Estratégia quantitativa de investimentos

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22 de novembro de 2022

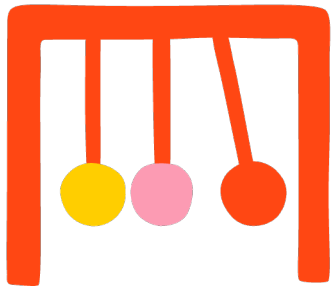
Objetivo

Montar um portfólio de investimentos que ofereça ao investidor um retorno superior e uma volatilidade inferior ao benchmark.

Benchmark

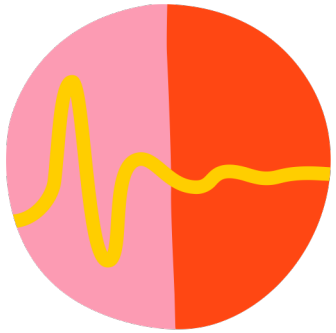
Índice Brasil 100 (IBrX 100 B3): desempenho médio dos 100 ativos de maior negociabilidade na bolsa.

Fatores



Momentum

Ativos com tendência de valorização.



Minimum Volatility

Ativos de baixa volatilidade, indicando estabilidade e menor risco.

Análise do fator momentum

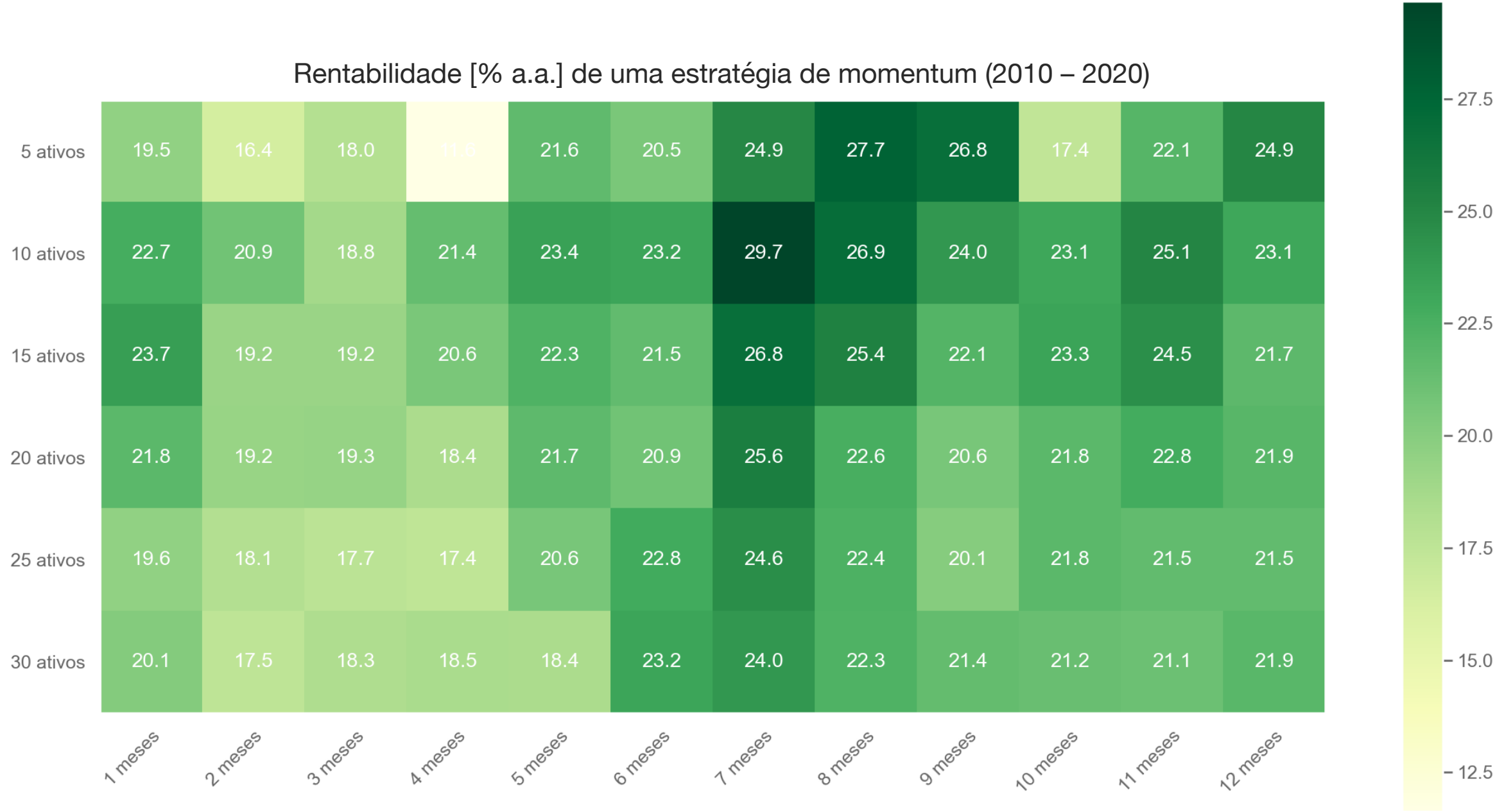
```
def get_momentum_stocks(today, lookback, assets):
    """
    :param date today:   date of analysis
    :param int lookback: lookback period in months
    :param int assets:   how many assets will be purchased
    """

    (...)

    return returns.index[:assets]

 >>>
```

