# INDEXING THEMATIC MEGATRENDS

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GLOBAL

INVESTMENT

INDEX

DATA

RESEARCH
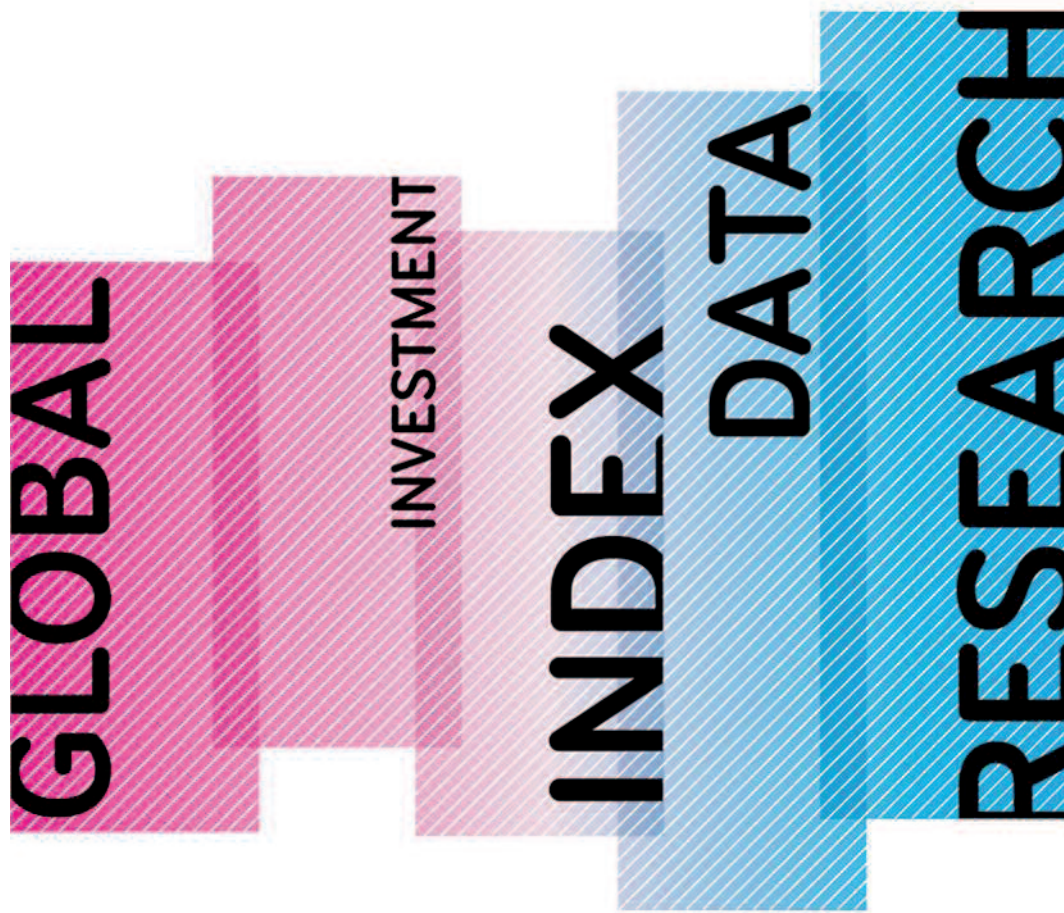
## STOXX

**INNOVATIVE. GLOBAL. INDICES.**

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## INTRODUCTION

The term "megatrend" was coined by US political scientist and author John Naisbitt at the start of the 1980s. It refers to powerful macroeconomic transformative forces that have a major impact on countries, businesses and societies around the world, disrupting the way products and services are produced, delivered and consumed. Such powerful forces typically tend to span business cycles, industries and geographies, creating a vicious cycle of sustained disruption resulting in structural shifts and irreversible transformations in the global economy, businesses and society. Megatrends are by no means a new phenomenon, with countries, industries and society all experiencing them, as noted by Naisbitt in his best-selling book by the same name.

However, thematic investing is a relatively new development in modern portfolio management that is driven by such megatrends. Although theme-based investing, e.g. in water utilities or infrastructure, has had its day in the sun in the past, thematic investing in its current form traverses geographies and industries/sectors with a forward-looking investment philosophy that typically focuses on the anticipated beneficiaries of a particular megatrend that has been identified. Driven by the disruptive power of innovation, thematic investing has gained in popularity and momentum over recent years from what may perhaps be considered to have originally been a bastion of a few well-informed active investment managers. STOXX has been at the forefront of bringing thematic investing to the mainstream, and has developed a suite of thematic indices that attempt to capture future megatrends using a transparent, systematic and rules-based approach.

In this paper, we discuss the STOXX approach to its family of thematic indices, familiarize readers with the data sources and the related index construction methodologies used to incorporate them, develop the concept and the rationale for each identified thematic, and analyze the resulting indices. This includes using basic index performance statistics and factor-based performance attribution[1] to identify any drivers of risk and return, plus any unintended systematic biases within each index that investors may need to be aware of whilst making investment decisions.
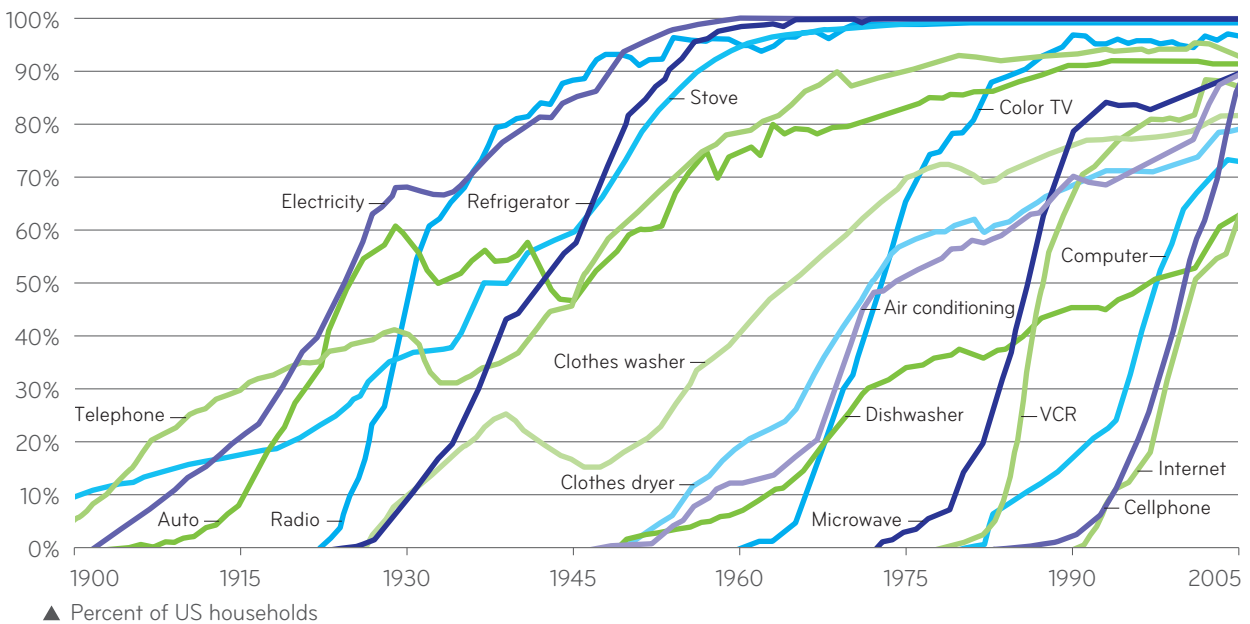
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[1] Performance attribution analysis uses Axioma's Portfolio Analytics system, which is based on the Axioma AX-WW 2.1 World-Wide Equity Factor Risk Model.

# INDEXING THEMATIC MEGATRENDS

## THE STOXX VIEW OF THE THEMATIC WORLD

**FIGURE 1:** Technology adoption rate versus time



Source: Nicholas Felton, The New York Times Company

Thematic investing is often considered to predict the winners of tomorrow, and hence to rely on successful identification of the overall theme and the sub-themes that are likely to become megatrends. Capitalizing on such a megatrend involves identifying a potential long-term structural theme and adopting that theme for investing with conviction. However, the pace of such innovation and change is much higher than it was a century or even half a century ago, as is suggested in Figure 1.

In STOXX's opinion, most of such changes have been triggered, and more importantly are likely to continue to be driven, by demographic changes, by the rapid evolution in new technology and by the growing awareness of climate change. This insight forms the foundation of the current thematic index offering (at the time of writing this publication) as depicted below.

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**FIGURE 2:** The pillars of thematic investment strategies
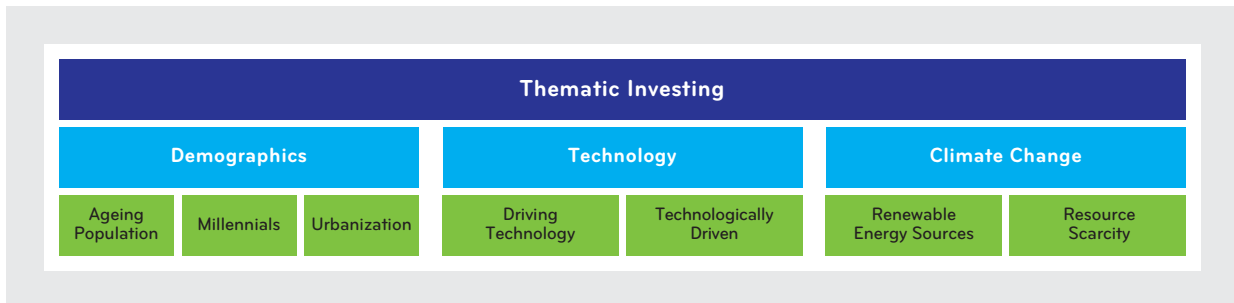


Source: STOXX

Identifying a megatrend at or before the first sign of its growth/adoption is extremely difficult, since a large number of ideas don't necessarily become megatrends. There is also likely to be less proof or historic/empirical evidence that can be utilized to identify a likely megatrend at an early stage, as its evolution has never played out before. STOXX has qualitatively assessed the various prevailing trends, collated feedback from existing and prospective client discussions, and surveyed the three megatrend pillars to come up with sub-themes for each of them. Within each sub-theme, individual trends are regularly assessed in a similar manner, and supplemented with innovative quantitative approaches in order to identify potential thematic sub-megatrends.

STOXX uses an open architecture approach and works with best-in-class data and intellectual property (IP) providers to develop innovative, systematic index solutions. In the case of thematic indices, STOXX has partnered with FactSet and Yewno to develop two different methodologies at the time of writing this publication, which are discussed in the next section.

## DATA SOURCES AND INDEX METHODOLOGY

Historically, thematic investing was usually considered the domain of specialist investment managers, who would typically carry out detailed proprietary research on the thematic megatrend they were interested in. They would then select stocks linked to the megatrend that offered the best value for their investment objective and horizon. Such investment research would consider not only typical financial data sets but also a mosaic of additional non-financial data from various non-standard sources. However, with the increasing popularity of thematic investing, new data providers have emerged to cater to this niche investment and indexing segment.

STOXX has designed two innovative approaches for its thematic indices: a revenue-based approach and an artificial intelligence (AI)-based approach.

### REVENUE-BASED APPROACH

The STOXX revenue-based thematic indices have been developed using the FactSet Revere Business Industry Classification System (RBICS) data set. FactSet RBICS is a collection of unique content sets that provides a dynamic industry taxonomy, offering investors a distinctive way to classify companies and

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analyze their performance. The highly granular (six levels) and accurate sector and industry classifications (1,500 distinct sub-industries) allows a detailed breakdown of the revenue sources of eligible companies. It thus helps identify and select companies with substantial exposure to particular themes.

**FIGURE 3:** Revenue Stream Classification
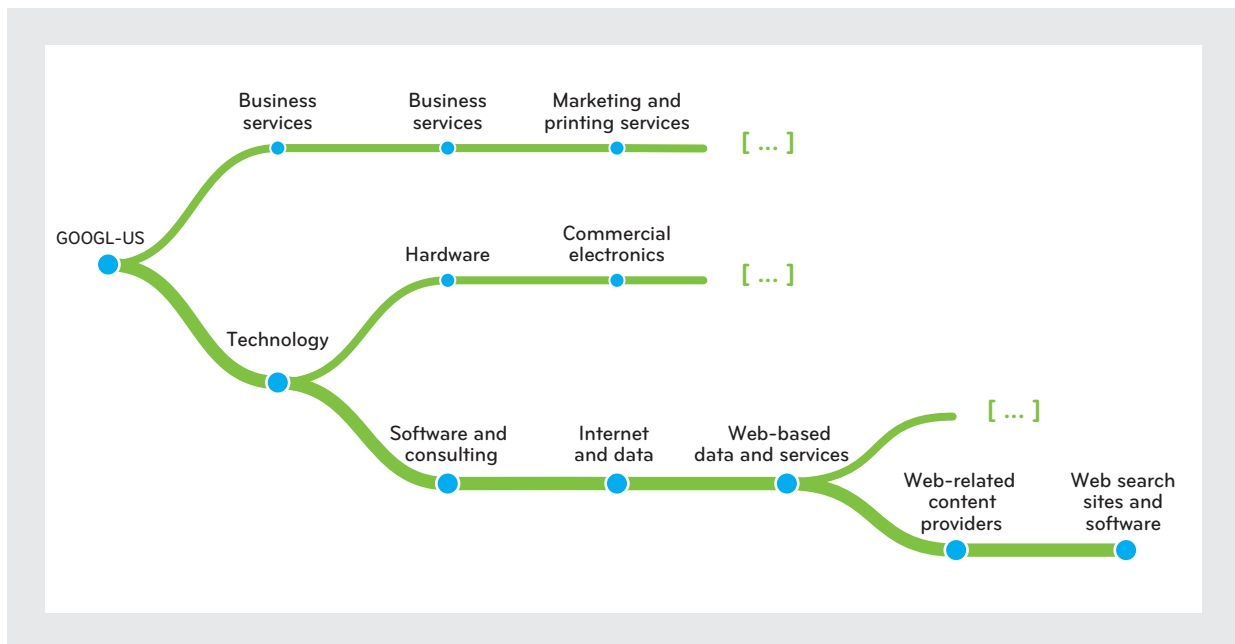


Source: FactSet

STOXX conducts extensive research, supplemented by client feedback, to identify thematics that benefit from certain megatrends. The drivers of the thematic in question are then identified and a list of RBICS sectors (typically Level 6 or the lowest of the 6 hierarchical levels) that are typically associated with a particular thematic are then mapped to them. All companies from the initial universe of securities are then considered using the typical revenue-based thematic index selection process, which is detailed below (the criteria are applied in the order listed). Some variations in the thresholds or filters are possible, depending on the thematic under consideration. For exact details of a particular thematic index, please refer to the Index Methodology Guide.

### Initial universe:
Typically, the STOXX Global Total Market Index or the STOXX Developed Total Markets Index as of the effective review date is used to define the index universe. Please refer to the index methodology guide for more details.

### Minimum liquidity:
Three-month median daily trading value (MDTV) in excess of EUR 1,000,000.

### Revenues:
More than 50% of revenues are generated from the aggregate of the RBICS sectors associated with the specific thematic megatrend.

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**Multiple share lines:**
Only the most liquid share line is included in the case of companies with multiple listings.

**ESG screening:**
For the purpose of environmental (E), social (S) and governance (G) based screening, STOXX has partnered with Sustainalytics, a leading independent ESG and corporate governance research, ratings and analytics firm that supports investors around the world with the development and implementation of responsible investment strategies.

**UN Global Compact compliance:**
STOXX excludes the companies that Sustainalytics considers to be non-compliant with the UN Global Compact principles. Sustainalytics has defined five ESG risk levels ranging from 1 (low risk) to 5 (very high risk). Level 5 companies are considered non-compliant with the Global Compact principles.

**Controversial weapons:**
STOXX excludes companies that Sustainalytics identifies as being involved with controversial weapons. The following weapons are considered controversial: anti-personnel mines, biological and chemical weapons, cluster weapons, depleted uranium, nuclear weapons and white phosphorus weapons.

The criteria for involvement in controversial weapons are:
» Internal production or sale of controversial weapons
» The ultimate holding company owns >10% of voting rights of an involved company
» 10% of the voting rights of a company are owned by the involved company

**Weighting scheme:**
The indices are weighted in proportion to the free-float market capitalization of the selected stocks, multiplied by the aggregate revenue exposure of each stock to the sectors associated with each theme.

**Review frequency:**
The index composition is reviewed annually in June. The review cut-off date is the last dissemination date for the preceding month.

## ARTIFICIAL INTELLIGENCE (AI)-BASED APPROACH

STOXX has teamed up with award-winning AI company Yewno, whose proprietary AI algorithms (including machine learning, computational linguistics and knowledge graph techniques) are used to identify the index constituents for a particular thematic megatrend within a gigantic, unstructured data-set. The key criterion used in the identification and selection process is patent filings related to the thematic megatrend.

**Initial universe:**
Typically, the STOXX Developed Markets Total Market Index or, alternatively, the STOXX Developed and Emerging Total Market Index as of the effective review date is used to define the index universe. Please refer to the index methodology guide for more details.
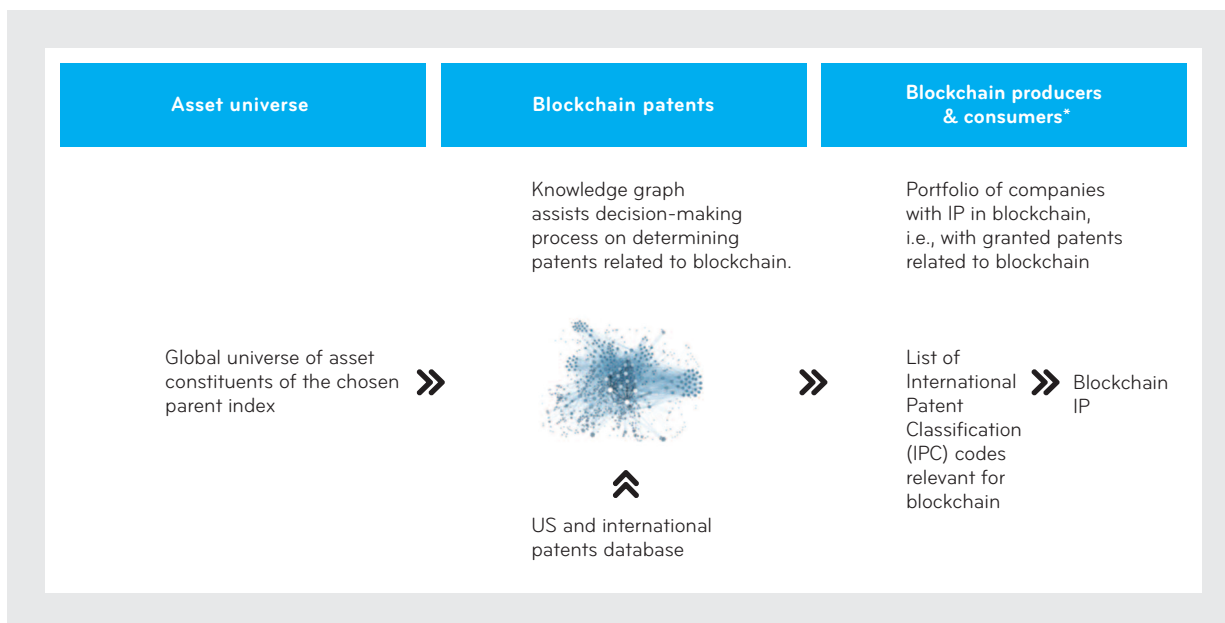
**IP screening:**
For the purposes of the STOXX AI-based thematic indices, Yewno calculates two metrics relevant to a company's involvement in relation to the thematic megatrend concerned.

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**FIGURE 4:** Selection criteria for AI-based indices



| Asset universe | Blockchain patents | Blockchain producers & consumers* |
|---|---|---|
| | Knowledge graph assists decision-making process on determining patents related to blockchain. | Portfolio of companies with IP in blockchain, i.e., with granted patents related to blockchain |
| Global universe of asset constituents of the chosen parent index | List of International Patent Classification (IPC) codes relevant for blockchain | Blockchain IP |
| | US and international patents database | |

Source: STOXX                                            *The analysis is repeated on a quarterly basis using a 3-year historical time window.

Intellectual Property (IP) Exposure:
Is defined as the ratio of the number of patents related to the particular thematic megatrend awarded to a company over the most recent 3-year period to the total number of patents awarded to that company over the same period. This provides an indication of the importance of research and applications relating to the thematic to the company's overall activities.

IP Contribution:
Is defined as the ratio of the number of patents related to the thematic megatrend awarded to a company over the most recent 3-year period to the total number of patents awarded to all companies in the index universe. This provides an indication of the importance of each company's particular thematic research and applications compared to the overall activities of all other companies in the index universe relating to the same thematic.

Screening:
Companies above the 25th percentile for each of these measures (IP Exposure and IP Contribution) are included in the index. When calculating the 25th percentile for each measure, companies with a value of zero for that measure are ignored.

**Minimum liquidity:**
Three-month average daily trading value (ADTV) in excess of EUR 1,000,000 for most indices. This filter is applied after all relevant calculations for the exposure filter above have been performed.

**Multiple share lines:**
If a company has multiple listings in an index, only the most liquid share line is retained.

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**Weighting scheme:**
The indices are equal-weighted. Where a company has multiple listings in an index, only the most liquid share line is retained. Weight factors are published on the second Friday of the review month and are based on the stock prices for the preceding Thursday.

**Review frequency:**
Each index is reviewed quarterly in March, June, September and December. No additional capping is performed between reviews.

## STOXX THEMATIC INDICES

At the time of writing, the current STOXX Thematic index offering is as shown in Figure 5. Although it is relatively straight-forward to identify indices based on the methodology (revenue-based versus AI-based), the thematics themselves span multiple areas. The figure below is an attempt to represent each thematic strategy based on an understanding of the most prominent drivers of the thematic concerned; however, readers may perceive this differently.

