# Indicator Momentum Strategy

# Pitchbook
## 2020

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# Agenda

# Strategy Description

Indicator momentum strategy can exploit the tendency of a continued persistence in a stock's price trend by taking short-term positions in stocks going up and selling them as soon as they show signs of going down with the right signal detection (including technical indicators, fundamental factors) and timing, as well as robust risk management, this strategy can generate large profits.

## Investment Universe

US: S&P 500
CHN: CSI 300

Long Short Exposure

## Portfolio Results

Annualized Return On Average
US: 23% CHN: 61%

## Competitive Edge

Factors Selection Based on Trading Frequency

Effective strategy both in Emerging Market and Developed Market

# Investment Universe

- Data includes historical prices and precalculated ratios
- US: Bloomberg
- CHN: Wind

- Data are reported on daily basis.
- Monitor the strategy daily in response the big news.

- Strategy's selection criteria yields a total number of 380+ unique US stocks and 120+ Chinese stocks as our final investment pool

# Competitive Edge & Motivation

- Momentum factor still prevails both in academia and industry.

- There are systems such as <u>CAN SLIM</u>, which combines fundamental and technical analysis techniques, are tested that can beat the S&P in the trailing five-year and ten-year periods.

- The factor performance is actually persistent over time.

- Regime switching feature and stop loss limit of our strategy can reduce overall portfolio risk.

- Additionally, in emerging markets (which are less efficient in general), our strategy will provide ample opportunities to exploit the anomaly.

# Model - Factor Construction

- For our trading strategy, we identified indicators in 3 dimensions:
    Use technical Indicators to capture trends and momentum
    Use financial ratios to capture companies' fair values
- Trading frequencies can be daily, weekly, monthly and yearly depending on market condition and strategy performance
- Assign different weights to factors based on trading frequencies

| **Historical values** | **Technical Indicators** | **Financial indicators** |
|---|---|---|
| • Return<br>• Volume | • RSI<br>• BBANDS<br>• MACD | • P/E ratio<br>• Debt-to-capital ratio |

# Model – Portfolio Construction

## Scores:
Scores are defined as the sum of rankings based on the indicators' values:
- **Simple (Ranking) Method**: Stocks are ranked based on the sum of values of indicators.
- **Moving Average Method**: Indicator values are compared with their past moving averages to present the changes. Then scores are created using the sum of ranking changes.
- **Regression Method**: Since we focus on the trends but not pricing, returns are first labeled 1 for positive and -1 for negative in order to avoid overfitting. Then we run regression for each indicator and sum up the predicted values.

## Signals: 1 for Long, -1 for short
Eventually strategy will generate signals to enter the position at the proper time and give the optimal number of shares of stocks to trade (n). We will long the top-ranked stocks, and short those with lowest scores.

We have tested that the portfolio performs the best when the rebalancing on a monthly basis.

# Risk Control

**Risk management: Stop Loss**

- For each stock, when its accumulated drawdown within the trading frequency period reaches the predefined stop loss limit, the strategy clears the current position for the rest of the period.

- Annualized return and Sharpe Ratio are substantially improved after Stop Loss is incorporated in the strategy.

- Stop Loss with 10% threshold performs better than 5% threshold.
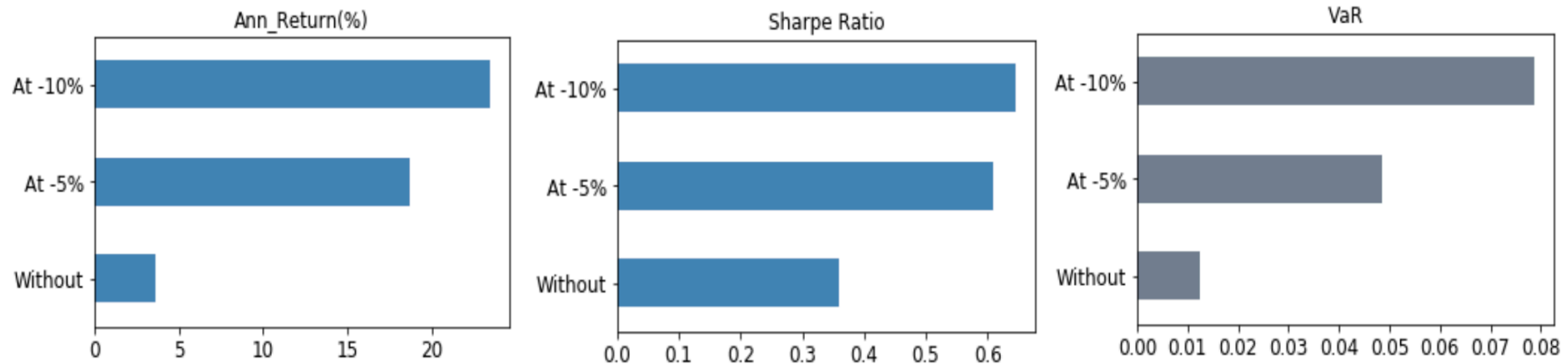
# Regime Switching

