Why does artificial intelligence matter to China and other emerging markets?

FOR PROFESSIONAL INVESTORS - September 2018

Executive summary

- Artificial Intelligence (AI) is a set of computational technologies inspired by the ways human use their nervous systems and bodies to sense, learn, reason and take actions.
- Supported by advancements in data collection and aggregation, algorithms and processing power, computer scientists have reached impressive breakthroughs in AI. These breakthroughs allow AI to handle a large amount of data, generate patterns and make predictions on a broader scale and in an efficient manner.
- Given the high potential to boost productivity dramatically, AI technologies are gaining momentum. In the emerging markets (EM) particularly, diminishing returns from labor dividends, capital investments and limited resources in key areas are prompting a number of economies to adopt AI. In China, the use of AI will particularly play an important role in the shift from a capital-intensive model to a consumption-based economy.
- Today, many machine learning systems are already part of our daily life. The applications are extremely varied, and adoption is growing fast in many sectors (e.g. consumption, logistics, health care, or oil and gas). Beyond platform companies, building an AI ecosystem will be key to accelerating AI development in EM.
- AI capabilities have exciting and far-reaching potential to enhance human welfare by improving health care, environment, and education. Most EM countries have favorable policies toward AI adoption and demographics act as a tailwind in many EM countries. In China, investing in AI is attractive given the country's vast population, large volume of data, deep pool of talents, fast adoption of new technologies, as well as government support.
- At the same time, AI also raises complex social, ethical, and legal questions about issues affecting discrimination, liability, and regulation. It is essential that governments in EM work closely with different stakeholders to balance the need to bolster productivity and maintain social equality.
- A number of emerging markets are already progressing at the forefront, and, in our view, more companies are emerging from the region to benefit from AI, either as technology drivers of AI or as early adopters of AI in traditional industries.

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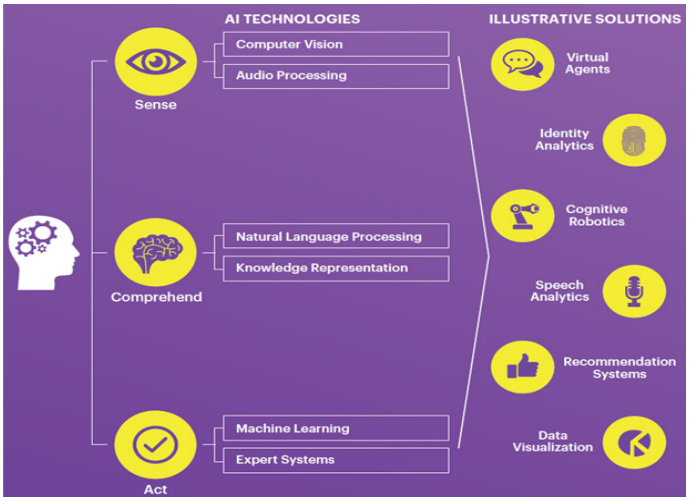
What is artificial intelligence (AI)?

Definition and history of AI

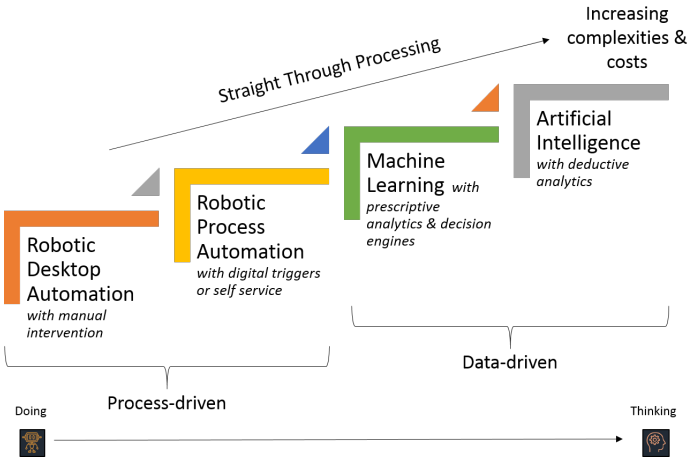
Artificial intelligence (AI) is a set of computational technologies that are inspired by the ways human use their nervous systems and bodies to sense, learn, reason and take actions. Sensors, including microphones and cameras, collect data in the external environment from our day-to-day interactions. Algorithms are coded to condition machines to gradually learn and make inferences based on past data. Over the years, AI has grown tremendously in complexity, transforming from handling process-driven tasks to data-drive ones.

Figure 1: AI technologies in a nutshell



Source: Accenture Analysis, 2016

Figure 2: AI development through time



Source: medium.com, April 2018

The term AI was officially born in 1956 at the Dartmouth Summer Research Project on Artificial Intelligence. Between the late 1960s and early 1980s, theories such as heuristic search, computer vision, natural language processing, mobile robotics, machine learning and artificial neural networks emerged. However, by the mid-1980s, AI still saw no significant practical success. The gap was in part because of the lack of direct access to environmental signals and data, and in part because of over-emphasis on characterizing true or false logic and thereby overlooking uncertainty. Interest in AI began to drop and funding dried up. The "AI winter" loomed for the next decade and started to see a new boom in the 1990s.