Rentabilidade [% a.a.] de uma estratégia de momentum (2010 – 2020)

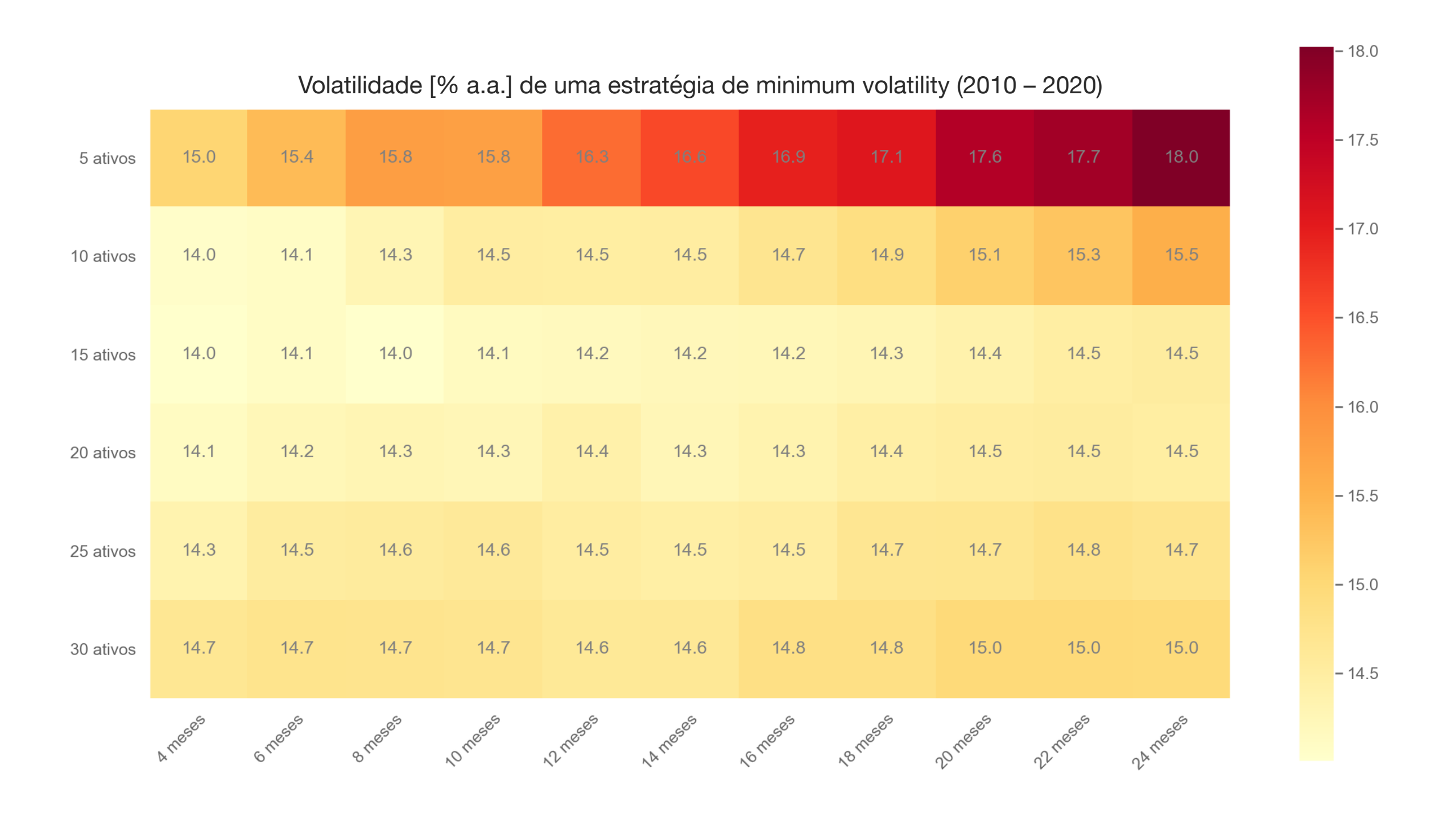


Análise do fator low volatility

```
def get_low_volatility_stocks(today, lookback, assets):
    """
    :param date today:   date of analysis
    :param int lookback: lookback period in months
    :param int assets:   how many assets will be purchased
    """

    (...)

    return volatility.index[:assets]
```


Volatilidade [% a.a.] de uma estratégia de minimum volatility (2010 – 2020)
5 ativos
10 ativos
15 ativos
20 ativos
25 ativos
30 ativos
15.0 15.4 15.8 15.8 16.3 16.6 16.9 17.1 17.6 17.7 18.0
14.0 14.1 14.3 14.5 14.5 14.5 14.7 14.9 15.1 15.3 15.5
14.0 14.1 14.0 14.1 14.2 14.2 14.2 14.3 14.4 14.5 14.5
14.1 14.2 14.3 14.3 14.4 14.3 14.3 14.4 14.5 14.5 14.5
14.3 14.5 14.6 14.6 14.5 14.5 14.5 14.7 14.7 14.8 14.7
14.7 14.7 14.7 14.7 14.6 14.6 14.8 14.8 15.0 15.0 15.0
4 meses
6 meses
8 meses
10 meses
12 meses
14 meses
16 meses
18 meses
20 meses
22 meses
24 meses
18.0
17.5
17.0
16.5
16.0
15.5
15.0
14.5

Elaboração de uma estratégia multi-factor

```python
def get_tickers(today_date, momentum_lookback, volatility_lookback, assets=5):
    # Filtrar ativos do IBrX-100 B3
    df = df.loc[:, utils.get_IBRX_assets(today_date)]

    # Ranquear ativos com base nos fatores utilizados
    momentum = utils.rank_stocks_by_momentum(df, today_date, 12)
    vol      = utils.rank_stocks_by_volatility(df, today_date, 12)

    # Montar ranking total dos ativos
    ranked_assets = utils.assemble_intersectional_model([momentum, vol])
    return ranked_assets.index[:assets]
```

