

Back-Testing Relative Performance and Evaluating Technical versus Macroeconomic and Corporate Research.

IFTA Conference
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Speaker



Tim McCullough

Bloomberg L.P.

Tim is the application specialist in Technical Analysis at Bloomberg LP in London, where he manages the rapidly increasing demand for charting and data visualization tools in EMEA.

He has over 30 years' experience in financial markets, in trading, sales and research at major international banks, including State Street, UBS, BNP Paribas and Lloyds. He uses diverse but complementary technical methodologies, based on behavioral finance, to help Bloomberg clients to analyze sentiment in all asset classes and all conditions of volatility and liquidity.

In 2018 he additionally took an MSc in Financial Investigation, including a dissertation examining the dependency of financial markets on illicit flows from money laundering. He previously took a BA in Classics and is a full member of the Society of Technical Analysts in London and of IFTA.

Content

Back-Testing Technical Analysis

BT and TSIG

Examples

Conclusion

Back-Testing Technical Analysis



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Credibility Gap

- Legacy of historical technical analysis
 - Original pattern recognition predated acceptance of behavioural finance
 - Sentiment excluded from macroeconomic and quantitative analysis
 - Efficient Market Hypothesis
 - Lack of coherent causality in macroeconomic or quantitative context
 - Obscure terminology and jargon
 - ‘Head and shoulders’, ‘gravestone doji’
- Exclusion of technical analysis
 - Disregarded by many professional investors and traders
 - Used for timing short-term entry and exit only
 - Overlooked in long-term, multi-asset or portfolio analysis

Absolute Back-Testing

- Opportunity to compare and integrate technical analysis
 - Specific trading rules based on technical analysis
 - Objective performance measurement in single securities / indices
- Fails to meet realistic needs of professional investors & traders
 - Relative performance measurement
 - Sophisticated investment / trading rules
 - Realistic trading environments and costs
 - Comparison with macroeconomic and corporate analysis

Bloomberg Back-testing

- Extend back-testing to needs of professional buy-side & sell-side
 - Relative performance measurement
 - Sophisticated investment / trading rules
 - Realistic trading environments and costs
 - Comparison with macroeconomic and corporate analysis

Relative Performance

- **Performance measured against any portfolio, index or basket**

Unavailable in macroeconomic or other fundamental analysis

- **Pairs trading**

Equities and bonds

Unavailable in macroeconomic or other fundamental analysis

Sophisticated and realistic conditions

- **Customised trading rules**

 - Single and multiple scenarios for trade entry and risk management

 - Unavailable in macroeconomic or other fundamental analysis

- **Conditions and costs**

 - Customised to each portfolio or market

 - Long & Short or Long Only

 - Scalable entry and exit

 - Full amount or pyramid-style

 - Choice of reporting currency

 - Commissions (fixed or percentage)

 - Slippage (use with Bloomberg LQA <GO> function)

Technical, Macroeconomic & Corporate Analysis

- **Data**

 - Bloomberg trusted provider of macroeconomic and corporate data

 - Billions of data points in major and emerging markets, in all asset classes

- **Alignment and comparison**

 - Use Bloomberg to back-test trading strategies using non-technical data

 - Compare technical with equivalent macroeconomic and corporate analysis

 - Eliminate the credibility gap between technical and non-technical analysis

- **Integration**

 - Combine technical with non-technical analysis and back-test performance

 - Common preference of traders and investors

Back-Testing in Bloomberg TSIG and BT



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TSIG

- **Fixed period Back-Testing analysis**

Assumes no amendment or risk management over fixed period

Available periods: 1 period of 1 minute to 100 years of quarterly

- **Easy observation of profit / loss**

How many signals over chosen history, when and at what price

How many profitable and losing signals

- **Easy observation of overall and individual profit / loss**

P/L of all signals identifiable over fixed period, including mean return

- **Easy to present and send to colleagues and clients**

Customized alerts

BT

- **Open-ended Back-Testing analysis**

Signals valid until trading rule / new signal terminates it

Available periods: 1 minute to quarterly charts

- **Easy observation of profit / loss**

How many signals over chosen history, when and at what price

How many profitable and losing signals and full performance statistics

- **Optimization of technical analysis indicators**

Thousands of permutations

- **Breakdown of portfolios / indices to individual securities**

Alerts on all securities

Back-Testing



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TSIG <GO>

Technical Strategy: fixed period in absolute terms

<Back> to Return

Save Analyze Actions Launch Trading Signals: Signal Definition

Signal Title: **ETA1**

Factors

Select From Available Factors

Add Variable...

Add Security/Datafield...