Why is AI gaining serious momentum this time?

Technological advancements

According to a Zignal Lab report from May 2017[1], 90% of the world's data was created in the last two years thanks to media and social intelligence. 2.5 Exabytes of media data are now produced daily. Coupled with improved quality and wide availability of different hardware over the years, data can now be fully and accurately captured, processed and shared. Sophisticated software programs have also been developed to interpret the output of algorithms and present data in easily digestible visualizations, allowing humans to interface, analyze and synthesize insights without the necessity of prior trainings in AI. Moreover, computing and storage power have grown exponentially while costs are reduced dramatically, further accelerating the processing efficiency and the pace of innovation.

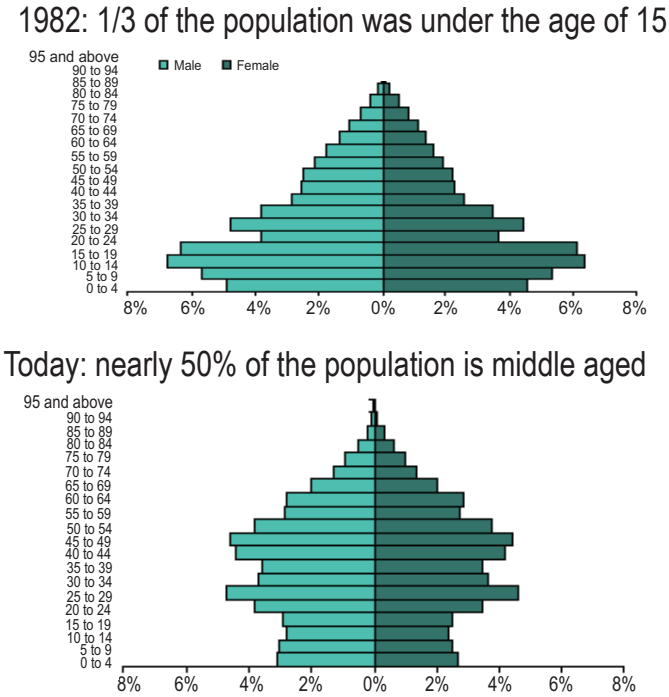
Changing demographics and economic needs

Another reason for this accelerating momentum hinges on the economic reality faced by the world's major economies. The example of China is a telling one. The world's second largest economy has relied heavily on its vast labor market and significant capital investment to sustain its economic growth over a long period. These two levers were the traditional drivers of production, yet they can no longer sustain the steady march of prosperity enjoyed in the past three decades. China's demographics are turning from a tailwind to a headwind. With an aging population – nearly 50% of it is now middle-aged (see Figure 3) – China seems likely to fall well short of the workforce numbers needed to sustain economic growth at current productivity levels. The government acknowledges the increasing need for China to embrace a new growth model that relies less on a capital-intensive model (fixed investment and exporting), and more on private consumption, services and innovation to drive higher quality and more sustainable economic growth (see Figure 4). China has to undergo structural reforms to address challenges arising from the past high-speed growth, such as excess capacity in numerous industries. The most realistic alternative for maintaining momentum would be to sharply accelerate productivity growth. The use of artificial intelligence is thus set

[1] Source: https://zignallabs.com/artificial-intelligence-new-communications-assistant/

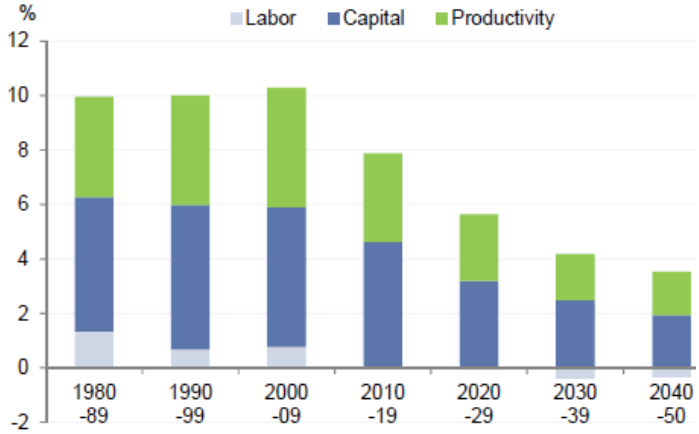
to play an important role in boosting productivity. AI can augment labor by complementing human capabilities, offering employees new tools to enhance their natural intelligence. In our view, a significant part of China's economic growth from AI will come, not from replacing existing labor and capital, but in enabling them to be used much more effectively. As AI technology continues to evolve and value slowly outweighs the cost of adoption, these emerging markets are more willing to adopt AI to solve some of their most pressing issues.

