ✓Can use any data source



Let’s Build a Trading System

System Development Lifecycle

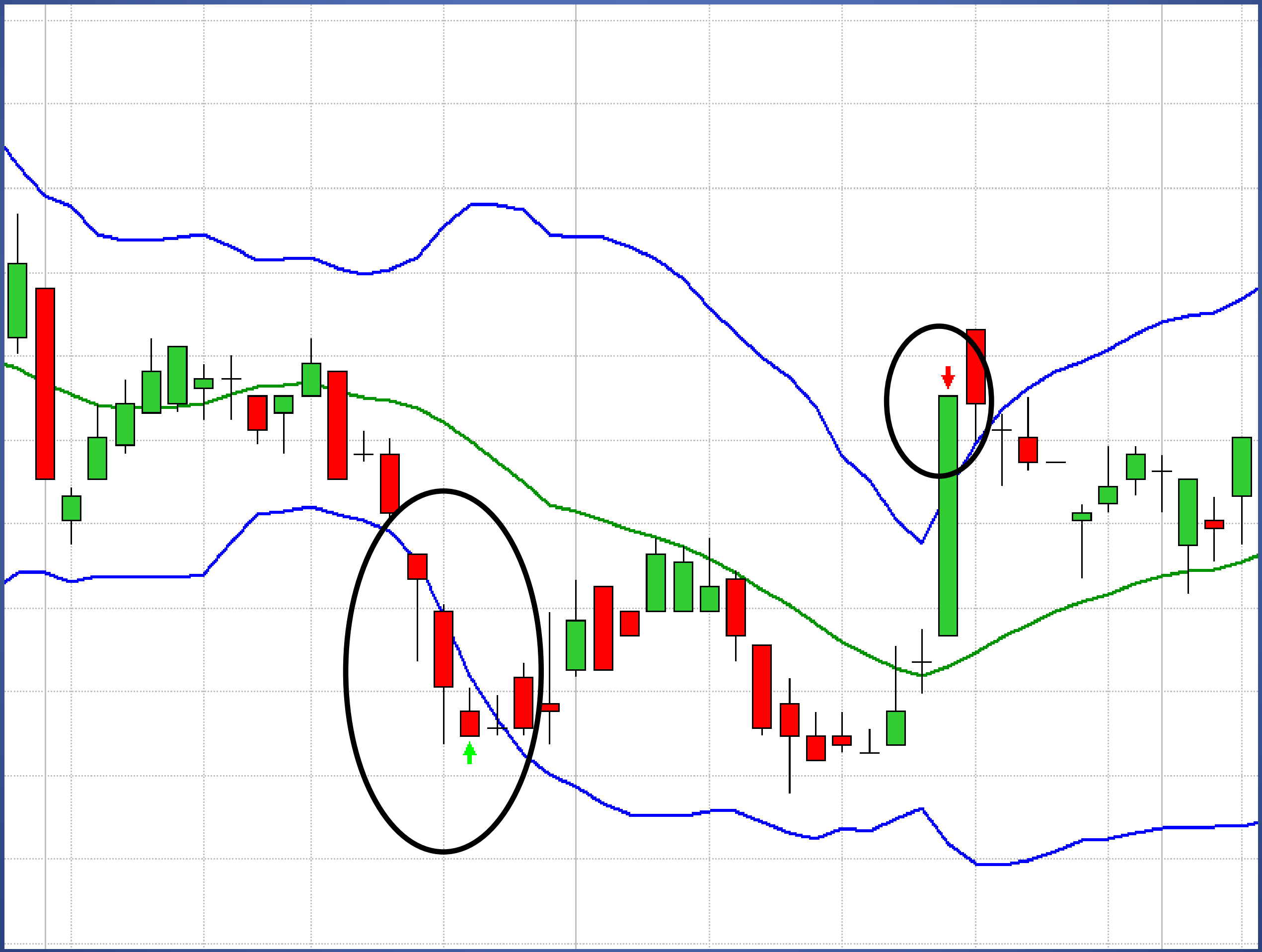
- Define an Objective
- Make an Observation
- Form a Hypothesis (trading rules)
- Test & Refine the Hypothesis
- Validate the results
- Trade the System
- Monitor the results
- Stop trading if system fails



Example Objectives

Objective	Why?	Target
High Win Rate	Easy to Trade	> 70%
Low Drawdown	Easy to Keep Trading	< 20%
Adequate Return to Drawdown Ratio	Compensated Well for Capital Risk	> 1.0
Short Holding Period	Reduced Market Risk	<= 5 Trading Days
Trades Frequently	Increased Compounding Potential	> 15 Trades / Month

Observation



Hypothesis

When the price of a stock closes below the lower Bollinger Band for 3 bars, it is likely to reverse very soon after, and move towards the top Bollinger Band.

