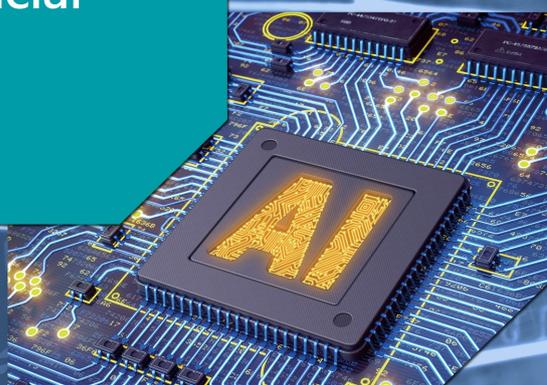


2018 Outlook for Global Artificial Intelligence

January 2018



Focus on Innovation in 2018

The global economy and financial markets have recovered since the financial crisis of 2008, making this one of the longest expansions in history. However, the recovery has been quite muted and required on-going government stimulus until recently. In 2016 and 2017, economic activity finally strengthened to become more self-sustaining. With many of the global economies benefitting from favourable monetary and fiscal policies, we are entering 2018 with a synchronized global expansion leading to improved business confidence and increased investment. Furthermore, U.S. tax reform is likely to provide further stimulus to many U.S. industries to spend on new initiatives that drive innovation and future productivity gains.

We believe that the global economy is just beginning to see the impacts of artificial intelligence (AI), robotics, and advanced automation on society and that these impacts will be transformative. These technologies have the potential to enable companies to do more with fewer resources, to streamline business processes, and to improve product quality while driving better profitability. We believe that the companies that advance and leverage these technologies have the potential to drive meaningful shareholder value creation over the next decade. As we look forward into 2018, the outlook for companies advancing and leveraging artificial intelligence continues to trend favourably with the chance of getting strong top and bottom line results.

Driving the Next Leg of Growth

The technology sector in 2017 outperformed most major markets

The technology sector in 2017 outperformed most major markets¹ due to strong returns from the large consumer tech bellwethers like Facebook, Amazon, Apple, Netflix, Google, Baidu, Alibaba and Tencent. These companies have been the beneficiaries of the growing penetration of smartphones that now has nearly a 3 billion installed base². As smartphones have

become more capable and consumer time spent on them has increased, these companies have been able to capture data on consumer habits and use artificial intelligence (AI) to translate them into actionable insights. We are now seeing this phenomenon broaden out such that many traditional companies are now investing in the same AI technologies to drive innovation and efficiency gains in their own industries. With a favourable macro and business investment backdrop, and reasonable valuation, we believe the technology sector outperformance can continue. We also believe that AI could become the most disruptive and impactful technology over the next several decades.

Artificial intelligence could become the most disruptive and impactful technology over the next several decades

However, the market has gone through periods of corrections driven by a host of factors over the years. The most recent volatility in the technology sector in November/December 2017 was due to investor rotation into under-owned sectors such as financial, media, and telecom that have the potential to benefit from the proposed U.S. Tax Bill. As a result, the technology sector, with its multi-year gains, fell victim to profit-taking to enable this rotation. This profit-taking is not driven by any deterioration in the fundamental outlook for the technology sector; in contrast, the fundamental outlook has never looked stronger due to end-demand drivers such as AI, Big Data, and Cloud.

While some stocks have corrected relatively sharply in a short period of time, the moves in securities remain within expected statistical ranges. Leverage in the market as a whole is not excessive and there isn't any indication of a sustained unwinding of leverage. While consumer debt levels in the U.S. have started to rise again, consumer balance sheets are not overly levered. From a policy perspective, the change in leadership at the US Federal Reserve (Fed) creates some potential for volatility as markets attempt to evaluate the stance of future policy. However, we believe these issues will not be meaningful in the long run as the goal of Fed policy is to support growth and moderate economic volatility.

We think the next several years could be very interesting on the corporate side as increased business investment and capital expenditures in productivity enhancing technologies like AI can drive more sustainable growth. Corporate profits for those companies investing in the right innovative areas could be stronger and longer lasting than any other business cycle of the past and result in better relative stock performance versus peers over the next several years.

Demand for AI is Accelerating

The pace of advancement in AI is accelerating with new breakthroughs happening seemingly every month. While the near-term impacts on companies and markets currently appear small, the exponential growth curve associated with the development of AI will mean the impacts will become increasingly more evident and pronounced. There are many examples of how AI is driving innovation in various industries.