Bloomberg Technical Studies

User Defined Studies

Events

Simple Moving Average

Relative Strength Index

Rate of Change

Mov Avg Convergence/Divergence

Acc/Dist Oscillator

Arson Oscillator

Asymmetrical Vol Bands

ATPR Trendline

ATPR U-Shaped

ATPR Y-Shaped HiLo

ATPR Y-Shaped Trend Break

Selected Factors

Type	Name
1. RSI(14)	RSI1
2. Number(40)	Oversold
3. Number(60)	Overbought
4. Simple MA(20,0)	SMAvg1
5. Simple MA(55,0)	SMAvg2

Rules

Add Rule

Action	Factor 1	Condition	Factor 2
1. Show icon below	RSI1	crosses above	Overbought
and	Close	>	SMAvg1
and	SMAvg1	>	SMAvg2
2. Show icon above	RSI1	crosses below	Oversold
and	Close	<	SMAvg1
and	SMAvg1	<	SMAvg2

Notes

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Standard or customized technical studies (or combination)

Customized trading strategy

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Technical Strategy: fixed period in absolute terms

Security and history

Strategy signals & data



Fixed period for analysis

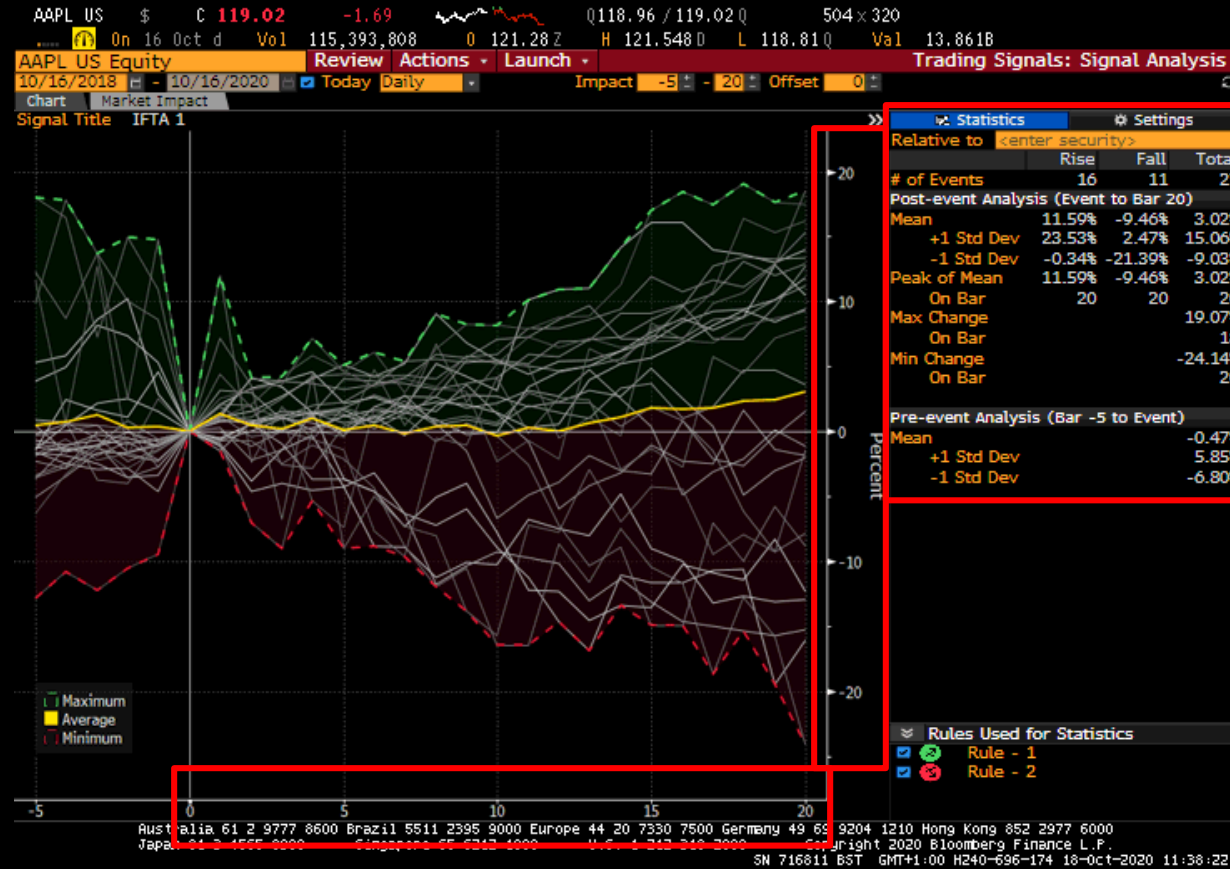
Performance statistics

TSIG <GO>

Technical Strategy: fixed period in absolute terms

Individual signal performance % returns

Highest
Mean
Lowest



Performance statistics

Date of signal Bars since signal

TSIG <GO>

Technical Strategy: absolute terms within portfolio

<Back> to Return

Resubmit Review Actions Trading Signals: Screen Results

5 D ending 10/16/2020 Today Daily Show All Securities

Screen Title IFTA 1

Security	October 2020					10/22/2019 - 10/16/2020			
	#	16	15	14	13	12	Gain	Loss	Mean
31) ADI UN Equity	1						11	7	2.54%
32) CMG UN Equity	1						10	5	1.85%
33) CSX UN Equity	1						10	3	1.20%
34) CTAS UN Equity	1						5	3	3.03%
35) DISCK UN Equity	1						3	5	-5.72%
36) DOV UN Equity	1						5	4	-2.82%
