Algotrading

GROUP2

Strategy of IDMR

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GOAL

"SIMULATE A STRATEGY THAT CAN MAKE MONEY USING QUANTCONNECT"

STRATEGY COMBINE FUNDAMENTAL AND MACD ANALYSES
" Small Wins, More Trades"

PART 1

PART 1 STRATEGY

Fundamental

- Filter Stock with High Liquidity and Volatility
- Liquidity: Universe of top 500 US-listed stocks by market capitalization
- Volatility: Top 20 companies by 3Y Revenue CAGR
- Rebalance portfolio every year

Technical

- Long only strategy as these stocks are expected to continue growing in future
- Buy/Sell based on MACD indicator

CAGR- Compound Average Growth Rate
MACD - Moving Average Convergence Divergence

Moving Average Convergence Divergence (MACD)

- Trend-following, momentum indicator
  Exponential Moving Average - more weight on
  recent price changes

- - MACD Line: 12-day EMA - 26-day EMA
  - Signal Line: 9-day EMA of MACD
  - MACD Histogram: MACD Line - Signal Line

- Pairing with other indicators for an enhanced and
  more effective trading.

Convergent

- technical signals when it crosses above (to buy) or below (to sell) its signal line.

- The speed/difference of crossovers is also taken as a signal of a market is overbought or oversold. Histogram

Bullish Confirmation

Signal Line

MACD

Bearish Confirmation

Signal Line

MACD

Divergent

- **Bullish divergent** - two rising lows that correspond with two falling lows on the price

- **Bearish divergent** - two falling highs that correspond with two rising highs on the price, a bearish divergence

Bullish Divergence

Bearish Divergence

Code implementation is a challenge

- Decide rolling window time frame
- Detection of Peak and valley

CHALLENGES

Challenges faced

- Selecting the financial instrument to trade (Forex? Stocks? Options?)
- Deciding on which trading strategy to use
- Risk management
- Understanding the code and parameters set
- Visualising the trend chart of a stock need more understanding on how to plot in quant connect due to lack of clear documentation
- Low PSR, Low Win Rate, High Commision Fee due to More Trades

OPPORTUNITIES

How our current strategy can be improved

Pairing MACD with other indicators -

Bollinger Band (BB): Identifies overbought/oversold conditions. Narrower band indicates low volatility. Wider band indicate high volatility.

Relative Strength Index (RSI): Also measures overbought/oversold indicators. Can be used to identify support/resistance, spot divergences for possible reversal, or confirm signals from other indicators.(More useful in trending markets).

Improvement Summary

Couple with RSI signal for affirmation of MACD buy / sell condition

If coupled with more than two indicator, the performance starts to drop as some buy / sell opportunity will be missed

Based on backtesting result, MACD + RSI seem to provide the best returns

STRATEGY IMPROVEMENT
ADDITIONAL INDICATORS: BOLLINGER BANDS, RSI & DIVERGENCE SIGNAL
"Big Wins, Less Trades"

PART 2

PART 2 STRATEGY

Fundamental
- Filter Stock with High Liquidity and Volatility
- Liquidity: Universe of top 500 US-listed stocks by market capitalization
- Volatility: Top 20 companies by 3Y Revenue CAGR
- Rebalance portfolio every year

Technical
- Long only and short sell strategies
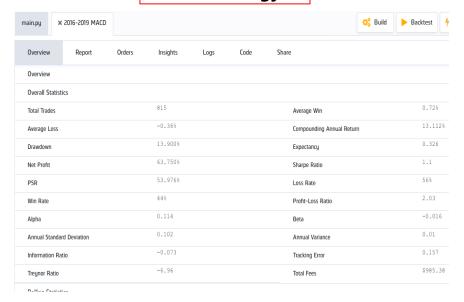- Buy/Sell based on MACD indicator, MACD-Divergence Signal, Bollinger Bands and RSI.

