

## 深度学习因子超额持续修复——高频选股因子周报（20240219-20240223）

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### 投资要点:

- **高频偏度因子**。本周（特指 2024.02.19-2024.02.23，下同）、2 月及 2024 年的多空收益率分别为 2.97%、-3.46%以及-3.01%。
- **下行波动占比因子**。本周、2 月及 2024 年的多空收益率分别为 2.55%、-4.14%以及-4.05%。
- **开盘后买入意愿占比因子**。本周、2 月及 2024 年的多空收益率分别为 4.22%、-2.71%以及-1.32%。
- **开盘后买入意愿强度因子**。本周、2 月及 2024 年的多空收益率分别为 4.14%、-1.33%以及-0.39%。
- **开盘后大单净买入占比因子**。本周、2 月及 2024 年的多空收益率分别为-2.96%、1.77%以及 2.13%。
- **开盘后大单净买入强度因子**。本周、2 月及 2024 年的多空收益率分别为-2.72%、1.36%以及 1.19%。
- **深度学习高频因子（GRU(50,1)+NN(10)）**。本周、2 月及 2024 年的多空收益率分别为 11.41%、-4.15%以及 3.55%。
- **深度学习高频因子（GRU(50,2)+NN(10)）**。本周、2 月及 2024 年的多空收益率分别为 12.66%、-5.98%以及 0.76%。
- **深度学习高频因子（改进 GRU(50,2)+NN(10)）**。本周、2 月及 2024 年的多空收益率分别为 3.15%、-17.70%以及-9.03%。
- **深度学习高频因子（残差注意力 LSTM(48,2)+NN(10)）**。本周、2 月及 2024 年的多空收益率分别为-0.72%、-29.23%以及-20.37%。
- **深度学习因子（多颗粒度模型-5 日标签）**。本周、2 月及 2024 年的多空收益率分别为 3.52%、-7.07%以及 2.98%。
- **深度学习因子（多颗粒度模型-10 日标签）**。本周、2 月及 2024 年的多空收益率分别为 5.18%、-8.50%以及 1.05%。
- **周度调仓的中证 500 AI 增强组合**。本周、2 月及 2024 年的超额收益分别为 2.88%、-2.52%以及-0.61%。
- **周度调仓的中证 1000 AI 增强组合**。本周、2 月及 2024 年的超额收益分别为 4.57%、-7.34%以及-5.27%。
- **风险提示：因子失效风险、流动性风险。**

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下表汇总了我们金融工程团队开发的高频选股因子本周、2月及2024年的多空收益、多头超额收益及月度胜率。本周，多颗粒度深度学习因子的多空及多头收益较为显著，超额收益持续修复。

表 1 高频选股因子多空收益、多头超额收益及月度胜率

|                         | 多空收益   |         |         |              | 多头超额收益 |         |         |              |
|-------------------------|--------|---------|---------|--------------|--------|---------|---------|--------------|
|                         | 本周     | 2月      | 2024YTD | 2024年<br>月胜率 | 本周     | 2月      | 2024YTD | 2024年<br>月胜率 |
| 日内高频偏度                  | 2.97%  | -3.46%  | -3.01%  | 0/2          | 4.42%  | -3.73%  | -4.74%  | 0/2          |
| 日内下行波动占比                | 2.55%  | -4.14%  | -4.05%  | 0/2          | 2.53%  | -2.71%  | -3.76%  | 0/2          |
| 开盘后买入意愿占比               | 4.22%  | -2.71%  | -1.32%  | 1/2          | 1.36%  | -1.94%  | 0.65%   | 1/2          |
| 开盘后买入意愿强度               | 4.14%  | -1.33%  | -0.39%  | 1/2          | 2.05%  | 0.13%   | 0.39%   | 2/2          |
| 开盘后大单净买入占比              | -2.96% | 1.77%   | 2.13%   | 2/2          | -1.48% | 1.25%   | 0.06%   | 1/2          |
| 开盘后大单净买入强度              | -2.72% | 1.36%   | 1.19%   | 2/2          | -1.76% | 1.47%   | 1.07%   | 1/2          |
| 改进反转                    | 1.10%  | 4.44%   | 3.12%   | 1/2          | -0.27% | 3.41%   | -0.86%  | 1/2          |
| 尾盘成交占比                  | -2.62% | 0.55%   | 0.07%   | 1/2          | -1.23% | 0.44%   | -0.72%  | 1/2          |
| 平均单笔流出金额占比              | 0.28%  | -0.28%  | 1.85%   | 1/2          | 0.10%  | -1.90%  | 1.42%   | 1/2          |
| 大单推动涨幅                  | 1.15%  | -1.78%  | -2.15%  | 0/2          | 1.41%  | -0.16%  | -2.50%  | 0/2          |
| GRU(50,1)+NN(10)        | 11.41% | -4.15%  | 3.55%   | 1/2          | 7.50%  | -2.45%  | -1.74%  | 1/2          |
| GRU(50,2)+NN(10)        | 12.66% | -5.98%  | 0.76%   | 1/2          | 8.52%  | -3.17%  | -3.01%  | 0/2          |
| 改进 GRU(50,2)+NN(10)     | 3.15%  | -17.70% | -9.03%  | 1/2          | 1.82%  | -12.45% | -9.01%  | 1/2          |
| 残差注意力 LSTM(48,2)+NN(10) | -0.72% | -29.23% | -20.37% | 1/2          | -2.15% | -18.95% | -14.75% | 1/2          |
| 多颗粒度模型-5 日标签            | 3.52%  | -7.07%  | 2.98%   | 1/2          | 1.72%  | -9.39%  | -6.55%  | 1/2          |
| 多颗粒度模型-10 日标签           | 5.18%  | -8.50%  | 1.05%   | 1/2          | 2.48%  | -10.76% | -8.57%  | 1/2          |

资料来源: Wind, HTI

下表展示了周度调仓的中证 500 AI 增强组合和中证 1000 AI 增强组合本周、2月及2024年的超额收益及周度胜率。

表 2 周度调仓的 AI 增强组合超额收益及周度胜率

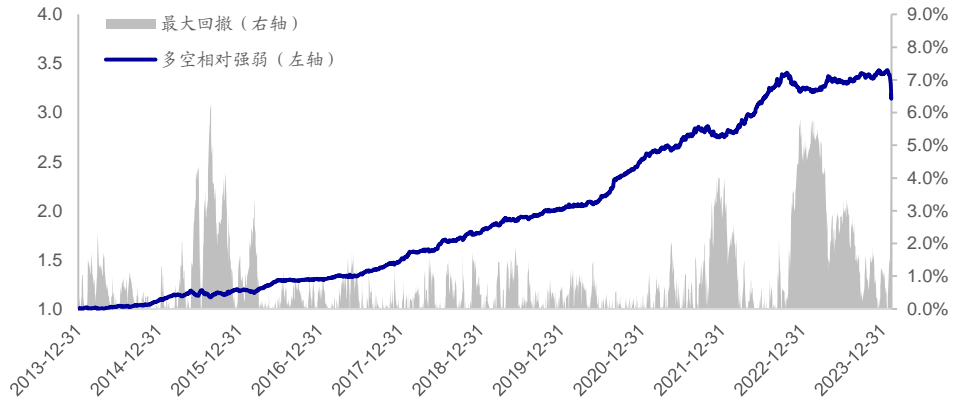
|               | 本周    | 2月     | 2024YTD | 2024年周度胜率 |
|---------------|-------|--------|---------|-----------|
| 中证 500 AI 增强  | 2.88% | -2.52% | -0.61%  | 3/7       |
| 中证 1000 AI 增强 | 4.52% | -7.34% | -5.27%  | 4/7       |

