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In-depth analysis and insights to inform your decision-making.

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Emerging Markets
INVESTING IN CHINESE INNOVATION

KEY POINTS

- China has made innovation a strategic priority that is creating an ecosystem of new, rapidly growing companies and opportunities for small- and mid-cap investors.
- China is challenging the United States in the development of artificial intelligence, and it is taking a leading role in mobile payments, online gaming, e-commerce, and high-speed rail while making significant advances in robotics and electric vehicles.
- China's domestic A-share stock markets are becoming more accessible to foreign investors and provide a large and diverse opportunity set in such sectors as health care, consumer goods and services, financials, and industrials.
- Reflecting China's focus on innovation, the weighting of the technology sector in the MSCI China Index has risen from just 3% a decade ago to 41% as of May this year.
- T. Rowe Price takes a strategic approach to investing in Chinese innovation, focusing on biotech and early-stage Internet companies, companies sustaining innovation for better performance and efficiency, and those with new business models that leverage technology to gain market share.

On its way to becoming the world's second-largest economy, China's growth was characterized by the low-skill manufacturing and the export of such basic consumer goods as clothing and shoes. While these remain important but shrinking parts of its economy, China recently has focused on fostering innovation and intellectual property, spurring an ecosystem of new, rapidly growing companies and opportunities for investors.

As part of its "Made in China 2025" plan, the country is moving up the value chain with government and private investment supporting significant progress in advanced information technology, leading-edge manufacturing, software, automated machine tools and robotics, modern rail transport equipment, new energy vehicles and battery technology, and biotech and advanced medical products.

While it will take time for China to approach the level of sophistication found in some advanced economies, it has separated itself from other emerging markets in terms of innovation. It is already playing a leading role in such areas as mobile payments, online gaming and commerce, high-speed rail, smartphones, surveillance cameras, telecom equipment, and social media.

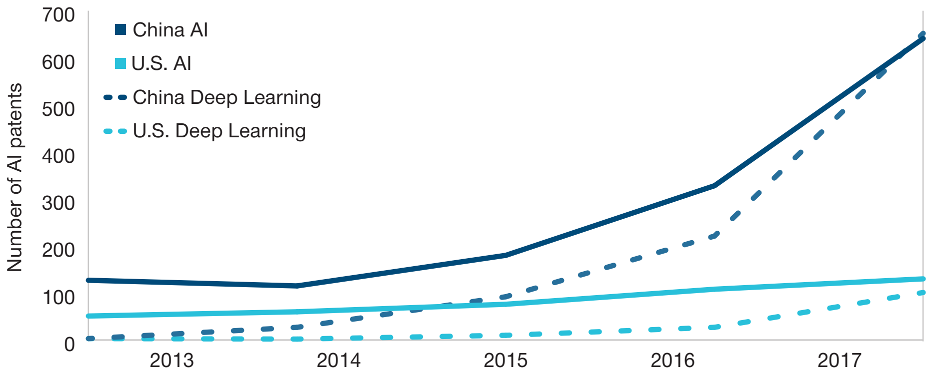
In artificial intelligence (AI), China's leading technology companies, such as Baidu, Alibaba, and Tencent, are challenging U.S. goliaths Google, Microsoft, Amazon, and Facebook. The Chinese firms have been bolstered by generous government support, abundant engineering talent, substantial private sector investment, and huge amounts of digital data for developing machine learning applications. However, it still must import the semiconductors crucial for AI advancement.

The Chinese government has made AI a strategic priority and plans on becoming the dominant force in this advanced technology by 2030. China accounted for more than 600 AI-related patent applications last year compared with 130 from the United States, according to a recent Bank of America/Merrill Lynch research report. A similar patent gap has opened up in deep learning—the technology driving the rise of AI.