Figure 3: Demographics in China in 1982 vs. today



Source: NBS, Haver, and Bernstein analysis, January 2018

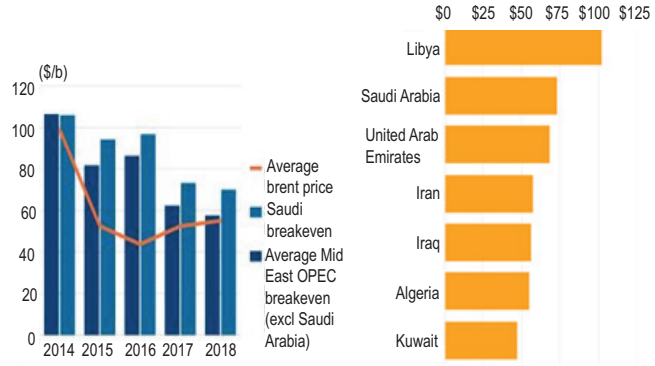
Figure 4: China's GDP has been capital-driven in the past; going forward productivity will play a bigger role



Source: NBS, Goldman Sachs Global Investment Research, CLSA, March 2018
Note: 2010-2019 and beyond are GS estimates

In the Middle East, the dependence on energy is pushing governments to diversify and leverage technology more. Even though gulf countries focused on cost-cutting after the oil price collapsed from its peak price in 2014, most countries today still have fiscal breakeven oil prices above the average trading Brent price. In Saudi Arabia, foreign exchange reserves collapsed from a peak of $750 billion USD in 2014 to below $500 billion USD in 2017, as the government had to draw down the reserves to cover a budget deficit caused by low oil export receipts.

Figure 5: OPEC breakeven oil prices, 2018



Source: IMF, 2018

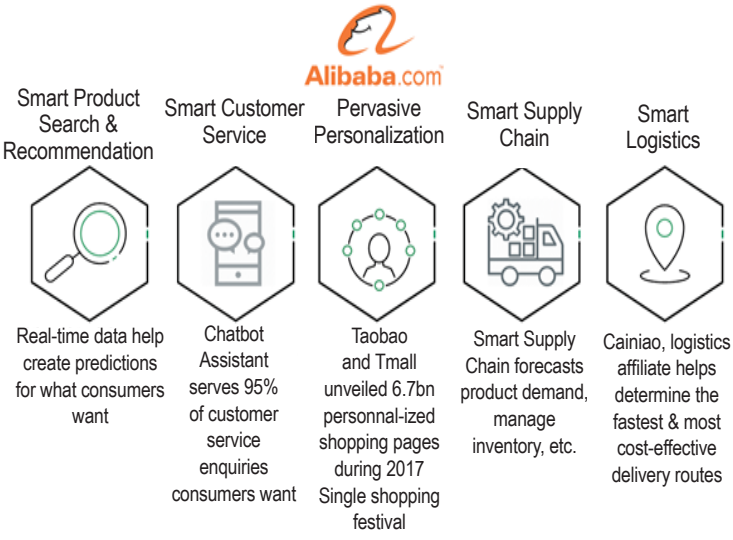
Exemplary cases of AI adoption

China consumer - AI changing how people shop online

China is an interesting case in which AI-powered tools are already widely adopted in people's daily lives. For instance, Taobao, Alibaba's leading online shopping website with over 500 million users, applies AI across the entire customer journey: from product discovery to purchase decision, delivery and after-sale service (see Figure 6). AI redefines the shopping experience for millions of China's online shoppers and merchants. Some of these developments may be subtle to the consumers, but they actually significantly improve the consumption experience. For instance, after opening the shopping app, users will see virtual storefronts that display information tailored to them as individual shoppers based on their unique characteristics and preferences. The system is smart enough to use users' browsing history, shopping history and other interesting behavioral traits that they leave online to create a list of products and advertisements appropriate for each potential shopper. The product search results also become uncannily precise. All of these features are implemented in real time with the aim of increasing the opportunity to match what a person wants with what is available. These AI-powered tools are capable of increasing conversion rate (sales) by as much as 20%.

Customer-service chatbot is another example how AI is slowly changing how consumer service are delivered. Ali Assistant, Taobao's customer chatbot, now handles more than 90% of customers' queries. It can conduct both spoken and written queries, functioning as both a customer-service representative and personal shopping assistant. Ali Assistant not only can provide answers on specific transactions, it can also recommend products based on text, photo or voice description. The chatbot function not only assists in lowering cost and increasing customer service efficiency, it also provides a more friendly-efficient environment along consumers' shopping journeys and increases the chance that consumers come back to the platform for future consumption. All these amazing capabilities are only made possible with the emerging AI technologies in the fields of voice recognition and natural language processing.

Figure 6: At Alibaba, AI is changing how people shop online



Source: Alibaba, June 2018.

China Logistics - AI-powered warehouse transforming the logistics industry

China has a gigantic online shopping segment, which creates a substantial challenge – how to rapidly deliver millions of packages daily to customers' hands on a consistent basis at a manageable cost? This is where AI can substantially improve productivity. The combination of consumer behavioral data, real-time warehousing and logistical data, as well as automation of warehouses allow delivery companies to speed up the delivery time and optimize the utilization of infrastructures (e.g. warehouses and trucks).

