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# **INDXX ARTIFICIAL INTELLIGENCE & BIG DATA INDEX METHODOLOGY**

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# 1. INDXX ARTIFICIAL INTELLIGENCE & BIG DATA INDEX

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## 1.1 INDEX DESCRIPTION

The Indxx Artificial Intelligence & Big Data Index is designed to track the performance of companies listed or incorporated in developed markets that are positioned to benefit from the development and utilization of Artificial Intelligence (“AI”) technology in their products and services, as well as companies that produce hardware used in Artificial Intelligence applied for the analysis of Big Data. The index intends to reflect the performance of companies engaged in applications of AI including but not limited to: AI developers, AI-as-a-service(“AlaaS”), AI hardware, and quantum computing.

The index has a base date of January 31, 2014 with an initial value of 1,000.

The index is currently available in the following version:

- Net Total Return (Bloomberg Ticker: IAIQ)

## 1.2 CREATION OF MASTER LIST

### 1.2.1 Initial Universe

To be eligible for inclusion in the Initial Universe, securities must have:

- Securities with primary listing or incorporation in the following countries are eligible for inclusion: United States, Canada, Taiwan, South Korea, Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Australia, Hong Kong, Japan, New Zealand, or Singapore. In addition, ADRs and GDRs of companies incorporated or with primary listing in China are eligible for inclusion.
- A minimum total market capitalization of \$2 billion for Category 1 and \$500 million for Category 2. Each category is described in more detail below.
- A minimum average daily turnover for the last 6 months greater than or equal to \$2 million for both Category 1 and Category 2.
  - In case of a Significant IPO, a security must have an average daily turnover greater than or equal to \$2 million since the IPO launch date.
- Traded on 90% of the eligible trading days in the last 6 months.
  - In case a security does not have a trading history of 6 months (only IPOs), to be considered for inclusion, in case of Significant IPOs, the IPO must have been listed at least 10 calendar days prior to the ‘ Selection Date’, and in the case of other IPOs, 3 calendar months prior to the ‘Selection Day’.
  - Additionally, unless the security is a Significant IPO, the security must have traded on 90% of the eligible trading days for the 3 months preceding the ‘Selection Day’ (this requirement shall not apply to Significant IPOs).
  - An IPO is considered to be a “Significant IPO” if its company level total market capitalization is greater than the company level total market capitalization of at least 50% of the on-going index constituents as of previous ‘Reconstitution Selection Day’.

### 1.2.2 Free Float

All constituents must meet at least one of the following criteria:

- (A) minimum free float equivalent to 10% of shares outstanding  
(or)
- (B) minimum free float market capitalization of \$1 billion.

### 1.2.3 Maximum Price

Securities trading at a price of \$10,000 or above are ineligible for inclusion in the index. This rule is not applicable for existing constituents. Existing constituents would remain in the initial universe irrespective of the stock price.

### 1.2.4 Security Type

The following security types are eligible for inclusion:

- Common Stock
- ADR
- GDR

### 1.2.5 Share Classes

If multiple share classes exist for a company, the following preference order is followed:

- The existing share class /listing in the portfolio is retained if it satisfies all the eligibility criteria of the index.
- In case an ADR for a security is available, it will be considered for inclusion over other security type.
- In all other cases, the most liquid share class is considered for inclusion in the portfolio.

## 1.3 SECURITY SELECTION PROCESS

The security selection process is based on research performed by Indxx and entails the following steps:

- Each security that has passed the investable universe criteria will be screened for the FactSet Industries as mentioned below as per their respective categories of Artificial Intelligence Developers (Category 1) and “Artificial Intelligence and Big Data Analytics Hardware” (Category 2). In the case that a security qualifies for both inclusion in Category 1 and Category 2, the security will be included in the Category for which it scores higher in the research framework defined below.
- As of March 2018, Indxx has identified the following FactSet industries to be eligible for selection for the respective categories:

Category 1		
Sub – Categories	Description	FactSet Industries
<b>Artificial Intelligence Developers</b>	This category includes companies that develop AI and use AI in their own products. Companies that have developed internal AI capabilities (organically or	<ul style="list-style-type: none"> <li>• Advertising/Marketing Services</li> <li>• Aerospace &amp; Defense</li> <li>• Biotechnology</li> <li>• Cable/Satellite TV</li> </ul>