Baseline Setup

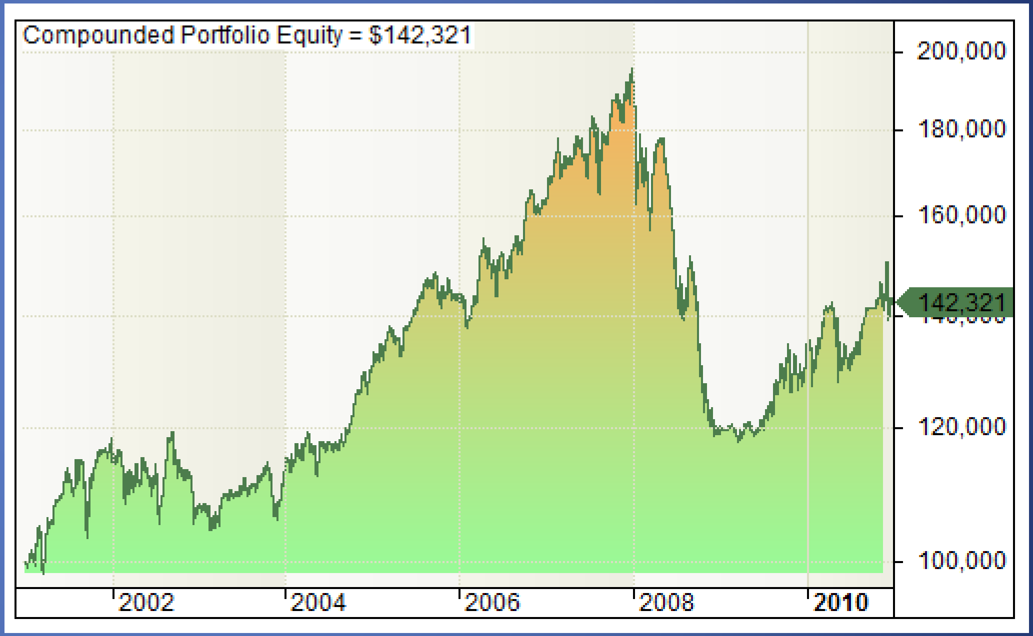
- In Uptrend: Price above 230-Day MA
- Liquid: Stock Turnover > $300K / Day
- Volatile: ATR > 1.5%
- Universe: ASX300 Stocks (SBF)
- IS Test Period: 2001-2010 / OOS:2011→
- Max Open Positions: 10
- Position Size: 10% per position

Test 1: Entry / Exit Rules

- Bollinger Bands (20, 2)
- Enter Long at Close of 3rd day below bands
- Exit at Close above top band. (No Stop Loss)

Test 1: Results

Metric	Test 1
Compound Annual Return	3.6%
Trades per annum	32
Avg Bars Held	64
Win Rate	71%
Max Drawdown	40%
Return to Drawdown Ratio	0.09



Issue: Excessive Drawdown

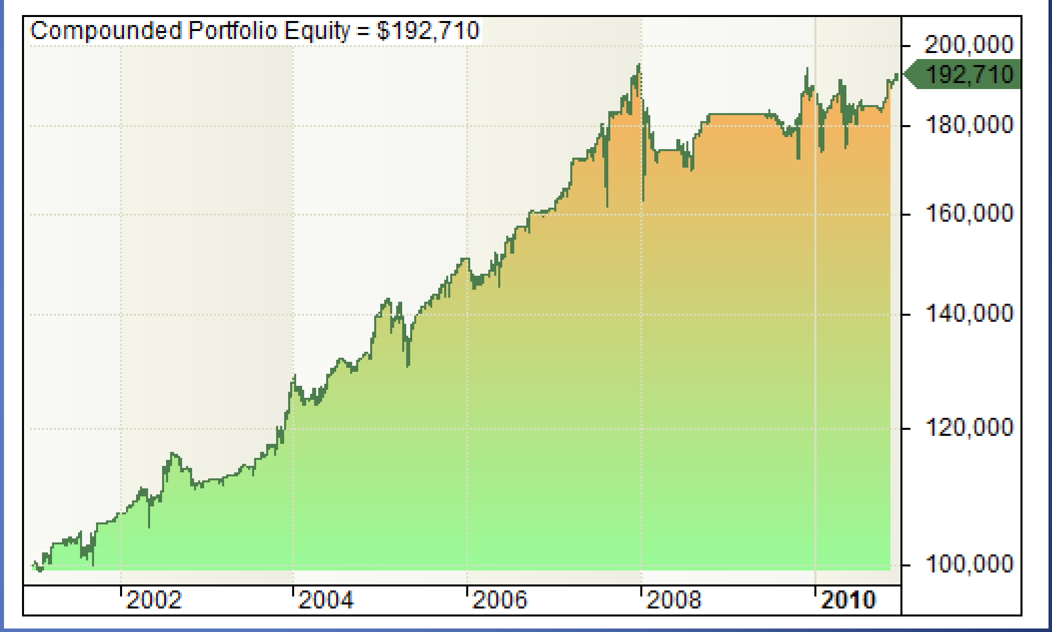

5.80
5.70
5.60
5.50
5.40
5.30
5.20
5.10
5.00
4.90
4.80
4.70
4.60
4.49826
4.40
4.30
4.20
4.11205
3.994
3.96
3.87595
3.80
3.70
3.60
3.50
3.40
3.30
3.20
19
26
Dec
10
17
24
2008
14
21
29
Feb
11
18
25
Mar
10
17
25
Apr
7
14
21
28
May
12

Test 2: Entry / Exit Rules

- Bollinger Bands (5, 1.5)
- Enter Long at Close of 3rd day below bands
- Exit at Close above top Band

Test 2: Results

Metric	Test 1	Test 2
Compound Annual Return	3.6%	6.7%
Trades per annum	32	46
Avg Bars Held	64	13
Win Rate	71%	71%
Max Drawdown	40%	17%
Return to Drawdown Ratio	0.09	0.41