One of the best examples of this in China is Alibaba's Cainiao system, a smart logistic system that can identify which box is required to pack items of different sizes or weight, thus optimizing the use of materials. This AI-driven solution already reduces the use of packing materials by more than 10%. With the help of AI, the system can also determine the fastest and most cost-effective delivery routes to speed up parcel delivery. In addition, it helps online and offline merchants to forecast product demand, and thus prepare and allocate the appropriate level of inventory. As a result, merchants can reduce working capital cost and minimize the loss of revenue due to out of stock popular items.

AI's ability to efficiently handle large volumes of data to generate a useful prediction or action also applies to other logistics needs. For instance, China's food delivery market (with 18 million orders per day), represents nine times the size of the US market and faces a daunting challenge to deliver time-sensitive goods (such as hot food) to feed hungry clients quickly. Meituan-Dianping, a leading food delivery application in China, uses the logic discussed previously in its AI engine to generate the most time-efficient delivery routes. Meituan's o2o Real Time Logistic Dispatch System is an engine that uses predictive modeling to support millions of orders between restaurants and customers every day with an average delivery time of less than 30 minutes.

Transport generally poses greater problems in China than in the rest of the world because of the country's high density. For example, some of its major cities are as big as five cities in other parts of the world. Didi Chuxing, a leading ride-sharing application in China, operates on a scale which is five to six times larger than that of its US competitors in its home market. The company uses AI, by taking into account weather, car numbers, customer profile and road conditions to forecast rider demand and car supply 30 minutes in advance with over 80% accuracy. By deploying AI, the system dispatches drivers in advance to meet potential demand and provides the most efficient route so that drivers can pick up customers and deliver them to their destinations in the shortest time. In Hangzhou, the government partners with Alibaba to deploy a smart city system to manage the city's traffic flow by using a combination of AI powered traffic light and accident detection systems. The city's traffic congestion is reduced by 10% as a result.

South Korea healthcare – AI accelerates discovery

In January 2018, Seegene Inc., a South Korean biopharmaceutical company that manufactures In Vitro Diagnostic (IVD) products, became the first company in the world to have successfully developed diagnosis reagents using a newly created AI based system. The company set up the system with data on pathogen and disease information accumulated

over the last 15 years. This approach simplified a complex research and development process through its self-developed algorithm and virtual experiment, reducing the development period from a typical one year to just four days. In general, a researcher needs to examine 200 to 300 cases of data each year to develop a new drug. An AI system can parse through more than 1 million dissertations and clinical test data for 4 million people during the same period.

Besides Seegene, many other Korean biopharmaceutical firms are actively leveraging AI in their research and development process. In December 2017, CJ Healthcare Corp signed an agreement with genome and exome data analysis firm Syntekabio Inc. to co-develop a new anticancer immunotherapy using an AI model. Dong-A ST Co. has been collaborating with the u-Health Information Research Institute at Ajou University since 2016 to develop new drugs by analyzing data on patients' medical records.

Russia oil & gas – AI reduces costs and errors

In June 2017, Gazprom Neft, an integrated oil and gas company in Russia, signed a Cooperation Agreement with Yandex, Russia's leading internet search company, on implementing AI-enabled projects in the oil and gas sector. The two parties are developing Russia's first integrated platform for the processing and interpretation of seismic data, a platform to support the entire seismic-survey cycle. AI helps reduce the significant costs that are typically incurred in managing disjointed data and modules. The end goal of the platform is to develop cognitive assistants that will process information and carry out calculations in order to provide engineers with pre-prepared solutions for further actions.

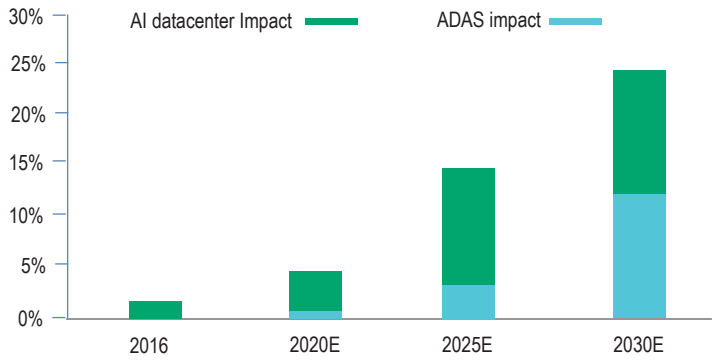
AI ecosystem beyond platform companies

Semiconductor

With more data collected, demands for computing power and storage memory have skyrocketed. In the driverless cars industry, Google and Intel estimated that there would be 4TB of raw data, or 400GB of compressed data, collected in an average 1.5-hour driving day. The large amount of data increases demand for servers, which are needed to store and process data with low latency. Alliance Bernstein estimated last year that cloud servers would grow 50% and enterprise servers would grow 25% by 2025.

