

Momentum & Contrarian Effects... Out-of-sample Results

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Why?

Necessity to check robustness of selected Momentum-Contrarian strategies in the period of abrupt trend reversal and extremely high volatility

- 1 Briefly about cryptocurrency markets
- 2 Briefly about momentum/contrarian
- 3 Hypothesis
- 4 Methodology
- 5 Data
- 6 Results
- 7 Summary
- 8 DFL extension

Total Market Capitalization

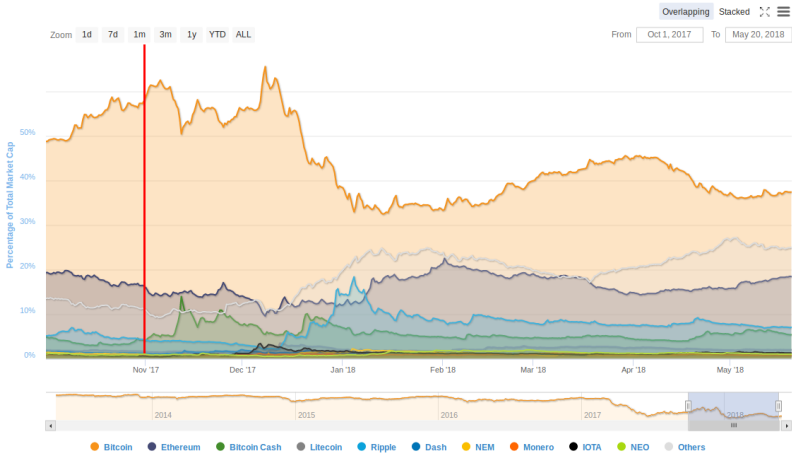
Linear Scale Log Scale

Zoom 1d 7d 1m 3m 1y YTD ALL

From Oct 1, 2017 To May 20, 2018



Percentage of Total Market Capitalization (Dominance)



coinmarketcap.com

Research Questions:

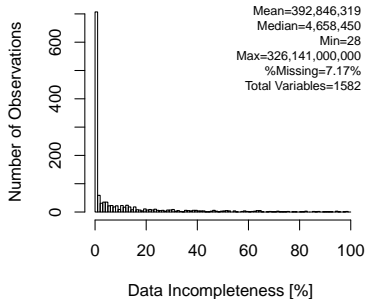
- 1 Are the same effects present?
- 2 What are their magnitudes in comparison with in-sample?
- 3 What are the reasons behind potential discrepancies?
- 4 Which assumptions are crucial for designing the final version of presented strategies?

Methodology:

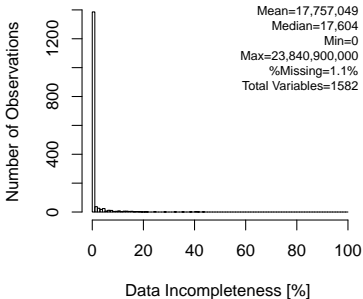
- 1 Exactly the same as for the in-sample case!

- ① Daily OHLC prices, market cap and 24h-volume data
- ② Out-of-sample time horizon: 2017-10-28 to 2018-05-20 for 1500+ cryptocurrencies
- ③ BTCUSD and S&P500 daily close prices as benchmarks
- ④ Data source: `www.coinmarketcap.com`

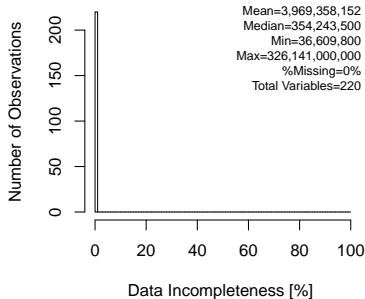
Market Cap



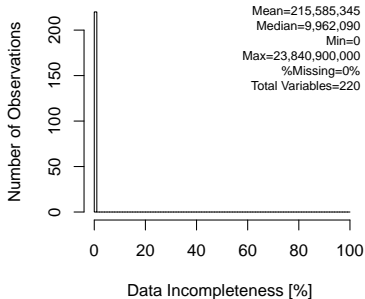
Volume (24h)



