AKROS

Akros Equity Index Methodology

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Akros Technologies, Inc.

Contents

1 Introduction

Akros Technologies ("Akros") is dedicated to maintaining the highest standards of integrity through a transparent and replicable index design and calculation methodology. Driven by deep expertise in indexing, portfolio analytics, and data management, Akros seeks to bring an innovative and insightful perspective to the financial market. This dedication is reflected in the meticulous processes and standards that Akros adheres to in the creation and management of its indices.

Akros Equity Index, which consists of listed securities, enable investors to gain exposure to various markets and size segments worldwide in a consistent, rule-based manner. This approach ensures a balanced combination of broad market coverage and liquidity. Offering diverse size and regional segmentations, Akros provides an extensive range of index products and custom index development services, thus facilitating access to systematic investment strategies. The comprehensive suite of services provided by Akros, including index administration and calculation agent services, caters to a wide client base that includes asset managers, index administrators, advisors, and investors. These services are designed to meet the unique needs of each client while maintaining the highest standards of accuracy and transparency.

Individual Index Methodology documents outline the specific details of each index, encompassing an introduction and the objectives of the index, the construction criteria for its constituents, the frequency of rebalancing, and additional relevant information. These documents are critical to maintaining the highest standards of integrity and precision in index management. The Individual Index Methodology often refers to the Akros Equity IndexMethodology, which serves as a comprehensive and holistic guideline for the development and maintenance of equity-based indices.

2 Adherence to the IOSCO Principles

Akros Technologies remains steadfast in its mission to uphold the highest standards of integrity and professionalism. This commitment is reflected in every aspect of its operations, from the development and calculation of indices to their ongoing management and administration.

Akros adheres to the IOSCO Principles regarding the quality and integrity of indices and their methodologies by providing all relevant stakeholders with detailed information regarding the calculation and maintenance of the indices that that Akros provides. This commitment to transparency is a cornerstone of Akros's approach, ensuring that each index is managed according to the highest standards. Stakeholders have access to comprehensive details about index components, their selection criteria, and the overall methodology used in index calculation and maintenance. This level of professional detail ensures that users clearly understand how indices are constructed and maintained, fostering trust and confidence in the indices provided by Akros.

In light of the EU Benchmarks Regulation (Regulation (EU) 2016/1011), the Akros Equity Index Methodology provides a comprehensive framework that aligns with all relevant regulatory standards. The regulation sets out stringent requirements for benchmark administrators, emphasizing the need for accuracy, reliability, and transparency.

By transparently disclosing index maintenance rules and general calculation methods, the Akros Equity Index Methodology enables investors to effectively evaluate and utilize the indices developed by Akros. Detailed documentation and regular updates regarding the index methodologies ensure that users remain well-informed about any changes to index calculations. This transparency allows stakeholders to make informed decisions based on accurate and up-to-date information, enhancing their ability to use Akros indices for various investment and analytical purposes. Akros's commitment to clear and comprehensive communication ensures that all relevant parties fully understand and benefit from its index products.

For further information, please refer to the Akros's Statement of Adherence to IOSCO Principles.

3 Index Construction

3.1 Initial Investable Universe Construction

An initial investable universe construction is the process of defining a set of investable equities that meet specific criteria prior to narrowing down further analysis and selection for the index. The step is important process that reduces the scope from numerous possible constituents to a manageable and relevant subset.

3.1.1 Eligible Investable Universe Construction

All listed equities, including Real Estate Investment Trusts (REITs) are considered for inclusion in the equity-based index. For the Akros Equity Index, the security types that are not considered for inclusion are as follows: Private Equity, closed-End Investment Companies, ETFs and ETNs, LLCs, Partnerships, Royalty Trusts, and Special Purpose Acquisition Companies, and Special Purpose Vehicles.