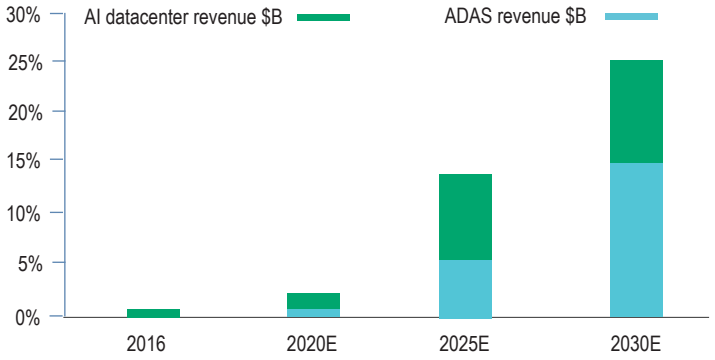
Within DRAM memory alone, analysts estimate that revenue derived from assisted driving and data centers will increase to $24 billion by 2030. Memory is just one example in the downstream semiconductor sector that is set to gain from the AI revolution. All parts of the value-chain, including silicon wafer, chips, and foundry, will benefit from the megatrend. Semiconductor strongholds Taiwan and Korea, and even newcomer China, should benefit.

Figure 8a: AI DRAM GB demand impact



Source: Bernstein estimates and analysis, July 2017

Figure 8b: AI DRAM revenue

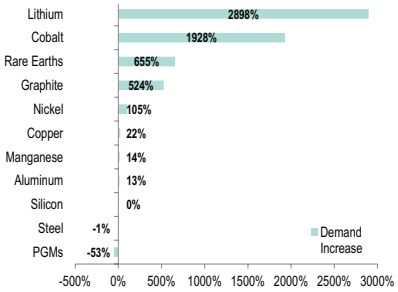


Source: Bernstein estimates and analysis, July 2017

Metals

One of the most exciting AI applications is the eventual shift to autonomous driving. Electric vehicles are often deemed the ideal solution for autonomous vehicles, from both an environmental and an engineering standpoint. Adding autonomous driving equipment to a car adds weight, aerodynamic drag, and electrical power consumption, leading to increased fuel consumption. However, with electric vehicles, emissions can be reduced by 55% to 65%. On the engineering side, there are much fewer moving pieces in an electric vehicle, resulting in less room for mechanical failure.

Figure 9: In a potential scenario of 100% electric vehicle adoption



Notes
Needed in all Lithium-ion batteries
Used in the Bolt's MSC cathode
Bolt uses neodymium in permanent magnet motor
Used in the anode of lithium-ion batteries
Used in the Bolt's NMC cathode
Used in permanent magnet motor & wiring
Used in the Bolt's NMC cathode
Used to reduce weight of vehicle
Bolt uses 6-10x more semiconductors
Uses 7% less steel, but fairly minimal impact on market
Catalytic converters not needed in EVs

Source: UBS Evidence Lab, September 2017. EV: Electric Vehicles

Should the world reach a 100% electric vehicle adoption, demands for many metals will skyrocket. The vast opportunity lies in not only the battery packs but also the body and the motor. These estimates do not yet include the additional demand created from complementary applications such as grids and charging infrastructure, applications that accelerate the need for metals. While electric vehicle adoption is still nascent, investment and consolidation in the metal industry have picked up significantly.

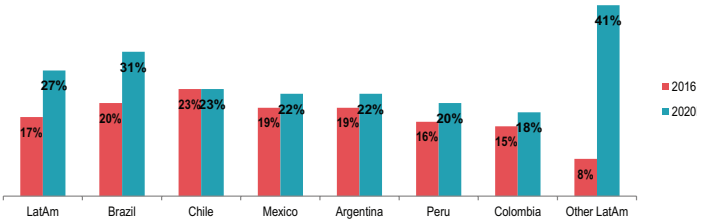
Cobalt, an essential metal in cathodes, is constrained by supply in tonnage and origin. Almost 60% of the world's unrefined cobalt output in 2017 came from the Democratic Republic of Congo, whose output was more than 10 times that of the second producer Russia. The price of cobalt has nearly tripled in the last two years, surging 129% in just 2017. Players along the value chain scramble to secure additional supplies. GEM, a China-based battery producer and recycler, struck a deal in March this year to buy a third of the cobalt output from projects owned by international commodities major Glencore over the next three years.

On the lithium front, even though it is not as supply-constrained as cobalt is, suppliers have quickened the pace in reaching greater concentration in an already oligopolistic market. In May this year, China-based Tianqi Lithium agreed to buy a 23.8% stake in Chile's Sociedad Quimica y Minera for $4 billion USD. The acquisition will boost Tianqi's global share of the metal's output to 18 % from 13%.

In addition to cobalt and lithium, other EM mining firms such as Norilsk Nickel (Nornickel) in Russia and Vale in Brazil are also principal players in the race for electrification. Nornickel is the world's leading producer of nickel, palladium and copper. Vale is the largest producer of iron ore and nickel in the world, and an important producer of manganese, copper and cobalt.

