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Asia Economics | Asia Pacific

Humanoids and Robots – The Next Chapter in China’s Dominance in Global Manufacturing

Humanoids and robots will be pivotal in lifting China’s export market share. On our recent trip to Shenzhen, we saw positive developments which reinforce our conviction that it is poised for sustained, rapid growth. We remain watchful on issues of excessive competition and sustainable profitability

Key Takeaways

- In December 2025, we had projected that China will be able to increase its export market share from 15% today to 16.5% by 2030.
- Humanoids and robots are one of the key industries that will support this market share gain. Our recent visit to Shenzhen reinforces this belief.
- Recent developments suggest that China has already captured an early dominant position, just like how the EV industry was ~10 years ago.
- Moreover, as Asia enters an industrial super-cycle as we expect, this will help accelerate China's export market share gains.
- The risk is that the rapid development of humanoids may yet lead to the issues of involution in the near term and excess capacity in the long term.

In this report, we detail recent developments in China's humanoids and robots industry and highlight how the rapid developments in these segments will help China gain market share in exports.

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Humanoids and Robots – The Next Driver of China's Exports Machinery

Humanoids and robots will play a critical role in extending China's export market share gains:

In late 2025, we highlighted that China would continue to expand its lead in global manufacturing and exports despite the backdrop of a multipolar world. We projected that China's export market share will rise from 15% today to 16.5% by 2030 – with advanced sectors like electric vehicles (EVs), batteries, and robotics driving much of the increase (see [Asia Economics: Why China will widen its lead in global manufacturing exports](#), 7 December 2025). In particular, humanoids and robots are poised to become the next major industry supporting China's manufacturing and exports machinery.

Exhibit 1: China's humanoids and industrial robot industry resembles the EV industry in its early stage, with current exports in 2025 comparable to EV exports in 2019

China exports (US\$bn, 12M trailing sum)

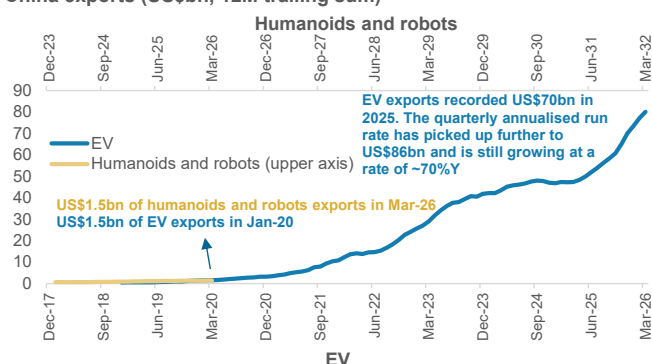
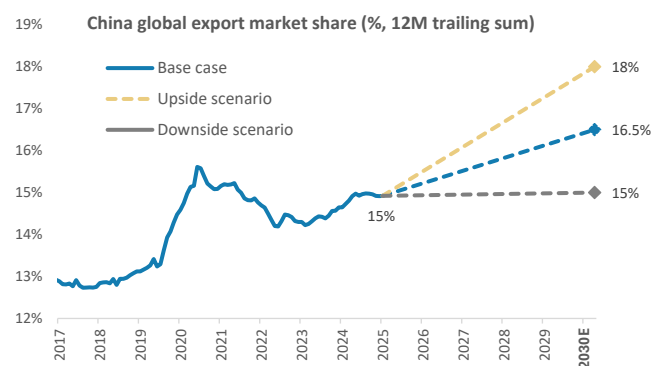


Exhibit 2: We expect China's global export market share to rise to 16.5% by 2030



Asia's industrial super cycle – a catalyst for accelerated gains: At the same time, we think the onset of an industrial super-cycle in Asia will act as a catalyst for accelerating gains in China's market share (see [Asia Economics: Headed Towards An Industrial Super-Cycle](#), 28 April 2026). We see a structural rise in Asia's capex driven by increased spending on AI and AI-related infrastructure, energy transition, defence, and a rise in industrial capex. As global and Asian capex rises, Asia and China as the production powerhouses will stand to enjoy a double benefit, having the production capacity to meet the structural increase in demand for capital goods.

Parallels with other strategic emerging industries like EVs: The top three new exports – EVs, batteries, and solar products – have been on a renewed rise recently, going from a 12-month trailing sum of US\$140bn in March last year to US\$200bn as of March 2026. Back in 2019, the export value of these segments was at US\$37bn. These segments had been identified as strategic: their growth had been supported from a policymaking perspective.

