



3AI Alpha Score Overview

Brief Introduction to 3AI

3AI is a UK-based artificial intelligence company specializing in AI-generated alpha forecasts for global equities, used by some of the world's leading asset managers and hedge funds to enhance returns. Founded in 2018 by former technologists and traders from Goldman Sachs, Barclays Capital and the founder of an award-winning data science team at a major UK insurer, 3AI combines deep market and machine intelligence. The company is part of NVIDIA's Inception Program—an accelerator for AI companies set to revolutionize industry—and has received financial backing from the UK Government to support its pioneering research, which has been showcased at both the Harvard Belfer Center and the UCL Centre for Artificial Intelligence.

Explanation of Alpha Scores

3AI's alpha forecasts represent the expected excess total return of a stock over a 12-month horizon, relative to a global universe of approximately 20,000 equities. This universe includes all stocks with a market capitalisation above \$50 million. The forecasts estimate each stock's potential to outperform the broader global equity market, adjusting for overall market movements.

Pioneering 3 Dimensions of Intelligence

At 3AI, we believe intelligence—human or artificial—emerges from three core capabilities: the ability to see more, think more, and learn more. These principles guide the design of our alpha forecasting system. Below is an overview of how each dimension contributes to our approach:

See More

Most systematic strategies are built on a limited set of signals, which can constrain insight into individual stocks. 3AI takes a broader approach, drawing from hundreds of predictive features sourced from financial statements, analyst forecasts, market data, macroeconomics and alternative datasets. This rich feature set enables our models to conduct deep, multi-dimensional assessments of each stock—across fundamentals, behaviour, sentiment, and valuation — helping 3AI form a more complete measure of present value with which to better inform its view of potential future performance. In addition, the Bayesian Believability Layer enhances 3AI's ability to see more by continuously observing and learning from its own forecasting performance—highlighting the conditions, stock types, and environments where its signals have historically been most effective.

Think More

Traditional investment models often rely on linear factor analysis, assuming fixed, simplified relationships between inputs and returns. However, financial markets are inherently complex, with non-linear and conditional interactions between factors. 3AI's AI-based models are explicitly designed to detect and model these complexities—such as value factors behaving differently under varying momentum conditions. By capturing interactions that linear frameworks like Fama-French may overlook, our models improve the accuracy and robustness of alpha forecasts.

Learn More

Effective machine learning requires not only smart algorithms but also large, high-quality datasets. To support this, 3AI has compiled a historical database covering more than 150,000 global equities dating



back to the mid-1970s, including delisted and failed companies. This breadth ensures our models learn from a full range of outcomes, mitigating survivorship bias and increasing the statistical reliability of insights—particularly in a domain as noisy as equity returns.

Model Training Overview

3AI's models are trained using historical data beginning from the mid-1970s, employing a rigorous walk-forward validation methodology. This process involves sequentially training the models only on data available up to a given historical point and subsequently validating their predictive accuracy on unseen future periods. This method ensures genuine out-of-sample validity, preventing look-ahead bias and overfitting, and confirms that forecasts are robust under real-world market conditions. Additionally, the dataset includes equities that no longer trade ("dead stocks"), eliminating survivorship bias.

For instance, the Single Stock AI models systematically analyses historical relationships between stock returns and a wide variety of indicators, including prior financial performance, valuation metrics, analyst forecasts, ratings, technical price patterns, and institutional sentiment. Through iterative training on extensive historical data, the AI progressively refines its predictive capabilities, resulting in a comprehensive and empirically validated understanding of the factors influencing future stock performance.

Data Foundations

Overview of Data Signals and Categories

Single Stock factors

3AI employs hundreds of proprietary features at the single stock level, grouped into the following categories: Accounting Forensics (earnings quality, accruals, intangibles, goodwill and financial robustness); Forecast, Sentiment & Surprise (analyst expectations, sentiment analysis, and earnings surprises); Clarity of Business Model (stability and transparency of business operations); Company Physics Models (shareholder return dynamics and implied rates of perpetual shareholder return); Credit Risk Models (debt and equity credit risk signals); Financial Change (indicators of analysis of change in historic financial statements); Shareholder Treatment (financing and capital management indicators); Technical Indicators (momentum and mean-reversion signals); Valuation Models (intrinsic and relative valuation metrics); Other Sources (fund flows, correlation risk, beta to markets & sectors and market microstructure insights).