**Approach:** Use VIX index as a benchmark to represent market volatility. When market volatility increased substantially, then the strategy will trade fewer number of stocks (Regime Switching Variable k) based on the ranking of our score.

**Regime Switching Performance:** Regime Switching improves the portfolio performance, Annualized Return and Sharpe Ratio increased comparing with previous result. The combination of Regime Switching method with Stop Loss threshold equals 10% performs best.
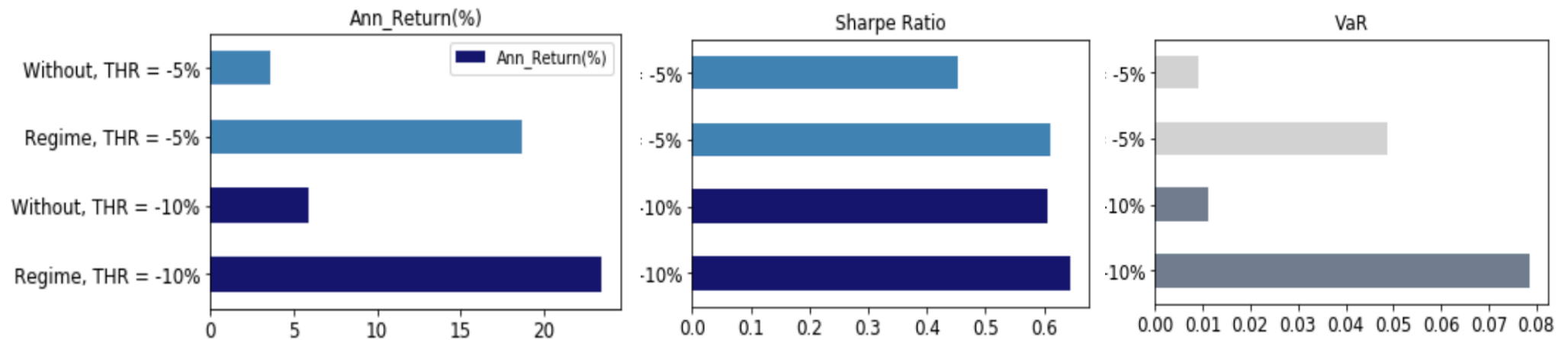
# Fee Structure

**Transaction Costs**

**Slippage Costs**

- Transaction costs typically varies from 0-0.75% (Reference: mudrex).

- Transaction costs in our strategy is $0.005 per share.

- Transaction costs are deducted from the balance for every order placed.

- Slippage is most prevalent during periods of high volatility.

- The strategy set the slippage under the worst-case scenario i.e., always assume the price moves against what we want.

- Slippage typically varies from 0-0.1% (Reference: mudrex).

- Slippage should not be a major concern since we are dealling with highly-liquid S&P500 constituent stocks.

- We add the slippage cost as $0.01 per share.

# Grid Search  - Parameters

### Frequency
- Daily
- Weekly
- Monthly

### Portfolio Size
- Variable n

### Walk-forward Method
- Simple
- Moving Average
- Regression

### Signal Types
- Market historical
- Technical indicators
- Fundamental Ratios

### Regime Switching
- Variable k

### Stop Loss
- Threshold

**Already Captured**

# Portfolio Optimization

## Annualized return

| method | indicator | Weekly | Monthly | Quarterly |
|---|---|---|---|---|
| Simple_method | All | -7.26% | 31.07% | 24.19% |
| | Foundamental | 14.48% | 7.43% | 16.32% |
| | Price | nan% | 30.33% | 25.09% |
| | Technical | 14.41% | 31.18% | 27.59% |
| | Without_Foundamental | 17.41% | 34.09% | 28.74% |
| MA_method | All | nan% | 29.51% | 31.41% |
| | Foundamental | 17.51% | 25.31% | 22.09% |
| | Price | nan% | 23.90% | -1.15% |
| | Technical | nan% | 24.16% | 34.65% |
| | Without_Foundamental | nan% | 31.26% | 34.57% |
| Reg_method | All | 40.14% | 34.26% | 31.86% |
| | Foundamental | 38.44% | 30.57% | 34.85% |
| | Price | 37.16% | 34.55% | 40.68% |
| | Technical | 40.90% | 34.89% | 31.48% |
| | Without_Foundamental | 39.91% | 34.57% | 31.45% |