资料来源: Wind, HTI

## 1. 高频偏度因子

下图展示了月度换仓的高频偏度因子全市场前后 10%多空组合的相对强弱净值。

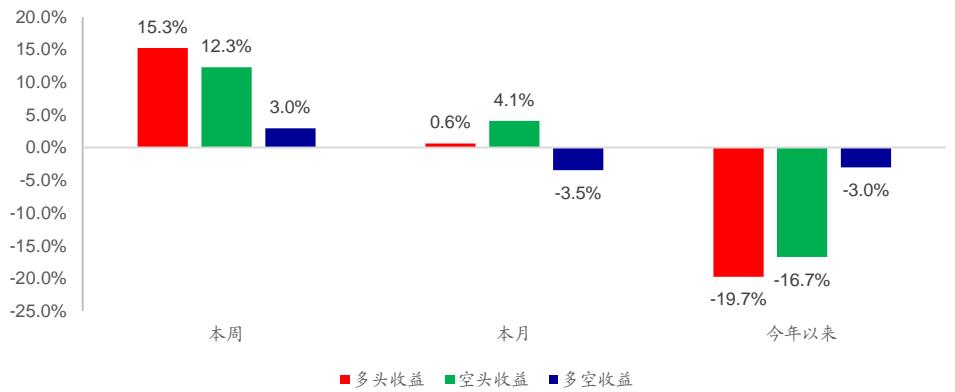
图1 高频偏度因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了高频偏度因子本周、2月及2024年的多空收益。

图2 高频偏度因子多空收益

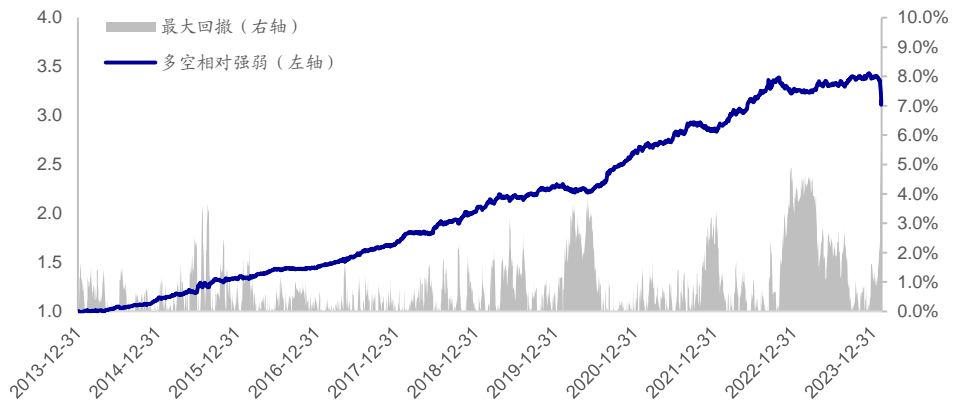


资料来源: Wind, HTI

## 2. 下行波动占比因子

下图展示了月度换仓的下行波动占比因子全市场前后 10%多空组合的相对强弱净值。

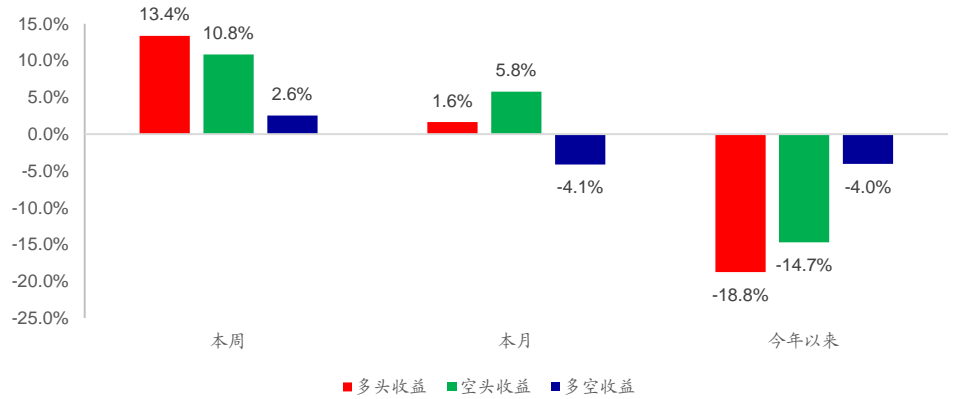
图3 下行波动占比因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了下行波动占比因子本周、2月及2024年的多空收益。

图4 下行波动占比因子多空收益

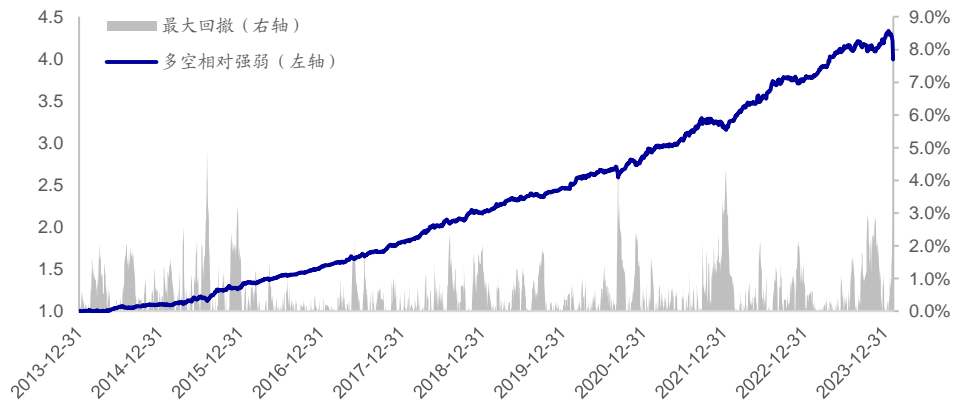


资料来源: Wind, HTI

### 3. 开盘后买入意愿占比

下图展示了月度换仓的开盘后买入意愿占比全市场前后 10%多空组合的相对强弱净值。

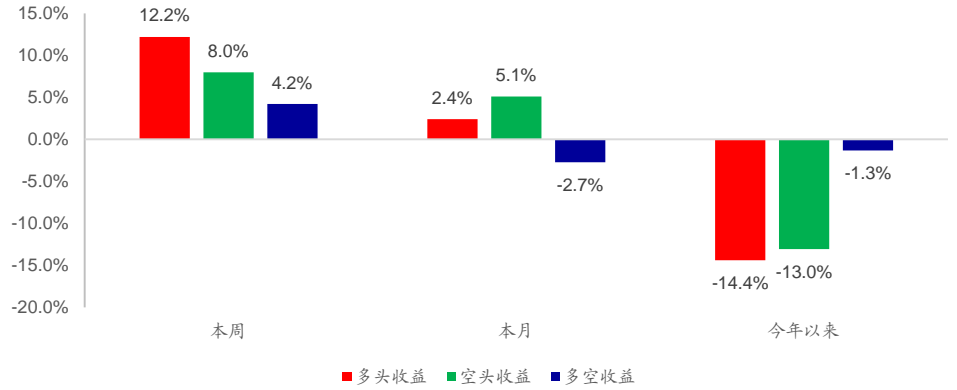
图5 开盘后买入意愿占比因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了开盘后买入意愿占比因子本周、2月及2024年的多空收益。