37) AEE UN Equity	1						5	4	-1.99%
38) EXPD UN Equity	2						9	9	0.33%
39) EXPD UN Equity	1						5	4	-11.02%
40) FANG UN Equity	1						3	3	-11.79%
41) FBHS UN Equity	1						11	3	3.33%
42) FCX UN Equity	1						17	3	11.60%
43) FISV UN Equity	1						12	7	0.05%
44) FITB UN Equity	1						7	8	-2.43%
45) FTV UN Equity	1						11	4	-0.31%
46) GE UN Equity	1						9	5	2.46%
47) GILD UN Equity	1						3	6	-0.98%
48) GM UN Equity	1						5	9	-3.55%
49) GPC UN Equity	1						6	6	-0.75%
50) AJG UN Equity	1						14	1	5.06%
51) HES UN Equity	1						6	10	-3.81%
52) HON UN Equity	2						6	8	-2.47%
53) HPQ UN Equity	1						8	7	-2.11%
54) HUM UN Equity	1						8	4	3.10%
55) IEX UN Equity	1						6	5	-1.43%
56) IFF UN Equity	1						8	5	2.64%
57) ALGN UN Equity	2						7	9	-1.11%
58) KIM UN Equity	1						4	12	-12.22%
59) KMX UN Equity	2						8	4	2.17%
60) LB UN Equity	1						7	1	16.74%
61) LEG UN Equity	1						6	5	5.75%
62) LEN UN Equity	1						11	1	11.63%
63) LH UN Equity	1						3	2	6.41%
64) LIN UN Equity	1						4	5	0.45%

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Strategy signals and performance in members of chosen index or portfolio

Set alerts: same strategy, any index or portfolio

of signals and dates Performance of signals

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Technical Strategy: relative to index or portfolio

Same security



Relative to index / portfolio

Performance statistics:
additional alpha relative to index / portfolio

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Technical Strategy: pairs trading

AAPL v
MSFT



Performance
statistics:
pairs trading

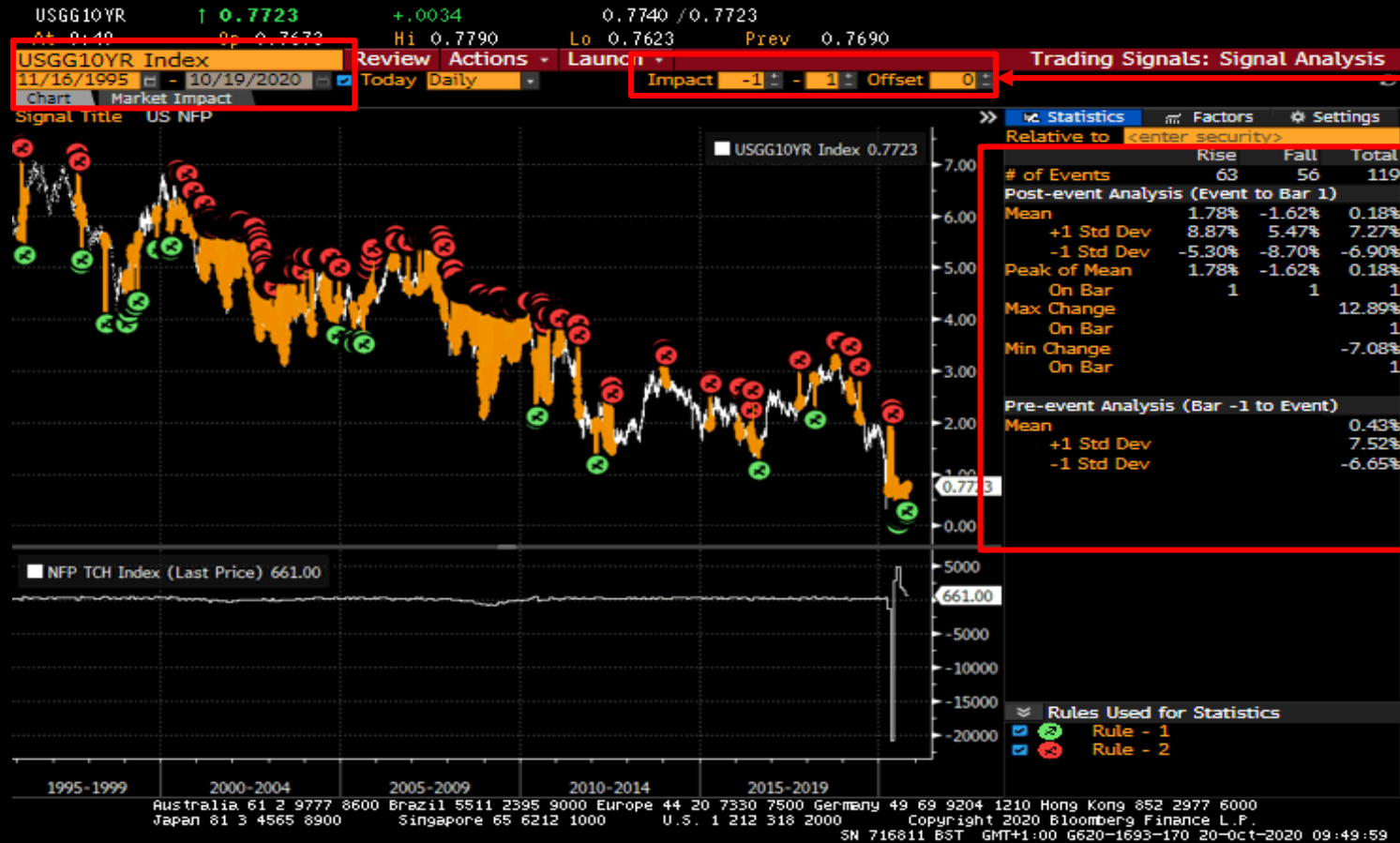
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Macroeconomic Strategy: US Non-Farm Payrolls