Definição dos parâmetros

Tempo de rebalanceamento do portfólio: 1 mês

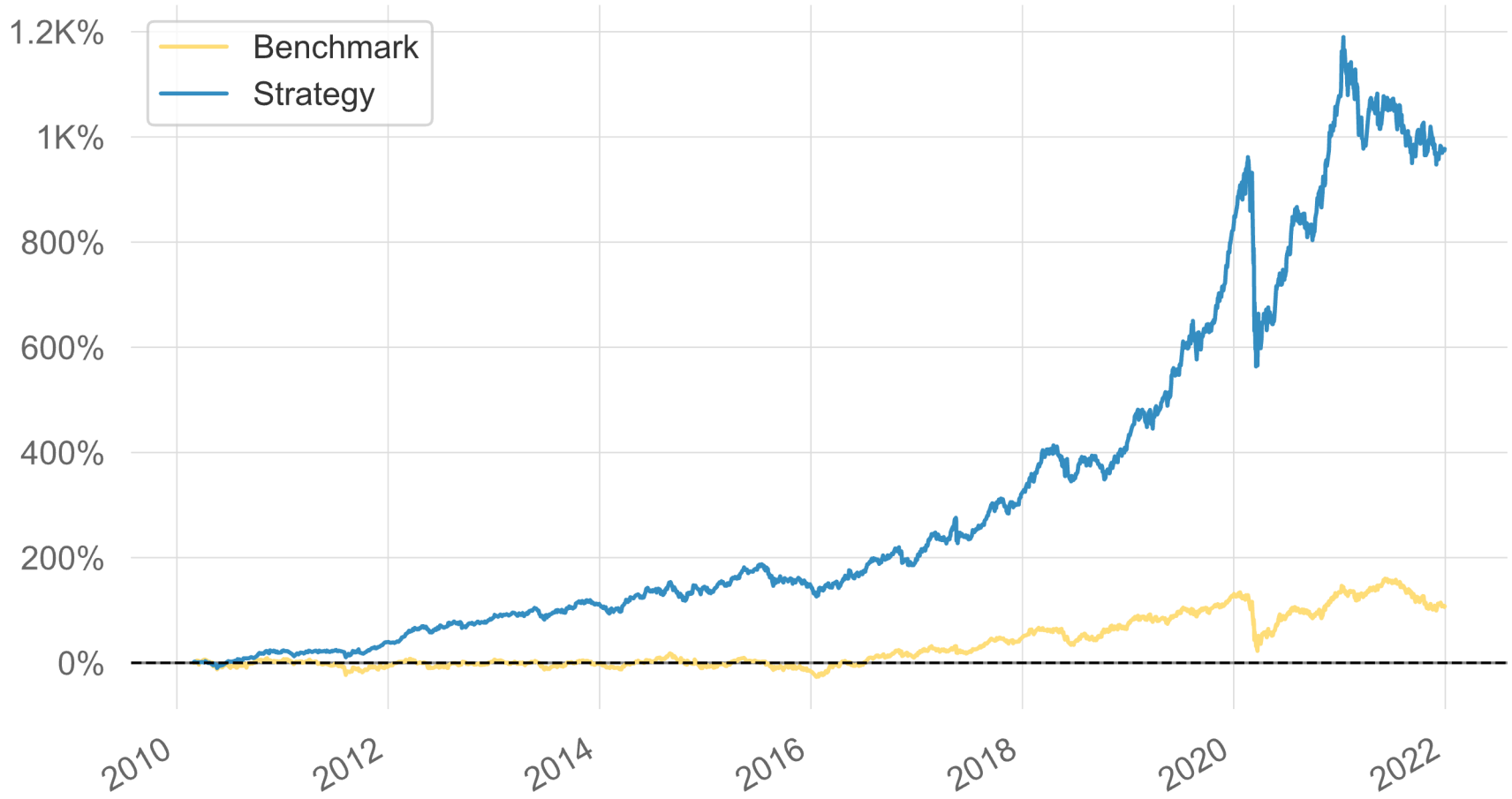
Tempo de lookback para o fator *momentum*: 8 meses