3.1.2 Tradable Equity Screening

Tradable equity screening is conducted to ensure that all equities in the initial investable universe are tradable and to minimize the potential market impact. Unless otherwise stated in the Individual Index Methodology with higher sets of requirements, the Akros Equity Index imposes the following minimum tradable equity screening requirements by default:

Minimum Market Capitalization Requirement

The default minimum market capitalization requirement is the 95% percentile of all listed equities eligible for investable universe construction with an additional n-month or n-days average daily market capitalization requirement. The default additional requirement is a 3-month average daily market capitalization of greater than USD $50M but can vary according to the Individual Index Methodology.

$$\frac{\sum_{i=1}^{n} \text{Daily Market Capitalization}}{n} > \text{USD \$50M} \tag{1}$$

Minimum Transaction Volume Requirement

The default minimum transaction volume requirement is the 95% percentile of all listed equities eligible for investable universe construction with an additional n-month or n-days average daily transaction volume requirement. The default additional requirement is a 3-month average daily transaction volume of greater than USD $50K but can vary according to the Individual Index Methodology.

$$\frac{\sum_{i=1}^{n} \text{Daily Transaction Volume}}{n} > \text{USD \$50K} \tag{2}$$

Minimum Trading Volume Requirement

The default minimum trading volume requirement is the 95% percentile of all listed equities eligible for investable universe construction with an additional n-month or n-days average daily trading volume requirement. The default additional requirement is a 3-month average daily trading volume of greater than 5,000 shares but can vary according to the Individual Index Methodology.

$$\frac{\sum_{i=1}^{n} \text{Daily Trading Volume}}{n} > \text{5,000 shares} \tag{3}$$

3.1.3 Geographical Region Selection

Appendix A shows the list of eligible exchanges for each of the defined geographical region. The eligibility of an exchange is reviewed by the Akros Index Committee on the annual basis.

3.1.4 Industry Classification Selection

Appendix B contains information about the Akros Industry Classification System (the "AICS") which classifies listed equities of eligible exchanges to a set of industry hierarchy based on the North American Industry Classification System.

3.2 Index Constituent Selection

The index objective varies according to the type of the index. As such, the process of selecting the individual constituents of the index varies according to the type of the index. The summary of different types of Akros Equity Index are outlined below, and details are further elaborated on the methodology of each index type.

3.2.1 Broad-Based Index

A broad-based index is a type of equity index that includes a wide range of companies from different sectors and industries to represent the overall performance of the market. These indices are designed to provide a comprehensive snapshot of the market's health and direction.

Please refer to the "Akros Broad-Based Index Methodology" for further information.

3.2.2 Fundamental-Based Index

A fundamental-based index is a type of stock market index that selects its constituent companies based on specific fundamental metrics. These indices aim to provide a different perspective on market performance by focusing on the intrinsic value and financial health of companies.

Please refer to the "Akros Fundamental-Based Index Methodology" for further information.

3.2.3 Factor-Based Index

A factor-based index is a type of index that selects its constituent based on specific quantitative factors. These indices aim to provide exposure to strategic beta deemed to drive excess returns relative to the market.

Please refer to the "Akros Factor-Based Index Methodology" for further information.

3.2.4 Thematic Index

A thematic index is a type of index that selects its constituent based on specific themes. These indices aim to provide exposure to themes that are identified by the Akros Industry Classification System as well as those that are not currently not well captured by the industry classification due to the novelty of the theme.

Please refer to the "Akros Thematic Index Methodology" for further information.

3.2.5 Inverse / Leveraged Index

An inverse index is a type of index designed to move in the opposite direction relative to a benchmark index. A leveraged index is a type of index that aims to provide a multiple of the daily performance of a benchmark index.

Please refer to the "Akros Inverse and Leveraged Index Methodology" for further information.

3.2.6 Enhanced Index

An enhanced index is a type of index that selects its constituent based on novel sets of quantitative factors that have been identified by Akros. These indices aim to provide exposure to companies that score highly amongst these quantitative factors and are probabilistically more likely to lead to excess returns relative to the benchmark.

Please refer to the "Akros Enhanced Index Methodology" for further information.

Naturally, each of the index type has different procedures with which the index cosntituents are selected from the Initial Investable Universe. The process ranges from the utilization of scores derived using company fundamentals and quantitative factors as well as the usage of thematic scores. These procedures are transparently disclosed in each of the methodology outlined above which elaborates the general methodology for each index type as well as in the Individual Index Methodology.