US 10 year Treasury

buy
if NFP < 100k

sell
if NFP > 350k



next month
market
impact

119 signals
low returns
over 25 years

TSIG <GO> Macroeconomic plus Technical Strategy

US 10 year
Treasury

buy
if NFP < 100k
& 10y yield
< mov average

sell
if NFP > 350k
& 10y yield
> mov average



next month
market
impact

26 signals
improved returns
over 25 years

TSIG <GO> Corporate: Analyst Upgrades & Downgrades

AAPL:
buy
if upgrade
sell
if downgrade



20 day
market impact

25 signals
but low returns
over 2 years

TSIG <GO>

Corporate: Earnings versus Estimates

AAPL:
buy if beat
 estimates
sell if miss
 estimates

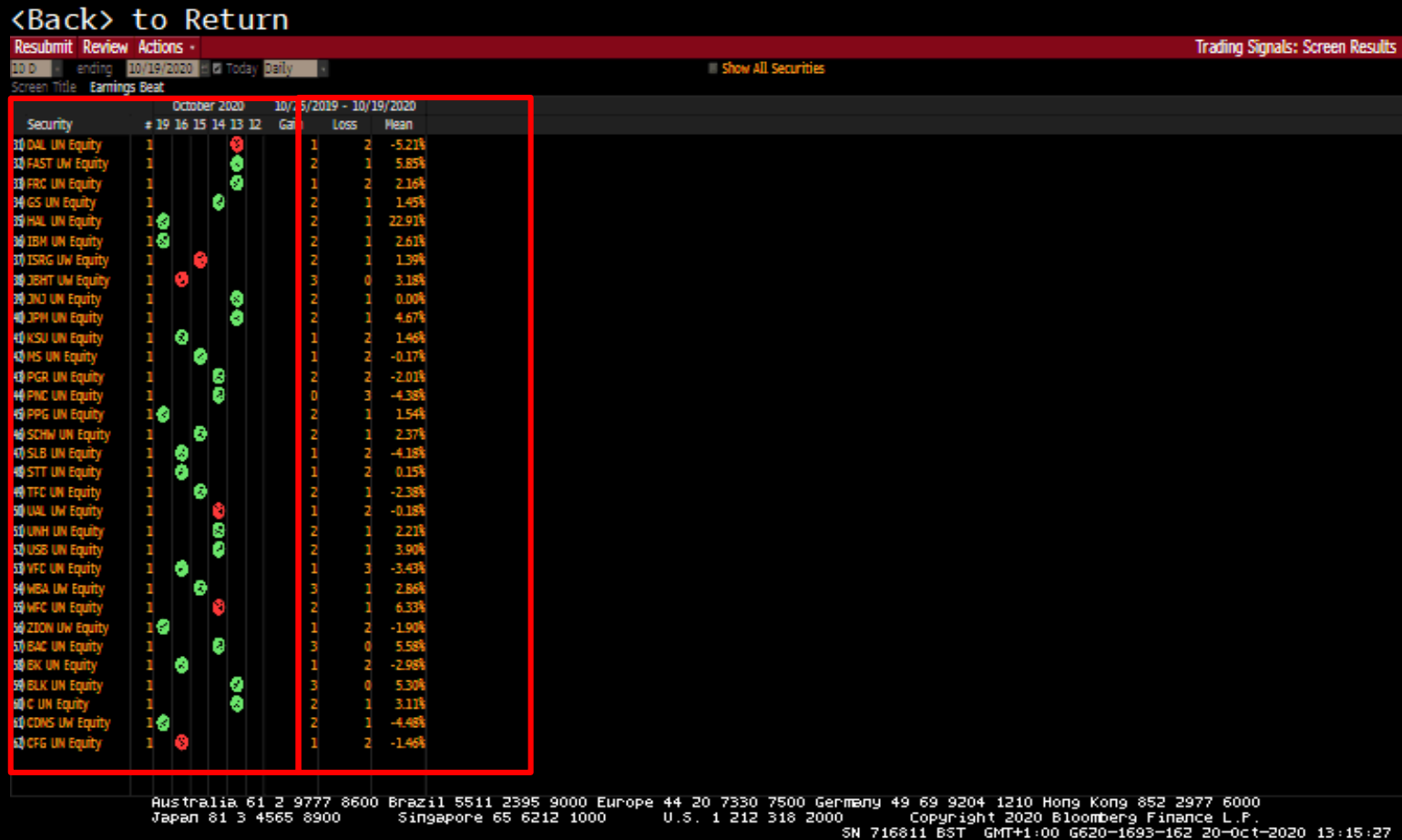


Only 8 signals
 4 profits
 4 losses
 but improved
 returns

TSIG <GO>

Corporate: Earnings versus Estimates (Portfolio)

S&P 500
members
beat or miss
estimates



signals in
chosen period

BT <GO> Technical Strategy: no Fixed Period

Strategy successfully saved.