图6 开盘后买入意愿占比因子多空收益

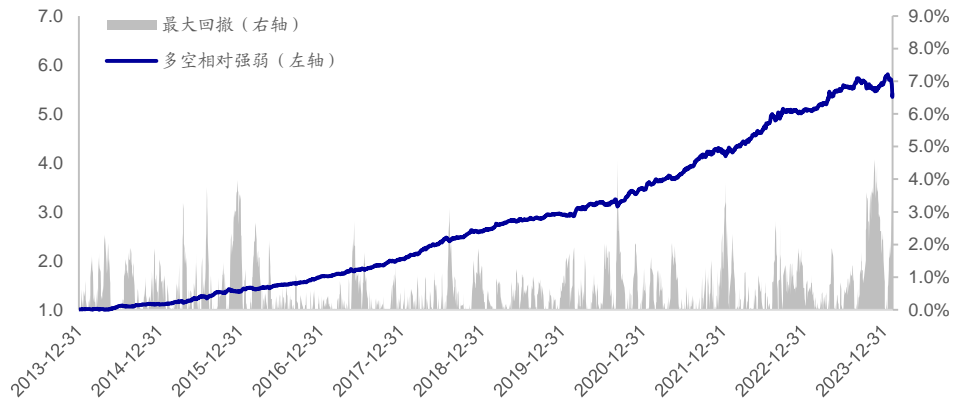


资料来源: Wind, HTI

#### 4. 开盘后买入意愿强度

下图展示了月度换仓的开盘后买入意愿强度全市场前后 10%多空组合的相对强弱净值。

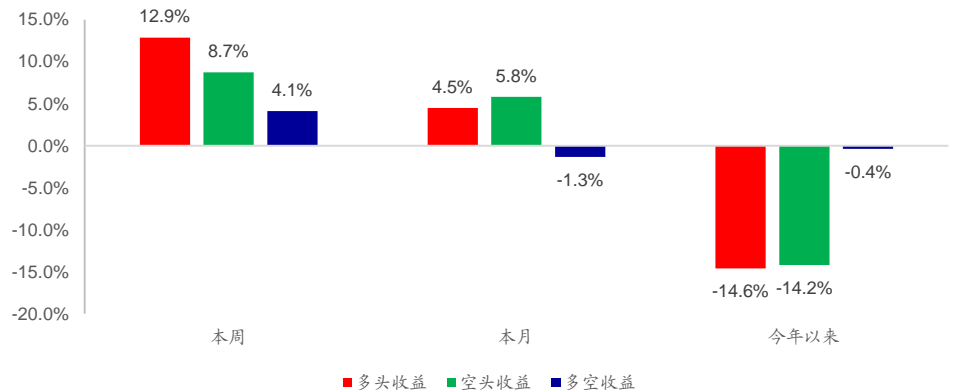
图7 开盘后买入意愿强度因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了开盘后买入意愿强度因子本周、2月及 2024 年的多空收益。

图8 开盘后买入意愿强度因子多空收益

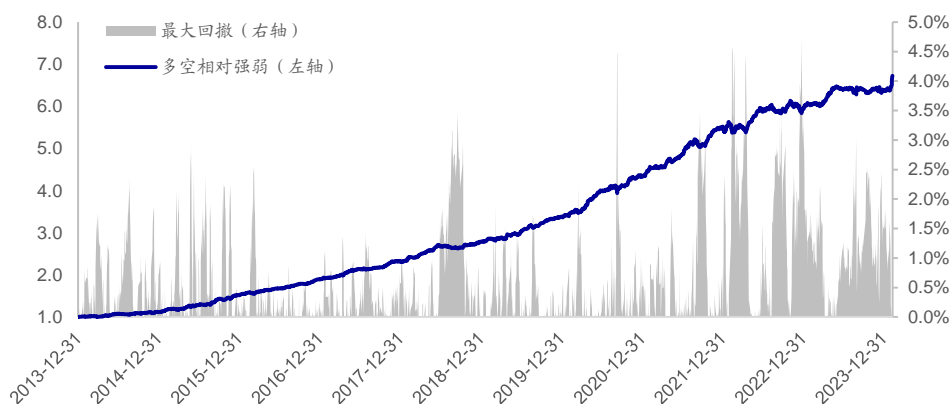


资料来源: Wind, HTI

## 5. 开盘后大单净买入占比

下图展示了月度换仓的开盘后大单净买入占比全市场前后 10%多空组合的相对强弱净值。

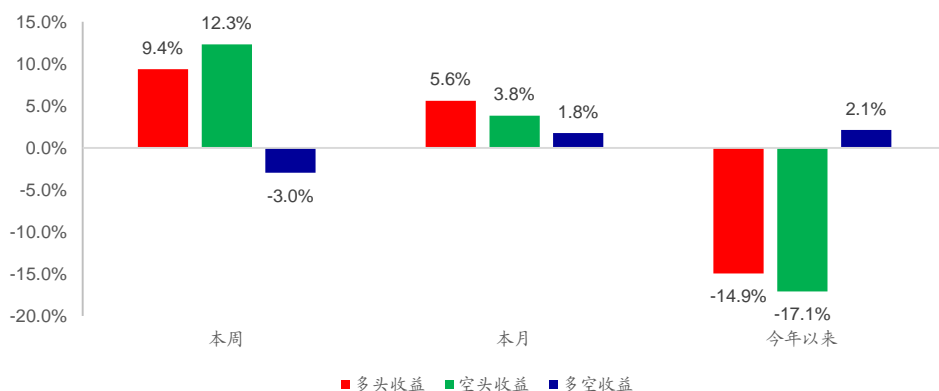
图9 开盘后大单净买入占比因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了开盘后大单净买入占比因子本周、2月及2024年的多空收益。

图10 开盘后大单净买入占比因子多空收益

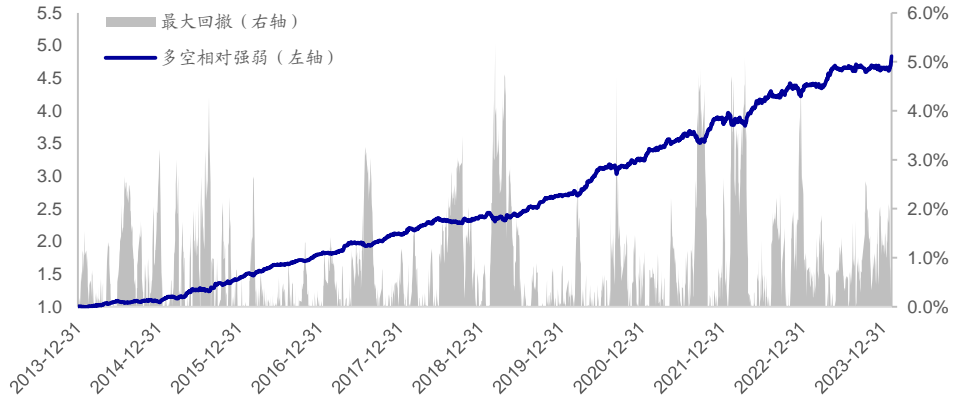


资料来源: Wind, HTI

## 6. 开盘后大单净买入强度

下图展示了月度换仓的开盘后大单净买入强度全市场前后 10%多空组合的相对强弱净值。

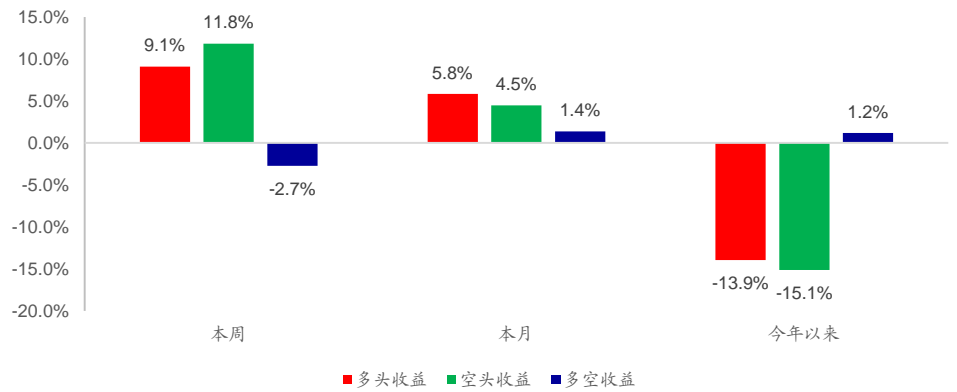
图11 开盘后大单净买入强度因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了开盘后大单净买入强度因子本周、2月及2024年的多空收益。

