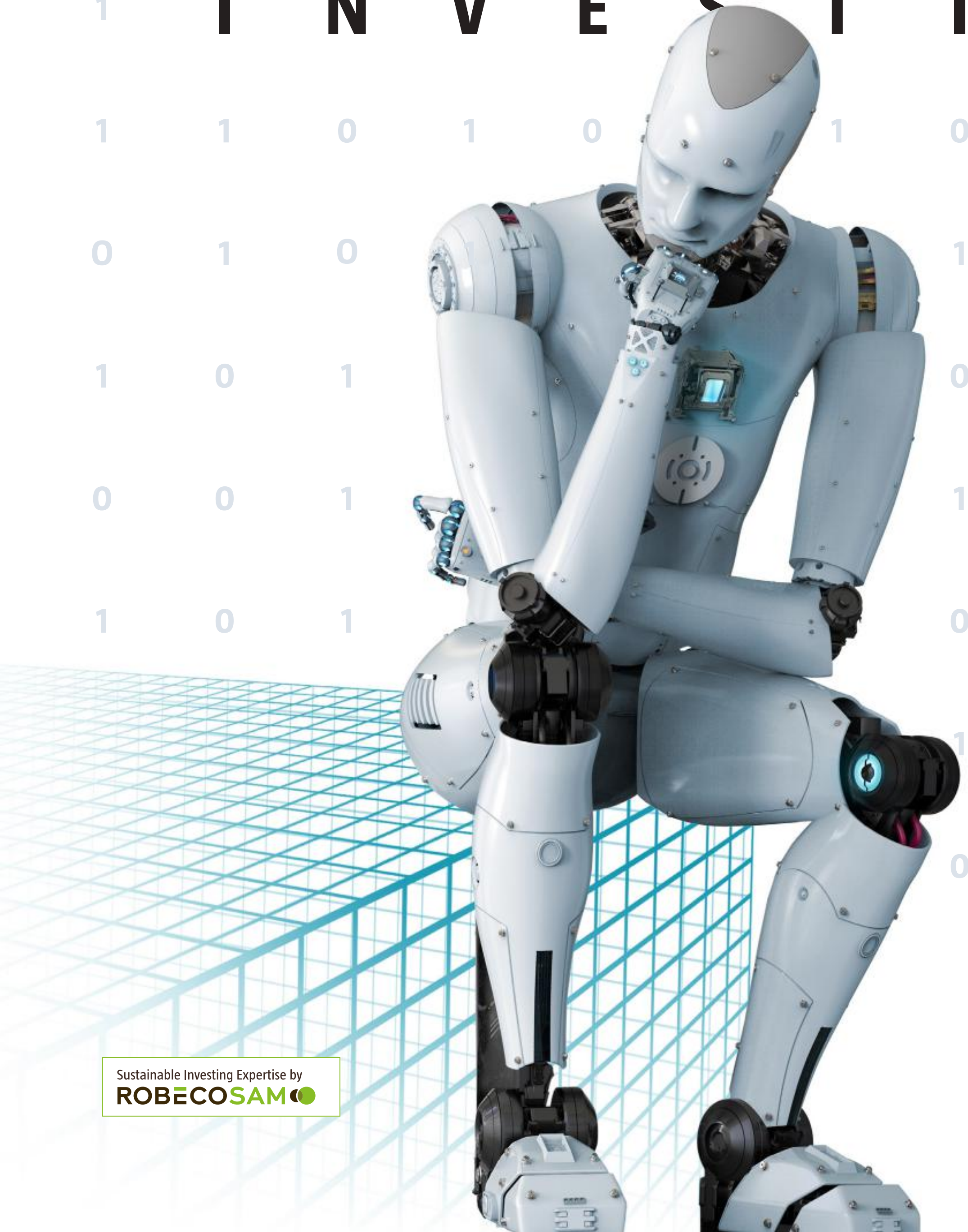
THE BIG BOOK OF

TRENDS & THEMATIC INVESTING



Sustainable Investing Expertise by ROBECOSAM

ROBECO
The Investment Engineers

THE BIG BOOK OF

TRENDS & THEMATIC INVESTING

Moving beyond storytelling

For professional investors

October 2020

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PREPARED FOR THE FUTURE

For hundreds of millions of people, March 2020 was a watershed. Within days, the Covid-19 pandemic had triggered powerful shockwaves across the world. Entire populations were put under strict lockdown measures almost overnight. Planes were grounded; and restaurants, museums and movie theaters were shut while economic activity plummeted and tried-and-tested health care systems teetered on the verge of collapse.

In financial markets, panic took hold as never before. Global equities suffered one of the most brutal sell-offs in history, losing up to one third of their value relative to the highs seen only a few weeks before. Governments and central banks announced unprecedented rescue packages – on a scale that would have been inconceivable a mere month earlier. As investors witnessed their certainties vanishing, they scrambled for a safe haven.

The violence of this maelstrom has shaken every aspect of our lives, with just a few exceptions. Among these are the three megatrends that we believe are shaping our future. These megatrends – transforming technology, changing sociodemographics, and preserving the earth – form the bedrock of our trends and thematic investment approach. They have so far proved resilient to the Covid-19 fallout. In fact, in many cases, the crisis has accelerated existing long-term trends.

Such resilience has not really come as a surprise. Megatrends are generally not affected by short-term or sporadic shocks – even if these are profound ones, such as epidemics or natural disasters. This also holds a lesson for investors. Preparing for the future entails a little more than just tactically adjusting to market developments and hoping for the best. It requires a vision of the future, and the ability to express this in an investment portfolio through clear-cut positioning choices.

A growing body of academic literature shows that a tiny fraction of listed stocks account for virtually all of the value created in the equity market. The vast majority of companies simply don't create wealth for their shareholders – from a long-term perspective. A trends and thematic approach narrows down the investable universe considerably, helping investors avoid losers and sharpen their focus on only those companies worth being considered for investment.

Yet, as this publication argues, not all trends and thematic strategies are born equal. A glossy write-up on, say, the future of robotics or the opportunities created by artificial intelligence, will not automatically yield real investment rewards. To achieve consistent long-term outperformance, trends and thematic strategies need a robust and transparent framework to identify relevant trends and themes, so that investors can capitalize on them.

Our aim in writing this 'Big Book' is to explain in detail – and with very concrete examples – what trends and thematic investing means to us. It is not just about great narratives, nor is it directed by fads or client appetite. Instead, it is a time-tested and clearly articulated investment approach, based on a thorough analysis of the powerful megatrends that shape our socioeconomic environment, and therefore our future.

One of the decisive ingredients in this investment approach is top-notch research. At Robeco, we believe excellence characterizes our in-house research and makes us stand out in the investment industry. Ever since our first director, Wim Rauwenhoff, said "every investment strategy should be research driven", we have placed great emphasis on the pursuit of knowledge, in order to help our clients achieve their investment goals.

Another key aspect to this approach is sustainability. Sustainability is a long-term force for change, which is why we integrate it in every step of our investment processes. This is obviously the case with our 'thematic' strategies, which revolve around the major sustainability challenges facing humankind, such as water scarcity or resource depletion. But it also applies to our 'trends' strategies, which typically focus more on developments such as technological innovation and demographic shifts.

Ultimately, and as recent market developments have confirmed, trends and thematic investing is arguably one of the best ways for investors to prepare for the future. Long-term changes are difficult to reverse and tend to be structurally underestimated. Investors who view the world through a trends-and-thematic lens are therefore most likely to see the real opportunities, avoid losers and focus on the long-run winners.

Mark van der Kroft
Head of Trends and Thematic Investing

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WHY TRENDS AND THEMATIC INVESTING?

1

Over the past decade, trends and thematic investing has enjoyed increasing popularity among global equity investors, registering stellar inflows. Asset managers have responded to this shift with abundant product launches, typically backed by appealing narratives. Yet, it requires more than a good story for trends and thematic investing to generate consistent outperformance. It is about uncovering the structural winners of long-term, socioeconomic shifts.

FUN QUIZ | QUESTION:

What is the average company lifespan in the S&P 500 Index?

A. 38 years
B. 24 years
C. 14 years

Answer: A 2018 report by Innosight estimated the average lifespan of a company in the S&P 500 Index to be 24 years.

The concept

Constant change is a defining characteristic of our socioeconomic environment. For instance, the last couple of decades have been marked by the advent of e-commerce and mass migrations to cities in emerging countries. Trends and thematic investing strives to benefit from these types of profound changes. They include changes related to technology (technology-driven change), regulations (policy-driven change), and culture and demographics (sociocultural and demographically driven change).

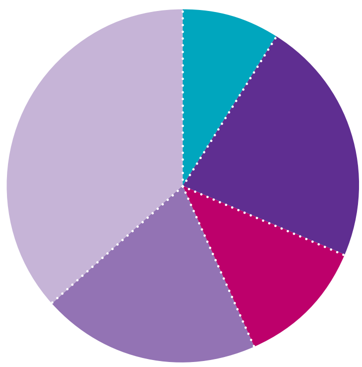
Structural changes make it difficult for incumbent, dominant companies or business ecosystems, to stay in control of their market positions. Challenger companies, or up-and-coming business ecosystems, however, are often able to capitalize on these changes to enter existing markets or establish new ones. These moves are reflected in constantly shifting profit pools. Anticipating and taking advantage of these shifts is the main objective of trends and thematic investing.

More common allocation setups, based on benchmarks, geographies and sectors, often produce disappointing results. Many investors have therefore started turning to trends and thematic investing as an alternative to help unlock the full potential of active management. The forward-looking nature of trends and thematic investing forms a sharp contrast to widely-used benchmark-based frameworks that rely heavily on conditions in the present.

This has prompted a flurry of product launches. Hundreds of thematic funds are currently available, from basic ETFs to sophisticated funds seeking exposure to multiple megatrends. Assets under management (AuM) have also surged, propelled by the commercial success of tech and sustainable funds. In Europe, for example, according to Broadridge, trends and thematic funds reached EUR 112 billion in March 2020, having attracted a net inflow of EUR 51 billion over the last three years.[1]

Figure 1: AuM for European trends and thematic strategies

AuM in EUR billion



Changing consumption	10
Emerging technologies	25
Healthy living	14
Multi-theme	23
Sustainability	41

Source: Broadridge, June 2020. As of March 2020.

1. Broadridge, June 2020. "Prism European Equities".

1

Trends and thematic investing may see its success accelerate further in the near future, due to the Covid-19 crisis. Broadridge reveals, for instance, that in Europe, thematic funds have performed considerably better than most other active funds, in terms of flows, since the onset of the pandemic. During the first quarter of 2020, while the most popular trends and themes (such as the rise of cloud computing or e-commerce) accelerated, thematic equities recorded organic growth equaling 5.9% as a result of the EUR 7.6 billion net inflow into these strategies.

This resilience to the Covid-19 shock and its repercussions for the financial markets and broader economy, contrasts strongly with the blow endured by geographically-focused funds that suffered negative flows in all regional categories in the first quarter of 2020. Going forward, trends and thematic investing is expected to capitalize on the move towards a more robust and sustainable world, supported by an increase in demand from both retail and institutional investors.

What are trends and themes?

Although trends and themes have a lot in common, they do differ. Trends represent actual changes or evolutions in our environment and rely on change dynamics. Themes, on the other hand, represent a common thread or idea regarding these changes or evolutions in our socioeconomic environment. The subject of these themes therefore relates to societal topics or ideas that are currently important. If, for example, a change in our socioeconomic environment would be X, then a trend might be Y and the theme would be Z. See box 'Trends vs. themes' for further clarification.

In short, trends investing is more about observing and predicting factual changes and trying to benefit from those changes. Thematic investing, on the other hand, confines itself to one topic or set of ideas as its investing domain, and often has a normative angle. As a result, trends investing shows a greater sensitivity to market movements and tends to be more dynamically managed compared to thematic investing.

Still, while the broader themes that define thematic investment strategies remain constant, underlying sub-themes that reflect new growth opportunities, are subject to change as

TRENDS VS. THEMES: USING ENERGY TRANSITION AS AN ILLUSTRATION

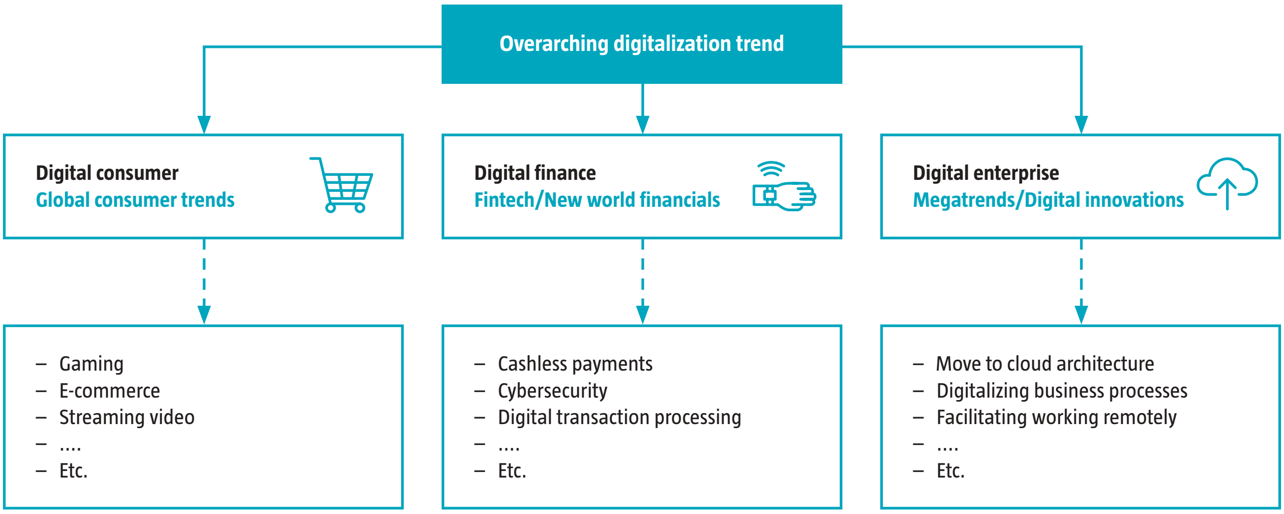
To help the reader get a better understanding of the difference this publication makes between trends and themes, we consider the current 'energy transition' phenomenon, towards cleaner and more efficient energy sources.

- **Common trends investing approach:** observe how energy composition is changing, predict where economic profit pools are moving to in the value chain and position portfolio accordingly.
- **Common thematic investing approach:** the world is moving to clean energy, position portfolio around clean energy companies.

trends evolve. Successful thematic investors will anticipate the impact of these changes and adjust portfolios, while still remaining aligned with broader theme goals.

Another important difference between trends and themes is that themes tend to be viewed as individual standalone concepts. Trends, however, can be grouped into overarching megatrends and segmented into different subtrends, forming a sort of hierarchy of trends. Figure 2 illustrates this, using the digitalization trend (in itself part of a broader, evolving technologies megatrend) as an example.

Figure 2: Drilling down to a granular level of trends and subtrends – Digitalization example



Source: Robeco

Why is a trends or thematic approach useful for investors?

There are several reasons why investors might adopt this type of approach. The main reason is that investors gain an analytical edge if they understand the dynamics and processes involved in secular change, and the macro and microeconomic implications of these changes. Looking at financial markets from a trends and thematic perspective allows investors to cut through short-term noise and focus on what really matters in the long run.

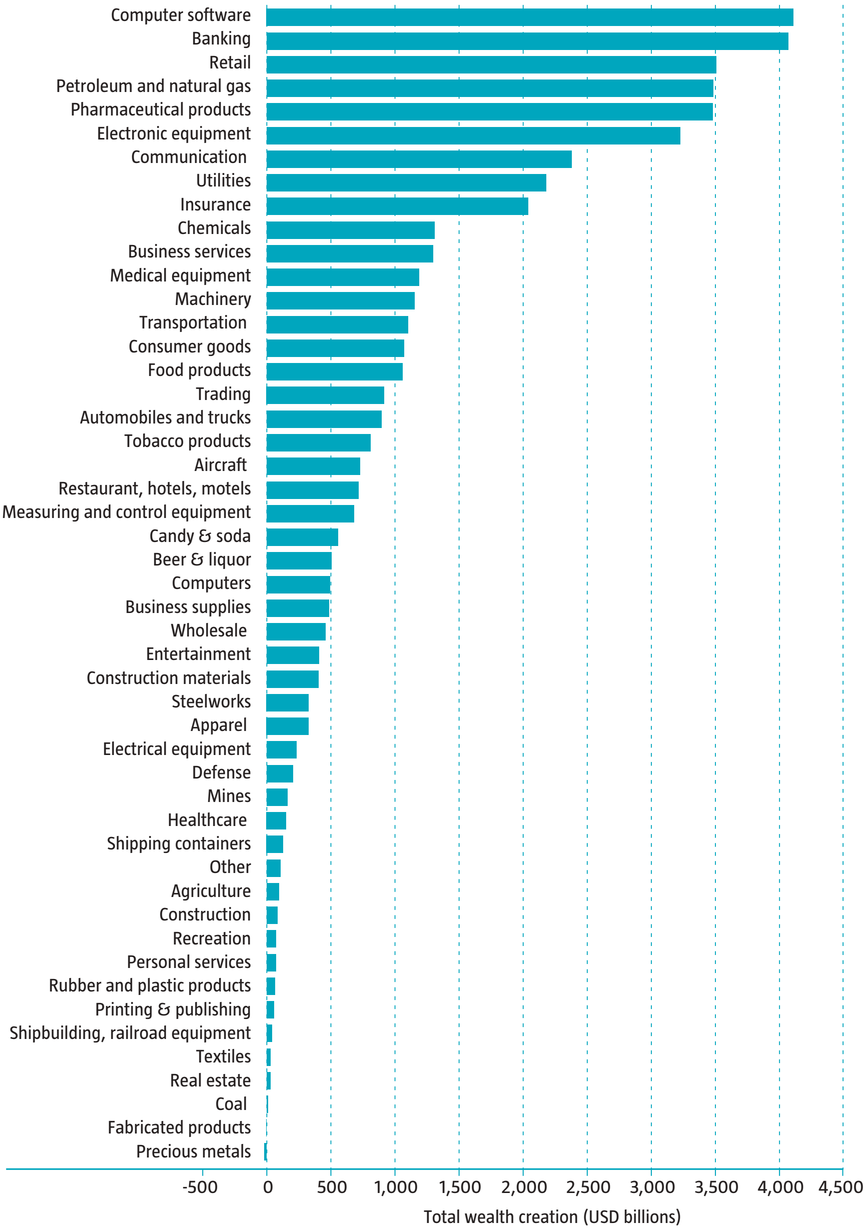
Another benefit of a trends and thematic approach is that it typically means abandoning rigid regional or sector classifications that often provide little added value, both in terms of evaluating the growth potential of companies and of risk mitigation through diversification. Trends and themes usually span multiple regions, sectors and business ecosystems. Looking for consistent exposure to a particular trend or theme ensures the portfolio is structurally geared toward high growth and economic value creation.

Identifying specific trends and themes, as a first step in the investment process, allows for a more useful allocation of resources. Therefore, instead of covering all regions, sectors and individual stocks, which is very expensive and inefficient as there are more than 53,000 listed companies worldwide, full attention can be paid to all securities associated with an identified, investible trend or theme.

Moreover, a number of recent empirical studies[2] have shown equity returns are extremely unevenly distributed across time, industries, countries and individual stocks (see our interview with Prof. Hendrik Bessembinder). They do, however, correlate with profit stream dynamics, which, in turn, are mostly driven by long-term trends and themes. A trends and thematic approach offers the best odds in terms of tracking profit movements and benefiting from them.

2. See: Bessembinder, H., 2018. "Do Stocks Outperform Treasury Bills?", *Journal of Financial Economics*. See also: Bessembinder, H., Chen, T. F., Choi, G. and Wei, K. C. J., 2019. "Do Global Stocks Outperform US Treasury Bills?", working paper. See also: Bradley, C., Dawson, A. and Smit, S., 2013. "The strategic yardstick you can't afford to ignore", *McKinsey Quarterly*.

Figure 3: Wealth creation by industry in the United States from 1926-2019



Source: CRSP, Robeco. Market: US. Time period: 1926-2019.

FUN QUIZ | WHO SAID:

'Wall Street has a few prudent principles; the trouble is that they are always forgotten when they are most needed.'

A. Gordon Gekko
B. Benjamin Graham
C. Bernie Sanders

Answer: Benjamin Graham, 1973, *The Intelligent Investor*, Fourth revised edition.

Predictable patterns

Finally, systematic expectation biases lead to predictable behavioral patterns in financial markets. People have a strong tendency to make linear extrapolations about the future, based on recent experiences. They therefore often underestimate non-linear change. In addition, long-term information related to demographic trends or relative industry returns on investment, for example, tends to be under-utilized. In the stock market, this means investors typically fail to recognize the disruptive power of new technologies and socioeconomic trends, and the speed at which they materialize and develop.

These widespread behavioral biases can be turned into sources of alpha. Trends and thematic investing therefore aims to harvest the positive surprises that result from investors systematically underestimating the consequences of longer-term trends and themes, played out over extended periods of time. It is also about identifying and avoiding short-term fads, that seem promising on paper, but do not reflect any profound structural change.

Trends and themes are not hype

The appeal of trends investing was originally mostly based on storytelling, with many of its growth topics, such as blockchain or cloud computing, offering attractive narratives. However, over the years, many products – in particular, the myriad of thematic exchange-traded funds (ETFs) launched since the early 2010s – have turned out to be gimmicky, based on fashions that quickly fall out of favor. Ultimately, the performance of many of them has proved to be disappointing.

Back in 2018, Morningstar estimated almost 80% of thematic ETFs launched prior to 2012, had closed.[3] This explains why, until recently, the demand for trends and thematic strategies used to be mainly driven by retail audiences. But the situation is gradually changing, as many institutional investors have started to question their traditional frameworks that are frequently structured around benchmarks and indexes.

These frameworks often fail to achieve the desired long-term investment results. This is mainly due to factors such as the short-term focus of regular benchmarking, or the potential undesirable risk exposures and the backward-looking nature of benchmark-based allocation. Nowadays, even cautious, long-term institutional investors understand trends and thematic strategies can offer far more than just the hype of a good story.

3. Lamont, K., November 2018. "Is My Thematic ETF a Fad?", Morningstar article.

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Trends and thematic investing are not about riding short-lived hypes, quitting at the right time and then hopping on the next hot topic. The key goal is to identify long-term opportunities and to capitalize on these. This is why this publication makes the distinction between megatrends, trends and themes, and most importantly, hypes, crazes, fads and microtrends. Megatrends are comprehensive changes that have the potential to influence society, the economy and our lives over the next decade or two.

Sectors move through continuous cycles

This form of investment is a long-term endeavor that strives to benefit from cumulative economic profits that have compounded over time, while the fruits of high-return investments are harvested. High-return opportunities emerge under the influence of profound changes: changes in technologies, changes in consumer attitudes and changes in how we shape our institutions. These types of changes can be identified as megatrends and they form the backbone of a robust trends and thematic investing framework.

Such megatrends can bolster an industry's long-term appeal by providing lasting tailwinds of growth and sustained profitability. But they also have the power to destroy the fortunes of an industry by making certain business models or products obsolete or less desirable. In other cases, they can exert a positive influence by facilitating the emergence of new business models and profitable growth opportunities.

Companies, industries and sectors move through continuous cycles of birth, growth, maturity and decline, and corporate birth-mortality rates are high. A trends and thematic approach should therefore not aim for the very early stages of these cycles, but rather target the growth and maturity phases. The growth phase is where profitable investments tend to be made and then they are harvested in the maturity phase.

Investing on the basis of megatrends means focusing less on the daily ups and downs of economic activity and financial markets. Instead, the asset manager must focus on capitalizing on the predictability and sustainability offered by multi-year developments. It is all about identifying those companies that have the potential to benefit from multi-year developments and that have the proven winning characteristics of a quality company.

Not all trends and thematic solutions are created equal

Before buying a trends and thematic investment product, investors should ensure they are investing in a strategy that is not blinded by the latest fads, but instead focuses on thoroughly researched, long-term structural shifts. The strategy needs to be robust and follow a rigorous and clearly articulated investment process, which includes the necessary risk management steps.

Robeco has used a rigorous, multi-disciplinary framework to identify three megatrends that we believe are the most important. These are long-term trends that affect every aspect of our socioeconomic environment for decades to come. They can be summed up as: transforming technologies, changing sociodemographics and preserving the earth. Fully understanding these megatrends will help us identify which companies will perform strongly within them. ■

INTERVIEW

Photo: Scott Mitchell

‘Most stocks do not outperform Treasury Bills in the long run’

PROF. HENDRIK BESSEMBINDER
from Arizona State University

Hendrik Bessembinder is a professor and holds the Francis J. and Mary B. Labriola Endowed Chair in Competitive Business at the W. P. Carey School of Business, Arizona State University. Some of his most recent research work focuses on the concentration of wealth creation in global equity markets, where only a small fraction of stocks account for the majority of markets returns. We asked him about his findings and the implications for investors.

Your recent work focuses on the skewness of equity returns and that only a minority of stocks manage to beat short-term bonds. Could you highlight your most important research findings? Were you surprised by anything?

"The two key findings that surprised me, along with a number of others, are, first, that most stocks do not outperform Treasury Bills in the long run, and, second, that the net long-term creation of shareholder wealth in the stock markets is concentrated in very few stocks."

What is the difference between buy-and-hold returns and wealth creation? Some stocks have gone bankrupt – General Motors is an example – but they still make the list of companies that have created massive wealth for their shareholders. Why?

"Buy-and-hold returns capture the outcome to a hypothetical investor who, after the initial purchase, makes no additional trades, except to reinvest dividends. But this is not the experience of shareholders in aggregate, as they fund new equity issuances, receive the proceeds of share repurchases, and receive, but do not reinvest, in aggregate dividends. General Motors is an illustrative example of the distinction: buy-and-hold returns were poor, because reinvested dividends lost value as bankruptcy approached. Wealth creation was hundreds of billions of dollars, because GM paid high dividends, and made share repurchases, in the decades prior to bankruptcy – these funds were not dissipated as bankruptcy approached. The wealth creation measure I use is also closely related to the idea of 'dollar-weighted' returns, except that I focus on a final dollar amount instead of a percentage per year."

The 4% of stocks responsible for the entire wealth creation during the study, comprise a group of stocks that have either been around for a long time and have therefore had the time to accumulate wealth; or they constitute a group of younger companies that have generated extraordinary wealth in a very short time. Can you give us a sense of how the composition of wealth builders has changed over time?

"While I have not investigated this issue systematically, it is clear that a small group of technology-related stocks, such as Apple, Amazon, Alphabet and Facebook, are responsible for a substantial portion of the stock market's recent wealth creation, particularly in recent years. In a new study, I provide an update on this.[1] On the other hand, thousands of technology stocks have delivered disappointing returns in the long run as well, so the implication is not as simple as just 'buy technology stocks'."

Are there any common traits among companies that generate large amounts of wealth for investors?