CAGR- Compound Average Growth Rate

MACD - Moving Average Convergence Divergence

RSI- Relative Strength Index
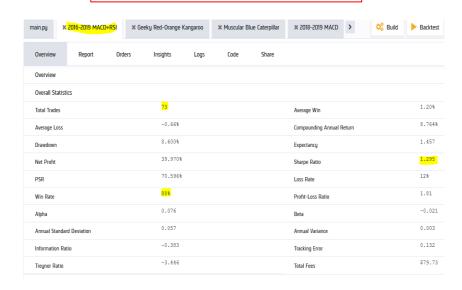
RESULTS COMPARISON BASED ON STRATEGY
(PART 1 & PART 2)

Comparison of 2 Strategies Using 5 years backtest

Part 1 Strategy

main.py	✕ 2016-2019 MACD						⚙ Build	▶ Backtest	⚡

Overview	Report	Orders	Insights	Logs	Code	Share

Overview

Overall Statistics

Total Trades	815	Average Win	0.72%
Average Loss	-0.36%	Compounding Annual Return	13.112%
Drawdown	13.900%	Expectancy	0.326
Net Profit	63.750%	Sharpe Ratio	1.1
PSR	53.976%	Loss Rate	56%
Win Rate	44%	Profit-Loss Ratio	2.03
Alpha	0.114	Beta	-0.016
Annual Standard Deviation	0.102	Annual Variance	0.01
Information Ratio	-0.073	Tracking Error	0.157
Treynor Ratio	-6.96	Total Fees	$985.38

Part 2 Strategy (Improved)

main.py	✕ 2016-2019 MACD+RSI	✕ Geeky Red-Orange Kangaroo	✕ Muscular Blue Caterpillar	✕ 2018-2019 MACD	❯	⚙ Build	▶ Backtest

Overview	Report	Orders	Insights	Logs	Code	Share

Overview

Overall Statistics

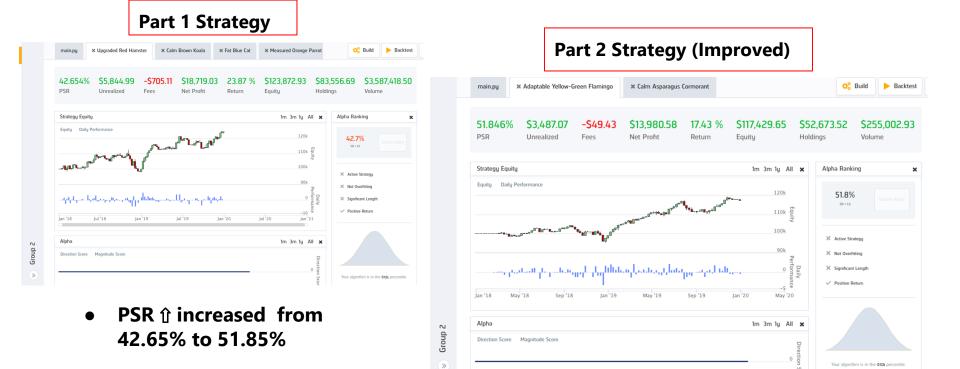| Total Trades	73	Average Win	1.20%
Average Loss	-0.66%	Compounding Annual Return	8.764%
Drawdown	8.600%	Expectancy	1.457
Net Profit	39.970%	Sharpe Ratio	1.295
PSR	70.596%	Loss Rate	12%
Win Rate	88%	Profit-Loss Ratio	1.81
Alpha	0.076	Beta	-0.021
Annual Standard Deviation	0.057	Annual Variance	0.003
Information Ratio	-0.383	Tracking Error	0.132
Treynor Ratio	-3.446	Total Fees	$79.73

- Reduced commision cost by reducing total trades
- Doubled win rate, from 44% to 88%
- Increased PSR from 53.98% to 70.60%

2 Years Back Test – Stocks with 3Y Rev CAGR as of 01/01/2018

S/N	Company	S/N	Company
1	Cheniere Energy, Inc.	11	Facebook, Inc.
2	Annaly Capital Management, Inc.	12	Incyte Corporation
3	XPO Logistics, Inc.	13	Centene Corporation
4	Shopify Inc.	14	Splunk Inc.
5	Charter Communications, Inc.	15	Workday, Inc.
6	Vertex Pharmaceuticals Incorporated	16	Arista Networks, Inc.
7	Broadcom Inc.	17	Palo Alto Networks, Inc.
8	Restaurant Brands International Inc.	18	ServiceNow, Inc.
9	Tesla, Inc.	19	Molson Coors Beverage Company
10	Cboe Global Markets, Inc.	20	Square, Inc.