| method | indicator | amount | Ann_Return(%) | SharpeRatio | Maximum_Drawdown(%) | VaR_95 |
|---|---|---|---|---|---|---|
| Reg_method | Price | n=60, k=5 | 34.55 | 0.27 | -45.63 | 0.75 |
| | Technical | n=60, k=5 | 34.89 | 0.27 | -49.60 | 0.78 |
| | Foundamental | n=60, k=5 | 30.57 | 0.28 | -41.85 | 0.51 |
| | All | n=60, k=5 | 34.26 | 0.27 | -37.73 | 0.90 |
| | Without_Foundamental | n=60, k=5 | 34.57 | 0.27 | -44.30 | 0.79 |

- The strategy performances best when **all three groups** of indicators are included.

- While using all indicators, the **Regression method** performs best with portfolio size **n=60**, and Regime Switching **variable k=5**. The annualized return is around 34%, Sharpe Ratio is 0.27, with Maximum Drawdown of around 40%.

# Portfolio Optimization



Annualized return with respct to k (n=60)

Annualized return with respct to n (k=5)
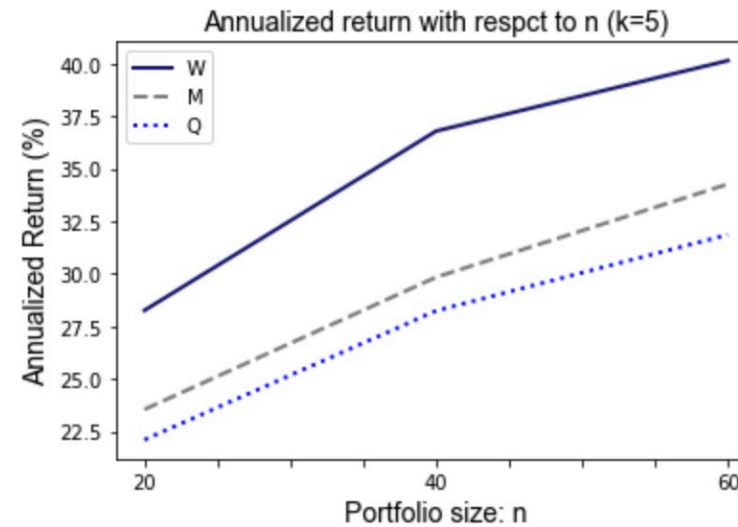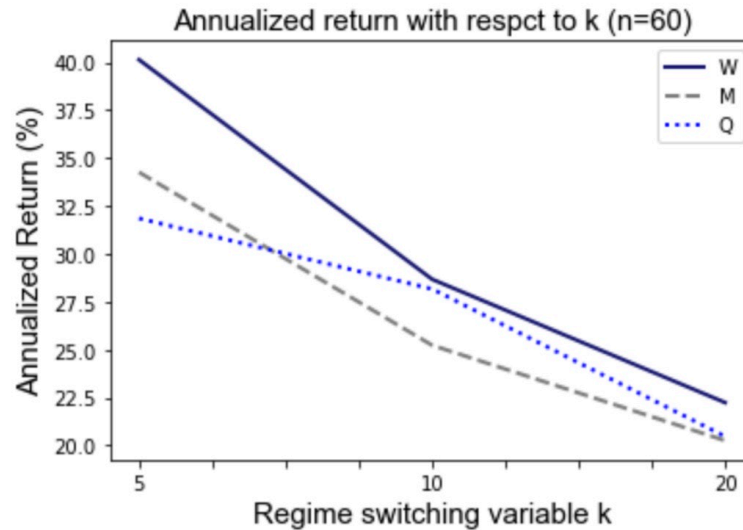
- Given k=5, annualized return increases as portfolio size n increases.

- Given n =60, annualized return increases as the regime switching variable k decreases.