	through acquisition) and are applying artificial intelligence technology to enhance their products and services are the focus. AI applications include but are not limited to language/image processing and recognition, automated communications, threat detection, recommendation generation, and other predictive analytics. The companies are considered for inclusion in this category based on the level of AI involvement of the companies.	<ul style="list-style-type: none"> <li>• Computer Communications</li> <li>• Computer Peripherals</li> <li>• Computer Processing Hardware</li> <li>• Data Processing Services</li> <li>• Electronic Equipment/Instruments</li> <li>• Financial Publishing/Services</li> <li>• Industrial Conglomerates</li> <li>• Industrial Machinery</li> <li>• Information Technology Services</li> <li>• Insurance Brokers/Services</li> <li>• Internet Retail</li> <li>• Internet Software/Services</li> <li>• Medical Specialties</li> <li>• Miscellaneous Commercial Services</li> <li>• Packaged Software</li> <li>• Semiconductors</li> <li>• Telecommunications Equipment</li> <li>• Other Consumer Services</li> <li>• Motor Vehicles</li> </ul>
<b>Artificial Intelligence-as-a-Service (“AlaaS”)</b>	Companies that provide artificial intelligence capabilities to their customers as a service. Companies in this segment typically offer cloud-based platforms that allow their customers to apply artificial intelligence techniques without needing to make a direct investment in AI-related infrastructure.	

<b>Category 2</b>		
<b>Sub – Categories</b>	<b>Description</b>	<b>FactSet Industries</b>
<b>Artificial Intelligence Hardware</b>	Companies that produce semiconductors, memory storage and other hardware that is utilized for artificial intelligence applications.	<ul style="list-style-type: none"> <li>• Computer Communications</li> <li>• Computer Peripherals</li> <li>• Computer Processing Hardware</li> <li>• Data Processing Services</li> <li>• Electronic Production Equipment</li> <li>• Information Technology Services</li> <li>• Internet Software/Services</li> <li>• Miscellaneous Commercial Services</li> <li>• Packaged Software</li> <li>• Semiconductors</li> <li>• Telecommunications Equipment</li> </ul>
<b>Quantum Computing</b>	Companies that are at the forefront of developing quantum computing technology, which is in the process of being commercialized and is expected to have significance in AI and big data applications	<ul style="list-style-type: none"> <li>• Information Technology Services</li> <li>• Internet Software/Services</li> <li>• Miscellaneous Commercial Services</li> <li>• Packaged Software</li> <li>• Semiconductors</li> <li>• Telecommunications Equipment</li> </ul>

	in the future.	<ul style="list-style-type: none"> <li>• Electronic Components</li> <li>• Electronic Equipment/Instruments</li> <li>• Financial Publishing/Services</li> <li>• Industrial Machinery</li> <li>• Insurance Brokers/Services</li> <li>• Tools &amp; Hardware <ul style="list-style-type: none"> <li>• Electrical Products</li> </ul> </li> <li>• Electronics/Appliance Stores</li> <li>• Electronics/Appliances</li> <li>• Engineering&amp; Construction</li> <li>• Industrial Conglomerates</li> <li>• Miscellaneous</li> <li>• Miscellaneous Manufacturing</li> <li>• Motor Vehicles</li> </ul>
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- The FactSet Industries are reviewed at each annual reconstitution.
- After the initial screening of FactSet Industries described above, extensive research is undertaken with a focus on identifying the business segments that facilitate Artificial Intelligence and Big Data analysis in their respective categories. Only those companies that provide direct exposure to AI or have stated their primary business to be in products and services focused on AI products, services, or utilization are eligible for inclusion in the index.
- As the last step of the research process, the remaining companies are scored by the extent of their exposure to AI using a proprietary framework described in more detail below.
- The following are the examples of criteria that are utilized in this framework for the assessment of Category 1 Companies:

Category 1		
Sample Exposure Category	Description	Definitions
<b>Application of AI in Core Products/Services</b>	Company demonstrates the application of AI in products/services defined as "Core"	"Core" - company utilizes AI in majority of the products and services in most of its products.
<b>Provider of AI- as-a-service (AlaaS)</b>	Provides AI capabilities such as those listed above to other companies in a "software-as-a-service" structure (platform for leveraging AI technology without requiring investment in infrastructure)	Company provides AlaaS platform as a complete AI solution to customers; typically leverages cloud infrastructure and eliminates need for customer to invest directly in AI related infrastructure.
<b>Acquisition of AI Company</b>	Company has made a significant acquisition of an AI company	Acquisition must have occurred after 2012

<b>Significant R&amp;D Investment into AI</b>	Company has made a significant R&D investment into AI	Company has publicly announced and/or clearly stated an R&D investment into AI.
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- The following are the examples of criteria that are utilized in this framework for the assessment of Category 2 Companies:

Category 2		
Sample Exposure Category	Description	Definitions
<b>Hardware is utilized specifically for AI applications (data center, autonomous vehicles) as per company/product details</b>	Companies that are developing hardware that is designed specifically for AI applications (not all producers of GPUs, FPGAs, etc. are designing hardware for AI applications specifically)	The primary "business segments" where hardware is being used for AI applications are (1) data centers/cloud and (2) embedded systems such as autonomous vehicles
<b>Developing quantum computing hardware/technology</b>	Computing that utilizes quantum-mechanical phenomena; has yet to be fully commercialized but significant R&D in the area	Companies that are developing quantum computing hardware/technology - typically this is being done by large technology companies with significant R&D budgets and existing computing capabilities
<b>Producer of Graphics Processing Units (GPUs)</b>	Electronic circuit designed to rapidly alter/manipulate memory; increasingly utilized in AI applications	Companies that produce GPUs
<b>Producer of Field Programmable Gate Arrays (FPGAs)</b>	Integrated circuit designed to be configured after it is manufactured (customizable); gaining adoption in AI applications	Companies that produce FPGAs

- A final composite score shall be arrived by combining the scores each company receives through the research framework.
- Each company will be assigned a final percentage score ("Exposure Score") based on the composite score that the company receives in its Category, relative to the total possible score of its Category.

## 1.4 FINAL COMPOSITION

From the Selection List:

- The top 60 securities from Category 1 and top 25 securities from Category 2 will be selected for the final security selection based on their Exposure Score. Companies must have a positive Exposure Score to be eligible for inclusion.
- If there is a tie-breaker for inclusion among the securities being scored, then the tied securities will be selected for inclusion based on the highest ADTV as of the reconstitution date.
- If there are fewer securities in either category than the target count as defined above, then all the remaining securities with positive Exposure Scores are considered for inclusion in the final portfolio.

## 1.5 WEIGHTING

- The Index is modified market cap-weighted at the time of reconstitution with a security cap of 3%. Securities with an Exposure Score less than 20% receive a security cap of 1%.
- The excess weight is proportionately distributed among the remaining uncapped securities. While retaining the 3% limit for securities with an Exposure Score greater than 20% and the 1% limit for securities with an Exposure Score less than 20%.
- Once the capping for the securities is fulfilled, the securities would be checked for a minimum weight floor of 0.3%. Any security with a weight less than or equal to 0.3% will be given a weight of 0.3%. The weights of the remaining uncapped securities will be proportionately reduced.
- Security-level market capitalization is considered for calculating weights.

## 1.6 BUFFER RULES

Buffer Rules are employed to reduce Portfolio Turnover. The following buffer rules apply:

### 1.6.1 Market Capitalization

A constituent shall continue to be included in the Initial Universe if its market capitalization is greater than or equal to 80% of the previously defined market capitalization limit. To illustrate, if an existing index member qualifies all other selection criteria but doesn't qualify the market capitalization criteria to the extent of 20% deviation then it will be retained in the new index member list.

### 1.6.2 Liquidity

A constituent shall continue to be included in the Initial Universe if its 6-month ADTV is greater than or equal to 70% of the previously defined liquidity limit. To illustrate, if an existing index member qualifies all other selection criteria but doesn't qualify liquidity criteria to the extent of 30% deviation then it will be retained in the new index member list.

## 1.7 RECONSTITUTION AND REBALANCING RULES

### 1.7.1 Annual Reconstitution

- The index follows an annual reconstitution schedule. The newly reconstituted portfolio becomes effective at the close of last trading day of January each year. This day is called the 'Effective Day.'



- The security selection and portfolio creation process start on the close of the nearest Friday falling at least one month before the Reconstitution Effective Day, called the 'Selection Day.' The selection list is created based on the data as of the Selection Day.
- Weights are calculated at the close of the seventh trading day prior (six trading days prior) to the Effective Day. Index Shares are frozen using weights as of this day.

### 1.7.2 Semi-Annual Rebalance and IPO Review

The index is rebalanced semi-annually based on the weighting scheme described in more detail in section 1.5.

In addition, to effectively capture IPOs and changes in the structure of a company's business due to corporate actions, the index composition will be reviewed on a semi-annual basis.

- Any new addition or deletion to the index becomes effective on the close of last trading day of July each year. This day is called the 'Review Effective Day.'
- The selection date shall be the nearest Friday falling at least one month before the Review Effective Day. This day is called the 'Review Selection Day.'
- The weights calculation shall take place at the close of the seventh trading day prior to the Review Effective Day. This day is called the 'Review Weight Freeze Day.'

On the 'Review Selection Day', the following evaluations are partaken:

- IPO Review –
  - For IPOs with less than 6 calendar months of trading history as of the 'Review Selection Date' to be considered for inclusion, the IPO must have been listed at least 10 calendar days prior to the 'Review Selection Date', in the case of Significant IPOs, and 3 calendar months prior to the 'Review Selection Day', in the case of other IPOs.
  - Additionally, unless the security is a Significant IPO, the security must have traded on 90% of the eligible trading days for the 3 months preceding the 'Review Selection Day' (this requirement shall not apply to Significant IPOs).
  - Finally, the security must have an available average daily turnover greater than or equal to \$2 million.
  - If an IPO meets aforesaid criteria and all other standard criteria outlined in section 1.2, then it will be eligible for inclusion in the index.
  - An IPO is considered to be a "Significant IPO" if its company level total market capitalization is greater than the company level total market capitalization of at least 50% of the on-going index constituents as of previous 'Reconstitution Selection Day'.
  - To qualify for inclusion, all IPOs must receive an Exposure Score that is higher than the lowest scoring company in its respective Category. At the semi-annual review, it is possible for a Category to exceed its respective security limit because of an IPO addition.
- Corporate Action Review – At the time of review, all existing index constituents are checked for corporate actions that have become effective in the last 6 calendar months and that have significantly altered the company's business operations. These corporate actions include Spin-offs, Mergers or Acquisitions, divestiture, etc., that may significantly change the fundamentals of a company's business operations. Only companies that still comply to the index objectives will be retained in the index.

## 1.8 CORPORATE ACTIONS

The corporate action guidebook is present in the Announcements section of our website, under 'Index Documents'.

## 2. APPENDIX

### 2.1 METHODOLOGY CHANGES

Methodology changes since November 2020 are as follows:

Section	Previous Value	New Value	Effective Date (close)
1.2.1	<ul style="list-style-type: none"> <li>Companies must have minimum average daily turnover for the last 6 months greater than or equal to \$2 million for both Category 1 and Category 2.</li> </ul>	<ul style="list-style-type: none"> <li>Companies must have minimum average daily turnover for the last 6 months greater than or equal to \$2 million for both Category 1 and Category 2. <ul style="list-style-type: none"> <li>In case of a Significant IPO, a security must have an average daily turnover greater than or equal to \$2 million since the IPO launch date.</li> </ul> </li> </ul>	Nov 30, 2020
	<ul style="list-style-type: none"> <li>Traded on 90% of the eligible trading days in the last 6 months. <ul style="list-style-type: none"> <li>In case a security does not have a trading history of 6 months (only IPOs), such a security must have started trading at least 3 months before the start of the Reconstitution/ Rebalancing Process and should have traded on 90% of the eligible trading days for the past 3 months.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Traded on 90% of the eligible trading days in the last 6 months. <ul style="list-style-type: none"> <li>In case a security does not have a trading history of 6 months (only IPOs), to be considered for inclusion, in case of Significant IPOs, the IPO must have been listed at least 10 calendar days prior to the 'Selection Date', and in the case of other IPOs, 3 calendar months prior to the 'Selection Day'.</li> <li>Additionally, unless the security is a Significant IPO, the security must have traded on 90% of the eligible trading days for the 3 months preceding the 'Selection Day' (this requirement shall not apply to Significant IPOs).</li> <li>An IPO is considered to be a "Significant IPO" if its company level total market capitalization is greater than the company level total market capitalization of at least 50% of the on-going index constituents as of previous 'Reconstitution Selection Day'.</li> </ul> </li> </ul>	

Section	Previous Value	New Value	Effective Date (close)
1.7.2	<p>IPO Review – To be considered for inclusion, the IPO must have been listed at least 3 calendar months prior to the ‘Review Selection Day.’ Additionally, the security must have traded on 90% of the eligible trading days for the 3 months preceding the ‘Review Selection Day’. If an IPO meets aforesaid criteria and all other standard criteria outlined in section 1.2, then it will be eligible for inclusion in the index</p>	<p>IPO Review –</p> <ul style="list-style-type: none"> <li>• For IPOs with less than 6 calendar months of trading history as of the ‘Review Selection Date’ to be considered for inclusion, the IPO must have been listed at least 10 calendar days prior to the ‘Review Selection Date’, in the case of Significant IPOs, and 3 calendar months prior to the ‘Review Selection Day’, in the case of other IPOs.</li> <li>• Additionally, unless the security is a Significant IPO, the security must have traded on 90% of the eligible trading days for the 3 months preceding the ‘Review Selection Day’ (this requirement shall not apply to Significant IPOs).</li> <li>• Finally, the security must have an available average daily turnover greater than or equal to \$2 million.</li> <li>• If an IPO meets aforesaid criteria and all other standard criteria outlined in section 1.2, then it will be eligible for inclusion in the index.</li> <li>• An IPO is considered to be a “Significant IPO” if its company level total market capitalization is greater than the company level total market capitalization of at least 50% of the on-going index constituents as of previous ‘Reconstitution Selection Day’.</li> <li>• To qualify for inclusion, all IPOs must receive an Exposure Score that is higher than the lowest scoring company in its respective Category.</li> <li>• At the semi-annual review, it is possible for a Category to exceed its respective security limit because of an IPO addition.</li> </ul>	Nov 30, 2020
1.3		<ul style="list-style-type: none"> <li>• New Industry added in category 1 and category 2 – Motor Vehicles</li> </ul>	Dec 21, 2021

### 3. DISCLAIMER

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