"I recently released a set of four reports on this subject.[2] Among other findings I document that top-performing firms most often have rapid organic, that is not based on acquisitions, asset growth, and in particular have strong cash accumulation. Top-performing firms are more also more profitable on average, despite higher R&D spending, and have profit growth rates that exceed their rapid asset growth. Top performing firms in terms of accumulated rates of return tend to be younger and have more volatile returns as compared to more ordinary firms, while top performing firms in terms of dollar shareholder wealth creation tend to be older and do not have particularly volatile returns. Perhaps surprisingly, given that the distribution of long run market outcomes is highly positively skewed, which gives rise to the concentrated wealth creation outcome top performing firms do not tend to have highly skewed short run returns."

Why do you think most stocks have a relatively short life in the public stock market?

"The economy is dynamic, perhaps to a greater extent than many realize. That said, stocks disappear from the public market – not just because of poor investment results associated with being on the receiving end of economies' 'creative destruction', but also because companies are frequently acquired, which tends to be a positive event for investors in the acquired firm."

How do you explain the finding that, over time, successively fewer IPO-ed companies, in percentage terms, have been able to generate positive lifetime returns?

"As you note, my main research results are attributable to the fact that there is substantial positive skewness in the distribution of long-horizon stock returns. I show, through simulations, that long-run skewness depends on short-run return volatility. Adam Farago and Erik Hjalmarsson[3] show more rigorously that the main determinant of long-run return skewness is short-run return volatility. So, I believe the answer is that companies that have completed IPOs in recent decades tend to be riskier firms. Of course, that alone does not mean they were bad investments."

'There are more people who think or claim to be as talented as Warren Buffett, than there are people who are actually as talented as Warren Buffett'

Given that small companies are more likely to fail, how would the results of the study change if you eliminated the 30-40% smallest market caps from the study?

"Smaller stocks tend to be riskier and therefore have more positive skewness in their long-run returns. The key findings of my study would have been more moderate if smaller firms would have been excluded. But, there would still have been positive skewness, and we would still have seen a few firms bear responsibility for a disproportionate share of net wealth creation."

You make an interesting observation that the degree of wealth concentration has actually increased over the last 25 years. What do you think is driving that?

"The short answer is that I do not know. But it may be the case that the internet-based economy has allowed for more 'winner-take-all' outcomes in certain industries."

How do you see the skewness of returns evolving over the next five to ten years?

"I see no reason to think that the future will be markedly different from the past. Stated differently, I am confident that a relatively small proportion of stocks will be responsible for a large share of market performance over the next decade. Which stocks that will be is, of course, a much harder question to answer."

The likelihood of having positive returns and then outperforming T-bills is positively correlated with size: the bigger the company, the greater the likelihood of wealth creation. How does this square with the empirical finding that small-cap stocks, as a group, produce higher returns over the long term than large-cap stocks (the size factor)? Does it imply that skewness is much greater for small-cap stocks than for large-cap stocks?

"Yes, skewness is the reason. Small stocks have higher mean returns than large stocks in the long run, this is the 'small-firm effect'. But they have lower median returns than large stocks – more skewness means more of a differential between the mean (which can be driven by a few firms) and the median outcome."

You and several colleagues, such as Adam Farago and Erik Hjalmarsson, have argued that short-term volatility induces skewness in long-term equity returns. What conclusion should we draw from this? Should we favor companies whose stocks are less volatile?

"This depends, in part, on investors' preferences. It is not irrational for investors to prefer positive skewness in returns. For investors with this preference, greater short-run volatility means greater long-run skewness."

What would your advice be for active investors, based on the findings?

"The implications for investors depend on the efficiency of the market and on the comparative advantage of identifying in advance which stocks will turn out to be long-run winners (or losers). Investors who do not have a comparative advantage along these lines, and who do not have a strong preference for skewness, should stick to low-cost, highly diversified, index funds. The reasons as to why have already been covered in all the textbooks. In addition, a poorly diversified portfolio has a less than 50% chance of beating a diversified portfolio. If the market is not fully efficient – and I think this is the case – investors with the right comparative advantage should be working hard to identify the 'next Amazon'. The big question is: who has the right comparative advantage? There are more people who think or claim to be as talented as Warren Buffett, than there are people who are actually as talented as Warren Buffett." ■

1. Bessembinder, H., 2020. "Wealth Creation in the U.S. Public Stock Markets 1926 to 2019", working paper.
2. Bessembinder, H., 2020. "Extreme Stock Market Performers, Part I: Expect Some Drawdowns", working paper. Bessembinder, H., 2020. "Extreme Stock Market Performers, Part II: Do Technology Stocks Dominate?", working paper. Bessembinder, H., 2020. "Extreme Stock Market Performers, Part III: What are their Observable Characteristics?", working paper. Bessembinder, H., 2020. "Extreme Stock Market Performers, Part IV: Can Observable Characteristics Forecast Outcomes?", working paper.
3. Farago, A. and Hjalmarsson, E. , 2019. "Compound Returns", Proceedings of Paris December 2019 Finance Meeting EUROFIDAI – ESSEC.

2

THREE MEGATRENDS THAT SHAPE OUR WORLD

A trends and thematic investing approach aims to identify, in a consistent fashion, which companies will benefit from structural changes in our socioeconomic environment. This requires a rigorous and structured approach. The process starts by identifying some of the most powerful forces behind these changes, which we refer to as megatrends. The megatrends we have identified are: transforming technologies, changing sociodemographics and preserving the earth.

FUN QUIZ | QUESTION:

Today, people aged over 70 represent less than 6% of the world's population. By 2100, this share is likely to rise to...

A. 9%
B. 16%
C. 21%

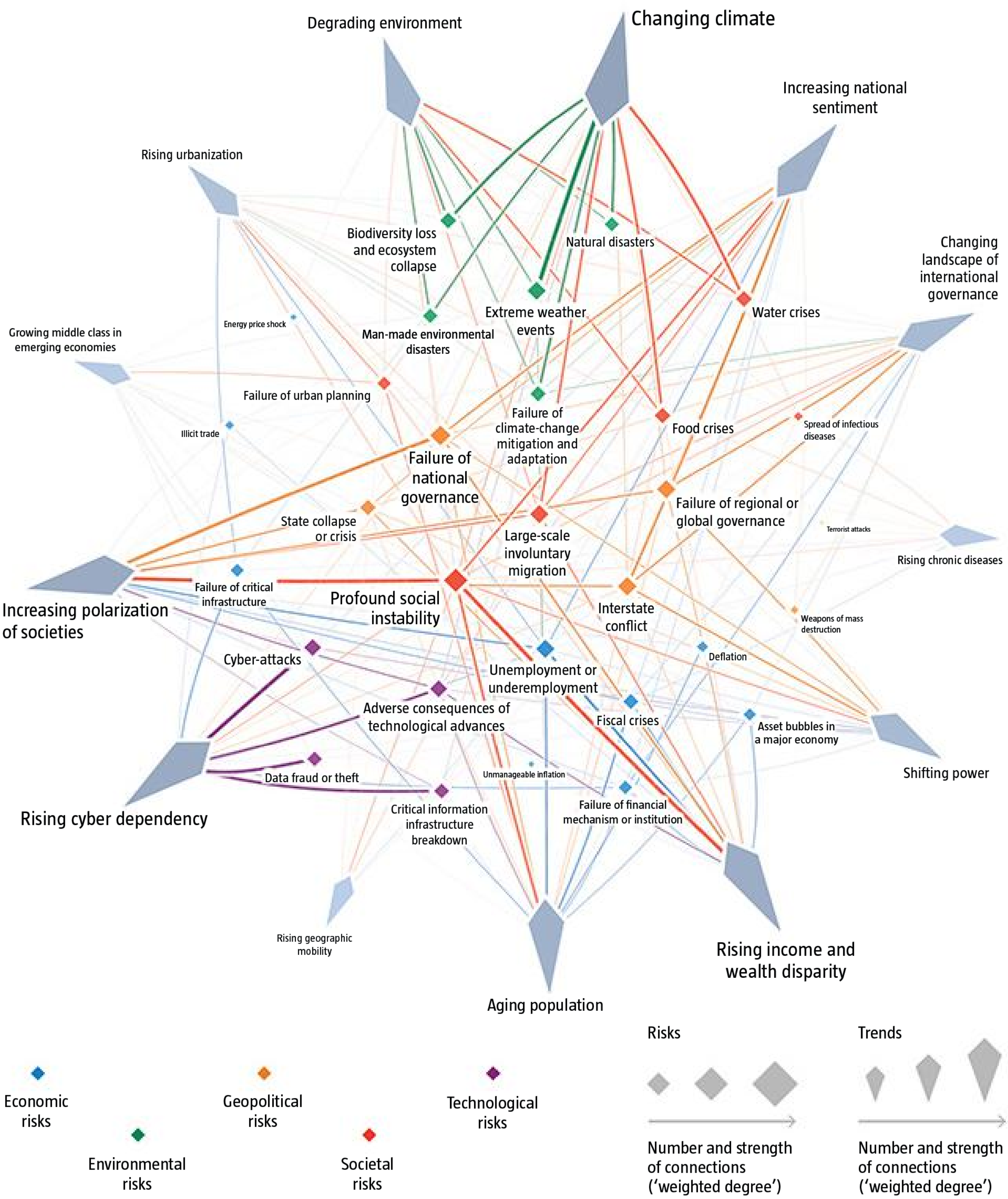
Answer: According to projections by the Institute for Health Metrics and Evaluation, part of the University of Washington, the percentage of people aged over 70 is likely to rise to 21% by 2100. If UN SDGs in terms of female educational attainment and contraceptive needs are met this percentage could go up to 28%.

Mapping the broader trends and themes landscape

As mentioned in the previous chapter, constant change is a defining characteristic of our socioeconomic environment. Individual changes can typically be grouped into broader trends which can, in turn, be grouped into even broader megatrends. Figure 4 depicts the most important trends highlighted by World Economic Forum (WEF) experts in 2019. This was based on a survey of close to one thousand members of multi-stakeholder communities.

The respondents were asked to select the three trends that would be most important in shaping global development in the next 10 years. For each of the three trends, respondents had to select the risks most strongly associated with those trends. Their answers predominantly featured topics that centered on technological innovation, demographic changes and environmental issues. This is consistent with the three megatrends Robeco identified for its trends and thematic investing approach.

Figure 4: The WEF's risks-trends interconnections map of 2019



Source: World Economic Forum Global Risks Perception Survey 2018-2019

Megatrend 1: transforming technologies

Technological change is arguably the most far-reaching megatrend in terms of creating investment opportunities. This is because new technologies often lead to non-linear change and create economic value. The technological megatrend has close ties with 'the fourth industrial revolution'[1] – as some economists now refer to it. It started a couple of decades ago, but has been gaining considerable traction over the past few years.

1. The term 'The Fourth Industrial Revolution' was coined in the 2010s by Klaus Schwab, founder and executive chairman of the WEF.

Table 1: The four industrial revolutions

	First industrial revolution 1760-1900	Second industrial revolution 1900-1960	Third industrial revolution 1960-2000	Fourth industrial revolution 2000-
Energy source	Coal	Oil, electricity	Nuclear energy, natural gas	Green energies
Main technical achievement	Steam engine	Internal combustion engine	Computers, robots	Internet, 3D printer, genetic engineering
Main developed industries	Textile, steel	Metallurgy, auto, machine building	Auto, chemistry	High-tech industries
Means of transport	Train	Train, car	Train, car, plane	Electric car, bullet train

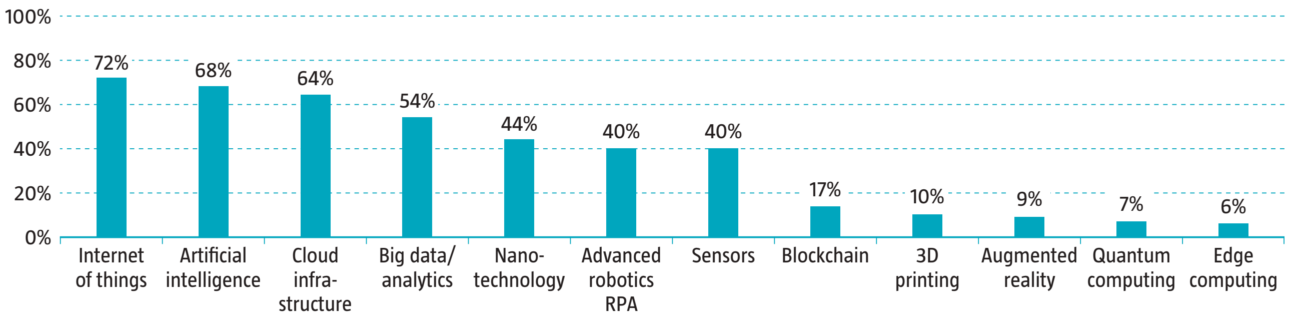
Source: Robeco. Based on: Prisecaru, P., 2016. "Challenges of the Fourth Industrial Revolution", Knowledge Horizons - Economics, 8(1).

The fourth industrial revolution is about combining more traditional means of production with novel digital technologies, such as the internet of things (IoT), artificial intelligence (AI), robots, drones, autonomous vehicles, 3D printing, cloud computing and nanotechnology – to name but a few. This combination ensures producers, consumers and other stakeholders are able to communicate, analyze and act upon information much more quickly and accurately, increasing their flexibility.

The list of relevant technologies is long, but clearly some are more important than others. Figure 5 reveals which technologies, business leaders anticipate will have the greatest impact, based on a survey held by Deloitte in 2019.[2] Those that stand out are the internet of things, artificial intelligence, cloud infrastructure and big data. These are the core technologies of the digitalization trend that helps connect organizations, generates and processes data, and facilitates more well-informed decisions.

2. Deloitte Insights, January 2020. "The fourth industrial revolution – At the intersection of readiness and responsibility", *Deloitte Review*, Issue 26.

Figure 5: The most influential Industry 4.0. technologies



Source: Deloitte Global analysis

These new technologies have the digital revolution in common, which has deeply impacted society since the beginning of the millennium. It is epitomized in many ways by the introduction of the very first smartphones, back in the late 1990s, and the subsequent spectacular success of the iPhone, first launched in 2007. Today, 5.2 billion people across the globe subscribe to mobile telecommunications services, which is around 67% of the world's total population. This figure is expected to reach 5.8 billion, or 70% of the global population, by 2025.[3]

3. GSMA Intelligence, March 2020. "The mobile economy 2020".

Recent technological developments have ensured social media, online dating and e-commerce have spread like wildfire. This has been followed by network-based business models such as Facebook, Airbnb and Uber, which are much less capital-intensive than traditional business models. But, the production and financial sectors have also started embracing digital technologies. Smarter automation, AI tools and faster 3D printers will help manufacturers reduce production costs significantly.

They will also be able to decrease production time, reduce waste, increase production flexibility and manufacture closer to the end consumer. A case in point is the IDAM (Industrialization and Digitalization of Additive Manufacturing) project, a consortium of 12 partners from the additive manufacturing – as 3D printing is known in the industry – and the automotive sectors, launched in March 2019 in Germany. Its goal is to build two pilot lines – one at GKN PM's factory in Bonn, and the other at BMW Group's facility in Munich – to demonstrate a digitalized and IoT-driven production line for 3D printing automotive components.

Disruptive in many ways

Widespread digitalization is disruptive in many ways. In some cases, it can lower the barrier for companies wanting to enter new or existing markets. For instance, these days, virtually anyone can start an online retail portal. Digitalization can also, in some cases, help moats disappear. A moat is a business's ability to maintain competitive advantages to protect its market share from competitors, thereby safeguarding its long-term profits.

In other cases, digitalization can help by circumventing the middleman. Previously, a Chinese, handmade piece of furniture would only enter a European living room if a chain of wholesalers, importers and distributors were involved. Nowadays, the Alibaba network – to give an example – can contact a local craftsman directly for a customized order, and get the product delivered to the other side of the world.

In the healthcare sector, digitalization can help reduce costs and improve services. Analytical tools will be able to make administrative processes more efficient, provide new insights into diseases and create new therapies. Genomics will completely transform how medications are prescribed, as it will be possible to tailor these to an individual's genetic profile. Some diseases may even be eradicated through gene-editing technology. Telemedicine will make care cheaper and more accessible.

The financial sector is seeing fintech companies challenging incumbent universal banks, with cheaper digital payments, peer-to-peer lending and, even, low-cost robot advice. In addition, these cheaper and, often, more flexible services are giving a growing number of people access to financial services they never had before. This is true, not just of large emerging countries, such as China or India, but also of smaller markets across Africa and Latin America.

From FAANG to BATX

At the start, the most successful digital tech companies were US or even Silicon Valley-based, but Chinese players have caught up quickly and have, in some cases, already surpassed some of the American giants. Today, top US tech stocks, the FAANG[4] – Facebook, Amazon, Apple, Netflix and Google – are increasingly being challenged by Chinese rival BATX stocks, Baidu, Alibaba, Tencent and Xiaomi.

4. Many argue Microsoft, which existed well before the advent of the internet, but also saw its value rise spectacularly over the past decade, should be included in the mix to form the acronym FANMAG.

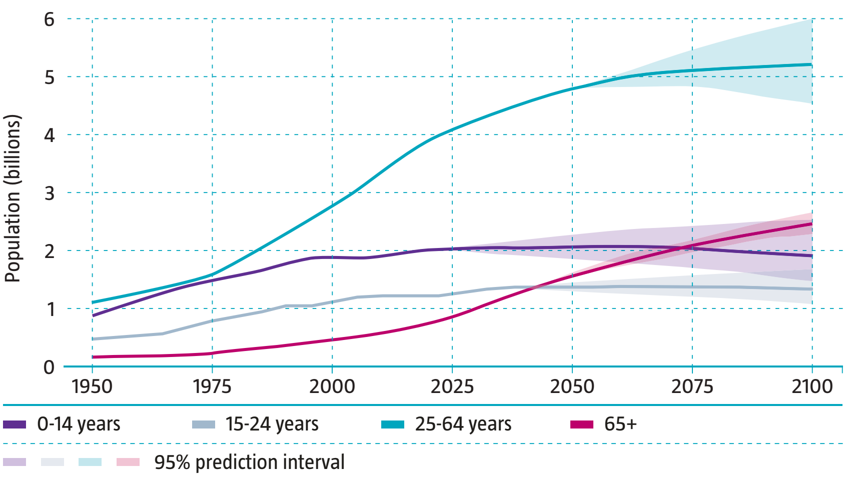
The role of European companies in this shift toward digitalization has been rather limited so far. This mainly has to do with the fact that the European information and telecommunications companies of the early 2000s, failed to catch certain technological waves. This could change, however, as the next stages of the digital revolution are currently taking place, and are expanding into more traditional areas of the economy, such as industrial production and financial services.

Technological change is not possible without risks. The biggest risks incurred are threats to privacy and cybercrime. These types of risks have increased significantly with the surge in cloud computing and the internet of things. But even here, investors have opportunities to capitalize on. Over the years, cybersecurity companies have found themselves embroiled in an arms race with hackers. Firewalls, virus scans, and malware detection need to be adapted almost continuously to ward off the latest wave of cyberattacks.

Megatrend 2: changing sociodemographics

Sociodemographic trends are generally predictable and persistent. Yet, they also tend to unfold slowly and have therefore little effect on a day-to-day basis. This explains why investors frequently overlook or misjudge their longer-term economic impact. Today's demographic megatrend is defined by an aging global population, new generations of digital natives and a rising middle class in emerging countries, such as China and India. These seismic shifts present both challenges and opportunities.

Figure 6: World population by age group



Source: United Nations

For instance, an aging global population will inevitably have far-reaching consequences for the labor, housing and financial markets. It will also most likely boost demand for certain goods and services, including financial services, travel and leisure services, and healthcare and home care services. Figure 6 illustrates the dominant role older age groups are bound to play in the coming decades worldwide, as the number of people aged 65+ likely triples by 2100.

It is probable that the aging global population will, slowly but surely, change long-term prospects in terms of consumer spending, inflation, economic growth and politics. Aging populations will also inevitably put increasing fiscal and political pressure on public health care, pensions and social security systems. For instance, health care spending in OECD member countries is expected to grow 2.7% annually until 2030, which is significantly higher than the expected GDP growth.[5]

5. OECD, 2019. "Health at a Glance 2019 – OECD indicators", OECD Report.

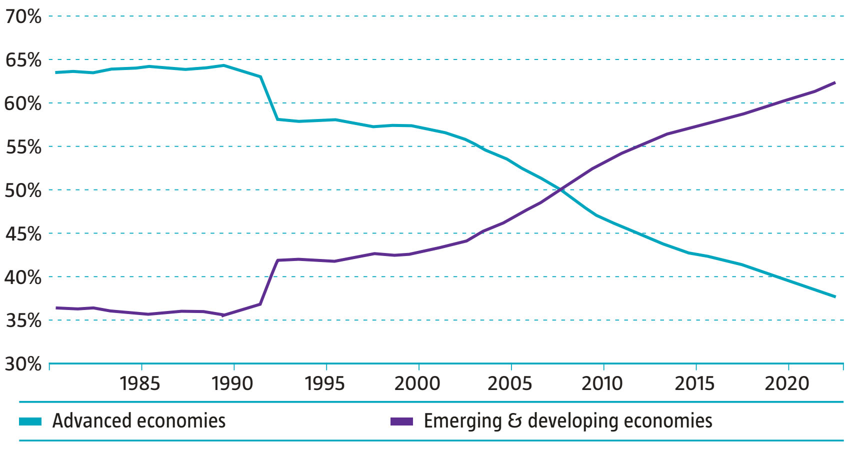
Such changes are becoming increasingly visible in countries with the most challenging demographics. These are typically advanced economies, such as Japan, Germany, or Italy. However, some emerging and developing countries, such as China or Thailand, are already experiencing depressed fertility rates, as well as a stagnating and fast-aging population. These countries often have weaker social security systems, meaning demographic shifts could lead to even more radical transformations.

The rise of the EM middle class

Meanwhile, increasing wealth in emerging countries is creating a surge of opportunities for consumer products and services. The global middle class is predicted to grow from approximately 3 billion people in 2015 to over 5 billion by 2030. The vast majority of this growth is expected to take place in Asia, notably in China and India. Almost 90% of the one billion people that are expected to join the global middle class between 2015 and 2022, will be Chinese or Indian.[6]

6. Homi Kharas, 2017. "The unprecedented expansion of the global middle class", Brookings.

Figure 7: Share of world GDP



Source: United Nations

The rise of Asia's middle class has significant implications. It is prompting the shift in the world's economic center of gravity, from developed to developing countries. It is also boosting discretionary consumption, as dozens of millions of emerging consumers join the ranks of the middle class every year. This means they will start purchasing items that are not basic necessities, supporting the soaring demand for products and services that include consumer goods and payments.

In a 2019 discussion paper,[7] McKinsey predicted that, during the current decade, Asia – with China and India leading the way – would fuel half of the total expected consumption growth worldwide. By 2030, it is predicted to account for more than half of global consumption growth. This will make Asia one of the most important markets, not just for international brands, but also for domestic brands as the bias Asian consumers traditionally have for western brands, gradually fades away.

Yet formidable challenges remain. For example, India's tremendous increase in its working age population, both in an absolute and relative sense, can do little to solve its structural deficiencies in education or infrastructure, which continue to hamper the country's growth potential. Meanwhile, China is facing strong headwinds in striving to maintain its economic momentum, and its rapidly aging population will soon start to weigh on its economic potential.

The rise of digital natives

Generational shifts have always been powerful drivers of social change. But the advent of digital technologies since the 1980s and the rise of generations that have grown up with these technologies, is widening the gap. According to Marc Prensky, who coined the term 'digital natives',[8] younger generations are used to receiving information at accelerated speeds. They like to parallel process and multi-task. They also prefer graphics to text and value random access to resources.[9]

These shifts have far-reaching consequences. For instance, a recent study by BCG found that the Covid-19 pandemic's impact on consumption habits was more pronounced for millennials[10] and generation Zs[11] than for older generations. In fact, 33% of millennial and 'Gen Z' consumers have increased their online spending since the pandemic began, accounting for a net increase of 6%; while 23% of consumers from older generations have done the same, achieving a net increase of only 1%.[12]

Millennials and Gen Zs are becoming increasingly influential as they currently make up roughly half of the world's population and most of the global workforce. This is changing the way our societies think and react, ensuring our priorities evolve as well. Some of the traditional milestones that were essential for older generations, such as having children or buying a home, do not top the list of priorities for younger generations.[13] Instead, seeing the world or having a positive impact on society, has become much more important.

Issues, such as climate change or saving the environment, have also become increasingly relevant in the decision-making process of millennials and generation Zs. For example, a 2017 survey[14] found that 85% of millennials felt it was "extremely" or "very" important that companies implement programs to protect the environment. For baby boomers (aged 50 to 64) and members of the silent generation (aged 65+) that proportion was significantly lower: 72% and 65% respectively.

7. Tonby, O., Woetzel, J., Choi, W., Seong, J., and Wang, P., 2019, "Asia's future is now", McKinsey Global Institute.

8. The term 'digital native' refers the generation of people who grew up in the era of ubiquitous information technology, including computers, mobile phones and the internet. By comparison, people from older generations, who only became familiar with digital systems as adults, are considered 'digital immigrants'.

9. Prensky, M., 2001. "Digital Natives, Digital Immigrants", On the Horizon.

10. Millennials, also known as "generation Y" usually refer to the demographic cohort born between the early 1980s and the mid-1990s to early 2000s, with 1981 to 1996 a widely accepted defining range for the generation.

11. Generation Z usually refers to the demographic cohort born between the mid-to-late 1990s and the early 2010s.

12. Source: Bona, C., Koslow, L., Frantz, R., Nadres, B. and Ratajczak D., June 2020. "How marketers can win with gen Z and millennials post-Covid-19", BCG.

13. Source: The Deloitte Global Millennial Survey 2019.

14. Source: The Conference Board Global Consumer Confidence Survey, conducted in collaboration with Nielsen Q2 2017.

Megatrend 3: preserving the earth

In just a few years, the need to preserve our planet has become one of the most powerful forces behind structural change in our societies. While this shift started several decades ago, momentum really started picking up in the last decade, heralding significant milestones such as the Paris Agreement, in 2015. The move towards preserving the earth has been fueled by increased environmental awareness, increased regulation and a growing scarcity of natural resources.

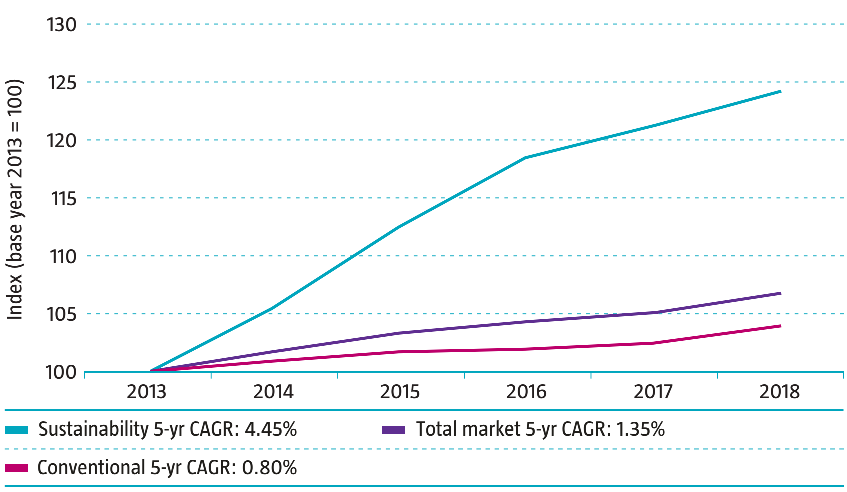
This megatrend is driving many changes, from more sustainable food production, to cleaner energy systems, to hybrid and electric vehicles. These changes are often driven by an increasing scarcity of resources, as well as increased social awareness and tighter regulation factors. Moreover, people, in particular the younger generations, are becoming more conscious of the need to preserve our planet.