Macroeconomic factors

3AI employs proprietary macroeconomic factors from the following categories: Government bond yields; Commodity & Market Indicators; Economic, Business & Market Confidence Surveys; Economic Cycle Indicators; Manufacturing & Supply Chain Indicators; Inflationary Indicators

Data Sources

Our data is sourced exclusively from reputable mainstream providers, encompassing, financial statements and accounting disclosures, corporate earnings reports, market trading and liquidity data, analyst consensus forecasts, corporate actions, macroeconomic indicators, economic think tanks, surveys and research institutions etc.

Frequency of Score Calculations

Alpha scores are calculated and published weekly, incorporating the most current data updates.



Calculation Process Overview

Calculation Process from Raw Data to Single Stock Alpha Forecast:

Raw Data → Feature Generation → Single Stock Alpha + Business Cycle Alpha → Bayesian Believability Layer → Alpha Forecast

1. Feature Generation Engine:

- a. Collect raw data items
- b. Calculate underlying features, factors and models.
- c. Perform Transformations: to cleanse for currency, inter-temporal differences in factor meaning and make data robust for machine learning.
- d. Imputation algorithms generate missing features where data is insufficient or simply non-existent resulting in a fully zero sparsity feature library for every AI learning system.



Data

- Point-in-time
- Broad Coverage



Synthetic Generation

- Missing data imputed
- Consistency ensured



Relativistic Transformation

- Normalises across time, currency
- Compares apples to apples



Feature Engineering

- Formulae representing intuitive properties of companies, stocks, markets and economies
- >300 factors

2. Generation of Single Stock "SS" Alpha forecasts (micro):

- a. Uses company-level stock features to forecast relative stock performance attributable to company & stock-specific information using advanced deep factor-based AI models.

3. Generation of Business Cycle "BC" Alpha forecasts (macro):

- a. Use macroeconomic features to forecast relative sector performance attributable to the Business Cycle using advanced deep factor-based AI models.
- b. Use stock-specific relationship with sectors to forecast stock-specific sector beta using advanced beta AI models.
- c. Forecast stock-specific business cycle alpha by multiplying stock-specific beta to sectors with sector forecasts to calculate business cycle alpha attributable to every stock.

$$\widehat{\alpha}_{BC,t}^{(s)} = \sum_{i=1}^{N_{sectors}} \beta_{i,t}^{(s)} \cdot \widehat{\alpha}_t^{(i)} \quad \dots \text{where } s \text{ is stock, } i \text{ is sector and } t \text{ is time}$$

4. Generation of final alpha forecasts using the Bayesian Believability Layer:

Single-stock and business cycle alpha forecasts are combined and passed through a Bayesian Believability Layer to generate final alpha scores. This final layer adjusts each component forecast using model-specific believability coefficients, which are dynamically estimated based on the historical relationship between forecasted and realized alpha outcomes.

These coefficients serve two key functions



- Forecast calibration: learning the degree to which past forecasts tend to materialise (typically a beta less than 1), and scaling future forecasts accordingly.
- Context-aware weighting: adapting the believability of each model on a stock-by-stock basis by identifying the environments and stock characteristics where each model performs best (i.e., its “circle of competence”).

This process ensures that the final alpha signal integrates not only the magnitude of returns, but also the learned empirical reliability of each forecasting system.

The final alpha is computed as a weighted combination of the calibrated single-stock and business cycle forecasts:

$$\widehat{\alpha}_t^{(s)} = \beta_{SS,t}^{(s)} \cdot \widehat{\alpha}_{SS,t}^{(s)} + \beta_{BC,t}^{(s)} \cdot \widehat{\alpha}_{BC,t}^{(s)}$$

Bayesian Believability Layer – Context and Application

The Believability Layer addresses two critical challenges in the use of machine learning in financial forecasting:

- Forecast realism: AI models often produce valid but inflated estimates. The belief layer applies a data-driven discounting process, learning from past performance how much of a given model’s forecast tends to materialize.
- Model self-awareness: Forecast reliability varies depending on stock characteristics and market conditions. The belief layer accounts for this by learning each model’s “circle of competence” and applying dynamic adjustments.

Together, these enhancements ensure that alpha forecasts are not accepted at face value but are instead weighted according to historical credibility and situational relevance on a stock-by-stock basis.