Looking ahead, humanoids and robots will be the next key driver of China's export machinery over the coming 5-10 years. Indeed, we see parallels between the development of the humanoids and robots industry and that of the EV industry a decade ago. China's dominance in the EV market has meant that exports have reached an three-month

annualised run rate of US\$86bn as of March 2026 and are still posting gains of almost 70%Y. On a HS 6 digit code basis, the value of EV exports is now the 10th highest among export categories in China, up from 1,944th highest in 2017.

For humanoids and robots, a similar story may pan out in coming years. China leads in terms of capabilities in manufacturing the final product as well as the key components – showcasing the depth of the buildout of the supply chain – something that we witnessed recently in our trip to Shenzhen. Already, together with the associated categories, China is already capturing incremental market share of 50% globally in industrial robot-related segments – and as we will argue in this report, these segments are poised for rapid, sustained growth.

Exhibit 3: Asia's industrial super-cycle – China stands out as one of the key beneficiaries

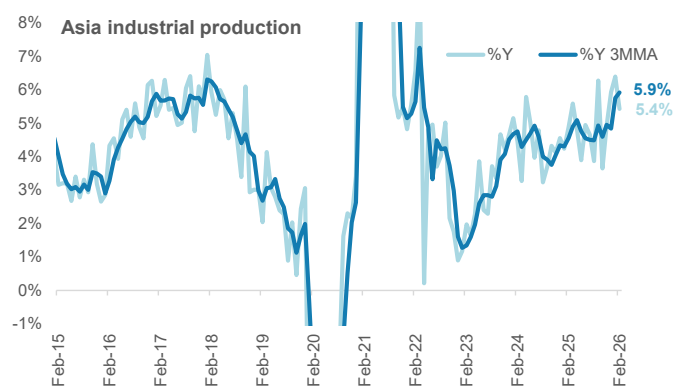


Exhibit 4: China's exports in advanced sectors like EVs, batteries, and solar exports are resuming their rise and have reached a US\$200bn annualized run rate

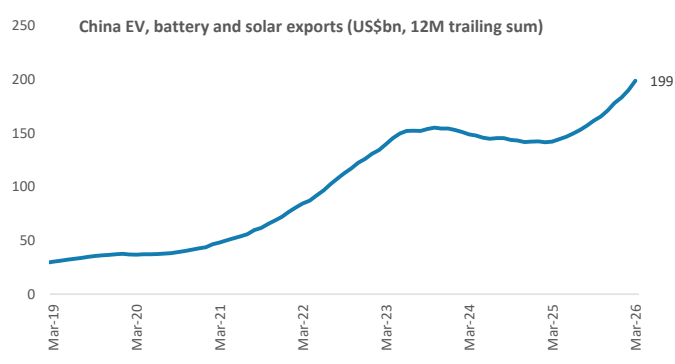


Exhibit 5: We expect China's global export market share to rise to 16.5% by 2030

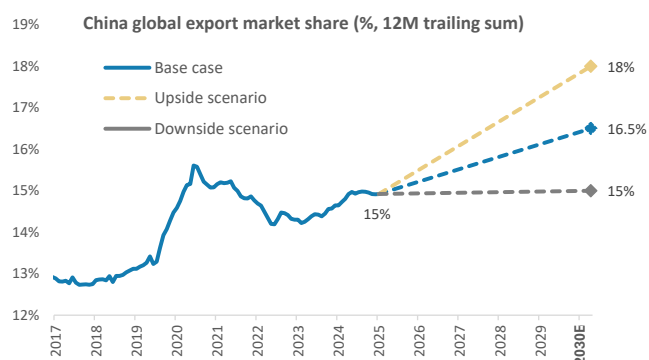
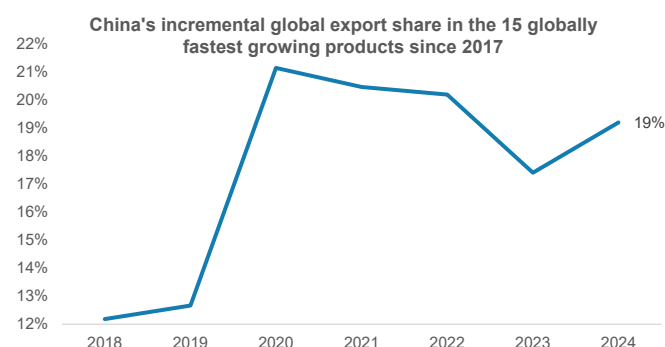


Exhibit 6: China has sustained a 19% market share in the 15 fastest-growing export segments globally, including electric vehicles (EVs), batteries, and robotics



identified the top 15 fastest-growing export segments at the HS four-digit level, which recorded the largest increases in global export market between 2019 and 2024. These segments include semiconductors, motor vehicles & parts, computers, mobile phones, vaccines, packaged medicines, batteries, trucks, electrical transformers & power converters, electrical wires & cables, semiconductor manufacturing equipment, medical equipment, tractors, semiconductor components, and industrial robots.