Issue: Insufficient Opportunity

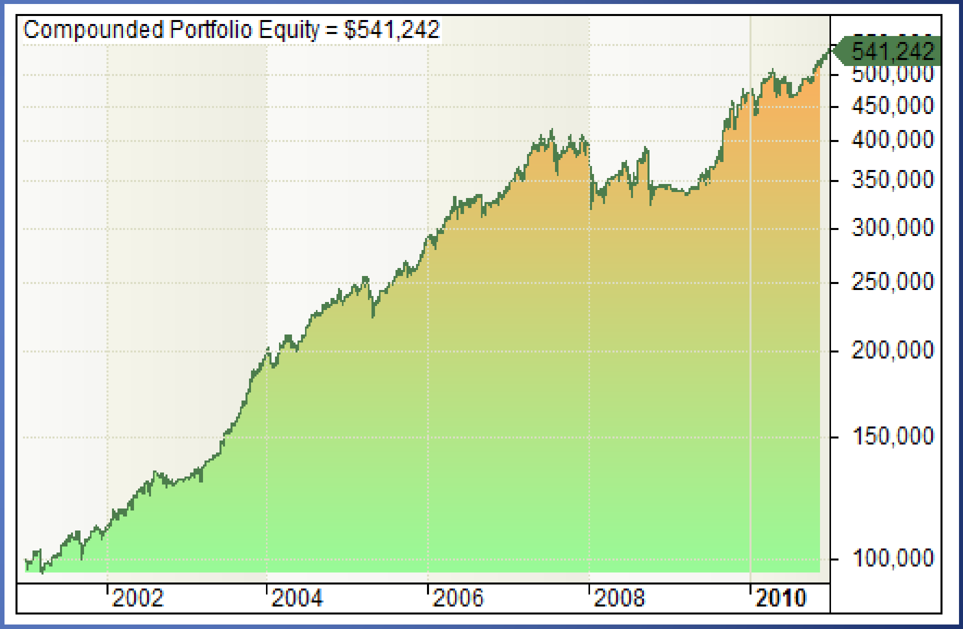

3.15
3.14
3.13
3.12
3.11
3.10
3.09
3.08
3.07
3.06037
3.06
3.05
3.04
3.036
3.03
3.02
3.01163
3.00
2.99
2.98
2.97
2.96
2.95
2.94
2.93
2.92
2.91
2.90
2.89
2.88
2.87
2.86
2.85
2.84
2.8313
20
27
Oct
4
11
18
25

Test 3: Entry / Exit Rules

- Bollinger Bands (5, 1.5)
- Enter Long at Close of 3rd day below lower 10% of band width
- Exit at Close above top Band

Test 3: Results

Metric	Test 1	Test 2	Test 3
Compound Annual Return	3.6%	6.7%	19%
Trades per annum	32	46	139
Avg Bars Held	64	13	12
Win Rate	71%	71%	70%
Max Drawdown	40%	17%	23%
Return to Drawdown Ratio	0.09	0.41	0.79