With smartphones, Chinese firms have more than 50% of the market share in China, India, and many other emerging markets. Other developments that reflect the growth of China's innovation economy include:

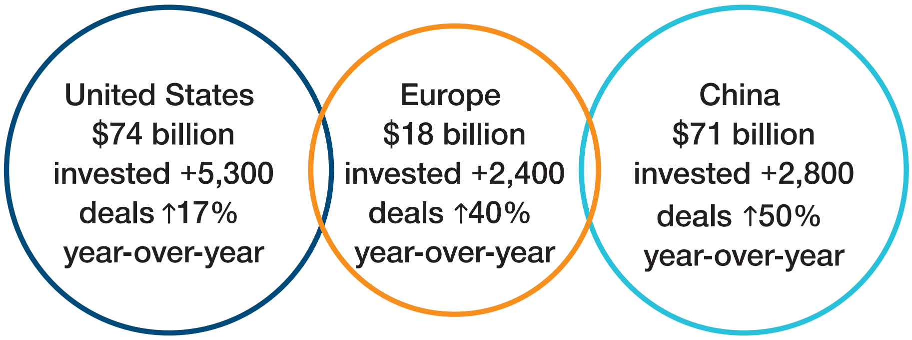
- **Internet:** With a surge in private-equity and venture capital investment, partly fueled by the venture capital of technology titans Alibaba and Tencent, China is home to a significantly growing number of so-called unicorns, or private companies with valuations of at least USD $1 billion, many of them Internet-related. China had about USD $71 billion invested in venture capital in 2017, almost catching up with the United States in that year's investment total. The downside, however, is that with so much venture capital available for start-ups, many are staying private longer.

FIGURE 1: **China Is Challenging the United States in Artificial Intelligence (AI)**
As of December 31, 2017



Sources: BofA Merrill Lynch Global Research and Sinovation Ventures AI Institute.

FIGURE 2: **China Catches Up to the U.S. in Venture Capital Funding**
As of December 31, 2017 in U.S. Dollars



Source: PWC | CB Insights MoneyTree Report Q4 2017.

- **E-commerce:** Without a competitive brick-and-mortar retail establishment, e-commerce as a percentage of retail sales and digital advertising spending as a share of overall advertising spending in China now exceed that in the United States.

- **Technology stocks:** The weighting of the technology sector in the MSCI China Index has risen from just 3% a decade ago to 41% as of May this year.

- **Research and development (R&D):** China's R&D spending—most of it by companies, not the government—is already higher than in Europe and gaining on the United States. It has accelerated from 0.9% of its gross domestic product (GDP) in 2000 to 2.12% in 2016 (compared with 2.74% for the United States). A Merrill Lynch study found that Chinese R&D spending as a share of its GDP compounded at an annual rate of 6.8% over the past 20 years versus 0.6% for the United States.

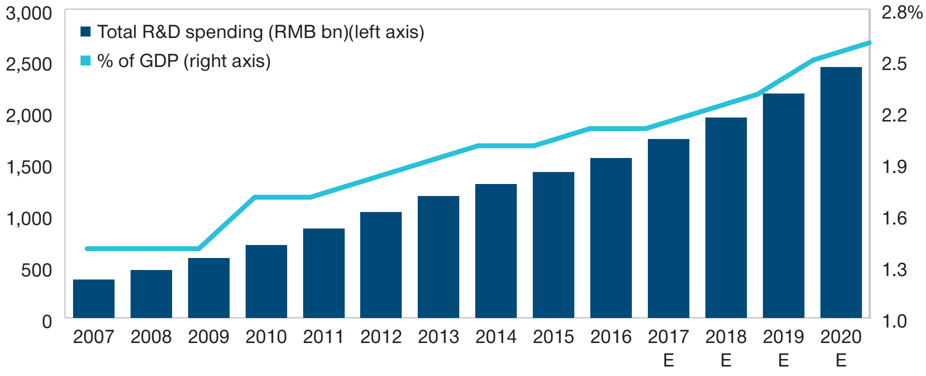
- **Education:** China annually graduates the world's largest pool of scientists and engineers. In 2016–2017, 40% of about 350,000 Chinese students who came to the United States for higher education were enrolled in science, technology, engineering, and mathematics programs. And China is luring these graduates and those who have worked in the technology and pharmaceutical industries back home with financial incentives.

