# Effectively Pairing Artificial Intelligence with Human Intelligence


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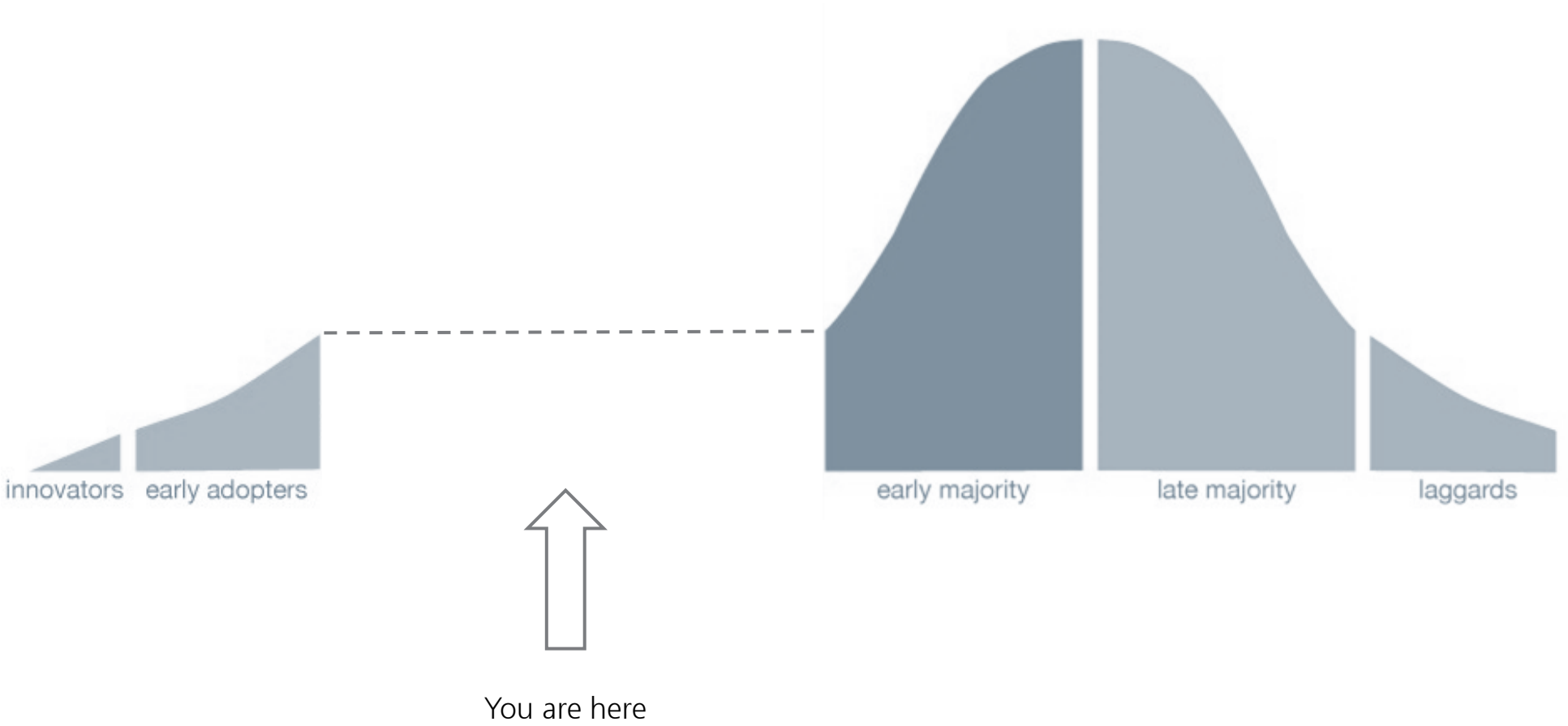
O'CONNOR UBS

# Crossing the Fundamental Investing Big Data / AI Investment Chasm



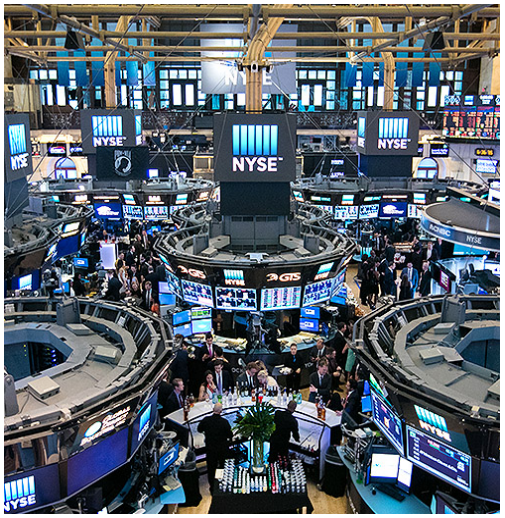
# Big Data and AI in Investment Management