# Portfolio Construction (Overview)

**Data Preparation**

**Investment Universe**
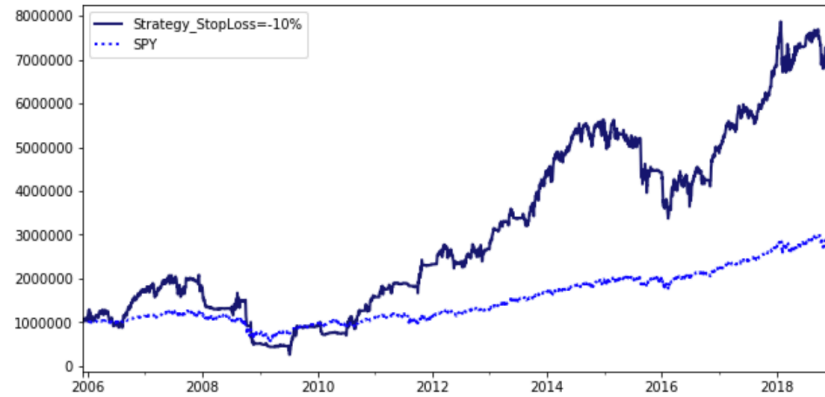S&P 500 Constituents' market data and financial ratios from Bloomberg