Exhibit 7: China has a significant export market share of more than 30% in batteries, mobile phones, semiconductor components, and computers

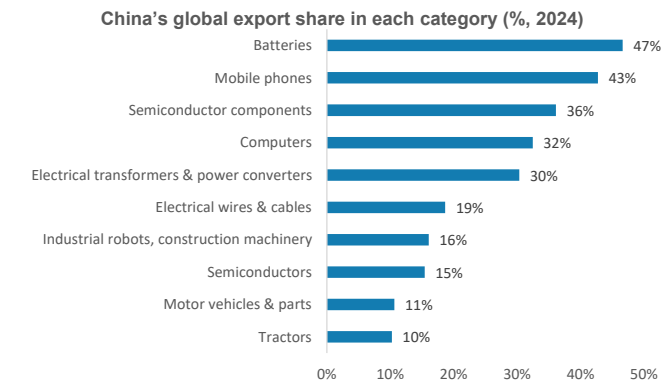
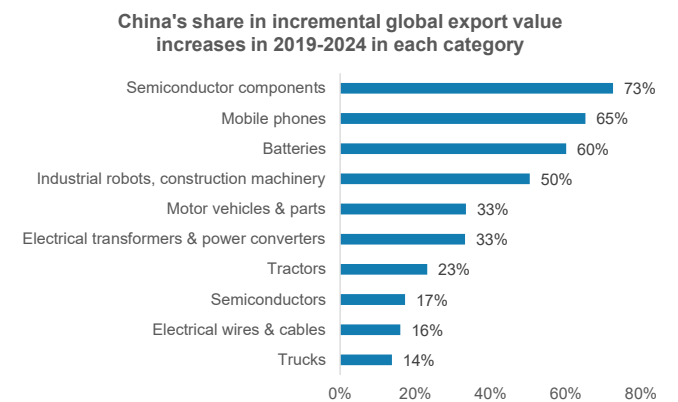


Exhibit 8: China has captured 33-73% of the incremental export market increase in segments such as semiconductor components, mobile phones, batteries, industrial robots, and motor vehicles and parts



Humanoids and Robots: China's Next Big Emerging Frontier

China is already dominant in this early phase of development: The clearest evidence of China's lead is in production and deployment. In 2025, an estimated 13,000–16,000 humanoid robots were shipped globally, and roughly 90% of these came from Chinese manufacturers. By comparison, the US, Japan, and others are still largely at the prototype stage.

Humanoid robotics are on the cusp of exponential growth: 2024–2025 appears to have been the inflection point when humanoid robotics started scaling from lab demos to real-world use in China. Chinese tech parks, factories, and universities have begun pilot programs deploying humanoids for 24-hour warehouse work, inspection rounds, and even fast-food service. Government procurement is also kicking in; many early orders for Chinese humanoids (over RMB2 billion worth in 2025) came from state-owned enterprises for uses like power plant/data center maintenance, public venue services, and entertainment. Just last week, China Grid announced plans to buy RMB2.5bn worth of humanoid robots this year, as part of its total RMB10bn purchase of intelligent robots.

For 2026, our industrials analyst for China, Sheng Zhong, projects that China's annual humanoid sales will more than double to around 28,000 units, higher than any other economy. At the current juncture, the deployment of humanoid robotics still require simulation environments. By the end of the year, she expects a number of field trials across China to demonstrate humanoids' real use cases in logistics, manufacturing and retail settings.

Adoption, production, and exports to ramp up: If performance and costs continue to improve, we believe adoption will likely accelerate in the latter half of the decade. On the export front, humanoid robotics could therefore become a major contributor to China's high-tech exports. Adam Jonas, our global embodied AI/robotics strategist, estimates the long-run total addressable market for "physical AI" (robots performing human tasks) at US \$60 trillion. Capturing a fraction of this opportunity could translate into a significant new export engine for China. Indeed, our analysts are expecting the annual run rate for additional robots in operation will reach 21mn for China in 2030, up from 6mn currently. For humanoids, the annual run rate will rise from 12,000 currently to 260,000 in 2030.