Telecommunication

Figure 10: 4G penetration as a % of total mobile devices



Source: Goldman Sachs Research, April 2018

For most of the EM countries, especially in Latin America, South East Asia and India, digitalization and 4G are still novel concepts. For example, the average 4G penetration in Latin America is just 17% and only 26% of total subscribers are on post-paid plans. However, as the economy recovers and as rollout for end-applications using digital services accelerates, growing evidence shows that customers are willing to pay more for better connectivity and network coverage. As 4G penetration deepens, the percentage of post-paid subscribers should therefore rise, enhancing the value proposition and monetization of telecom operators.

In more advanced EM countries, such as China and Korea, operators are moving into 5G deployment and value-added services such as payment, e-commerce, Internet of Things and data center, riding the AI growth wave.

Why is investing in emerging markets AI attractive?

Figure 11: China has a large pool of data

	Games	Advertising	Retail	Travel	Local services	Video	Music	Literature
TAM 2020e RMB bn	325	1,033	47,943	3,420	11,983	92	23	59
2020e online penetration	100.0%	74.7%	25.8%	55.9%	14.5%	100.0%	96.0%	22.7%
2017 online penetration	100.0%	60.4%	18.4%	45.2%	10.8%	100%	96.0%	11.4%
Online size 2017 RMB bn	217	388	6,752	1,085	978	28	6	5
Top 2 players	Tencent, Netease	Baidu, Alibaba	Alibaba, JD	Ctrip, Meituan	Meituan, Ele.me	iQiyi, Tencent Video	Kugou, Kuwo	China Literature, iReader*
Top 2 market share 2017	72%	48%	81%	52%	3%	69%	-	73%

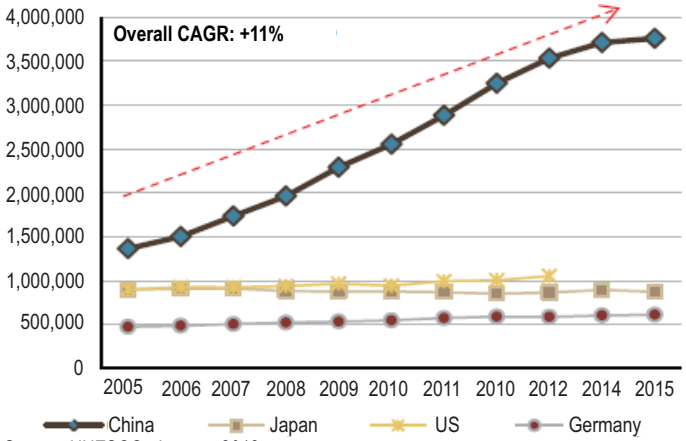
Source: TAM: Total Addressable Market Source: BNP Paribas Asset Management, Goldman Sachs, August 2017

China is an interesting case as to why so many AI-related investment opportunities are emerging. Firstly, China has a large data pool across many verticals and industries (see Figure 11). The country has over 900 million smartphone users with easy internet access (four times the number in the US or India), the market is also an eager adopter of leading technologies in their daily lives. For instance, the total value of mobile payment transactions in China is more than 10 times that in the US. Digital penetration is very high across a range of day-to-day applications, ranging from retail and travel to entertainment and local services. This large volume of data generated by various applications form the backbone of AI development.

Secondly, China has a large pool of low-cost engineering talent. Every year, 3-4 million students graduate in math, science and engineering or technology related disciplines vs. approximately 500,000 in the US. Today, China has the world's highest number of R&D personnel, three times the number in the US (see Figure 12). China's large economy and booming business opportunities mean Chinese technology companies can now compete with western firms in hiring the most talented engineers. Chinese companies have opened research labs in Silicon Valley and offer comparable salaries (see Figure 13).

Last but not least, the Chinese government is highly supportive of AI development and is already setting the goal of positioning the country to be a major AI innovation hub in the next decade. In 2015, the Made in China 2025 policy was announced by the State Council – the first ten-year action plan that calls for green, innovative and intelligent manufacturing in China. In the "Internet+" Action Plan, the plan listed AI as one of its 11 key focus areas. In 2016, the Chinese government published the Three-year Implementation Plan for "Internet Plus" Artificial Intelligence. This identifies six specific areas of support for AI development, including capital funding, system standardization, IP protection, human capital development, international cooperation and implementation arrangement. The importance of AI was reiterated in 2017, with the government's New Plan on Artificial Intelligence Development, in which China's goal is to catch up with global leaders and achieve world-leading positions in AI by 2030 by solving issues such as a lack of high-end computer chips, software and trained personnel. The government looks set to play a growing role through policy support and regulation. It expects China's overall AI industry to be synchronized with international development, and to lead the global market in system-level AI technology and applications.