## Self-driving AI


Min cost function

S.t. operating constraints(1)

## Investment AI

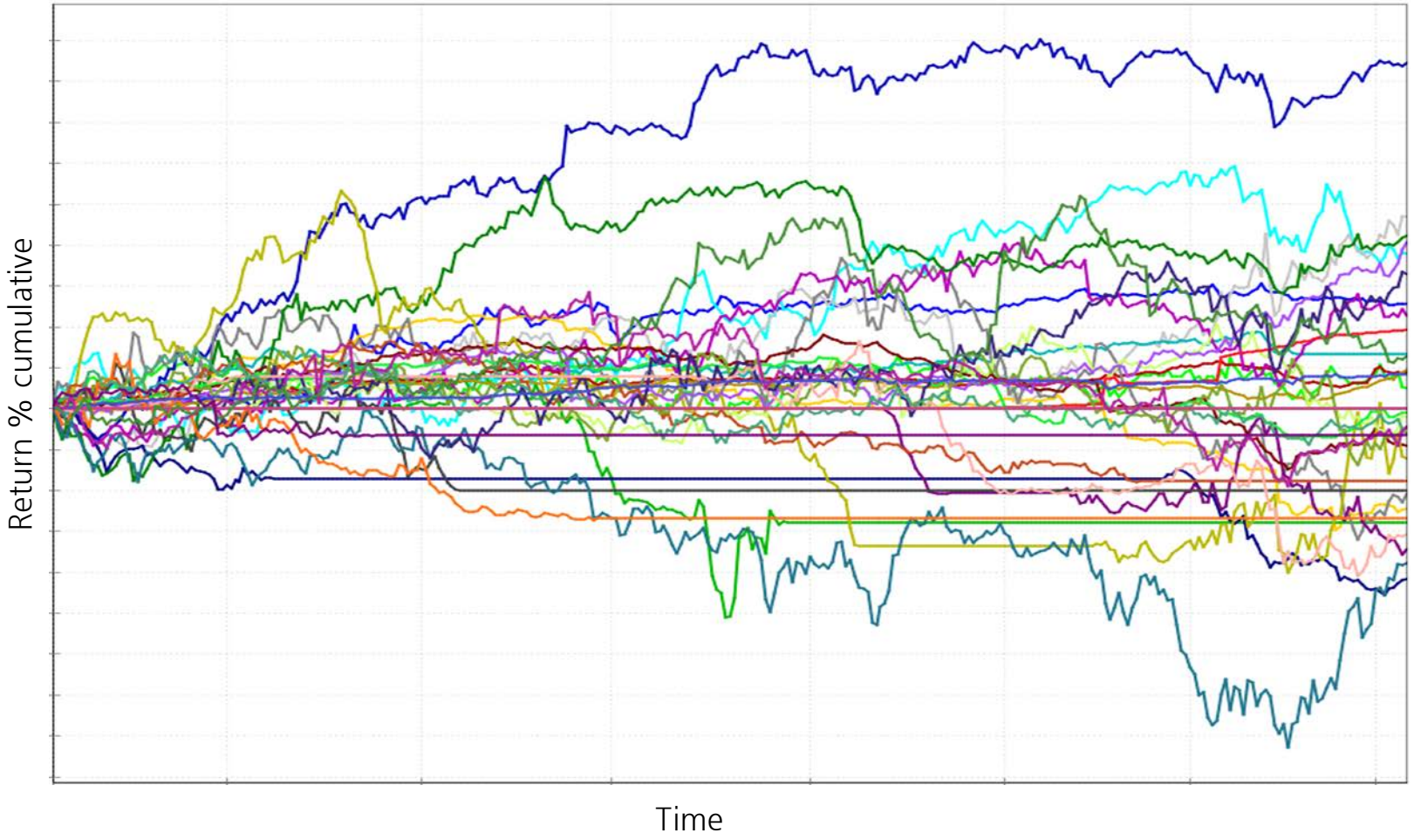



Min risk function

S.t. operating constraints

(1) Fletcher, Luke, et al. "The MIT–Cornell collision and why it happened." Journal of Field Robotics 25.10 (2008): 775-807