Quantconnect 2 Years Backtest Results (01-Jan-2018 to 31-Dec-2019)

Part 1 Strategy

Part 2 Strategy (Improved)

- **PSR ⇧ increased from 42.65% to 51.85%**

2 Years Backtest -Overview

Overview	Report	Orders	Insights	Logs	Code	Share

Overview

Overall Statistics

Total Trades	657	Average Win	0.55%
Average Loss	-0.26%	Compounding Annual Return	11.298%
Drawdown	13.000%	Expectancy	0.204
Net Profit	23.873%	Sharpe Ratio	0.923
PSR	42.654%	Loss Rate	61%
Win Rate	39%	Profit-Loss Ratio	2.10
Alpha	0.101	Beta	-0.031
Annual Standard Deviation	0.106	Annual Variance	0.011
Information Ratio	-0.05	Tracking Error	0.175
Treynor Ratio	-3.162	Total Fees	$705.11

Rolling Statistics

Part 2 Strategy (Improved)

Overview	Report	Orders	Insights	Logs	Code	Share

Overview

Overall Statistics

Total Trades	47	Average Win	1.06%
Average Loss	-0.66%	Compounding Annual Return	8.365%
Drawdown	8.600%	Expectancy	1.057
Net Profit	17.430%	Sharpe Ratio	1.065
PSR	51.846%	Loss Rate	21%
Win Rate	79%	Profit-Loss Ratio	1.61
Alpha	0.072	Beta	-0.016
Annual Standard Deviation	0.066	Annual Variance	0.004
Information Ratio	-0.238	Tracking Error	0.152
Treynor Ratio	-4.442	Total Fees	$49.43

- **Sharp Ratio ⇧ increased from 0.922 to 1.065**
- **Win Rate ⇧ increased from 39% to 79%**

2 Years Backtest -Order History

Part 2 Strategy (Improved)

Part 1 Strategy

Overview	Report	Orders	Insights	Logs	Code	Share

Orders Summary

Date Time	Symbol	Type	Price	Quantity	Status	Tag
+ 2019-12-14 00:00:00	TSLA	Buy Market On Open	Fill: $72.51 USD	83	Filled	
+ 2019-12-18 00:00:00	SNAP	Buy Market On Open	Fill: $15.07 USD	402	Filled	
+ 2019-12-19 00:00:00	TWLO	Buy Market On Open	Fill: $98.33 USD	62	Filled	
+ 2019-12-20 00:00:00	KKR	Buy Market On Open	Fill: $29.57655694 USD	208	Filled	
+ 2019-12-24 00:00:00	XP	Buy Market On Open	Fill: $39.00 USD	157	Filled	
+ 2019-12-24 00:00:00	CI	Buy Market On Open	Fill: $206.487743962 USD	29	Filled	
+ 2019-12-24 00:00:00	KKR	Sell Market On Open	Fill: $28.64858753 USD	-208	Filled	Liquidated
+ 2019-12-27 00:00:00	CBOE	Buy Market On Open	Fill: $117.775925213 USD	52	Filled	

Part 2 Strategy (Improved)
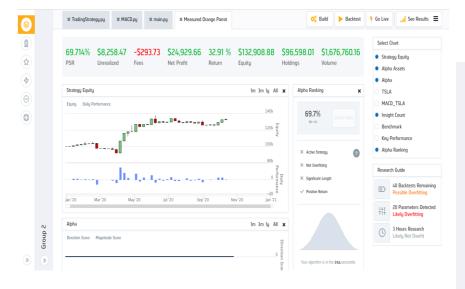
Overview	Report	Orders	Insights	Logs	Code	Share

Orders Summary

Date Time	Symbol	Type	Price	Quantity	Status	Tag
+ 2019-08-14 00:00:00	PANW	Sell Market On Open	Fill: $218.96 USD	-28	Filled	Liquidated
+ 2019-08-29 00:00:00	WDAY	Buy Market On Open	Fill: $187.36 USD	29	Filled	
+ 2019-09-26 00:00:00	LNG	Buy Market On Open	Fill: $63.96 USD	86	Filled	
+ 2019-10-16 00:00:00	TAP	Sell Market On Open	Fill: $55.66996902 USD	-80	Filled	Liquidated
+ 2019-11-20 00:00:00	QSR	Buy Market On Open	Fill: $63.32451846 USD	91	Filled	
+ 2019-12-07 00:00:00	CNC	Sell Market On Open	Fill: $61.18 USD	-102	Filled	Liquidated
+ 2019-12-20 00:00:00	SPLK	Sell Market On Open	Fill: $150.11 USD	-42	Filled	Liquidated