Implications for Index Use

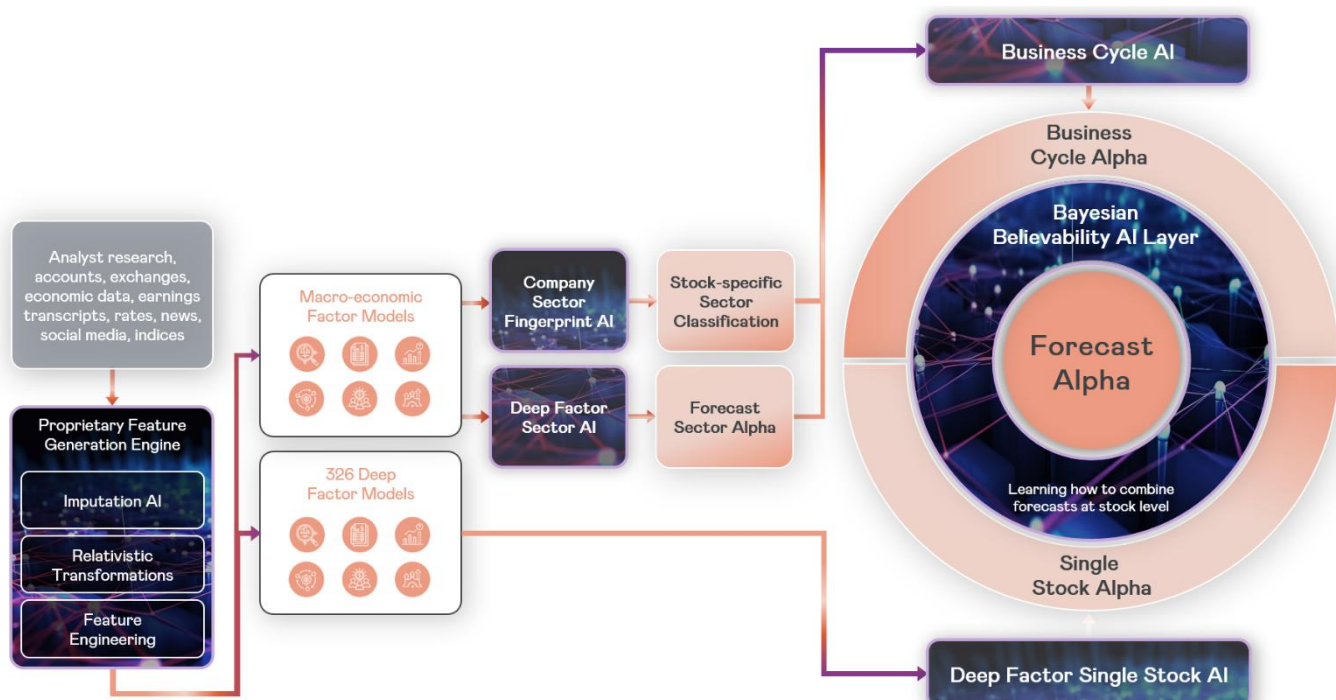
In the context of index construction, these adjustments are not simply technical enhancements—they’re essential safeguards. The belief layer helps:

- Reduce the risk of systematic overfitting
- Avoid excess concentration in stocks where forecast confidence is weak
- Promote consistent use of empirical calibration

By embedding this mechanism into the core of the forecast generation process, 3AI ensures its forecasts are not just statistically driven but also statistically defensible, while maintaining full transparency and traceability in how those forecasts are calculated.



System Overview:



Quality Assurance Measures

Model Training Validation:

- Extensive testing and remediation of lookahead in data sources to ensure point-in-time accurate training data, free of survivorship bias.
- Rigorous walk-forward methodology generates out-of-sample forecast history.
- Statistical validation of feature and forecast distributions and correlations.

Score Validation Procedures:

- Universe stability monitoring to ensure consistent representativeness.
- Raw data completeness and accuracy audits.
- Feature correlation and stability checks against historical norms.
- Regular forecast stability verification, ensuring consistency week-over-week.
- Final pre-delivery data completeness verification.

Level of Human Oversight:

While the forecasting and production process is automated, human oversight is integrated at multiple levels, particularly:

- Feature development and refinement
- Model interpretation through explainability (SHAP values)
- Ongoing data and model quality monitoring

This structured oversight guarantees robustness in 3AI's Alpha forecasting methodology.