**Factor Construction**
Constructed Technical Indicators to capture trend and momentum

**Scale Matching**
Calculated changes / Standardized

**Model & Factor Selection**

**Grid Search**
Optimize parameters and models

**Logistic Regression Method**
Walk-forward indicator selections and weights changing

**Ranking and Selecting**
Ranked stocks based on scores, long the top ones & short the

**Regime-switching & Risk Control**

**Regime Switching**
Changed to more rigorous and careful stock-selection based on VIX

**Stop Loss**
Tracked individual stock performance and stop-loss based on threshold

**Monthly Rebalancing**

# Performance Analysis

### In Sample 2005 – 2018



### Out of Sample 2019 – 2020
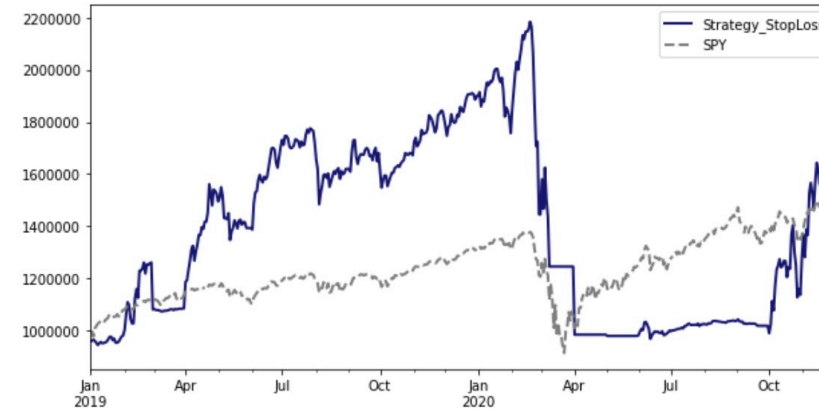


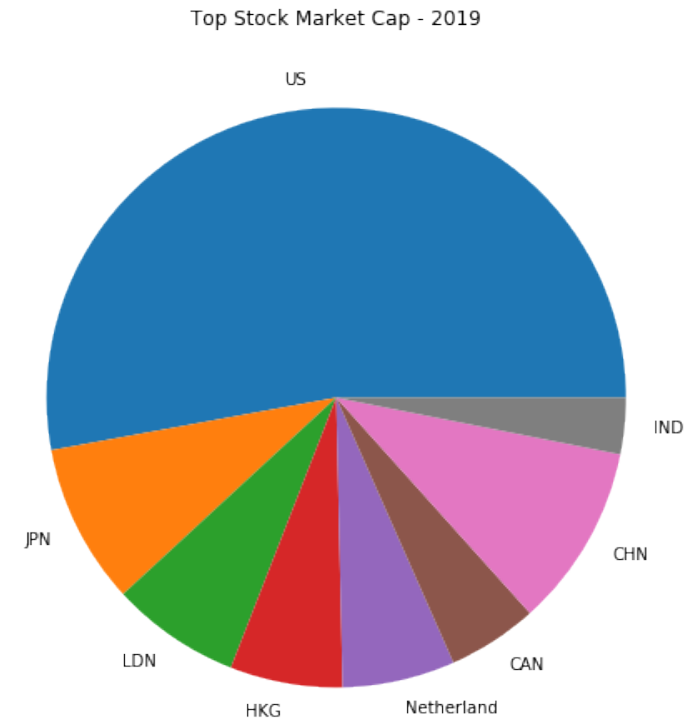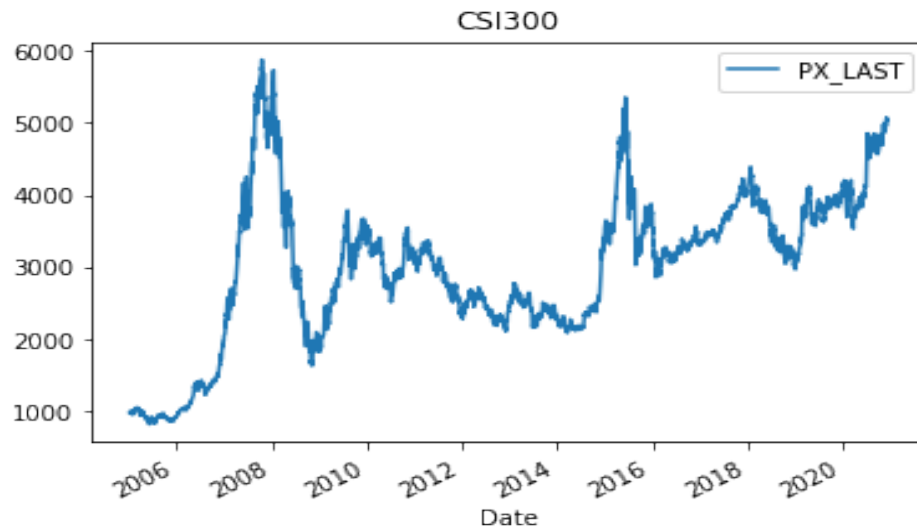| | Ann_Return(%) | SharpeRatio | Maximum_Drawdown(%) | VaR_95 |
|---|---|---|---|---|
| **Strategy_In-Sample** | 34.26 | 0.27 | -37.73 | 0.90 |
| **Strategy_Out-of-sample** | 23.44 | 0.64 | -77.26 | 0.08 |
| **SPY_In-sample-Period** | 7.54 | 0.48 | -55.20 | 0.02 |
| **SPY_Out-of-sample-Period** | 13.91 | 0.73 | -33.70 | 0.02 |

Treynor ratio 15.84

- The strategy can beat the market in both training and test period.

# Emerging Market - China

Opportunity:
- 1) One of the biggest market after US
- 2) Weak efficient market provides ample profits to be captured
- 3) Fewer momentum strategies available to investors
- 4) Buy-and-hold strategy is not very ideal

| | Ann_Return(%) | SharpeRatio | Maximum_Drawdown(%) | VaR_95 |
|---|---|---|---|---|
| **CSI300** | 10.78 | 0.64 | -61.95 | 0.03 |



CSI300



Top Stock Market Cap - 2019

# Emerging Market - China

- Market restrictions (no short sell)
- Fundamentals play little roles
- Best: MA method with technical indicators with 5 candidates
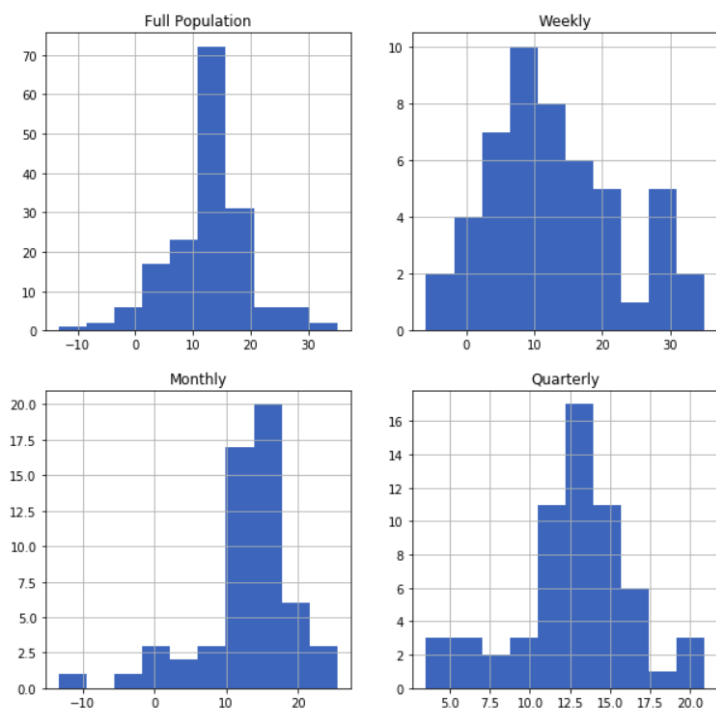