图12 开盘后大单净买入强度因子多空收益

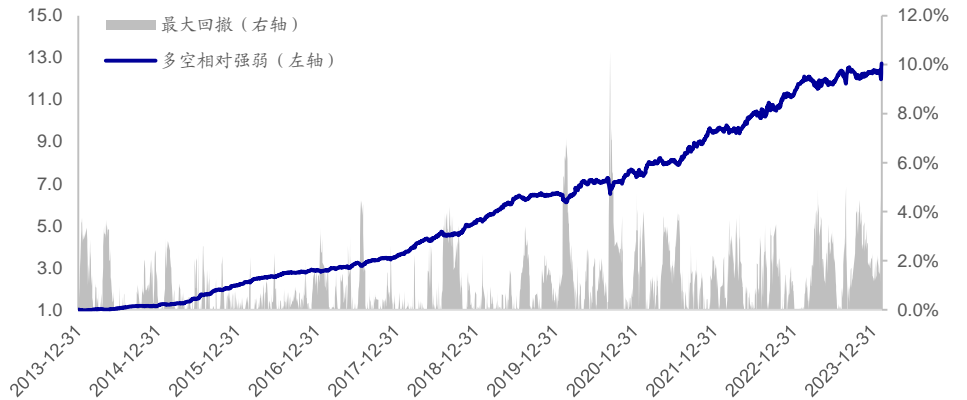


资料来源: Wind, HTI

## 7. 改进反转

下图展示了月度换仓的改进反转因子全市场前后 10%多空组合的相对强弱净值。

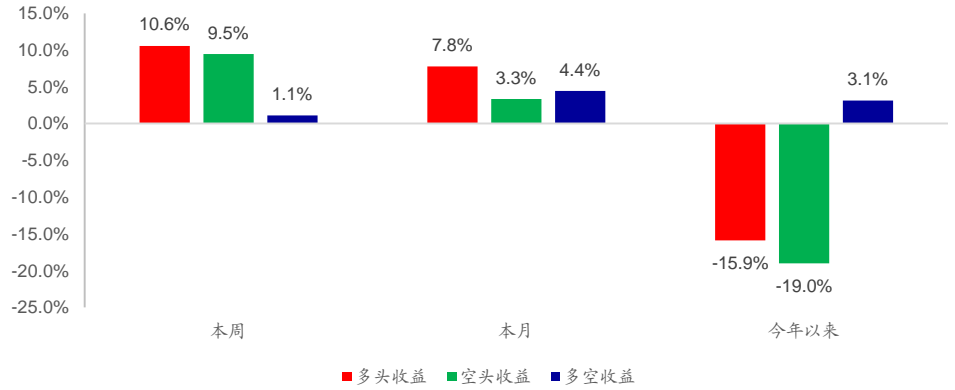
图13 改进反转因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了改进反转因子本周、2月及2024年的多空收益。

图14 改进反转因子多空收益

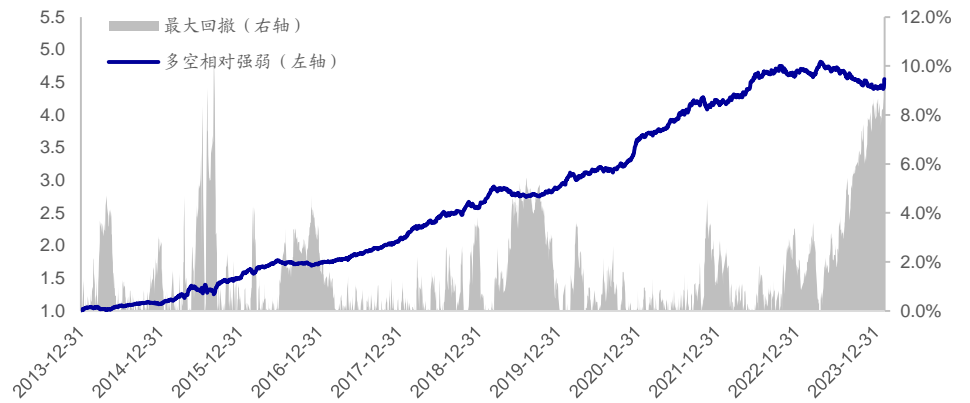


资料来源: Wind, HTI

## 8. 尾盘成交占比

下图展示了月度换仓的尾盘成交占比全市场前后 10%多空组合的相对强弱净值。

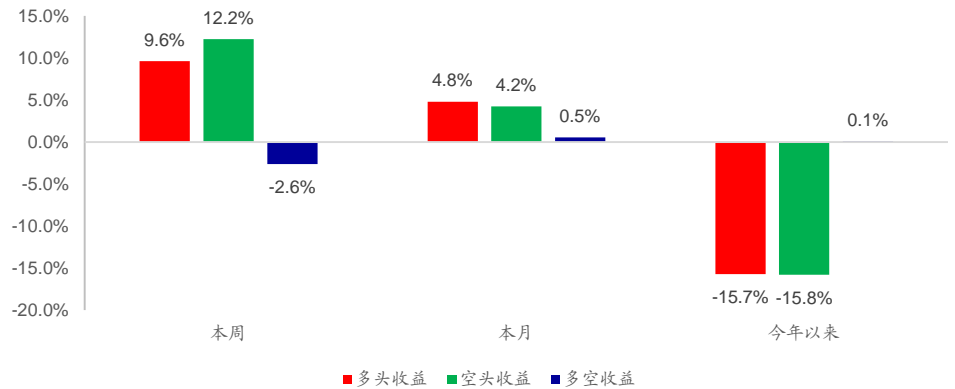
图15 尾盘成交占比因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了尾盘成交占比因子本周、2月及 2024 年的多空收益。

图16 尾盘成交占比多空收益

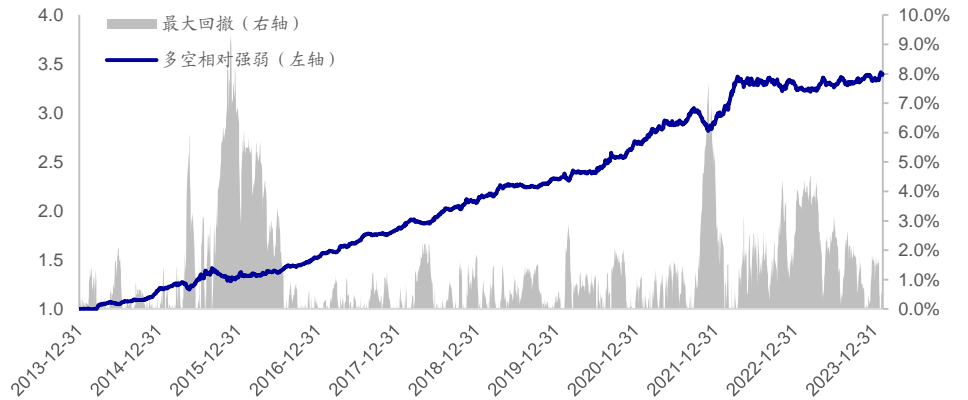


资料来源: Wind, HTI

## 9. 平均单笔流出金额占比

下图展示了月度换仓的平均单笔流出金额占比全市场前后 10%多空组合的相对强弱净值。

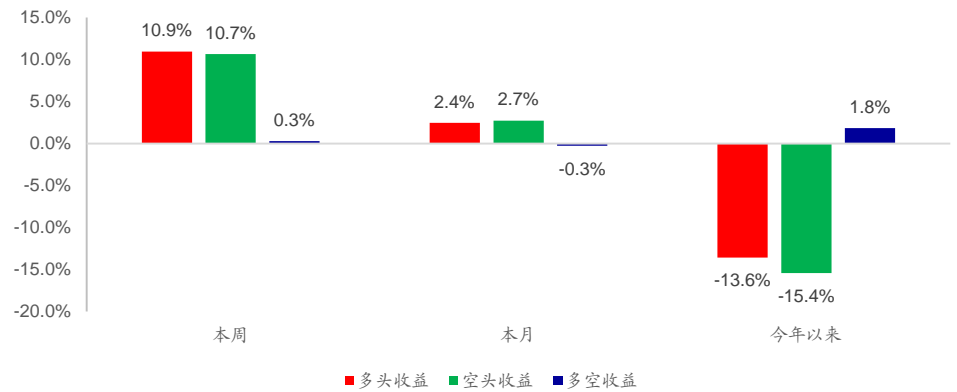
图17 平均单笔流出金额占比因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了平均单笔流出金额占比因子本周、2月及2024年的多空收益。