Tempo de lookback para o fator *minimum volatility*: 12 meses

Quantidade de ativos na carteira: 10 ativos

Backtesting: 1/3/2010 – 30/12/2021

Cumulative Returns vs Benchmark



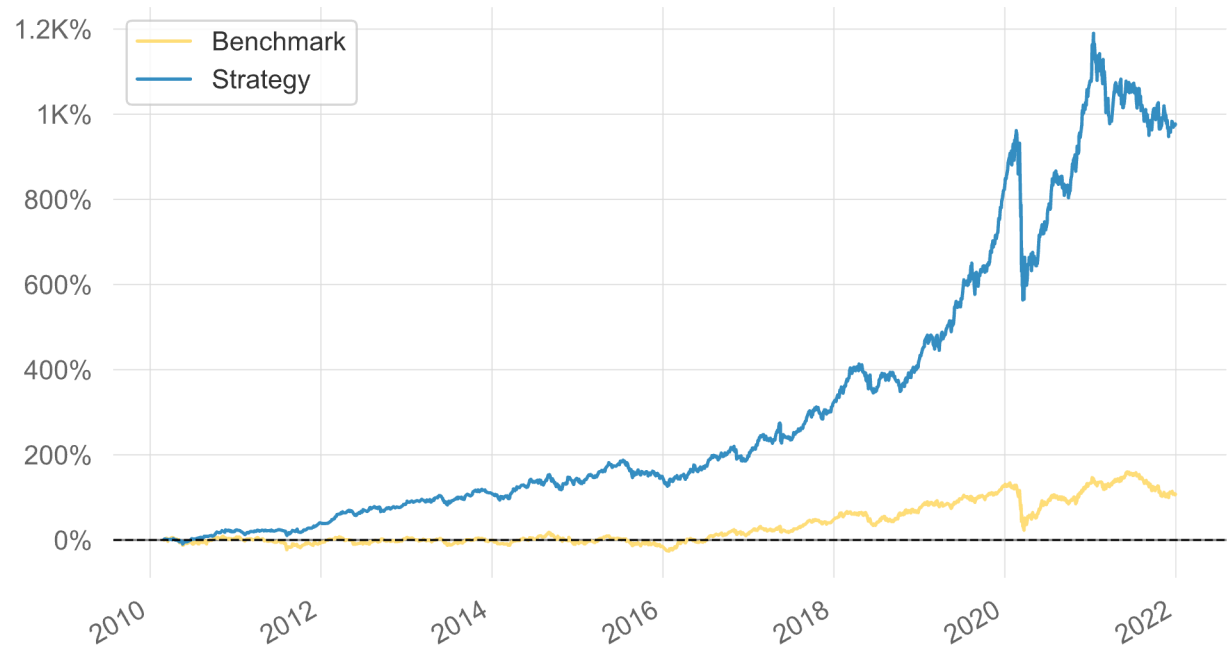
Monthly Returns (%)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	0.00	0.00	1.39	-3.33	-1.56	6.00	4.62	0.99	2.06	7.92	2.79	0.18
2011	-4.48	0.33	2.59	1.75	-0.58	1.35	-0.86	-1.20	-1.35	4.89	5.36	6.26
2012	-0.57	9.02	6.71	4.80	-5.81	6.97	1.24	0.18	-2.76	3.63	2.11	3.58
2013	3.04	1.53	0.21	2.24	0.88	-4.87	3.43	0.74	2.49	6.99	0.80	-3.19
2014	-6.95	2.59	6.27	4.05	-0.19	6.01	-2.62	9.46	-9.59	1.55	6.42	-0.59
2015	-3.02	5.98	0.59	5.50	1.02	3.41	0.71	-8.81	-0.34	-2.20	0.85	-1.61
2016	-2.75	3.26	0.03	6.03	-1.30	5.13	8.68	-2.56	3.48	6.32	-6.96	0.06
2017	6.36	7.89	-1.13	3.17	-1.78	-1.29	5.67	5.47	4.85	0.59	-0.41	6.06
2018	8.31	4.15	6.88	1.11	-7.99	-4.32	7.16	1.68	-3.41	-1.05	5.61	4.41
2019	10.70	-2.07	0.91	6.42	7.41	3.07	6.56	2.48	2.15	3.76	6.19	12.66
2020	6.29	-2.04	-25.84	7.26	6.69	3.71	13.81	-2.95	-2.69	6.25	13.94	7.03
2021	0.12	-0.15	-7.44	5.93	0.20	-0.10	-2.86	-3.70	2.06	-3.01	-0.51	1.18