Advertising: Machine learning algorithms allow online retailers to personalize advertisements based on many factors such as age, location, preferences,

lifestyle, and purchase history. AI is now being incorporated to make adjustments in real time to optimize campaigns, filter out inappropriate ads, and leverage offline data to recommend other products of interest.



Agriculture: Companies are using autonomous drones to help farmers survey their land, taking images that reveal things like the fertility of specific patches of soil and how much water the crops need.

AI is also being used to improve crop yields by predicting various environmental changes and the presence of weeds or disease.



Aerospace: Next generation AI autopilot systems with multiple neural networks are being trained by watching human pilots. Data from the thousands of sensors within aircraft are being processed by AI in the cloud to monitor in-flight performance and increase safety through predictive maintenance.



Automotive: We are just starting to benefit from today's advanced driver-assistance systems such as lane departure warnings, automatic breaks, and parking assistance. Tesla, BMW, Mercedes-Benz, and

Infiniti also now offer vehicles with autopilot capabilities. Several countries are testing fully autonomous, driverless vehicles on public roads and we believe the technologies are advancing to make self-driving cars commercially available by 2020-2025.



Education: Intelligent tutoring systems are lowering the costs and allowing many more students to benefit from personalized instruction and targeted feedback. AI is also now performing the time-consuming task of grading, which allows teachers to spend more time on course preparation and student interaction.



Energy: Many companies are now leveraging AI to determine where to drill and optimizing drilling by merging real time operational and environmental data to predict disruptions. AI is also being piloted to make electric grids more smart and efficient with better demand predictions and balancing power across intermittent renewable sources like wind and solar.



Finance: Many institutions are investing in artificial intelligence and blockchain to create superior solutions for their clients and operate more efficiently. In wealth management, robo-advisors are helping to reach the underserved, low end of the market. AI is revolutionizing credit lending by using machine learning to analyze many more sources of data for potential borrowers than just credit scores. AI surveillance tools are being used to reduce fraud and thwart financial crime. Many insurers now use automated underwriting tools in their daily decision-making.

Blockchain could potentially save dozens of percents by reducing infrastructure costs, and improving data quality and transaction transparency.



Healthcare: AI is being trained on x-ray images and achieving accuracy rates better than most human doctors in diagnosing numerous medical illnesses including various cancers, tuberculosis, diabetic eye damage, pneumonia, and blood infections. In electronic medical records, AI is helping to predict the risks of heart attacks or other diseases in patients. A neural network was trained recently to predict chemical reactions, which could significantly accelerate the creation of new drugs. We are just scratching the surface of what AI technologies can do to help make doctors better and more efficient, and improve the quality of care in the future.



Legal: AI is enhancing the effectiveness of lawyers by simulating court rulings based on inputs of client details, arguments, and legal precedent. Courts are using predictive tools to help them strategically determine bail amounts, sentence lengths, and parole opportunities.



Manufacturing: Machine vision and AI image recognition are being used to provide real-time product identification, item counting, and quality inspection. Collaborative robots infused with AI and light-touch capabilities can learn and improve by working alongside humans now.



Retail: Retailers are leveraging AI and machine learning technology to help create a more interactive and personal experience for consumers. AI-powered assistants can now answer questions about products and availability when you walk into a physical store. Deep learning is being used to better understand a customer's personal style and search for similar items of clothing with different features, like a different cut or color combination. 3D sensing and augmented reality (AR) technologies are enabling new virtual fitting rooms/showrooms to give shoppers a richer experience before purchasing.