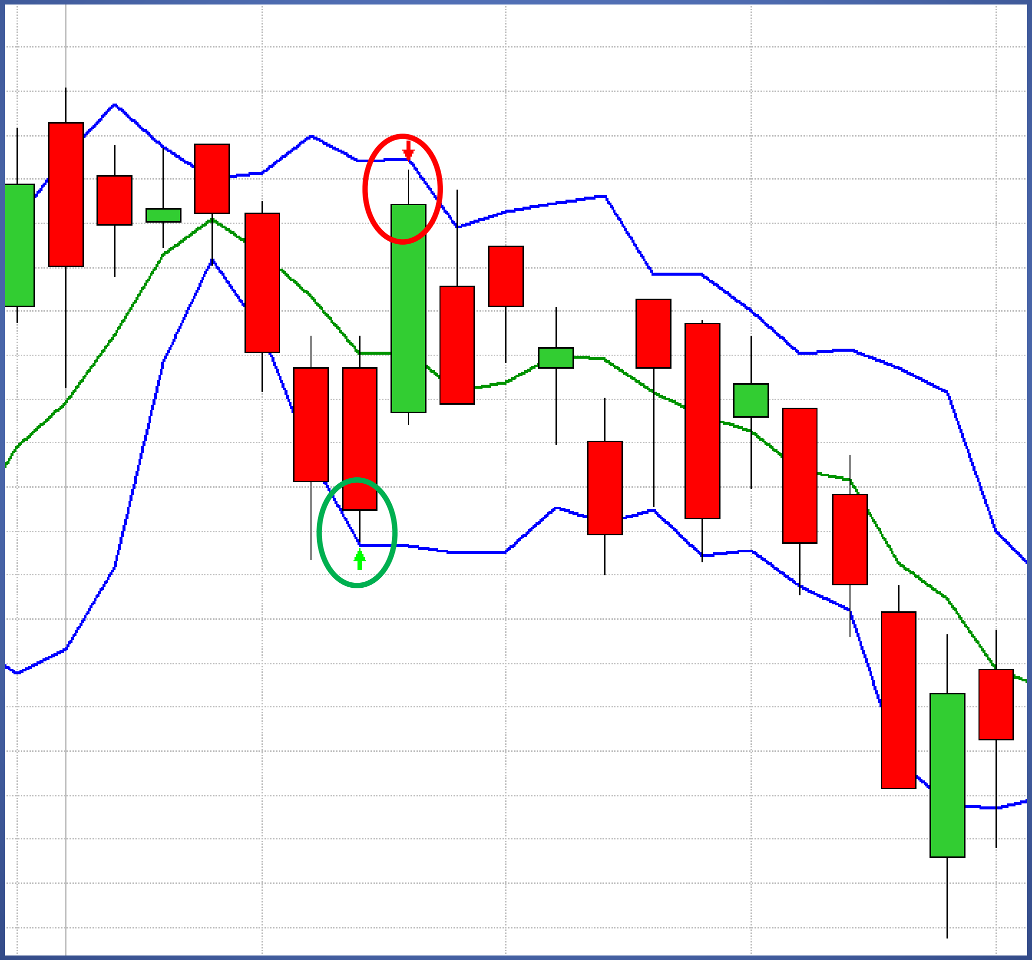


Issue: Holding Period and Drawdown

Test 4: Entry / Exit Rules

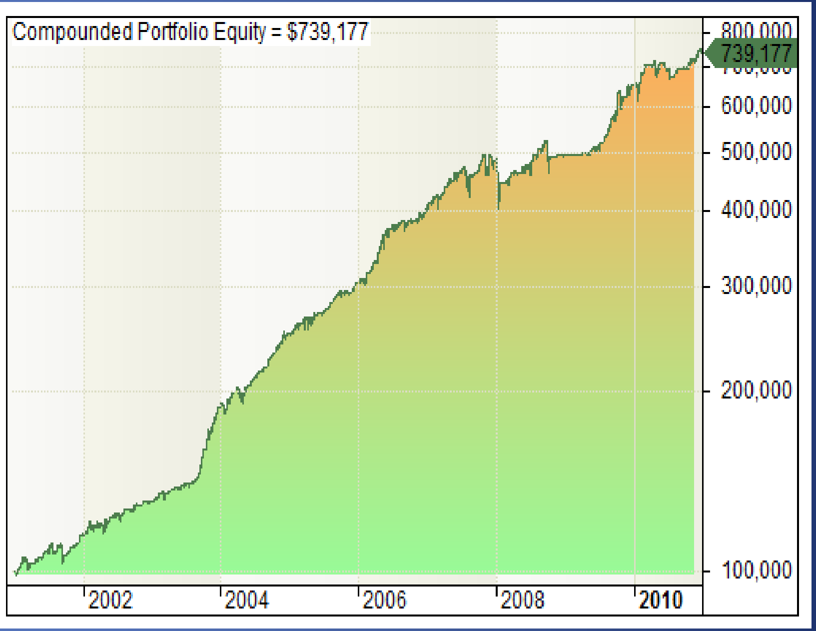
- Bollinger Bands (5, 1.5)
- Enter Long at Close of 3rd day below lower 10% of band width
- Exit at Close ~~above top Band~~ above centreline

Test 4: Rules



Test 4: Results

Metric	Test 1	Test 2	Test 3	Test 4
Compound Annual Return	3.6%	6.7%	19%	22%
Trades per annum	32	46	139	210
Avg Bars Held	64	13	12	5
Win Rate	71%	71%	70%	71%
Max Drawdown	40%	17%	23%	19%
Return to Drawdown Ratio	0.09	0.41	0.79	1.2

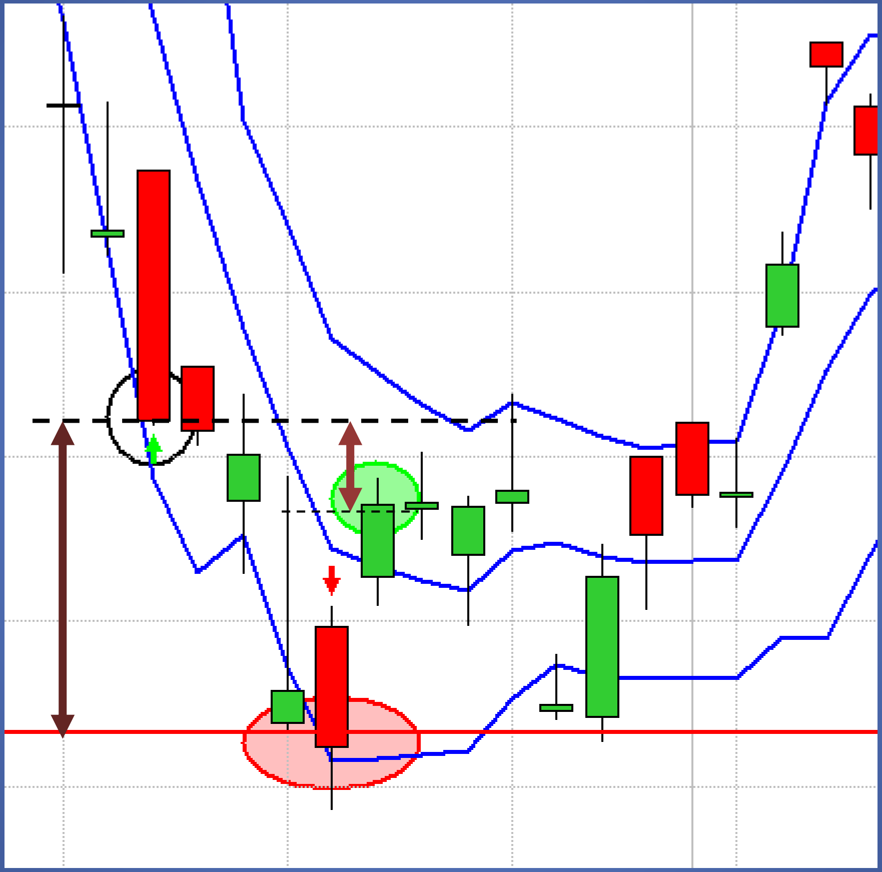


Test 5: Entry / Exit Rules

- Bollinger Bands (5, 1.5)
- Enter Long at Close of 3rd day below lower 10% of band width
- Exit at Close ~~above top Band~~ above centreline, or below 2 x ATR(14) Stop Loss