Consumers across the globe, in survey after survey, have revealed sustainability plays an increasingly important role in their decision making.[15] Moreover, sustainability's growing influence appears to be about more than just stated intentions – it is actually visible in purchasing behavior. For instance, a recent paper[16] by NYU researchers, found that products carrying sustainable claims on their package clearly outperform conventional products in the same respective categories.

15. This is, for example, one of the key findings of PwC's Global Consumer Insights Survey 2020.

16. Kronthal-Sacco. R., Van Holt, T., Atz, U. and Whelan, T., 2020. "Sustainable Purchasing Patterns and Consumer Responsiveness to Sustainability Marketing Messages", *Journal of Sustainability Research*.

Figure 8: Growth sustainability-marketed products versus conventionally-marketed products



Source: Kronthal-Sacco. R., Van Holt, T., Atz, U. and Whelan, T., 2020. "Sustainable Purchasing Patterns and Consumer Responsiveness to Sustainability Marketing Messages", Journal of Sustainability Research.

The paper illustrated that, in just a few years, sustainability-marketed products had moved beyond niche positioning and were contributing to over half of the sales growth seen in the sample of goods studied from 2013 to 2018. During this period, the share for sustainability-marketed products had grown from 14.3% to 16.6%. Overall, sustainability-marketed products had grown 5.6 times faster than their conventionally marketed counterparts, and 3.3 times faster than the total market. See Figure 8.

Tighter regulations

Increased awareness and public health concerns are putting pressure on governments and regulators to implement stricter sustainability standards. Tighter regulations to protect the environment are therefore becoming a powerful catalyst of change. In the building and construction sector, for instance, new standards on resource conservation and environmental efficiency have shaken up the industry.

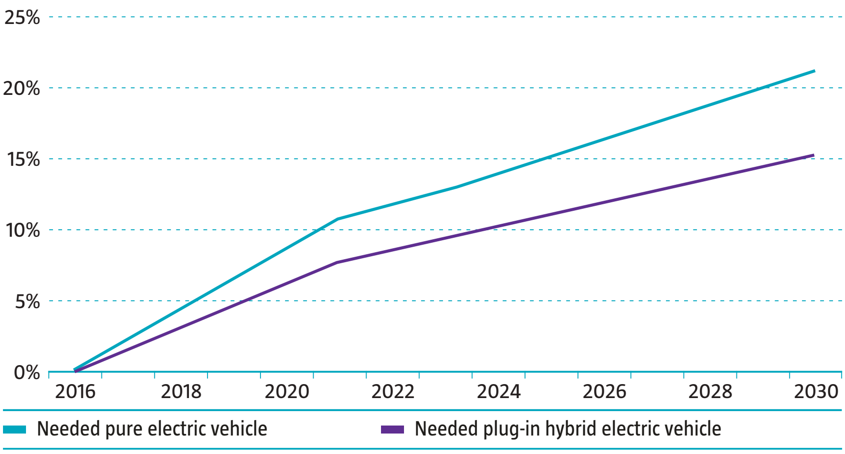
Another telling example involves the automotive sector. According to some estimates,[17] the total cost of air pollution will account for 1% of global GDP by 2060, up from 0.3% in 2015. Combating air pollution by targeting automotive transport is therefore gaining momentum among governments worldwide. Regulators around the world are pushing carmakers to reduce their emissions. Failure to meet these targets may force manufacturers to pay hefty penalties.

17. OECD Policy Highlights, Economic Consequences of Outdoor Air Pollution, OECD Publishing 2018.

Countries such as China are aggressively supporting the Electric Vehicles (EV) market through subsidies and by implementing restrictions on petroleum-powered vehicles in smog-choked cities. Similar measures have been introduced in urban areas across the world and are hastening the demise of conventional cars. Although incremental improvements in fuel efficiency and exhaust technologies of traditional cars are advancing, the overall costs of emission compliance are rising.

Figure 9: Emission standards spurring electric and hybrid vehicles uptake

Example European Union: required EV share of new vehicle sales



Source: RobecoSAM, ICCT, 2018. Estimates assume fossil fuel car efficiency to improve 1% p.a. and 47g/CO2 per 100 km for plug-in hybrid EVs

Tighter restrictions and increased public awareness of health issues and climate change have ensured EVs have entered the mix as a solution for pollution. This means car manufacturers will be forced to step up their production of EVs, presenting both challenges and opportunities for the sector. Figure 9 illustrates the pace at which these developments may unfold. It also signifies the percentage of new vehicle sales that will need to be attributable to EVs to satisfy EU emission standards.

FUN QUIZ | WHO SAID:

'Big will not beat small anymore. It will be the fast beating the slow.'

A. Steve Jobs
B. Jack Ma
C. Rupert Murdoch

Answer: Rupert Murdoch, at a press conference in London, as reported by *The Guardian* on 2 July 1999.

Scarce resources

While the desires of our human societies may be infinite, the resources available to satisfy them are, by definition, finite. As the global population rises and economies develop, resource scarcity is becoming an increasingly important factor to consider. Take water, for instance. While water scarcity has always been an issue for arid climates, an increasing number of regions across the globe are now maxing out reserves and threatening human health, local development and global economic growth.

Meeting growing global demands for water supply has fast become one of the biggest challenges for humankind. If the current levels of water consumption and pollution are not altered, demand for water may exceed supply by 40% by 2030. This means almost half of the world's population will suffer severe water stress. Consequently, countries may be forced to spend USD 200 billion per year on upstream water supplies, due to demand outstripping cheaper forms of supply – up from historic averages of USD 40 to 45 billion.[18]

18. United Nations Environment Program, Policy Options for Decoupling Economic Growth from Water Use and Water Pollution, March 2016.

Necessity is therefore the catalyst behind innovation in new water treatment and water reuse technologies across the globe. Some countries are proving that a little financing, ingenuity and long-term thinking, can go a long way. Singapore, Jordan and the Gulf States are just a few water stressed zones that are pioneering and deploying innovation to combat water scarcity. Their success can be applied to other water stressed areas in the future. But water is just one of the countless examples that illustrate how resource scarcity is driving long-term changes. For instance, the auto and aviation industry are increasingly using alternative materials, such as carbon fibers or titanium, to reduce aircraft and passenger car weight, thereby reducing energy consumption. Carbon fiber currently accounts for over 50% of the material used in Boeing 787s and Airbus A350s.

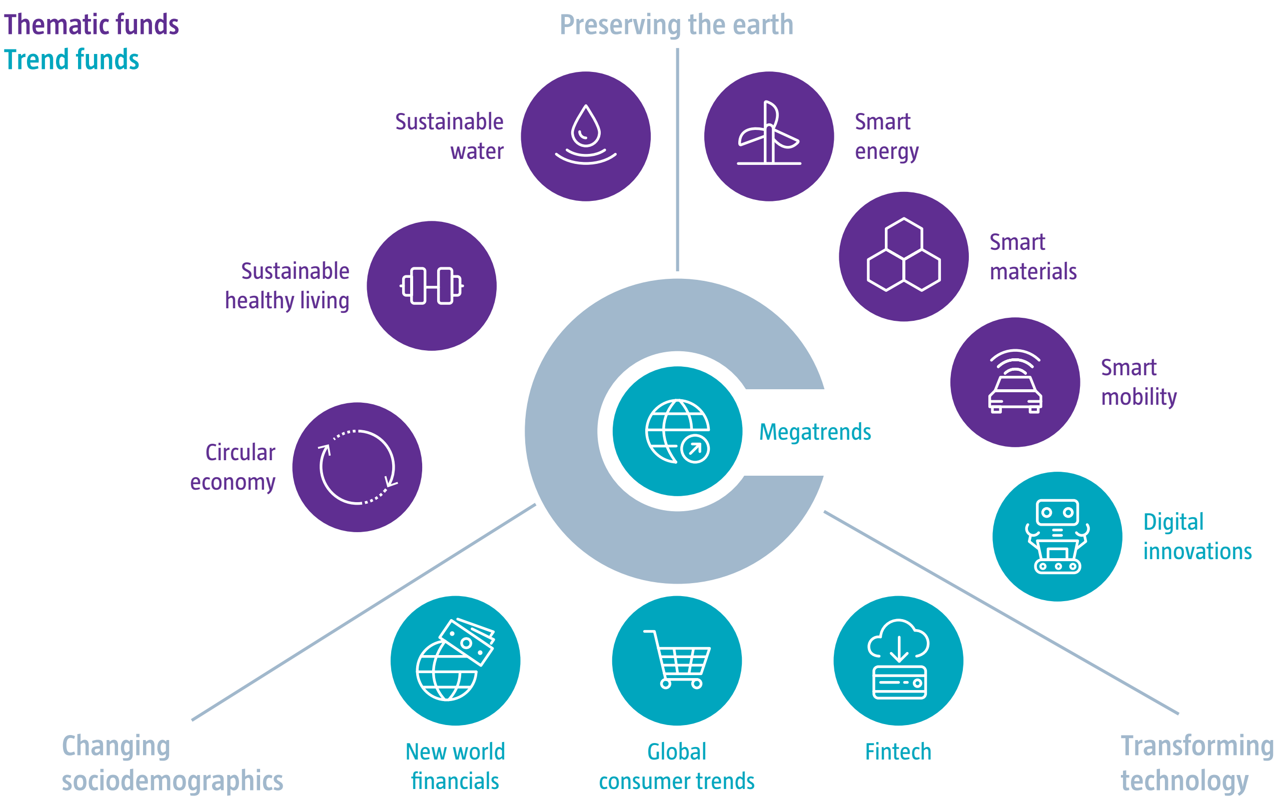
Moreover, addressing resource scarcity challenges is about more than just replacing traditional materials with alternative ones. It is about improving production processes to make manufacturing safer and more efficient and to reduce pollution. It is also about increasing efficiency – for example through reuse and recycling – to achieve cleaner solutions in extraction, processing, and when using resources and materials.

How do our strategies tie in with this framework?

Robeco in Rotterdam and the sustainability experts at RobecoSAM in Zurich have joined forces to provide our trends & thematic investing offering. These investment strategies have been designed in line with the three overarching megatrends described in this chapter – transforming technology, changing sociodemographics and preserving the earth. Within this framework, the different strategies typically focus on a subtrend or theme, or a set of subtrends or themes.

Consequently, some of our strategies reflect various megatrends, whereas others may only tie in with one of these megatrends. For example, the Robeco Global Consumer Trends Equities strategy focuses on three main trends: the digital consumer, the emerging consumer and strong brands. This means it is very well aligned with the transforming technologies and changing sociodemographics megatrends, but less so with the preserving the earth megatrend. Figure 10 provides an overview of our trends & thematic strategies and how they tie in with our analytical framework of megatrends, trends and themes, and subtrends.

Figure 10: Overview of trends & thematic investing strategies



Source: Robeco

INTERVIEW

'We are on the cusp of the golden age of digitalization'

STEVEN VAN BELLEGHEM

International keynote speaker

Steven van Belleghem is the co-founder of inspiration agency Nexxworks and social media agency Snackbytes. As an investor he is also involved in the fast-growing digital agency Intracto and AI scale-up Hello Customer. Finally, Steven is also on the board of directors of Plan International. In addition to his entrepreneurial activities Steven is also a part-time marketing professor at the Vlerick Business School and a guest lecturer at the London Business School.

June 2020. The world is slowly coming round after being knocked out by a sucker punch to the jaw. The Covid-19 pandemic struck the global economy at its core, forcing economic growth to come to a screeching halt. It is estimated that the economy will shrink by five to ten percent in many regions throughout 2020. Grounded airplanes stand as silent witnesses to the dive the economy has taken. And social tensions that have always been bubbling under the surface intensified after the death of George Floyd. Stock markets took a staggering plunge in March and April, only to shoot up at an equally astounding rate, severely testing investors' nerves.

As the dust slowly settles, we speak with Steven van Belleghem, an expert when it comes to client centricity. The coronavirus has ensured the customer is put first again: companies who offer customers superior service, more than ever before have a competitive edge in these tough times. This insight will prove to be invaluable to investors, particularly as a 'winner takes all' effect has been observed in many sectors over recent years.

What does Van Belleghem believe is required to win the battle for customers? The formula is simple. Van Belleghem explains: "The ideal customer relationship of the future can be characterized by three aspects: more digitalization, more empathy and more corporate social responsibility." At a first glance, these two aspects – more digitalization and more empathy – may appear to be mutually exclusive, but Van Belleghem points out that they actually reinforce one another. "The efficiency of online shopping appeals to customers, but so does the human aspect, often found in brick and mortar businesses, which focuses on excellent customer service. Businesses need to offer their customers products of good quality and good value, that are easily purchased online and that follow up with a great after-sales service. Companies that become partners in the lives of their customers win."

The fifth technological revolution

Not all companies have been equally successful in making this transition though. Van Belleghem points out that many NGOs score high in terms of empathy, which is important to customers. However, these types of organizations often tend to lag behind when it comes to digitalization – meaning their reach remains quite small. But Van Belleghem believes there are a lot of opportunities out there for businesses as well: "The key themes these days all revolve around health, climate change, discrimination and inequality. And what's really remarkable, is that consumers are looking more to businesses for solutions and answers than to governments." The current Covid-19 crisis has played an important role in this. In fact, Van Belleghem thinks that we have reached a turning point precisely because of the pandemic. He refers to the work of Venezuelan Carlota Perez – a well-known academic who studies the impact of technological revolutions across the centuries. She argues that with the advent of the Industrial Revolution, a pattern began by which we have an economic revolution of seismic proportions every 60 years. Perez claims this sequence is so precise, you could set your watch by it.

Digitalization is our current economic leap forward and it is in full swing. According to Perez, each economic revolution is characterized by three distinct phases: the first 20 years comprise the 'installment phase', which is marked by dramatic changes to work and daily life. It is a period defined by resistance to these new developments, in which a small group of winners become extremely wealthy. This, in turn, leads to inequality and is followed by the second phase: a period of recession. Once the crisis ends, a period of prosperity ensues in which we enter the golden age of the new technology. This third and final phase sees a much wider portion of the population benefit from the new technology as its implementation and scope improves. Van Belleghem believes we are currently in the transition phase between phase two and phase three: "When we look back on 2020 in 2030, we will conclude that this difficult year was actually the gateway to the golden age of digitalization." The markets may also reflect this as the 'winner takes all' effect of the past few years should, according to Perez' theory, gradually start to subside.

"What really counts," says Van Belleghem, "is the value of a brand. A company's goal is to get customers to stop thinking 'I need toothpaste' and instead get them to think 'I want Colgate'. The importance of brands will only increase in the coming years. Personalization has imposed filters on the way consumers view the world. The main challenge for businesses is to navigate their way around these filters to engage with the client and build a relationship with them." In this vein, Van Belleghem cites Nike, whose website and online shops alone account for a third of its USD 33 billion revenue. Van Belleghem goes on to describe how smart technology can help in this regard: "An increasing number of products contain sensors, telling businesses where, how and when consumers use their products. And businesses can use this information to create added value for their customers."

Privacy and inequality

Of course, this concept does have a certain trade off: privacy is sacrificed for user-friendliness. Van Belleghem explains: "People generally are quite vocal about the importance of privacy, but their online behavior presents a very different picture." He says this only changes in a crisis: "During the 2019 protests in Hong Kong, people suddenly started wearing masks on the street and destroying facial recognition cameras. That's what happens when trust suddenly evaporates. People didn't even want to use their phone to make mobile payments. And now in the West, the privacy debate about coronavirus apps has kicked off, but at the same time, everyone uses Strava for their cycling routes." Van Belleghem believes there is a gap between what consumers say and what they do – although he applauds the debate about privacy and emphasizes it is a good thing.

The privacy debate is inextricably linked to the digitalization of our society. And digital security – essential in this day and age – has undeniably benefited the online security sector. If a large organization is hacked, the consequences are immediate: hundreds of millions of euros in damage, not to mention reputational damage. And what about fintech? Van Belleghem says: "Until recently, the majority of people in countries such as Kenya and Tanzania didn't have a bank account. Nowadays, even people in the most inaccessible hinterlands have a digital wallet on their first-generation Nokia. This is tangible proof of phase three of the digital revolution." According to Van Belleghem, income inequality can be reduced to acceptable proportions through technological developments. However, he admits not all issues can be resolved this way. He is referring, in particular, to the inequality and disadvantages the black population in the US face every day. This issue has, of course, come to the fore as a result of George Floyd's violent death, which once again exposed the huge rifts present in US society. These rifts are then, in turn, magnified on social media and the online world.

Online meets offline

We live in a hybrid society that allows us to divide our time between the online world and the offline world. Yet, these two worlds are becoming increasingly entangled, especially as many people now work from home due to the Covid-19 crisis. This has forced businesses to innovate as meetings and events are currently not possible in the offline world. Van Belleghem, who is a keynote speaker in more than 40 countries, knows all about this. He is convinced that digital events will be the next big thing – irrespective of whether this is out of necessity. "Businesses can organize state-of-the-art, live digital events for a select group of clients. But these events can then have a larger reach by targeting a wider group." Van Belleghem compares it to a football match: "Suppose you have 40,000 people in the stadium, while at the same time, hundreds of millions of people, who have paid far less, are watching the same game via a live TV broadcast. This type of hybrid solution can be applied to online events as well. Why invite 200 people to your event when you could invite 5,000? And why invite 5,000 if you could invite 50,000?"

Digital events are not the only things accelerating at a rapid rate. "Everything is accelerating at a rapid rate in this trend. E-commerce doubled in size in the period between April and May. The last time such a two-fold expansion occurred, it lasted seven years. It may feel as if we are taking a step back because of the pandemic, but actually we are taking a giant leap forward." Van Belleghem is confident that the high street will still be there in ten years' time, but that it will primarily house stores with innovative concepts. Shopping will be a completely different experience to what it is now. Van Belleghem elaborates: "Approximately 80% of our household purchases are the same each month. This means we won't be going to the mall for laundry detergent in the future. Refrigerators will come equipped with an algorithm that calculates when we are about to run out of a certain product, so that it can be ordered on time."

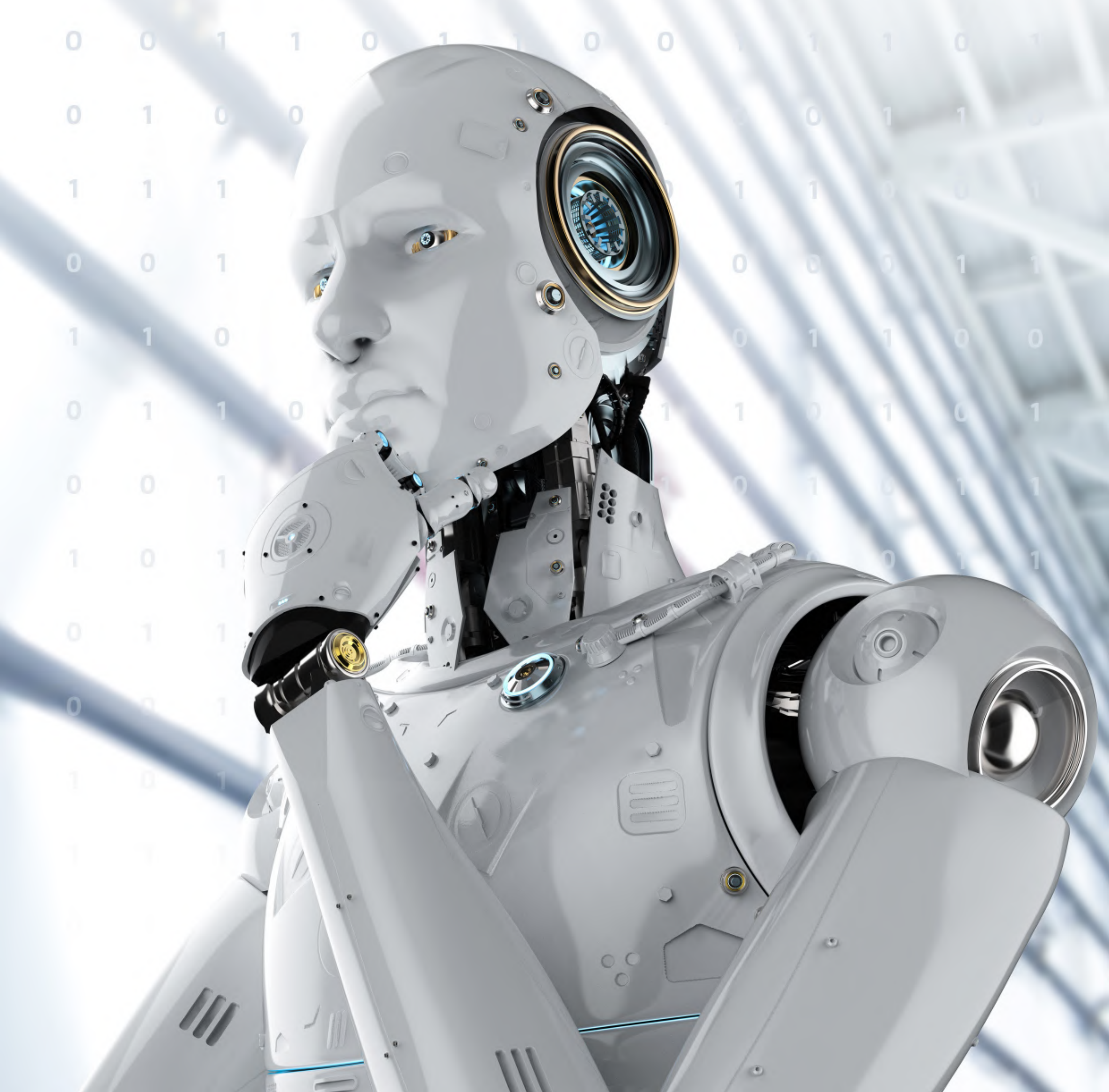
An optimist's doom scenario

Van Belleghem considers himself an optimist, but refuses to turn a blind eye to the dark side of artificial intelligence, algorithms, digitalization and personalization of the online world. He points out, for instance, that this has created a situation in which we all exist in our own customized bubbles, making it easier to manipulate our thoughts. Van Belleghem cites the 2016 US elections and the Brexit referendum as prominent recent examples of this. Cybercrime is another obvious threat. Van Belleghem says: "A criminal nowadays would have to be a real idiot if they decided to put on a ski mask and rob a physical bank." He believes, as a society, we are inadequately prepared for digital calamities: "What will we do if hackers hold a hospital hostage? Or what about the fact that countries such as China, Iran, Russia and the US are secretly involved in hacking activities, which could lead to geopolitical tensions?"

Meanwhile, the corporate world continues to move towards a new and increasingly digitized world, with people such as Bill Gates, Jeff Bezos, Steve Jobs and Elon Musk paving the way in the last few years. Van Belleghem is a Musk fan: "That man really thinks outside the box. He has the craziest ideas, like colonizing Mars! But he's the one taking those first steps, time and time again. He shook up the car industry when he launched Tesla and now he's got a plan for a Hyperloop." If you realize that – according to Van Belleghem and Perez – we're on the cusp of the golden age of digitalization, it would then appear that our journey has just begun.

3

WHAT MAKES A TREND INVESTIBLE?



Identifying promising trends that will reshape our socioeconomic environment is one thing, but consistently outperforming by investing in companies benefiting from these trends is another. Robeco's Trends Investing team has identified three key criteria to determine whether a specific trend offers an attractive investment opportunity: monetization potential, scope and good timing. Good timing in this context means that the trend is ripe for investment. Only trends that meet these three criteria are deemed investible.

FUN QUIZ | QUESTION:

Which year did Amazon report an annual net profit for the first time?

A. 1999
B. 2001
C. 2004

Answer: Amazon reported a full-year profit for the first time in 2004. Before that, the company, founded in 1994, reported its first quarterly profit in 2001.

Criterion 1: monetization potential is key in capturing value

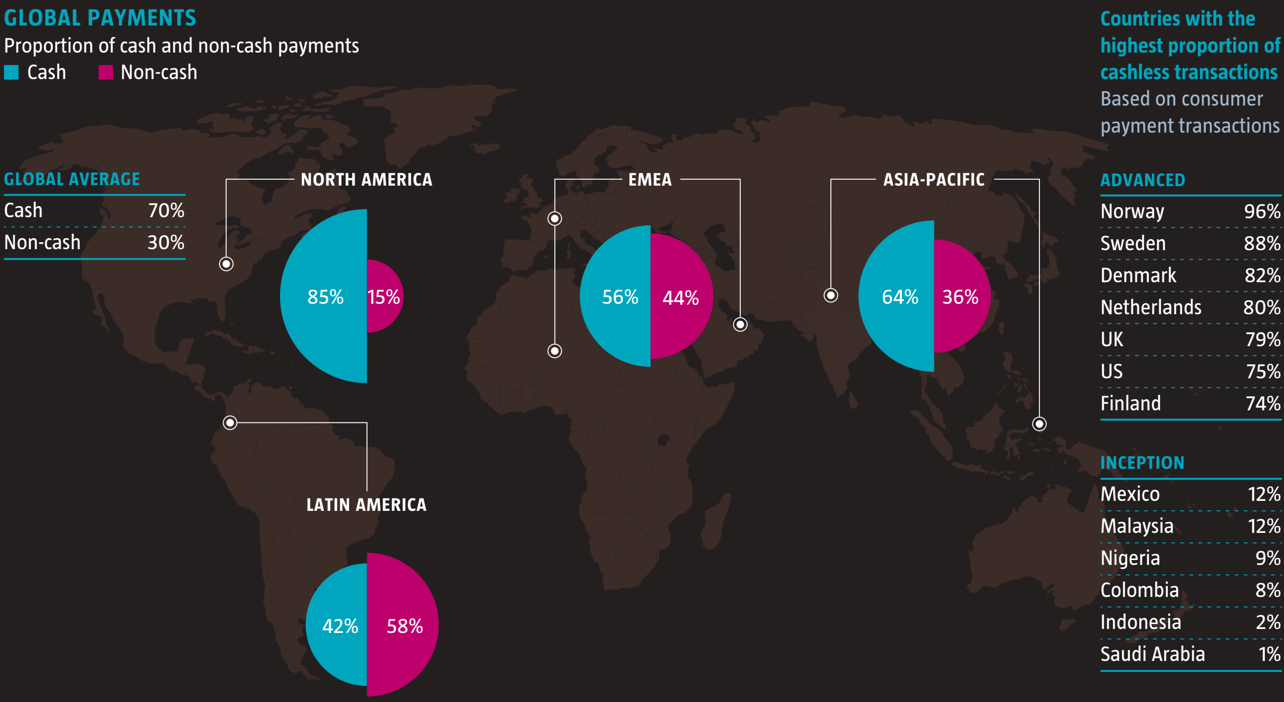
Monetization is the process of earning money[1] from a business or asset. If a company is able to earn revenue from its business, this means customers value the goods or services a company provides and are willing to pay for them. It is important that a company is able to retain part of the value it creates for customers, for itself. For example, a global payment service provider ensures customers are able to make cashless payments all over the world. For business travelers and tourists, the value of this service is clear: they do not need to exchange cash, saving time and improving security levels.