图18 平均单笔流出金额占比因子多空收益

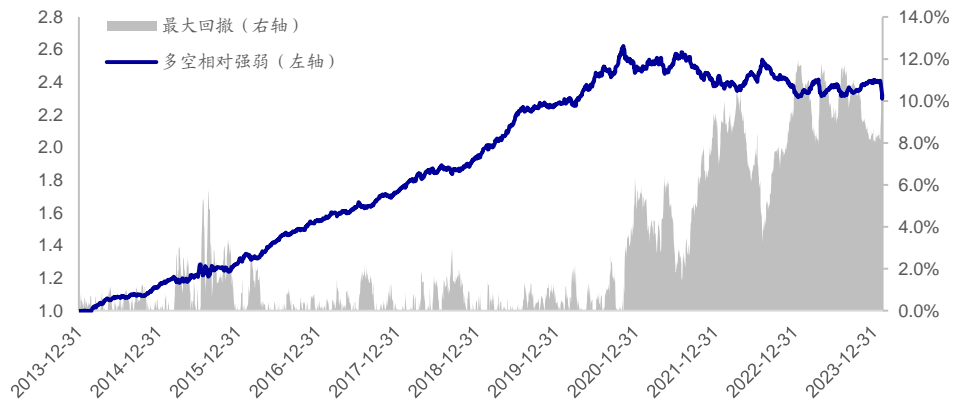


资料来源: Wind, HTI

## 10.大单推动涨幅

下图展示了月度换仓的大单推动涨幅全市场前后 10%多空组合的相对强弱净值。

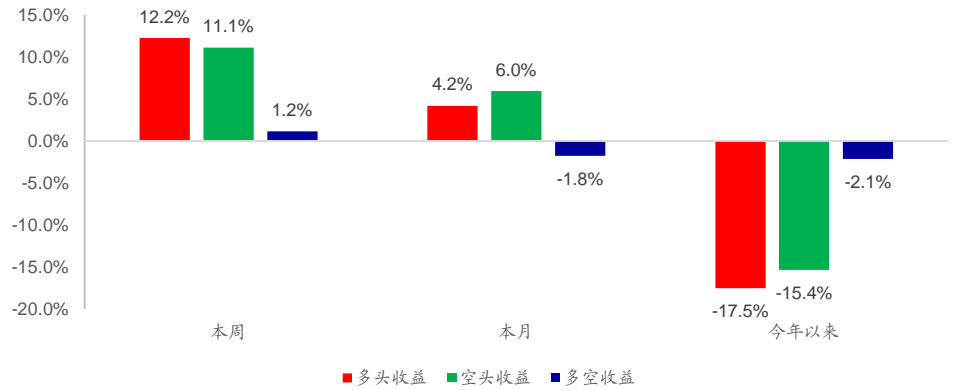
图19 大单推动涨幅因子多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了大单推动涨幅因子本周、2月及2024年的多空收益。

图20 大单推动涨幅因子多空收益

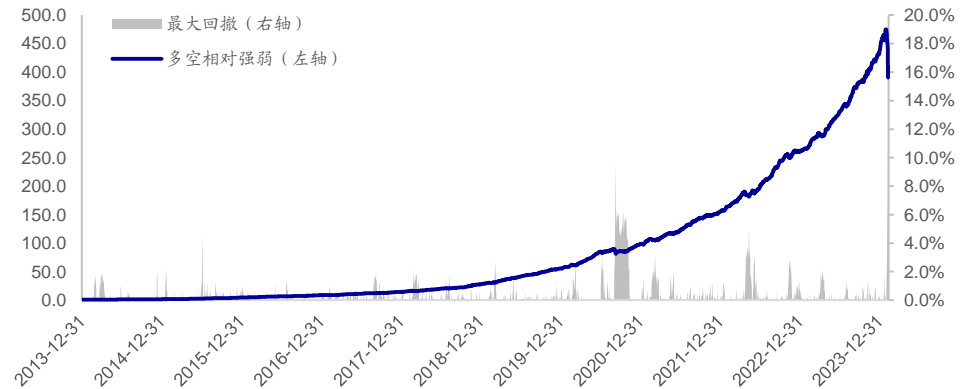


资料来源: Wind, HTI

## 11.深度学习高频因子 (GRU(50,1)+NN(10))

下图展示了周度换仓的深度学习高频因子 (GRU(50,1)+NN(10)) 全市场前后 10% 多空组合的相对强弱净值。

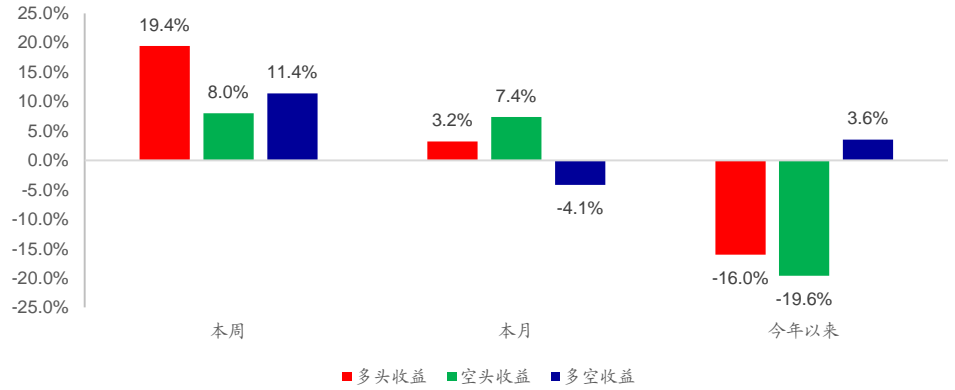
图21 深度学习高频因子 (GRU(50,1)+NN(10)) 多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了深度学习高频因子 (GRU(50,1)+NN(10)) 本周、2月及2024年的多空收益。

图22 深度学习高频因子 (GRU(50,1)+NN(10)) 多空收益

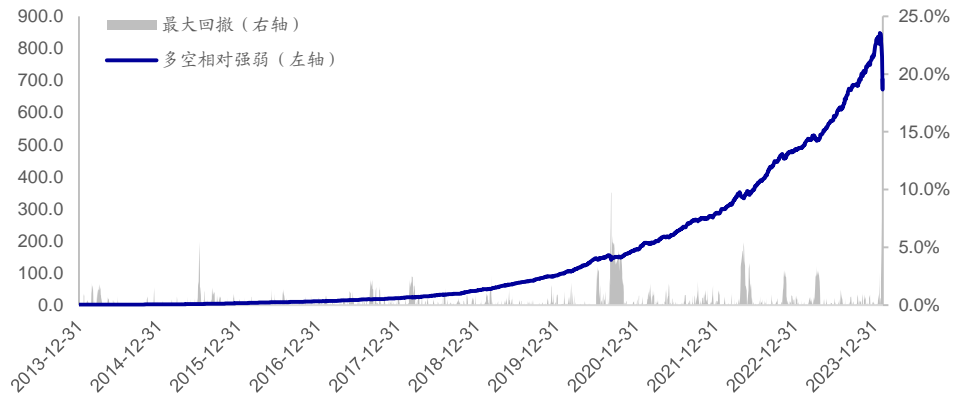


资料来源: Wind, HTI

## 12.深度学习高频因子 (GRU(50,2)+NN(10))

下图展示了周度换仓的深度学习高频因子 (GRU(50,2)+NN(10)) 全市场前后 10% 多空组合的相对强弱净值。

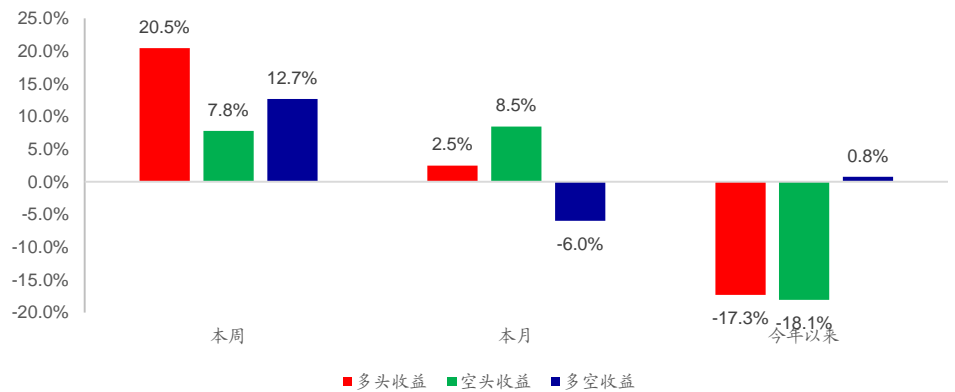
图23 深度学习高频因子 (GRU(50,2)+NN(10)) 多空相对强弱 (2014.01-2024.02)