Exhibit 9: China is already dominant in the production and deployment of humanoids...

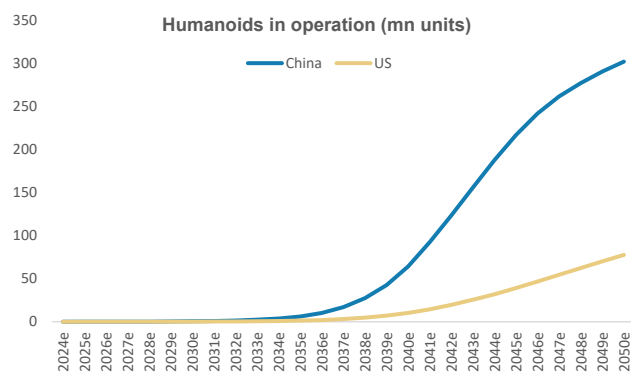


Exhibit 10: ...as well as in general robotics

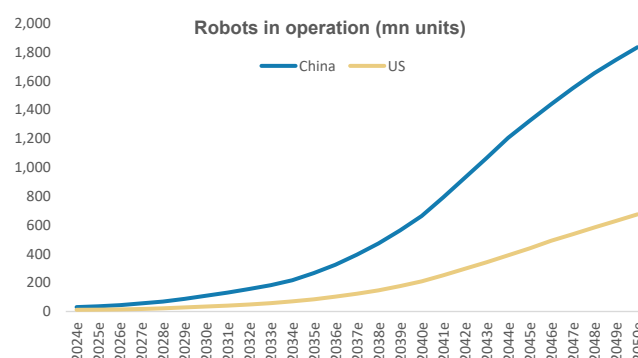


Exhibit 11: Average price per humanoid is expected to fall

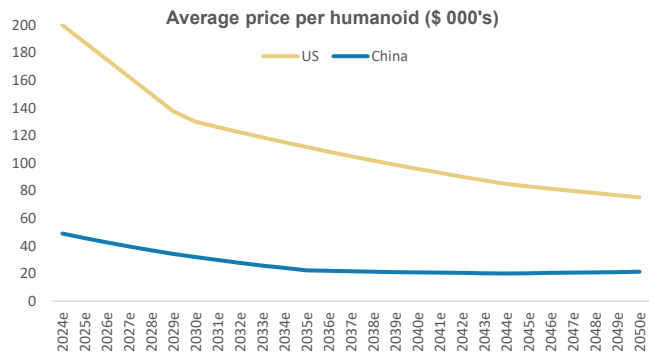
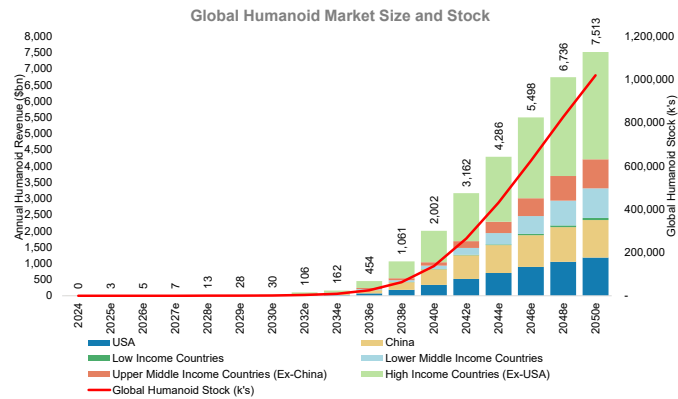


Exhibit 12: Market size will likely expand as adoption accelerates



What's Behind China's Success in Manufacturing?