**FIGURE 5:** STOXX thematics



| | | Thematic | |
| --- | --- | --- | --- |
| | | **Demographics** | **Technology** |
| **Revenue-based** | | Global Millennials<br>Global Sharing Economy<br>Global Sharing Economy Drivers<br>Global Silver Economy<br>Global Housing Construction<br>Global Smart Cities<br>Ageing Population Breakthrough Healthcare | Global Industry 4.0<br>Global Artificial Intelligence<br>Developed Markets B.R.AI.N.<br>Global Fintech<br>Global Smart Factory<br>Global Digital Security<br>Electric Vehicles & Driving Technology<br>Digitalization<br>Automation & Robotics |
| **AI-based** | | | AI Global Artificial Intelligence Developed Markets<br>Blockchain<br>AI Global Artificial Intelligence ADTV5 |

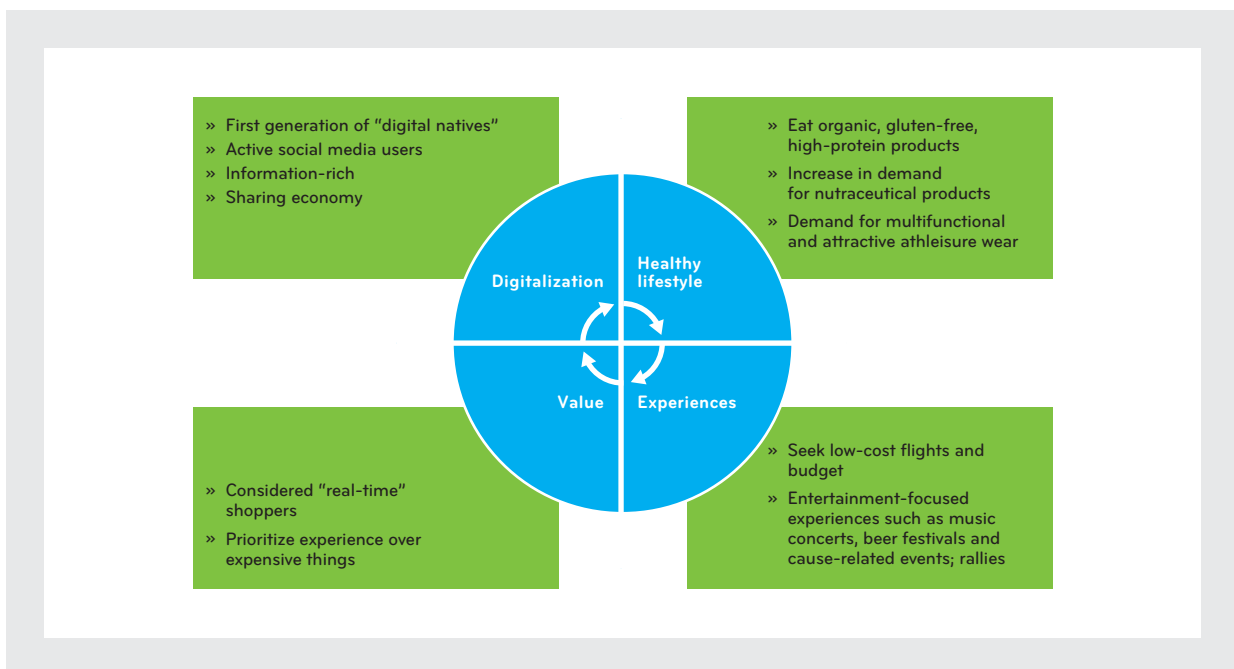Source: STOXX

# INDEXING THEMATIC MEGATRENDS

## REVENUE-BASED THEMATIC INDICES

In this section, we discuss the revenue-based thematic indices, the rationale and basis for selecting appropriate sectors, risks and returns, and the results of factor-based performance attribution for each index.

## GLOBAL MILLENNIALS

The millennial generation, typically those born between 1980 and 2000[2], are also known as "digital natives". Millennials are the first true members of this category and have quickly adopted the current pinnacle of digital evolution – the smartphone. They are known to prioritize spending on technology, health and wellness, and experiences over fashion. In line with this, the Millennials thematic includes companies from the following four areas:

**FIGURE 6:** STOXX Global Millenials Index themes



» First generation of "digital natives"
» Active social media users
» Information-rich
» Sharing economy

» Eat organic, gluten-free, high-protein products
» Increase in demand for nutraceutical products
» Demand for multifunctional and attractive athleisure wear

Digitalization
Healthy lifestyle
Value
Experiences

» Considered "real-time" shoppers
» Prioritize experience over expensive things

» Seek low-cost flights and budget
» Entertainment-focused experiences such as music concerts, beer festivals and cause-related events; rallies

Source: STOXX

### Digitalization

Raised as digital natives, millennials are typically well-informed about the latest advances in technology, as smartphones and the mobile internet become all-prevalent. Millennials also prefer to stay up-to-date on brands via social media and are willing to promote brands on their social networks. Wearable technology is leaving the introduction stage of the product life-cycle and entering its growth stage as millennials embrace the notion of the quantified self, pursuing self-improvement through data. Digitalization has also enabled the rise of the "sharing economy", i.e. the peer-to-peer network for sharing goods and services. Companies that match drivers and passengers, find accommodations for travelers and allow music/video content sharing are expected to continue to disrupt the traditional transportation, travel and entertainment industries.

[2] Source: Goldman Sachs Global Investment Research

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### Healthy lifestyle

Thanks to millennials, health and wellness has now become a status symbol and not just a lifestyle. Millennials' food is typically healthy, economically and environmentally sustainable, and visually appealing (so it can be shared on their social media). The trends towards health consciousness, healthy living and nutraceutical products are primarily driven by millennials who are seeking to avoid visiting the doctor as healthcare costs continue to increase. Millennials also prefer to use alternative medicines such as herbal remedies and naturopathic cures. Athletic and savvy millennials are also demanding multi-functional and attractive clothing on the track and for work.

### Experiences

Millennials have distinct approaches to travel, typically choosing budget/low-cost flights and peer-to-peer accommodation-sharing options over traditional choices. Millennials prefer to free-up money that they can use on indulging themselves during their trips, including impulse buys and personal treats. Another aspect to the millennial experience is the widespread creation of mobile event apps that enable event planners to perform such tasks as ticketing, notifications, scheduling and event mapping for live events and concerts. Millennials are also seen to prioritize spending on multisensory experiences over product ownership, preferring instant gratification from entertainment and are attracted to media, gaming and experiences that are shared socially.

### Value

Millennials prioritize spending on technology and experiences over fashion. They fear recession or a potential lack of employment, and therefore prefer to shop on an as-needed basis wherever they can find the best deal (real-time shoppers).

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 7:** Historical performance
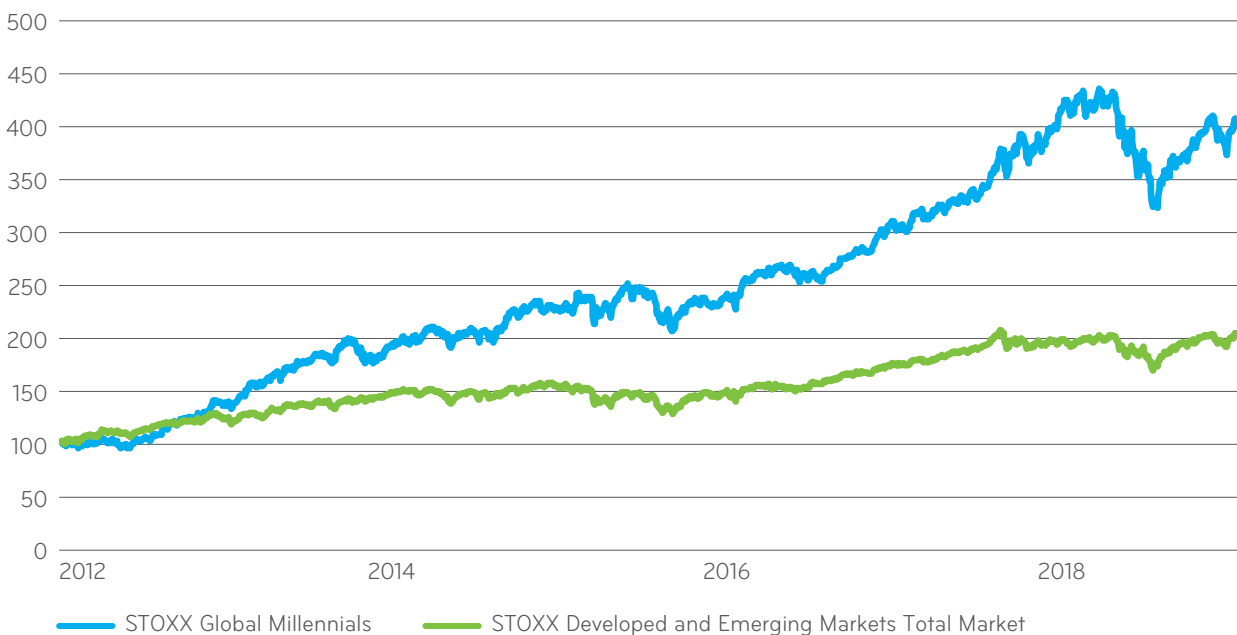


STOXX Global Millennials  STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

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**FIGURE 8:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 22.4% | 10.8% |
| 5y return | 15.9% | 6.6% |
| 3y return | 21.1% | 13.2% |
| 1y return | −1.8% | 6.5% |
| Volatility since inception | 15.8% | 10.7% |
| 5y volatility | 15.4% | 10.9% |
| 3y volatility | 14.4% | 9.4% |
| 1y volatility | 18.8% | 11.6% |
| Sharpe ratio since inception | 1.31 | 0.94 |
| 5y Sharpe ratio | 0.97 | 0.56 |
| Max. drawdown since inception | −26.0% | −18.8% |
| 5y max. drawdown | −26.0% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 9:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 23.34% | | 14.91% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 12.93% | | 9.47% | 1.36 | 3.61 |
| Specific return | 8.52% | | 6.21% | 1.37 | 3.63 |
| Factor contribution | 4.41% | | 6.21% | 0.71 | 1.88 |
| Style | −1.71% | | 2.75% | −0.62 | −1.65 |
| Exchange rate sensitivity | −0.01% | 0.1898 | 0.34% | −0.03 | −0.07 |
| Growth | 0.55% | 0.5788 | 0.54% | 1.03 | 2.72 |
| Leverage | 0.28% | −0.4634 | 0.40% | 0.71 | 1.88 |
| Liquidity | −0.05% | 1.1118 | 1.64% | −0.03 | −0.08 |
| Medium-term momentum | 0.90% | 0.2107 | 0.81% | 1.11 | 2.94 |
| Short-term momentum | −0.26% | 0.0940 | 0.80% | −0.33 | −0.87 |
| Size | 0.31% | 0.0011 | 0.50% | 0.63 | 1.66 |
| Value | −1.01% | −0.4761 | 0.82% | −1.23 | −3.25 |
| Volatility | −2.43% | 0.3430 | 1.47% | −1.65 | −4.38 |
| Country | 0.52% | 0.13% | 2.64% | 0.20 | 0.52 |
| Industry | 4.64% | 0.13% | 4.33% | 1.07 | 2.83 |
| Currency | 0.99% | 0.00% | 1.66% | 0.59 | 1.57 |
| Local | −0.01% | 0.01% | 0.01% | −0.39 | −1.04 |
| Market | −0.01% | 0.13% | 0.05% | −0.23 | −0.61 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The Millennials Index has delivered an overall annualized return of 11.6 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of just over 5 percentage points (see Figure 8)[3]. More than two-thirds of this "active" return comes from the specific

[3] The annualized active return obtained from Axioma differs from the value calculated using the official index returns. We believe the difference is the result of Axioma's slightly different treatment of corporate actions compared to the official STOXX methodology, the use of end-of-month portfolios for attributions compared to the change in mid-month constituents in the review month used for the benchmark, and the fact that Axioma's attribution methodology commences at the end of the month following the index inception date. We are aware of these differences when performing our attribution and consider their probable impact on the interpretation as not being materially significant. This is expected to be the case for all the analyses in this publication.
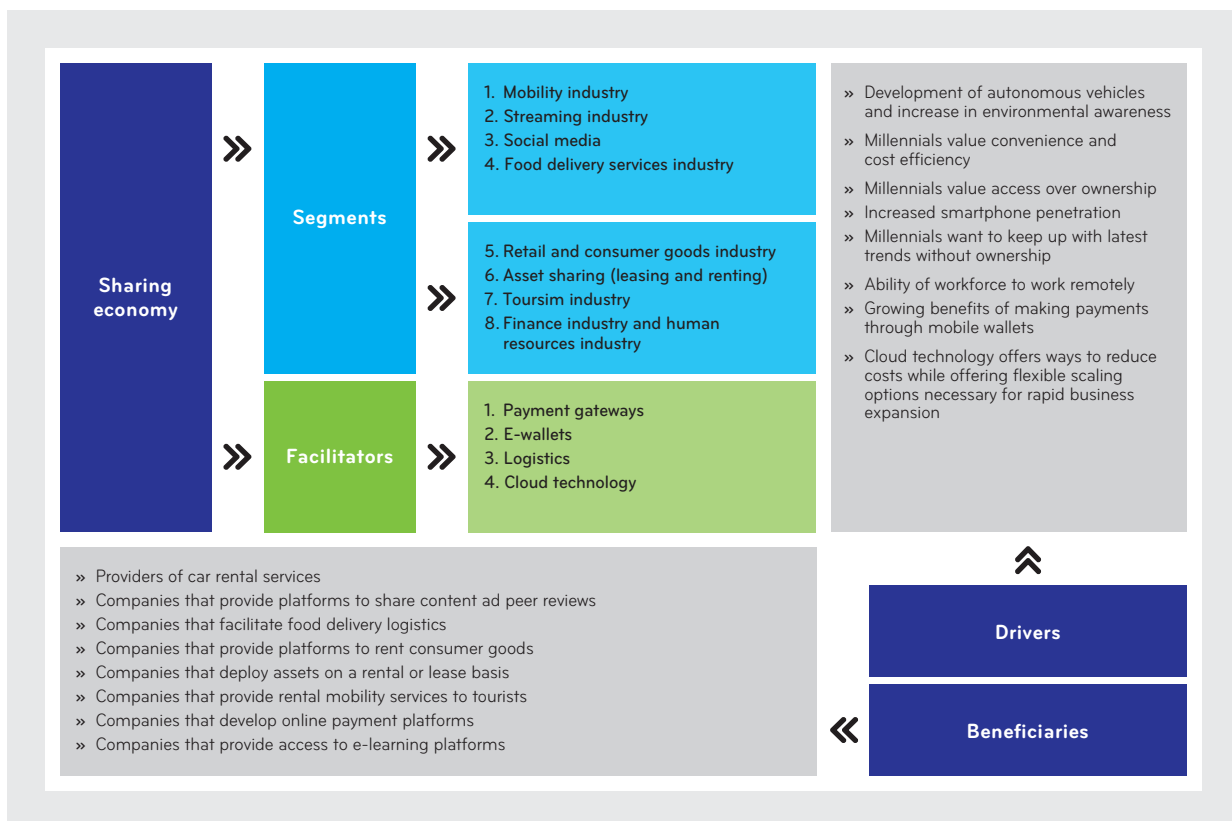
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return, and the remaining third comes from the factor contribution. The industry factor is the largest component of the overall factor contribution, and is driven by positive exposures (relative to the benchmark) to the software, internet software & services, internet catalog & retail, and hotels, restaurants & leisure sectors. Style, however, depresses the overall factor contribution, with volatility contributing nearly all of the drag. The index also has positive exposure to growth and negative exposure to value factors, which perhaps validates the intuitive tilts a millennials portfolio is expected to have. Growth contributes positively to the return but is more than offset by the drag from the value factor. The index also derives positive but less pronounced contributions from currency and country factors.

With a strong overall IR of 1.36 with a t-stat of 3.61, index performance is statistically significant at 95% confidence levels. The strongly positive specific return is also statistically significant, and together with a similar result for the industry factor may be interpreted as demonstrating favorable security and sector selection for the thematic.

## GLOBAL SHARING ECONOMY

The sharing economy is a rapidly growing set of platforms that permit users to gain temporary access to various assets. It is a deep socio-economic trend that is fundamentally changing the way we live, with new players disrupting incumbents.

**FIGURE 10:** STOXX Global Sharing Economy Index themes



Source: STOXX

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## Segments

The transportation ecosystem is evolving and new collaborative opportunities are emerging for the mobility industry. Technology platforms, convenience and the trend of avoiding ownership of assets are factors facilitating its growth. Additionally, one of the most prominent forms of sharing economy enterprise is online content streaming, in which content can be watched or listened to without downloading. Online food delivery platforms, rentable fashion, furniture, assets and sports are all becoming increasingly popular with consumers who want instant access without the high price tag. Sharing concepts coupled with e-learning are likely to disrupt higher education.

## Facilitators

The growth in cross-border e-commerce, ambitious business models, and disparate cultural and economic realities in different parts of the world has made handling payments more complex but equally crucial in today's global context. Third-party services such as payment gateways have intervened to unfurl such complexities. Integrating mobile payment platforms is likely to open up access to sharing assets and services, adding convenience for consumers. Mobile payments and the peer-to-peer sharing economy are thus highly compatible, both acting as disruptive economic forces. The logistics industry, which has historically been plagued by underutilization of assets, old and inefficient manual processes and outdated customer interfaces that serve to decrease response times, is set to face disruption from shared warehousing, urban discreet warehousing and logistics asset sharing.

For more details on sectors/specialty areas, see the appendix.

## Index performance and return attribution

**FIGURE 11:** Historical performance
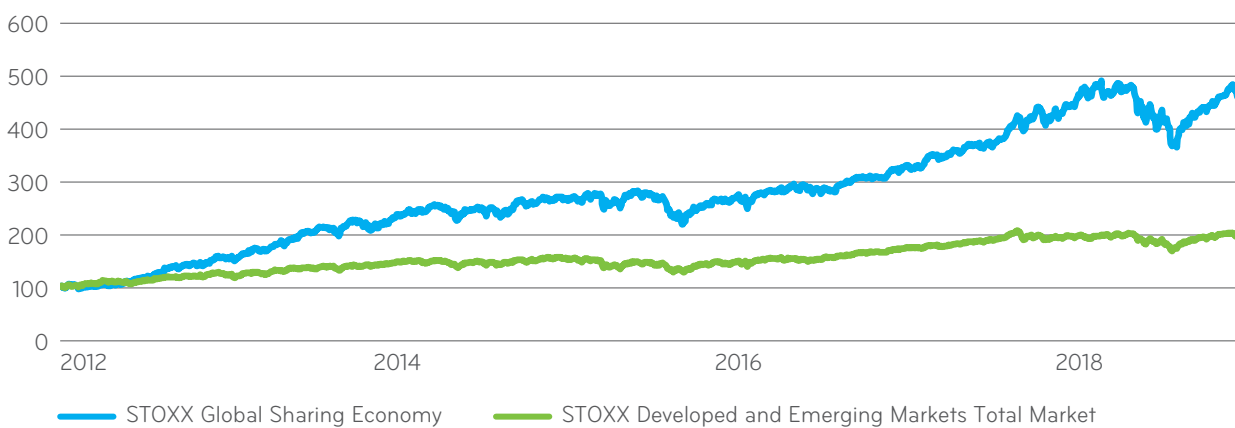


The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

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**FIGURE 12:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 26.1% | 10.8% |
| 5y return | 15.9% | 6.6% |
| 3y return | 25.6% | 13.2% |
| 1y return | 8.2% | 6.5% |
| Volatility since inception | 17.3% | 10.7% |
| 5y volatility | 17.0% | 10.9% |
| 3y volatility | 15.8% | 9.4% |
| 1y volatility | 20.8% | 11.6% |
| Sharpe ratio since inception | 1.39 | 0.94 |
| 5y Sharpe ratio | 0.90 | 0.56 |
| Max. drawdown since inception | −25.7% | −18.8% |
| 5y max. drawdown | −25.7% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 13:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 26.34% | | 16.13% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 15.94% | | 9.40% | 1.69 | 4.48 |
| Specific return | 8.96% | | 7.16% | 1.25 | 3.31 |
| Factor contribution | 6.98% | | 6.32% | 1.10 | 2.92 |
| Style | −0.55% | | 2.42% | −0.23 | −0.60 |
| Exchange rate sensitivity | 0.06% | 0.0890 | 0.34% | 0.17 | 0.45 |
| Growth | 0.61% | 0.6453 | 0.64% | 0.96 | 2.53 |
| Leverage | −0.02% | 0.0330 | 0.06% | −0.30 | −0.80 |
| Liquidity | −0.13% | 0.9323 | 1.33% | −0.10 | −0.26 |
| Medium-term momentum | 1.58% | 0.3014 | 1.00% | 1.57 | 4.16 |
| Short-term momentum | −0.44% | 0.1175 | 0.73% | −0.60 | −1.59 |
| Size | 0.29% | −0.1625 | 0.71% | 0.40 | 1.07 |
| Value | −0.96% | −0.4504 | 0.79% | −1.21 | −3.21 |
| Volatility | −1.54% | 0.2560 | 1.22% | −1.26 | −3.33 |
| Country | 0.87% | 0.26 | 3.16% | 0.27 | 0.73 |
| Industry | 5.42% | 0.26 | 4.24% | 1.28 | 3.39 |
| Currency | 1.22% | 0.00 | 1.88% | 0.65 | 1.71 |
| Local | 0.00% | −0.02 | 0.01% | −0.55 | −1.46 |
| Market | 0.02% | 0.26 | 0.03% | 0.75 | 1.99 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Sharing Economy Index has delivered an overall annualized return of 15.3 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of 6.6 percentage points (see Figure 12). This "active" return is driven strongly by the specific return and the factor contribution. Industry is responsible for a large proportion of the positive returns from the factor contribution, driven by positive exposures (relative to the benchmark) to the internet & catalog retail, internet software & services and IT services sectors. Style has a small drag on the returns,

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wiping out some of the gains from the industry factor, with volatility contributing to this. The index also has a positive tilt to growth and a negative tilt to value factors (something that is intuitive for a portfolio such as the STOXX Global Sharing Economy Index), contributing positively and negatively respectively to the returns from style. Momentum also contributes significantly to returns, offsetting some of the other negative style component returns.

The statistically significant (at 95% confidence levels) specific return and factor contribution, which are driven mainly by the industry factor, result in a significantly (t-stat of 4.48) strong overall IR of 1.69. This result may be interpreted as demonstrating favorable security and sector selection for the thematic.

## SHARING ECONOMY DRIVERS

Sharing economy drivers reflect those economic activities that permit shared access to resources amongst shareholders. The sharing economy is a rapidly growing set of platforms that permit users to gain temporary access to various assets. It is a deep socio-economic trend that is fundamentally changing the way members of society live their lives. In the age of smartphones and big data, consumer-to-consumer rental and lending has become easier, less time-consuming and less costly. The resources which are ultimately shared are reusable and are only required temporarily by the end user, leading to the extensive and productive use of under-utilized resources.

**FIGURE 14:** STOXX Global Sharing Economy Drivers Index themes



Source: STOXX

# INDEXING THEMATIC MEGATRENDS

### Mobility
Technology platforms, convenience and the trend of avoiding ownership of assets are facilitating factors in the growth of mobility. Shared mobility includes vehicle sharing or hiring, shuttle services and on-demand ride services. Beneficiaries include manufacturers of automated manufacturing systems and machines, among others.

### Tourism
The sharing economy is changing the tourism marketplace, giving people new options for boarding and lodging, to do and getting around. Beneficiaries include blockchain technology providers.

### Retail & consumer goods
Multiple streams of sharing economy are present in the retail or consumer goods segment, such as organized online markets, furniture rental, sports rental and/or rentable fashion. Beneficiaries include cybersecurity software providers, semiconductor manufacturers and cloud services providers, among others.

### Finance
The sharing economy is reshaping the finance industry through peer-to-peer (P2P) lending, social payments, crowdfunding and P2P insurance. Beneficiaries include blockchain technology providers.