Market Cap



Volume (24h)



First 10 cryptocurrencies in TOP100 as of 2018-05-20

Nazwa	%ARC	%ASD	%MDD	IR1	IR2	Start Date	MarketCap [USD]	Volume (24h) [USD]	%MISS
bitcoin	101.6	113.0	66.0	0.9	1.4	2017-10-28	140,556,000,000	5,191,060,000	0
ethereum	384.1	119.9	73.5	3.2	16.7	2017-10-28	69,472,800,000	2,156,910,000	0
ripple	826.0	219.2	85.9	3.8	36.2	2017-10-28	26,541,700,000	275,614,000	0
bitcoin.cash	636.0	199.9	84.4	3.2	24.0	2017-10-28	20,276,500,000	805,599,000	0
eos	34,198.4	216.6	71.3	157.9	75,682.0	2017-10-28	11,420,300,000	1,228,360,000	0
litecoin	435.5	160.9	68.4	2.7	17.2	2017-10-28	7,657,330,000	324,983,000	0
cardano	5,947.8	307.7	87.0	19.3	1,321.9	2017-10-28	6,303,990,000	101,310,000	0
stellar	6,873.2	206.6	78.9	33.3	2,895.9	2017-10-28	5,902,850,000	30,586,700	0
iota	1,450.3	197.9	82.6	7.3	128.7	2017-10-28	4,860,710,000	47,072,900	0
tron	33,368.4	345.0	87.1	96.7	37,040.7	2017-10-28	4,554,320,000	470,467,000	0

Last 10 cryptocurrencies in TOP100 as of 2018-05-20

Nazwa	%ARC	%ASD	%MDD	IR1	IR2	Start Date	MarketCap [USD]	Volume (24h) [USD]	%MISS
zcoin	401.3	186.7	80.7	2.1	10.7	2017-10-28	172,371,000	1,337,600	0.0
kin	1,254.5	756.3	90.2	1.7	23.1	2017-10-28	171,931,000	701,274	37.6
nuls	1,407.8	240.8	25.5	5.8	322.6	2018-03-21	168,823,000	4,832,440	68.9
salt	3.2	181.7	88.4	0.0	0.0	2017-10-28	165,542,000	5,263,210	0.5
matrix.ai.network	-99.8	193.1	38.4	-0.5	1.3	2018-05-05	165,423,000	8,524,250	6.2
gifo	-100.0	147.3	51.0	-0.7	1.3	2018-04-27	164,378,000	11,767,200	29.2
electronium	-70.2	255.8	90.1	-0.3	0.2	2017-11-08	162,138,000	530,975	18.6
maidsafecoin	26.3	161.5	80.6	0.2	0.1	2017-10-28	161,199,000	1,704,050	7.8
chainlink	308.0	207.1	81.0	1.5	5.7	2017-10-28	158,921,000	1,025,440	11.2
wax	-97.1	282.7	94.4	-0.3	0.4	2017-12-29	157,789,000	2,566,840	32.9

Legend:

- Start Date - the first day the asset has appeared on TOP100
- %MISS - percentage of missing data