Global payment providers can monetize part of the value they create for customers by charging a transaction fee, creating a profitable business model. This is a prime illustration of how the structural move from cash to digital payments has become a monetizable subtrend. And this subtrend is part of the wider digitalization trend, which in turn is part of the transforming technology megatrend.

Successful monetization means companies are able to generate economic profit from the trend they are exposed to. Economic profit can be defined as earning returns that exceed the cost of capital. The beauty of a monetizable trend is that companies generate economic profit, while growing that profit at the same time. Continued economic profit generation is likely to translate into wealth creation for shareholders. This is why monetization must be considered a key criterion in determining whether a trend is investible.

1. In this context, we define the notion of profit as earning returns above the cost of capital.

Figure 11: Going cashless around the world



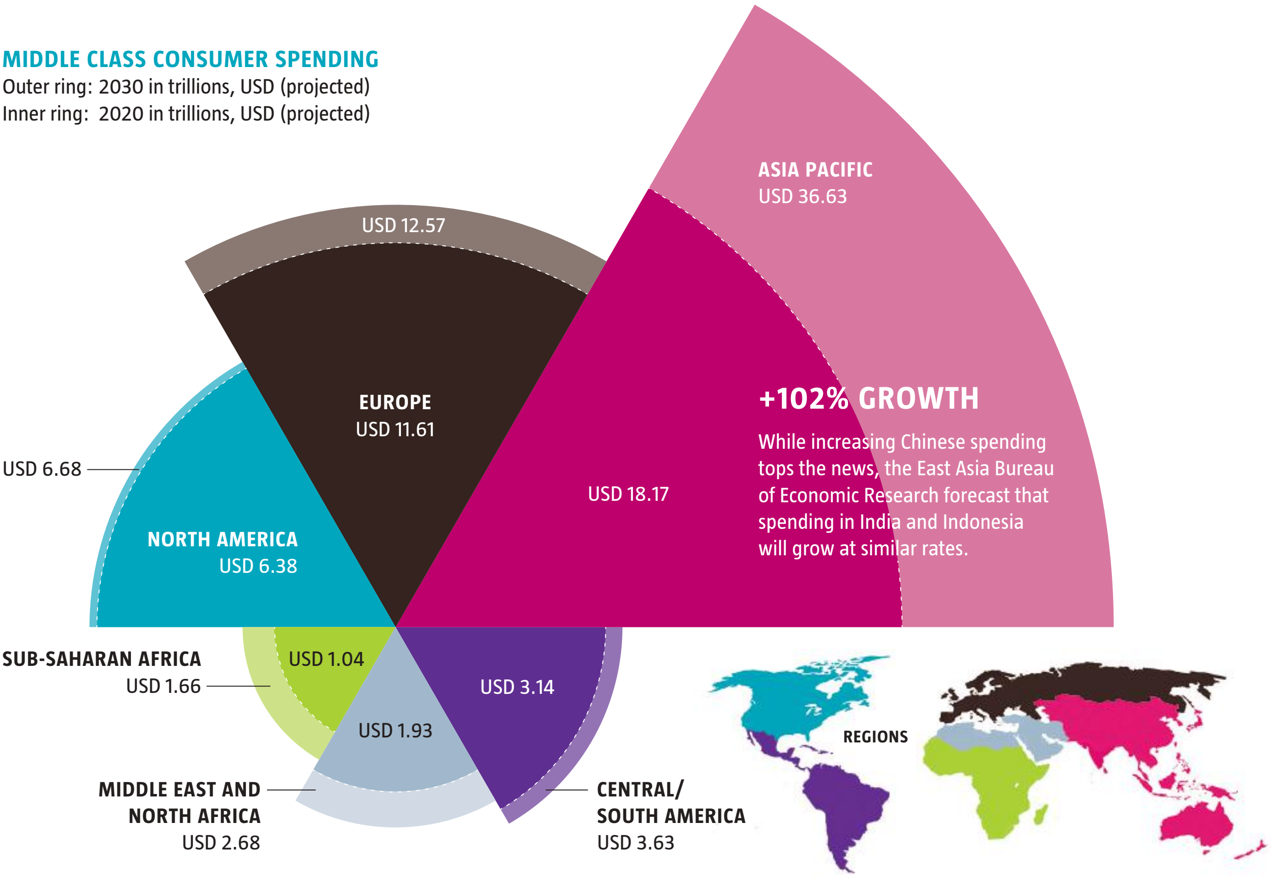
Source: ACI Worldwide. Date: 2019

INVESTMENT SHOWCASE: FINTECH

Traditional banks are facing several major trends that are radically transforming the financial services industry, and that are offering attractive investment opportunities. For incumbent players, the biggest challenge is the revolution triggered by financial technology or fintech. Technology companies and more traditional financial institutions are building new platforms, or radically upgrading existing ones, to offer their clients an increasingly wide and complex range of online financial services.

These include access to bank accounts, financial planning, robo-powered investment advice services and even mortgages. State-of-the-art technology will make it possible for clients to integrate all of their data from their bank, their insurance policies, their credit card issuers and even their pension fund manager. The types of technologies involved will range from artificial intelligence, and in particular machine learning, to blockchain. Fintech is currently offering extremely attractive investment opportunities.

Figure 12: Geographical redistribution of global consumer spending



Source: Global Economy and Development at Brookings. Date: 2017

Criterion 2: sizing up a trend's scope

A trend must be far-reaching enough to allow companies to earn and grow revenues, by building a business that capitalizes on the trend in question. One way to measure scope is by looking at the number of consumers and businesses influenced by a given trend. A good example of a far-reaching trend is the emerging middle-class subtrend, which is part of our changing sociodemographics megatrend.

Income levels are rising rapidly in many developing countries, particularly in Asian countries such as China, India, Indonesia or Vietnam. Billions of people will join the ranks of the middle class in the coming decades. As income levels rise, expenditure on more discretionary items, such as cosmetics, fashion and entertainment, will increase significantly. This change is a key factor in driving demand for these products, which will be sold by both local and global companies.

Investors can benefit from the emerging middle-class trend by investing in companies selling services and products that are set to experience substantial, long-term demand growth. For example, L'Oréal, the world's largest personal care products maker in terms of sales, saw its sales in Asia rise by 112% over the last 5 years, from EUR 4.56 billion to EUR 9.66 billion. Asia is currently the company's largest and fastest growing market, having surpassed Western Europe in 2019.

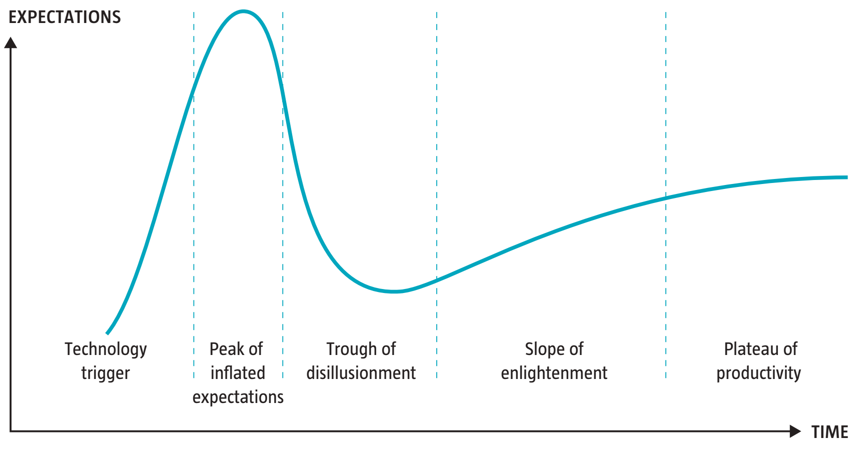
Another important facet in measuring scope is ensuring enough companies are listed on the stock exchange, with pure-play exposure to the trend. Additionally, these companies' market capitalization must be sufficient, both at the individual and group level, to merit significant investment. In other words, a strategy that aims to benefit from a given trend, must offer investors sufficient capacity.

The structural move away from brick and mortar stores to e-commerce, which is part of the broader digitalization trend, illustrates this point. Investors can benefit from this shift as there is a wide range of companies to invest in, including Alibaba in China, Amazon in the US, Mercado Libre in Latin America and Zalando in Europe. These four companies have market capitalizations ranging from USD 19 billion to USD 1.5 trillion, and derive most, to all, of their revenue from e-commerce.

Criterion 3: time to hit the road

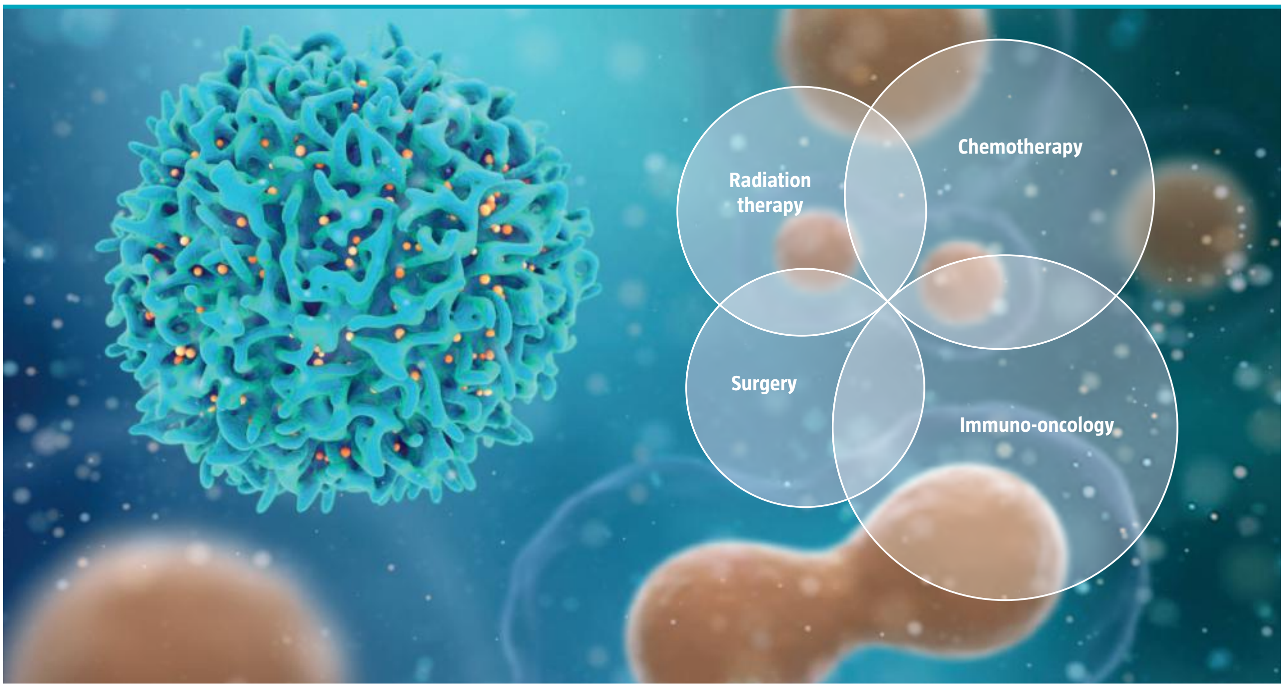
The third element in determining whether or not a trend is investible, is its position in the life cycle. To be deemed investible, a trend must be in the right phase of its life cycle: not too early or late, but just at the right stage. One way to evaluate this is by using Gartner's 'hype cycle' as a framework. In the early stages of a trend, an innovation has just occurred and investors tend to be overexcited. Adoption is still low and clear, and profitable business models have not been found yet.

Figure 13: Gartner's 'hype cycle'



Source: Gartner, 2020

Figure 14: The four pillars of cancer treatment



Source: Global Data PharmaFocus, 2017.

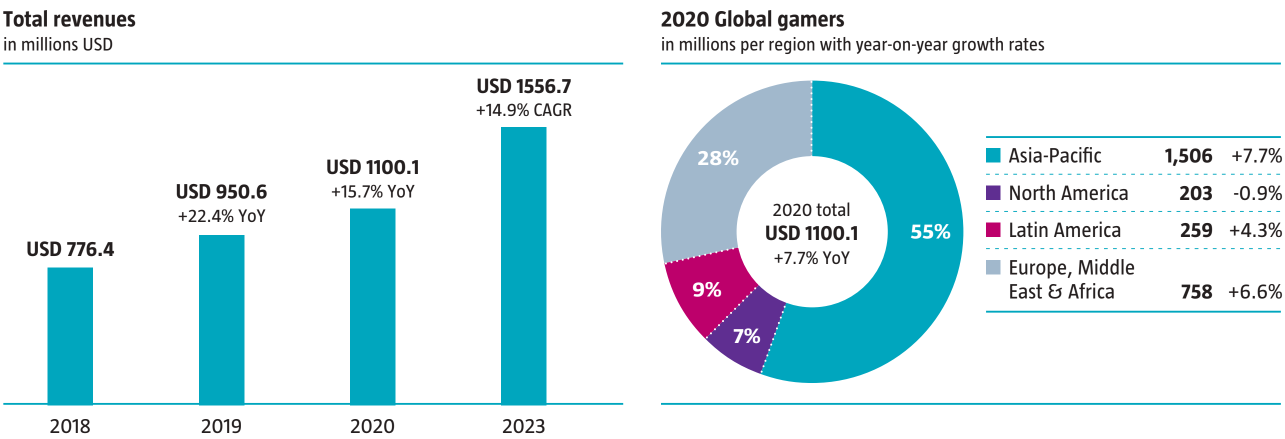
Investors therefore do not have sufficient information to determine whether a trend will become a driver of long-term growth and present a real investment opportunity. For instance, within the transformative life sciences trend – part of the transforming technology megatrend – we have identified immuno-oncology as a promising area for investments. Immuno-oncology focuses on treatments that activate the body's immune system to help it fight cancer.

On paper, immuno-oncology has the potential to become the fourth pillar in cancer treatment, in addition to chemotherapy, surgery and radiation therapy (see Figure 14). It would therefore appear to satisfy both the monetization and scope criteria of an investible trend. However, immuno-oncology research and technology are still in the early stages, making it difficult to determine which companies will actually benefit from these innovations.

A shakeout often occurs after an initial peak of enthusiastic expectations, leaving only the fittest players. Such a shakeout typically coincides with many companies exiting – who initially seemed extremely promising, but ultimately failed to deliver consistent growth and profitability over time. Companies that currently show promise in terms of their prospects in immuno-oncology, may well turn out to be disappointing investments in the next few years.

Gartner's 'hype cycle' stipulates that the optimal stages for investment are the 'trough of disillusionment' and 'the slope of enlightenment'. In these stages, investors tend to underestimate the chances of a market experiencing long-term, profitable growth. This is currently exemplified in the video game industry: companies are moving away from traditional risky business models that rely on the success of a few blockbuster titles, to more predictable subscription-based models.

Figure 15: Gamers and eSports revenues



Source: Newzoo, 2020

These new business models are very attractive to investors. They usually generate greater profitability and earnings visibility, compared to the traditional business models that have prevailed until recently. This shift, and the potential of a 2.7 billion global population of gamers,[2] suggests the time is ripe for investors to gain exposure to the video game industry, especially as this population is bound to grow and therefore increase spending on games.

2 Source: Newzoo Global Games Report, 2020.

Once investors' portfolios have been exposed to a specific trend, developments should be closely monitored to ensure they have not reached the plateau phase. This stage is characterized by low or no sales growth, when companies start focusing on costs instead of growth. At this point, investors should consider exiting the trend. This is why investing too late in a trend means missing out, at least partially, on the peak period for investment returns, economic profit and growth.

FUN QUIZ | WHO SAID:

'After 25 years of buying and supervising a great variety of businesses, I have not learned how to solve difficult business problems. What I have learned is to avoid them.'

A. Jack Bogle
B. Warren Buffett
C. George Soros

Answer: Warren Buffett, Berkshire Hathaway 1989 Chairman's letter.

TRENDS SHOWCASE: HUMANIZATION OF PETS

While the most attractive trends investing narratives often have to do with technology and innovation, this is not always the case. Some timeless things, such as the bond between humans and animals, can turn out to be an exciting playground for investors. This is true of the pet care market, as pet ownership is rising globally and the amount owners spend on their pets keeps on increasing.

The pet care market offers moderate, but stable growth prospects. It is currently worth USD 190 billion and is expected to grow 5% annually.[3] This expected growth will mainly be driven by the surge in pet numbers and increased spending per pet – related, for example, to fresher, healthier food and better animal healthcare.

Pet ownership is not just rising globally – owners are also spending more on their loyal companions. These non-human companions are increasingly been treated as family members, with all the perks and benefits this brings. Some millennials even see their pets as genuine alternatives to children.

But the pet care market does not just offer moderate growth prospects, it also presents a relatively resilient profile. In the US, for example, pet care spending continued to grow even during the financial crisis of 2008-2009. In fact, the most recent increase in ownership, driven in some countries by increased adoption and fostering by people confined to their homes, could result in the industry experiencing a tailwind soon.

Another interesting, recent development is the emergence of new types of services, particularly in the online retail sector. For example, Chewy.com offers 'Autoship' subscriptions that regularly ship pet food to people's homes. The 'humanization' of pets is a typical example of the type of broad sociodemographic shift that Robeco aims to benefit from with its Global Consumer Trends strategy.

3. Source: Global Market Insights, June 2019

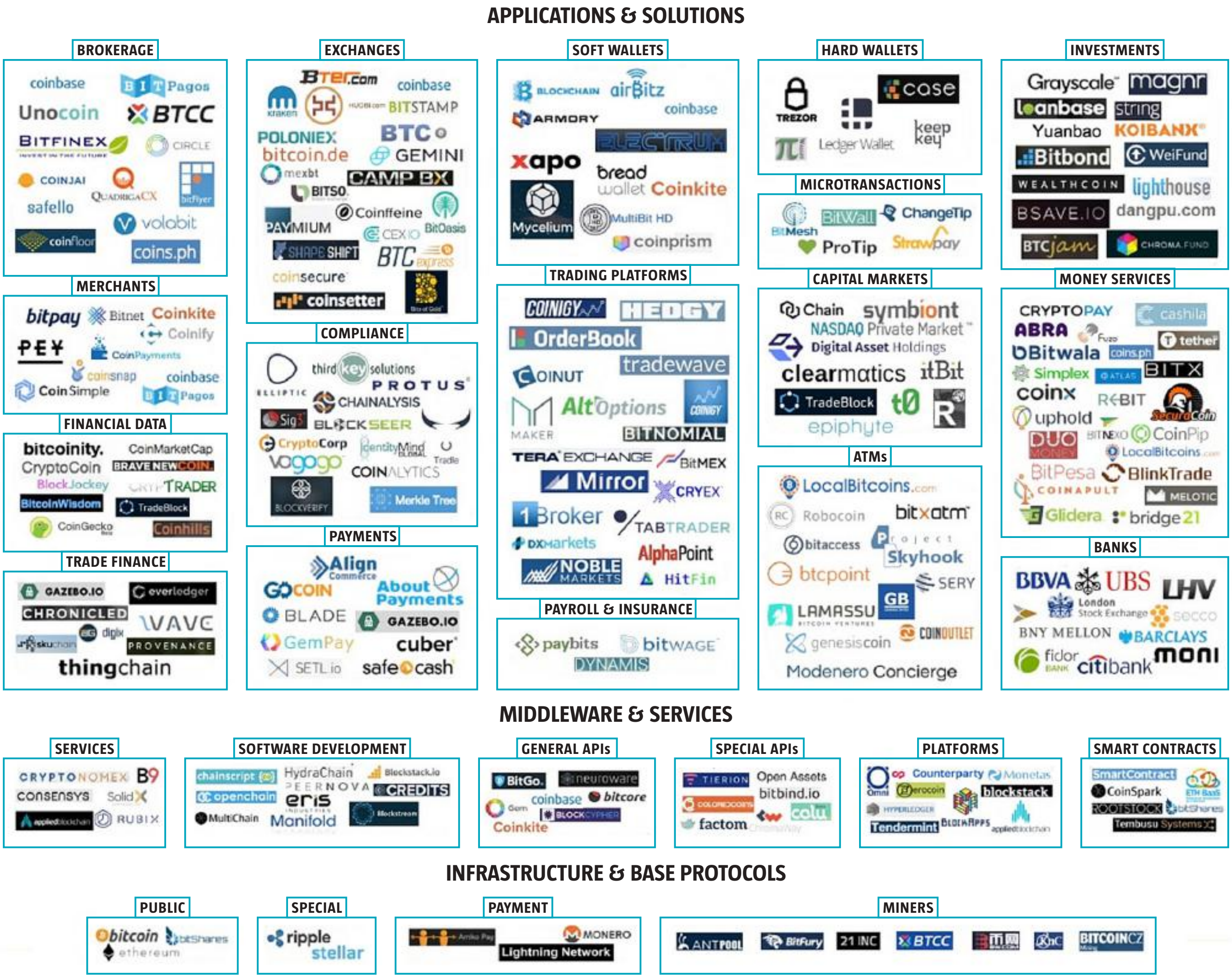
Don't tread on thin ice

All three key criteria – monetization potential, scope and good timing – must be simultaneously met to deem a trend investible. If one ingredient is missing, the identified trend should not be considered investible. To illustrate how rigorously investors should follow this rule, some examples have been included of non-investible trends that were promising in two of the three key criteria.

Big bang, no bucks

If the monetization potential is missing, companies will not be able to build a profitable business. This could be, for example, because the market is too competitive. If companies are unable to generate and secure sustainable competitive advantages, such as a network effect, an installed base, or a strong brand, they will not be able to achieve sufficient economic profit and will not survive in the long run.

Figure 16: Blocktech in financial services



Source: Virtual Capital Ventures. 2015.

This is the case with blockchain. This technology has attracted considerable attention from investors, and has been used in numerous ways that include tokenized assets, decentralized administration and trustworthy digital contracts – to name but a few related to the financial sector. Bitcoin itself has proven to be a successful application of blockchain. And yet, companies able to monetize this technology have remained conspicuously absent, at least up to now.

This is partly because blockchain is a distributed system, meaning there is no central organization that controls it. Potential users therefore do not have an obvious 'tollbooth' that they have to pass through – as they do with centralized payment networks such as Visa or Mastercard. Capturing value through service or transaction fees could therefore prove to be difficult, as blockchain participants can easily circumvent those charging fees.

There is a plethora of companies that are actively using blockchain, but investment opportunities for public investors remain paltry. This would only change if there was a significant increase in the number of companies generating substantial and growing revenues and profits from this type of technology. This could, however, take years or may never happen, which is why blockchain is not an investible trend, despite its growing use.

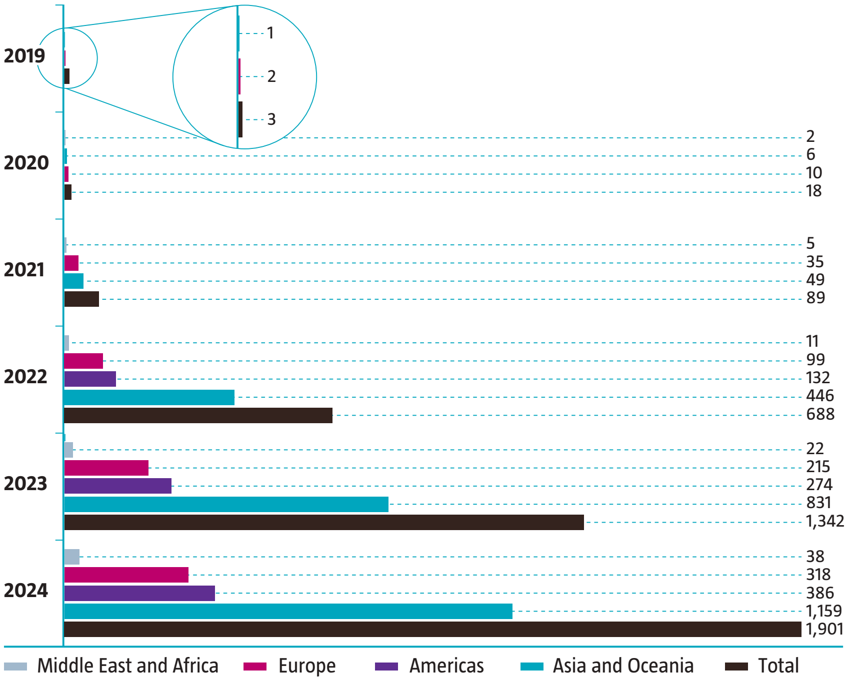
Not taking baby steps

There are two main reasons why a trend's scope may not be broad enough to make it investible. Firstly, growth opportunities emanating from the trend may be too scarce or weak, preventing companies from becoming large businesses. Secondly, the investment universe related to this trend may be too small, in terms of market capitalization or the number of pure-play companies.

For example, the global rollout of 5G cellular networks could, in theory, present an attractive investment opportunity – but in practice, the situation is more complex. The advent of 5G is part of a broader trend towards faster and denser telecommunications infrastructures that has been in place for a long time now. 5G could trigger new consumer behaviors, or amplify existing patterns, and create additional business opportunities such as the internet of things or virtual reality.

However, the number of pure-play companies working on 5G remains limited, many companies derive only a small percentage of revenue from 5G. One way to overcome this is to invest in companies owning digital infrastructure, such as cell towers and data centers. These stand to benefit from increased data transfer volumes and demand for critical infrastructure. Taking this approach enables investors to circumvent the lack of pure-play companies, while still participating in the global upgrade of our telecommunications infrastructure.

Figure 17: Projected global 5G subscriptions (in millions)



Source: Raconteur. Date: 2020.

Counting chickens before they hatch

Ensuring a trend is in the right stage of its life cycle is crucial when trying to avoid investing in a trend that is either not mature enough, or on the verge of decline. RegTech firms provide a good illustration of this. RegTech is short for 'regulatory technology', and may not appear very exciting at first, but can free companies from legacy systems and save costs and time by automating and streamlining regulatory processes.