Test 5: Results

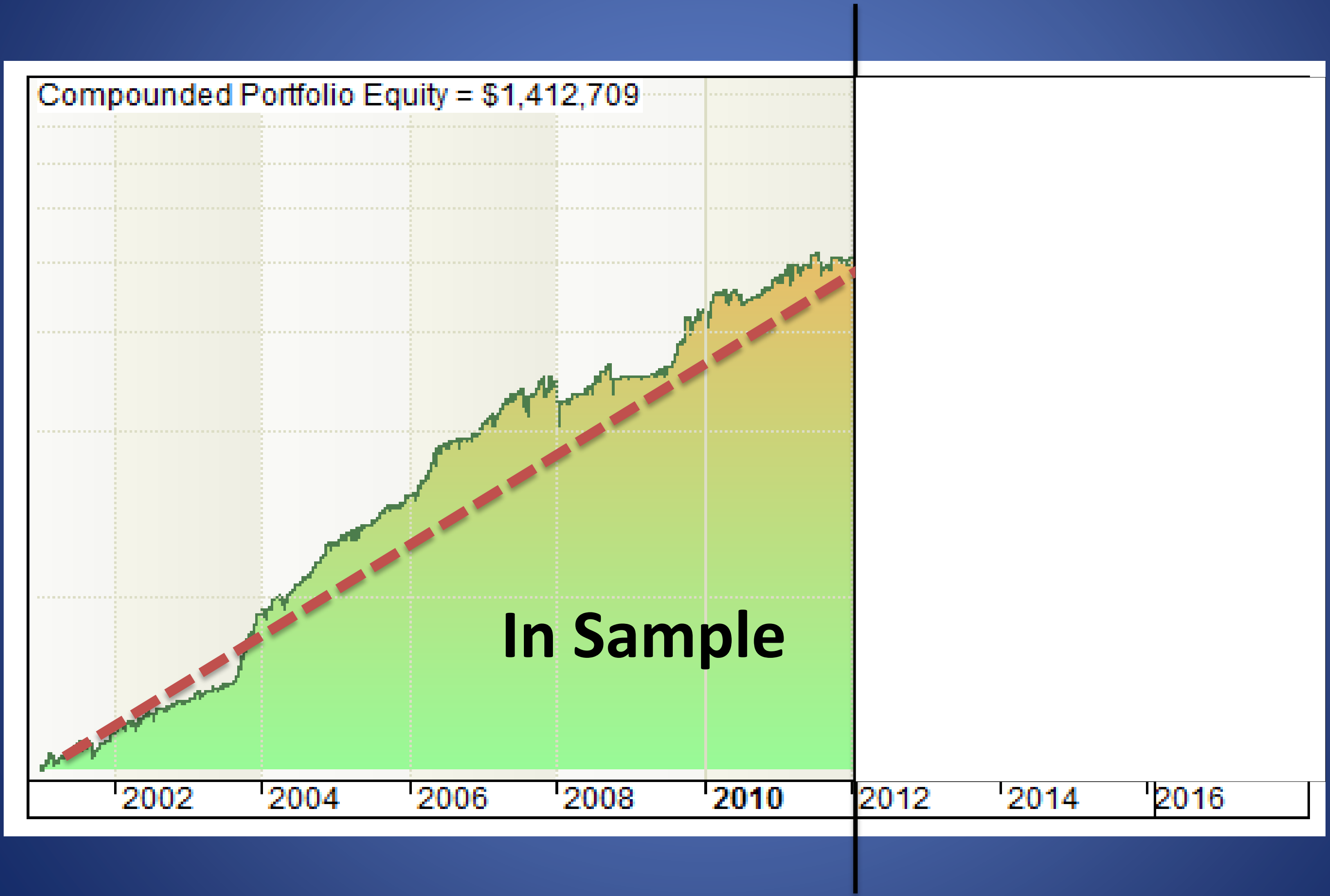
Metric	Test 1	Test 2	Test 3	Test 4	With 2 ATR Stop
Compound Annual Return	3.6%	6.7%	19%	22%	18%
Trades per annum	32	46	139	210	221
Avg Bars Held	64	13	12	5	4
Win Rate	71%	71%	70%	71%	71%
Max Drawdown	40%	17%	23%	19%	23%
Return to Drawdown Ratio	0.09	0.41	0.79	1.2	0.78