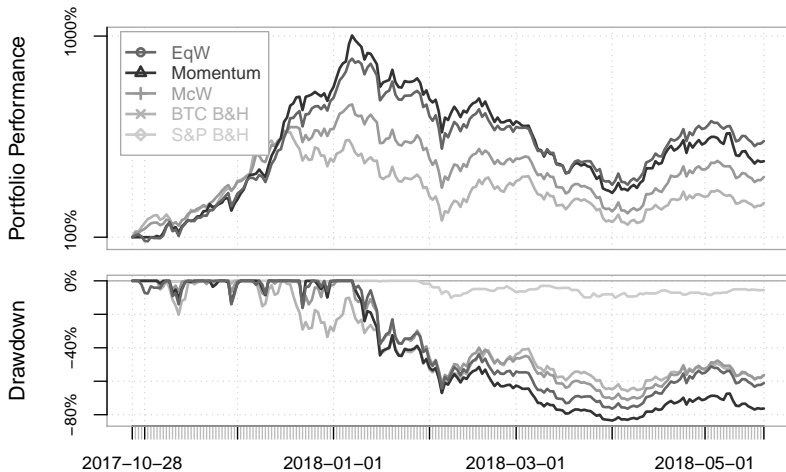
Name	%N	RE	RA	%TC	VF	%ARC	%ASD	%MDD	IR1	IR2	%MT
S&P B&H	-	-	-	-	-	10.0	15.2	10.2	0.7	0.6	0.0
BTC B&H	-	-	-	-	-	100.9	112.7	66.0	0.9	1.4	0.0
McW	100	1w	-	1.0	100	241.3	108.3	71.3	2.2	7.5	6.2
EqW	100	1w	-	1.0	100	609.2	127.0	76.4	4.8	38.2	24.2
Momentum	25	1w	1w	1.0	100	370.6	132.5	83.5	2.8	12.4	147.1
Contrarian	25	1w	1w	1.0	100	67.6	130.7	82.4	0.5	0.4	152.7

Legend: McW - MarketCap weighted strategy, EqW - Equally Weighted strategy, %N - percent of TOP100 currencies used to construct the portfolio, RE - reallocation period, RA - width of the ranking window used to calculate the highest/lowest rates of return, %TC - total transaction costs, VF - volume filter threshold, %ARC - annualised rate of return, %ASD - annualised standard deviation, %MDD - maximum drawdown, IR1, IR2 - risk-weighted gain coefficients, %MT - portfolio mean turnover ratio. Time horizon: 2017-10-28 – 2018-05-20

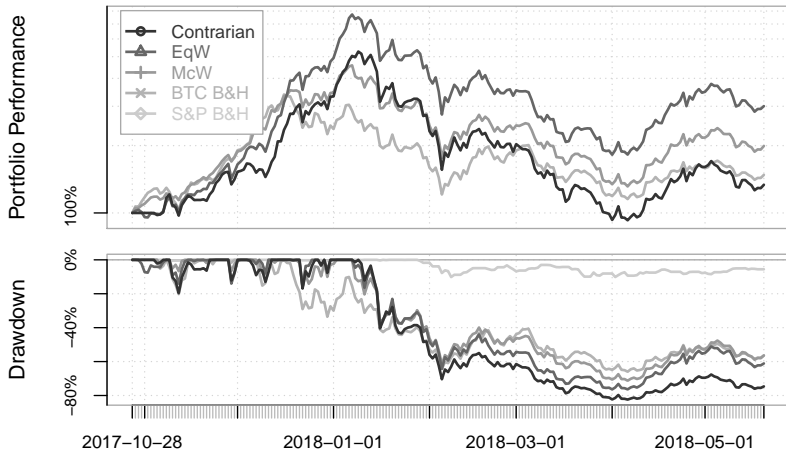
Time horizon: 2017-10-28 – 2018-05-20

- 1 EqW portfolio is still the most efficient among other benchmarks
- 2 None of the selected strategies overperformed EqW
- 3 Momentum significantly overperform Contrarian and other benchmarks with the exception of EqW
- 4 Momentum portfolio performs better than reference portfolios from regulated markets

Momentum, %N=25, RE=1w, RA=1w, KT=1.0%, VF=100



Contrarian, %N=25, RE=1w, RA=1w, KT=1.0%, VF=100



- 1 %N = 1%, 2%, 3%, 4%, 5%, 10%, **25%**, 50%
- 2 Reallocation period RE = 1d, **1w**, 1m
- 3 Ranking window RA = 1d, **1w**, 1m
- 4 Transaction costs TC = 0.5%, **1.0%**, 2.0%
- 5 Volume filter VF = **100**