The rationale behind increased demand for RegTech appears to be strong, given the broad trend towards stricter and more comprehensive regulation. This can be seen in a number of diverse areas such as environmental protection, money laundering or financial stability enforcement. For instance, since the onset of the global financial crisis in 2008, banks have paid more than USD 160 billion in fines for non-compliance with anti-money laundering laws, oversight failures and foreclosure abuses.[4]

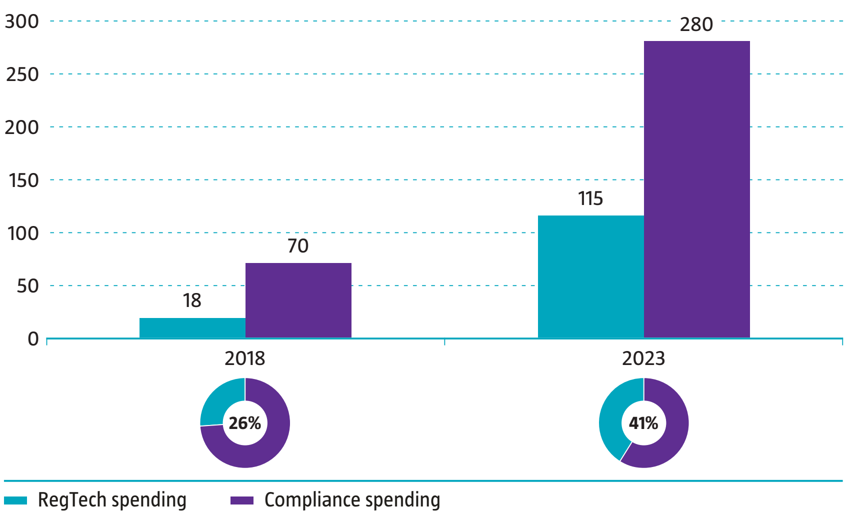
Key areas where RegTech firms can add value are regulatory reporting, identity management and transaction monitoring. Financial institutions are currently hiring numerous teams comprising staff who are specialized in know-your-customer (KYC) and anti-money laundering processes. What's more, 10 -15% of their total workforce is dedicated to governance, risk management and compliance.[5] Costs could be cut and efficiency could be increased with RegTech solutions. Yet, RegTech remains in the early stages of its development despite these promising prospects, and opportunities for investing in listed companies are scarce.[6]

4. Medici: "How banks can effectively manage regulatory changes". Date: 2019

5. BBVA, Digital Economy Outlook. Date: 2016

6. See: Kostic, D. and Van Oerle, J., 2019. "RegTech - tackling the Achilles heel of the financial sector", Robeco white paper.

Figure 18: RegTech vs compliance spending in billion USD



Source: Juniper, Medici, Robeco. Date: 2019.

When monetization, scope and good timing intersect

If a trend satisfies the monetization, scope and good timing conditions, investors may move on to the next stage of the investment process and start looking for the best way to get exposure to this trend. Trends that check all three boxes help companies capture value by allowing them to build profitable business models. They also give investors ample opportunity to allocate capital and revenues and offer bright, long-term market growth prospects.

TECH IS TOP

The transforming technology megatrend is responsible for most investible trends, rather than changing sociodemographics and preserving the earth. The reason for this is twofold. Firstly, non-linear change resulting from technological advances tends to create better alpha opportunities. Secondly, new technology creates economic value, whereas other megatrends result, in most cases, in the migration or redistribution of economic value.

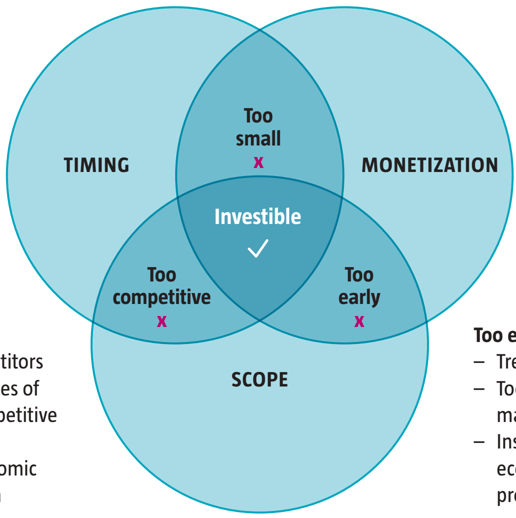
Technological advancements create new profit pools, because efficiency increases. In other words, more can be done with less. For example, e-commerce gives consumers access to a wider range of products and saves them from having to visit physical shops. The preserving the earth megatrend, on the other hand, has triggered the switch from combustion engines to electric vehicles, resulting in a shift of economic value.

Looking for the sweet spot

Digitalization is a good example of an investible trend that has facilitated the emergence of subtrends in areas such as consumer spending or financial services. Consumers increasingly shop online, instead of going to a physical store. They also listen to music through streaming platforms, rather than buying CDs and DVDs. Technological improvements – including faster, more stable internet connections, powerful smartphones and cashless payments – are the reason many businesses have been able to grow from small ventures in garages into massive companies with a global reach.

Figure 19: Investibility of trends and themes

Too small
- Insufficient total market cap
- Insufficient # of companies
- Insufficient growth opportunities



Too competitive
- Too many competitors
- Insufficient sources of sustainable competitive advantage
- Insufficient economic profit generation

Too early
- Trend too immature
- Too many 'question marks'
- Insufficient # of economically profitable companies

Investible trend or theme
- Sufficient size
- Sufficient monetization opportunities
- Sufficient # of economically profitable companies

Source: Robeco

Digitalization is shaking up numerous sectors, including consumer goods and financial services. For instance, companies are increasingly turning to cloud computing services, to avoid using their own servers for processing and storing data. Meanwhile, factories are increasingly relying on robots to improve efficiency and automate manufacturing processes. Profitable investment opportunities are available for investors, provided they pick the structural winners of the digitalization trend.

From tangibles to intangibles

Megatrends are the long-term shifts that shape our socioeconomic environment through time. They are the moving forces behind economic development.

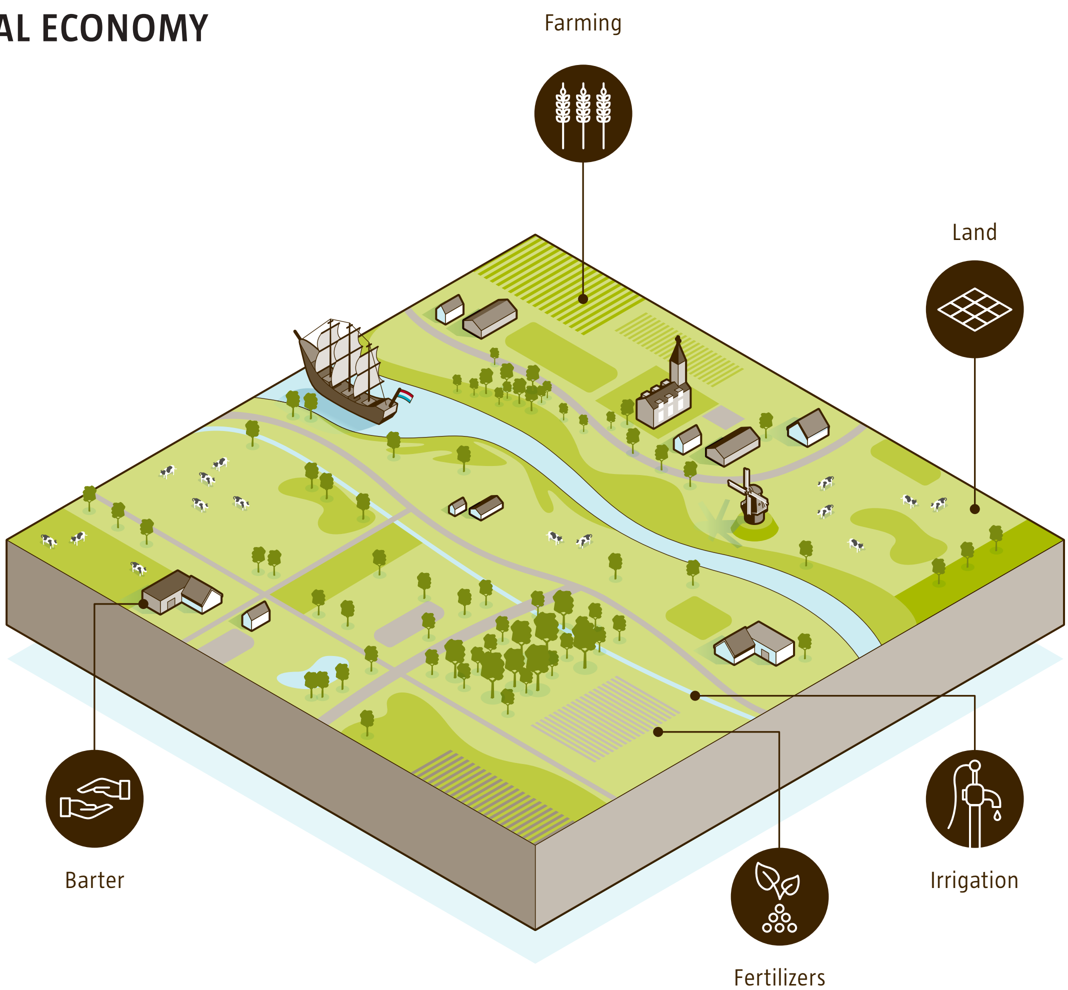
AGRICULTURAL ECONOMY	INDUSTRIAL ECONOMY	POST-INDUSTRIAL ECONOMY	INFORMATION ECONOMY	KNOWLEDGE ECONOMY
1	2	3	4	5

AGRICULTURAL ECONOMY

Dominant asset:
Land

Top company:
Dutch East India Company (VOC)

Richest person:
Jakob Fugger



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AGRICULTURAL ECONOMY	INDUSTRIAL ECONOMY	POST-INDUSTRIAL ECONOMY	INFORMATION ECONOMY	KNOWLEDGE ECONOMY
1	2	3	4	5

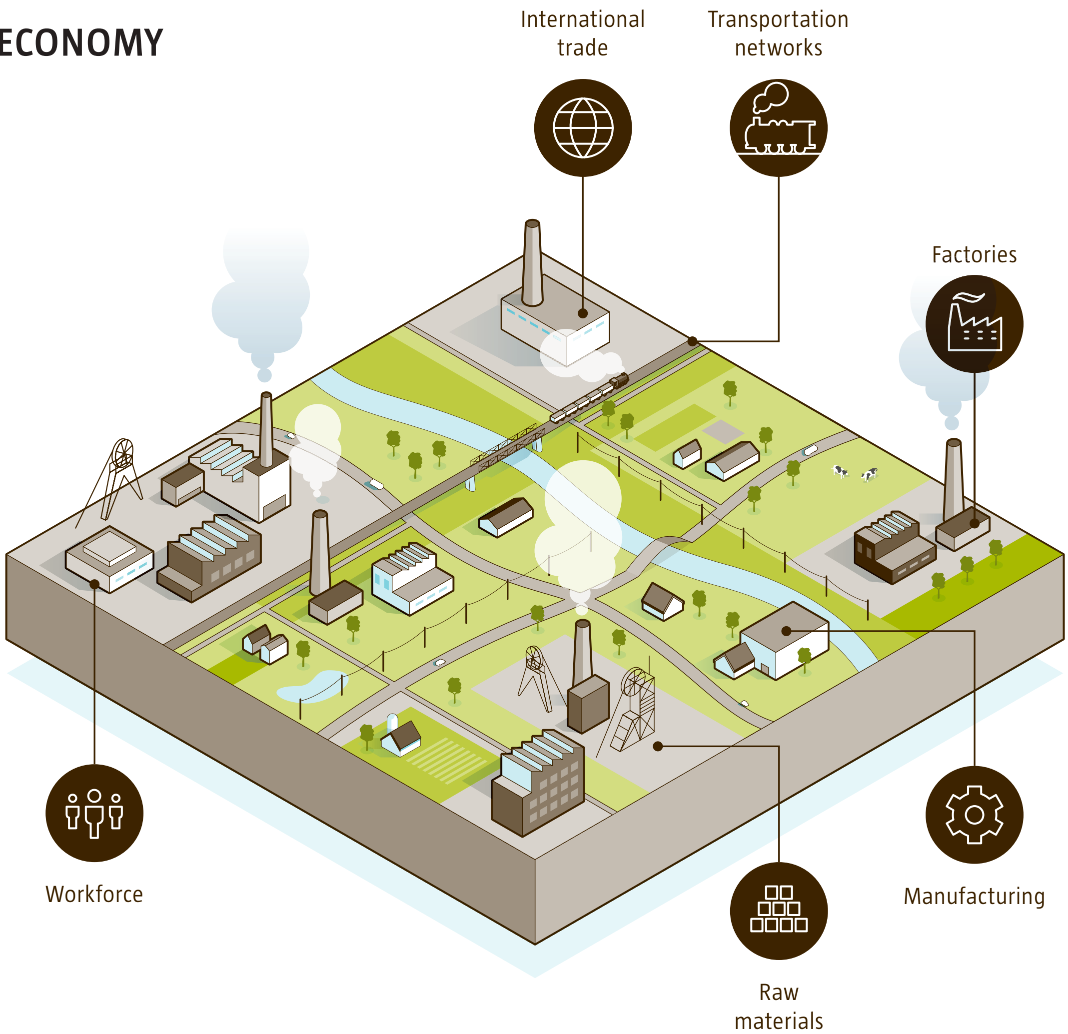
INDUSTRIAL ECONOMY

Main innovation:
Cumbustion engine

Dominant asset:
Capital

Top company:
Standard Oil

Richest person:
John D. Rockefeller (Standard Oil)



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AGRICULTURAL ECONOMY	INDUSTRIAL ECONOMY	POST-INDUSTRIAL ECONOMY	INFORMATION ECONOMY	KNOWLEDGE ECONOMY
1	2	3	4	5

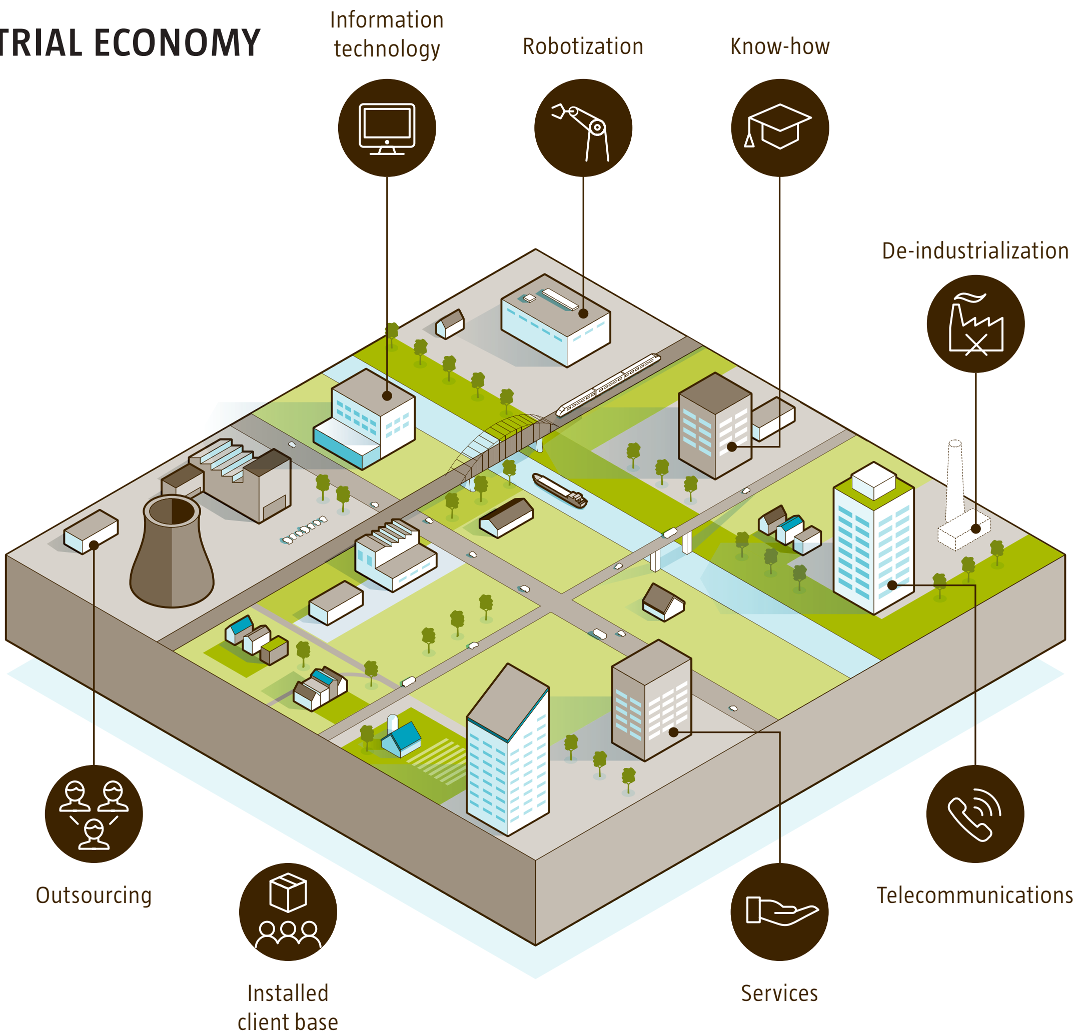
POST-INDUSTRIAL ECONOMY

Main innovation:
Transistors

Dominant asset:
Installed base,
know-how

Top company:
IBM

Richest person:
J. Paul Getty



From tangibles to intangibles

Megatrends are the long-term shifts that shape our socioeconomic environment through time. They are the moving forces behind economic development.

AGRICULTURAL ECONOMY	INDUSTRIAL ECONOMY	POST-INDUSTRIAL ECONOMY	INFORMATION ECONOMY	KNOWLEDGE ECONOMY
1	2	3	4	5

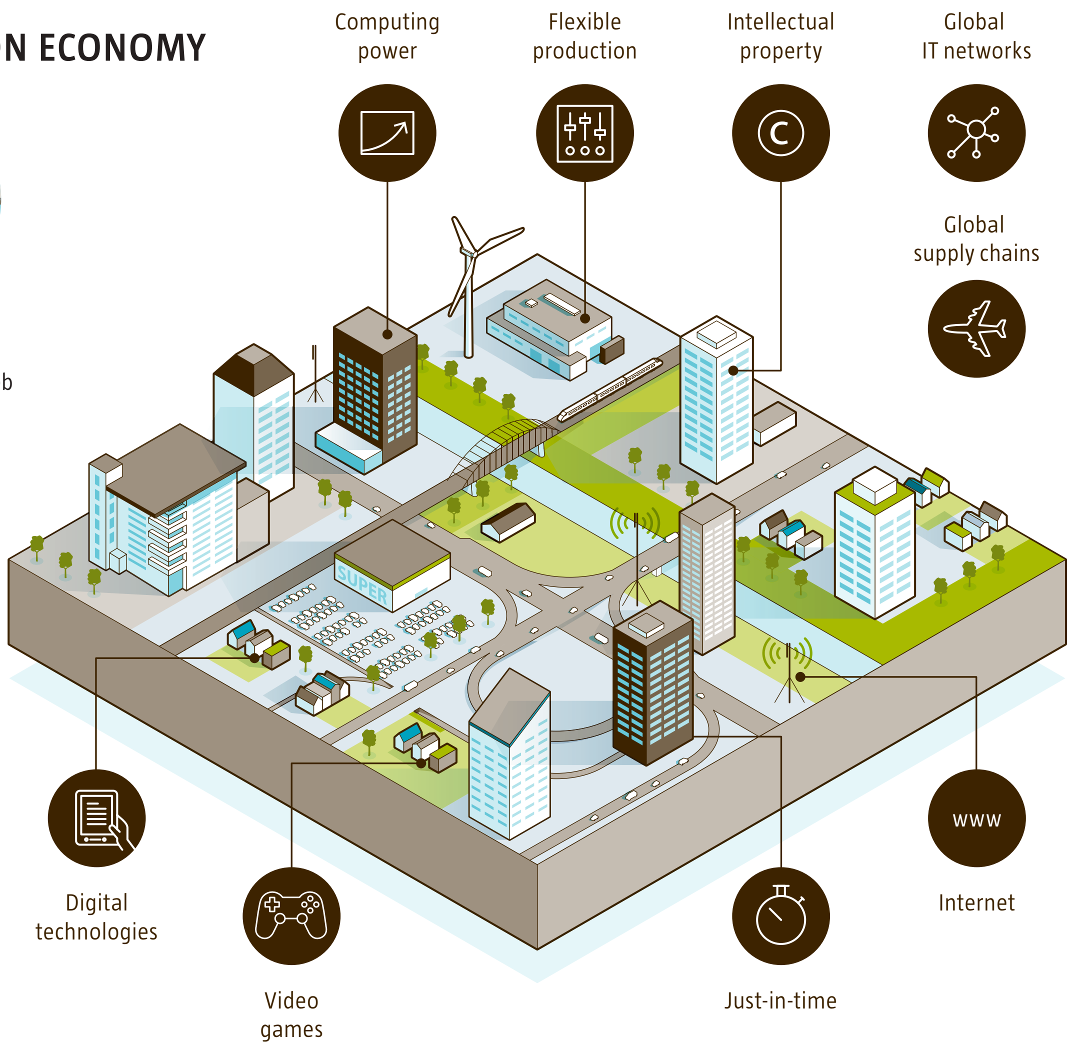
INFORMATION ECONOMY

Main innovation:
Internet/worldwide web

Dominant asset:
Intellectual capital, networks

Top company:
Microsoft

Richest person:
Bill Gates



From tangibles to intangibles

Megatrends are the long-term shifts that shape our socioeconomic environment through time. They are the moving forces behind economic development.

AGRICULTURAL ECONOMY	INDUSTRIAL ECONOMY	POST-INDUSTRIAL ECONOMY	INFORMATION ECONOMY	KNOWLEDGE ECONOMY
1	2	3	4	5

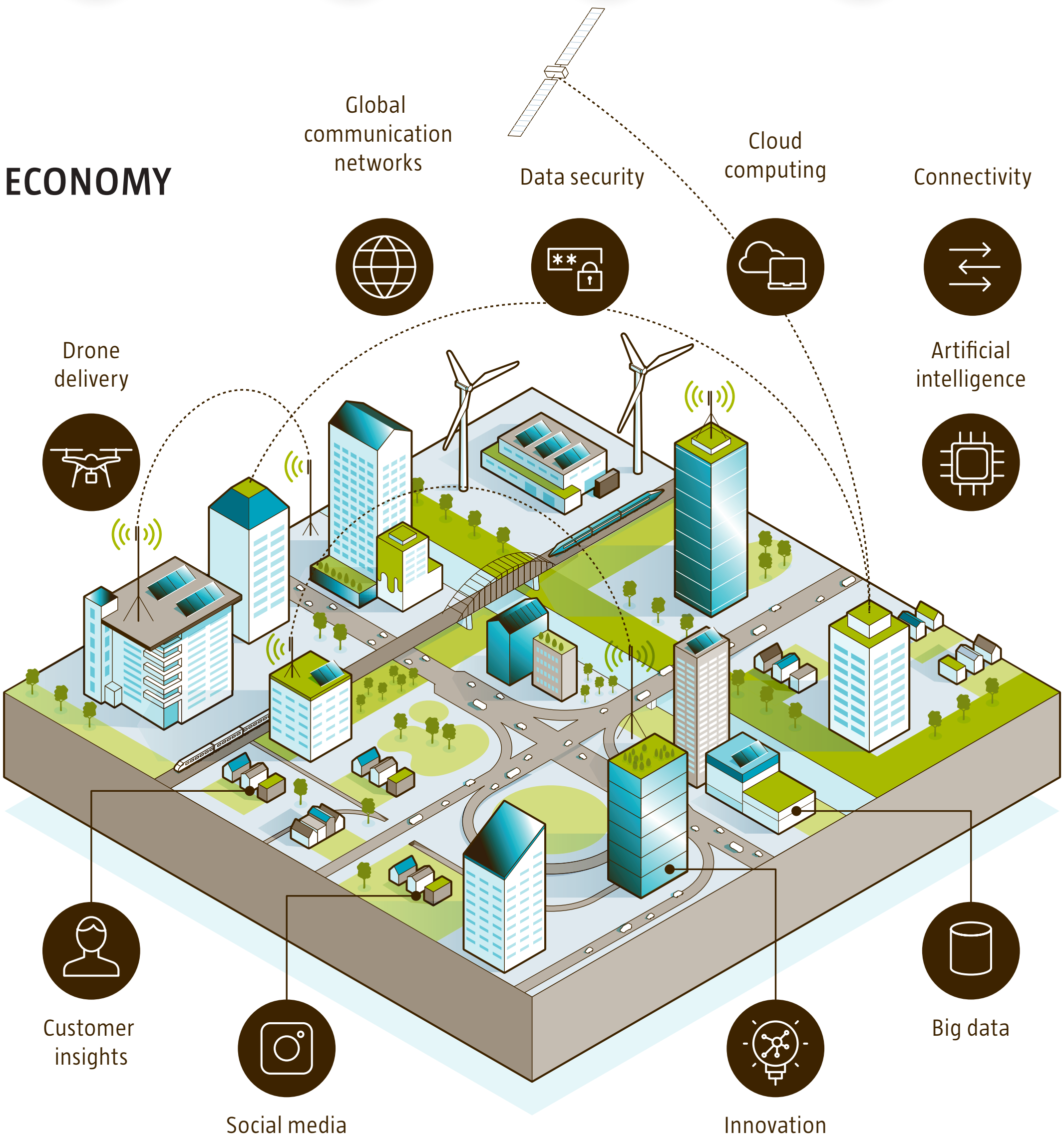
KNOWLEDGE ECONOMY

Main innovation:
AI/machine learning

Dominant asset:
Customer capital, auto-learning algorithms

Top company:
Amazon

Richest person:
Jeff Bezos



4

FROM MEGATREND TO SUSTAINABLE INVESTMENT THEME

Sustainable Investing Expertise by ROBECOSAM

The search for attractive investment themes starts with identifying enduring challenges that create obstacles for sustained growth and prosperity. Megatrends will exacerbate some obstacles, neutralize others, and even spawn new trends – some positive, some negative. Sustainable thematic investing is about navigating the complexity of these trends and their aggregate effects on business and society in order to discover solutions that bring transformative change and pathways of sustainable growth.

FUN QUIZ | QUESTION:

For the world to reach net-zero emissions by 2050, additions of renewable power capacity would need to average around .... the 2019 annual record.

A. Twice
B. Four times
C. Six times

Answer: According to a 2020 report from the International Energy Agency (IEA), to meet the huge increase in demand for electricity, additions of renewable power capacity would need to average around four times the 2019 annual record.

Viewing trends through a sustainability lens

Discovering sustainable themes begins with the conviction that capital in all its forms – financial, natural, human, and social – should be optimized for both present and future generations.[1] The present business ecosystem, however, is not maximizing total capital. Too much capital is squandered by shortsighted companies driven by the pursuit of short-term profits. These companies gobble up and spit out resources at warp speed, indifferent to the negative externalities society suffers as a result.

Still other, seemingly more deserving, companies employ capital to chase problems with trivial value potential. This is especially true when one considers some of the global issues, like carbon emissions, uncontrolled waste, and water insecurity, that cause enormous environmental damage and reduce the economic potential of billions across the globe. As one socio-entrepreneur writes, "there are plenty of products that attempt to leverage the latest technological trends without giving much thought to the importance of the problem being solved."[2]

Sustainability challenges, on the other hand, offer endless opportunities for creating enduring value potential. Low-end estimates put business opportunities that contribute to the SDGs[3] at USD 12 trillion by 2030.[4] And what is now an opportunity will soon grow into an absolute business imperative. According to the UN Principles for Responsible Investing (PRI), achieving the SDGs will be key in driving global economic growth on which corporate earnings are predicated.