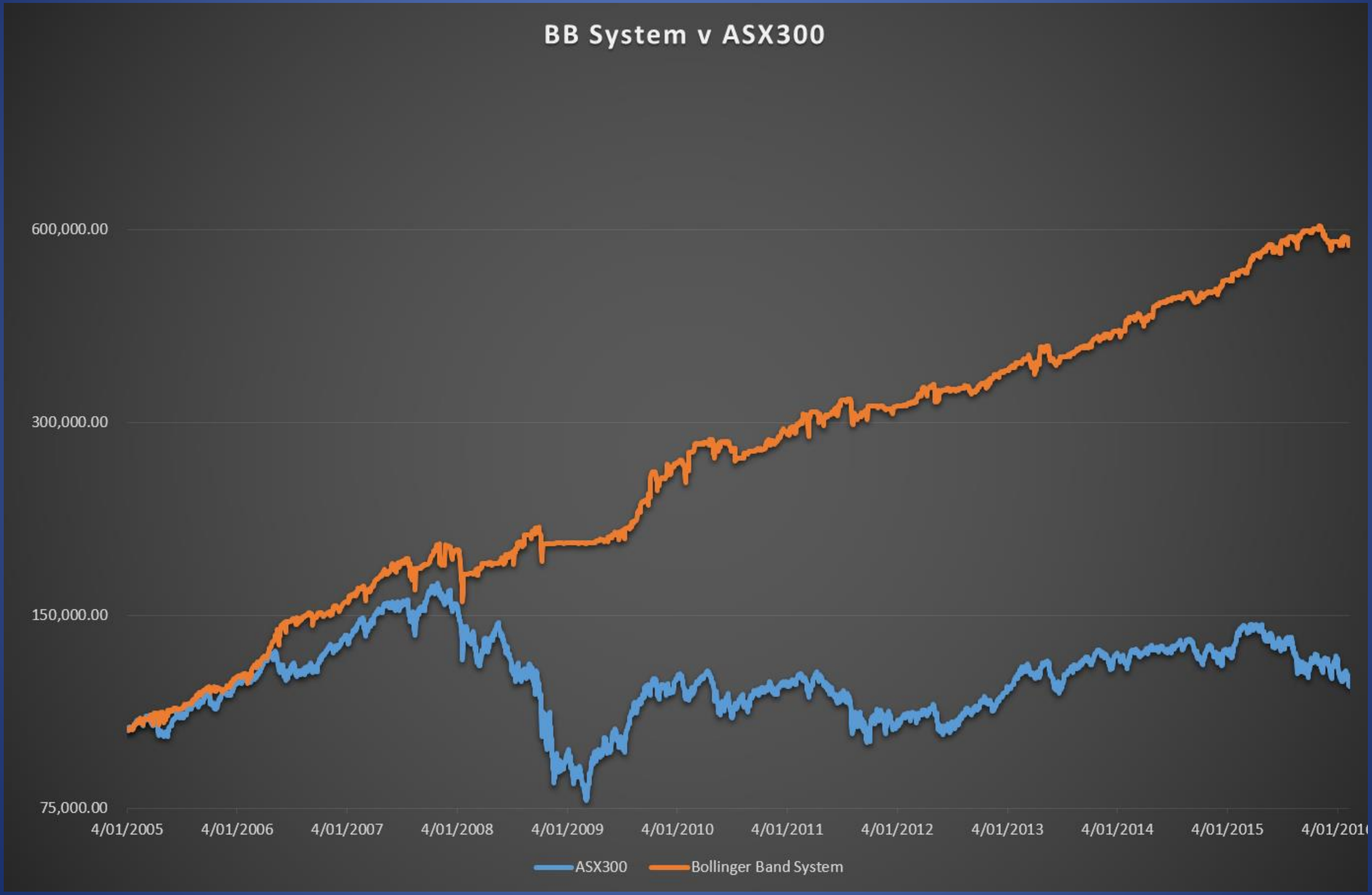
Test 4 : Full Rules

- Uptrend: Latest close is above 230 day SMA
- Liquid: Average Daily Turnover > $300000 and Price > 5 cents
- Volatile: Average Daily Range > 1.5% and ATR(2) > ATR(90)
- Bollinger Bands (5, 1.5)
- Enter on third consecutive close within lower 10% of bands
- Exit on first close above 5 day SMA