4 Index Weighting Methodology

Once the individual constituents of the index have been identified, the weighting methodology is applied to the constituents to determine the weight of each equity constituent in the overall index. There are conventional weighting methodologies such as market capitalization weighting, equal weighting and mixed weighting. In additional to conventional methodologies, Akros Equity Indices also adopts the score-based weighting where the score for each individual constituent is calculated and evaluated according to the Individual Index Methodology.

4.1 Market Capitalization Weighting

In a market capitalization-weighted index, each index constituent company i is weighted according to its market capitalization $\mathrm{MC}_{i,t}$ at time t, or its free-float adjusted equivalent. Market capitalization is calculated by multiplying the company's current share price by the total number of its outstanding shares and its variant is calculated by multiplying the free float adjustment factor with the market capitalization.

$$\mathbf{w_t} = \left\{ \frac{\mathrm{MC}_{1,t}}{\sum_{i=1}^{n} \mathrm{MC}_{i,t}}, \frac{\mathrm{MC}_{2,t}}{\sum_{i=1}^{n} \mathrm{MC}_{i,t}}, \frac{\mathrm{MC}_{3,t}}{\sum_{i=1}^{n} \mathrm{MC}_{i,t}}, \cdots, \frac{\mathrm{MC}_{n,t}}{\sum_{i=1}^{n} \mathrm{MC}_{i,t}} \right\} \tag{4}$$

4.2 Equal Weighting

Equal weighting is a method where each index constituent i is assigned the same weight $1/n$ where n is the total number of index constituents. When compared to the market capitalization weighting method, the equal weighting method provides greater exposure to equities with comparatively smaller market capitalization.

$$\mathbf{w_t} = \left\{ \frac{1}{n}, \frac{1}{n}, \cdots, \frac{1}{n} \right\} \tag{5}$$

4.3 Mixed Weighting

Mixed weighting is the average of the market capitalization weighting and the equal weighting. The expression on the left hand side of the numerator represents the market capitalization-weighted component and the expression on the right hand side of the numerator represents the equal-weighted component. The aim is to provide greater exposure to equities with comparatively smaller market capitalization whilst maintaining greater constituent weight to those with comparatively larger market capitalization.

$$\mathbf{w_t} = \left\{ \frac{n\mathrm{MC}_{1,t} + \sum_{i=1}^{n} \mathrm{MC}_{i,t}}{2n \sum_{i=1}^{n} \mathrm{MC}_{i,t}}, \frac{n\mathrm{MC}_{2,t} + \sum_{i=1}^{n} \mathrm{MC}_{i,t}}{2n \sum_{i=1}^{n} \mathrm{MC}_{i,t}}, \cdots, \frac{n\mathrm{MC}_{n,t} + \sum_{i=1}^{n} \mathrm{MC}_{i,t}}{2n \sum_{i=1}^{n} \mathrm{MC}_{i,t}} \right\} \tag{6}$$

4.4 Score-Based Weighting

Score-Based weighting is a method where each index constituent i is weighted according to its score $s_{i,t}$ at time t, which is defined in the Individual Index Methodology. The Score-Based weight provides an alternative weighting scheme to the conventional methods and thereby accomodates for a different exposure to equities. The procedure with which the scores are determined for each constituent is fully disclosed in each of the Individual Index Methodology.

$$\mathbf{w_t} = \left\{ \frac{\mathrm{s}_{1,t}}{\sum_{i=1}^{n} \mathrm{s}_{i,t}}, \frac{\mathrm{s}_{2,t}}{\sum_{i=1}^{n} \mathrm{s}_{i,t}}, \cdots, \frac{\mathrm{s}_{n,t}}{\sum_{i=1}^{n} \mathrm{s}_{i,t}} \right\} \tag{7}$$

5 Index Weight Capping Methodology

The index weight capping methodology refers to the procedure used to modify the weights of index constituents to satisfy all the constraints specified in each individual index methodology. The constraints are often intended to ensure that each index constituent has a reasonable influence on the index.

5.1 Common Constraints

The most commonly used constraints are described below.

5.1.1 Maximum Capping

Maximum weight capping involves setting an upper limit w_{max} on the weight of each individual constituent in the index. This prevents large constituents from having too much exposure on the index.

