CHINA MONTHLY

OCTOBER 2023

The Big Picture

No city in the world is further from the sea than Xinjiang's capital Urumqi, yet the region is now sustainably farming seafood through advances in agricultural technology.

SINGAPORE   SHANGHAI   BEIJING   SHENZHEN

THE BRIEFING

Signs of Stabilization

Industrial output and retail sales grew 4.5% and 4.6% respectively YoY in August, both surpassing consensus expectations. Manufacturing and credit demand also showed signs of a rebound, which could mean the economy bouncing back. However, the stabilization of housing prices, which is likely necessary to sustain a recovery in consumer confidence, has yet to solidify as of August.

Healthcare Cleanup

Over 180 hospitals have been swept up in China's latest anti-corruption campaign. The effort is aimed at cleaning up practices in a healthcare sector that has long been marred by bribery and embezzlement, by doctors as well as senior hospital management.

Strategic Emerging Industries Fund

China Reform Holdings (CRH), a state asset manager set up in 2021 and tasked with deepening SOE reforms, is planning a development fund of at least CNY100 billion to invest in strategic emerging industries. The fund has interest from more than 20 government-owned enterprises, provincial administrations, and social capital, and is expected to start operating within the year. CRH managed nearly CNY860 bn of assets at end 2022.

Avoiding Deflation

China's prices are recovering, with the all-sector price index hitting a 14-month high of 50.9 in September, according to data company World Economics' independent survey. "This suggests fears of Chinese price deflation ushering in a Japanese-style period of very low or negative growth have been overblown," it said.

US, China Launch Senior Economic Working Groups

The United States has launched new economic and financial working groups with China that would come under Treasury Secretary Janet Yellen and China's Vice Premier He Lifeng. They would meet "at a regular cadence" and "will provide ongoing structured channels for frank and substantive discussions on economic and financial policy matters".

AI: THE NEXT SPACE RACE
By Russell Cai and Wong Qi Yang

In 2021, APS discussed a two-Sun global order, predicting a shift in the global geopolitical economy from an American-led order to one where China develops into a center of a secondary solar system. Artificial Intelligence (AI) is akin to gravitational force in this solar system, drawing some countries to orbit both Suns, while others are firmly in the grip of one or the other.

A new space race has begun. Supremacy in the adoption of AI — which is as critical to 21st century modernization as 5G technology — will soon become the linchpin for productivity gains, new markets of growth, national security applications, becoming synonymous with technological supremacy. There may only be two winners in this race, and China might be one of the two, to ascend as the second Sun.

Despite headwinds from the low density of Chinese-language content on the internet, corporate cultures that are relatively more conservative in spurring innovation, and the global "de-risking" trend, China may well succeed before 2030. Our optimism is informed by four key facets of the unique dynamics in China's budding AI ecosystem:

1. Far-sighted regulatory support undergirds large players like BBAT (Baidu, ByteDance, Alibaba and Tencent), as well as smaller players like Minimax and other startups;
2. Growing competency in building specialized chips that trade generality in function for lower cost and computational efficiency;
3. World-leading AI research and the availability of massive volumes of manufacturing data that will power future breakthroughs in AI technology;
4. National champions like Huawei with the expertise to overcome geopolitically motivated restrictions that will attract other countries to revolve around Chinese standards in AI.

China reckons that it must succeed, else its ascendency as the second Sun will be at risk. China's success in the AI race is a cornerstone of the country's long-term investment thesis.

Why Only Two Suns?

To command a dominant position in AI, you either offer the most cutting-edge technology, or you offer less-than-cutting edge technology at very competitive pricing. Currently, the US is the undisputed leader of innovation in AI, and their products are the most advanced and

dominate the global scene (think Amazon Web Services, Alphabet, OpenAI). Most other economies struggle to compete, and at best become a major player in very niche environments, not nearly enough to have other countries revolve around them. China may be the only economy skilled enough to offer less-than-cutting-edge technology at a low enough cost and a large enough scale to be competitive as the clear second option. Hence, China is the most likely candidate among all nations to emerge as the second Sun.

The de-risking process and technological war imposed onto China will likely result in incompatible systems and parallel technological standards. Countries are disincentivized to combine AI systems from different sources if they are not cross compatible. Like how it is futile to try downloading an Apple App Store application on your Android mobile phone, countries will find it much more efficient and effective to use cross-compatible AI systems and applications, meaning that they are more likely to lean toward one Sun than the other.

This two-Sun solar system is perpetuating, because the growing gap between the suns and the planets is exacerbated by AI technology. Take the electric vehicle (EV) industry for instance. In 2015, worldwide plug-in EV sales barely crossed half a million units, the technology was so nascent that you would be forgiven for believing that traditional Internal Combustion Engine (ICE) companies like Volkswagen (VW) could easily catch up.

Recently VW bought a 5% stake in Xpeng, a Chinese EV company, to gain access to their EV manufacturing capability and autonomous driving architecture. Many auto watchers view this as a crucial turning point for the auto industry: VW has admitted that it could not remain competitive without Chinese technology.