S/N	Company	S/N	Company
1	Lyft, Inc.	11	Okta, Inc.
2	Exact Sciences Corporation	12	Cigna Corporation
3	Cheniere Energy, Inc.	13	Uber Technologies, Inc.
4	Diamondback Energy, Inc.	14	Cboe Global Markets, Inc.
5	Nutrien Ltd.	15	Tesla, Inc.
6	Alnylam Pharmaceuticals, Inc.	16	SS&C Technologies Holdings, Inc.
7	Snap Inc.	17	Brookfield Infrastructure Partners
8	XP Inc.	18	KKR & Co. Inc.
9	Twilio Inc.	19	Concho Resources Inc.
10	Shopify Inc.	20	Roku, Inc.

Source: Capital IQ

Quantconnect Real Trading Results (01-Jan-2020 to 16-Oct-2020)

Part 1 Strategy

Part 2 Strategy (Improved)
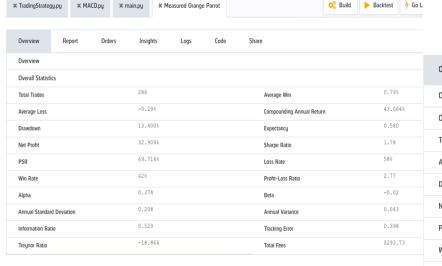
- **PSR ⇧ increased from 69.714% to 79.217%**

Real Trading-Overview

- **Sharp Ratio ⇧ increased from 1.780 to 2.031**
- **Win Rate ⇧ increased from 42% to 86%**

Real Trading-Order History

Part 1 Strategy

| | | Overview | Report | Orders | Insights | Logs | Code | Share |

Orders Summary

Date Time	Symbol	Type	Price	Quantity	Status	Tag
+ 2020-10-09 00:00:00	NTR	Buy Market On Open	Fill: $40.97 USD	162	Filled	
+ 2020-10-10 00:00:00	LNG	Buy Market On Open	Fill: $48.19 USD	136	Filled	
+ 2020-10-13 00:00:00	UBER	Sell Market On Open	Fill: $36.22 USD	-170	Filled	Liquidated
+ 2020-10-14 00:00:00	TSLA	Buy Market On Open	Fill: $449.94 USD	14	Filled	
+ 2020-10-15 00:00:00	NTR	Sell Market On Open	Fill: $39.50 USD	-162	Filled	Liquidated
+ 2020-10-16 00:00:00	EXAS	Sell Market On Open	Fill: $103.74 USD	-81	Filled	Liquidated

Part 2 Strategy (Improved)

| | | Overview | Report | Orders | Insights | Logs | Code | Share |

Orders Summary

Date Time	Symbol	Type	Price	Quantity	Status	Tag
+ 2020-05-21 00:00:00	SNAP	Sell Market On Open	Fill: $18.20 USD	-406	Filled	Liquidated
+ 2020-05-22 00:00:00	TSLA	Sell Market On Open	Fill: $164.658 USD	-51	Filled	Liquidated
+ 2020-05-30 00:00:00	EXAS	Sell Market On Open	Fill: $84.88 USD	-55	Filled	Liquidated
+ 2020-06-17 00:00:00	TWLO	Sell Market On Open	Fill: $211.31 USD	-54	Filled	Liquidated
+ 2020-06-30 00:00:00	ROKU	Buy Market On Open	Fill: $115.10 USD	51	Filled	
+ 2020-07-07 00:00:00	XP	Sell Market On Open	Fill: $47.50 USD	-270	Filled	Liquidated
+ 2020-07-07 00:00:00	UBER	Sell Market On Open	Fill: $32.40 USD	-196	Filled	Liquidated
+ 2020-08-21 00:00:00	CI	Buy Market On Open	Fill: $178.53 USD	34	Filled	
+ 2020-09-01 00:00:00	KKR	Sell Market On Open	Fill: $35.80 USD	-233	Filled	Liquidated

Thank You

By Group 2