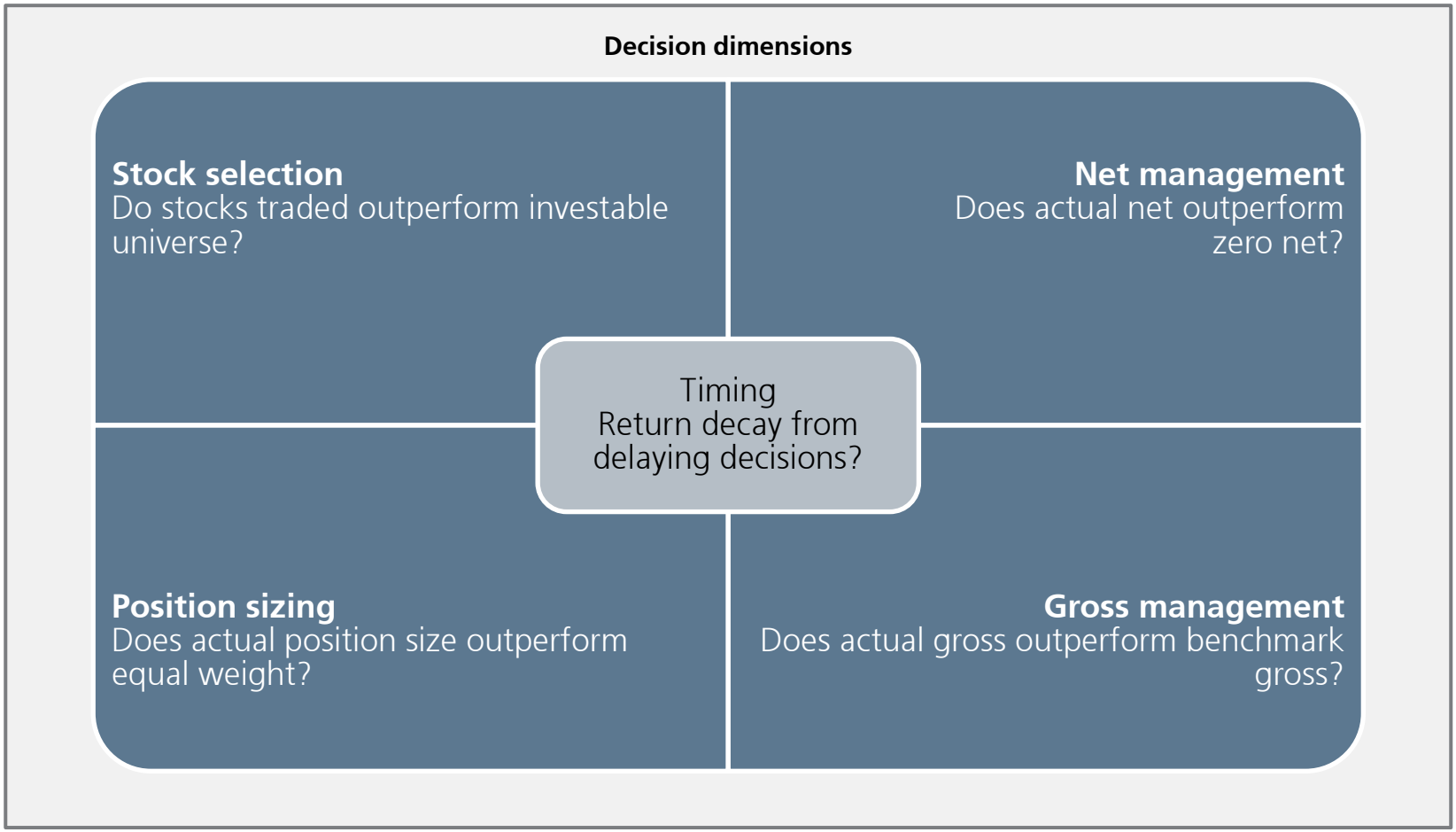
# How to Quantify the AI Opportunity?