Over time, we can expect AI-powered Chinese technology to be foundational to other industries, strengthening China's position as the second Sun, bringing a new wave of investment opportunities.

Roadblocks to China's AI Development

American-orchestrated obstruction, which will likely persist for some time, presents the most serious challenge to China's AI ambitions. Citing national security, the US and its partners have severely restricted China's access to cutting-edge technology in crucial AI-related industries. Strangling access to chips, chip-manufacturing equipment, and capital are materially challenging to the development of Chinese AI, since training models on older, more dated servers will consume more time and resources. In fact, as China draws nearer to the cutting edge, those strictures might both tighten further and multiply.

Other challenges are more within China's control. It is almost universally recognized that data quantity and quality form the backbone of AI training. Despite having more internet users than any other country (around 20% of the world's total internet population), Chinese-language content on the internet is significantly underrepresented, accounting for only 1.3% of total accessible internet content. As a result, many Chinese large language models (LLM) like Baidu's ERNIE have been trained using a mixed-language data set, comprising English and Mandarin. Thus far, none of the Mandarin-trained LLMs have convincingly beaten OpenAI's

GPT-4, and the consensus is that Chinese players in the generative AI space are two generations behind. Catching up to the leading edge will require a few generations of refinement of data quality and processing, to overcome the domestic "data drought".

Corporate culture differences between American and Chinese AI companies are also important when charting the development of leading-edge AI, since it contributes to the funding of AI projects and talent. Thus far, we see that American companies have embraced a culture of innovation mostly for the sake of innovation. While monetization is still an important goal, innovation-centric teams lead the charge, and open-source development is more prominent outside of China.

Chinese companies are more careful about their development efforts, often investing heavily only when a path to monetization is clear. Some argue that one result is that Chinese companies tend to lag in developing cutting-edge technology, especially when the market still has not fully digested previous-generation technology. This cautiousness extends to hiring AI talent, with companies less willing to pay premiums for the best AI engineers. The mean salary of an AI engineer in China is only slightly more than a third of the mean in America. Even if we account for differences in standards of living, the average Chinese AI engineer is still paid far less than the American counterpart, which might hobble Chinese firms' acquisition and retention of world-class AI talent.

However, these challenges are not fatal to the Chinese AI industry.

Tailwinds

While hardware is important for training AI models, China can overcome their restricted access to cutting edge technology by using slightly older chips and infrastructure, as well as software that is more finely tuned. To predicate the success of an entire industry on access to cutting-edge Graphics Processing Units (GPU) is too simplistic.

Customization of training requirements and increasing demand for edge computing will lead to more demand for specialized chips and pieces of infrastructure to boost the efficiency of the AI infrastructure. We believe that Chinese players can still contribute to the AI infrastructure industry meaningfully through developing Application-Specific Integrated Circuits (ASICs), computer chips that have specialized functionalities.

Examples include Rockchip and Fullhan, which produce System-on-Chips (SoCs) and ASICs applicable to AI inference, edge computing, Advanced Driver Assistance System (ADAS), etc. Such chips are designed to boost the penetration rate of AI functionality among servers, IoT, and automobiles. The lead of global players is continually being eroded by Chinese players, which provide reasonably priced alternatives, fueling the domestic substitution trend at the expense of overseas players like Qualcomm.

Further, Chinese firms have both pre-emptively built-up reserves of powerful chips and have made remarkable progress in developing their own GPUs and ASICs for AI model training. The BBAT companies have purchased USD5 billion of chips from Nvidia, while Huawei

developed and trained their Pangu 3.0 LLM using the domestically produced line of Kirin chips designed in-house.

China might be able to drastically reduce reliance on Nvidia GPUs for AI training, following SMIC's reported breakthrough in manufacturing yields for 7-nanometer (nm) equivalent processes, which catalyzed Huawei's much-talked-about release of its near-5G Mate 60 phone series. This notable breakthrough paves the way for China's chip design houses to domestically produce GPU and ASIC substitutes for Nvidia's cutting edge H100 GPU, using SMIC's technology. Chinese firms may be able to reduce their reliance on Western technology, and maybe even achieve better AI training using ASIC chips. Having local, cost-efficient alternatives also lowers entry barriers for new entrants, spurring innovation and competition.

Perhaps the most important tailwind is generous government and regulator support. There are many indications that the Chinese government has budgeted time, effort, and resources in smoothening the process, having long taken a forward-looking stance towards AI. There are already state goals for AI development, as well as laws and regulations governing AI Generated Content (AIGC) since 2017. This early and intentional examination of the implications of AI adoption in China suggests that the government is determined to build a robust and deliberate AI ecosystem.

Chinese generative AI companies require approval before they can offer their products to the masses. Appropriate regulation reduces the risk of some users exploiting or misusing vulnerable and incomplete AI models. Recently, Chinese regulators approved 11 AI LLMs for public release, including the products of large companies like Baidu and iFLYTEK, to smaller startups like Minimax, and academia-linked projects like Zhipu AI.

The generative AI ecosystem in China is young and vibrant. While some experts claim that the high cost of developing and implementation will handicap smaller firms with less capital, the Chinese government has made progress in providing capital for startups.