Therefore, the first step in selecting a sustainable investment theme involves identifying sustainability challenges that have yet to be addressed by markets in a meaningful way.

1. "Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Our Common Future. The Brundtland Report, 1987. United Nations World Commission on Environment and Development.

2. Marmer, M., April 2020. Transformational Entrepreneurship: Where Technology Meets Societal Impact. Harvard Business Review.

3. For more information on the United Nations Sustainable Development Goals (SDGs), please visit https://www.un.org/sustainable development/sustainable-development-goals/

4. International Finance Corporation (IFC), World Bank, Annual Report 2018, p. 48. Redefining Development Finance.

The value proposition of sustainable challenges

Most sustainability challenges are marked by excess: excess use of resources, excess consumption, and excess inequality. And problems of excess bring excessive consequences, like excessive waste and pollution, excessive depletion of resources, excessive carbon emissions, and excessive healthcare spending, which are felt across environmental, economic, and social spheres.

But the good news is that, though this damage is significant, it is matched by significant value potential.

MAJOR SUSTAINABILITY CHALLENGES

Water scarcity – By 2050, up to 5.7 billion people around the globe will live in areas of water scarcity.[5] Meanwhile, water consumption worldwide is dramatically increasing – according to the UN, 70 liters of water are needed to produce just one apple.[6] The global economic losses from inadequate water supply and sanitation were estimated at USD 260 billion per year.[7]

Global health – Over the last two decades, global health spending in real terms grew by 3.9% p.a., while global GDP grew only 3.0%.[8] The incidence of preventable chronic diseases like obesity, diabetes, stroke, and cardiovascular diseases is also rising rapidly. In the US, the cost of direct healthcare treatment for chronic health conditions totaled USD 1.1 trillion; equivalent to nearly 6% of the nation's GDP.[9]

Climate change and CO_2 emissions – Increased energy demand and carbon intensity will push energy-related carbon emissions to 45 Gigatons of CO_2 equivalents p.a. by 2050.[10] This figure should be 'net zero' to avert a climate emergency. Climate change could cost the world nearly USD 8 trillion by 2050, or 3% of global GDP.[11]

Resource destruction/depletion – Global growth means more consumption and more trash. By 2050, there will be more plastic than fish (by weight) in the ocean,[12] and plastics can take up to 500 years to decompose.[13] The rate of global waste production will be nearly twice that of population growth by 2050.[14] The value potential of a circular economy where waste is reduced, recycled, or integrated into other products is estimated at USD 4.5 trillion.[15]

The tolls of transportation – Transport is responsible for nearly 30% of the EU's total CO_2 emissions.[16] In addition, traffic transport significantly contributes to toxic airborne particulate that damages respiratory health. In the US, traffic congestion costs drivers USD 88 billion in lost revenues annually.[17] Outdoor air pollution will cause an estimated 6-9 million premature deaths at a cost of USD 2.6 trillion per year by 2060.[18]

5. United Nations Water Facts, unwater.org
6. World Economic Forum, United Nations Food and Agricultural Organization, 2019.
7. Global Water Partnership / OECD, Report of Task Force on Water Security and Sustainable Growth, 2015.
8. WHO, Global Spending on Health: A World in Transition, 2019.
9. Milken Institute, 2016.
10. OECD, Environmental Outlook to 2050.
11. Economist Intelligence Unit, 2019.
12. "The New Plastics Economy, Rethinking the Future of Plastics", World Economic Forum, Ellen MacArthur Foundation, McKinsey & Co., 2016.
13. Whiting, K. (2018, November). "This is how long everyday plastic items last in the ocean". World Economic Forum and the National Oceanic and Atmospheric Administration.
14. "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050". The World Bank (2018).
15. "Waste to Wealth: Creating Advantage in a Circular Economy," Accenture (2015).
16. European Parliament (2019, April). www.europarl.europa.eu/news/en/headlines/society. See "CO2 Emissions from Cars: Facts and Figures."
17. Inrix, 2019 Global Traffic Scorecard. www.inrix.com/press-releases/2019-traffic-scorecard-us/
18. The Economic Consequences of Outdoor Air Pollution. OECD (2016, June).

A framework for assessing sustainable challenges and solutions

Preserving the earth, using resources more efficiently, eliminating inequalities, and improving health are obvious and noble goals. But, how can lofty goals translate into actionable investment ideas? A framework is needed to gain a deeper understanding into the nature of sustainability challenges and how they interact with other secular trends playing out more broadly in society and the global economy.

Understanding how sustainability challenges interact with secular trends

Sustainable thematic investing should avoid focusing solely on unsustainable status quos or on negative developments. This can cause investors to lose sight of positive sustainability trends. Although many sustainability challenges, like scarce resources and environmental damage, are reflective of a suboptimal status quo that leaves society with a net negative balance, some trends are clearly good, leading to better outcomes across social and economic spheres of life.

Many positive trends have, in fact, emerged in response to earlier, unsustainable trends. For example, even as the prevalence of obesity, diabetes, and chronic disease is rising worldwide, younger generations are spawning countertrends in disease prevention. Millennials and Gen Zs, who see balance and well-being as central to their cultural identity, are taking health and wellness seriously and taking charge early in life.

Meanwhile, technological trends are merging with social, fitness and nutrition trends to create a healthy lifestyle bundle that promotes health, reduces disease, and decreases healthcare costs for both the individual and society. Similarly, trends in electrification are catching on across multiple sectors including utilities, transportation, and buildings and construction which, in turn, are converging to change the world's energy mix over the long term. As more sectors embrace electrification to power processes, there will be less demand for fossil fuels.

Prioritizing disruptive technologies and transformative solutions

Many unsustainable trends are stuck in a state of inertia. They are moving in the same direction, at a constant speed, and highly resistant to change from external forces. Throughout history, innovation has provided the monumental force needed to disrupt this inertia within societies and industries.

For example, telemedicine and better diagnostic technologies have the potential to radically shift healthcare from later-stage treatment in hospitals to early-stage prevention in private homes. Likewise, decentralizing energy grids to micro-energy-producing households, will reduce the natural monopoly of utilities. Electric motors and battery storage are replacing internal combustion in vehicles and transportation, reducing our reliance on fossil fuels.

Technology is critical, not only for industry disruption and transformation but, more importantly, for sustainable disruption and transformation. Innovative technologies improve the efficiency and scalability of sustainable solutions. The value of any technology is directly proportional to its reach. The more broadly a technology can be applied to solve problems and create cost and resource efficiencies, the greater its value for business and society. Technologies that can be applied to multiple sectors and industries, carry the most value potential and provide the most robust opportunities for growth and investment.

The term 'disruptive change' immediately conjures images of cutting-edge concepts such as 'digitalization', and 'network platforms'. But technology is an enabler in less exciting industries as well. Improvements in water testing and analytics is enabling growth across sectors as diverse as industrial utilities and biopharmaceuticals. Attractive, sustainable themes will capture these technologies that drive sustainable growth across multiple industries and create sustainable returns.

Reviewing government action and regulation

Effective policies are often needed to support and encourage the development and adoption of new technologies in the market. Regulation therefore plays a crucial role in driving the direction and speed of trends. Regulatory measures are often paired with other policies that increase the value proposition of end-market products and technologies.

For example, in many countries, governments eager to reduce waste have introduced bans on single-use plastics and set quotas for recycled content in bottles, bags and packaging. Meanwhile, regulations on CO_2 emissions combined with vehicle subsidies, have stimulated R&D in electric motors and battery technologies, helping propel the electric vehicle market forward.

Initiatives and directives from non-governmental and intergovernmental organizations, such as the UN, have also been significant in setting the tone and priorities that shape global standards, especially with respect to issues where markets have failed to respond adequately. Such initiatives target a wide range of sustainability challenges, including human rights and labor practices, fair trade, equitable and inclusive economic development, and environmental protection.

Assessing the maturity and scalability of sustainable solutions

Not all trends will have the same value proposition, nor will they unfold at the same speed. Some can mature quickly and radically alter an industry in the span of a few years, while others might need decades to ripen. Thorough research and careful timing are critical to trend selection and theme development.

Recognizing a trend's points of inflection is a useful indicator when trying to identify the best possible moments for investments. Signals of inflection points are often characterized by the emergence of new market players offering better products, more decentralized business models, or lower costs.

Another indicator that a market is ripe for growth is when incumbent players are investing heavily in R&D for new products and technologies, launching new products, or forming alliances for new ventures with other firms.

Moreover, public awareness can also be a significant factor that can dramatically change the course of trend development. For example, solar cells have been a viable technology for decades, but their use as a commercial alternative to petroleum only gained powerful momentum when consumers became sensitized to climate change, and public opinion on fossil fuels soured.

FUN QUIZ | WHO SAID:

'Global warming pollution, indeed all pollution, is now described by economists as an "externality." This absurd label means, in essence: we don't need to keep track of this stuff so let's pretend it doesn't exist.'

A. Mark Carney
B. Al Gore
C. Ursula von der Leyen

Answer: Al Gore, Address at New York University Law School , 18 September 2006.

Understanding emerging market dynamics

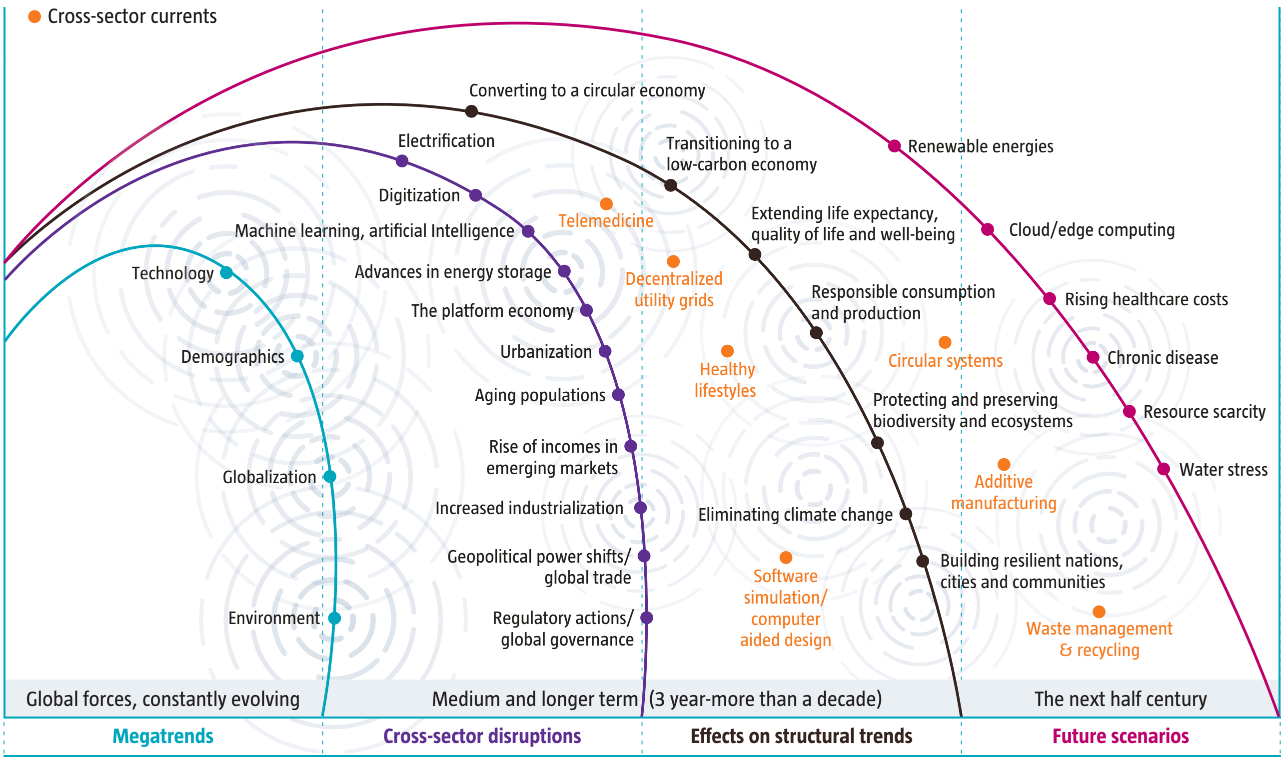
Given their growing populations and a rapidly expanding middle class, emerging markets have become a key barometer for gauging how market trends will merge with sustainability challenges and solutions. Trends forming in developed markets are likely to accelerate in emerging economies, while sustainability challenges are likely to exacerbate. Yet, because these economies are less developed, growth patterns will follow a different trajectory than in developed markets.

In business, the playing field is usually more leveled – incumbents are fewer, barriers to entry are lower, and interests are less entrenched. This gives new technologies and new business models the opportunity to flourish and grow. Moreover, emerging economies can effectively start afresh, building new and better-designed infrastructure, and designing news laws and mandates with resource efficiency and sustainability in mind.

China's role in the EV market is illustrative. Rapid growth and urbanization have intensified many sustainability challenges, such as air pollution, carbon emissions, and traffic congestion. EVs have been a cost-effective solution to address all three. Government subsidies (coupled with a less-developed automotive market) have allowed the EV market in China to flourish. They are now the default option for many first-time car owners in China's middle class. Moreover, municipal mandates for EVs in public transportation have helped lower urban smog and control traffic congestion.[19]

19. Sheng, W. "China's Manufacturers and market take the lead to embrace green vehicles." (2019, July). Global Times (China).

Figure 20: The seismic nature of trends – trends move in waves that impact business and society



Source: RobecoSAM, EY (2020)

Assessing how trend dynamics affect sector fundamentals

Preserving the earth, sociodemographic shifts, and transformative technologies have created a triumvirate of megatrends that will inevitably impact most areas of business and society. However, their reach will vary from one sector to another. For this reason, rigorous analysis is needed to assess the impact on specific industries and the attractive growth opportunities created in response.

Smart materials: transforming industrial manufacturing

Growing sociodemographic challenges such as population growth, urbanization, and increasing consumption mean finite resources are being extracted at an alarming rate. For a sustainable future, the resource regeneration ratio should be 1:1, meaning the earth is able to 'recover' and reproduce 100% of what is consumed.

Current resource consumption rates, however, are nearly twice (or 1.75x) as much as the planet's annual regenerative capacity.[20] Without intervention, the economic prosperity of future generations is being jeopardized.

20. Global Footprint Network's National Footprint Accounts, The Circle Economy. (2019)

Trends in resource extraction and use have the largest ramifications for resource-intensive sectors along the industrial processing and manufacturing value chains. These include material sectors like petrochemicals and metals that provide production inputs. They also include the industrial manufacturing sectors that refine and process inputs to create outputs, which are used by industries to power modern cities and economies.

Resource constraints have spurred human ingenuity in creating an arsenal of innovative solutions to reduce the consumption of resources and improve resource processing in industrial manufacturing. Nanoengineering is being used to produce more from less,

Table 2: Small, fast and soft meets large, hard and heavy – the benefits of digitization across industrial manufacturing

High ● Medium ● Low ●

	Asset performance enhancement through data analytics					
	Throughput	Resource efficiency	Asset reliability	Digital workforce	Asset network value maximization	Robotics and cobotics
Chemicals	High	Medium	Low	Low	Medium	Low
Petrochemicals	High	Medium	Low	Low	Medium	Low
Refining	High	Medium	Medium	Low	Low	Low
Pulp and paper	Medium	Low	Medium	Low	Low	Low
Steel	High	Medium	Low	High	Medium	Medium

Source: McKinsey & Co. (September 2018)

creating materials with enhanced properties (e.g. strength, lightweight, flexibility) while using fewer resources. For instance, lightweight carbon fibers are being used to replace steel in vehicles and heavy machinery. They may be light, but the strongest carbon fibers are ten times stronger than steel and are less energy-intensive to produce.

Innovation and ingenuity are also leading to transformational change in manufacturing techniques. Leading companies in the mining, chemicals, steel, and pulp & paper industries are applying new data sources and new digital technologies to boost throughput, efficiency, reliability, and productivity. With the help of computer-aided design (CAD) software, additive manufacturing techniques like 3D printing and 'digital twins' are being used to optimize products well before they hit the assembly line – saving time, money, and resources in the process.

Water: the source of health and wealth

Water scarcity is a critical sustainability challenge that has been exacerbated by population growth, urbanization, and industrialization. Global water demand already exceeds supply. There are currently two billion people living in areas of acute water stress.[21] As populations grow, more food must be produced including water-intensive varieties like beef, chicken, and pork, as Western dietary standards are adopted worldwide. The daily food intake of one person can use up to 5,000 liters of water.[22]

In parallel, there is an upsurge in people moving from rural to urban centers, increasing demands on utilities that support life and industry. By 2030, 60% of the world's population will be in megacities, that are, by current standards, ill-equipped to cope.[23] Aging infrastructures and stressed-out capacity are limiting the provision of safe drinking water, effective sanitation services, and efficient waste management systems.

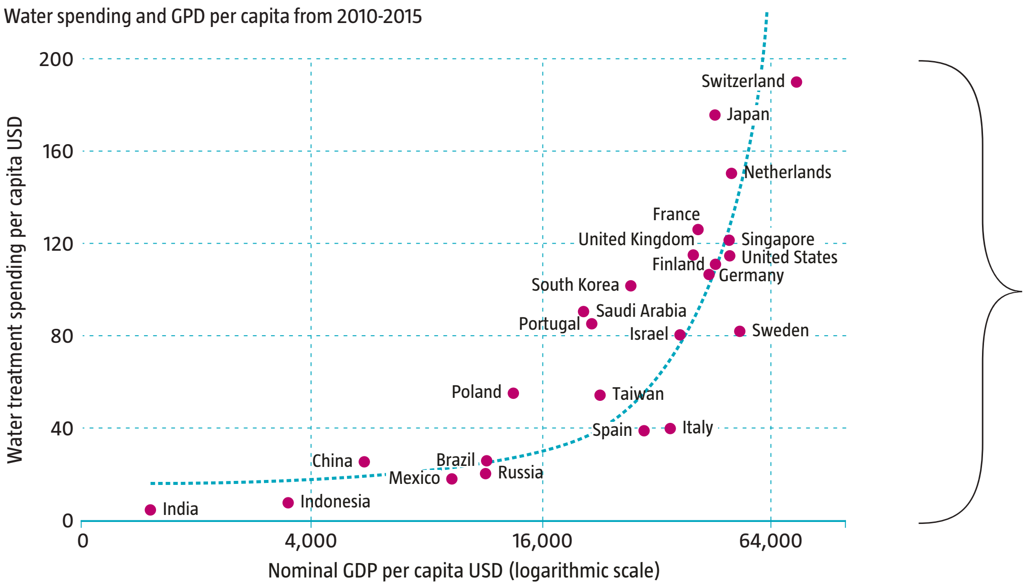
21. United Nations Water Facts, unwater.org

22. United Nation Water Facts, unwater.org, see "water, food, and energy," https://www.unwater.org/water-facts/water-food-and-energy/

23. The World's Cities in 2018 Data Booklet, United Nations (2018).

Figure 21: Investing flows into water infrastructure – water demand in emerging market economies is increasing with industrialization

Water spending and GPD per capita from 2010-2015



Opportunities
- Advanced water treatment
- Smart water solutions (leak detection, sensors, analytics)

Source: The World Bank (the Global Water Market, 2018), RobecoSAM

Infrastructure improvements are needed not only to support health and sanitation but also to support manufacturing and industrial processing. Industry is the second largest consumer of water in both developed and emerging economies. In light of this, countries in emerging markets on every continent have embarked on massive infrastructure programs. Sustainability experts believe water resources will be a critical part of China's upcoming 14th Five-Year Plan (2021-2025).[24]

24. Neuweg, I. and Stern, N., May 2019. "China's 14th Plan, sustainable development and the new era". Centre for Climate Change Economics and Policy.

In developed markets, changes are also under way. Local municipalities are imposing stricter regulations on water quality. At the same time, however, water demand from healthcare and biopharmaceutical sectors is increasing. Both trends provide supportive end markets for sophisticated water analytics that guarantee quality and purity. Broad demographic trends like globalization and urbanization are also converging with more focused cross-sector trends, to create robust growth themes related to efficient water use, water quality, water distribution, and wastewater treatment.

This, in turn, creates investment opportunities across a wide range of activities, including irrigation systems and treatment chemicals within agriculture, as well as the provision of safe drinking water and waste management services for public utilities and private industries. In addition, the growth of water-intensive industries, like pharmaceuticals, biotech and healthcare, are providing high-value growth channels in the areas of high-precision water testing and analytics.

Trend bundling to derive robust investment themes

Understanding the dynamics between long-term trends facilitates the recognition and bundling of trends with a common root cause and/or that can benefit from a shared solution.

Seizing threads and weaving bundles

Powerful investment themes are like steel threads in a robust cable: they are formed by bundling robust, individual – but related – trends that are mutually reinforcing. Separate but related trends are usually correlated and complementary – the evolution of one impacts the evolution of the other, and their trajectories tend to move in parallel or in tandem.

Both sustainable and unsustainable trends exhibit complementary characteristics. A negative trend is often exacerbated by other negative trends, while positive trends tend to reinforce and amplify one another. Recognizing complementary and correlated trends playing out across sectors, regions, and demographics provides insights into the root causes of a challenge, as well as its scope and magnitude, its potential evolution, and the appropriate solutions that apply.

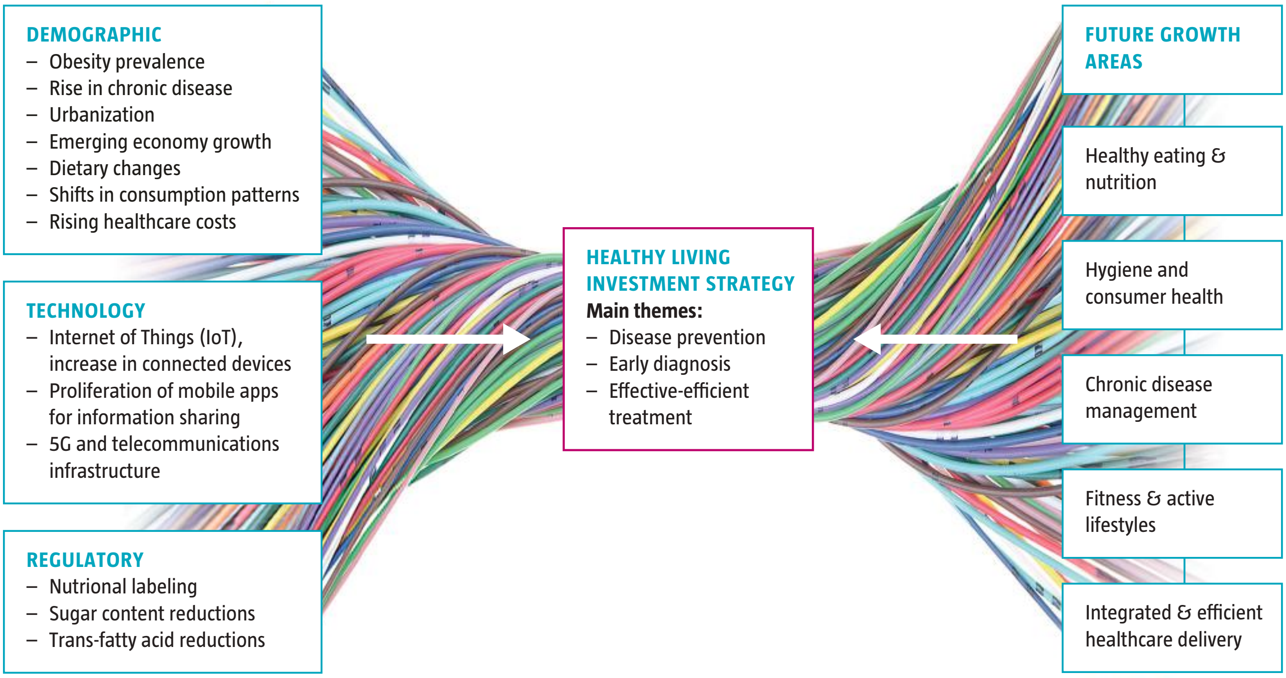
Recognizing and linking related demographic trends

One example of a sociodemographic variable that is trending unsustainably is obesity. Moreover, obesity is closely linked to chronic diseases such as diabetes and cardiovascular disease, which are increasing worldwide in both developed and emerging markets. Obesity does not just reduce life expectancy, life quality, and economic productivity – it also contributes to higher healthcare costs.

Rising obesity is in turn influenced by complementary sociodemographic trends, like urbanization. Economic development has contributed to a dramatic expansion of the service sector, leading to a proliferation of sedentary 'desk' jobs. Urbanization has also led to a greater emphasis on convenience across all aspects of life, from work, entertainment and transportation, to food preparation and consumption.

At the same time, however, countertrends are emerging in other segments of society. Millennials and Gen Zs favor healthier lifestyles, that include fitness, nutrition, mental well-being, and work-life balance. Understanding that these trends are highly correlated means they can be bundled together to facilitate the search for solutions that address sustainability challenges.

Figure 22: Bundling trends to create robust investment themes and growth opportunities



Source:RobecoSAM

Recognizing sustainable solutions for multiple challenges

Any sustainable solution that seeks to address the causes and extreme costs of obesity (and many other chronic diseases) will need to include prevention, early diagnostics, and intervention. Effective strategies must include physical activity and improved nutrition, the hallmarks of healthy lifestyles. Companies that provide products and services that support healthy living will find strong demand across a large and diversified consumer base.

Recognizing supporting technologies that build scale and increase value

Technology is also included in trend bundles, as it often plays a key role in promoting trends and ensuring that effective solutions are adopted. Digitalization and the IoT have also entered lifestyle and health markets. Mobile phones and apps provide tools for healthy users to stay fit, eat right, and stay motivated. Combined with sensors and connected devices, they also provide cost-effective tools to monitor and share health data in lieu of more expensive hospital visits.

Technology trends like these can be bundled with other sociodemographic trends to further strengthen prevention and healthy-living investment themes. More than half of the global population resides in emerging countries where healthcare infrastructure is inadequate for managing chronic diseases or maintaining preventative lifestyles. Yet, while fixed health infrastructure is lacking, telecommunications infrastructure in these countries is rapidly expanding, making it possible for people to access the same tech-based health solutions that are available within developed markets.

Continuous trend review

In a rapidly changing world, the relevance of specific themes can increase or decline over time, leading to the emergence of new investment opportunities and the disappearance of others.

For example, the smart energy theme is increasingly less focused on energy generation and more on how to efficiently manage energy flows throughout economic sectors. The shift is the result of cross-sector secular trends like the electrification of the automotive industry, and more broadly, the transportation sector. Furthermore, both electrification and digitalization trends are changing energy demand and consumption patterns within infrastructure and the built environment.

Changes are enabling the decentralization of utilities but will also have more sweeping effects. As big data and cloud computing rise, electricity demand and heat generation will soar. Thermal management of building systems, datacenters, and even the semiconductor technologies that enable rapid computer processing, will need to keep up in order to meet increased demand while remaining energy efficient.