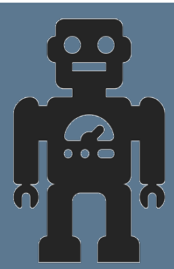

Source: UBS O'Connor

# AI Bots as Benchmark

## Measuring alpha added across investment process



# Humans vs Machines: the Result

| |  |  |
|---|---|---|
| Selection | ✓ | |
| Sizing | | ✓ |
| Net | (✓) | |
| Gross | | ✓ |

Source: UBS O'Connor

# Case Study: Price Target Optimizer

**Goal**: improve human sizing alpha with machine input

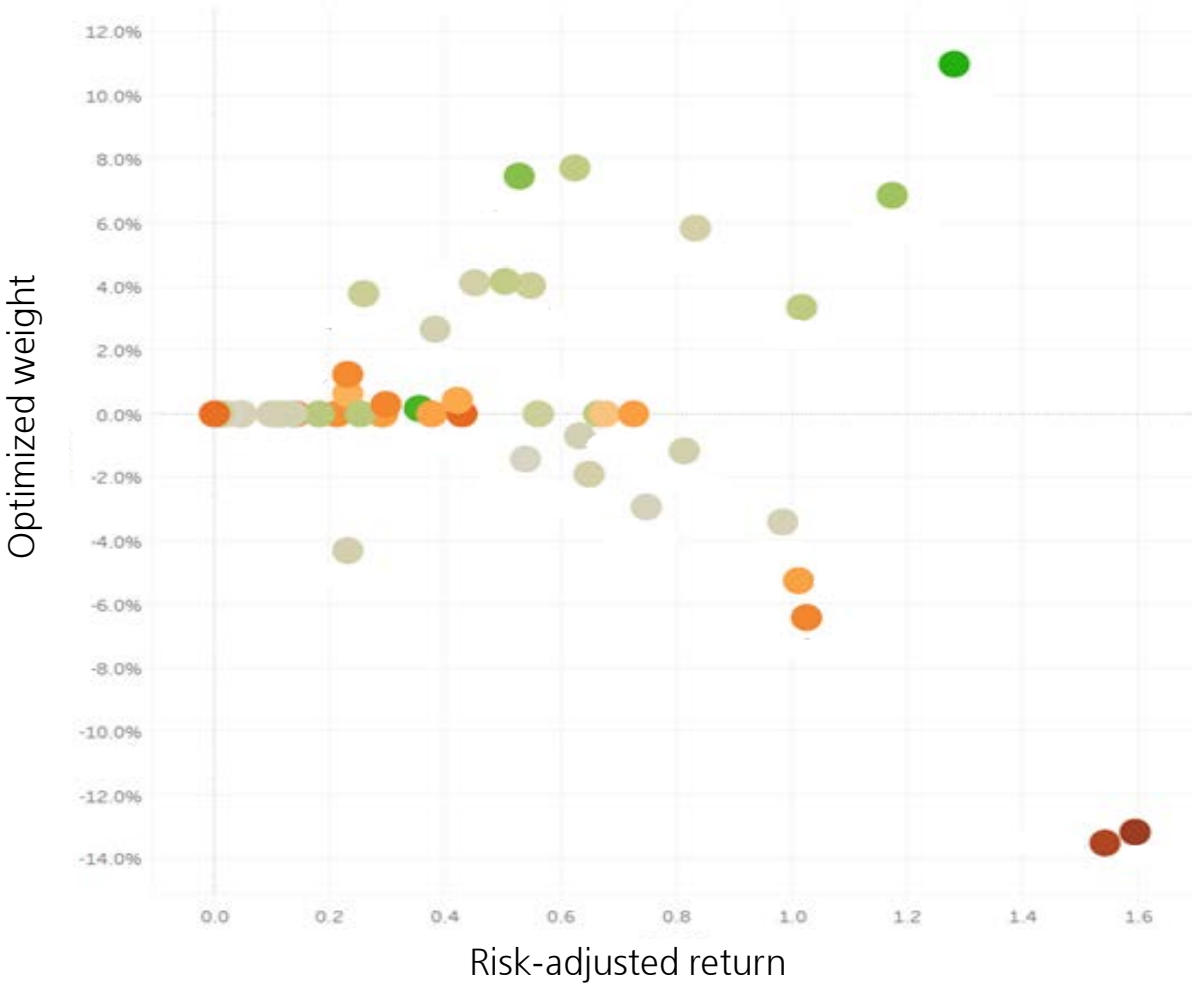
**Optimizer**: maximize asymmetric risk / reward s.t. risk and liquidity constraints