Key Performance Metrics

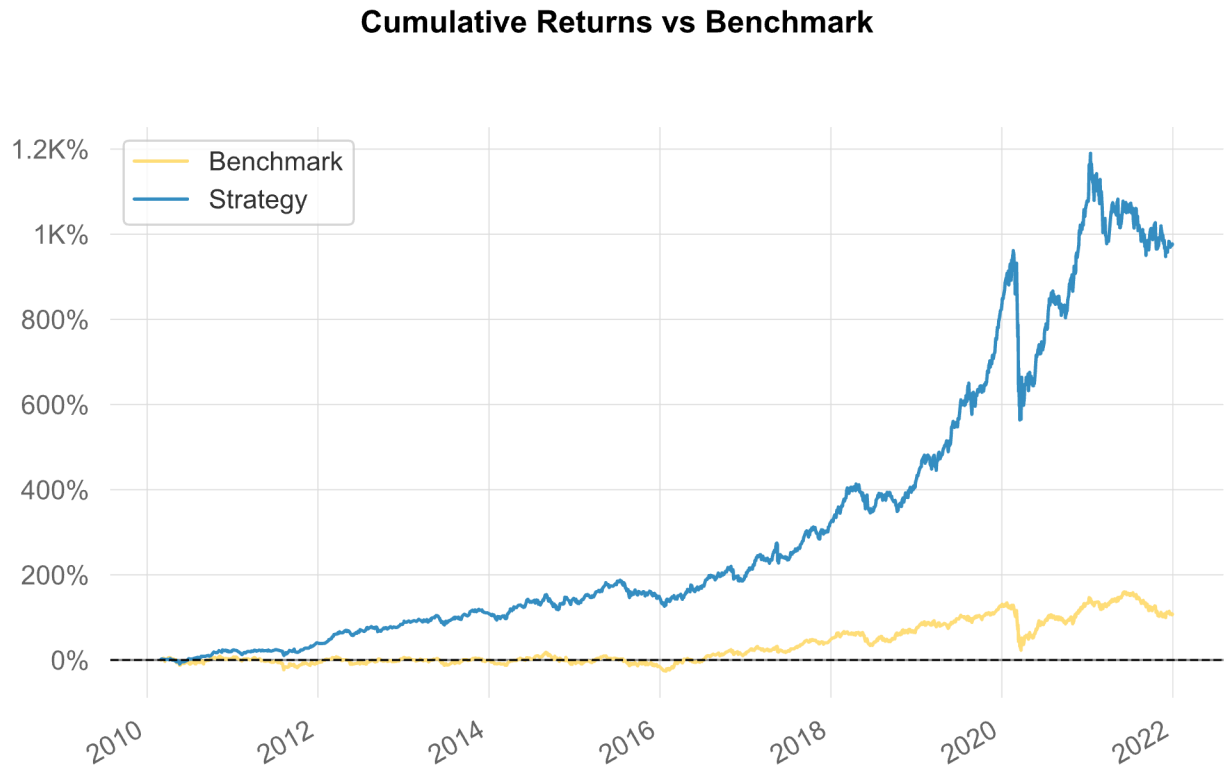
Metric	Strategy	Benchmark
Cumulative Return	977.1%	107.89%
CAGR%	22.23%	6.38%
Max Drawdown	-37.5%	-47.56%
Longest DD Days	364	1349
Volatility (ann.)	18.38%	24.92%
Beta	0.48	-
Alpha	0.18	-
Correlation	65.71%	-

Cumulative Returns vs Benchmark



EOY Returns vs Benchmark

Year	Benchmark	Strategy	Multiplier	Won
2010	4.43%	22.56%	5.09	+
2011	-11.51%	14.39%	-1.25	+
2012	11.01%	32.04%	2.91	+
2013	-3.49%	14.68%	-4.20	+
2014	-1.40%	15.63%	-11.13	+
2015	-13.57%	1.20%	-0.09	+
2016	36.55%	19.88%	0.54	-
2017	27.22%	40.90%	1.50	+
2018	15.17%	23.23%	1.53	+
2019	33.78%	78.46%	2.32	+
2020	3.65%	27.65%	7.57	+
2021	-11.19%	-8.56%	0.77	+



Próximos passos

- Análise de consistência: efetuar backtest de múltiplas janelas de 5 anos num universo de 10 anos.