资料来源: Wind, HTI

下图展示了深度学习高频因子 (GRU(50,2)+NN(10)) 本周、2 月及 2024 年的多空收益。

图24 深度学习高频因子 (GRU(50,2)+NN(10)) 多空收益

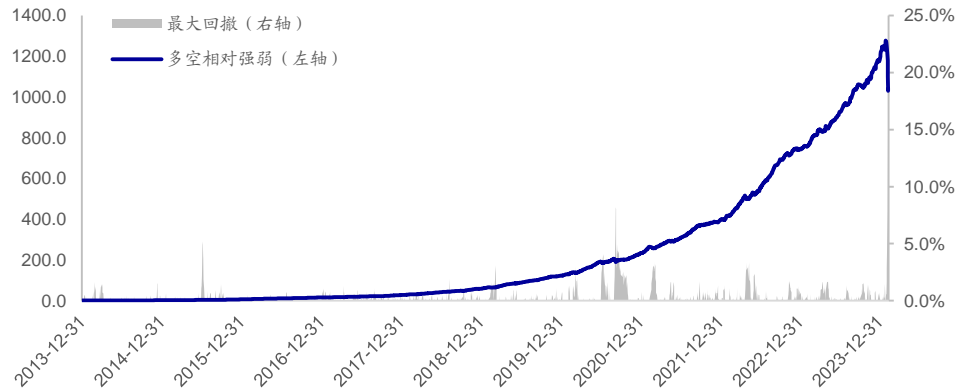


资料来源: Wind, HTI

### 13.深度学习高频因子（改进 GRU(50,2)+NN(10)）

下图展示了周度换仓的深度学习高频因子（改进 GRU(50,2)+NN(10)）全市场前后 10%多空组合的相对强弱净值。

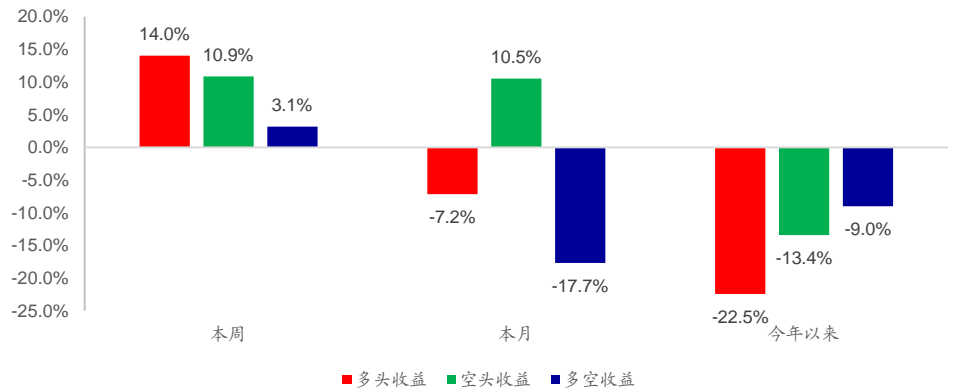
图25 深度学习高频因子（改进 GRU(50,2)+NN(10)）多空相对强弱（2014.01-2024.02）



资料来源：Wind, HTI

下图展示了深度学习高频因子（改进 GRU(50,2)+NN(10)）本周、2月及 2024 年的多空收益。

图26 深度学习高频因子（改进 GRU(50,2)+NN(10)）多空收益

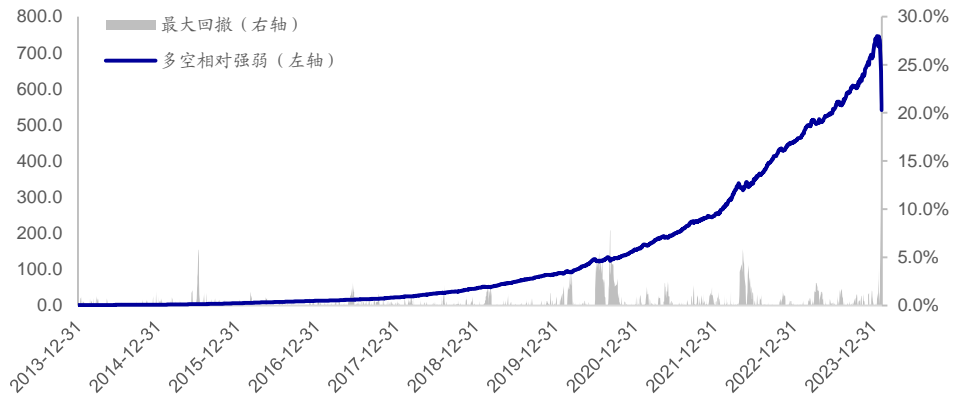


资料来源：Wind, HTI

### 14.深度学习高频因子（残差注意力 LSTM(48,2)+NN(10)）

下图展示了周度换仓的深度学习高频因子（残差注意力 LSTM(48,2)+NN(10)）全市场前后 10%多空组合的相对强弱净值。

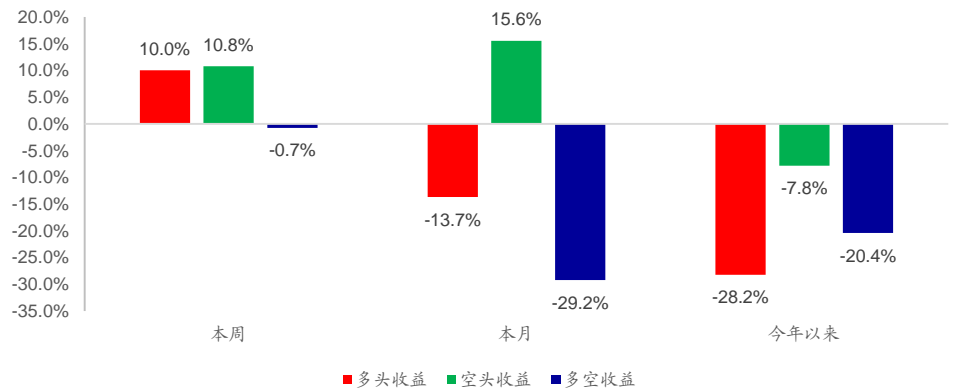
图27 深度学习高频因子（残差注意力 LSTM(48,2)+NN(10)）多空相对强弱（2014.01-2024.02）