- **Management:** Previously, Chinese firms were focused on creating capacity. Now managements are much more disciplined and willing to rationalize capacity, focusing on becoming the most profitable company rather than the largest. So capacity has been restructured and debt is being reduced, and there is a drive to improve long-term returns on capital and capital allocation, resulting in a recent boom in free cash flow.

- **Scale:** China's size enables and encourages companies to take risks and helps lower the unit cost of production. It also fosters R&D investment because new companies could have large potential markets. High-speed rail and telecom equipment, on which China by far is the world's biggest spender, are industries that have benefited. China's huge population also provides an advantage in collecting data for machine learning applications.

- **Global competitiveness:** The most comprehensive index measuring innovation with a wide range of criteria is the Global Innovation Index, published by the World Intellectual Property Organization, Cornell University's SC Johnson College of Business, and the European business school INSEAD. In the 2017 study, China ranked 22 among 64 developed and emerging

FIGURE 3: **China Is Becoming a Global Innovator**
As of September 30, 2017



Sources: National Bureau of Statistics of China and Credit Suisse estimates.

markets, a big jump from its global ranking of 43 in 2010. Moreover, China led the rankings for 10 middle-income countries. In an analysis issued last year by the Center for Strategic and International Studies, the report concludes that China still has "a substantial distance to travel" before catching up with the level of innovation in advanced economies. But the report also notes that "China is distancing itself from other emerging economies, such as Brazil and India, and gradually approaching more advanced industrialized economies known for their innovation prowess."

STRATEGIC APPROACH

In our global approach to investing in small to medium-sized companies, we pursue a strategic investment strategy, placing our biggest bets where we have time and information advantages. The best companies are adaptive and innovative and consistently add economic value. The shift in China from macro-levered growth to innovation-driven growth plays to our strengths.

We also leverage T. Rowe Price's vast global research capabilities. For example, we were relatively early investing in the Chinese Internet. Ongoing assessment of such opportunities has benefited from the firm's long experience investing in the U.S. Internet sector. Having local teams of research analysts on the ground in these markets who know the language and culture is also crucial to uncovering opportunities.

We categorize innovation into three buckets. The first is companies with disruptive technology, products, or services; these include biotech and early-stage Internet companies. The second focuses on sustaining innovation for improving performance and efficiency—common in technological hardware and auto parts. The third bucket consists of new business models levered to technology trends to gain market share. From December 31, 2014, through May 2018, about 90% of the value added in our China strategy relative to the MSCI China SMID index can be attributed to investment in such innovative companies.

Investments in Chinese Internet companies include a livestreaming online platform where users interact through voice, text, and video; online listing platforms that enable local merchants and consumers to conduct business; an online media company and mobile portal for news and information; and an e-commerce leader serving foreign brands that want to access the largest emerging middle class in the world.

Chinese health care investments include some of the country's most promising pharmaceutical companies and one that enables biotech start-ups. Other investments in innovative firms include one that offers an online education platform, a hotel operator that is well positioned to consolidate China's highly fragmented hotel industry, and a shipping logistics company.

HEALTH CARE STRIDES

We maintain a positive view of China's growing pharmaceutical industry. Within the last decade, China doubled the provision of health care coverage to 95% of the population, fueling rapidly growing demand for quality drugs—mostly generics. However, a new generation of Chinese biotech start-ups is developing homegrown innovations and attracting record investment.

Over the last decade, China has attracted 250,000 of its citizens to return from careers overseas in the life sciences by providing initial funding to start their own businesses and other incentives, thereby forming a foundation of biotech entrepreneurs.