Sensitivity Analysis I: Out-of-sample

Benchmark Strategies																
Name					%ARC	%ASD	%MDD	IR1	IR2	%MT	%ARC	%ASD	%MDD	IR1	IR2	%MT
S&P B&H					10.0	15.2	10.2	0.7	0.6	0.0	10.0	15.2	10.2	0.7	0.6	0.0
BTC B&H					100.9	112.7	66.0	0.9	1.4	0.0	100.9	112.7	66.0	0.9	1.4	0.0
McW					241.3	108.3	71.3	2.2	7.5	6.2	241.3	108.3	71.3	2.2	7.5	6.2
EqW					609.2	127.0	76.4	4.8	38.2	24.2	609.2	127.0	76.4	4.8	38.2	24.2
Parameters					MOMENTUM						CONTRARIAN					
%N	RE	RA	%TC	VF	%ARC	%ASD	%MDD	IR1	IR2	%MT	%ARC	%ASD	%MDD	IR1	IR2	%MT
25	1d	1w	1.0	100	109.0	135.3	85.4	0.8	1.0	55.5	-77.6	129.0	87.3	-0.6	-0.5	66.8
25	1w	1w	1.0	100	370.6	132.5	83.5	2.8	12.4	147.1	67.6	130.7	82.4	0.5	0.4	152.7
25	1m	1w	1.0	100	469.9	133.1	78.2	3.5	21.2	135.1	524.4	122.2	70.0	4.3	32.2	143.0
25	1w	1d	1.0	100	302.9	139.9	82.1	2.2	8.0	150.3	37.3	124.7	84.0	0.3	0.1	149.8
25	1w	1w	1.0	100	370.6	132.5	83.5	2.8	12.4	147.1	67.6	130.7	82.4	0.5	0.4	152.7
25	1w	1m	1.0	100	325.3	140.8	84.1	2.3	8.9	78.8	72.5	125.6	75.8	0.6	0.6	85.2
1	1w	1w	1.0	100	-27.5	300.4	77.3	-0.1	0.0	186.2	-96.1	216.0	94.5	-0.4	-0.5	186.2
2	1w	1w	1.0	100	1,820.2	301.4	76.8	6.0	143.1	179.3	-80.9	174.7	89.7	-0.5	-0.4	186.9
3	1w	1w	1.0	100	1,581.6	248.5	85.5	6.4	117.7	172.4	-82.2	153.0	90.6	-0.5	-0.5	189.2
4	1w	1w	1.0	100	308.7	218.1	88.8	1.4	4.9	174.1	30.3	164.3	84.9	0.2	0.1	190.2
5	1w	1w	1.0	100	2,072.3	204.6	87.6	10.1	239.7	175.2	-65.4	155.7	89.0	-0.4	-0.3	186.5
10	1w	1w	1.0	100	687.9	163.0	86.2	4.2	33.7	166.1	-12.4	140.5	84.7	-0.1	0.0	173.2
25	1w	1w	1.0	100	370.6	132.5	83.5	2.8	12.4	147.1	67.6	130.7	82.4	0.5	0.4	152.7
50	1w	1w	1.0	100	568.2	130.0	78.9	4.4	31.5	104.0	223.3	127.2	79.4	1.8	4.9	113.1
25	1w	1w	0.5	100	584.4	132.9	81.9	4.4	31.4	147.1	147.9	130.9	80.6	1.1	2.1	152.7
25	1w	1w	1.0	100	370.6	132.5	83.5	2.8	12.4	147.1	67.6	130.7	82.4	0.5	0.4	152.7
25	1w	1w	2.0	100	120.7	132.3	86.3	0.9	1.3	147.1	-24.2	131.0	85.6	-0.2	-0.1	152.7
10	1d	1d	1.0	100	-95.7	159.6	96.5	-0.6	-0.6	165.1	-99.9	129.7	98.2	-0.8	-0.8	174.0
25	1w	1w	1.0	100	370.6	132.5	83.5	2.8	12.4	147.1	67.6	130.7	82.4	0.5	0.4	152.7
50	1m	1m	1.0	100	201.0	126.4	78.5	1.6	4.1	96.9	336.8	127.7	70.8	2.6	12.6	113.0