Five key drivers

Several factors explain how China continually captures global leadership in manufacturing. Understanding these five drivers provides context for China's rapid progress in humanoid robots:

1) Anticipating global demand trends and building capacity ahead of time

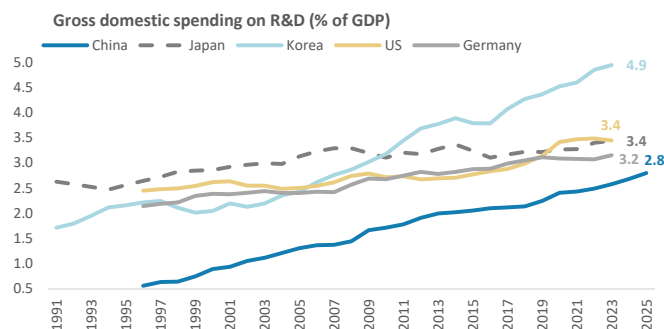
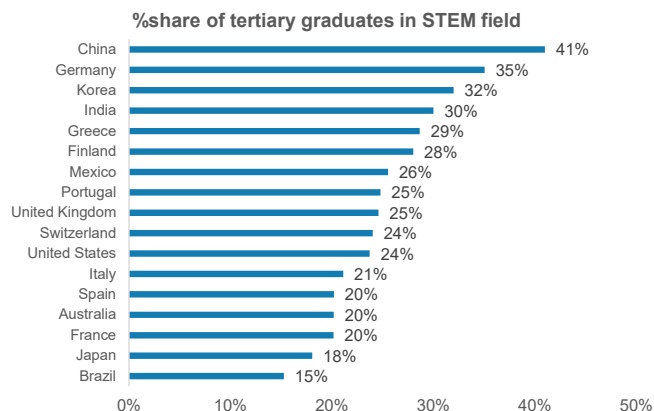
China has a track record of spotting the next big growth areas early and planning ahead: Time and again, Chinese policymakers and firms have anticipated shifts in global demand – be it for EVs or renewable energy – and have moved proactively. For example, over 2019–2024 China captured an estimated 19% of the increase in global exports across the world's top 15 fastest-growing export segments. With EVs, years of state-backed investment in battery technology and electric drivetrains allowed Chinese automakers to scale up quickly and offer affordable EVs just as worldwide demand took off.

The robotics industry has followed a similar path: Policymakers recognized robotics (including humanoids) as a strategic priority years ago. As early as 2021, China's State Council flagged intelligent robots as a focus area in its national development plans. By mid-2023, the Ministry of Industry and Information Technology (MIIT) explicitly framed humanoids as a strategic emerging sector. These guidelines set technology milestones for 2025 and 2027 – for instance, targets for breakthroughs in key components and the establishment of a domestic ecosystem of suppliers. These efforts meant that by 2024, China accounted for 54% of the world's new industrial robot installations, positioning its firms to ride the automation wave.

2) Focus on R&D and innovation

China has ramped up its investment in research and development, with the aim of moving up the value chain: In 2025, national R&D expenditure rose to around 2.8% of GDP (around \$550 billion annually), second only to the US in absolute terms. Importantly, China's innovation drive extends beyond funding: there is an emphasis on results like patent output and technological standards. For instance, Chinese companies and universities produce a large share of the world's AI research, and China's patent office leads in AI-related patent grants.

Robotics and AI are at the forefront of this push – they are designated as “strategic emerging industries” in China's 15th Five-Year Plan (2026–2030): In robotics specifically, technology hubs like Shenzhen and Hangzhou have offered incentives for robot R&D and even built specialized “robot industrial parks” and pilot zones to foster collaboration. Against this backdrop, Chinese engineers have rapidly improved robot locomotion, dexterity, and AI decision-making. Chinese humanoids already boast features like autonomous navigation, visual and tactile sensors (for fine object handling), and cloud-connected AI brains.

Exhibit 13: China's R&D spending rose to 2.8% of GDP in 2025**Exhibit 14:** China's share of STEM graduates is the highest globally at 41% and is double that of the US at 20%

Research; Note: Tertiary level graduates are individuals who have obtained a degree at Levels 5 to 8 of the International Standard Classification of Education (2011) (i.e. bachelor, master, doctoral or equivalent qualifications as well as short-cycle tertiary courses).

3) Ability to execute with its integrated supply chain and ecosystem

A defining feature of China's manufacturing model is its ability to develop an entire domestic supply chain ecosystem: Chinese industries tend to localize production of components, materials, and equipment, which reduces reliance on imports and lowers costs through economies of scale. In robotics, this approach has been evident: key parts like servomotors, gears, sensors, and batteries are increasingly sourced from within China, often from specialized suppliers that grew out of the consumer electronics and auto industries. As a result, the local content of Chinese-made robots jumped from about 30% to over 50% in the last five years. Greater use of domestic inputs, combined with large production volumes, has made Chinese robots 20% or more cheaper than comparable foreign models on average. This feeds a virtuous cycle where lower prices accelerate adoption, in turn further scaling up China's production and reinforcing its supply chain dominance.