**Price Target Optimizer Input**

| | Price | | | Probability | |
|---|---|---|---|---|---|
| Ticker | Current | Target Up | Target Down | Price Up | Price Down |
| A UN | 10.0 | 12.0 | 8.0 | 55% | 45% |
| AAL UW | 10.0 | 11.0 | 7.0 | 50% | 50% |
| AAP UN | 10.0 | 13.0 | 9.0 | 45% | 55% |

Source: UBS O'Connor

# Explaining the AI Algorithm

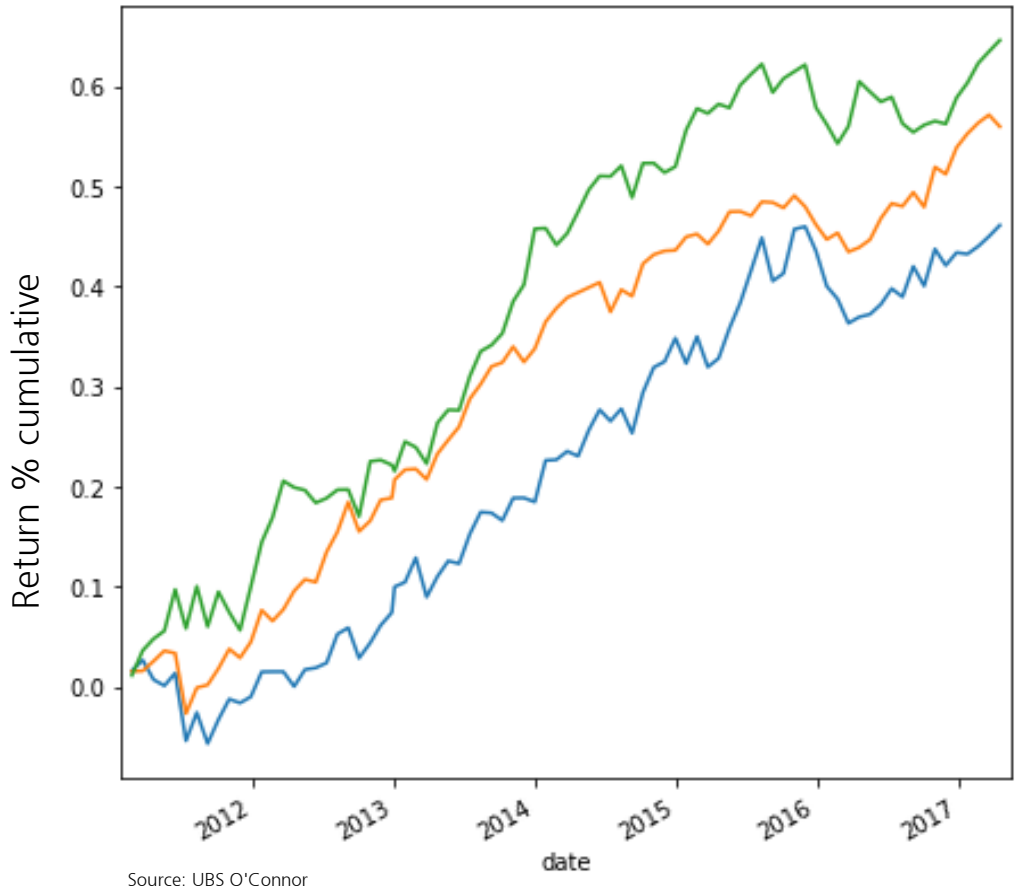



Source: UBS O'Connor

# Case study: Stock Selection

**Goal**: improve machine stock selection alpha with human input

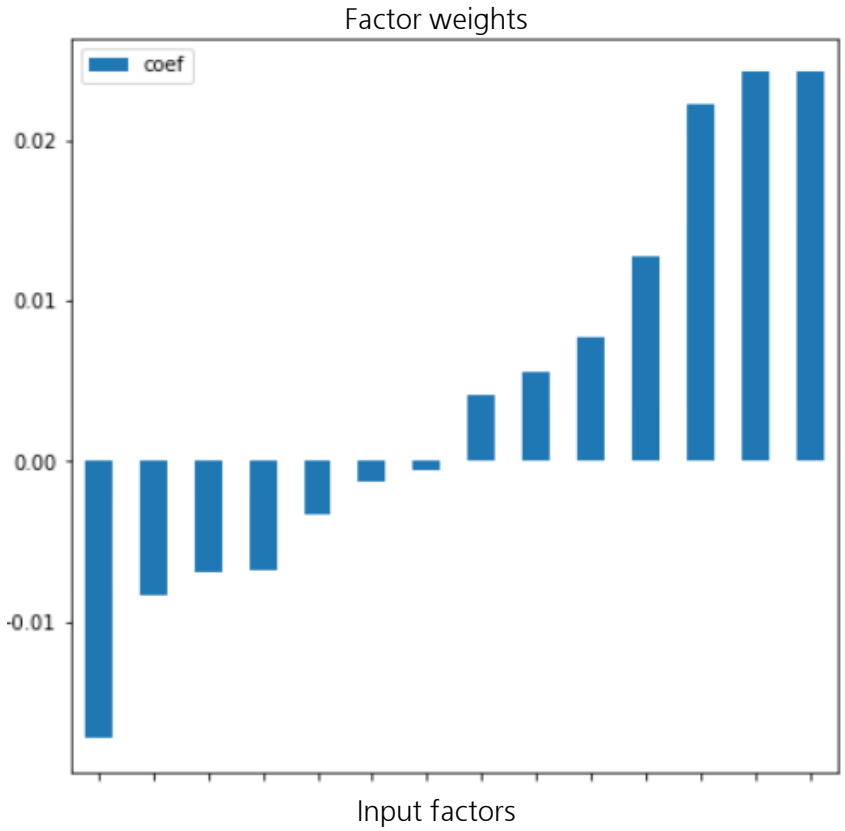
**Optimizer**: minimize prediction error




Source: UBS O'Connor

# Explaining the AI Algorithm

## Explanation




Source: UBS O'Connor

## Dashboard

| Ticker bbg | Model | Input factors | | | |
|---|---|---|---|---|---|
| ADP UW Equity | 0 | 6 | 0 | 3 | 1 |
| AVY UN Equity | 0 | 6 | 9 | 5 | 2 |
| BDX UN Equity | 0 | 5 | 5 | 2 | 5 |
| CHD UN Equity | 0 | 4 | 1 | 5 | 3 |
| COTY UN Equity | 0 | 0 | 8 | 1 | 9 |
| EVHC UN Equity | 0 | | 3 | | |
| GILD UW Equity | 0 | 1 | 9 | | 5 |
| KO UN Equity | 0 | 4 | 6 | 2 | 2 |
| PFE UN Equity | 0 | 2 | 4 | | |