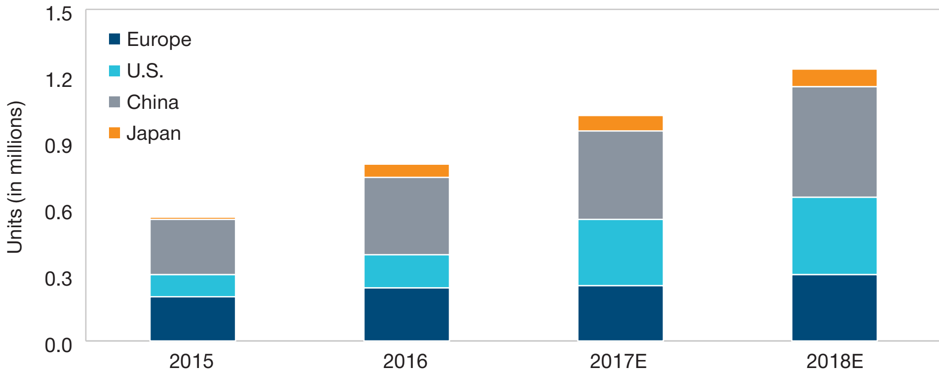
China's large pool of patients is a structural advantage for drug development in terms of cost and time to market. It is estimated that more than 20 Chinese biotech companies will list on the Hong Kong stock exchange in the coming quarters.

Admittedly, China biotech is still behind Western incumbents in many aspects, and the industry experiences long cycles with periodic bubbles. The first wave of biotech in China is producing drugs for the domestic market, but the next wave will focus on drugs with genuine global appeal.

In addition to health care, new opportunities also continue to emerge in the technology sector. Technology continues to evolve, which creates opportunities for disruption. With

FIGURE 4: **China: A Leading Market for Electric Vehicle Sales**

As of September 28, 2017



Source: UBS Q-Series "China Sparks: from smokestack to labtech; where is the Chinese innovation boom taking place?" September 28, 2017. Sources cited: China Auto Market and UBS.

plentiful venture capital, however, companies are staying private longer and achieving high valuations. Several private companies have emerged over the past five years in China with valuations greater than USD $30 billion.

CHINA'S A-SHARES

China's A-shares—stocks listed on mainland Chinese stock exchanges—are becoming more accessible to foreign investors who have had limited access to China's equities market.

The A-shares markets include about 3,200 stocks, providing a large and diverse opportunity set and significantly expanding the investable universe in the health care, consumer goods and services, and industrials sectors, particularly for small- and mid-cap investors. Many of the structural growth stories reside in this part of the market.

T. Rowe Price has been investing in the A-shares market for a decade but with limited exposure. These "onshore" stocks have only been available to foreign institutions under strict quotas set by the Chinese government.

In June, MSCI, the global index provider, began including a portion of the China A-shares market into the broad MSCI Emerging Markets Index with the intention of expanding that list over time. In our view, the index has been hugely understating the opportunity set in China.

At the same time, the A-shares market is a challenge to navigate. It is dominated by retail domestic investors, is often driven by momentum and speculation, has limited transparency, and can be notoriously volatile. However, it is also an inefficient market, which creates opportunities for research-driven, active investors who can take advantage of the volatility.

CONTINUING PRIORITY

The scale and sophistication of innovation that we see in China may be surprising. But we expect it to continue gaining momentum, buoyed by a supportive government policy, a market of more than one billion people, and industry clusters that will continue to evolve and progress.

Chinese President Xi Jinping has made it clear that there will be no significant changes to China's economic strategy, with the emphasis remaining on quality over quantity and on gradual progress toward a more market-driven, entrepreneurial economy.

There will certainly be roadblocks and misallocation of capital. The United States is still the most important innovative engine—followed by China, which is leading the rest of the world.

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T. Rowe Price focuses on delivering investment management excellence that investors can rely on—now and over the long term.

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