5.1.2 Minimum Capping

Minimum weight capping involves setting a lower limit w_{min} on the weight of any individual constituent in the index. This ensures that small constituents have at least some exposure on the index.

5.1.3 Diversification Rule

The diversification rule prevents a small number of index constituents from dominating the index. The default setting is to ensure that the combined weight of consituents exceeding 4.5% remains below 45%.

$$\mathcal{S} = \{i \mid w_i > 0.045\} \tag{8}$$

$$\sum_{i \in \mathcal{S}} w_i \leq 0.45 \tag{9}$$

5.2 Optimization

The aim of the optimization is to modify the original constituent weights $(w_1, \ldots, w_n)$ so that all of the weight constraints are satisfied while minimizing the amount of deviation from the original weights.

5.2.1 Problem Formulation

The amount of deviation between the optimized weights and the original weights is defined by the *objective function*, which is the sum of squares error unless otherwise specified in the individual index methodology.

The *constraints* used for the optimization are:

- Constraint 1 ensures that the sum of the weights of the constituents w_i is equal to 1 for a conventional long-only equity portfolio. This sum may change depending on the type of index, influenced by the use of the inverse ratio r_I and the leverage ratio r_L.
- Constraint 2 defines the maximum and minimum cap as defined in Section 5.1.
- Additional constraints specific to each individual index may exist, but are omitted from the equations below.

Writing w_i^* as the optimized weight, combining the above gives the following set of equations:

$$[w_1^*, \ldots, w_n^*] = \underset{\hat{w}_1, \ldots, \hat{w}_n}{\operatorname{argmin}} \sum_{i=1}^{n} (\hat{w}_i - w_i)^2 \qquad \text{(Objective Function)}$$

$$\sum_{i=1}^{n} \hat{w}_i = 1 \cdot r_I \cdot r_L \qquad \text{(Constraint 1)}$$

$$w_{min} \leq \hat{w}_i \leq w_{max} \quad \forall\ i \in \{1, \ldots, n\} \qquad \text{(Constraint 2)}$$

5.2.2 Optimization Algorithm

The most common optimization setup, including the default case outlined in Section 5.2.1, is a convex optimization problem. For such cases, the index methodology uses CVXPY, an open source library for solving convex optimization problems. The library solves the optimal weight vector using a variety of available solvers, including but not limited to ECOS, SCS, and OSQP.

In the rare case when the optimization problem is a non-convex optimization, the specific algorithm details will be outlined in the individual index methodology.

6 Index Maintenance

Index rebalancing is conducted to ensure that the index constituents remain in aligned with the objective of the index. Akros conducts two types of rebalancing: Regular rebalancing and Ad-hoc Rebalancing.

6.1 Regular Rebalancing

Regular rebalancing involves adjusting the index constituent of the index at predefined intervals to accurately maintain the investment goal of the index.

Frequency

The length of the interval can vary for each index, from daily regular rebalancing to annual regular rebalancing. The frequency of regular rebalancing is set out in the Individual Index Methodology.

Determination Date

On the closing of the determination date, all the data required to conduct regular rebalancing are collected. Performing all the necessary procedures from initial investable universe construction, and index constituent selection to index weighting and capping using the data from determination date, the index weights and shares are finalized.

Implementation Date

An implementation interval is a window between the determination date and the implementation date that allows room for review and operation. The interval allows the index committee to review the index constituent and portfolio managers to make the corresponding trades. The default implementation interval is 3 days but the interval can be adjusted according to the Individual Index Methodology.

Effective Date

The index constituents are incorporated into the index at the close of the implementation date and become effective at the opening of the effective date, which is the day immediately following the implementation date.

6.2 Ad-hoc Rebalancing

Ad-hoc rebalancing involves adjusting the index constituents when specific conditions are met, rather than at regular intervals. Upon meeting these conditions, Akros notifies the relevant internal stakeholders and establishes the determination, implementation, and effective dates for the rebalancing process. These conditions as outlined in the Individual Index Methoddology, vary according to each index and may include, but are not limited to, the following:

Maximum Threshold

Ad-hoc Rebalancing can be conducted when the weight of any single constituent exceeds over a defined maximum threshold.