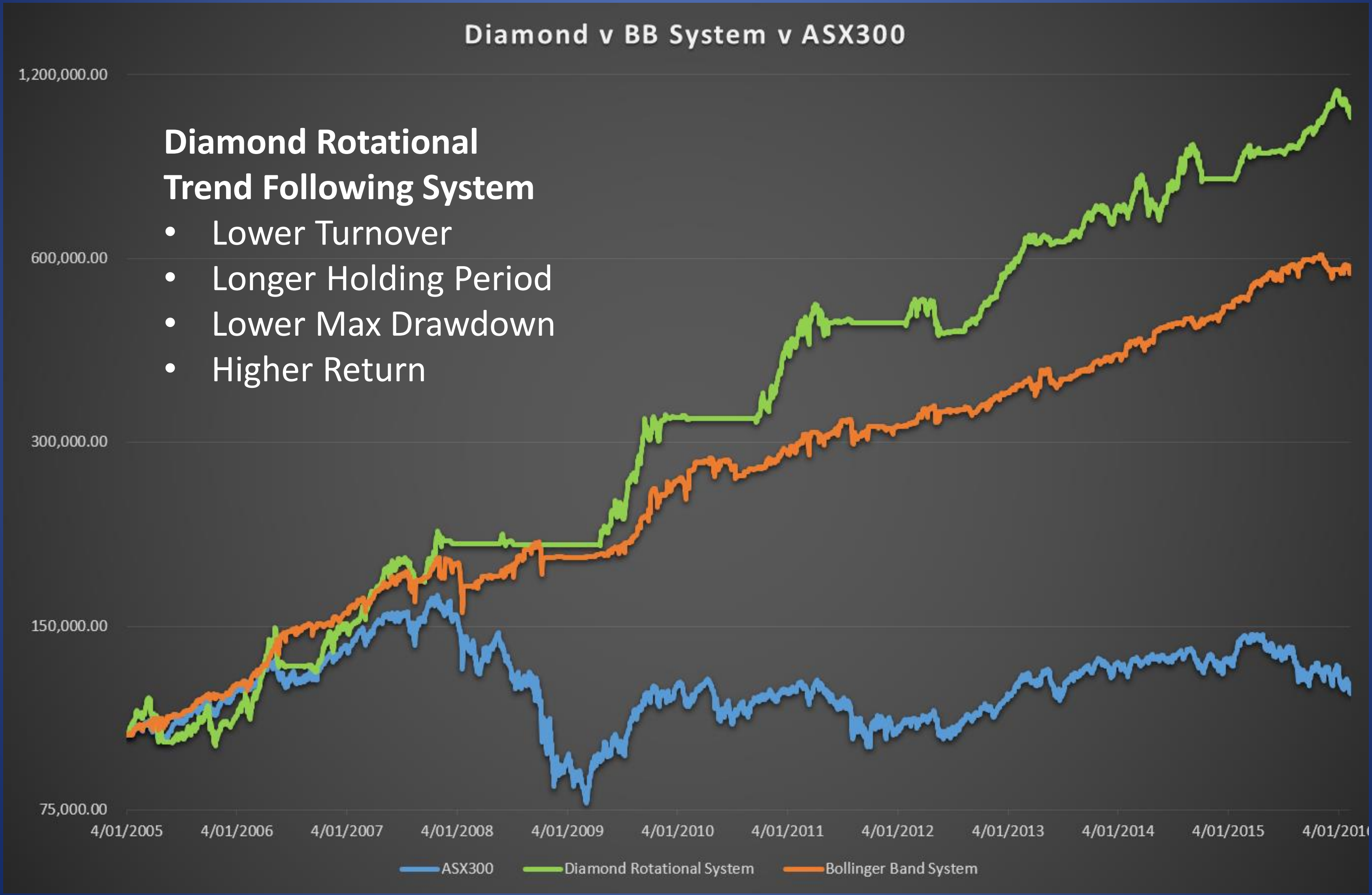
Test 4: Out of Sample



Bollinger System v ASX300



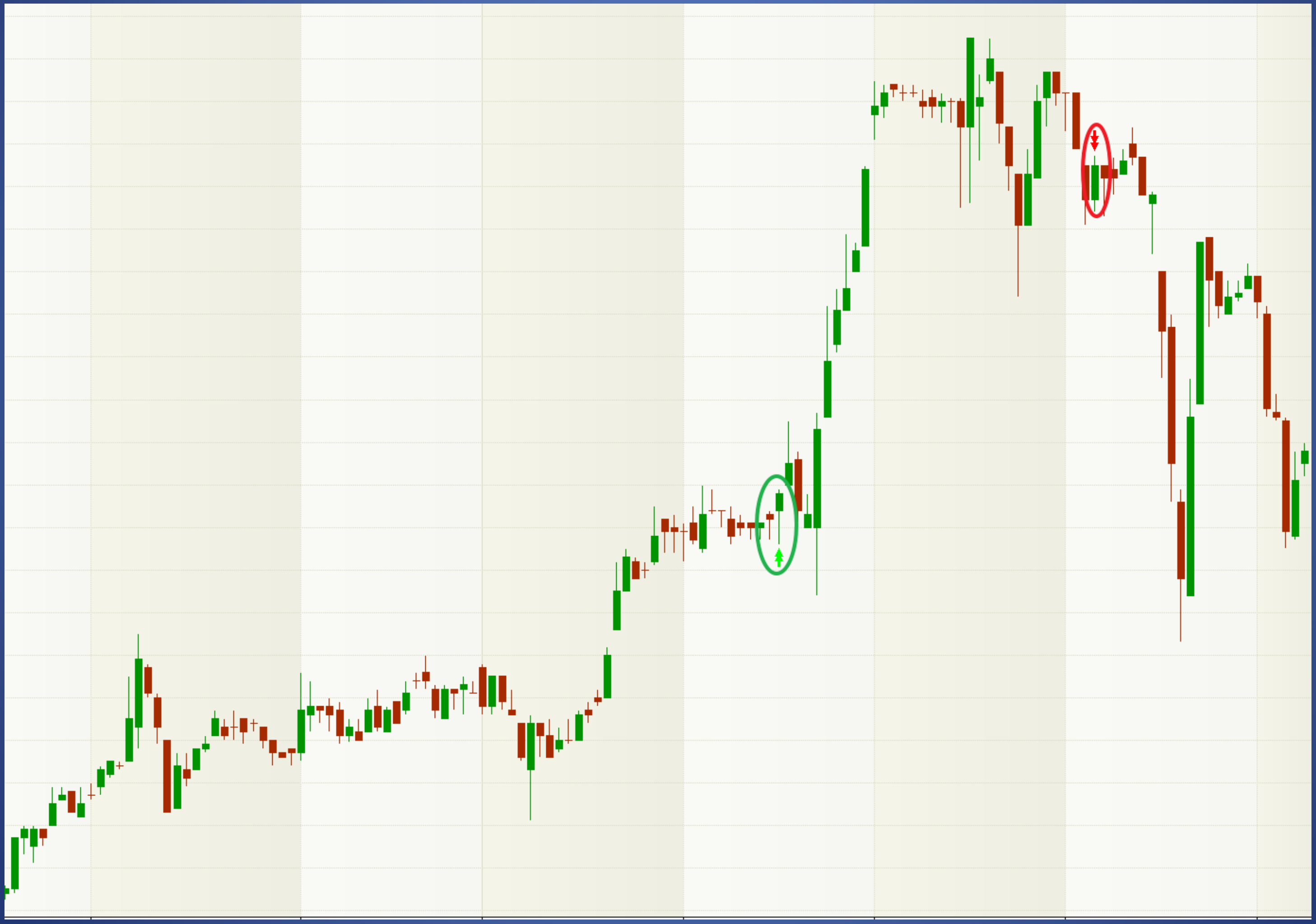
Diamond Rotational System



Diamond Rotational System

Metric	Bollinger Band System	Diamond Rotational
Compound Annual Return	22%	26% ✓
Trades per annum	210	50 ✓
Avg Bars Held	5	41 ✓
Win Rate	71%	52%
Max Drawdown	19%	17% ✓
Return to Drawdown Ratio	1.2	1.5 ✓
Avg Profit % Per Trade	0.9%	7.5% ✓

Diamond Win Trade Example



Diamond Losing Trade Example

Diamond Quantitative Signals

Date	Name	Full Name	Close Price	Ranking ...	Current Rank	Previous Rank	Action	Status
30/01/2015	CTX.asx	Caltex Australia Limited Ordinary Fully Paid	33.42	75.49	1	1	HOLD	Open Position
30/01/2015	SRX.asx	Sirtex Medical Limited Ordinary Fully Paid	26.95	73.73	2	2	HOLD	Open Position
30/01/2015	CTD.asx	Corporate Travel Management Limited Ordinary Fully...	9.76	72.42	3	3	HOLD	Open Position
30/01/2015	FPH.asx	Fisher & Paykel Healthcare Corporation Limited Ordin...	5.88	71.63	4	4	HOLD	Open Position
30/01/2015	TCL.asx	Transurban Group Ordinary Shares/Units Fully Paid Tr...	9.18	70.60	5	5	HOLD	Open Position
30/01/2015	QAN.asx	Qantas Airways Limited Ordinary Fully Paid	2.61	70.12	6	7	HOLD	Open Position
30/01/2015	WFD.asx	Westfield Corporation Stapled Securities	9.86	69.89	7	8	HOLD	Open Position
30/01/2015	REC.asx	Recall Holdings Limited Ordinary Fully Paid	7.15	69.88	8	6	HOLD	Open Position
30/01/2015	ORA.asx	Orora Limited Ordinary Fully Paid	2.13	69.26	9	10	HOLD	Open Position
30/01/2015	API.asx	Australian Pharmaceutical Industries Limited Ordinary...	0.91	68.48	10	11	HOLD	Open Position
30/01/2015	TGA.asx	Thorn Group Limited Ordinary Fully Paid	2.86	67.84	12	9	HOLD	Open Position
30/01/2015	RHC.asx	Ramsay Health Care Limited Ordinary Fully Paid	59.45	67.50	13	13	HOLD	Open Position
30/01/2015	RMD.asx	Resmed Inc CDI 10:1 Foreign Exempt NYSE	8.08	67.94	11	16	BUY	Open Position
30/01/2015	MFG.asx	Magellan Financial Group Limited Ordinary Fully Paid	19.13	67.50	13	18	BUY	Open Position
30/01/2015	LLC.asx	Lendlease Group Unit/Ordinary Fully Paid Stapled Sec...	16.68	67.25	15	12	SELL	Candidate
30/01/2015	CSL.asx	CSL Limited Ordinary Fully Paid	87.95	67.06	17	14	SELL	Candidate
30/01/2015	COH.asx	Cochlear Limited Ordinary Fully Paid	83.00	67.09	16	17	No Position	Candidate
30/01/2015	EVT.asx	Event Hospitality and Entertainment Ltd Ordinary Ful...	11.69	66.37	18	20	No Position	Candidate
30/01/2015	SHJ.asx	Shine Corporate Ltd Ordinary Fully Paid	2.85	66.12	19	15	No Position	Candidate
30/01/2015	MTU.asx	M2 Group Ltd Ordinary Fully Paid	9.00	65.85	20	22	No Position	Candidate
30/01/2015	ALL.asx	Aristocrat Leisure Limited Ordinary Fully Paid	7.02	65.79	21	21	No Position	Candidate