### Social media
Social media is a direct facilitator of the sharing economy model. Due to its advent in the form of collaborative platforms, people are more willing to share information, recommendations and opinions with complete strangers. Beneficiaries include platforms for sharing content and peer reviews.

### Streaming
One of the most prominent forms of sharing economy enterprise is online content streaming: content that can be watched or listened to without downloading. These platforms have helped to further usher in the sharing economy by introducing family plans. Beneficiaries include enterprise management software providers and data analytics, among others.

### Food delivery services
Online food delivery platforms provide for an easy and direct access to notable and not so notable but good quality restaurants by consumers, directly on their smartphones. Beneficiaries include design software providers, 3D modeling and automation providers, etc.

### Human resources
An increasingly important area of the sharing economy is the sharing of human resources, allowing individuals to make use of their specialist knowledge and experience to provide services – for free or in return for payment – to others. Beneficiaries include blockchain technology providers.

### Asset sharing (leasing and renting)
A wide range of assets are typically underutilized, including heavy lifting equipment and construction machinery. Renting such equipment tends to be a cost-effective means of using machines that would otherwise sit idle a majority of the time. Beneficiaries include blockchain technology providers.
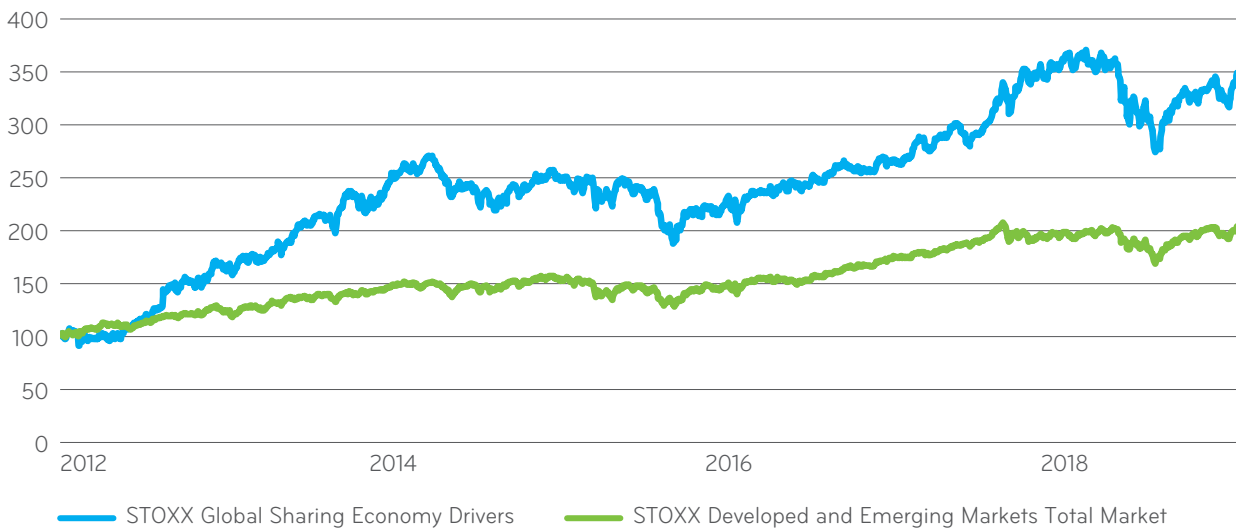
For more details on sectors/specialty areas, see the appendix.

# INDEXING THEMATIC MEGATRENDS

## Index performance and return attribution

**FIGURE 15:** Historical performance



STOXX Global Sharing Economy Drivers — STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 16:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 19.7% | 10.8% |
| 5y return | 6.4% | 6.6% |
| 3y return | 18.6% | 13.2% |
| 1y return | −0.9% | 6.5% |
| Volatility since inception | 18.7% | 10.7% |
| 5y volatility | 16.3% | 10.9% |
| 3y volatility | 14.6% | 9.4% |
| 1y volatility | 18.4% | 11.6% |
| Sharpe ratio since inception | 1.02 | 0.94 |
| 5y Sharpe ratio | 0.40 | 0.56 |
| Max. drawdown since inception | −30.8% | −18.8% |
| 5y max. drawdown | −30.8% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 17:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 20.03% | | 19.00% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 9.63% | | 12.79% | 0.75 | 1.99 |
| Specific return | 8.32% | | 9.67% | 0.86 | 2.28 |
| Factor contribution | 1.31% | | 6.80% | 0.19 | 0.51 |
| Style | −3.34% | | 3.92% | −0.85 | −2.25 |
| Exchange rate sensitivity | −0.04% | 0.1318 | 0.39% | −0.10 | −0.27 |
| Growth | 0.30% | 0.4986 | 0.48% | 0.63 | 1.67 |
| Leverage | −0.28% | 0.4243 | 0.43% | −0.65 | −1.72 |
| Liquidity | −0.15% | 1.2300 | 1.89% | −0.08 | −0.20 |
| Medium-term momentum | 1.27% | 0.2568 | 1.10% | 1.15 | 3.05 |
| Short-term momentum | −0.10% | 0.1005 | 0.94% | −0.10 | −0.28 |
| Size | −0.07% | −0.4459 | 1.58% | −0.04 | −0.12 |
| Value | −0.56% | −0.2654 | 0.60% | −0.93 | −2.46 |
| Volatility | −3.72% | 0.5405 | 2.21% | −1.69 | −4.46 |
| Country | 1.04% | 0.18 | 2.19% | 0.48 | 1.26 |
| Industry | 3.30% | 0.18 | 4.17% | 0.79 | 2.10 |
| Currency | 0.29% | 0.00 | 1.55% | 0.19 | 0.50 |
| Local | −0.01% | 0.04 | 0.02% | −0.40 | −1.05 |
| Market | 0.02% | 0.18 | 0.03% | 0.73 | 1.94 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Sharing Economy Drivers Index has delivered an overall annualized return of 8.9 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of 8 percentage points (see Figure 16). This "active" return is driven mainly by the specific return and to a much lesser extent by the overall factor contribution. However, industry contributes considerably to the overall factor contribution, driven by high positive exposures (relative to the benchmark) to the internet & catalog retail and internet software & services sectors. Style is a significant drag on returns, wiping out all of the gains from the industry and country factors, with volatility making the largest contribution to this. The index also has a positive tilt to growth and a negative tilt to value factors, contributing positively and negatively respectively to style factor returns, while a bias towards momentum contributes strongly to returns.

The index has an IR of 0.75, which is statistically significant (t-stat of 1.99) and is driven by a strong contribution from the specific return. The overall factor contribution is neither strong nor statistically significant, although industry is. These results may therefore be interpreted as demonstrating favorable security and sector selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## GLOBAL SILVER ECONOMY

A European Commission paper from 2015 defines the "silver economy" as the economic opportunities arising from public and consumer expenditure relating to population ageing and the specific needs of the population over the age of 50[4] years. The impact of the growing silver economy is changing the demographics megatrend, with higher healthcare spending, an increase in effective wealth saving plans (robo-advice solutions) and a shift in consumer preferences from unhealthy (processed) food to low-fat and organic food delivered at the purchaser's convenience (online delivery). Companies from the following seven areas are identified for inclusion:

**FIGURE 18:** STOXX Global Silver Economy Index themes
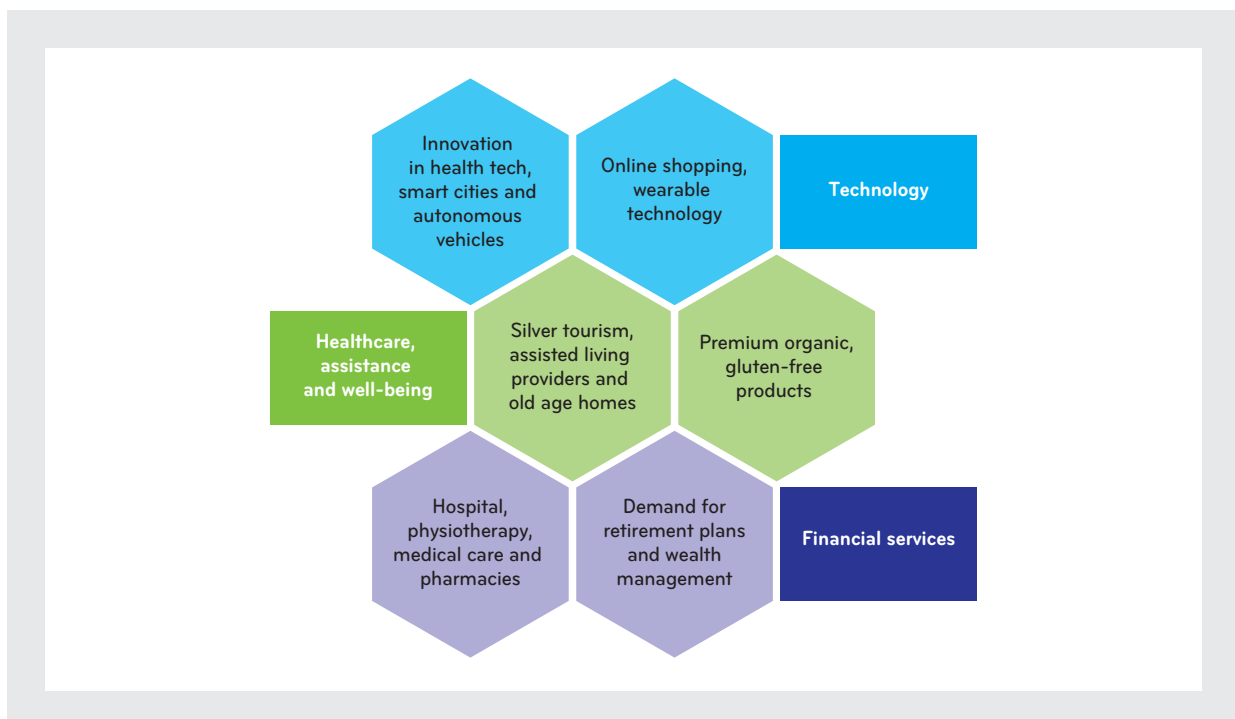


Source: STOXX

### Innovative technology
The Internet of Things (IoT) is contributing to the silver economy in the form of connected healthcare devices, worn by patients and armed with sensors, which can collect data on glucose levels, blood pressure, blood oxygen levels, sleep patterns and coagulation rates. Robots that lead workouts for the elderly and telemedicine systems for home care and patient monitoring are gaining in popularity. Autonomous vehicles are expected to preserve freedom of mobility by leveraging technology.

### Nutrition and well-being
An ageing population is expected to contribute to a significant innovation drive in healthy and organic food/drink. Food and beverage categories such as fresh, less processed, local and real are likely to drive new ageing consumers, with an underlying current of health and wellness impacting lifestyle choices.

[4]  Source: GROWING THE EUROPEAN SILVER ECONOMY, European Commission, 2015
   (http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/silvereco.pdf)

# INDEXING THEMATIC MEGATRENDS

An increasing emphasis on healthy lifestyles will lead to a stronger preference for vitamins and dietary supplements. Nutrition and well-being is expected to be a major contributing factor in an increasingly ageing population.

### E-commerce
The ageing population is bound to have a certain impact on the development of e-commerce. The difficulty for senior citizens to navigate large stores, along with difficulties in accessing products on shelves (either too high or too low), is increasing the use of tablets/mobile applications for shopping online.

### Leisure and tourism
The tourism sector is emerging as one of the biggest beneficiaries of the ageing process as a result of changes in the lifestyle of the population today, which is more leisure-oriented than previous generations. Recreational activities such as cruise liners are expected to benefit from increased consumption by seniors.

### Healthcare
As medical knowledge and technical solutions to healthcare problems become increasingly sophisticated, the healthcare needs of ageing populations are continuing to diversify. Medical device manufacturers are unveiling better technology every year in order to help keep patients healthy. Longer life expectancies will trigger increased consumption of pharmaceuticals. This trend improves the health and well-being of the average person, as lifestyles become healthier overall and care continues to improve.

### Old age care
The main emphasis in terms of assistance and support is on the "older aged", typically people over 75–80 years of age. The main driver for the growth in assisted living facilities is the global increase in life expectancy rates. Rapid urbanization and the rise in the average age of the population means that the death care and funeral services markets are also expected to see sustained high growth rates.

### Financial services
As reliance on public and corporate pension plans decline, it is expected that households will increasingly save privately for retirement, with a portion of future pension income coming from accumulated assets and savings. This will trigger a need for more sophisticated investment products to channel and convert those assets over an individual's lifetime.

For more details on sectors/specialty areas, see the appendix.

# INDEXING THEMATIC MEGATRENDS

## Index performance and return attribution

**FIGURE 19:** Historical performance
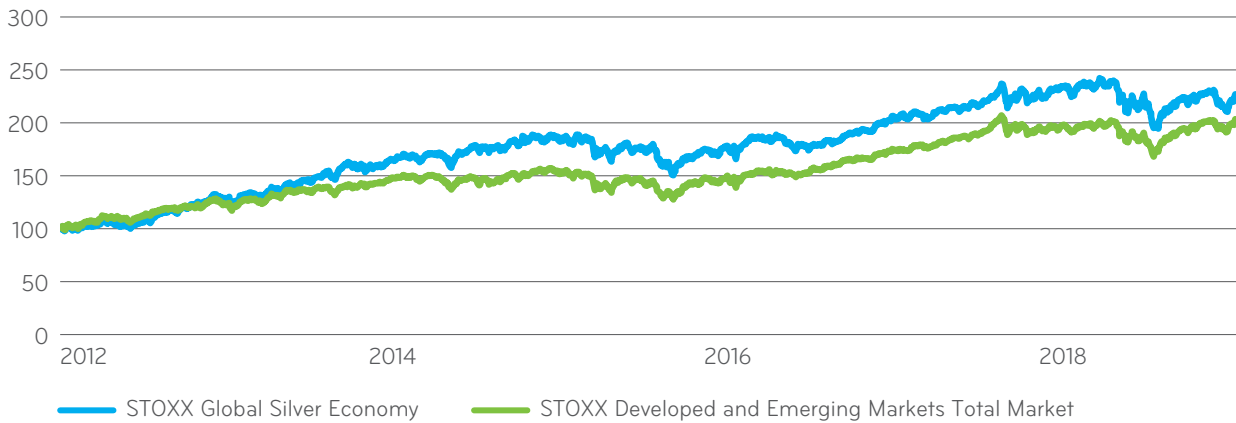


STOXX Global Silver Economy

STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 20:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 12.6% | 10.8% |
| 5y return | 6.4% | 6.6% |
| 3y return | 10.5% | 13.2% |
| 1y return | 1.1% | 6.5% |
| Volatility since inception | 13.2% | 10.7% |
| 5y volatility | 13.3% | 10.9% |
| 3y volatility | 12.2% | 9.4% |
| 1y volatility | 15.6% | 11.6% |
| Sharpe ratio since inception | 0.91% | 0.94% |
| 5y Sharpe ratio | 0.46% | 0.56% |
| Max. drawdown since inception | −20.3% | −18.8% |
| 5y max. drawdown | −20.3% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 21:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 12.51% | | 12.84% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 2.11% | | 5.65% | 0.37 | 0.99 |
| Specific return | −2.34% | | 3.25% | −0.72 | −1.90 |
| Factor contribution | 4.44% | | 5.19% | 0.86 | 2.27 |
| Style | −0.35% | | 1.13% | −0.31 | −0.81 |
| Exchange rate sensitivity | −0.08% | −0.0138 | 0.15% | −0.50 | −1.32 |
| Growth | 0.22% | 0.2142 | 0.21% | 1.04 | 2.75 |
| Leverage | 0.01% | −0.0381 | 0.07% | 0.10 | 0.25 |
| Liquidity | 0.08% | 0.3451 | 0.60% | 0.13 | 0.35 |
| Medium-term momentum | 0.22% | 0.0450 | 0.32% | 0.70 | 1.84 |
| Short-term momentum | 0.25% | 0.0022 | 0.38% | 0.65 | 1.72 |
| Size | −0.04% | 0.0450 | 0.28% | −0.14 | −0.38 |
| Value | −0.58% | −0.2857 | 0.51% | −1.14 | −3.01 |
| Volatility | −0.43% | 0.0653 | 0.52% | −0.83 | −2.19 |
| Country | 0.86% | 0.13 | 2.30% | 0.37 | 0.98 |
| Industry | 3.41% | 0.13 | 3.41% | 1.00 | 2.64 |
| Currency | 0.52% | 0.00 | 1.46% | 0.36 | 0.95 |
| Local | 0.00% | −0.04 | 0.01% | −0.38 | −1.00 |
| Market | 0.01% | 0.13 | 0.02% | 0.43 | 1.14 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Silver Economy Index has delivered a marginal annualized return of only 1.8 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of 2.5 percentage points (see Figure 20). In contrast to many other thematic indices, the specific return depresses the "active" return, offset by a strong overall factor contribution. Industry is the largest component of the overall factor contribution and is driven by positive exposures (relative to the benchmark) to the biotech, healthcare equipment, leisure, internet retail, pharmaceuticals and semiconductors sectors. Marginal gains from positive exposures to growth and momentum are more than offset by a drag from value and volatility factors, resulting in a net negative style return.

The index has an IR of 0.37, although this is not statistically significant at 95% confidence levels (t-stat of 0.99). The industry contribution is positive and statistically significant, while the specific return is negative and not statistically significant. Consequently, it is not possible to draw any meaningful conclusions about the effectiveness of security or sector selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## GLOBAL HOUSING CONSTRUCTION

Demand for investment capital in real estate and its supporting infrastructure has increased enormously in the last decade or so. In the emerging economies, massive migration to the cities, the growing population and the swelling middle classes are creating an urgent need for more urban real estate. Cities in the advanced economies are also growing, although not so rapidly, while technology, demographics and environmental issues are becoming new value drivers in this sector. Companies from the following six areas are identified for inclusion:

**FIGURE 22:** STOXX Global Housing Construction Index themes
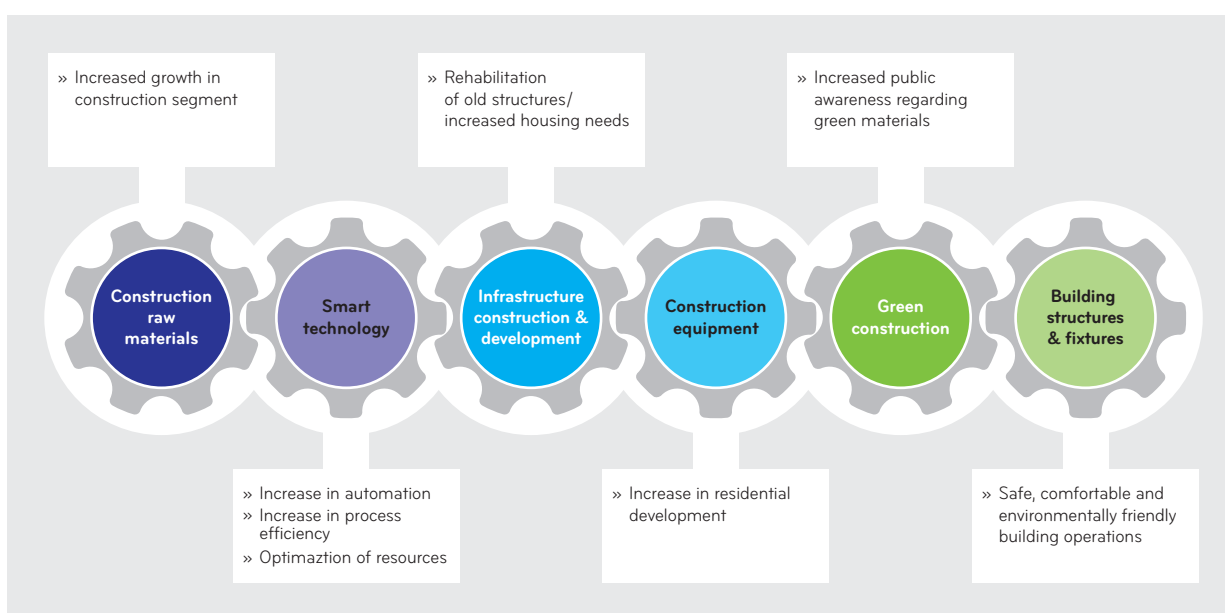


Source: STOXX

## Construction raw materials
The high growth of the raw materials market is attributable to an increase in the pace of construction activity, rapid industrialization and urbanization, and growing business activities, which are resulting in more commercial building projects. Beneficiaries include providers of raw materials for construction.

## Smart technology
The goals of creating green structures, resource efficiency, waste management, etc. can only be achieved using advanced sensors, electronics and networks, which are at the core of the information and communication technology industry. Also, the use of building management software, building information software and robotics will result in construction automation and efficiency. Beneficiaries include providers of IoT systems, advanced construction software and/or construction robotics.

## Infrastructure construction & development
Infrastructure construction & development includes units engaged in constructing buildings and other structures, along with additions, alterations and repairs to, and the reconstruction, installation and maintenance of, buildings and other structures. Beneficiaries include structural construction companies and/or providers of structural maintenance and repairs.

# INDEXING THEMATIC MEGATRENDS

### Construction equipment
Heavy construction equipment comprises vehicles used for construction tasks such as mining, lifting, material handling and excavation. The heavy construction equipment market is mainly driven by residential, commercial and industrial developments, increasing public-private partnerships and global economic growth. Beneficiaries include providers, manufacturers and retailers of earth-moving and material handling equipment, etc.

### Green construction
Green construction or green building refers to environmentally responsible and sustainable building design and construction. Construction companies use green technology and green building techniques to lessen a building's impact on the environment and leave a smaller carbon footprint. The sector is gaining traction due to demographic changes. Beneficiaries include manufacturers of sustainable building materials and/or solar products.