These shifts are changing the dominant players in the energy value chain and are creating new challenges and new areas of growth and investment. Trend streams and cross-currents are constantly changing, so trend analysis and theme development should not be a one-off process. It should be part of an ongoing journey of continuous monitoring and evaluation to identify areas of secular growth and to ensure thematic investment strategies are well positioned to benefit.

Complementary trends – SDGs and sustainable investment themes

The UN Sustainable Development Goals (SDGs) are a comprehensive set of 17 global challenges that must be addressed to help ensure a universally safe, healthy, and prosperous future. The goals span a broad range of issues relevant to both developing and developed populations, including improving health and education, combating climate change and environmental pollution, enhancing diversity, reducing inequalities and building resilient cities, communities, infrastructures, and institutions.

The SDGs and sustainable thematic funds both share a common vision and commitment to overcoming challenges that reduce the potential of capital and lead to suboptimal outcomes. In this way, they can be characterized as complementary and mutually reinforcing trends – investment in one contributes to the success of the other. Sustainable thematic funds support the SDGs by allocating capital to firms that are actively working to create solutions for sustainability challenges and that are directly contributing to achieving SDG targets.

Figure 23: The 17 UN SDGs

Source: United Nations

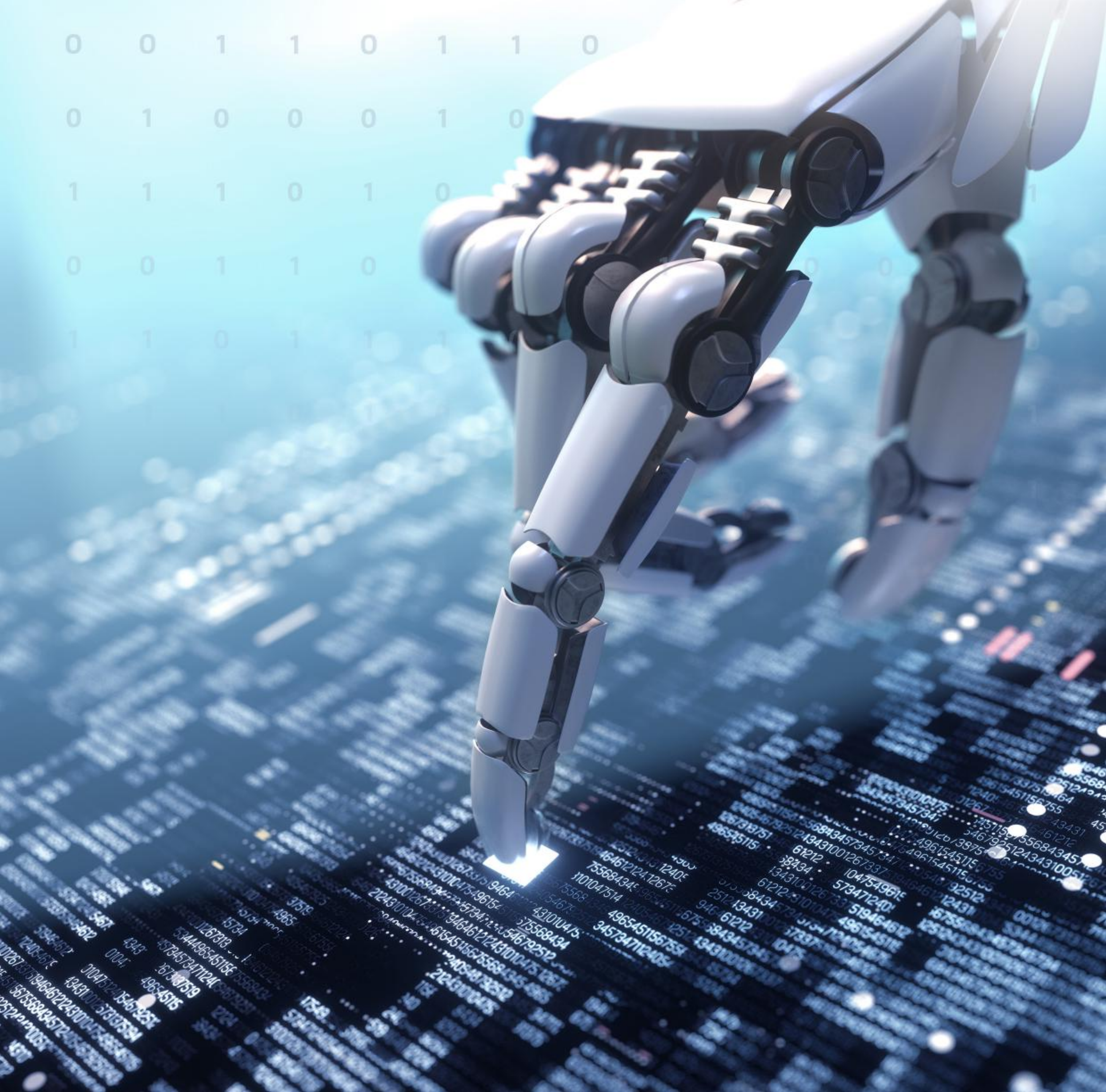
Sustainability challenges are too big, too complex, and too expensive for the public sector alone. Effective action and solutions need the innovation, know-how and financing of companies in the private sector. But private sector intervention shouldn't be construed as charitable giving. The SDGs represent a multi-trillion dollar opportunity for committed and enterprising firms looking to develop innovative solutions and effective business models to distribute sustainable products and services.

With so much value at stake, it is no surprise to discover corporate interest in SDGs is intensifying. Since their launch in 2015, more than 15,000 organizations, including 9,500 companies representing every economic sector and geographic region, have committed to supporting and achieving the SDGs.

Sustainable investment portfolios benefit directly from greater awareness and support from companies, regulators, governments, consumers, and other stakeholders. The strong waves created by the SDG mindset taking hold in public and private sectors will make investment themes that have a head start in addressing sustainability challenges even more effective.

5

IDENTIFYING STRUCTURAL WINNERS



Fundamental analysis, aided by state-of-the-art screening tools, such as relative valuation, momentum, or earnings revisions, remains the main workhorse for stock selection. It is beyond the scope of this publication, however, to delve into the art of fundamental analysis. Many textbooks do a much better job than we ever could. Instead, we highlight a few models that are not part of the standard toolkit, but can nevertheless shed light on this matter; especially in the context of a trends or thematic approach.

FUN QUIZ | QUESTION:

Apart from Tesla, which other US carmaker never went bankrupt?

A. Chrysler
B. Ford
C. GM

Answer: According to Elon Musk, Tesla's CEO, Ford and Tesla are the only two US carmakers that never went bankrupt. Since both Chrysler and GM already went bankrupt, this is at least true with regards to independent listed carmakers.

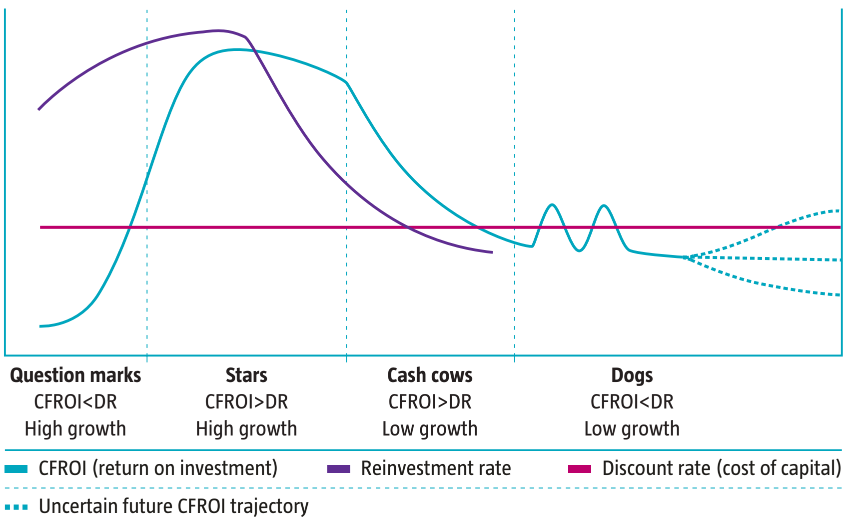
The company life cycle

One model that we find very useful when thinking about change and how it affects companies and industries over time, is the company life-cycle model.[1] Figure 24 categorizes businesses into four groups, reflecting the life stages all people, businesses and industries go through – namely birth, growth, maturity, and decline. These groups emerge on the basis of answers to the following two questions:

– Is the business's cash flow return on investment (CFROI) higher or lower than its cost of capital (real discount rate or DR)?
– Is the business investing heavily or moderately in future growth?

1. This concept was developed by Bartley Madden in "The CFROI Life Cycle". Bartley J. Madden. *The Journal of Investing*, Summer 1996, 5 (2) 10-20

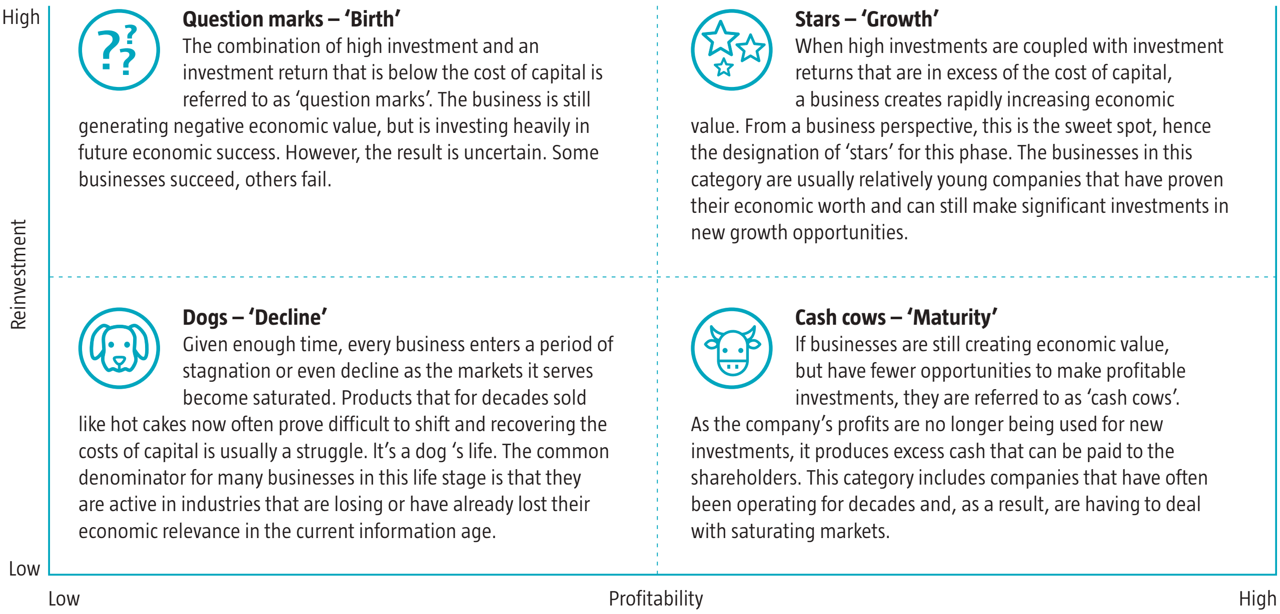
Figure 24: Stylized company life cycle



Source: Credit Suisse HOLT

The combination of different answers yields four categories: question marks, stars, cash cows and dogs. These categories correspond to those highlighted in the BCG growth-share matrix, developed by the Boston Consulting Group in the 1970s. The matrix plots a company's products and services in a four-square matrix. The y-axis represents the rate of market growth and the x-axis represents market share. To adjust the matrix to the company life-cycle model, we need to substitute reinvestment for market growth on the y-axis and profitability for market share on the x-axis, as shown in Figure 25.

Figure 25: BCG matrix amended to reflect the company life-cycle model



Source: Robeco Trends Investing

A stylized framework – not a fixed trajectory that every company passes through

The BCG matrix is, of course, a stylized representation of the business life cycle. Not all businesses go through each stage and not necessarily in that sequence. Relatively few companies will follow the exact trajectory projected by the life-cycle framework. The competitive landscape is often too tough and too dynamic for that. Nevertheless, distilling a complex reality into a simple matrix can help with investment decisions.

Sooner or later, businesses that create economic value are rewarded, while those that destroy economic value suffer the consequences. From an investor's perspective, question marks and dogs are, in theory, the riskiest categories. Stars and cash cows tend to be a safer bet. Table 3 describes some common stock characteristics of question marks, stars, cash cows and dogs (QSCD), depending on a company's life-cycle stage.

Table 3: Common stock characteristics of QSCD

	Question marks	Stars	Cash cows	Dogs
Strategic situation	Prove economic viability – invest to establish market foothold and build competitive advantage(s)	Develop market – invest to maximize growth opportunity and future economic profit generation	Harvesting mode – invest to maintain or extend competitive advantage(s) and maximize free cash flow	Struggling to survive – strategic initiatives needed to escape an eventual but inevitable collapse of the business
Returns spread	Negative – improving	Positive – rising	Positive – declining	Flat – negative
Reinvestment rate	Rising	Peaking	Declining	Maintenance at best
Free cash flow	Negative	Negative/low	Positive/high	Erratic
Valuation	Largely reflects expected future value creation – high multiples of existing P&L line items	Value of assets-in-place < future value creation – multiples generally higher than market average	Value of assets-in-place > future value creation – multiples generally around market average	Largely reflects value of assets-in-place – multiples generally below market average

Source: Robeco Trends Investing

How does the company life cycle tie in with a trends and thematic investing approach?

The question marks and stars categories represent the most fertile hunting grounds for early stage exposure to high-growth, monetizable trends and themes. Question marks might have a few potential future winners, but the odds of finding these are rather slim.[2] This is also the category that contains most of the hypes and bubbles, making it a high-risk investment category. It is therefore preferable that only a relatively small part of a trends or thematic portfolio be allocated to this category.

Stars consist primarily of proven winners that still have ample opportunity to invest in profitable projects, thus compounding profits at the highest rate. They therefore typically account for a large part of a trends or thematic portfolio. The risk in this category is usually that investors' expectations can easily overshoot, leading to sudden price corrections when high expectations are not met.

Cash cows generally do not meet the high growth criteria, but are the least risky category. It often makes sense from a risk management perspective to allocate a sizeable portion of a trends or thematic portfolio to this category, provided there is sufficient exposure to the identified trend or theme.

Dogs can sometimes reinvent themselves and become stars, but this is rare.[3] While dogs can represent short-term, tactical investment opportunities, this category should be structurally avoided.

Practical use cases for the QSCD framework

The bottom-up classification of individual companies, as either question marks, stars, cash cows or dogs, provides an essential reality check and feedback mechanism for the top-down identification of trends or themes. It answers questions regarding:

2. Holland, D. A. and Matthews, B. A., 2017. "Beyond Earnings: Applying the HOLT CFROI® and economic profit framework", Wiley. The authors find that approximately one in eight companies manages to transition from question marks to stars.

3. Looking at five-year periods, Holland and Matthews, *ibid.*, find that only about 7% of stocks in the dogs category are able to transition to the stars category.

- **The timing of trends and themes.** The proportion of question marks, stars, cash cows or dogs within a given trend or theme's investable universe tells us a lot about the relative maturity of that trend or theme, and about how it could evolve over time.
- **The scope of the market opportunity.** The aggregate market capitalization of businesses benefiting from a particular trend or theme, is a useful indicator of the relative scope of the relevant universe and corresponding investment opportunity.
- **The portfolio composition.** The QSCD framework helps determine whether strategies are logically and prudently positioned across question marks, stars, cash cows and dogs.
- **The monetization potential of trends and themes.** Trends or themes may appear attractive from a top-down perspective, but if the accompanying investment universe has lots of question marks and dogs, monetization potential may (still) be insufficiently attractive for investment.
- **The distribution of attractive investment opportunities.** Sometimes, there is a large discrepancy between the equal or market-weighted statistics of a group of companies across a universe and the relative attractiveness of companies across a business value chain. The company life-cycle lens can help investors zoom in on attractive investment opportunities with greater accuracy.

All in all, the QSCD framework can be said to serve as a useful and dynamic guide in helping trends and thematic investors navigate the continuously changing business environment.

Circumventing market efficiency: incorporating long-term information and non-linear change

The market's assessment of future growth opportunities is, at any point in time, reflected in a stock's valuation and continually adjusted as the future unfolds. Outperforming the market therefore depends on finding windows of opportunity where the market temporarily overlooks growth prospects. As any practitioner can attest to, that is a tall order. However, it is not impossible. There are two types of situations[4] in which the market is relatively slow to react:

- **Long-term trends that are relatively predictable in a statistical sense.** For instance, Stefano DellaVigna and Joshua Pollet[5] find markets interpret long-term demographic information inaccurately when pricing forecastable demand changes for age-sensitive sectors, such as toys, bicycles, beer, life insurance and nursing homes.
- **Non-linear change.** In the 1970s, William Wagenaar and Sabato Sagaria[6] conducted several experiments, using an intuitive extrapolation exercise that showed exponential growth in numerical series and graphs was grossly underestimated. The extrapolations did not improve through daily experience with growth processes or when additional explanations regarding the nature of exponential growth were given, suggesting the human brain is not equipped to deal with non-linear change processes.

FUN QUIZ | WHO SAID:

'There's no chance that the iPhone is going to get any significant market share. No chance.'

A. Steve Ballmer
B. Paris Hilton
C. Jack Welsh

Answer: Steve Ballmer, in an interview with newspaper *USA Today*. Lieberman, D., 'CEO Forum: Microsoft's Ballmer having a 'great time' 29 April 2007.

4. As discussed more extensively in our white paper "The Rationale for Trends Investing", *Robeco Trends Investing*, 2017, trends and thematic strategies are underreaction or momentum strategies. There is another broad class of events in which markets show an opposite tendency to overreact: hypes, bubbles and temporary overextrapolations of salient but typically transitory events. Value strategies are designed to deal with these temporary mispricings and benefit from them.

5. DellaVigna, S. and Pollet, J., 2007. "Demographics and Industry Returns", *American Economic Review*.

6. Wagenaar, W. A. and Sagaria, S.D., 1975. "Misperception of exponential growth", *Perception & Psychophysics*.

WHY DO THESE GROWTH STOCKS ALWAYS SEEM IMPOSSIBLY EXPENSIVE?[7]

Many investors find it difficult to invest in stocks of high-quality and high-growth companies because they usually trade at multiples[8] that are – sometimes much – higher than that of the market. Implicitly, these investors assume there is some reasonable range of multiples at which most, or all, companies should trade relative to the market. Usually, this notion of 'reasonable' is based on a historical average or a peer group of similar companies.

Multiples, however, have become a shorthand for the valuation process. Importantly, multiples obscure the value drivers that really matter. It is the value drivers that determine the reasonableness of the multiple, not the multiple that determines the reasonableness of the valuation. More specifically, the market value of a company and its associated valuation multiple can be broken down into two main parts:

1. **The steady-state value** assumes that the current assets in place, properly maintained, will produce a level of normalized profits indefinitely into the future. This steady stream of future profits can be valued as a perpetuity – in other words, the normalized profit divided by the cost of capital. Therefore, the appropriate multiple to determine what should be paid for the steady-state value of a business is the reciprocal of the cost of capital. So, if the cost of capital is 8%, the steady-state price/earnings (P/E) multiple is 12.5 (1/8%).
2. **Future value creation** is driven by three fundamental factors. First, the spread between returns on incremental invested capital and the cost of capital. Second, the relative size of profitable investment opportunities. Third, the duration of competitive advantage.

The steady-state value is the straightforward function of prevailing risk-free capital market rates and the equity risk premium, which itself depends on aggregate investor risk appetite at a given point in time. The steady-state value of a company can vary a lot over time, as both capital market rates and investor risk appetite fluctuate. However, this does not cause divergence in multiples across companies.

Differences in multiples across companies are determined by differences in expected future value creation. Companies that earn high returns on future investments generally have profitable investment opportunities and can be expected to maintain their competitive advantage for the foreseeable future. Therefore, they typically trade at much higher multiples than companies that lack these characteristics.

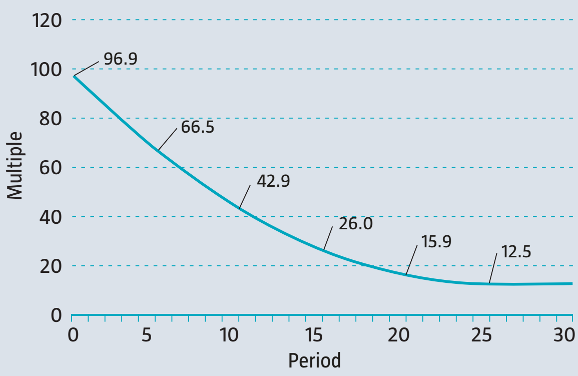
The justified multiple as a function of the company life cycle
There is an obvious link between a company's life-cycle stage and the multiple it should trade at. Young companies that have a long runway of future value creation ahead of them deserve to trade at much higher multiples than older, larger and more established companies. The latter make up the bulk of the equity market but have fewer or no growth opportunities relative to their existing assets.

Figure 26 shows the theoretical multiple trajectory of a fictitious company that starts out with a positive spread of 25% over its 8% cost of capital. The spread is assumed to erode by 1% every year, so that the firm's competitive advantage will last 25 years. Assuming perfect prescience, investors should be willing to pay a seemingly astronomical P/E multiple of 96.9 at the start of this company's life.

This high multiple is warranted, however, by the prospect of 25 years of profitable, value-creating growth. As the company matures over time and steadily realizes its growth opportunities, the justifiable valuation multiple will slowly converge towards the steady-state P/E multiple of 12.5 (1/8% after 25 years), reflecting the shrinking prospects for future profitable growth.

7. For an in-depth discussion of what drives multiples and in which circumstances paying a high multiple is justified, see the white paper "When paying a high multiple makes sense", *Robeco Trends Investing*, February 2017.
8. There are many kinds of multiples, of course. Here, we implicitly use the price-earnings multiple.

Figure 26: The justified P/E multiple with perfect foresight



Source: Robeco Trends Investing

Tools and models to benefit from underappreciation of long-term information

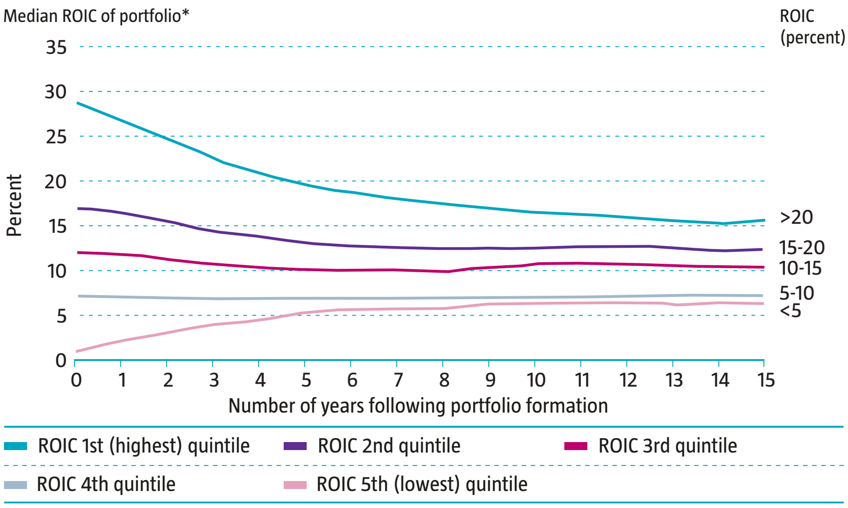
One of the challenges for growth-oriented investment approaches such as trends and thematic strategies is that growth – whether measured as growth in revenues, earnings or assets – tends to mean revert rather quickly.[9] As the base against which growth is measured gets bigger, it becomes increasingly difficult to maintain high growth rates, while market saturation and increasing competition weigh heavier on growth as time goes by.

Because high historical growth rates of revenues or earnings tend to fade over time, these numbers are not sufficiently reliable to base an investment strategy on. Only in exceptional cases, such as demographically driven changes in age-sensitive sectors, for example, may it be possible to benefit from predictive, long-term statistical information.

ROIC[10]: an underutilized source of long-term information

ROIC contains useful, long-term information that markets tend to underappreciate, but that provides an opportunity for exploitation. It is well documented that relative returns on invested capital, while showing a distinct tendency to revert to the mean, tend to persist for much longer than most financial analysts anticipate and which the market discounts.[11] Figure 27 shows that the rank order of relative returns remains intact even after 15 years.

Figure 27: ROIC Decay Analysis: non-financial companies



* At year 0, companies are grouped into one of five portfolios, based on ROIC.
Source: Koller, Goedhart, Wessels, "Valuation – Measuring and Managing the Value of Companies", Fourth edition, Wiley 2005, Chapter 6.

This is partly due to the fact that most financial analysts use a 10-year horizon, at most, to predict above-average returns. They assume returns start to veer towards or equal the cost of capital thereafter. This has important implications for corporate valuation. Determining a continuing value on the premise that ROIC will converge towards the weighted average cost of capital (WACC) is overly conservative for companies generating high ROICs, which in turn creates opportunities for horizon arbitrage.

9. Koller, Goedhart, Wessels, "Valuation – Measuring and Managing the Value of Companies", Fourth edition, Wiley 2005, for instance, find that growth rate differentials typically tend to largely dissipate in five years. Other studies generally come to similar conclusions.

10. ROIC stands for return on invested capital.

11. The white paper "Trends, Industries and the Quest for Alpha", Robeco Trends Investing, 2019, demonstrates, for instance, that by using a simple strategy of investing in high returns and avoiding low returns, industries would have significantly outperformed the market over longer time frames.