Summary

- Always ask for evidence that any idea works
- Better still do your own testing
- Get to know the metrics of your own system
- Always be on the look out for new ideas
- Constantly compare your best systems or ideas to others you find
- Aim to trade the system or systems that best suit your personality and lifestyle

Further Reading

- *Quantitative Trading Systems* – Howard Bandy
- *The Signal and the Noise* – Nate Silver
- *Fooled by Randomness* – Nassim Taleb
- *Thinking Fast and Slow* – Daniel Kahneman
- *The Success Equation* – Michael Mauboussin

Take Your Trading to the Next Level

Trader Coaching and Mentoring
Amibroker Development Training
Quantitative Trading Systems
System Signals Subscriptions

www.HelixTrader.com

"Trade strategies that meet your objectives and suit your personality & lifestyle"

alan@helixtrader.com

Helix Model Portfolios

Diamond

Weekly Rotational

ASX All Ordinaries

26% CAR

17% Max DD

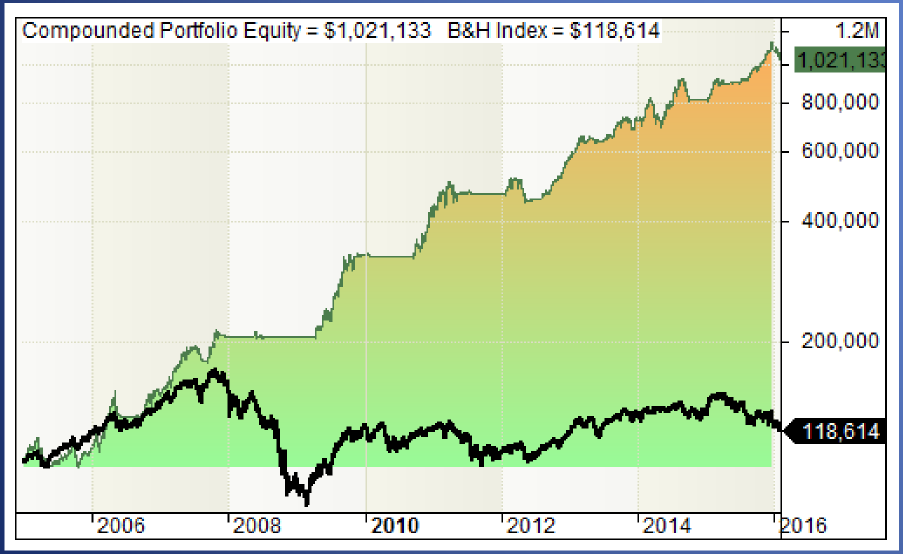
Jupiter

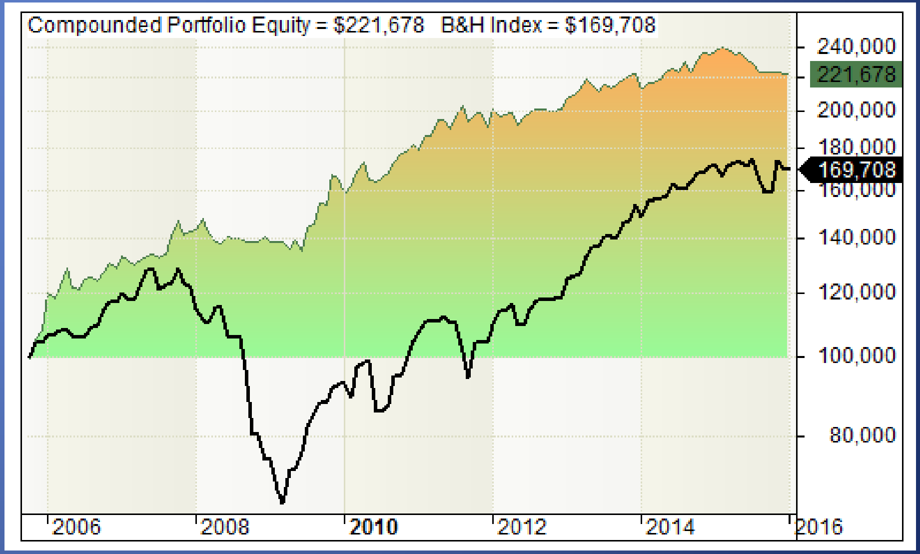
Monthly Rotational

US ETFs

8% CAR

8% Max DD





www.HelixTrader.com