### Building structures & fixtures
Building services engineers are responsible for the design, installation, operation and monitoring of mechanical, electrical and public health systems. These systems are required for the safe, comfortable and environmentally friendly operation of modern buildings. Beneficiaries include providers and manu-facturers of HVAC systems, alarm systems, anti-theft systems, etc.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 23:** Historical performance
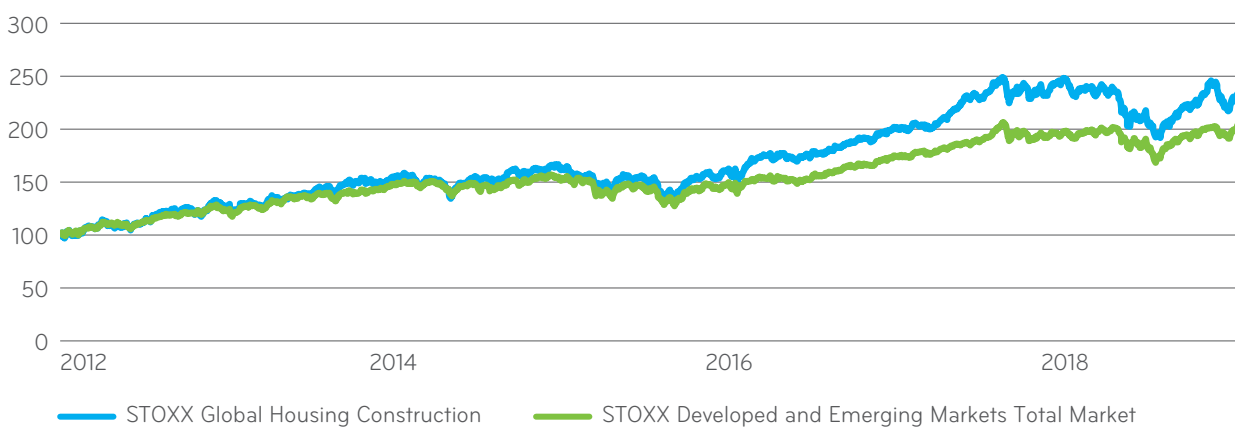


STOXX Global Housing Construction — STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 24:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 13.3% | 10.8% |
| 5y return | 9.1% | 6.6% |
| 3y return | 16.5% | 13.2% |
| 1y return | 2.3% | 6.5% |
| Volatility since inception | 14.4% | 10.7% |
| 5y volatility | 13.7% | 10.9% |
| 3y volatility | 12.6% | 9.4% |
| 1y volatility | 15.6% | 11.6% |
| Sharpe ratio since inception | 0.89 | 0.94 |
| 5y Sharpe ratio | 0.63 | 0.56 |
| Max. drawdown since inception | −23.1% | −18.8% |
| 5y max. drawdown | −23.1% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 25:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 12.80% | | 14.29% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 2.39% | | 7.01% | 0.34 | 0.90 |
| Specific return | −1.26% | | 3.45% | −0.36 | −0.97 |
| Factor contribution | 3.65% | | 6.01% | 0.61 | 1.61 |
| Style | −0.50% | | 1.85% | −0.27 | −0.71 |
| Exchange rate sensitivity | −0.07% | 0.0366 | 0.22% | −0.33 | −0.86 |
| Growth | 0.13% | 0.1245 | 0.19% | 0.70 | 1.86 |
| Leverage | 0.05% | −0.0959 | 0.10% | 0.53 | 1.39 |
| Liquidity | 0.25% | 0.5450 | 0.93% | 0.27 | 0.71 |
| Medium-term momentum | 0.52% | 0.0556 | 0.48% | 1.08 | 2.87 |
| Short-term momentum | 0.34% | 0.0131 | 0.57% | 0.59 | 1.55 |
| Size | −0.16% | −0.2026 | 0.73% | −0.22 | −0.58 |
| Value | −0.28% | −0.0837 | 0.19% | −1.51 | −4.01 |
| Volatility | −1.28% | 0.1954 | 0.90% | −1.42 | −3.76 |
| Country | 0.51% | 0.10 | 1.70% | 0.30 | 0.80 |
| Industry | 3.17% | 0.10 | 5.05% | 0.63 | 1.66 |
| Currency | 0.46% | 0.00 | 1.18% | 0.39 | 1.02 |
| Local | 0.00% | −0.03 | 0.01% | −0.28 | −0.73 |
| Market | 0.01% | 0.10 | 0.01% | 1.04 | 2.76 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Housing Construction Index has delivered a marginal annualized return of 2.5 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of 3.7 percentage points (see Figure 24). In contrast to many other thematic indices, the specific return depresses the "active" return, offset by a positive overall factor contribution. Industry is the largest component of the latter and is driven by positive exposures to industries related to the semiconductors,

# INDEXING THEMATIC MEGATRENDS

building products and household durables sectors. Positive return contributions from some style factors are more than offset by the drag from others, resulting in a net negative style return. Country and currency also contribute marginally positive returns.

The index has an IR of 0.34, although this is not statistically significant at 95% confidence levels (t-stat of 0.90). Some sub-industry contributions are significant, but the overall industry factor is not. When combined with a negative (although not significant) specific return, this means that it is impossible to draw any meaningful conclusions about the effectiveness of security or sector selection for the thematic.

## GLOBAL SMART CITIES

A smart city is an "innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, the efficiency of urban operations and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects"[5]. Soaring adoption of novel technologies that complement the management of future cities is a major catalyst in this industry's growth. The industry also stands to benefit from initiatives taken by residents, local businesses, and national and regional governments.

**FIGURE 26:** STOXX Global Smart Cities Index themes
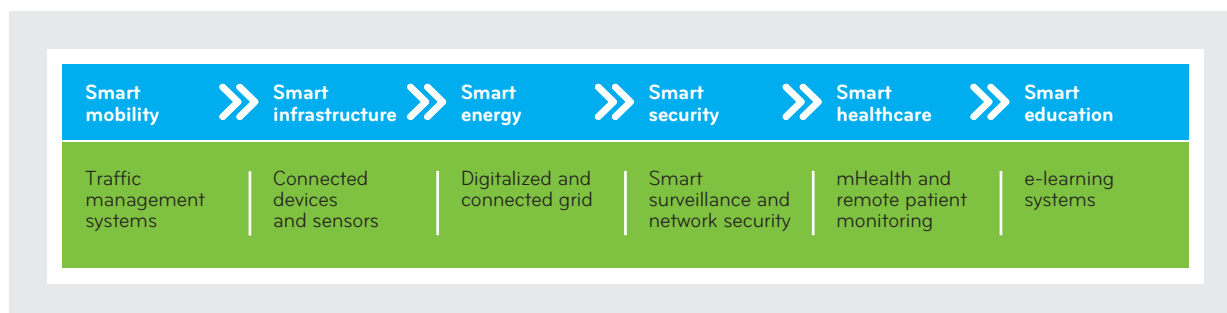


Source: STOXX

### Smart mobility

Urban populations are growing rapidly, creating challenges for current transportation systems; roads are increasingly gridlocked and public transportation is operating at full capacity. Given increasing demand for finite resources, there is a growing need for smarter solutions. Connecting smart cities with smart transportation systems is a crucial next step.

Companies included in the index are expected to invest heavily in traffic management systems and/or applications, or working towards autonomous vehicles. Beneficiaries include adaptive and predictive traffic control system manufacturers, semi-autonomous and autonomous vehicle technology providers, suppliers of vehicle detection technology, and the like.

### Smart infrastructure

"Smart infrastructure" is a collective term for holistic development concepts that aim to make cities more efficient, technologically advanced, green and socially inclusive. The development of new applications for connected infrastructure systems in areas such as waste management, highways, buildings and homes is boosting this segment.

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[5] cf. International Telecommunications Union Report

# INDEXING THEMATIC MEGATRENDS

Companies included in the index are providers of connected devices and sensors, or supply various infrastructure systems. Beneficiaries are manufacturers of highway management systems, waste management solutions and smart home and building systems, drone manufacturers, electronic toll collection system providers, etc.

### Smart energy

Smart energy is a collective term used for modern and connected technologies across the entire energy industry value chain, right from energy production, energy storage, energy transfer and all the way up to consumption monitoring. A smart grid is a digitalized and connected electrical grid encompassing clean technology. Smart energy thus includes transmission upgrades, distribution automation and advanced metering infrastructures.

Companies included in the index are those that are introducing new technologies and systems to the energy sector. Beneficiaries include home energy management systems providers and manufacturers of smart grid components, technologies and smart meters.

### Smart city security

As smart cities grow, their security will also be dependent on cybersecurity, as most functions and systems are likely to be connected via the network. City-wide systems will provide real-time surveillance and security to inhabitants while cybersecurity will ensure that the data collected from the city remains safe and protected.

Companies included in the index are those that are introducing smarter surveillance systems and/or providing data or network security. Beneficiaries include cybersecurity solutions providers and providers of surveillance equipment and biometric evaluation technology and solutions, among others.

### Smart healthcare

Smart healthcare may be defined as using modern, connected technology to better diagnose disease, improve patient treatment and enhance quality of life, and take preventive measures. The Internet of Medical Things (IoMT) uses sensors to collect patient data remotely. This data can be stored and analyzed by doctors, researchers and healthcare professionals to improve diagnoses and solutions.

Companies included in the index are those that are investing in connected medical devices and mHealth and/or remote patient monitoring. Beneficiaries include providers and manufacturers of remote patient monitoring devices, providers of cloud-based and premises-based electronic health record software, providers of smart and connected medical devices, etc.

### Smart education

The introduction of smart education may be attributed to the increasing preference for e-learning and rising interest in innovative, interactive techniques such as educational apps and gamification to enhance learning.

Companies included in the index are those that are investing in e-learning and/or developing innovative education techniques. Beneficiaries include manufacturers of smart education platforms, applications and software.
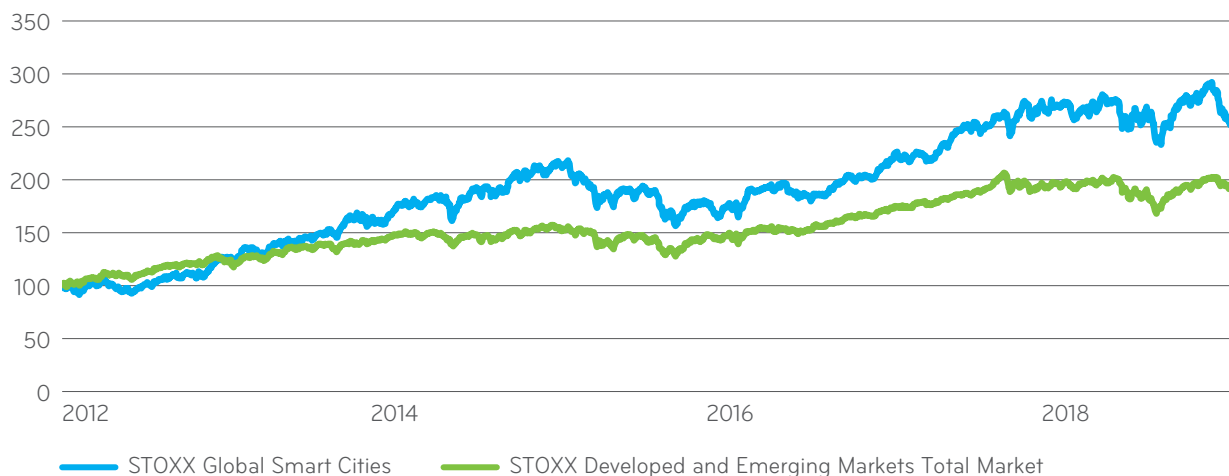
For more details on sectors/specialty areas, see the appendix.

# INDEXING THEMATIC MEGATRENDS

## Index performance and return attribution

**FIGURE 27:** Historical performance



STOXX Global Smart Cities  —  STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 28:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
| --- | --- | --- |
| Return since inception | 15.7% | 10.8% |
| 5y return | 9.5% | 6.6% |
| 3y return | 18.4% | 13.2% |
| 1y return | 6.6% | 6.5% |
| Volatility since inception | 16.4% | 10.7% |
| 5y volatility | 15.8% | 10.9% |
| 3y volatility | 14.3% | 9.4% |
| 1y volatility | 18.2% | 11.6% |
| Sharpe ratio since inception | 0.92 | 0.94 |
| 5y Sharpe ratio | 0.60 | 0.56 |
| Max. drawdown since inception | −28.4% | −18.8% |
| 5y max. drawdown | −28.4% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 29:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 15.97% | | 15.67% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 5.57% | | 10.43% | 0.53 | 1.41 |
| Specific return | 2.04% | | 6.67% | 0.31 | 0.81 |
| Factor contribution | 3.53% | | 7.81% | 0.45 | 1.19 |
| Style | −3.34% | | 3.32% | −1.01 | −2.66 |
| Exchange rate sensitivity | −0.04% | −0.1205 | 0.34% | −0.13 | −0.34 |
| Growth | −0.16% | −0.0334 | 0.18% | −0.90 | −2.38 |
| Leverage | 0.22% | −0.4733 | 0.41% | 0.53 | 1.40 |
| Liquidity | −0.11% | 0.9846 | 1.44% | −0.08 | −0.21 |
| Medium-term momentum | 0.43% | 0.0701 | 1.16% | 0.37 | 0.98 |
| Short-term momentum | −0.22% | 0.0611 | 0.77% | −0.29 | −0.77 |
| Size | −0.20% | −0.3312 | 1.15% | −0.17 | −0.46 |
| Value | −0.07% | −0.2023 | 0.41% | −0.18 | −0.48 |
| Volatility | −3.17% | 0.4193 | 1.77% | −1.79 | −4.75 |
| Country | 0.96% | 0.17% | 2.10% | 0.46 | 1.22 |
| Industry | 5.41% | 0.17% | 5.73% | 0.94 | 2.50 |
| Currency | 0.48% | 0.00% | 1.44% | 0.34 | 0.89 |
| Local | 0.00% | −0.04% | 0.01% | −0.48 | −1.27 |
| Market | 0.02% | 0.17% | 0.02% | 0.74 | 1.96 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Smart Cities Index has delivered an overall annualized return of 4.9 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of nearly 6 percentage points (see Figure 28). Almost two-fifths of this "active" return comes from the specific return, while the rest comes from the factor contribution (see Figure 29). Industry is the largest component of the overall factor contribution, driven by positive exposures (relative to the benchmark) to industries related to the semiconductors, software, communications equipment and healthcare technology sectors. However, style depresses returns, with volatility contributing nearly all of the drag.

The index has an IR of 0.53, although this is not statistically significant at 95% confidence levels (t-stat of 1.41). The specific return is not statistically significant and nor is factor contribution, since the significant positive industry contribution is offset by the equally significant negative style contribution. Consequently, no meaningful conclusions may be drawn about the effectiveness of security or sector selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## GLOBAL INDUSTRY 4.0

The convergence of the digital and physical worlds, including information technology (IT) and operations technology (OT), are considered to be the driving force behind what is considered the fourth industrial revolution or "Industry 4.0". The increasing adoption of industrial robots, the evolution of the Internet of Things (IoT) and growth in demand for smart automation solutions are expected to drive the shift towards this. Smart factories can operate within the four walls of a factory, but they can also connect to a global network of similar production systems and a digital supply network.

**FIGURE 30:** STOXX Global Industry 4.0 Index themes
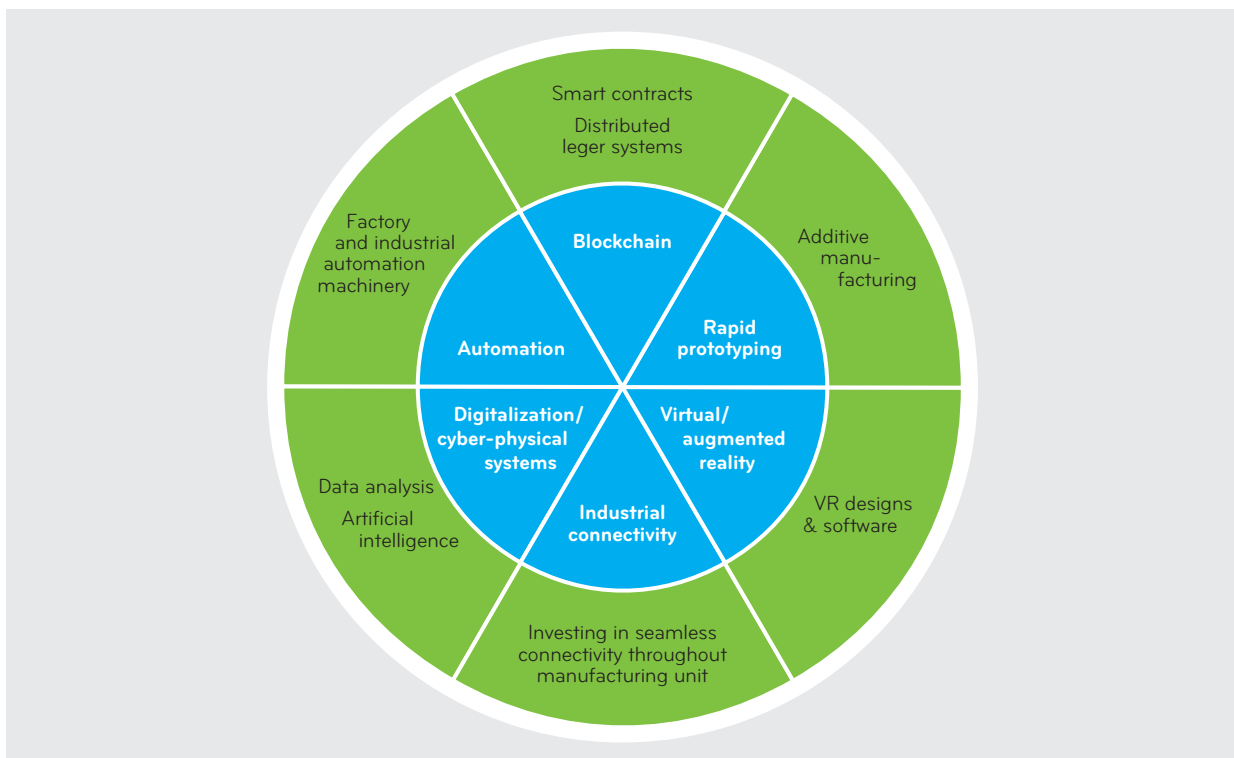


Source: STOXX

### Automation

Industrial/manufacturing automation involves everything from self-driving trucks to supply chain management software. Industrial automation has the ability to pack and ship items using advanced technology – something known as "smart manufacturing". Companies included in the index are those that are investing heavily in factory and industrial automation machinery. Beneficiaries include manufacturers of automated manufacturing systems and machines, etc.

### Digitalization/cyber-physical systems

With the advent of Industry 4.0, industries are expected to generate a lot more data than they have before. With proper analysis and machine learning, we will be able to automate and predict the behavior of both the machines and the associated people. Companies included in the index are those that are investing in data analysis and/or AI. Beneficiaries include enterprise management software providers, data analytics companies and the like.

# INDEXING THEMATIC MEGATRENDS

### Virtual/augmented reality

Virtual reality-based systems support multiple services, such as selecting parts in a warehouse and sending repair instructions via mobile devices. Companies have developed virtual plant-operator training modules that uses a realistic, data-based 3D environment with AR glasses to train plant personnel to handle emergencies. Companies included in the index are those that are investing in VR design and software. Beneficiaries include AR/VR device manufacturers.

### Rapid prototyping

With Industry 4.0, additive manufacturing methods are expected to be widely used to produce small batches of customized products that offer construction advantages such as complex, lightweight designs. Companies included in the index are those that are investing heavily in additive manufacturing. Beneficiaries include design software providers, and 3D modeling and automation providers.

### Industrial connectivity

In smart factories, industrial machines are fitted with sensors, equipping employees across the supply and delivery chains with the tools needed to monitor and respond to the output from them. Companies included in the index are those that are investing in seamless connectivity throughout manufacturing units. Beneficiaries include cybersecurity software providers, semiconductor manufacturers, cloud services providers, etc.

### Blockchain

Blockchain enables the creation of smart contracts, with terms and conditions that both sides can specify, assuring trust in their enforceability and in the identity of the counterparty. This will open the door to automated, dynamic tracking of supply chains, inventory levels and prices, reducing costs and maximizing profits. Companies included in the index are those that are investing in smart contracts. Beneficiaries include blockchain technology providers.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 31:** Historical performance
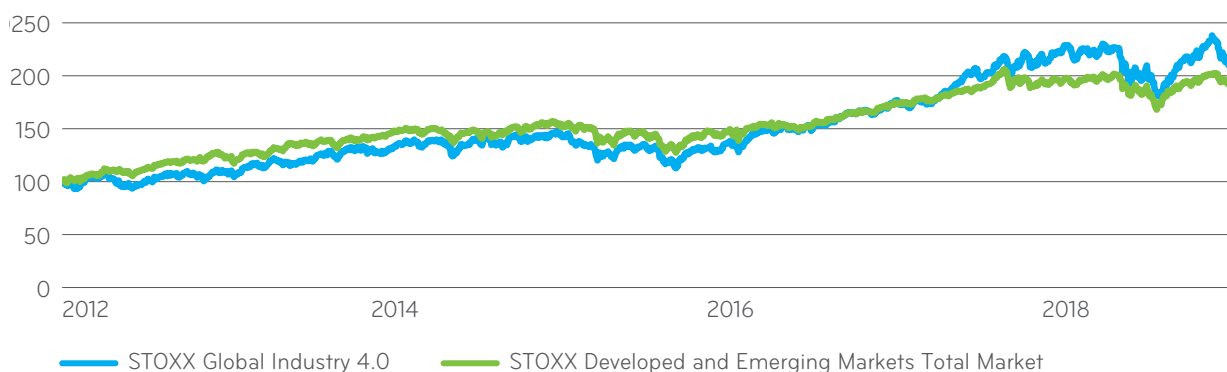


STOXX Global Industry 4.0

STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 32:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 12.6% | 10.8% |
| 5y return | 11.2% | 6.6% |
| 3y return | 21.0% | 13.2% |
| 1y return | 5.7% | 6.5% |
| Volatility since inception | 15.2% | 10.7% |
| 5y volatility | 14.7% | 10.9% |
| 3y volatility | 13.8% | 9.4% |
| 1y volatility | 17.6% | 11.6% |
| Sharpe ratio since inception | 0.81 | 0.94 |
| 5y Sharpe ratio | 0.73 | 0.56 |
| Max. drawdown since inception | −23.4% | −18.8% |
| 5y max. drawdown | −23.4% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 33:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 12.69% | | 15.17% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 2.29% | | 8.81% | 0.26 | 0.69 |
| Specific return | −4.36% | | 4.52% | −0.97 | −2.55 |
| Factor contribution | 6.65% | | 6.80% | 0.98 | 2.59 |
| Style | −0.86% | | 1.79% | −0.48 | −1.27 |
| Exchange rate sensitivity | −0.01% | −0.0479 | 0.23% | −0.04 | −0.10 |
| Growth | 0.13% | 0.1642 | 0.17% | 0.75 | 1.97 |
| Leverage | 0.15% | −0.4142 | 0.37% | 0.40 | 1.06 |
| Liquidity | 0.22% | 0.6010 | 0.97% | 0.23 | 0.61 |
| Medium-term momentum | −0.05% | 0.0278 | 0.72% | −0.07 | −0.18 |
| Short-term momentum | 0.15% | 0.0151 | 0.65% | 0.23 | 0.61 |
| Size | 0.04% | −0.0521 | 0.20% | 0.21 | 0.55 |
| Value | −0.54% | −0.2547 | 0.44% | −1.24 | −3.28 |
| Volatility | −0.95% | 0.1425 | 0.78% | −1.22 | −3.23 |
| Country | 0.57% | 0.14% | 2.27% | 0.25 | 0.67 |
| Industry | 5.97% | 0.14% | 5.43% | 1.10 | 2.91 |
| Currency | 0.95% | 0.00% | 1.52% | 0.63 | 1.66 |
| Local | 0.00% | −0.03% | 0.01% | −0.35 | −0.93 |
| Market | 0.01% | 0.14% | 0.02% | 0.86 | 2.27 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Industry 4.0 Index has delivered an annualized return of only 1.8 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of 4.5 percentage points (see Figure 32). In contrast to many other thematic indices, the specific return depresses the "active" return, but is offset by a strongly positive factor contribution. Industry is the largest component of the overall factor contribution and is driven by positive exposures (relative to the benchmark)
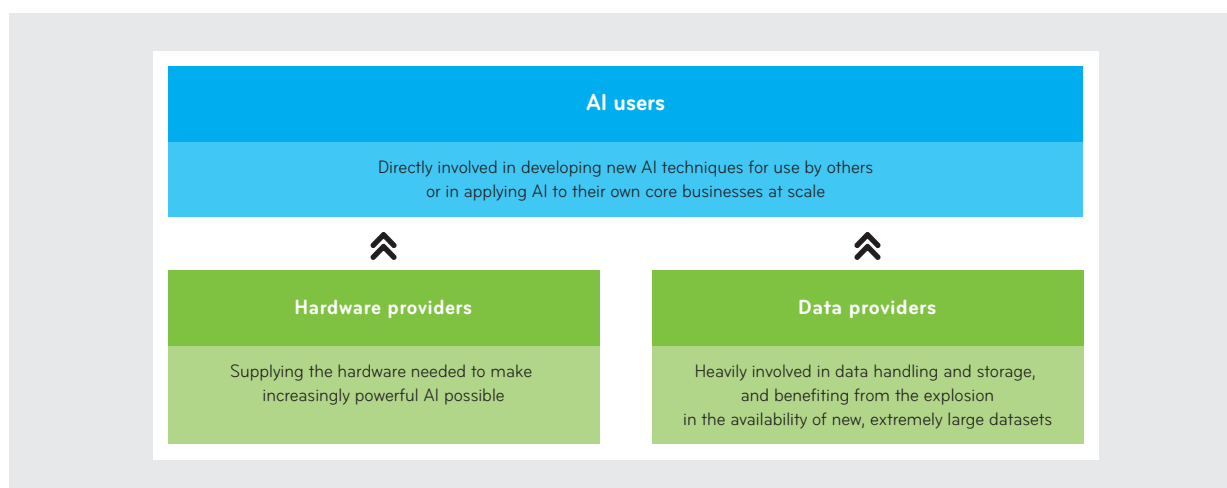
# INDEXING THEMATIC MEGATRENDS

to industries related to the semiconductors, software, IT services and communications equipment sectors. Style drags the factor contribution down, mostly due to volatility and value. Currency and country contribute positively to the returns, although no significant bias is evident within these factors.