- 1 Sensitivity analysis confirms the initial out-of-sample results.
- 2 Results for various parameters reveal some volatility
- 3 Strong monotonic effect observed in case of the efficiency of contrarian and momentum strategies for in-sample period was not confirmed in out-of-sample period

In-sample: 2014-05-12 – 2017-10-28

	S&P B&H	BTC B&H	McW	EqW	Momentum	Contrarian
S&P B&H	1.0000	-0.0169	-0.0126	-0.0104	-0.0427	0.0127
BTC B&H	-0.0169	1.0000	0.9475	0.6090	0.4900	0.4237
McW	-0.0126	0.9475	1.0000	0.6785	0.5412	0.4748
EqW	-0.0104	0.6090	0.6785	1.0000	0.6672	0.5950
Momentum	-0.0427	0.4900	0.5412	0.6672	1.0000	0.3335
Contrarian	0.0127	0.4237	0.4748	0.5950	0.3335	1.0000

Much stronger correlation of strategies with S&P B&H and with BTC B&H than in-sample

Out-of-sample: 2017-10-28 – 2018-05-20

	S&P B&H	BTC B&H	McW	EqW	Momentum	Contrarian
S&P B&H	1.0000	0.1244	0.1407	0.1577	0.1447	0.1485
BTC B&H	0.1244	1.0000	0.8968	0.7008	0.6683	0.6679
McW	0.1407	0.8968	1.0000	0.8958	0.8508	0.8569
EqW	0.1577	0.7008	0.8958	1.0000	0.9459	0.9556
Momentum	0.1447	0.6683	0.8508	0.9459	1.0000	0.8778
Contrarian	0.1485	0.6679	0.8569	0.9556	0.8778	1.0000

- 1 Strong momentum effect on cryptocurrency market in out-of-sample
- 2 Momentum is much stronger than Contrarian opposite to in-sample
- 3 Sensitivity analysis performed for various parameters does not confirm in-sample results
- 4 Strong monotonic effect in case of efficiency of contrarian and momentum strategies is not visible in out-of-sample
- 5 Much stronger correlation of strategies with S&P B&H and with BTC B&H than in in-sample period

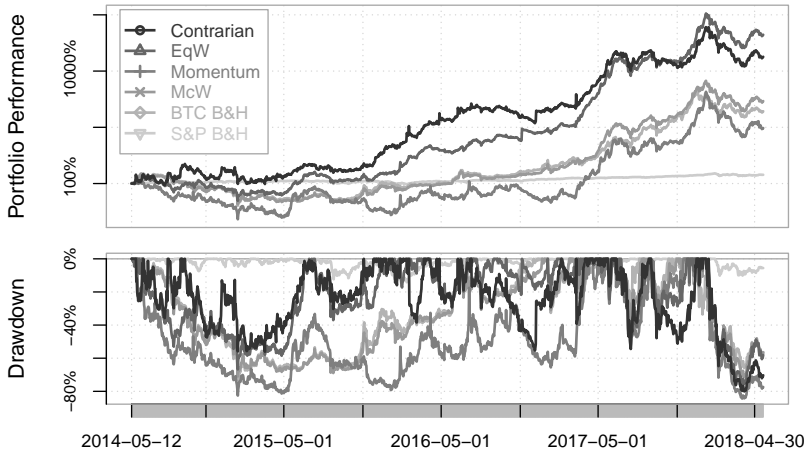
- 1 Characteristics of volatile fluctuations of prices
- 2 If we loose 50% then we need to gain 100% to break even
- 3 Volatility of SPX vs volatility of BTCUSD...