Save Analyze Actions Launch Backtesting & Optimization: Strategy Definition

Strategy Definition Simulation Control

Strategy Title MLR Slope Long & Short

Factors

Select From Available Factors

- Add Variable...
- Add Security/Datafield...
- Bloomberg Technical Studies
- User Defined Studies
- Events
- Simple Moving Average
- Relative Strength Index
- Rate of Change
- Mov Avg Convergence/Divergence
- Acc/Dist Oscillator
- Aroon Oscillator
- Asymmetrical Vol Bands
- ATPR Trendline
- ATPR U-Shaped
- ATPR V-Shaped HiLo
- ATPR V-Shaped Trend Break

Selected Factors

Type	Name
1 MLR Slope(52,0)	MLR Slope1

Rules

Action	Factor 1	Condition	Factor 2
1. Cover & go Long	using a Market Order	at	Next Open
when	MLR Slope1	>	Value 0
2. Close & go Short	using a Market Order	at	Next Open
when	MLR Slope1	<	Value 0

Notes

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Moving Linear
Regression Slope

Long
if MLR > 0
Short
if MLR < 0

BT <GO> Technical Strategy: no Fixed Period

Security

Strategy
Signals

Returns on
notional
\$100k

Long
if $MLR > 0$
Short
if $MLR < 0$



7 profits
9 losses
but net positive
returns

BT <GO>

Technical Strategy: Realistic Trading Conditions

Strategy successfully saved.

Save Analyze Actions Launch Backtesting & Optimization: Strategy Definition

Strategy Definition Simulation Control

10/19/2015 - 10/22/2020 Today
Daily Max range is 25 Years.
Trigger warning 15 minutes before bar's end

Trading Approach Long & Short
Initial Capital 100k
Default Trade Price Next Open
Enable Multiple Trades Per Bar
Enable Pyramiding
Scale In Trade Size All in
Scale Out Trade Size Exit All

Reporting Currency Local CCY
Commission Per Trade 0.0000 Local CCY
Commission Per Share 0.00000 Local CCY
Commission Percentage 0.0000 %
Slippage Local CCY
0.0000

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BT <GO> Technical Strategy: Optimization

LEGATRUU 543.9745 -.1828 Ret MTD +.56 Ret 3M +1.90
 As of 10/20/20 YTW 0.90 OAS 0.47

LEGATRUU Index Submit Backtesting & Optimization: Submit Optimization

10/19/2015 - 10/22/2020 Today Daily

Optimization Parameters Strategy Definition Simulation Control

Optimization Title MLR Slope Long & Short

Available Parameters

- MLR Slope1
 - MLR Period
 - MA Period
 - Lead/Lag

Selected Parameters (Max 10)					
Factor	Parameter		Min	Max	Step
1	MLR Slope1	MLR Period	48	56	1
2	MLR Slope1	MA Period	3	7	1
3	MLR Slope1	Lead/Lag	-1	1	1

* Only factors used in strategy rules are shown.