The index has an IR of 0.26 and is not statistically significant at 95% confidence levels (t-stat of 0.69). The specific return is statistically significant (negative) and is offset by the significant positive industry contribution. Consequently, no meaningful conclusions may be drawn about the effectiveness of security or sector selection for the thematic.

## GLOBAL ARTIFICIAL INTELLIGENCE

The Global Artificial Intelligence Index includes companies that are typically engaged in creating increasingly potent artificial intelligence (AI) applications, either by developing new AI methods and applications or by providing and/or improving the systems required to successfully utilize AI in real-world situations.

**FIGURE 34:** STOXX Global Artificial Intelligence Index themes



**AI users**

Directly involved in developing new AI techniques for use by others
or in applying AI to their own core businesses at scale

**Hardware providers**

Supplying the hardware needed to make
increasingly powerful AI possible

**Data providers**

Heavily involved in data handling and storage,
and benefiting from the explosion
in the availability of new, extremely large datasets

Source: STOXX

### AI users
Artificial intelligence is increasingly being applied across a broad range of industries [cf. McKinsey report] from technology to construction; however, different industries are at different stages of adoption. AI is already widely deployed in many sectors with significant plans for future investment in some other sectors where activity indicates that enterprises have well-developed plans to expand their capabilities in this area. Sectors such as social networking, web searches and the financial services industry are considered to be the leading areas for AI research and applications[6].

Companies included in the index are those that are investing heavily in AI research and/or applications, and that they have access to interesting datasets/a large user base. Beneficiaries include social networking/web advertising companies, business software providers and certain automation specialists (e.g. machine vision providers).

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[6] cf. McKinsey Report

# INDEXING THEMATIC MEGATRENDS

## Hardware providers

Most AI applications require the use of a significant amount of computing power. Some techniques currently in the mainstream, such as deep learning, have been around for a long time but only became prevalent with the advent of cheap computing power, which facilitated their application to real-life problems. Companies which provide the specialist chips required for machine learning and AI applications, such as graphics card and CPU manufacturers, may benefit significantly from increasing demand from high-quality chips that can support the demands of complex AI applications.

Companies included in the index are those that are providers of specialist hardware for artificial intelligence applications. Beneficiaries are graphics card manufacturers (graphics cards are especially useful for some AI applications as they are optimized for certain mathematical operations that are prevalent in this area), and more general chip and CPU manufacturers.
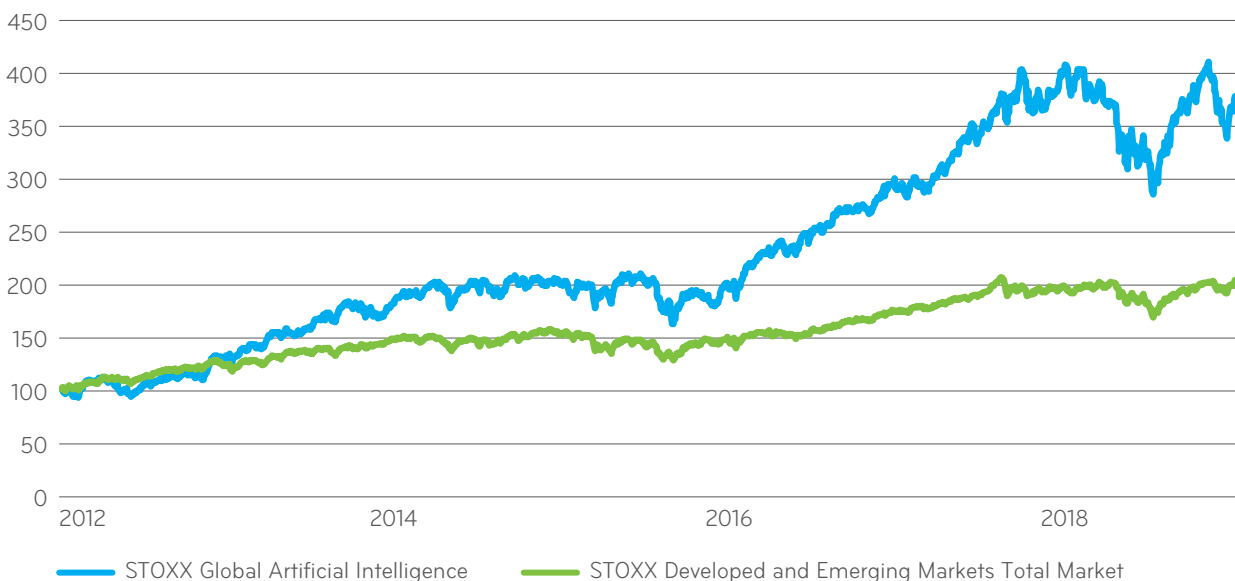
## Big data enablers

Big data and AI are very closely connected. Powerful AI applications require increasingly large datasets to maintain or increase their effectiveness, and the amount of raw data entailed with big data more or less requires the use of AI techniques to derive useful and actionable results from it. As the increasing prevalence of AI makes large datasets both increasingly useful and necessary, companies enabling big data – such as data center providers and storage media manufacturers – are also expected to benefit significantly.

Companies included in the index are those that are data storage providers for large datasets, and/or offer online data storage allowing access from multiple locations. Beneficiaries include online storage providers, colocation providers (for financial applications) and data chip manufacturers.

For more details on sectors/specialty areas, see the appendix.

## Index performance and return attribution

**FIGURE 35:** Historical performance



STOXX Global Artificial Intelligence          STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 36:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 21.4% | 10.8% |
| 5y return | 15.5% | 6.6% |
| 3y return | 26.6% | 13.2% |
| 1y return | −0.5% | 6.5% |
| Volatility since inception | 19.6% | 10.7% |
| 5y volatility | 19.8% | 10.9% |
| 3y volatility | 19.6% | 9.4% |
| 1y volatility | 24.9% | 11.6% |
| Sharpe ratio since inception | 1.05 | 0.94 |
| 5y Sharpe ratio | 0.78 | 0.56 |
| Max. drawdown since inception | −30.1% | −18.8% |
| 5y max. drawdown | −30.1% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 37:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 21.35% | | 17.56% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 10.95% | | 11.64% | 0.94 | 2.49 |
| Specific return | 6.18% | | 7.18% | 0.86 | 2.28 |
| Factor contribution | 4.76% | | 8.29% | 0.57 | 1.52 |
| Style | −3.08% | | 3.61% | −0.85 | −2.26 |
| Exchange rate sensitivity | 0.02% | 0.1142 | 0.37% | 0.05 | 0.13 |
| Growth | 0.20% | 0.1777 | 0.22% | 0.91 | 2.41 |
| Leverage | 0.19% | −0.3713 | 0.33% | 0.57 | 1.50 |
| Liquidity | −0.16% | 1.3917 | 1.92% | −0.08 | −0.22 |
| Medium-term momentum | 0.39% | 0.1231 | 1.04% | 0.37 | 0.99 |
| Short-term momentum | −0.27% | 0.0847 | 0.96% | −0.28 | −0.74 |
| Size | −0.08% | −0.1417 | 0.56% | −0.14 | −0.36 |
| Value | −0.47% | −0.2765 | 0.54% | −0.86 | −2.27 |
| Volatility | −2.90% | 0.4499 | 1.89% | −1.54 | −4.06 |
| Country | 0.96% | 0.08% | 3.53% | 0.27 | 0.72 |
| Industry | 5.68% | 0.08% | 5.58% | 1.02 | 2.70 |
| Currency | 1.22% | 0.00% | 2.35% | 0.52 | 1.37 |
| Local | 0.00% | −0.05% | 0.01% | −0.32 | −0.84 |
| Market | −0.01% | 0.08% | 0.05% | −0.28 | −0.75 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Artificial Intelligence Index has delivered a strong annualized return of 10.6 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of nearly 9 percentage points (see Figure 36). Specific return accounts for more than half of this "active" return and factor contribution the rest. Industry, driven by positive exposures (relative to the benchmark) to the semiconductors, software, internet software & services and computer peripherals sectors, produces a greater return than the overall factor contribution, with further contributions coming from

# INDEXING THEMATIC MEGATRENDS

currency and country. Style weighs down returns, with volatility contributing nearly all of the drag. The index also has a positive tilt to growth and a negative tilt to value factors, which contribute positively and negatively respectively to returns.

With an overall IR of 0.94 and a t-stat of 2.49, index performance is statistically significant at 95% confidence levels. The statistically significant and strong specific return and industry factor may be interpreted as demonstrating favorable security and sector selection for the thematic.

## DEVELOPED MARKETS B.R.AI.N.

There are four megatrends that are likely to shape the future – biotechnology, robotics, artificial intelligence and nanotechnology. These megatrends form the basis of fundamental sectors such as healthcare and materials science, and also impact the workforce.

**FIGURE 38:** iSTOXX Developed Markets B.R.AI.N. Index themes
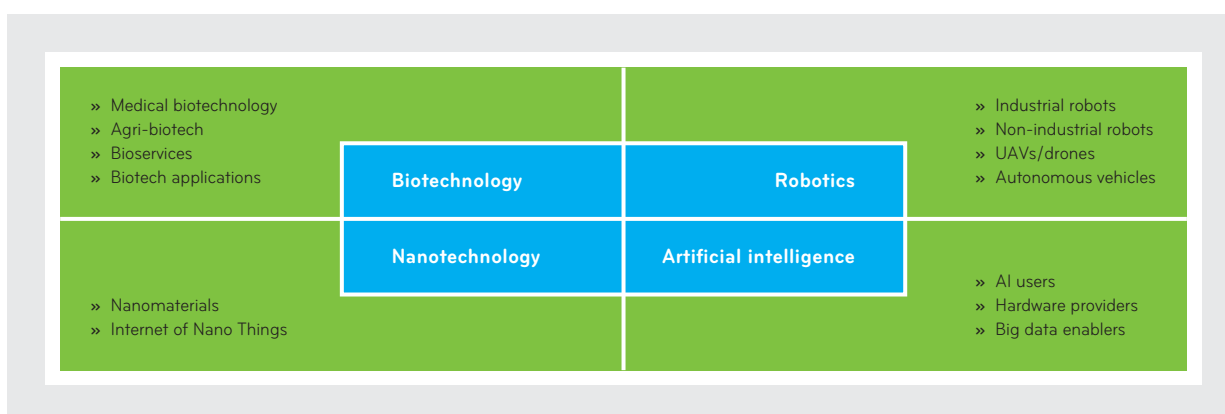


Source: STOXX

### Biotechnology
Biotechnology is a broad discipline in which biological processes, organisms or cellular components are harnessed to develop new technologies and products. Companies included in the index are that they are developing protein-based drugs, using stem cells, modified genetic structures, etc. Beneficiaries include biofuel providers, contract research organizations, seed producers, biopharmaceuticals companies, etc.

### Robotics
The increasing demand for automation in numerous aspects of life has contributed considerably to the growth of robotics. Robots deliver better-quality products and services offering higher efficiency, less wastage and little to no physical risk to humans due to their autonomous nature. Beneficiaries include companies involved in manufacturing industrial robots, manufacturing non-industrial robots, manufacturing drones, autonomous vehicle control software and the like.

# INDEXING THEMATIC MEGATRENDS

### Artificial intelligence

Artificial intelligence is increasingly being used across a broad range of industries from technology to construction; however, different industries are at different stages of adoption. AI is already widely deployed in some sectors with significant plans for future investment, whereas other sectors are still in the very early stages and plans for expanding it in these areas are less aggressive. Beneficiaries include social networking/advertising companies, automation specialists, business software providers, etc.

### Nanotechnology

Scientists and engineers are finding a wide variety of ways to deliberately make materials at the nanoscale to leverage their enhanced properties (such flexible control of the light spectrum, high strength, light weight and higher chemical reactivity) compared to their larger-scale counterparts. Beneficiaries include producers and suppliers of nanomaterials, manufactures of nanoscale devices, nanomedical device suppliers, manufacturers of nanotools, etc.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 39:** Historical performance
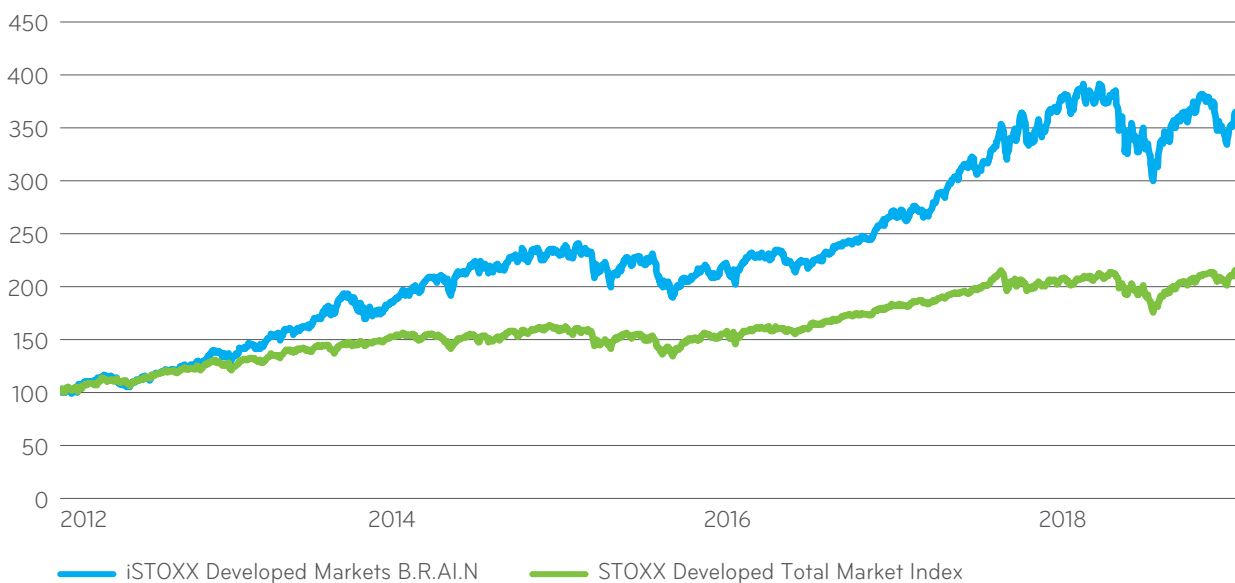


iSTOXX Developed Markets B.R.AI.N          STOXX Developed Total Market Index

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 40:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 20.5% | 11.6% |
| 5y return | 14.0% | 7.1% |
| 3y return | 21.2% | 13.5% |
| 1y return | −0.4% | 6.6% |
| Volatility since inception | 16.7% | 11.0% |
| 5y volatility | 16.6% | 11.2% |
| 3y volatility | 15.7% | 9.8% |
| 1y volatility | 19.6% | 12.1% |
| Sharpe ratio since inception | 1.16 | 0.99 |
| 5y Sharpe ratio | 0.82 | 0.58 |
| Max. drawdown since inception | −23.5% | −18.4% |
| 5y max. drawdown | −23.5% | −18.4% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 41:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 19.26% | | 15.51% | | |
| Benchmark | 11.18% | | 10.87% | | |
| Active | 8.08% | | 8.94% | 0.90 | 2.39 |
| Specific return | 2.34% | | 5.31% | 0.44 | 1.17 |
| Factor contribution | 5.74% | | 8.25% | 0.69 | 1.84 |
| Style | −11.12% | | 2.33% | −0.48 | −1.27 |
| Exchange rate sensitivity | −0.02% | 0.0375 | 0.28% | −0.07 | −0.19 |
| Growth | 0.46% | 0.5122 | 0.57% | 0.80 | 2.13 |
| Leverage | 0.12% | −0.2784 | 0.25% | 0.49 | 1.30 |
| Liquidity | 0.11% | 0.6447 | 0.94% | 0.12 | 0.31 |
| Medium-term momentum | 1.58% | 0.2592 | 0.88% | 1.80 | 4.76 |
| Short-term momentum | 0.23% | 0.0576 | 0.69% | 0.34 | 0.89 |
| Size | 0.19% | 0.0383 | 0.31% | 0.60 | 1.59 |
| Value | −0.87% | −0.4095 | 0.69% | −1.25 | −3.31 |
| Volatility | −2.93% | 0.3947 | 1.57% | −1.87 | −4.95 |
| Country | 0.27% | 0.19% | 1.99% | 0.13 | 0.35 |
| Industry | 5.29% | 0.19% | 6.37% | 0.83 | 2.20 |
| Currency | 1.28% | 0.00% | 1.40% | 0.91 | 2.41 |
| Market | 0.02% | 0.19% | 0.02% | 0.87 | 2.30 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The iSTOXX Developed Markets B.R.AI.N. Index has delivered a strong annualized return of 8.9 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of just under 6 percentage points (see Figure 40). The majority of this "active" return is driven by the factor contribution, with a little over one-quarter attributable to the specific return (see Figure 41). Industry contributes nearly all of the returns from the overall factor contribution and is driven by positive exposures (relative to the benchmark) to sectors related to biotechnology, pharmaceuticals, internet
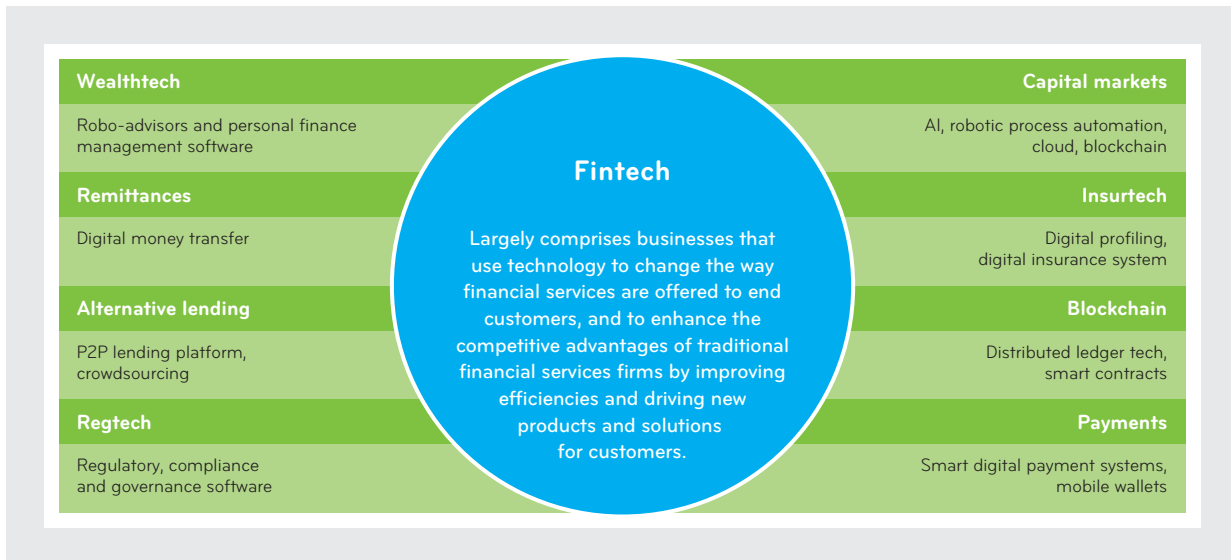
# INDEXING THEMATIC MEGATRENDS

software & services and semiconductors. Other positive return contributions come from currency and country. Style acts as a small drag on returns, erasing some of the gains from industry, although volatility contributes much more than the overall style drag. The index also has a positive tilt to growth and a negative tilt to value factors, which contribute positively and negatively respectively to the returns from style. Momentum also makes a significant contribution to returns, offsetting some of the other negative style components.

With a strong overall IR of 0.90 and a t-stat of 2.39, index performance is statistically significant at 95% confidence levels. The strongly positive industry contribution, which is statistically significant, may be interpreted as demonstrating favorable sector selection. However, the same may not be said of security selection because the specific return, although positive, is not significant.

## GLOBAL FINTECH

Fintech is an evolution of financial services that is being driven by technology, changing customer expectations, the availability of funding and increasing support from governments and regulators. The massive reach and penetration of the internet, technological advances and changes in consumer preferences favoring the technological transformation of financial products are propelling the growth of the fintech industry.

**FIGURE 42:** STOXX Global Fintech Index themes



| Wealthtech | | Capital markets |
| --- | --- | --- |
| Robo-advisors and personal finance management software | | AI, robotic process automation, cloud, blockchain |
| **Remittances** | **Fintech** | **Insurtech** |
| Digital money transfer | Largely comprises businesses that use technology to change the way financial services are offered to end customers, and to enhance the competitive advantages of traditional financial services firms by improving efficiencies and driving new products and solutions for customers. | Digital profiling, digital insurance system |
| **Alternative lending** | | **Blockchain** |
| P2P lending platform, crowdsourcing | | Distributed ledger tech, smart contracts |
| **Regtech** | | **Payments** |
| Regulatory, compliance and governance software | | Smart digital payment systems, mobile wallets |

Source: STOXX

### Alternative lending tech

Alternative lending platforms perform the credit underwriting process and approve or decline loan applications based on the borrower's risk. To do so they rely heavily on proprietary algorithms and on collating different sources of data directly from borrowers or third parties via a digital network. Beneficiaries include online lending platforms, P2P lending platforms, crowdfunding platforms, etc.