| method | indicator | amount | Ann_Return(%) | SharpeRatio | Maximum_Drawdown(%) | VaR_95 |
|---|---|---|---|---|---|---|
| Simple_method | Price&Volume | n=40, k=1 | 13.54 | 0.40 | -54.76 | 0.05 |
| | Technical | n=10, k=1 | 17.09 | 0.38 | -68.07 | 0.09 |
| | Foundamental | n=5, k=1 | 11.41 | 0.34 | -64.03 | 0.08 |
| | All | n=40, k=1 | 13.84 | 0.41 | -63.52 | 0.05 |
| | Without_Foundamental | n=10, k=1 | 12.67 | 0.28 | -103.57 | 1.37 |
| MA_method | Price&Volume | n=5, k=1 | 19.96 | 0.43 | -61.63 | 0.08 |
| | Technical | n=5, k=1 | 25.47 | 0.57 | -74.89 | 0.06 |
| | Foundamental | n=40, k=1 | 16.11 | 0.44 | -45.20 | 0.05 |
| | All | n=5, k=1 | 21.72 | 0.48 | -77.34 | 0.07 |
| | Without_Foundamental | n=5, k=1 | 24.66 | 0.47 | -66.08 | 0.08 |
| Reg_method | Price&Volume | n=40, k=1 | 15.93 | 0.45 | -60.22 | 0.05 |
| | Technical | n=10, k=1 | 20.90 | 0.45 | -47.87 | 0.07 |
| | Foundamental | n=20, k=1 | 13.76 | 0.51 | -55.21 | 0.03 |
| | All | n=20, k=1 | 14.32 | 0.50 | -55.07 | 0.04 |
| | Without_Foundamental | n=20, k=1 | 16.81 | 0.50 | -42.63 | 0.04 |

# Emerging Market - China

- Out-of-Sample performances are very ideal (2019-2020)
- Best performance: Weekly rebalance
- Best balanced performance: monthly
- Strategy is very versatile and flexible to fit in different markets
- Strategy outperforms the benchmark as well as strategy in US
- Risk control plays an important role and is able to generate higher Sharpe ratio despite having a larger drawdown than the benchmark

|  | Ann_Return(%) | SharpeRatio | Maximum_Drawdown(%) | VaR_95 |
|---|---|---|---|---|
| US_Strategy | 23.44 | 0.64 | -77.26 | 0.08 |
| CSI | 14.54 | 0.65 | -18.43 | 0.03 |
| NoRegime_NoThresh | 73.32 | 1.15 | -32.83 | 0.07 |
| NoRegime_Thresh | 61.31 | 0.77 | -46.35 | 0.10 |

| method | indicator | Weekly | Monthly | Quarterly |
|---|---|---|---|---|
| | All | 11.31% | 13.84% | 15.53% |
| | Foundamental | 9.72% | 11.41% | 14.72% |
| Simple_method | Price&Volume | 18.90% | 13.54% | 13.30% |
| | Technical | 35.00% | 17.09% | 15.32% |
| | Without_Foundamental | 19.09% | 12.67% | 15.40% |
| | All | 8.56% | 21.72% | 12.94% |
| | Foundamental | 8.45% | 16.11% | 17.39% |
| MA_method | Price&Volume | 29.03% | 19.96% | 13.24% |
| | Technical | 34.84% | 25.47% | 12.75% |
| | Without_Foundamental | 29.16% | 24.66% | 12.04% |
| | All | 16.84% | 14.32% | 19.98% |
| | Foundamental | 17.48% | 13.76% | 14.05% |
| Reg_method | Price&Volume | 20.41% | 15.93% | 17.34% |
| | Technical | 4.68% | 20.90% | 19.86% |
| | Without_Foundamental | 20.39% | 16.81% | 20.88% |

# Conclusion

- **The strategy generates consistent positive returns over both in-sample and testing period, passed sensitivity tests, and is effective on both emerging and developed market.**

- **The aggregate return significantly outperform the benchmark of index ETFs.**

- **The strategy generally targets investors who aim at high returns and are risk-takers, but the risk level could be customized based on stop-loss thresholds.**

# Management Fees

| | Indicator Momentum Strategy |
|---|---|
| **Management fees** | 1% |
| **Promote  (Compared with corresponding index)** | 20% |
| **Subscriptions** | Monthly Start |
| **Capacity Limit** | No |
| **Redemptions** | Monthly End |
| **Lock up period** | 3 Months |

# Q&A