Current iterations 135
 Remaining iterations 14865

Notes

9, 5 & 3:
permutations
of individual factors

Total 135
permutations
in optimization

BT <GO> Technical Strategy: Optimization

<Back> to Return

LEGATRUU Index Resubmit Review Actions Backtesting & Optimization: Results

10/19/2015 - 10/22/2020 Today Daily

Table 3D Surface Graphics Filter

Optimization Title MLR Slope Long & Short

	Current Position			P&L	Age	Trades			Profit (Loss)			Avg Dura...	Profi... Factor	Shar... Ratio	Sorti... Ratio	Total Return	% Max Return	% Min Return	
	MLR Slope	MLR Slope	MLR Slope			Long	Sho...	Total	Total	%Total	Long								Short
Maxim				253.26	12	11	10	21	27.13k	27.13	24.68k	2.45k	82.25	4.84	1.11	1.14	27.13	31.11	-3.6
Averag				-418.19	7	9	8	17.22	22.76k	22.76	22.36k	398.09	77.15	3.10	0.92	0.95	22.76	29.40	-3.9
Median				-573.20	8	8	8	16	22.65k	22.65	22.37k	286.46	82.25	3.06	0.92	0.94	22.65	29.60	-3.9
Minimu				-893.37	1	8	8	16	19.17k	19.17	20.52k	-1.35k	62.90	2.31	0.77	0.78	19.17	27.21	-4.4
31	55	3	1	-257.21	7	8	8	16	27.13k	27.13	24.68k	2.45k	82.25	4.84	1.11	1.14	27.13	30.36	-3.6
32	55	4	1	-257.21	7	8	8	16	27.13k	27.13	24.68k	2.45k	82.25	4.84	1.11	1.14	27.13	30.36	-3.6
33	55	5	1	-257.21	7	8	8	16	27.13k	27.13	24.68k	2.45k	82.25	4.84	1.11	1.14	27.13	30.36	-3.6
34	55	6	1	-257.21	7	8	8	16	27.13k	27.13	24.68k	2.45k	82.25	4.84	1.11	1.14	27.13	30.36	-3.6
35	55	7	1	-257.21	7	8	8	16	27.13k	27.13	24.68k	2.45k	82.25	4.84	1.11	1.14	27.13	30.36	-3.6
36	52	3	1	-573.20	10	8	8	16	25.66k	25.66	23.90k	1.76k	82.25	4.03	1.05	1.08	25.66	28.91	-3.6
37	52	4	1	-573.20	10	8	8	16	25.66k	25.66	23.90k	1.76k	82.25	4.03	1.05	1.08	25.66	28.91	-3.6
38	52	5	1	-573.20	10	8	8	16	25.66k	25.66	23.90k	1.76k	82.25	4.03	1.05	1.08	25.66	28.91	-3.6
39	52	6	1	-573.20	10	8	8	16	25.66k	25.66	23.90k	1.76k	82.25	4.03	1.05	1.08	25.66	28.91	-3.6
40	52	7	1	-573.20	10	8	8	16	25.66k	25.66	23.90k	1.76k	82.25	4.03	1.05	1.08	25.66	28.91	-3.6
41	54	3	1	-746.25	8	8	8	16	25.34k	25.34	23.77k	1.57k	82.25	4.10	1.03	1.06	25.34	29.74	-3.6
42	54	4	1	-746.25	8	8	8	16	25.34k	25.34	23.77k	1.57k	82.25	4.10	1.03	1.06	25.34	29.74	-3.6
43	54	5	1	-746.25	8	8	8	16	25.34k	25.34	23.77k	1.57k	82.25	4.10	1.03	1.06	25.34	29.74	-3.6
44	54	6	1	-746.25	8	8	8	16	25.34k	25.34	23.77k	1.57k	82.25	4.10	1.03	1.06	25.34	29.74	-3.6
45	54	7	1	-746.25	8	8	8	16	25.34k	25.34	23.77k	1.57k	82.25	4.10	1.03	1.06	25.34	29.74	-3.6
46	53	3	1	-893.37	9	8	8	16	25.09k	25.09	23.64k	1.45k	82.25	3.90	1.03	1.05	25.09	30.04	-3.7
47	53	4	1	-893.37	9	8	8	16	25.09k	25.09	23.64k	1.45k	82.25	3.90	1.03	1.05	25.09	30.04	-3.7
48	53	5	1	-893.37	9	8	8	16	25.09k	25.09	23.64k	1.45k	82.25	3.90	1.03	1.05	25.09	30.04	-3.7
49	53	6	1	-893.37	9	8	8	16	25.09k	25.09	23.64k	1.45k	82.25	3.90	1.03	1.05	25.09	30.04	-3.7
50	53	7	1	-893.37	9	8	8	16	25.09k	25.09	23.64k	1.45k	82.25	3.90	1.03	1.05	25.09	30.04	-3.7
51	48	3	1	-41.86	1	10	9	19	25.02k	25.02	23.52k	1.50k	69.42	3.48	1.02	1.05	25.02	29.79	-3.8
52	48	4	1	-41.86	1	10	9	19	25.02k	25.02	23.52k	1.50k	69.42	3.48	1.02	1.05	25.02	29.79	-3.8
53	48	5	1	-41.86	1	10	9	19	25.02k	25.02	23.52k	1.50k	69.42	3.48	1.02	1.05	25.02	29.79	-3.8
54	48	6	1	-41.86	1	10	9	19	25.02k	25.02	23.52k	1.50k	69.42	3.48	1.02	1.05	25.02	29.79	-3.8
55	48	7	1	-41.86	1	10	9	19	25.02k	25.02	23.52k	1.50k	69.42	3.48	1.02	1.05	25.02	29.79	-3.8
56	56	3	0	-252.82	7	8	8	16	24.71k	24.71	23.37k	1.34k	82.25	3.74	1.01	1.03	24.71	29.75	-3.8