# INDEXING THEMATIC MEGATRENDS

**Wealthtech and personal finance management**
Digital providers are mainly targeting the wealth management market via investment advisors that provide automated customized advice including goal setting, allocation, monitoring and rebalancing (robo-advisors), and portfolio review providers that offer financial management portals to track portfolio and advisor performance. Beneficiaries are manufacturers of investing and analytical tools, portfolio management software, etc.

**Payments**
Payments firms span a broad range of providers including card networks, merchant acquirers, POS players, digital payment platforms, person-to-person companies, bill payment companies, money transfer companies, mobile wallets and peer-to-peer payment systems. Beneficiaries include mobile wallet solutions, payment gateways, credit card companies, etc.

**Blockchain**
The financial industry has been one of the first sectors to leverage the efficiency savings provided by distributed ledger technology. With the help of distributed ledger technology, financial services providers can lower the worldwide cost of compliance, cross-border payments and securities trading. Beneficiaries include companies leveraging blockchain/distributed ledger technology (DLT) for financial services and platforms using smart contracts, etc.

**Remittances and money transfer**
A number of alternative FX service providers have recognized the potential offered by new technologies and entered the market, offering minimal-cost remittances. Online service providers eliminate high bank fees by matching demand for, and the supply of, user currencies. The use of technology has made remittances relatively cost-effective. Beneficiaries include providers of P2P exchange platforms and/or of international money transfer services and tracking software, and facilitators.

**Regtech**
Regtech primarily addresses the problem of facilitating and streamlining regulatory compliance by leveraging new technologies, such as big data and machine learning. It offers possible ways to improve security and mitigate risks through the use of data analytics and other technologies. Beneficiaries include firms addressing automated employee surveillance, compliance data management, fraud prevention and audit trail capabilities.

**Insurtech**
Insurtech is exploring avenues that large insurance firms have less incentive to exploit, such as offering ultra-customized policies and social insurance, and using new streams of data from internet-enabled devices to dynamically price premiums according to observed behavior. Beneficiaries include firms leveraging mortgage lending and digitalization platforms, digital insurance distribution platforms, etc.

**Capital markets**
Capital market fintechs are offering a service by building capabilities to improve existing client relationships and experiences, streamlining front-to-back costs, and optimizing regulatory compliance using advance analytics, as well as reducing costs using improved post-trade processing platforms. Beneficiaries include algorithmic trading solutions, exchanges, investment cycle management solution providers, etc.
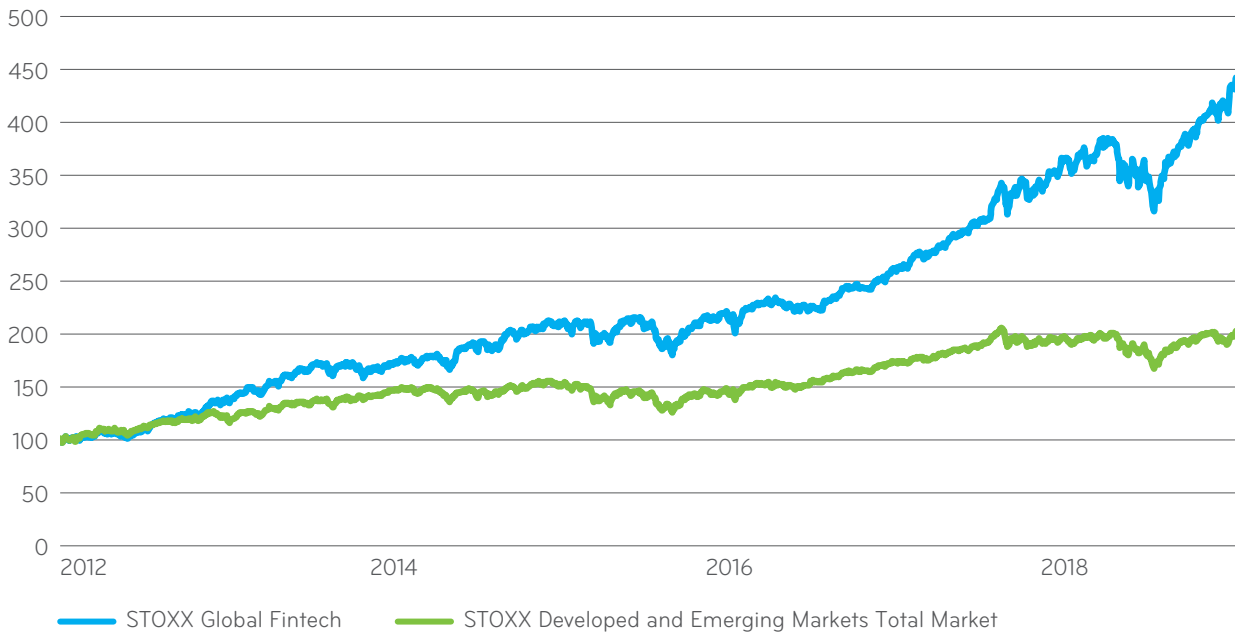
For more details on sectors/specialty areas, see the appendix.

# INDEXING THEMATIC MEGATRENDS

## Index performance and return attribution

**FIGURE 43:** Historical performance



STOXX Global Fintech — STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 44:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 23.7% | 10.8% |
| 5y return | 20.5% | 6.6% |
| 3y return | 29.0% | 13.2% |
| 1y return | 23.8% | 6.5% |
| Volatility since inception | 14.2% | 10.7% |
| 5y volatility | 14.4% | 10.9% |
| 3y volatility | 13.4% | 9.4% |
| 1y volatility | 17.6% | 11.6% |
| Sharpe ratio since inception | 1.52 | 0.94 |
| 5y Sharpe ratio | 1.30 | 0.56 |
| Max. drawdown since inception | −17.9% | −18.8% |
| 5y max. drawdown | −17.9% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 45:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 22.94% | | 12.43% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 12.53% | | 6.41% | 1.95 | 5.17 |
| Specific return | 6.23% | | 4.55% | 1.37 | 3.63 |
| Factor contribution | 6.30% | | 4.79% | 1.31 | 3.47 |
| Style | 1.02% | | 1.98% | 0.51 | 1.36 |
| Exchange rate sensitivity | 0.10% | 0.1524 | 0.32% | 0.32 | 0.86 |
| Growth | 0.28% | 0.2704 | 0.32% | 0.87 | 2.29 |
| Leverage | 0.09% | −0.1297 | 0.13% | 0.71 | 1.88 |
| Liquidity | 0.17% | 0.2437 | 0.41% | 0.41 | 1.09 |
| Medium-term momentum | 1.00% | 0.2102 | 0.80% | 1.26 | 3.32 |
| Short-term momentum | −0.56% | 0.0875 | 0.59% | −0.95 | −2.50 |
| Size | 0.04% | −0.1759 | 0.64% | 0.06 | 0.15 |
| Value | −0.74% | −0.3838 | 0.71% | −1.05 | −2.77 |
| Volatility | 0.64% | −0.0593 | 0.53% | 1.21 | 3.20 |
| Country | 0.37% | 0.18% | 2.66% | 0.14 | 0.36 |
| Industry | 4.17% | 0.18% | 3.17% | 1.32 | 3.48 |
| Currency | 0.72% | 0.00% | 1.56% | 0.46 | 1.22 |
| Market | 0.00% | −0.05% | 0.01% | −0.32 | −0.85 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Fintech Index has delivered a strong annualized return of nearly 13% more than its benchmark since inception (including over the backtest period), with an increased volatility of 3.5 percentage points (see Figure 44). This "active" return is driven almost equally by the specific return and the factor contribution. Industry is the largest component of the overall factor contribution and is driven by positive exposures (relative to the benchmark) to the IT services, financial services and professional services sectors. Style only impacts marginally on the top-level factor contribution with volatility producing positive returns, unlike for most of the other thematic indices. Positive and negative exposures to growth and value respectively contribute positively and negatively to the returns.

With a strong overall IR of 1.95 and a t-stat of 5.17, index performance is statistically significant at 95% confidence levels. The statistically significant and strongly positive specific return and industry contributions may be interpreted as demonstrating favorable security selection and sector selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## GLOBAL SMART FACTORY

The convergence of the digital and physical worlds, including information technology (IT) and operations technology (OT), are considered to be the driving force behind what is considered the fourth industrial revolution or "Industry 4.0". The concept of the "smart factory" covers the technologies affecting manufacturing units and does not consider external factors such as customer expectations or the use of artificial intelligence to optimize inventory based on supply and demand. Smart factories offer ways to maximize output from the manufacturing unit setup.

**FIGURE 46:** STOXX Global Smart Factory Index themes



| | | |
|---|---|---|
| **Automation** | » | » Reduced error rate/returns<br>» Improved coordination |
| **Industrial connectivity** | » | » Preventive maintenance<br>» Seamless connectivity |
| **Virtual reality** | » | » Reduced set-up time<br>» Reduced inventory |
| **Rapid prototyping** | » | » Reduced logistics costs<br>» Informed decisions |

Source: STOXX

### Automation
Industrial/manufacturing automation involves everything from self-driving trucks to supply-chain management software. Industrial automation has the ability to pack and ship items using advanced technology – something known as "smart manufacturing". Companies included in the index are those that are investing heavily in factory and industrial automation machinery. Beneficiaries include manufacturers of automated manufacturing systems and machines, etc.

### Industrial connectivity
In smart factories, industrial machines are fitted with sensors, equipping employees across the supply and delivery chains with the tools needed to monitor and respond to the output from them. The defining traits of companies included in the index are that they are investing in seamless connectivity throughout manufacturing units. Beneficiaries include cybersecurity software providers, semiconductor manufacturers, cloud services providers, etc.

### Virtual/augmented reality
Virtual reality-based systems support multiple services, such as selecting parts in a warehouse and sending repair instructions via mobile devices. Some companies have developed virtual plant-operator training modules that uses a realistic, data-based 3D environment with AR glasses to train plant personnel to handle emergencies. Companies included in the index are those that are investing in VR design and software. Beneficiaries include AR/VR device manufacturers.

# INDEXING THEMATIC MEGATRENDS

### Rapid prototyping

With Industry 4.0, additive manufacturing methods are expected to be widely used to produce small batches of customized products that offer construction advantages such as complex, lightweight designs. Companies included in the index are those that are investing heavily in additive manufacturing. Beneficiaries include design software providers, and 3D modeling and automation providers.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 47:** Historical performance
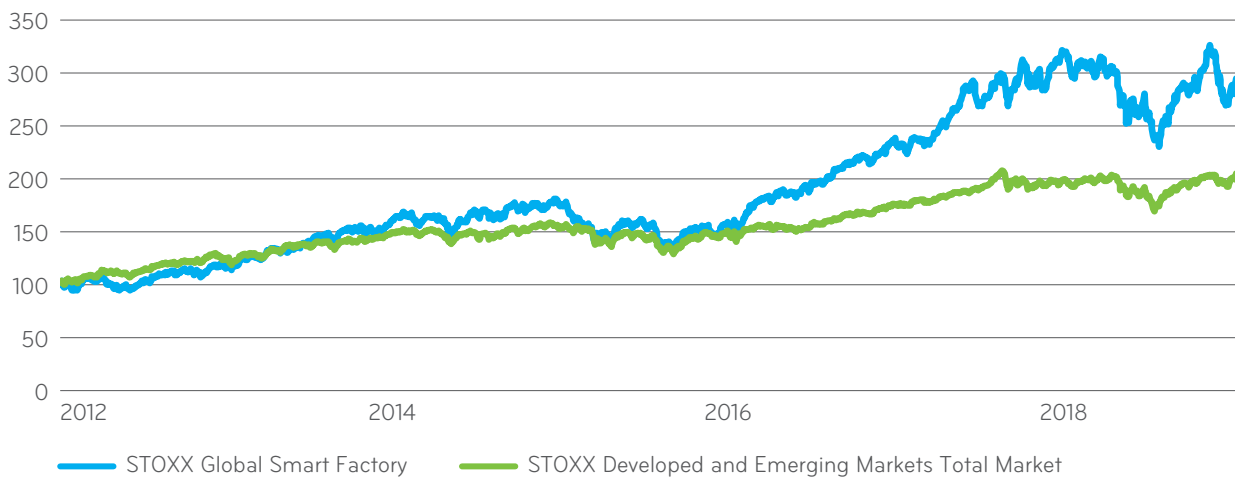


STOXX Global Smart Factory     STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

Figure 48: Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 17.2% | 10.8% |
| 5y return | 13.4% | 6.6% |
| 3y return | 26.6% | 13.2% |
| 1y return | 1.4% | 6.5% |
| Volatility since inception | 18.1% | 10.7% |
| 5y volatility | 18.3% | 10.9% |
| 3y volatility | 18.1% | 9.4% |
| 1y volatility | 23.1% | 11.6% |
| Sharpe ratio since inception | 0.93 | 0.94 |
| 5y Sharpe ratio | 0.73 | 0.56 |
| Max. drawdown since inception | −28.6% | −18.8% |
| 5y max. drawdown | −28.6% | −18.8% |

The analysis is conducted for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 49:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 17.24% | | 18.34% | | |
| Benchmark | 10.41% | | 10.82% | | |
| Active | 6.84% | | 12.39% | 0.55 | 1.46 |
| Specific return | 0.94% | | 5.03% | 0.19 | 0.50 |
| Factor contribution | 5.90% | | 9.90% | 0.60 | 1.58 |
| Style | −1.82% | | 2.73% | −0.67 | −1.77 |
| Exchange rate sensitivity | −0.11% | −0.0082 | 0.37% | −0.30 | −0.78 |
| Growth | 0.07% | 0.1272 | 0.15% | 0.49 | 1.29 |
| Leverage | 0.16% | −0.4395 | 0.41% | 0.39 | 1.04 |
| Liquidity | 0.00% | 0.7955 | 1.16% | 0.00 | 0.00 |
| Medium-term momentum | 0.76% | 0.1123 | 1.05% | 0.72 | 1.91 |
| Short-term momentum | 0.17% | 0.0379 | 0.90% | 0.19 | 0.50 |
| Size | −0.03% | −0.1614 | 0.58% | −0.05 | −0.13 |
| Value | −0.42% | −0.2139 | 0.38% | −1.10 | −2.90 |
| Volatility | −2.42% | 0.3123 | 1.47% | −1.65 | −4.37 |
| Country | 0.44% | 0.14% | 2.48% | 0.18 | 0.46 |
| Industry | 6.19% | 0.14% | 8.21% | 0.75 | 1.99 |
| Currency | 1.09% | 0.00% | 1.63% | 0.67 | 1.76 |
| Local | 0.00% | −0.01% | 0.01% | −0.26 | −0.68 |
| Market | 0.01% | 0.14% | 0.02% | 0.77 | 2.05 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Smart Factory Index has delivered an annualized return of 6.4 percentage points more than its benchmark since inception (including over the backtest period), with an increased volatility of 7.4 percentage points (see Figure 48). This "active" return is driven mainly by the factor contribution and much less so by the specific return (see Figure 49). Industry is the largest component of the overall factor contribution and is boosted by positive exposures (relative to the benchmark) to the semiconductors, software, electronic equipment, and instruments & components sectors. Currency and country also make marginally positive contributions to top-level factor returns. Style contributes negatively to factor performance, with volatility being largely responsible for the drag. Positive and negative exposures to momentum and value respectively contribute positively and negatively to returns.

The index has an IR of 0.55, although it is not statistically significant at 95% confidence levels (t-stat of 1.46). The strongly positive industry contribution, which is statistically significant, may be interpreted as indicating favorable sector selection. However, the same may not be inferred for security selection since the specific return, although positive, is not significant.

# INDEXING THEMATIC MEGATRENDS

## GLOBAL DIGITAL SECURITY

The Digital Security theme comprises companies that are involved in the transmission, safeguarding and/or handling of sensitive data, and/or access control of secure locations (e.g. data centers).

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 50:** Historical performance
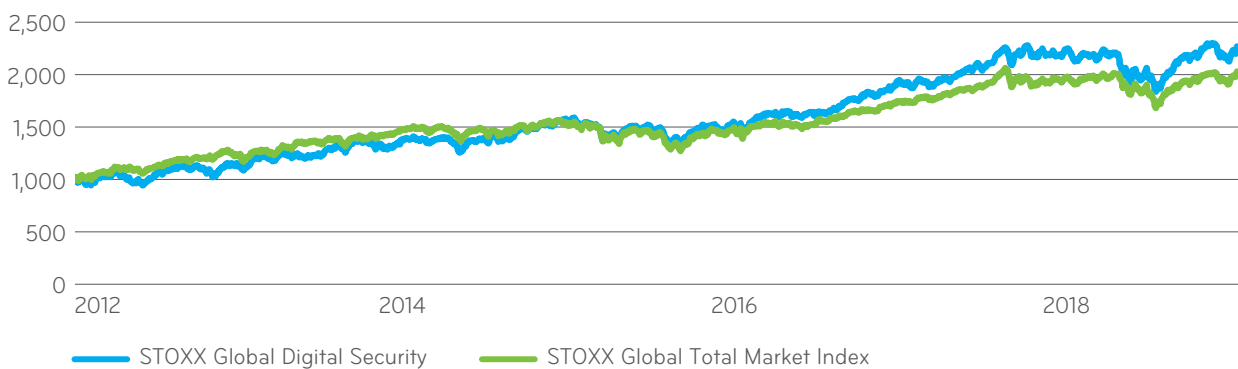


The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 51:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
| --- | --- | --- |
| Return since inception | 12.5% | 10.8% |
| 5y return | 10.5% | 6.6% |
| 3y return | 16.6% | 13.2% |
| 1y return | 6.5% | 6.5% |
| Volatility since inception | 13.7% | 10.7% |
| 5y volatility | 12.2% | 10.9% |
| 3y volatility | 11.2% | 9.4% |
| 1y volatility | 13.9% | 11.6% |
| Sharpe ratio since inception | 0.88 | 0.94 |
| 5y Sharpe ratio | 0.81 | 0.56 |
| Max. drawdown since inception | −19.3% | −18.8% |
| 5y max. drawdown | −19.3% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 52:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 12.53% | | 13.04% | | |
| Benchmark | 10.39% | | 10.82% | | |
| Active | 2.14% | | 7.81% | 0.27 | 0.72 |
| Specific return | −0.32% | | 4.54% | −0.07 | −0.19 |
| Factor contribution | 2.46% | | 6.04% | 0.41 | 1.08 |
| Style | −3.43% | | 3.08% | −1.11 | −2.95 |
| Exchange rate sensitivity | 0.00% | −0.0331 | 0.14% | 0.00 | 0.01 |
| Growth | 0.10% | 0.1203 | 0.16% | 0.62 | 1.63 |
| Leverage | 0.15% | −0.4082 | 0.36% | 0.42 | 1.10 |
| Liquidity | 0.18% | 0.6596 | 1.01% | 0.18 | 0.47 |
| Medium-term momentum | −0.26% | −0.0009 | 0.66% | −0.39 | −1.04 |
| Short-term momentum | −0.25% | 0.0382 | 0.57% | −0.43 | −1.14 |
| Size | −0.48% | −0.5213 | 1.94% | −0.25 | −0.66 |
| Value | −0.52% | −0.3041 | 0.59% | −0.90 | −2.37 |
| Volatility | −2.35% | 0.3095 | 1.35% | −1.75 | −4.62 |
| Country | 0.52% | 0.11% | 2.05% | 0.25 | 0.67 |
| Industry | 5.04% | 0.11% | 3.96% | 1.27 | 3.37 |
| Currency | 0.32% | 0.00% | 1.31% | 0.25 | 0.65 |
| Local | 0.00% | −0.05% | 0.01% | −0.31 | −0.81 |
| Market | 0.01% | 0.11% | 0.02% | 0.63 | 1.67 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Digital Security Index has delivered an annualized return of 1.7 percentage points more than its benchmark since inception (including the backtest period), although with an increased volatility of 3 percentage points (see Figure 51). Factors account for most of the "active" return, with only a slight contribution coming from the specific return. Differences in sector exposure relative to the benchmark have the biggest impact on factor performance, with overweights to securities related to the semiconductors, software, IT services and communication equipment sectors boosting industry returns. However, these gains are significantly depressed by the style component, with volatility accounting for over two-thirds of the drag. Size, value and momentum also drag on the return.

The index has an IR of 0.27, which is not statistically significant at 95% confidence levels (t-stat of 0.72). Although the industry factor contributes strongly and is statistically significant, the specific return is negative and not significant. Consequently, no meaningful conclusions may be drawn about the effectiveness of security selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## GLOBAL ELECTRIC VEHICLES & DRIVING TECHNOLOGY

The electric vehicles and assisted driving technologies theme includes firms that are involved in manufacturing electric and autonomous vehicles, battery suppliers for electric vehicles, and other suppliers in the electric and autonomous vehicle manufacturing supply chain.