资料来源：Wind, HTI

下图展示了深度学习高频因子（残差注意力 LSTM(48,2)+NN(10)）本周、2月及2024年的多空收益。

图28 深度学习高频因子（残差注意力 LSTM(48,2)+NN(10)）多空收益

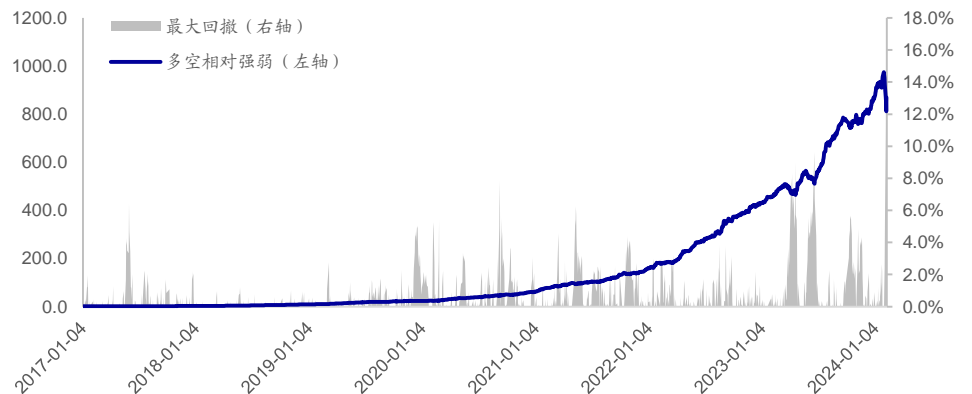


资料来源：Wind, HTI

## 15.深度学习因子（多颗粒度模型-5日标签）

下图展示了周度换仓的深度学习因子（多颗粒度模型-5日标签）全市场前后 10%多空组合的相对强弱净值。因子基于双向 AGRU 训练得到。

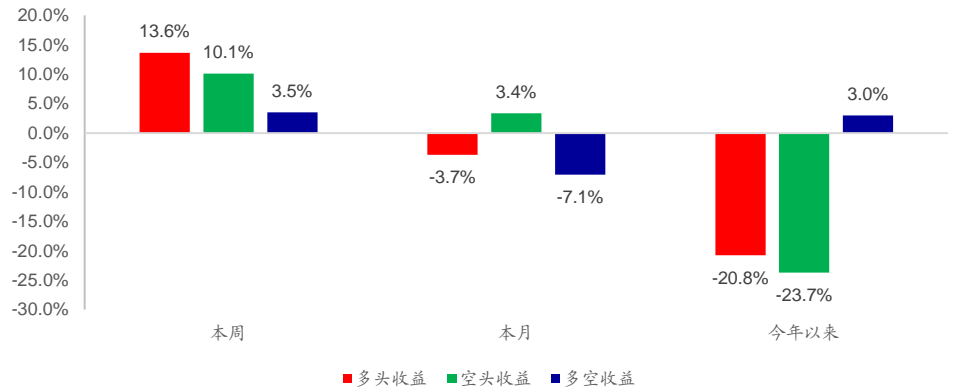
图29 深度学习因子（多颗粒度模型-5日标签）多空相对强弱（2017.01-2024.02）



资料来源：Wind, HTI

下图展示了深度学习因子（多颗粒度模型-5日标签）本周、2月及2024年的多空收益。

图30 深度学习因子（多颗粒度模型-5日标签）多空收益

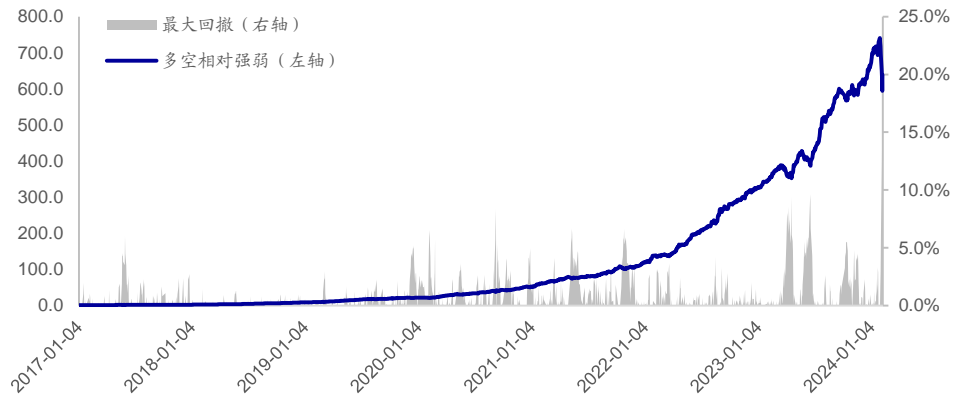


资料来源: Wind, HTI

## 16.深度学习因子（多颗粒度模型-10日标签）

下图展示了周度换仓的深度学习因子（多颗粒度模型-10日标签）全市场前后10%多空组合的相对强弱净值。因子基于双向AGRU训练得到。

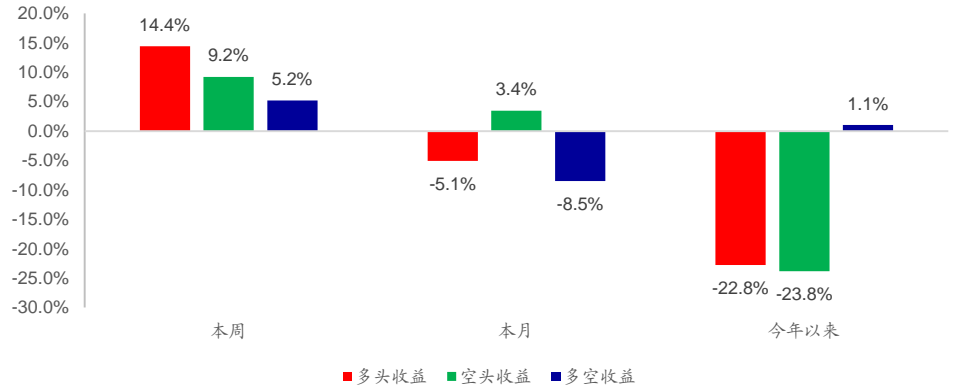
图31 深度学习因子（多颗粒度模型-10日标签）多空相对强弱（2017.01-2024.02）



资料来源: Wind, HTI

下图展示了深度学习因子（多颗粒度模型-10日标签）本周、2月及2024年的多空收益。

图32 深度学习因子（多颗粒度模型-10日标签）多空收益



资料来源：Wind, HTI

## 17. 周度调仓的 AI 指数增强组合

我们基于深度学习因子（多颗粒度模型-10日标签）构建中证 500 AI 增强组合和中证 1000 AI 增强组合。其中，增强组合的风险控制模块包括以下几个方面的约束。

- 1) 个股偏离：相对基准的权重偏离不超过 1%；
- 2) 因子暴露：估值中性、市值（500 增强：中性；1000 增强：[-0.2, 0.2]），常规低频因子：[-0.8, 0.8]；
- 3) 行业偏离：严格中性；
- 4) 换手率限制：单次单边换手不超过 30%。

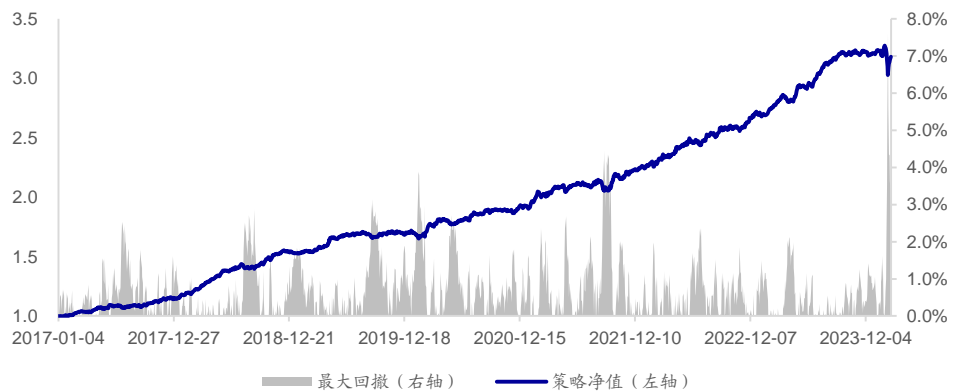
两个组合的优化目标均为最大化预期收益，目标函数如下所示。

$$\max_{w_i} \sum \mu_i w_i$$

其中， $w_i$  为组合中股票  $i$  的权重， $\mu_i$  为股票  $i$  的预期超额收益。为使周报的测试结果贴近实践，下文的测算均假定以次日均价成交，同时扣除双边 3% 的交易成本。

下图展示了组合 2017 年以来相对中证 500 指数的累计超额收益。

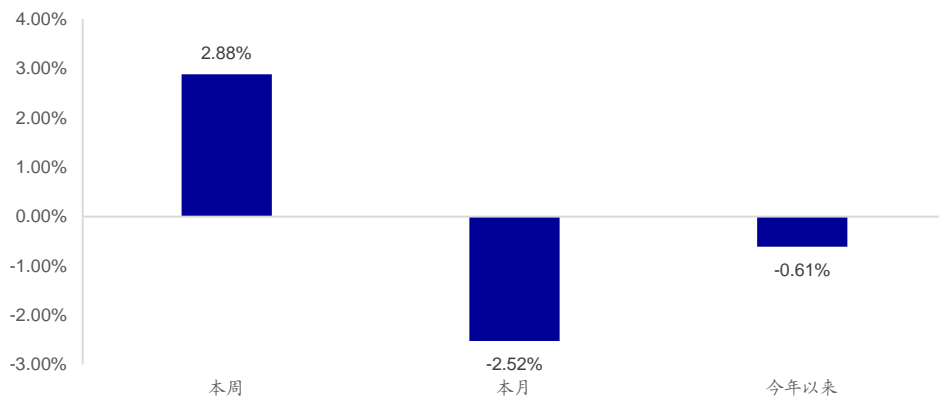
图33 周度调仓的中证 500 AI 增强组合累计超额收益（2017.01-2024.02）