While the US government has one CHIPS act, the Chinese government has set up at least 102 funds using state capital, and sponsored competitions with attractive cash prizes to directly subsidize and support research conducted by Chinese AI companies. State support can defray costs for many nascent Chinese AI companies or help boost their topline growth.

These companies, especially in key industries like cybersecurity or surveillance, will find that large State-owned Enterprises (SOEs) cannot rely on foreign, especially not Western, technology. These SOEs must turn to domestic AI providers, and can provide them with stable revenue, decent margins, and more predictable order streams.

Another significant tailwind is the strength of Chinese AI research. Since 2015, China's AI research has overweighted computer vision (CV), at 39% of the total, compared to the global average of 30%. The Center for Security and Emerging Technology (CSET) concluded that China's contribution to CV research singlehandedly matches the US and its allies. Deeper research focus on CV has resulted in material gains in CV applications in China. Even though

China leads in CV research, AI is broad, and China still has more work to do to catch up in other areas like LLMs.

While Chinese firms may need to take a more expensive and longer road to AI development and deployment, the more important point is that this flight path exists, and tailwinds will help accelerate their progress towards AI supremacy.

Much Ado About GPUs: Focus on AI Applications, Not Infrastructure

While Chinese companies can contribute to AI infrastructure, we do not think this offers the richest portfolio returns from the AI revolution. We believe that businesses that build applications that leverage AI technology, and companies that effectively use AI in their operations, will create the most value for investors.

We are less inclined towards AI infrastructure names, partly because euphoric investors have driven up the stock prices of AI infrastructure names, echoing the hype-driven dot-com bubble at the turn of the century. In addition, AI infrastructure companies are more limited in scope, while AI applications are near limitless in creating novel interactions and monetization paths.

In the near to medium term, we believe that Chinese companies that have championed CV applications are the most competitive on a global scale. China already has a commanding lead in CV, in both software and hardware. A study by America's National Institute of Standards and Technology found that the five best facial recognition AI were made by Chinese companies. Chinese CV AI is here to stay, and at the front of the line no less.

Hikvision and Sensetime are all national champions of global CV, especially in image recognition. We can also expect to see logistics chains and intelligent factories increase their productivity through CV-powered robot applications and construction sites improve safety standards through rapidly identifying potentially dangerous situations.

The recent advent of LLMs and AIGC have many wondering if a Chinese company will be a global leader in this field. While investor consensus is precluded by the lack of a clear path to monetization, we believe that monetization has been hiding in plain sight. Generative AI and AI do not necessarily have to be a standalone product or service from a viable company.

Huawei's heavy reinvestment in R&D despite significant headwinds, and fixation on delivering quality products to the market, are some reasons to look toward them to understand the future of profitable and sustainable Chinese AI. Huawei's Pangu 3.0 LLM was publicly announced in July during the 2023 Huawei developer conference. Despite the hype around LLM technology at the time, ironically, CV took center stage. Of ten significant use cases, six were squarely centered on Pangu-powered CV.

We can almost certainly expect companies that adopt implementing LLM technology to experience huge cost and time savings, giving them an almost insurmountable edge against non-AI enabled competitors.

On the application side, Huawei's Harmony OS 4 demonstrates how AI technology can be seamlessly integrated with existing devices, potentially extrapolating from your recent photos to suggest activities, analyzing changes in your tone while calling or texting to recommend getting some rest, plan date-night itineraries, and make on-point reservations almost instantly. Your AI assistant learns and improves on the job. Huawei's adoption of AI has been focused and represents what we think will be the future of AI application: not as a standalone technology but as a powerful tool for customized, user-specific integrations of different technologies.

> One application highlighted by Huawei was in China's highspeed rail fault detection system, where previously engineers at a single train depot would manually check through four million images of train carriages a day to spot for faults. Implementing Pangu's CV ability managed to reduce the workload of the engineers by 95% and had an astonishing exclusion rate of 0% for potential faults.

Another example is iFLYTEK, originally an information technology company focused on voice recognition technology, releasing products that transcribe and translate content for users. iFLYTEK is one of the 11 companies approved by Beijing to release their LLM services to users in late August. One week later, iFLYTEK released a keyboard that had AIGC technology in-built, able to prepare presentation slides or write essays in a single stroke. iFLYTEK's use of AIGC in hardware, a first in the industry, is a result of a culture that emphasizes early adoption and innovative combinations of products.

Hardware Meets Software: AIGC-enabled Keyboard from iFLYTEK. Source: Gizmochina

AI Application Companies at the Crest

Manufacturing upgrade, a vanguard comprising innovative private companies like Huawei that have substantial government support, and a need for a technological revolution to leaven its aging demographic, will contribute to the AI wave that will inevitably sweep across China.

We think that AI application companies are the best bet for investors looking to ride this wave, instead of getting sunk by the siren songs of "AI-washing" companies.

We believe that AI is as important to China's tomorrow, as the internet is to our society today. China must build its own strong AI enabled ecosystem of technologies to achieve its goal of modernization, and if it succeeds, will inevitably find itself at the center of its own solar system. For investors, they must look beyond the current hype and search for the long-term winners.

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