Corporate Action

Ad-hoc Rebalancing can be performed in response to significant market events or changes in economic conditions as per decided by the index committee.

Advisory from the Index Committee

Ad-hoc rebalancing can be performed based on the advice and feedback from the index committee when a constituent is deemed inappropriate for inclusion. This decision undergoes a thorough review process by the committee to ensure it aligns with the index's objectives and criteria.

7 Index Governance

Index governance follows a structured framework and established processes to oversee the creation, maintenance, and review of financial indices. Akros' index governance ensures transparency, reliability, and integrity of the indices, which are crucial for stakeholders who rely on the indices for benchmarking and making investment decisions.

7.1 Index Committee

Akros Index Committee consists of external professionals in the related field, including professors and lawyers, responsible for overseeing the creation, maintenance, and management of financial indices developed by Akros. The Akros Index Committee oversees from the proposal of new index concepts based on market needs to holding periodic reviews of Individual Index Methodology to ensure that they remain relevant and reflect the objective. The committee ensure the accuracy and reliability of the data used for index calculations, whilst making sure that the indices remain in compliant with relevant regulatory requirements and standards. It is the role of the committee to disclose the index methodology and that its changes are transparent and clearly communicated to stakeholders. The committee maintains the independence and objectivity of the index calculation process to avoid conflicts of interest.

A List of Eligible Exchanges

The following table shows the list of eligible and regulated exchanges that comply with specific regulations and standards set by financial authorities. The Individual Index Methodology specifies the exchanges and the listed securities from these exchanges which are utilized in the initial investable universe.

Country	**Name of Exchanges**	**Country**	**Name of Exchanges**
Argentina	Bolsa de Comerico de Buenos Aires	Luxembourg	Luxembourg Stock Exchange
Australia	Australian Securities Exchange	Malaysia	Bursa Malaysia
Austria	Vienna Stock Exchange	Mauritius	Mauritius Stock Exchange
Belgium	Euronext Brussels	Mexico	Mexico Stock Exchange
Brazil	Bolsa de Valores Mercadorias e Futuros	Morocco	Casablanca Stock Exchange
Bulgaria	Bulgarian Stock Exchange	Namibia	Namibian Stock Exchange
Canada	Canadian Securities Exchange	Netherlands	Euronext Amsterdam
	Toronto Stock Exchange	New Zealand	New Zealand Exchange
	TSX Venture Exchange	Nigeria	Nigerian Stock Exchange
Colombia	Bolsa de Valores de Colombia	Norway	Oslo Bors
Croatia	Zagreb Stock Exchange	Oman	Muscat Stock Exchange
Czech Republic	Prague Stock Exchange	Palestine	Palestine Securities Exchange
Denmark	NASDAQ OMX Copenhagen	Peru	Bolsa de Valores de Lima
Ecuador	Bolsa de Valores de Quito	Phillipines	Phillipines Stock Exchange
Egypt	Egyptian Stock Exchange	Poland	Warsaw Stock Exchange
Finland	NASDAQ OMX Helsinki	Portugal	Euronext Lisbon
France	Euronext Paris	Qatar	Qatar Exchange
Germany	Berlin Stock Exchange	Russia	Moscow Stock Exchange
	Dusseldorf Stock Exchange	Serbia	Belgrade Stock Exchange
	Frankfurt Stock Exchange	Singapore	Singapore Stock Exchange
	Hamburg Stock Exchange	Slovenia	Ljubljana Stock Exchange
	Munich Stock Exchange	South Africa	Johannesburg Stock Exchange
	Stuttgart Stock Exchange	South Korea	Korea Exchange KOSPI
Ghana	Ghana Stock Exchange		Korea Exchange KOSDAQ
Greece	Athens Stock Exchange	Spain	Bolsa de Barcelona
Hong Kong	Hong Kong Stock Exchange		Bolsa de Madrid
Hungary	Budapest Stock Exchange	Sri Lanka	Colombo Stock Exchange
India	BSE India	Sweden	Berne Stock Exchange
	National Stock Exchange of India		SIX Swiss Exchange
Indonesia	Indonesia Stock Exchange	Taiwan	Taipei Stock Exchange
Ireland	Irish Stock Exchange		Taiwan Stock Exchange
Israel	Tel Aviv Stock Exchange	Thailand	Stock Exchange of Thailand
Italy	Borsa Italiana	UK	BATS Europe
Ivory Coast	Bourse Regionale des Valeurs Mobilieres		London Stock Exchange
Japan	Tokyo Stock Exchange	Ukraine	Ukrainian Stock Exchange
	Fukuoka Stock Exchange	USA	Chicago Stock Exchange
	Nagoya Stock Exchange		NASDAQ
	Sapporo Securities Exchange		New York Stock Exchange
Kenya	Nairobi Stock Exchange		NYSE Arca
Kuwait	Kuwait Stock Exchange	Vietnam	Hanoi Stock Exchange
Latvia	NASDAQ OMX Riga		Ho Chi Minh Stock Exchange
Lebanon	Bourse de Beyrouth	Zimbabwe	Zimbabwe Stock Exchange