### Index performance and return attribution

**FIGURE 53:** Historical performance
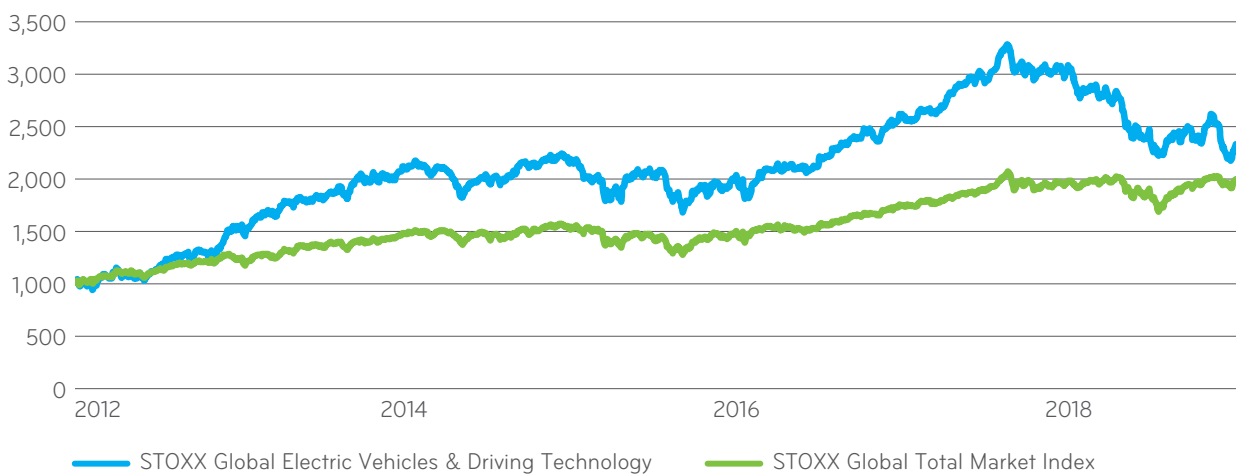


The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

**FIGURE 54:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 13.4% | 10.8% |
| 5y return | 2.5% | 6.6% |
| 3y return | 9.8% | 13.2% |
| 1y return | −15.3% | 6.5% |
| Volatility since inception | 15.3% | 10.7% |
| 5y volatility | 14.3% | 10.9% |
| 3y volatility | 13.0% | 9.4% |
| 1y volatility | 16.2% | 11.6% |
| Sharpe ratio since inception | 0.85 | 0.94 |
| 5y Sharpe ratio | 0.18 | 0.56 |
| Max. drawdown since inception | −34.0% | −18.8% |
| 5y max. drawdown | −34.0% | −18.8% |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 55:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 13.16% | | 17.11% | | |
| Benchmark | 10.39% | | 10.82% | | |
| Active | 2.77% | | 10.45% | 0.26 | 0.70 |
| Specific return | 5.70% | | 5.09% | 1.12 | 2.97 |
| Factor contribution | −2.94% | | 7.85% | −0.37 | −0.99 |
| Style | −3.04% | | 3.28% | −0.93 | −2.45 |
| Exchange rate sensitivity | −0.01% | −0.0849 | 0.18% | −0.08 | −0.21 |
| Growth | 0.05% | 0.1165 | 0.13% | 0.36 | 0.96 |
| Leverage | 0.07% | −0.0952 | 0.10% | 0.66 | 1.75 |
| Liquidity | 0.07% | 0.3113 | 0.59% | 0.11 | 0.30 |
| Medium-term momentum | 0.05% | −0.0085 | 1.06% | 0.04 | 0.11 |
| Short-term momentum | 0.01% | 0.0151 | 1.10% | 0.01 | 0.03 |
| Size | −0.62% | −0.3967 | 1.57% | −0.39 | −1.04 |
| Value | 0.47% | 0.1767 | 0.50% | 0.93 | 2.45 |
| Volatility | −3.11% | 0.4063 | 1.88% | −1.66 | −4.38 |
| Country | −1.04% | 0.05% | 3.52% | −0.30 | −0.78 |
| Industry | 0.35% | 0.05% | 6.13% | 0.06 | 0.15 |
| Currency | 0.79% | 0.00% | 2.17% | 0.36 | 0.96 |
| Local | 0.00% | −0.05% | 0.01% | −0.31 | −0.83 |
| Market | 0.00% | 0.05% | 0.02% | 0.06 | 0.15 |

The analysis was performed for the period from June 2012 to June 2019. Returns are measured in USD total return.

The STOXX Global Electric Vehicles & Driving Technology Index has delivered an annualized return of 2.6 percentage points more than its benchmark since inception (including the backtest period), although with an increased volatility of 4.6 percentage points (see Figure 54). In contrast to many other thematic indices, the overall factor contribution to the "active" return is negative. The significant drag on performance from volatility and, to a lesser extent, from size result in a net negative contribution from style. Additionally, unfavorable tilts in country selection relative to the benchmark weighed down returns. Industry barely manages to produce a positive return, although it is a prime source of strongly positive returns across most other thematic indices.

The index has an IR of 0.26, which is not statistically significant at 95% confidence levels (t-stat of 0.70). However, the specific return is statistically significant (t-stat of 2.71), reflecting favorable security selection for the thematic. However, the same conclusion may not be drawn about sector selection.

# INDEXING THEMATIC MEGATRENDS

## AUTOMATION & ROBOTICS

The automation and robotics theme includes all stocks from the STOXX Global Total Market Index that derive more than 50% of their most recent total annual revenues from sectors linked to the automation & robotics business and that are classified as belonging to a defined set of developed and emerging countries.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 56:** Historical performance
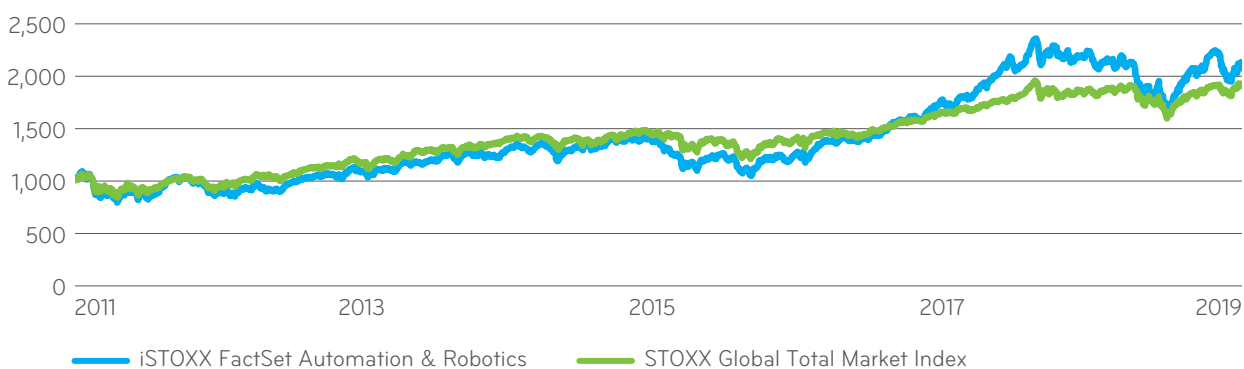


The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

**FIGURE 57:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 10.0% | 8.6% |
| 5y return | 10.3% | 6.6% |
| 3y return | 21.9% | 13.2% |
| 1y return | 2.7% | 6.5% |
| Volatility since inception | 15.4% | 12.4% |
| 5y volatility | 14.0% | 10.9% |
| 3y volatility | 13.7% | 9.4% |
| 1y volatility | 17.9% | 11.6% |
| Sharpe ratio since inception | 0.66 | 0.68 |
| 5y Sharpe ratio | 0.70 | 0.56 |
| Max. drawdown since inception | −29.1% | −21.3% |
| 5y max. drawdown | −29.1% | −18.8% |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 58:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 9.93% | | 18.11% | | |
| Benchmark | 8.03% | | 12.58% | | |
| Active | 1.90% | | 9.04% | 0.21 | 0.59 |
| Specific return | 3.02% | | 4.22% | 0.71 | 2.02 |
| Factor contribution | −1.12% | | 7.21% | −0.16 | −0.44 |
| Style | −4.15% | | 3.86% | −1.08 | −3.04 |
| Exchange rate sensitivity | 0.01% | −0.0010 | 0.16% | 0.04 | 0.12 |
| Growth | 0.00% | −0.0086 | 0.11% | 0.00 | 0.01 |
| Leverage | 0.35% | −0.4450 | 0.49% | 0.71 | 2.01 |
| Liquidity | −0.13% | 0.4623 | 0.68% | −0.18 | −0.52 |
| Medium-term momentum | 0.95% | 0.1045 | 0.84% | 1.13 | 3.21 |
| Short-term momentum | 0.32% | 0.0400 | 0.80% | 0.40 | 1.12 |
| Size | −0.65% | −0.6167 | 2.28% | −0.29 | −0.81 |
| Value | −0.46% | −0.3222 | 0.58% | −0.79 | −2.24 |
| Volatility | −4.53% | 0.5374 | 2.77% | −1.64 | −4.63 |
| Country | 0.50% | 0.09% | 2.27% | 0.22 | 0.62 |
| Industry | 2.65% | 0.09% | 5.72% | 0.46 | 1.31 |
| Currency | −0.19% | 0.00% | 1.59% | −0.12 | −0.33 |
| Local | 0.05% | −0.07% | 0.23% | 0.22 | 0.62 |
| Market | 0.01% | 0.09% | 0.02% | 0.62 | 1.75 |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

The iSTOXX FactSet Automation & Robotics Index has delivered an annualized return of 1.4 percentage points more than its benchmark since inception (including the backtest period), although with an increased volatility of 3 percentage points (see Figure 57). The specific return is the primary driver of the positive "active" return, outweighing the negative factor contribution. Style is the largest drag on the overall factor contribution with volatility being mostly responsible for the drag. However, the industry factor offsets some of this drag with a positive return contribution from overweights (relative to the benchmark) to companies specializing in software, semiconductors, electronic equipment and instruments & components. These boosted industry-level returns.

The index has an IR of 0.21, which is not statistically significant at 95% confidence levels (t-stat of 0.59). However, the specific return is statistically significant (t-stat of 2.02), which may be interpreted as demonstrating favorable security selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## AGEING POPULATION

The ageing population theme includes all stocks from the STOXX Global Total Market Index that derive more than 50% of their most recent total annual revenues from sectors linked to the ageing population business, and that are classified as belonging to a defined set of developed and emerging countries.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 59:** Historical performance
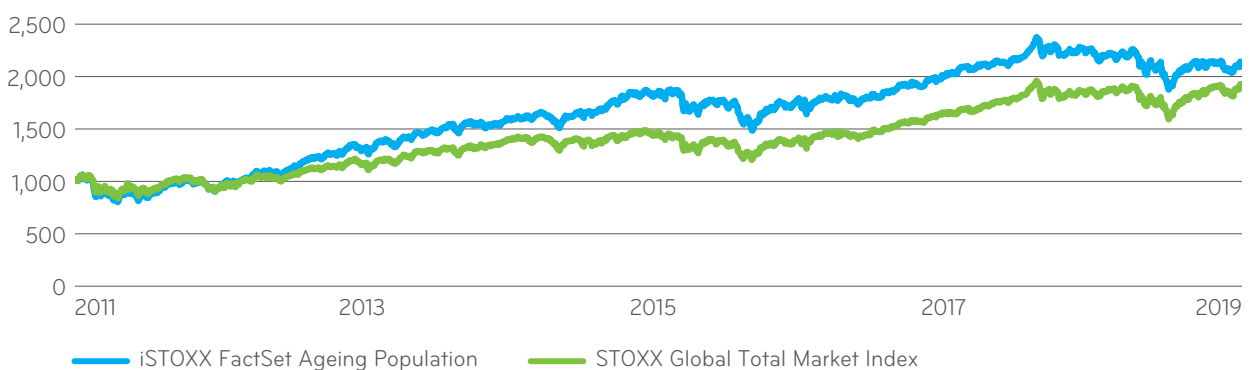


The analysis was performed for the period from June 2011 to April 2019. Returns are measured in USD total return.

**FIGURE 60:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
| --- | --- | --- |
| Return since inception | 10.1% | 8.6% |
| 5y return | 6.2% | 6.6% |
| 3y return | 9.0% | 13.2% |
| 1y return | −0.4% | 6.5% |
| Volatility since inception | 12.9% | 12.4% |
| 5y volatility | 10.9% | 10.9% |
| 3y volatility | 9.4% | 9.4% |
| 1y volatility | 11.4% | 11.6% |
| Sharpe ratio since inception | 0.76 | 0.68 |
| 5y Sharpe ratio | 0.52 | 0.56 |
| Max. drawdown since inception | −24.6% | −21.3% |
| 5y max. drawdown | −21.0% | −18.8% |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 61:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 9.74% | | 13.58% | | |
| Benchmark | 8.03% | | 12.58% | | |
| Active | 1.71% | | 4.23% | 0.40 | 1.14 |
| Specific return | 2.03% | | 2.51% | 0.81 | 2.28 |
| Factor contribution | −0.32% | | 3.34% | −0.10 | −0.27 |
| Style | −1.86% | | 2.20% | −0.85 | −2.40 |
| Exchange rate sensitivity | −0.05% | 0.1037 | 0.11% | −0.49 | −1.39 |
| Growth | 0.07% | 0.0852 | 0.11% | 0.63 | 1.77 |
| Leverage | 0.19% | −0.2430 | 0.22% | 0.83 | 2.36 |
| Liquidity | −0.05% | 0.0924 | 0.17% | −0.28 | −0.79 |
| Medium-term momentum | 0.48% | 0.0558 | 0.61% | 0.79 | 2.23 |
| Short-term momentum | −0.02% | 0.0285 | 0.39% | −0.05 | −0.14 |
| Size | −0.66% | −0.5021 | 1.86% | −0.36 | −1.01 |
| Value | −0.09% | −0.0556 | 0.14% | −0.64 | −1.81 |
| Volatility | −1.72% | 0.2095 | 1.03% | −1.67 | −4.73 |
| Country | 0.01% | 0.05% | 1.30% | 0.00 | 0.01 |
| Industry | 1.56% | 0.05% | 2.83% | 0.55 | 1.56 |
| Currency | −0.05% | 0.00% | 0.99% | −0.05 | −0.13 |
| Local | 0.02% | −0.25% | 0.22% | 0.07 | 0.21 |
| Market | 0.00% | 0.05% | 0.01% | 0.23 | 0.64 |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

The iSTOXX FactSet Ageing Population Index has delivered an annualized return of 1.5 percentage points more than its benchmark since inception (including the backtest period), although with an increased volatility of 0.5 percentage points (see Figure 60). The specific return is the sole driver of the positive "active" return, mitigating the negative impact from the factor contribution. The latter is mainly due to style, with volatility and size being the biggest drags on performances. However, positive returns yielded from overweights (relative to the benchmark) to healthcare providers, healthcare equipment, biotechnology, hotels and restaurant & leisure offer some respite, minimizing the downward pressure from style.

The index has an IR of 0.40, which is not statistically significant at 95% confidence levels (t-stat of 1.14). The specific return is statistically significant (t-stat of 2.28) and may be interpreted as demonstrating favorable security selection for the thematic.

# INDEXING THEMATIC MEGATRENDS

## DIGITALIZATION

The digitalization theme includes all stocks from the STOXX Global Total Market Index that derive more than 50% of their most recent total annual revenues from sectors linked to the digitalization business and that are classified as belonging to a defined set of developed and emerging countries.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 62:** Historical performance
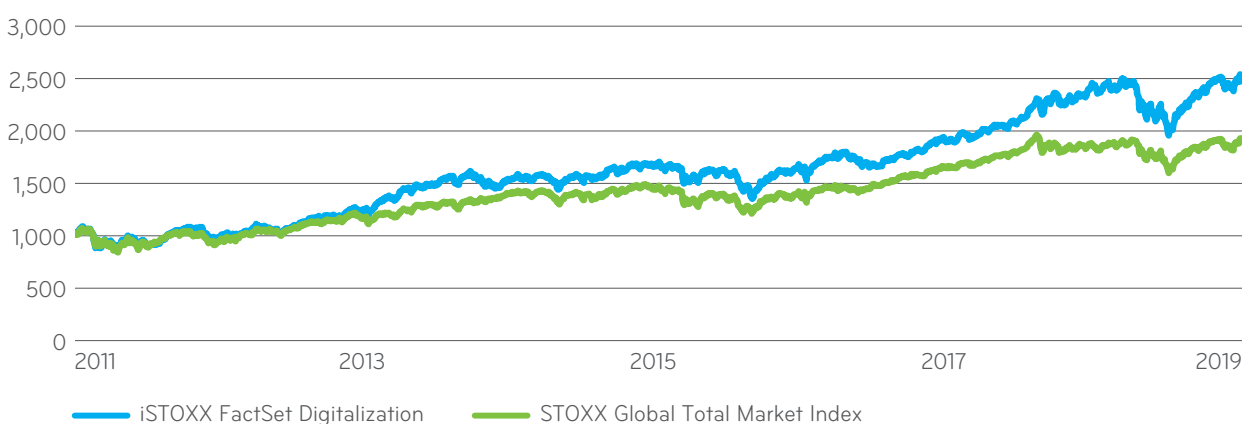


The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

**FIGURE 63:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
| --- | --- | --- |
| Return since inception | 12.3% | 8.6% |
| 5y return | 10.3% | 6.6% |
| 3y return | 17.8% | 13.2% |
| 1y return | 6.6% | 6.5% |
| Volatility since inception | 14.2% | 12.4% |
| 5y volatility | 12.7% | 10.9% |
| 3y volatility | 12.0% | 9.4% |
| 1y volatility | 15.6% | 11.6% |
| Sharpe ratio since inception | 0.84 | 0.68 |
| 5y Sharpe ratio | 0.76 | 0.56 |
| Max. drawdown since inception | −22.3% | −21.3% |
| 5y max. drawdown | −21.7% | −18.8% |

The analysis was performed for the period from June 2011 to April 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 64:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 11.89% | | 14.53% | | |
| Benchmark | 8.03% | | 12.58% | | |
| Active | 3.86% | | 5.79% | 0.67 | 1.88 |
| Specific return | 1.63% | | 3.06% | 0.53 | 1.50 |
| Factor contribution | 2.23% | | 5.45% | 0.41 | 1.16 |
| Style | −3.64% | | 3.10% | −1.17 | −3.32 |
| Exchange rate sensitivity | 0.09% | 0.0822 | 0.19% | 0.45 | 1.28 |
| Growth | 0.32% | 0.3195 | 0.32% | 1.00 | 2.82 |
| Leverage | 0.27% | −0.3689 | 0.41% | 0.66 | 1.88 |
| Liquidity | −0.18% | 0.6058 | 0.89% | −0.20 | −0.57 |
| Medium-term momentum | 0.32% | 0.1346 | 0.71% | 0.45 | 1.28 |
| Short-term momentum | −0.19% | 0.0676 | 0.53% | −0.35 | −1.00 |
| Size | −0.57% | −0.4772 | 1.75% | −0.32 | −0.91 |
| Value | −0.74% | −0.4636 | 0.83% | −0.89 | −2.53 |
| Volatility | −2.97% | 0.3597 | 1.92% | −1.55 | −4.37 |
| Country | 0.49% | 0.16% | 0.91% | 0.54 | 1.53 |
| Industry | 4.97% | 0.16% | 4.50% | 1.10 | 3.13 |
| Currency | 0.38% | 0.00% | 0.69% | 0.55 | 1.55 |
| Local | 0.02% | −0.34% | 0.22% | 0.10 | 0.29 |
| Market | 0.01% | 0.16% | 0.02% | 0.23 | 0.66 |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

The iSTOXX FactSet Digitalization Index has delivered an annualized return of 3.7 percentage points more than its benchmark since inception (including the backtest period), with an increased volatility of just under 2 percentage points (see Figure 63). This "active" return is driven more by the factor contribution than by the specific return. The internet & catalog retail, internet software & services, IT services and software sectors have high positive exposure (relative to the benchmark) and contribute most of the positive return to the factor contribution. Style is a considerable drag on returns, wiping out a large part of the industry gains, with volatility depressing performance the most. The index also has a positive tilt to growth and a negative tilt to value factors. Country and currency also contribute small positive returns.

The index has an IR of 0.67, which is not statistically significant at 95% confidence levels (t-stat of 1.88). The specific return is not statistically significant, although the industry contribution is. Consequently, no meaningful conclusions may be drawn about the effectiveness of security selection for the thematic but a case may be made for favorable sector selection.

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## BREAKTHROUGH HEALTHCARE

The breakthrough healthcare theme includes all stocks from the STOXX Global Total Market Index that derive more than 50% of their most recent total annual revenues from sectors linked to the breakthrough healthcare business and that are classified as belonging to a defined set of developed and emerging countries.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 65:** Historical performance
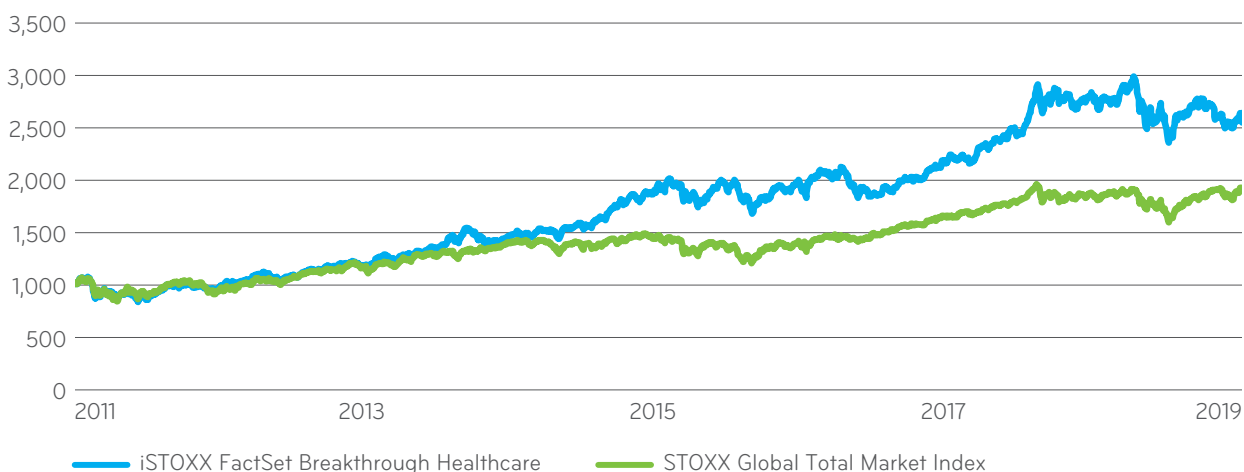


iSTOXX FactSet Breakthrough Healthcare — STOXX Global Total Market Index

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

**FIGURE 66:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
| --- | --- | --- |
| Return since inception | 13.1% | 8.6% |
| 5y return | 12.4% | 6.6% |
| 3y return | 12.3% | 13.2% |
| 1y return | −1.2% | 6.5% |
| Volatility since inception | 14.5% | 12.4% |
| 5y volatility | 13.9% | 10.9% |
| 3y volatility | 13.9% | 9.4% |
| 1y volatility | 17.0% | 11.6% |
| Sharpe ratio since inception | 0.88 | 0.68 |
| 5y Sharpe ratio | 0.84 | 0.56 |
| Max. drawdown since inception | −22.2% | −21.3% |
| 5y max. drawdown | −21.2% | −18.8% |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

# INDEXING THEMATIC MEGATRENDS

**FIGURE 67:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 12.19% | | 15.34% | | |
| Benchmark | 8.03% | | 12.58% | | |
| Active | 4.16% | | 10.14% | 0.41 | 1.16 |
| Specific return | 2.91% | | 4.82% | 0.60 | 1.71 |
| Factor contribution | 1.25% | | 9.13% | 0.14 | 0.39 |
| Style | −4.78% | | 3.59% | −1.33 | −3.77 |
| Exchange rate sensitivity | 0.05% | 0.0001 | 0.17% | 0.30 | 0.85 |
| Growth | 0.23% | 0.1365 | 0.31% | 0.75 | 2.12 |
| Leverage | 0.20% | −0.2171 | 0.21% | 0.95 | 2.68 |
| Liquidity | -0.13% | 0.4560 | 0.66% | -0.19 | −0.54 |
| Medium-term momentum | 0.85% | 0.2125 | 1.04% | 0.82 | 2.32 |
| Short-term momentum | −0.08% | 0.0649 | 0.84% | −0.09 | −0.27 |
| Size | −0.70% | −0.5780 | 2.13% | −0.33 | −0.92 |
| Value | −0.90% | −0.5414 | 0.98% | −0.92 | −2.61 |
| Volatility | −4.30% | 0.5166 | 2.31% | −1.87 | −5.28 |
| Country | −0.25% | 0.23% | 1.90% | −0.13 | −0.37 |
| Industry | 5.58% | 0.23% | 7.18% | 0.78 | 2.20 |
| Currency | 0.66% | 0.00% | 1.03% | 0.64 | 1.80 |
| Local | 0.02% | −0.34% | 0.22% | 0.11 | 0.31 |
| Market | 0.01% | 0.23% | 0.03% | 0.34 | 0.96 |

The analysis was performed for the period from June 2011 to June 2019. Returns are measured in USD total return.