Name	%N	RE	RA	%TC	VF	%DFL	%ARC	%ASD	%MDD	IR1	IR2	%MT
S&P B&H	-	-	-	-	-	100	9.3	12.8	14.2	0.7	0.5	0.0
BTC B&H	-	-	-	-	-	100	108.5	74.5	73.3	1.5	2.2	0.0
McW	100	1w	-	1.0	100	100	131.3	72.2	71.4	1.8	3.3	4.3
EqW	100	1w	-	1.0	100	100	354.1	89.8	75.7	3.9	18.4	27.2
Momentum	25	1w	1w	1.0	100	100	75.8	111.9	84.4	0.7	0.6	151.9
Contrarian	25	1w	1w	1.0	100	100	262.9	125.1	80.1	2.1	6.9	163.8
S&P B&H	-	-	-	-	-	5	0.5	0.6	0.7	0.7	0.5	0.0
BTC B&H	-	-	-	-	-	5	5.1	3.7	5.8	1.3	1.2	0.0
McW	100	1w	-	1.0	100	5	5.6	3.6	5.4	1.5	1.6	4.3
EqW	100	1w	-	1.0	100	5	9.9	4.4	5.8	2.2	3.7	27.2
Momentum	25	1w	1w	1.0	100	5	5.9	5.5	7.9	1.0	0.7	151.9
Contrarian	25	1w	1w	1.0	100	5	10.4	6.2	6.5	1.6	2.6	163.8

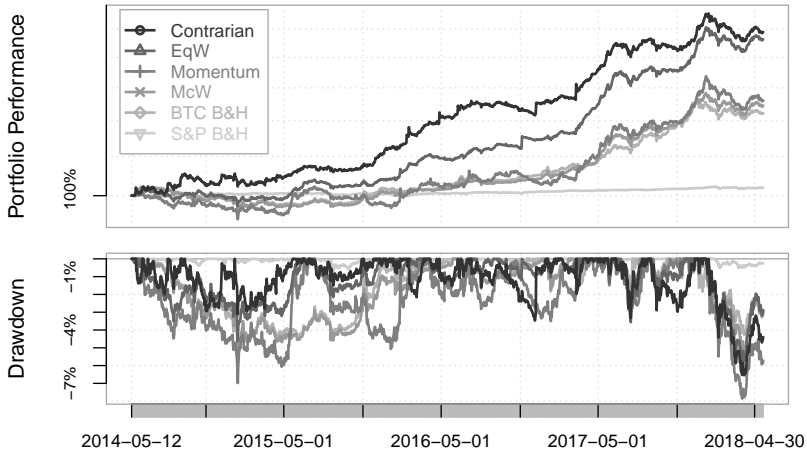
Legend: McW - MarketCap weighted strategy, EqW - Equally Weighted strategy, %N - percent of TOP100 currencies used to construct the portfolio, RE - reallocation period, RA - width of the ranking window used to calculate the highest/lowest rates of return, %TC - total transaction costs, VF - volume filter threshold, %ARC - annualised rate of return, %ASD - annualised standard deviation, %MDD - maximum drawdown, IR1, IR2 - risk-weighted gain coefficients, %MT - portfolio mean turnover ratio. **Time horizon: 2017-10-28 – 2018-05-20**

Results - DFL=100% Equity Lines

DFL=100%, %N=25, RE=1w, RA=1w, KT=1.0%, VF=100



DFL=5%, %N=25, RE=1w, RA=1w, KT=1.0%, VF=100



- 1 EqW benchmark is the best strategy in long term
- 2 Higher DFL leads to fast bankruptcy
- 3 Lower (reasonable) DFL allows to obtain more stable equity lines, which is a feature sought by both institutional & individual investors

Thank you!

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