B Akros Industry Classification System (AICS)

The Akros Industry Classification System (AICS) is a system created by Akros to facilitate investors' understanding of global companies and their business operations.

The AICS adheres to the 6-digit classification standards set by the North American Classification System (NAICS). Further building upon the foundation set forth by the NAICS, Akros has expanded upon this framework to increase the overall scope of the classification standards to encompass a broader range of companies globally.

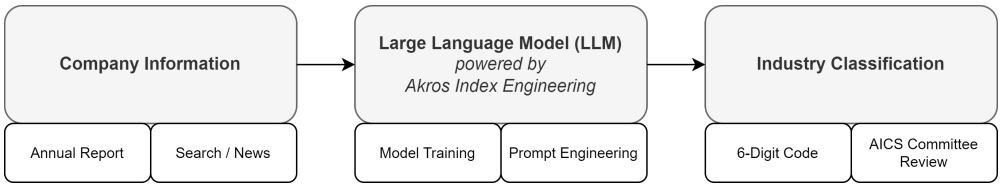

Figure 1: Process of Assigning the AICS label to a single company

Consequently, Akros has developed a scalable and systematic procedures to create classification labels that accurately represent the business operations of global companies.

Firstly, we gather publicly available information required to classify the company. These data include but are not limited to business description and revenue segment by product from the Annual Report, Search and News information available from online. Secondly, Akros developed its proprietary large language model (LLM) trained to the task to accurately label each company to an industry classification. The scope of model development includes training of the model to financial natural language data to fine-tuning and prompt engineering suitable for the classification task. Thirdly, the output of the classification label (6-digit-code) is reviewed by the AICS committee to ensure the assignment of the classification label that best reflects the business operation of the company.

The final output of the classification label is a 6-digit-code as AICS uses a 6-digit coding system structured in a hierarchical manner divided into 5 distinct classification levels, each offering varying degrees of specificity. At the foundation is the Sector level, classified with a 2-digit code, representing broad industry categories. This structure then progressively narrows down to Subsectors (3-digit), Industry Groups (4-digit), NAICS Industries (5-digit), culminating in the most granular classification, the 6-digit Industries. A zero as the sixth digit indicates that the NAICS industry and the U.S. industry are identical.

Most modern companies are not composed of a single business. For example, while Amazon operates an e-commerce business, it also owns AWS, a leading cloud service. Therefore, AICS follows NAICS, but performs a dual classification into Primary and Secondary Classification. The category contributing the most to revenue is considered for Primary Classification, while a complementary category that does not overlap with the Primary is chosen for Secondary Classification. Akros believes that such a structure of AICS enables a multifaceted industry classification that provides a holistic picture of the company.

Classification	**Code Digits**	**Example Code**	**Example Name**
Sector	2	11	Agriculture, Forestry, Fishing and Hunting
Subsectors	3	111	Crop Production
Industry Groups	4	1112	Vegetable and Melon Farming
NAICS Industries	5	11121	Vegetable and Melon Farming
6-Digit Industries	6	111211	Potato Farming

Table 1: Example of NAICS Classification

Please refer to the Akros Industry Classification System for further information.