The iSTOXX FactSet Breakthrough Healthcare Index has delivered an annualized return of 4.5 percentage points more than its benchmark since inception (including the backtest period), with an increased volatility of 2.1 percentage points (see Figure 66). The "active" return is driven largely by the specific return plus a moderate factor contribution. The biotechnology, pharmaceuticals, life sciences tools & services and healthcare technology sectors have a high positive exposure (relative to the benchmark), and are the main contributors to the large industry return. Currency also makes a positive factor contribution, with a small drag coming from the country factor. Style depresses returns considerably, mainly due to volatility, and wipes out a large part of the positive contribution from the industry and currency factors. The index also has a positive tilt to growth and a negative tilt to value factors.

The index has an IR of 0.41, which is not statistically significant at 95% confidence levels (t-stat of 1.16). The specific return, despite being positive, is statistically not significant (t-stat of 1.71), although the significance of the industry contribution may be interpreted as indicating favorable sector selection for the thematic.

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## AI-BASED THEMATIC INDICES

In this section, we discuss the AI-based thematic indices, risk and return performance, and the results of factor-based performance attribution for each index.

## AI GLOBAL ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) is the science of creating computer programs and machines that exhibit human-like intelligence and cognitive skills. The AI Global Artificial Intelligence theme comprises companies from a wide range of industries that invest heavily in the development of new AI technologies, and are therefore considered to be well-positioned to benefit from its increased adoption.

Two metrics relevant to a company's involvement in the artificial intelligence field are calculated:

**AI Intellectual Property Exposure** is defined as the ratio of the number of AI patents awarded to a company over the most recent 3-year period to the total number of patents awarded to that company over the same period. This provides an indication of the importance of AI research and applications to the overall activities of each company.

**AI Contribution** is defined as the ratio of the number of AI patents awarded to a company over the most recent 3-year period to the total number of AI patents awarded to all companies in the index universe. This provides an indication of the importance of each company's AI research and applications compared to the overall AI-related activities of other companies in the index universe.

Securities need a minimum average daily trading value (ADTV) of EUR 1 m to be eligible for the index. The detailed methodology is provided in the STOXX Index Methodology Guide.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 68:** Historical performance
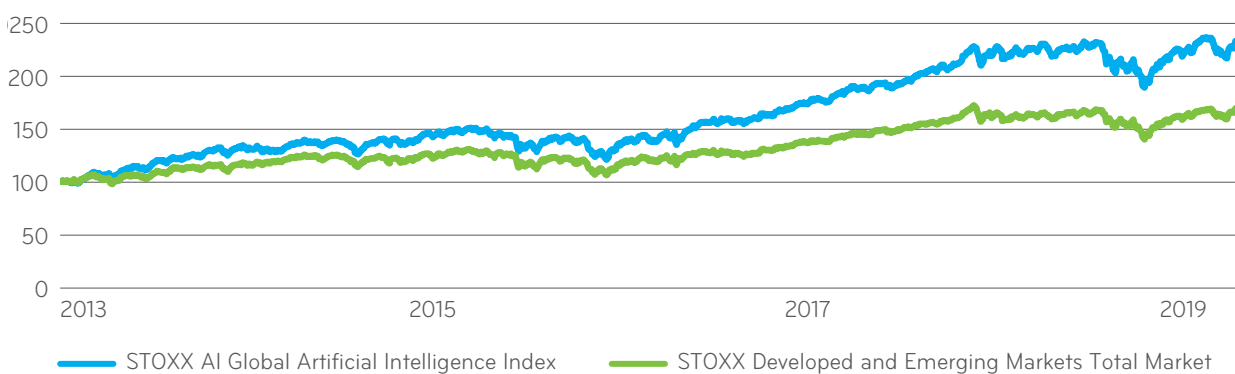


The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

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**FIGURE 69:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 14.7% | 8.9% |
| 5y return | 11.5% | 6.6% |
| 3y return | 19.9% | 13.2% |
| 1y return | 6.9% | 6.5% |
| Volatility since inception | 11.5% | 10.6% |
| 5y volatility | 11.8% | 10.9% |
| 3y volatility | 10.7% | 9.4% |
| 1y volatility | 13.6% | 11.6% |
| Sharpe ratio since inception | 1.19 | 0.78 |
| 5y Sharpe ratio | 0.90 | 0.56 |
| Max. drawdown since inception | −19.9% | −18.8% |
| 5y max. drawdown | −19.9% | −18.8% |

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

**FIGURE 70:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 14.68% | | 13.12% | | |
| Benchmark | 8.81% | | 11.24% | | |
| Active | 5.87% | | 4.58% | 1.28 | 3.21 |
| Specific return | 3.87% | | 2.08% | 1.87 | 4.66 |
| Factor contribution | 2.00% | | 3.82% | 0.52 | 1.31 |
| Style | −2.35% | | 1.75% | −1.34 | −3.36 |
| Exchange rate sensitivity | 0.02% | −0.0181 | 0.09% | 0.19 | 0.47 |
| Growth | −0.11% | −0.1171 | 0.11% | −0.97 | −2.41 |
| Leverage | 0.07% | −0.1351 | 0.11% | 0.65 | 1.63 |
| Liquidity | −0.19% | 0.4418 | 0.65% | −0.29 | −0.73 |
| Medium-term momentum | 0.10% | 0.0066 | 0.40% | 0.24 | 0.60 |
| Short-term momentum | −0.14% | 0.0481 | 0.46% | −0.30 | −0.75 |
| Size | −0.22% | −0.2327 | 0.87% | −0.26 | −0.65 |
| Value | −0.09% | −0.0702 | 0.13% | −0.66 | −1.66 |
| Volatility | −1.79% | 0.2310 | 0.95% | −1.88 | −4.71 |
| Country | 0.42% | 0.05% | 1.58% | 0.27 | 0.67 |
| Industry | 3.51% | 0.05% | 3.07% | 1.14 | 2.86 |
| Currency | 0.41% | 0.00% | 1.17% | 0.35 | 0.88 |
| Local | 0.00% | −0.05% | 0.01% | −0.48 | −1.20 |
| Market | 0.00% | 0.05% | 0.01% | 0.17 | 0.43 |

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

The STOXX AI Global Artificial Intelligence Index has delivered an annualized return of 5.8 percentage points more than its benchmark since inception (including the backtest period), with an increased volatility of just under 1 percentage point (see Figure 69). Two-thirds of this "active" return is driven by the specific return, with the factor contribution accounting for the remainder (see Figure 70). Industry is the largest contributor to the factor returns, followed by country and currency. As one might intuitively expect from a technology-related play such as AI, industries related to the semiconductors, software, IT services,

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communications equipment and internet software & services sectors have positive exposures (relative to the benchmark) and contribute positively to returns. Style, however, acts as a drag on returns; this is mainly due to volatility, although size and value also play a role.

With a strong overall IR of 1.28 and a t-stat of 3.21, index performance is statistically significant at 95% confidence levels. The strongly positive specific return is also statistically significant, alongside the similarly significant industry contribution allowing us to conclude that security and sector selection for the thematic are favorable.

## DEVELOPED MARKETS BLOCKCHAIN

The blockchain theme comprises companies from a wide range of industries that invest heavily in the development of technologies related to blockchain, and are therefore considered to be well-positioned to benefit from its increased adoption.

Two metrics relevant to a company's involvement in the blockchain field are calculated:

**Blockchain Intellectual Property Exposure** is defined as the ratio of the number of blockchain patents awarded to a company over the most recent 3-year period to the total number of patents awarded to that company over the same period. This provides an indication of the importance of blockchain research and applications to the overall activities of each company.

**Blockchain Contribution** is defined as the ratio of the number of blockchain patents awarded to a company over the most recent 3-year period to the total number of blockchain patents awarded to all companies in the index universe. This provides an indication of the importance of each company's blockchain research and applications compared to the overall blockchain-related activities of other companies in the index universe.

For more details on sectors/specialty areas, see the appendix.

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## Index performance and return attribution

**FIGURE 71:** Historical performance
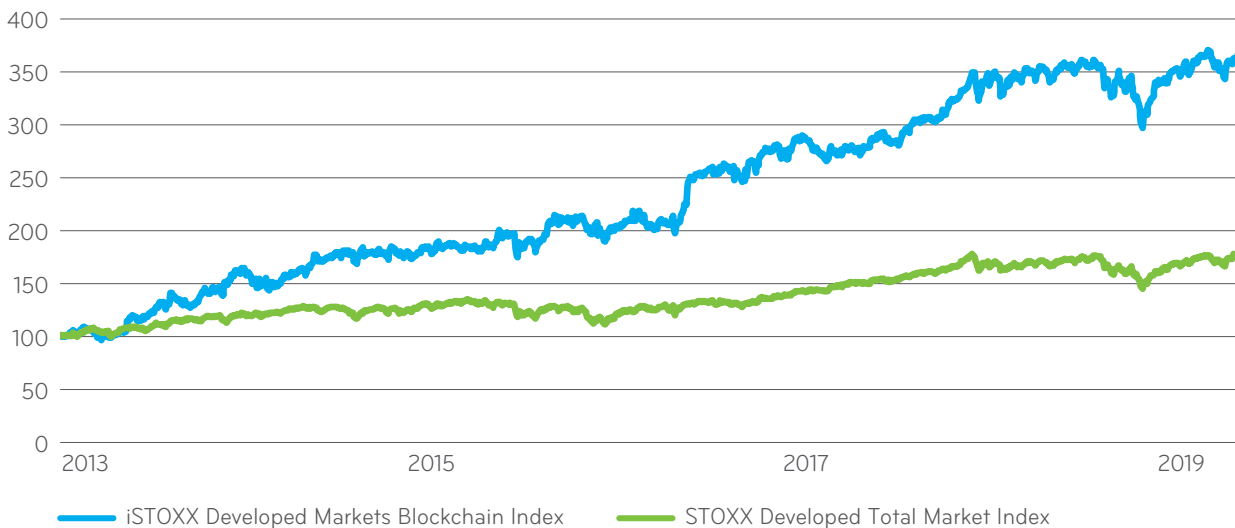


iSTOXX Developed Markets Blockchain Index — STOXX Developed Total Market Index

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

**FIGURE 72:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 23.3% | 9.7% |
| 5y return | 17.8% | 7.1% |
| 3y return | 22.5% | 13.5% |
| 1y return | 6.9% | 6.6% |
| Volatility since inception | 18.6% | 10.9% |
| 5y volatility | 17.1% | 11.2% |
| 3y volatility | 14.8% | 9.8% |
| 1y volatility | 14.2% | 12.1% |
| Sharpe ratio since inception | 1.18 | 0.83 |
| 5y Sharpe ratio | 0.99 | 0.58 |
| Max. drawdown since inception | −17.9% | −18.4% |
| 5y max. drawdown | −17.9% | −18.4% |

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

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**FIGURE 73:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 21.95% | | 17.68% | | |
| Benchmark | 9.57% | | 11.28% | | |
| Active | 12.38% | | 13.34% | 0.93 | 2.32 |
| Specific return | 5.76% | | 12.13% | 0.47 | 1.19 |
| Factor contribution | 6.63% | | 6.28% | 1.06 | 2.64 |
| Style | 1.30% | | 2.54% | 0.51 | 1.28 |
| Exchange rate sensitivity | 0.00% | 0.4075 | 0.49% | −0.01 | −0.02 |
| Growth | 0.91% | 0.1943 | 0.49% | 1.87 | 4.68 |
| Leverage | 0.18% | −0.1204 | 0.29% | 0.64 | 1.61 |
| Liquidity | −0.07% | 0.5979 | 1.23% | −0.06 | −0.15 |
| Medium-term momentum | 0.74% | 0.2165 | 1.01% | 0.73 | 1.83 |
| Short-term momentum | 0.06% | 0.0724 | 1.10% | 0.06 | 0.14 |
| Size | 0.12% | 0.2749 | 1.23% | 0.10 | 0.25 |
| Value | −0.45% | −0.1924 | 0.78% | −0.57 | −1.42 |
| Volatility | −0.20% | 0.0647 | 1.12% | −0.18 | −0.44 |
| Country | 0.45% | 0.08% | 3.24% | 0.14 | 0.35 |
| Industry | 3.16% | 0.08% | 4.86% | 0.65 | 1.63 |
| Currency | 1.70% | 0.00% | 2.37% | 0.72 | 1.80 |
| Local | 0.01% | 0.08% | 0.02% | 0.59 | 1.47 |

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

The iSTOXX Developed Markets Blockchain Index has delivered a strong annualized return of 13.6 percentage points more than its benchmark since inception (including the backtest period), although with an increased volatility of nearly 8 percentage points (see Figure 72). This "active" return is driven almost equally by the specific return and the factor contribution. As one might intuitively expect from a technology-related play such as blockchain, industries related to the IT services, telecommunication services and internet software & services sectors have positive exposures (relative to the benchmark) and boost the industry factor, which is the largest contributor to returns. Style also contributes to gains, with positive tilts providing solid returns from growth and momentum, whilst value and volatility exert a small drag on returns. Country and currency also contribute positively to returns.

The index has an IR of 0.93 and is statistically significant at 95% confidence levels (t-stat of 2.32). However, neither the specific return nor the industry is statistically significant and therefore no meaningful conclusion may be drawn about the effectiveness of security or sector selection on the thematic.

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## AI GLOBAL ARTIFICIAL INTELLIGENCE ADTV5

Artificial intelligence (AI) is the science of creating computer programs and machines that exhibit human-like intelligence and cognitive skills. The AI Global Artificial Intelligence ADTV5 theme comprises companies from a wide range of industries that invest heavily in the development of new AI technologies, and are therefore considered to be well-positioned to benefit from its increased adoption.

Two metrics relevant to a company's involvement in the artificial intelligence field are calculated:

**AI Intellectual Property Exposure** is defined as the ratio of the number of AI patents awarded to a company over the most recent 3-year period to the total number of patents awarded to that company over the same period. This provides an indication of the importance of AI research and applications to the company's overall activities.

**AI Contribution** is defined as the ratio of the number of AI patents awarded to a company over the most recent 3-year period to the total number of AI patents awarded to all companies in the index universe. This provides an indication of the importance of each company's AI research and applications compared to the overall AI-related activities of other companies in the index universe.

For more details on sectors/specialty areas, see the appendix.

### Index performance and return attribution

**FIGURE 74:** Historical performance
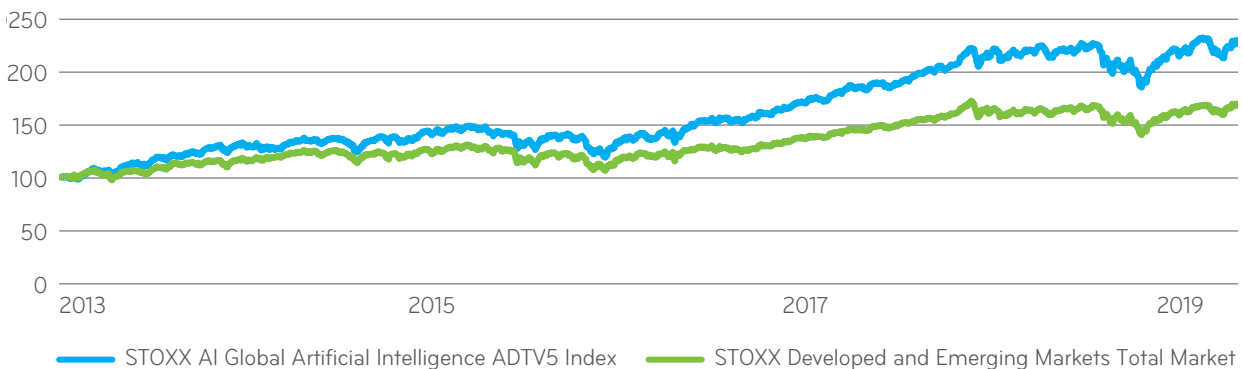


Legend: STOXX AI Global Artificial Intelligence ADTV5 Index — STOXX Developed and Emerging Markets Total Market

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

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**FIGURE 75:** Index performance and risk statistics

| Attribute | Thematic index | Benchmark index |
|---|---|---|
| Return since inception | 14.4% | 8.9% |
| 5y return | 11.5% | 6.6% |
| 3y return | 19.9% | 13.2% |
| 1y return | 7.6% | 6.5% |
| Volatility since inception | 11.7% | 10.6% |
| 5y volatility | 11.9% | 10.9% |
| 3y volatility | 10.8% | 9.4% |
| 1y volatility | 13.8% | 11.6% |
| Sharpe ratio since inception | 1.15 | 0.78 |
| 5y Sharpe ratio | 0.89 | 0.56 |
| Max. drawdown since inception | −20.1% | −18.8% |
| 5y max. drawdown | −20.1% | −18.8% |

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

**FIGURE 76:** Factor-based performance attribution

| Source of Return | Contribution | Avg Exposure | Risk | IR | T-stat |
|---|---|---|---|---|---|
| Portfolio | 14.43% | | 13.16% | | |
| Benchmark | 8.81% | | 11.24% | | |
| Active | 5.62% | | 4.61% | 1.22 | 3.05 |
| Specific return | 3.35% | | 2.07% | 1.62 | 4.04 |
| Factor contribution | 2.26% | | 3.80% | 0.60 | 1.49 |
| Style | −2.09% | | 1.65% | −1.27 | −3.17 |
| Exchange rate sensitivity | 0.03% | −0.0195 | 0.08% | 0.33 | 0.83 |
| Growth | −0.10% | −0.1146 | 0.11% | −0.90 | −2.25 |
| Leverage | 0.06% | −0.1175 | 0.10% | 0.59 | 1.48 |
| Liquidity | −0.19% | 0.4707 | 0.69% | −0.27 | −0.67 |
| Medium-term momentum | 0.15% | 0.0133 | 0.38% | 0.38 | 0.96 |
| Short-term momentum | −0.09% | 0.0447 | 0.45% | −0.20 | −0.50 |
| Size | −0.20% | −0.1929 | 0.72% | −0.28 | −0.70 |
| Value | −0.10% | −0.0738 | 0.13% | −0.78 | −1.95 |
| Volatility | −1.64 | 0.2156 | 0.87% | −1.88 | −4.69 |
| Country | 0.42% | 0.05% | 1.59% | 0.26 | 0.66 |
| Industry | 3.46% | 0.05% | 3.02% | 1.14 | 2.86 |
| Currency | 0.48% | 0.00% | 1.21% | 0.39 | 0.99 |
| Local | 0.00% | −0.05% | 0.01% | −0.48 | −1.19 |
| Market | 0.00% | 0.05% | 0.01% | 0.22 | 0.54 |

The analysis was performed for the period from March 2013 to June 2019. Returns are measured in USD total return.

The STOXX AI Global Artificial Intelligence ADTV5 Index has delivered an annualized return of 5.5 percentage points more than its benchmark since inception (including the backtest period), with an increased volatility of just over 1 percentage point (see Figure 69). Both specific and factor returns contribute positively to the "active" return. As one might intuitively expect from a technology-related play such as AI, industries related to the semiconductors, software, IT services, communications equipment and internet software & services sectors have positive exposures (relative to the benchmark)

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and contribute positively to the industry return. Currency and country factors also have a positive impact. Style, however, acts as a drag on the return, with volatility contributing a large part of the negative returns from this factor.

With a strong overall IR of 1.22 and a t-stat of 3.05, index performance is statistically significant at 95% confidence levels. The strongly positive specific return is also statistically significant, and this plus a significant industry contribution may allow us to conclude that security and sector selection for the thematic are favorable.

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## OVERALL CONCLUSION

STOXX offers a large number of thematic indices providing exposure to specific individual megatrends, as well as some indices combining multiple thematic megatrends. Using these systematic index-based investments, investors may obtain efficient exposure to specific megatrends so as to benefit from the structural trends that are shaping or expected to shape the future. Many of these thematic indices are already available to investors in the form of ETFs linked to various STOXX indices.

Overall, strong biases towards the industries contributing to positive active returns were observed for most of the thematics. This was quite intuitive given that most of the thematic indices identified specific sectors (in the form of L6 RBICS sectors) in order to benefit from the megatrend concerned. In many instances, the specific return (the portion of the return due to the idiosyncratic component of the asset returns that is not explained by known/defined factors in the risk model) contributed a significant, strongly positive return, hence indicating a relatively favorable security selection process. A bias towards growth was observed in most of the thematic indices, which may be considered intuitive since thematic indices attempt to obtain exposure to a particular megatrend as it is evolving. These biases are likely to have resulted, albeit inadvertently, in positive exposure (relative to the benchmark) to volatility, not only increasing the standard deviation of total returns but also resulting in a drag on active returns in most cases.

A secular trend that was observed with all the thematics was a positive active return since inception, with the active return ranging from marginally positive to strongly positive across the entire range of indices. In all of the cases, volatility (measured by the standard deviation of total returns) also increased secularly, with a wide variation in values being observed for the standard deviation of returns. Nonetheless, the information ratio (IR) for the thematic indices varies between 0.23 and 1.51. This indicates that a widely varying active return is offered for each active unit of risk within the range of thematic indices. Investors should therefore consider the appropriate theme for their investment, based not only on their assessment of specific megatrends but also on the incremental active returns generated for each additional unit of risk. They should consider the impact of this on their overall portfolio risk and return profile, and be aware of potential biases in their overall portfolios arising from investments in the relevant thematic.

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**About STOXX Ltd.**

STOXX Ltd. is a global index provider, currently calculating a global, comprehensive index family of over 10,000 strictly rules-based and transparent indices. Best known for the leading European equity indices EURO STOXX 50, STOXX Europe 50 and STOXX Europe 600, STOXX Ltd. maintains and calculates the STOXX Global index family which consists of total market, broad and blue-chip indices for the Americas, Europe and Asia/Pacific regions and the Latin America and BRIC (Brazil, Russia, India and China) sub-regions, as well as global markets.

To provide market participants with optimal transparency, STOXX indices are classified into four categories. Regular "STOXX" indices include all standard, theme and strategy indices that are part of STOXX's integrated index family and follow a strict rules-based methodology. The "iSTOXX" brand typically comprises less standardized index concepts that are not integrated in the STOXX Global index family, but are nevertheless strictly rules-based. While indices that are branded "STOXX" and "iSTOXX" are developed by STOXX for a broad range of market participants, the "STOXX Customized" brand covers indices that are specifically developed for clients and do not carry the STOXX brand in the index name. Under the Omnient brand, STOXX offers custom indices from its existing index universe.

STOXX indices are licensed to more than 600 companies around the world as underlyings for exchange traded funds (ETFs), futures and options, structured products and passively managed investment funds. Three of the top ETFs in Europe and approximately 25% of all assets under management are based on STOXX indices. STOXX Ltd. holds Europe's number one and the world's number two position in the derivatives segment.

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