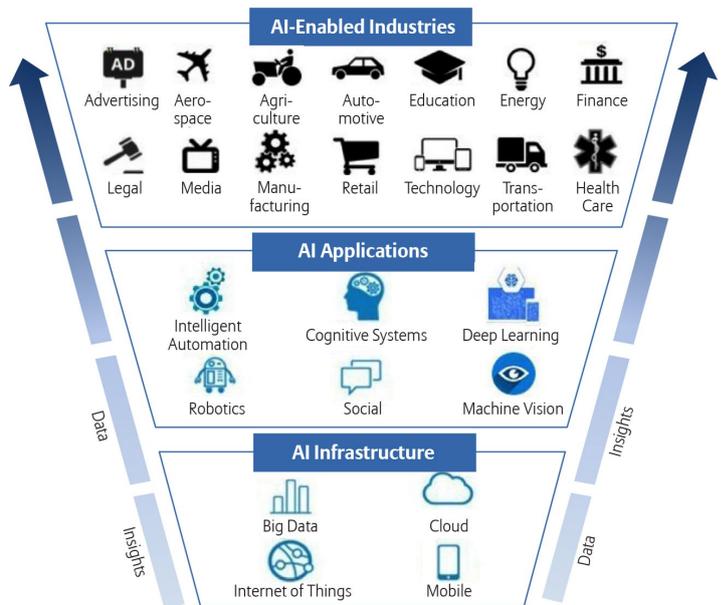
A Broad Spectrum of AI Opportunities

More companies are looking to AI as a way to improve their products and consumer experiences, enhance efficiency, and drive competitive advantage. In recent surveys, nearly 75% of executives surveyed believed that AI would allow their companies to move into new markets³, while 84% thought that it would allow their companies to obtain a competitive advantage³. Despite this belief by executives, it's clear that not everyone will succeed and many are just starting to invest in AI projects. Some companies will fail in the execution on the

Companies believe AI will allow them to obtain a competitive advantage

underlying technology, others on the cultural fit with the organization, and others due to marketplace dynamics. Not all companies will succeed in executing on the opportunities offered by AI, but we believe almost every company will be impacted by the technology. We believe that the upheavals brought about by this period of accelerating innovation means that stock picking and active management will be even more important.

Stock picking and active management will be even more important



Source : Allianz Global Investors

As we look out into 2018 and beyond, we continue to see exciting innovations and growth in many areas of the AI landscape.

In AI infrastructure, we expect the healthy demand for the build-out of the underlying AI infrastructure to continue. The last few years has been driven by the early adoption of new computing architectures to train deep neural networks for machine learning. Training involves the development of an algorithm to understand a large data set, whereas inference is when a machine infers things about new data it sees and learns from it. As training progresses past the pilot stage, the next phase will be about AI inference and the new types of processing and storage

needs to deploy AI from the cloud to billions of edge devices. We estimate this next phase to be an opportunity three to five times the size of the training market, and expect to see a number of new product innovations over the next few years.

In AI applications, we are seeing AI get embedded into an increasing number of software applications and systems to help make more intelligent decisions. These new AI-aware applications are able to leverage existing business processes and incorporate Big Data to drive valuable new insights. In some aspects, AI is the new era of the enterprise resource planning (ERP) software and business re-engineering boom that created tremendous value in a number of companies during the 1990s. AI is helping to drive higher levels of automation, better recommendations, faster decision-making, and significant cost savings. We think AI is going to be part of nearly every application we have around us and create an even bigger market opportunity than past IT transformation eras.

In AI-enabled industries, we are seeing more companies begin to leverage AI to drive new innovations. Automotive, consumer, healthcare, and finance sectors are already seeing the early benefits from AI, which is allowing them to introduce unique products and services enabling them to out-perform their industry peers. This out-performance has allowed these companies to deliver superior financial performance in the form of faster growth and higher earnings, which in turn has resulted in better relative stock performance that we believe can continue as long as they execute to plan.

2018 will bring more opportunities to invest in innovative AI-beneficiaries outside the U.S.

We believe 2018 will bring more opportunities to invest in innovative AI-beneficiaries outside the U.S. The early development of artificial intelligence was initially centered in Silicon Valley and U.S. companies were earlier to invest more in the technology. As we have seen over the last 12-24 months, there are now big investments being made by China, Japan, and Europe as every big nation is now racing to build its AI capabilities. AI is getting adopted by more companies around the world as the heavy investments over the last few years start to bear fruit.

With a favourable economic and financial market backdrop, we remain optimistic on the continued strong performance gains in the coming year. We are still at the beginning phases of a global transformation that will be ushered in by developments in artificial intelligence. The opportunity for shareholder value creation remains substantial and is growing. At the same time we believe that stock picking will be imperative to capturing the benefits of the opportunity. We are excited about what the coming years will bring and to see how AI technologies can be leveraged to improve people's lives.

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¹ As measured by MSCI World Information Technology Index versus MSCI World Index as at 29 December 2017.

² Source: Statista, as at January 2018.

³ Source: Boston Consulting Group and MIT Sloan Management Review, as at September 2017.

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