Figure 12: China has the highest number of R&D personnel globally (3 times higher than the United States)



Source: UNESCO, January 2018

Figure 13: Baidu offers competitive salary in hiring machines learning talent (ML Scientist Salaries)

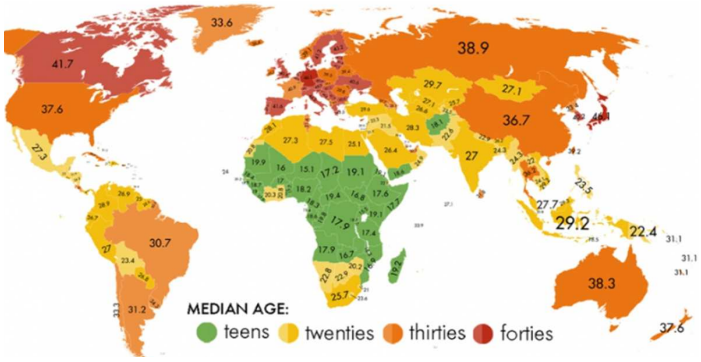
Source: Paysa, Goldman Sachs, August 2017. Note: data based on its analysis of 7.45 million job changes across 198k companies over the past 15+ years.

Most EM countries have favorable policies toward AI adoption. According to SAP, more than half of 1,500 AI research projects in Russia in the past decade were paid for by the state[2]. Hungary and Poland have actively supported the growth of start-ups by setting up special economic zones, investing in infrastructure, and providing tax breaks. In the UAE, the government just appointed its first minister for AI in October 2017 and it launched a $270 million Dubai Future Endowment Fund in the same year. Saudi Arabia shares a similar ambition to invigorate the economy

[2] Source: http://www.eenewsanalog.com/news/look-ai-russia-0

through innovation in the National Transformation Program 2020 and Vision 2030 programs announced in 2017. In November 2017, Saudi Arabia's Crown Prince Mohammed bin Salman also pledged $500 billion to build a new, high tech city called Neom on the Kingdom's Red Sea coast.

Figure 14: Favorable demographics in the emerging markets

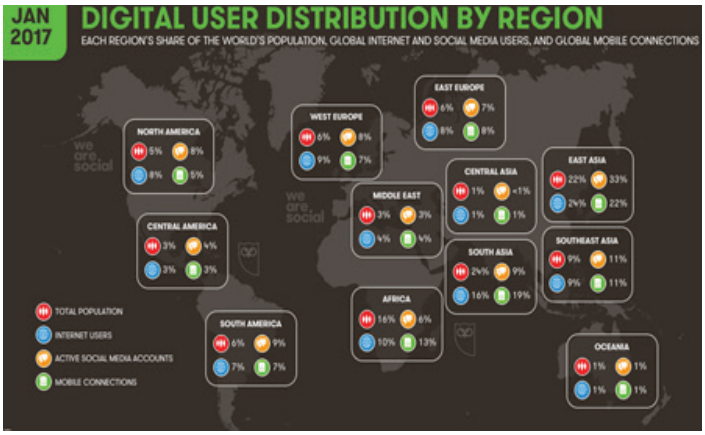


Source: CIA World Factbook, September 2014

Besides favorable government policy, the demographics in EM have also acted as a tailwind for AI. The median age in most of EM countries is much lower than that in developed markets. A younger population is often correlated with a greater willingness to accept new technology. Increasingly cheaper smartphones have also enabled EM countries to leapfrog the desktop age, straight to mobile adoption.

Statistics have shown that Asia and Latin America have consistently led developed markets in terms of digital and social media penetration in the last few years, despite later adoption by EM. Such trend to digitalization is key for AI because digitalization enables data collection, which ultimately leads to extracting insights and making inferences using AI framework.

Figure 15: Digital user distribution by region



Source: We Are Social Ltd., Jan 2017

In addition to benefiting from a younger population, another demographics dividend that cannot be underestimated is the large population size in EM. China and India together account for 36.4% of the world population. As Sachin Chitturu, a partner at the McKinsey Digital Labs based in Singapore, said in an interview last year, "Value increases as scale does. […] The economies of scale and the cost improvement are so much better."

Challenges that face EM in the rise of AI

Although the rise of AI is expected to materially increase productivity, it may cause social and economic challenges in the short term. Jobs involving routine work and predictable, programmable tasks will be particularly vulnerable to replacement by AI. Many key emerging market industries are labor-intensive and thus could be the primary victims of job losses to AI. According to McKinsey Research[3], it is estimated that 50% of work tasks in China (affecting 394 million workers) could be replaced by AI. Also, the technology is developing at such a speed that it could leave little time for many of these emerging markets to capture the remaining labor dividends or move up the industrial value chains. The combination of sharply increased demand for advanced digital skills and a growing surplus of lower-skilled labor may exacerbate inequality. Similarly, the growing adoption of AI may underscore existing divisions between urban and rural areas due to the gap in assessing quality education and tools that increasingly emphasize the digital skill-sets. Helping the labor force in heavily affected industries to adapt and gain more relevant new skills will be an ongoing challenge that is critical to maintaining public welfare and social stability.

A second challenge hinges on the openness of data networks. Although emerging markets tend to involve large populations and cumulate large volumes of data, many of these data networks are either closed or too concentrated in the hands of too few to allow the AI dividends to flow efficiently to other parts of the economy.