| TSN UN Equity | 0 | 0 | 5 | 7 | 8 |
| WU UN Equity | 0 | 0 | 5 | 5 | 0 |
| ABC UN Equity | 1 | 5 | 2 | 6 | 2 |
| CLX UN Equity | 1 | 4 | 2 | | 0 |
| DHR UN Equity | 1 | 4 | 6 | 5 | 8 |
| HOLX UW Equity | 1 | 6 | 3 | 0 | 5 |
| ISRG UW Equity | 1 | 9 | 6 | 1 | 3 |
| MCK UN Equity | 1 | 1 | 1 | 9 | 7 |

# Organizational and Incentive Structures

## Now

- Quant / data science separate from investment process
- All decisions made by discretionary managers
- Either pure discretionary or pure systematic

## Ideal future?

- Quant / data science integrated in investment process
- Some decisions made by discretionary managers, some by machines
- Hybrid discretionary and systematic

# Appendix: Our Stack

| Stage | Stack |
|---|---|
| Data storage | Vendor feed, SQL, parquet |
| Data prep | Pandas, dask, d6t-python |
| Modeling | Statsmodels, sklearn, lightgbm, pymc3, TF, h2o |
| Optimizer | Cvxpy, risk models |
| Backtester | pandas, zipline, pyfolio, alphalens |
| Front-end | Email, Tableau, django, PM Sys, Trade Sys |
| Human Capital | Good coders, not necessarily CS, financial engineers, translators, no PhDs |