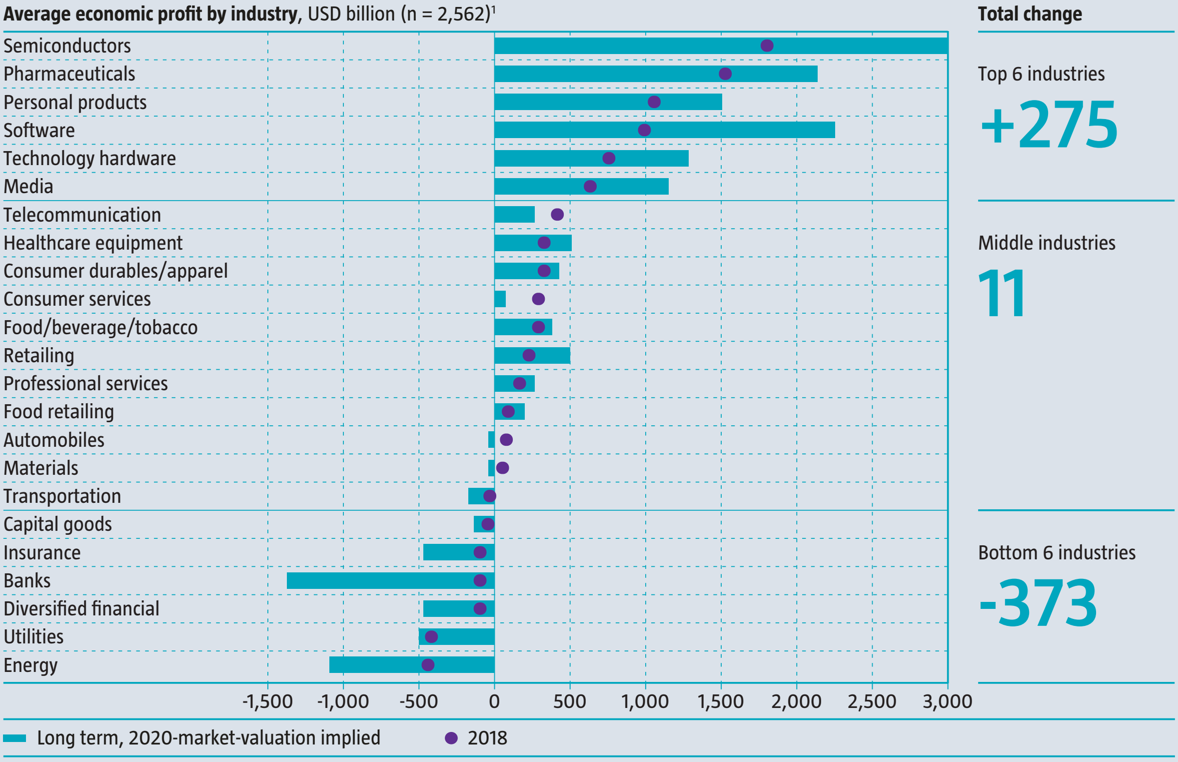
Industry is the most important driver of differences in returns on invested capital
Company returns on invested capital are primarily determined by industry economics.[12] Moreover, industry ranking of returns do not vary materially over time.[13] This means industry returns can be very useful in providing information about likely future returns of individual companies. This, combined with the tendency to underutilize long-term information, adds up to an exploitable market inefficiency.[14]

12. In "The strategic yardstick you can't afford to ignore", *Mc Kinsey on Finance*, Number 49, Winter 2014, Bradley, Dawson and Smit report that 40% of a company's profit depends on the industry in which it operates, while the remaining 60% can be attributed to company-specific factors.
13. See, for instance, Koller, Goedhart, Wessels, "Valuation – Measuring and Managing the Value of Companies", chapter 6.
14. A simple strategy of buying a basket of the top quintile profitable industries in 2007, shorting the bottom quintile and holding on for ten years, would have produced 11.7% annualized excess return relative to the MSCI ACWI index.

COVID-19 AND THE GREAT ACCELERATION

The Covid-19 pandemic of 2020 has reinforced and even widened the gap between the best and worst performing industries, according to a recent study by McKinsey. This illustrates how important it is to choose the right industries to invest in. Factoring in relative industry profitability significantly improves the odds of beating the market in the long term. This is why we believe relative industry profitability deserves a place in every trends investor's toolkit.

Figure 28: The best industries are getting better, and the worst are getting worse



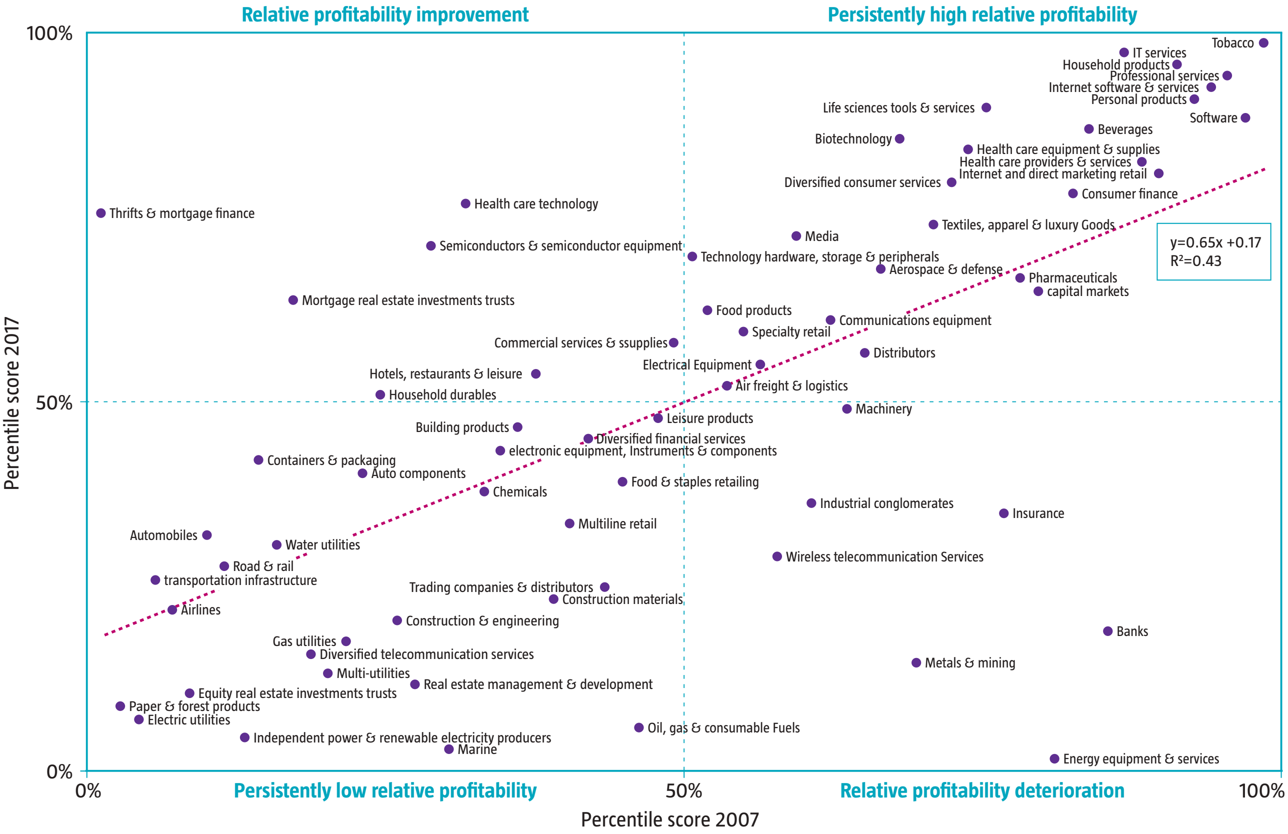
1. Largest non-financial companies by revenue in 2018 with data for 2003-2018 available.
Source: Bradley, C., Hirt, M., Hudson, S., Northcote, N. and Smit, S., July 2020. "The Great Acceleration", McKinsey Insights.

Figure 29 illustrates this point well. It depicts the relative profitability of industries and how this evolved over time, in the period 2007-2017.[15] Most industries tend to experience fairly consistent relative economic performance over time, with a minority of industries experiencing either a significant improvement or a significant deterioration in relative profitability. The message is clear: winning industries tend to remain winners, whereas losing industries tend to remain stuck in the mud.

15. "Trends, industries and the quest for outperformance", *Robeco Trends Investing*, January 2019.

Broad secular trends in technology improvements, sociodemographics and societal institutions tend to stay in place for decades and largely determine the relative profitability across industries. These differences in profitability generally remain relatively stable over time. However, changes in relative profitability do occasionally happen, and are driven either by outsized fluctuations of the business cycle or the emergence of new trends.

Figure 29: Relative industry profitability and its stickiness over time



Source: Robeco Trends Investing based on Crédit Suisse HOLT data

Disruptive change and the business model lens

Most of the time, things stay the same or change only incrementally. Sometimes, however, they change suddenly and explosively. In business, such sudden shifts are often described as 'disruptive', as they tend to destroy the traditional ways of doing things while creating a new way of doing things. Disruptive change doesn't evolve linearly. Instead, it typically follows a non-linear path, often expressed as an S-curve.

The human brain struggles to grasp the reach of non-linear change. We therefore considerably underestimate the consequences of such changes (such as exponential growth, for instance) and, in particular, their effect over longer time frames. The outcome of compounding long-term growth will therefore never cease to amaze us. It is also why non-linear change can be a potential source of long-term alpha for investors.

Clayton Christensen, the late Harvard innovation guru, coined the term 'disruptive innovation' and built groundbreaking theories around it.[16] Disruption is often attributed to the emergence of superior, new technologies that render older technologies obsolete. However, as Christensen pointed out, in most cases it isn't the superiority of new technologies[17] that is disruptive, but that these technologies facilitate the emergence of new business models,[18] which completely change the competitive landscape.

16. Christensen, Clayton M.; "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail". Boston, MA: Harvard Business School Press, 1997.

17. In fact, they are often inferior to existing technologies in their first iteration.

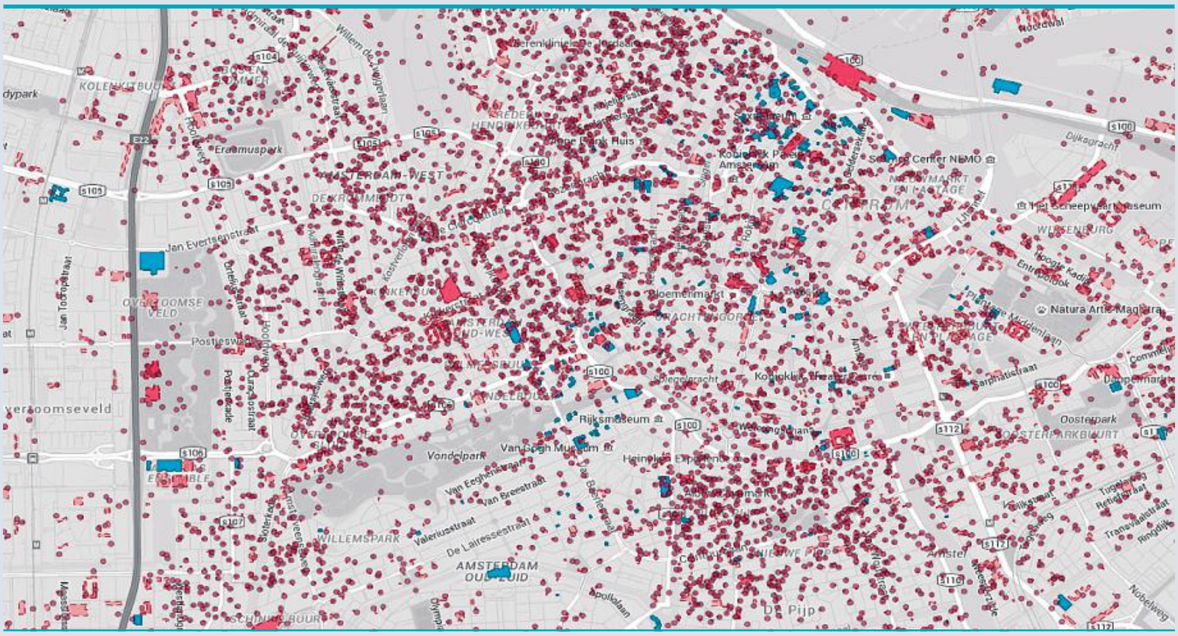
18. See our 2016 white paper "Business model disruption - digitization and connectivity drive ground-shifting new business models", Robeco Trends Investing, for an in-depth discussion of this topic.

HOW AIRBNB DISRUPTED THE LODGING INDUSTRY – BUSINESS MODEL INNOVATION IN ACTION

Few industries were thought to be as immune to potential disruption as the lodging industry. Location and sufficient scale had always been key to thriving in the face of competition. Good, available locations were scarce and finding new locations was difficult. If a business had a good location with sufficient supply to absorb local demand, the local competitive landscape remained stable.

Enter Airbnb in the late 2000s. By simply providing an online platform that connected private lodging suppliers with those looking for lodging space, Airbnb and the likes vastly increased the potential lodging supply. Traditional suppliers, such as hotels and B&Bs, suddenly had to contend with this increased base of suppliers, especially during times of peak demand – previously the most lucrative periods.

Figure 30: A visual impression of Airbnb's disruption of the lodging industry



Conventional lodging in Amsterdam | Airbnb listings in Amsterdam

Source: OSCity.eu, Google Maps

Generic business models and how they relate to the stages of economic development

Business models come in many different guises, with different value propositions and monetization schemes. This can make it difficult to see the forest for the trees. Fortunately, all business models have an underlying structure or logic to their value creation process, and can be categorized according to this.[19] From this perspective, three main groups emerge: the value chain, the value shop, and the value network.

– **The value chain**. The value proposition of firms employing a value chain business configuration is to produce a highly standardized product or service that satisfies common customer needs. The capabilities needed to deliver on this value proposition revolve around inbound logistics, operations, outbound logistics, marketing and services. Monetization comes from the price the customer pays for the product or service that the firm delivers. Value chain business models typically dominate in industrial economies.

– **The value shop**. Firms employing a value shop business configuration create value by finding a solution to a specific customer problem or by creating intellectual property. The capabilities needed to deliver on this value proposition revolve around expert knowledge, problem analysis, problem solving, choice, (project) execution, as well as control and evaluation. Monetization comes from the fee the customer pays for the service, or from the license fee that is charged for using the intellectual property. Value shop business models are a typical product of service economies.

– **The value network**. Firms employing a value network business configuration create value by linking firms or people that need or want to interact economically or socially. The capabilities needed to deliver on this value proposition revolve around network promotion, contract management, service provisioning and infrastructure operation. Monetization takes the form of an access fee, which is the price the network member pays for the opportunity to interact with other network members. Value network business models typically thrive in digital economies.

Table 4 summarizes and provides examples of these generic business models, based on the work of Barry Libert, Megan Beck and Jerry Wind, in collaboration with Deloitte.[20]

The most relevant takeaway for investors is that within markets there is a clear hierarchy of multiples of revenue for the different business model classes. On average, investors pay twice as much for service-oriented value shops than for value chains, four times as much for intellectual property value shops, and eight times as much for value networks.[21] Also, investors pay two to four times as much for businesses that operate beyond the 'digital divide', the demarcation line between decreasing and increasing returns to scale.[22]

As economic value creation shifts from tangible to intangible and from analogue to digital assets, there is an inexorable pull towards intellectual property (IP) and network-based business models. As seen recently, the adoption of network-based business models by companies such as Uber, Airbnb or Grubhub has created huge disruptive potential for traditional businesses in the transportation, lodging or restaurant sectors. Trends and thematic investors who ignore the business model lens, do so at their own peril.

19. This categorization is based on Stabell and Fjeldstad; "Configuring Value for Competitive Advantage: on Chains, Shops and Networks"; Strategic Management Journal, Vol.19 (1998).

20. See B. Libert, M. Beck and J. Wind "The Network Imperative: How to Survive and Grow in the Age of Digital Business Models", Harvard Business Review Press, 2016.

21. These multiples have moved up in recent years as market valuations have increased, mainly under the influence of very low interest rates. The relative differences between these classes have broadly remained the same.

22. The authors have dubbed value chains "asset builders", service-oriented value shops "service providers", IP value shops "technology creators" and value networks "network orchestrators".

Table 4: Main features of different business models

Business model	Tagline	Description	Unit of monetization	Examples	Revenue multiple
Value chain – making physical products, asset building	Make one, sell one	Use capital to make, market, distribute and sell physical products	Products	– Manufacturing – Packaging – Metals production – Chemicals production – Shipbuilding	1x
Value shop – providing services, solving unique problems	Hire one, sell one	Use people who produce billable hours for which they charge clients	Billable time	– Repair, inspection & maintenance services – Consulting services – Resource exploration – Engineering & construction – Legal services	2x
DIGITAL DIVIDE					
Value shop – creating technology, ideas or know-how, that can be reproduced at low marginal cost	Make one, sell many	Use company resources to develop and sell intellectual property (IP)	Intellectual property: source code, patents, trademarks, copyrights etc.	– Software code – Games – Biotechnology – Pharmaceuticals – Creative products (films, TV-series, books)	4x
Value network facilitating and orchestrating commercial or social interactions	Many make, market and sell to many	Use digital networks / platforms to connect businesses and potential clients with each other	Network size (number and quality of participants/ connections)	– Social networks – Stock exchanges – Online market places – Credit card companies – Car sharing companies	8x

Source: B. Libert, M. Beck and J. Wind, Deloitte, Robeco Trends Investing

Curveballs – hype cycles and persistent (mis)perceptions

There are clear instances where investors get collectively carried away and temporarily misprice groups of stocks, as several well-known bubbles and manias have shown. Industries in the early stages of their life cycle are more susceptible to these temporary mispricings than more mature industries. This is especially true when it comes to promising new technologies that capture the imagination of investors.

It is easy to get sucked into these bouts of euphoria as stock prices shoot up to the moon, but the risks are very high. The Gartner Hype Cycle is a useful tool when navigating these tricky waters, but in general, it is best to stay clear of the hype phase.

Another curveball long-term investors need to be prepared for is persistent market perceptions or misperceptions of certain stocks or groups of stocks. Although fundamentals have started to diverge from prevailing views of market participants, only perceptive observers will be aware of this and it might take a long time for these views to become widely accepted. This is the potential downside of employing an underreaction strategy. You might very well be right, but you might end up waiting a long time for the rest of the market to catch on. ■

AMAZON: WHEN A PLAN COMES TOGETHER, EVENTUALLY

Finding a structural winner and holding on through good and bad times is very difficult, as rewards may only be reaped after many years. However, the analytical framework and the tools presented in this publication make this search easier and help investors to have the conviction to invest in these stocks and hold on to them. Amazon's case study provides a clear illustration of the twists and turns involved in this quest for structural winners.

Beginnings: a classic hype cycle

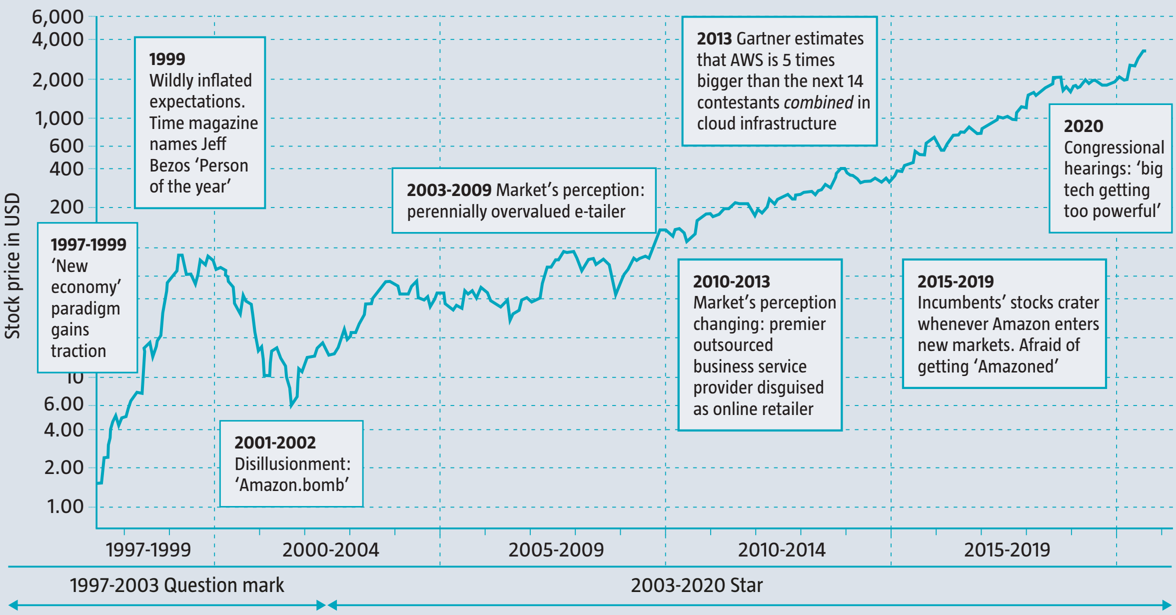
Amazon started out as an online bookseller in 1996 and IPO'ed in 1997. Excitement about the 'new economy' was running high and the stock was caught up in the frenzy of buying anything that had to do with the internet. It was a classic hype cycle. Amazon, like so many internet startups, invested heavily in its future but did not yet have a proven, profitable business model – the hallmark of a question mark company. Its stock cratered once the internet bubble was pierced, compounded by a lot of skepticism regarding the company itself. This was exemplified by nicknames such as Amazon.con, Amazon.bomb, Amazon.toast or Amazon.org (the .org extension is reserved for non-profit organizations).

Surviving the crisis and building its business model for the digital age

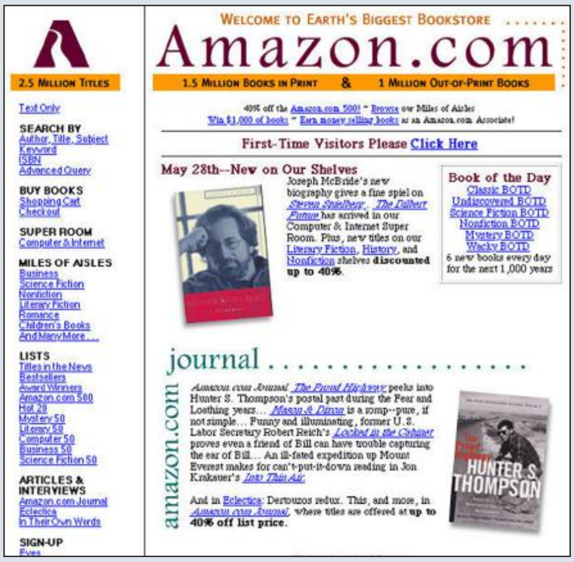
However, in contrast to many other internet startups, Amazon managed to get its business model right. By 2003, it had earned a higher ROIC than its cost of capital for the first time ever, placing it in the star category of its life cycle. It continued to invest heavily, to the detriment of its short-term earnings. This led to a perennially high P/E multiple and a persistent consensus perception that Amazon was overvalued.

The stock was an uninspiring performer for most of the 2000s. At this time, most investors were focused on the astonishing growth in emerging economies, and many were still mindful of the dot-com crash. Yet to the trained eye, Amazon was launching a lot of promising business model innovations. It had added a third-party market platform to its services, had come up with the Prime subscription and had launched Amazon Web Services (AWS), boosting its fitness for the digital age.

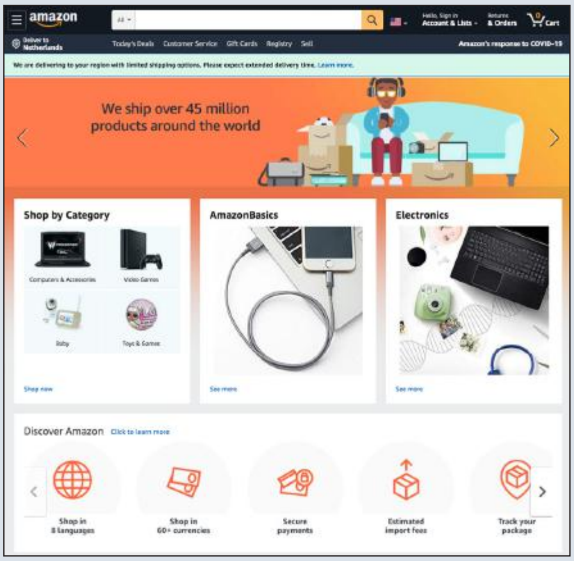
Figure 31: Amazon's stock history and some salient events



Source: Bloomberg, Robeco



Amazon.com in 1997



Amazon.com in 2020

Recognition and the rise to stardom
It wasn't until the aftermath of the global financial crisis that market perception gradually became more positive – not only with respect to Amazon, but in terms of the entire internet industry. This was largely due to its significant growth, paired with high and sustainable returns on invested capital – which was difficult to ignore. Nevertheless, Amazon only received widespread recognition as a growth company when it became clear how large and profitable its AWS business had become, around 2015.

Market perception then decisively shifted to being predominantly positive. Amazon was increasingly seen as a formidable competitor that could disrupt any market it entered – even to the point that stocks of incumbents in that market cratered, out of fear of being 'Amazoned'. Amazon's market capitalization has, at the time of writing, reached USD 1.6 trillion. In fact, concerns about its power and that of other internet giants have instigated congressional hearings about possible abuses of that power.

The end of an epic narrative?
So, will the company be forced to split up and will this herald the end of Amazon's epic narrative? Anything is possible of course, but the odds still heavily favor a continuation of Amazon's business success, even if the company is eventually broken up.

As long as its considerable competitive advantages support returns higher than its cost of capital and as long as it finds enough sizeable investment opportunities, the company will remain in the star stage of its life cycle and continue to generate and compound profits at a high rate. There are currently no indications that this dynamic is weakening. What's more, the company is active in attractive industries and has the right business model configuration for the digital age.

Life is never easy as an investor
Of course, good business performance does not equate good stock performance. High expectations regarding Amazon's future value creation are embedded in its stock price, and it will be increasingly difficult to beat those expectations. Its earnings may soar as the company matures and its earlier investments start to bear fruit, but that will be counterbalanced by a multiple contraction if market perceptions cast doubt on Amazon's continued capacity to generate future value.

CONCLUSION

Active management and trends and thematic investing: a perfect match

In a world characterized by accelerating socioeconomic shifts, trends and thematic investing offers active investors a promising proposition aimed at achieving attractive investment results over the long run.

Trends and thematic investing gives investors the opportunity to express their convictions with respect to long-term developments. They are able to adopt more active positions relative to market capitalization-weighted indices and to target high relative returns over time. Finally, a trends and thematic investing approach ensures sustainability takes the center stage in investors' portfolios.

Trends and thematic investment products have enjoyed quite some popularity over the past few years, which can largely be explained by their attractive narrative and – in some cases – good short-term investment results. Yet, not all trends and thematic strategies are born equal. Some offerings are clearly better than others. Just a good story is not enough.

To achieve consistent long-term outperformance, trends and thematic strategies need a robust and transparent framework to identify and analyze relevant trends and themes so that investors can capitalize on them. As this publication illustrates, this starts with identifying a few megatrends, i.e. broad-based structural shifts in our socioeconomic environment, that comprise subtrends, which are more focused and concrete manifestations of these forces of change.

The next stage is about identifying the most attractive trends and themes, while avoiding fads. This demands a rigorous approach and combines continuous, thorough research and distinctive insights with sustainability principles. Monetization potential, sufficient scope and strategic timing are key criteria when assessing investible trends. But, the search for sustainable themes starts with identifying the challenges inherent in sustainable growth and prosperity.

The final step is about uncovering those companies that are best positioned to benefit from each trend or theme in the long run. It is also about avoiding the multitude of losers – i.e. the obvious victims of change and disruption. Top-notch fundamental analysis of individual companies is the backbone of this stage of the investment process.

However, the process of categorizing companies as thematic winners and losers can be significantly simplified by using a set of models that do not belong to a fundamental investor's standard toolkit. These include tools such as the company life-cycle model, relative industry profitability and the business model lens.

At its root, a trends and thematic investment approach is an underreaction strategy. It is an underreaction to long-term information such as demographics, and to non-linear change caused by phenomena such as technological disruption. The challenge for trends and thematic investors is to outshine other market participants by using long-term information more intelligently and by being exceptionally quick to respond to non-linear change.

With all these characteristics, trends and thematic investing can arguably be considered active management at its best.

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Credits

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