Moreover, many emerging markets are still lagging in key technology building blocks, such as semiconductors or advanced telecommunication networks. This bottleneck could increasingly become a serious issue on the back of rising nationalism globally. Developed markets such as the US also have a more comprehensive innovation ecosystem. For example, the US is home to not only the leading technology firms, but also to some of the world's best universities and research institutions. For China to address its talent gap in AI, the government will need to further invest and reorient the education system for a greater focus on innovation and digital skills.

[3] Source: McKinsey Global Institute, "Artificial Intelligence: Implications for China", as of April 2017.

Furthermore, AI's introduction to society also has many legal implications. The technology is advancing at such a speed that it could be increasingly difficult for governments to adjust their legal and social systems rapidly enough to keep pace. Therefore, it is crucial that governments in emerging markets work closely with different stakeholders to balance the need to bolster productivity and maintain social equality.

In a nutshell, there are risks that many of these social issues, such as income inequality and discrimination, may only be made worse if emerging markets do not adjust to this new world quickly. Policymakers will need to consider and prepare for the potential labor market disruptions that AI could unleash.

Future development

For EM markets as a whole, some existing structural issues should get resolved in the short to medium term. Currently, lack of talents is the most commonly cited reason for the gap in AI development that exists between developed and emerging markets. Many countries also lack infrastructure. However, the long-term attractiveness of AI investment and the rapid adoption in EM are clear trends. Many foreign owned companies have long deployed resources in EM. For example, in India 58% of the companies are using AI at work at scale[4]. The sector is dominated by foreign firms such as Accenture, Microsoft, and Adobe, all of which have their innovation centers in India. Foreign presence in the country is an important step to AI adoption as it helps raise awareness and educate the local workforce.

In China, the country is gradually narrowing the gap with developed markets in some key technology building blocks. China has already outstripped the US in terms of AI research publication and citation. It is already spending more than the European Union in terms of R&D and the spending gap with the US continues to narrow quickly. Today, China has over 600 AI start-ups, making it already second only to the US. Since 1999, China has invested about USD 10 billion in AI, again bringing the nation second to the US (with USD 16 billion). As detailed previously, an increasing number of leading AI talents are coming back to China to work for local companies. China is seeing the rapid emergence of domestic technology leaders, such as Baidu, Alibaba and Tencent. These companies have participated in over 300 AI-related equity deals since 2014, over 50% of which have been outside China. They have created investment and research centers around the globe including in the US and Israel. AI-related investments in China are also slowly diverging beyond the popular fields (e.g. computer vision and voice recognition) to other areas (e.g. AI processors, autonomous driving, natural language processing etc.), which is a sign that the country is emerging as a vibrant innovation ground in AI.

Conclusion

In short, despite a number of challenges, AI could bring many new opportunities to emerging markets. A number of markets, such as China, are already progressing at the forefront. More companies from the region are well positioned to benefit from AI, either as technology drivers of AI or as the early adopters of AI in traditional industries.

[4] Source: https://qz.com/1198182/modi-government-pushes-for-artificial-intelligence-like-china-but-is-india-ready-for-it/

Biographies

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Michelle is an Analyst for the Global Emerging Markets Equity team at BNP Paribas Asset Management. She focuses on Technology, Healthcare and Telecom.

She joined the team in 2017 and she is based in Boston. Prior to her current position, Michelle was an Associate at Blackrock where she formulated capital markets assumptions and evaluated key return drivers on behalf of clients. She also delivered portfolio construction solutions by performing scenario analyses, optimization, attribution and valuation.

Michelle has five years of investment experience. She speaks fluent Mandarin and Cantonese and holds a BSc in Economics, magna cum laude with a concentration in Finance and Accounting from the Wharton School at the University of Pennsylvania.

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Based in Hong Kong, David joined BNP Paribas Asset Management in 2012 as Portfolio Manager. Within the Greater China Equities investment team, he is a major contributor to the investment process, particularly in fundamental equity research, with specialist knowledge of the technology / media / telecom, insurance, diversified financials and materials.

Prior to joining BNP Paribas Asset Management, David worked at Fidelity Management & Research (Hong Kong), as an International Equity Analyst specialising in Asia Pacific Telecommunications.

In addition to his expertise in investment management, David brings valuable experience and insight from his prior roles as a Senior Associate in Mergers and Acquisitions Advisory at Deloitte & Touche (Hong Kong), and as a Senior Consultant in Economic Consulting Group at Deloitte Financial Advisory Services (Boston, USA). David worked in a number of projects spanning different industries such as banking, media, telecommunication, utility, logistics, manufacturing, and healthcare.

Born in Hong Kong, he holds a Master of Business Administration degree from the Wharton School of Business at the University of Pennsylvania (USA). He also holds a Bachelor of Science degree in Economics and Management Science at the Massachusetts Institute of Technology, in Cambridge (USA). David is a CFA® charterholder and a member of the Hong Kong Chartered Financial Analyst society.

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