资料来源：Wind, HTI

下图分别展示了组合在本周、2月及 2024 年的超额收益。

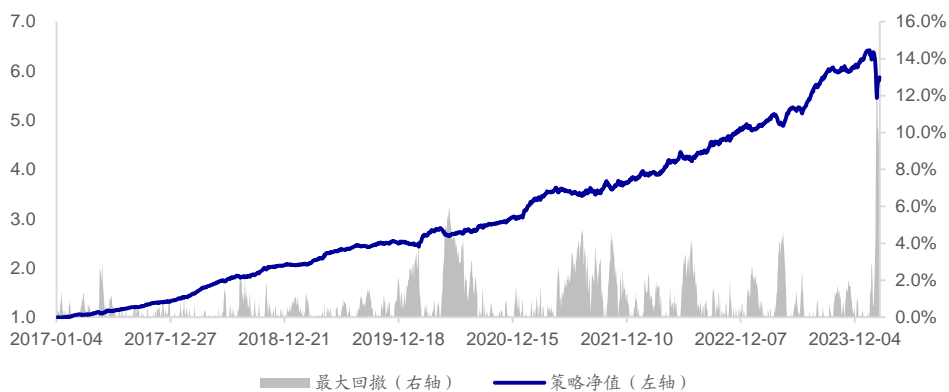
图34 周度调仓的中证 500 AI 增强组合超额收益



资料来源: Wind, HTI

下图展示了组合 2017 年以来相对中证 1000 指数的累计超额收益。

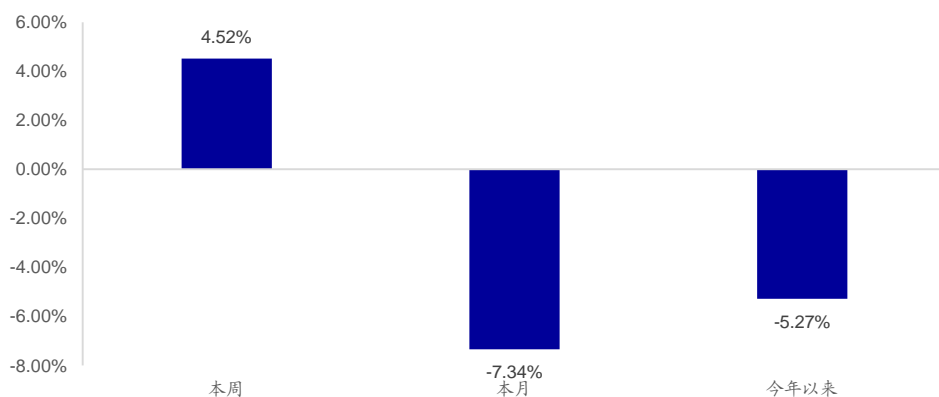
图35 周度调仓的中证 1000 AI 增强组合累计超额收益 (2017.01-2024.02)



资料来源: Wind, HTI

下图分别展示了组合在本周、2月及 2024 年的超额收益。

图36 周度调仓的中证 1000 AI 增强组合超额收益



资料来源: Wind, HTI

## 18. 风险提示

因子失效风险、流动性风险。

## 附录 APPENDIX

### 重要信息披露

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**优于大市**，未来 12-18 个月内预期相对基准指数涨幅在 10%以上，基准定义如下

**中性**，未来 12-18 个月内预期相对基准指数变化不大，基准定义如下。根据 FINRA/NYSE 的评级分布规则，我们会将中性评级划入持有这一类别。

**弱于大市**，未来 12-18 个月内预期相对基准指数跌幅在 10%以上，基准定义如下

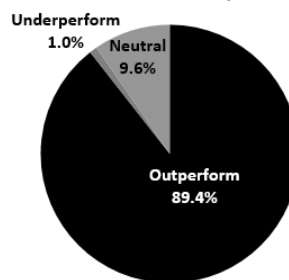
各地股票基准指数：日本 - TOPIX, 韩国 - KOSPI, 台湾 - TAIEX, 印度 - Nifty100, 美国 - SP500; 其他所有中国概念股 - MSCI China.

### Ratings Definitions (from 1 Jul 2020):

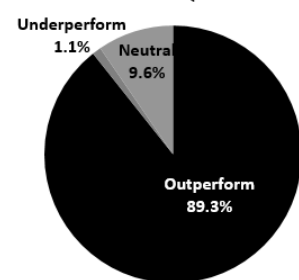
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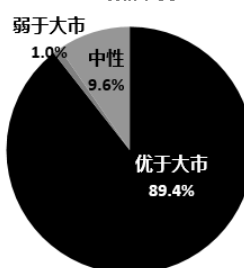
Most Recent Full Quarter



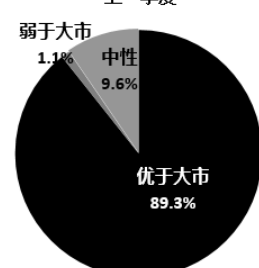
Prior Full Quarter



最新季度



上一季度



advice. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations.

#### Analyst Stock Ratings

**Outperform:** The stock's total return over the next 12-18 months is expected to exceed the return of its relevant broad market benchmark, as indicated below.

**Neutral:** The stock's total return over the next 12-18 months is expected to be in line with the return of its relevant broad market benchmark, as indicated below. For purposes only of FINRA/NYSE ratings distribution rules, our Neutral rating falls into a hold rating category.

**Underperform:** The stock's total return over the next 12-18 months is expected to be below the return of its relevant broad market benchmark, as indicated below.

**Benchmarks for each stock's listed region are as follows: Japan – TOPIX, Korea – KOSPI, Taiwan – TAIEX, India – Nifty100, US – SP500; for all other China-concept stocks – MSCI China.**

#### 截至 2023 年 12 月 31 日海通国际股票研究评级分布

|             | 优于大市  | 中性<br>(持有) | 弱于大市 |
|-------------|-------|------------|------|
| 海通国际股票研究覆盖率 | 89.4% | 9.6%       | 1.0% |
| 投资银行客户*     | 3.9%  | 5.1%       | 5.6% |

\*在每个评级类别里投资银行客户所占的百分比。

上述分布中的买入，中性和卖出分别对应我们当前优于大市，中性和落后大市评级。

只有根据 FINRA/NYSE 的评级分布规则，我们才将中性评级划入持有这一类别。请注意在上表中不包含非评级的股票。

#### 此前的评级系统定义（直至 2020 年 6 月 30 日）：

买入，未来 12-18 个月内预期相对基准指数涨幅在 10%以上，基准定义如下

中性，未来 12-18 个月内预期相对基准指数变化不大，基准定义如下。根据 FINRA/NYSE 的评级分布规则，我们会将中性评级划入持有这一类别。

卖出，未来 12-18 个月内预期相对基准指数跌幅在 10%以上，基准定义如下

各地股票基准指数：日本 – TOPIX, 韩国 – KOSPI, 台湾 – TAIEX, 印度 – Nifty100; 其他所有中国概念股 – MSCI China.

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|                              | Outperform | Neutral<br>(hold) | Underperform |
|------------------------------|------------|-------------------|--------------|
| HTI Equity Research Coverage | 89.4%      | 9.6%              | 1.0%         |
| IB clients*                  | 3.9%       | 5.1%              | 5.6%         |

\*Percentage of investment banking clients in each rating category.

BUY, Neutral, and SELL in the above distribution correspond to our current ratings of Outperform, Neutral, and Underperform.

For purposes only of FINRA/NYSE ratings distribution rules, our Neutral rating falls into a hold rating category. Please note that stocks with an NR designation are not included in the table above.

#### Previous rating system definitions (until 30 Jun 2020):

**BUY:** The stock's total return over the next 12-18 months is expected to exceed the return of its relevant broad market benchmark, as indicated below.

**NEUTRAL:** The stock's total return over the next 12-18 months is expected to be in line with the return of its relevant broad market benchmark, as indicated below. For purposes only of FINRA/NYSE ratings distribution rules, our Neutral rating falls into a hold rating category.

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