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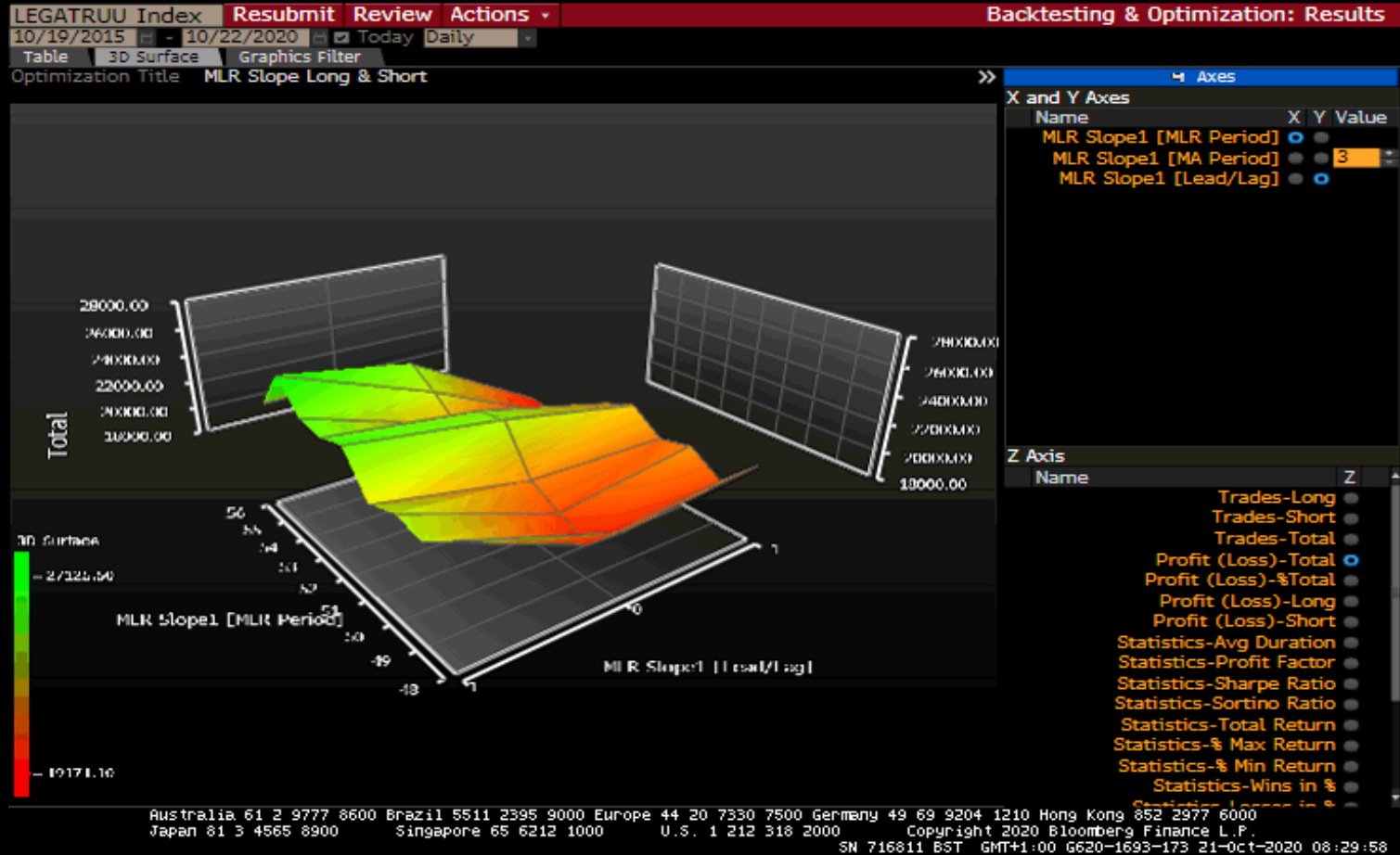
Optimum
signal settings

Optimum returns

BT <GO>

Technical Strategy: Optimization

<Back> to Return



BT <GO>

Popular Strategy: Golden Cross & Death Cross

Strategy successfully saved.

Save Analyze Actions Launch Backtesting & Optimization: Strategy Definition

Strategy Definition Simulation Control

Strategy Title Golden Cross

Factors

Select From Available Factors

- Add Variable...
- Add Security/Datafield...
- Bloomberg Technical Studies
- User Defined Studies
- Events
- Simple Moving Average
- Relative Strength Index
- Rate of Change
- Mov Avg Convergence/Divergence
- Acc/Dist Oscillator
- Aroon Oscillator
- Asymmetrical Vol Bands
- ATPR Trendline

Selected Factors

Type	Name
1 Simple MA(55,0)	SMAvg1
2 Simple MA(200,0)	SMAvg2

Rules 2/ Add Rule

Action	Factor 1	Condition	Factor 2
1. Cover & go Long	using a SMAvg1	at SMAvg1 crosses above SMAvg2	Next Open SMAVG
when			
2. Close & go Short	using a SMAvg1	at SMAvg1 crosses below SMAvg2	Next Open SMAVG
when			

Notes

All-in reversing Simple Moving Average strategy that goes long when the 55 day SMAvg1 crosses above the 200 day SMAvg2 and reverses its position to short when SMAvg1 crosses below SMAvg2.

55 bar Mov Av
& 200 bar Mov Av

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BT <GO>

Popular Strategy: Golden Cross & Death Cross

Strategy successfully saved.



55 bar Mov Av
& 200 bar Mov Av

Positive return
but volatile

Return on
notional \$100k

BT <GO>

Integrated Strategy: long-only with multiple factors

<Back> to Return

Save As Analyze Actions Launch Backtesting & Optimization: Strategy Definition

Strategy Definition Simulation Control

Strategy Title Analyst Recommendations

Factors

Select From Available Factors

- Add Variable...
- Add Security/Datafield...
- Bloomberg Technical Studies
- User Defined Studies
- Events
- Simple Moving Average
- Relative Strength Index
- Rate of Change
- Mov Avg Convergence/Divergence
- Acc/Dist Oscillator
- Aroon Oscillator
- Asymmetrical Vol Bands
- ATPR Trendline

Selected Factors

Type	Name
1. Simple MA(50,0)	SMAvg1
2. Total Buy Recommendations	TotalBuy
3. Total Sell Recommendations	TotalSell
4. 3 Month 100% Moneyness Impl...	Volatility
5. Number(18)	VolatilityLvl
6. Number(2)	ROC_Lvl
7. Number(13)	MaxLoss%
8. ROC of SMA(50,7,2)	ROC of SMA1

Rules 2/2 Add Rule

Action	Factor 1	Condition	Factor 2
1. Enter Long	using a Market Order	at	Current Close
when	Low	>	SMAvg1
and	Volatility	>	SMAVG
and	Close	>	18
and	TotalBuy	>	VolatilityLvl
2. Exit Long	using a Market Order	at	Next Open
when	Max Loss	>	MaxLoss%
3. Exit Long	using a Market Order	at	Next Open
when	ROC of SMA1	crosses below	SMAvg1
4. Exit Long	using a Stop Order	at	Prior ROC of SMA1
when	Low	crosses below	MA Lagged
and	ROC of SMA1	>	MA Lagged
			2

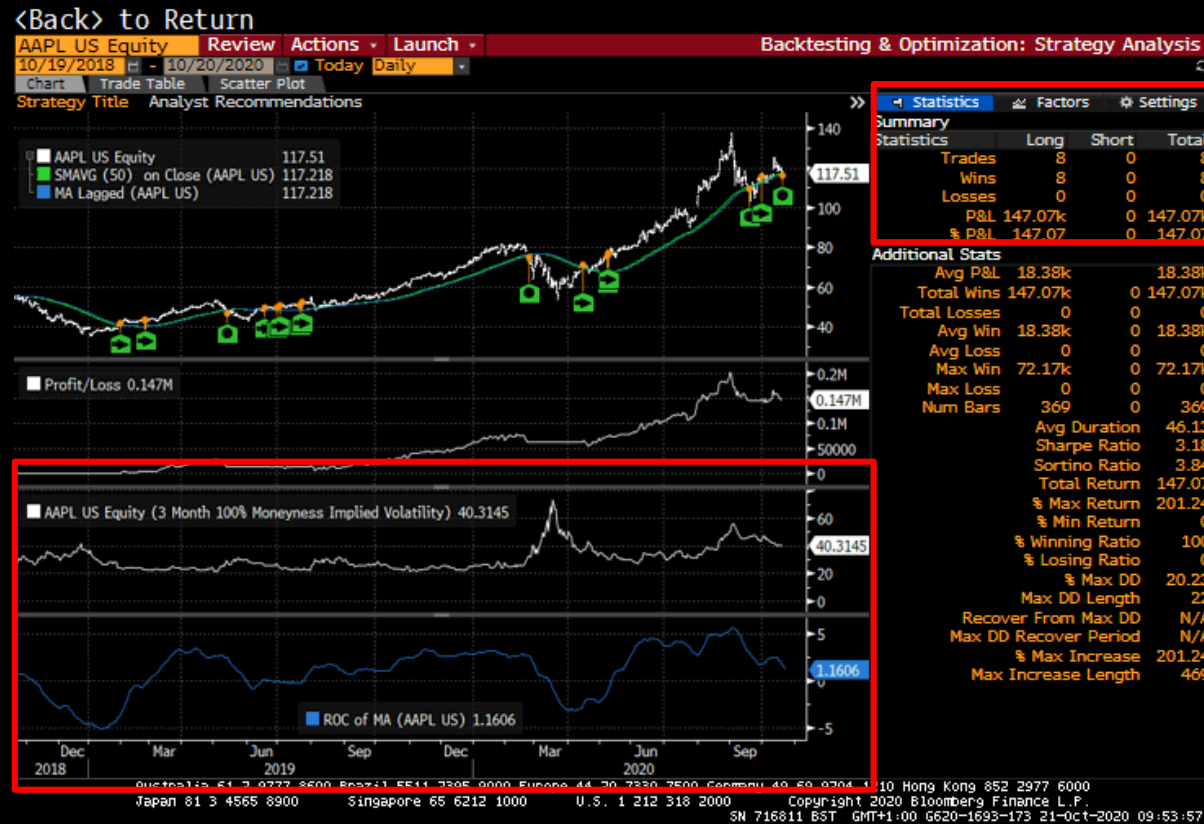
Notes

Long Strategy that incorporates Buy & Sell Recommendations, Volatility, a Stop/Loss and a CS.Lite that calculates the ROC of a Simple MA.

Strategy factors:
Analyst recommendations,
volatility,
RoC of Mov Av,
stop-loss

BT <GO>

Integrated Strategy: long-only with multiple factors



No losing trades

Analyst recommendations,
volatility,
RoC of Mov Av,
stop-loss

Conclusion

- Technical analysis now directly comparable with macroeconomic and corporate analysis
- Technical analysis now integrated with macroeconomic and corporate analysis
- Technical analysis now measurable in realistic trading scenarios of relative return and variable market conditions



Tim McCullough

Bloomberg L.P.

Thank You

- To learn more, please contact your Bloomberg representative or
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- Tim McCullough
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