4) Financial system aligned to strategic goals

China's financial and corporate environment encourages aggressive investment in new sectors: Banks and local governments tend to roll out measures to aid the growth of strategic industries. For example, many city governments have set up dedicated industrial guidance funds or incubators for robotics startups. This ready availability of risk capital allows Chinese companies to scale up, experiment, and pursue long-term market leadership, often with the implicit assumption of short-term losses. It reflects the alignment among policymakers, banks, and investors, with multiple parts of the ecosystem coming together to pull in the same direction.

5) Large talent pool

China's large pool of human capital provides a strong foundation: Around 42% of China's annual college graduates have STEM degrees, compared to ~20% in the US. In absolute terms, China had 3.6 million new STEM graduates in 2020, versus about 820,000 in the US. This talent pipeline feeds directly into research labs, tech companies, and factories.

This large talent pool has enabled Chinese firms to innovate and iterate quickly, speeding up the journey from concept to commercial product. As exemplified by the displays in this year's Spring Gala relative to last year, Chinese engineers transformed early humanoid prototypes into agile robots capable of climbing stairs and performing martial arts routines.

Parallels with the Development of the EV Industry

Similarities abound: A decade ago, China identified EVs as a strategic sector and invested heavily in it – building battery supply chains, encouraging domestic champions, and subsidizing consumer adoption. Today, over 50% of all electric vehicles sold globally are made by China, and China has become the world's largest auto exporter.

Early, large-scale investment: Chinese companies are scaling up production of humanoids before global demand fully emerges, in anticipation of future needs – reminiscent of how China built world-leading EV battery capacity even when EV sales were modest. The crossover of technology is direct. The vast battery and motor manufacturing capacity developed for EVs is now being repurposed for robots. This confers a structural cost advantage; as one example, China's dominance in battery cells and rare-earth magnets (90% of global production of certain magnet types) means Chinese humanoid makers have access to the most expensive components of a robot's "body". Chinese firms are rapidly driving material costs through scale and localization – just as they slashed EV battery costs ~80% over the last decade.

Domestic market as a springboard: China's enormous home market serves as a testing ground to refine humanoids and achieve efficiencies. For instance, the government's support for the EV sector started from e-taxis and e-buses from 2009, which was then enlarged to national e-taxis in 2015. Moreover, 2015 was when more consumers started to try EVs. A large domestic buyer base (supported by subsidies) helped Chinese automakers achieve scale and improve quality before venturing abroad.

With humanoids, the initial market may be domestic as well – Chinese companies and municipalities are keen to adopt robots to address labor and service sector gaps. These early deployments will give Chinese manufacturers valuable operational data and customer feedback, allowing them to iterate faster.

Comprehensive ecosystem and policy support: The EV ecosystem in China – from mining of lithium to mass production of battery cells – was built with government support and close public-private coordination. A similar comprehensive ecosystem is forming around humanoid robotics. The government funds R&D and fosters platforms and standards. For instance, authorities encourage open-source AI and robotics software (the "Tiangong" initiative) and have set up robotics business parks that provide space and shared resources to startups. Such institutional support lowers the hurdle for new entrants and accelerates commercialization. Meanwhile, large tech firms (from autos to electronics) are investing in robotics startups, integrating them into broader supply chains. This holistic approach means that when global demand for humanoid robots picks up, China will have an entire industry – from upstream components to final assembly and maintenance services.

Exhibit 15: BYD's passenger vehicle sales have shown much higher growth than Tesla's in the past four years

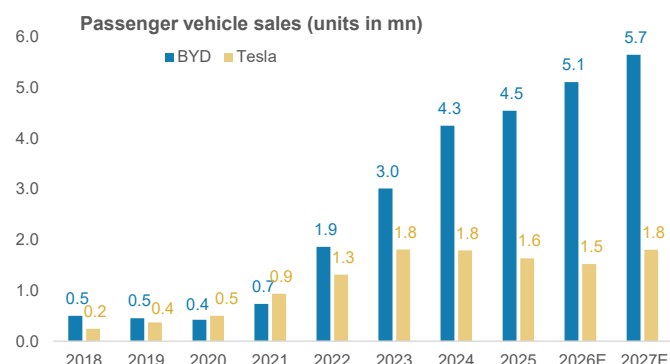


Exhibit 17: China's NEV penetration has continued to increase, with penetration likely to rise above 70% by 2030

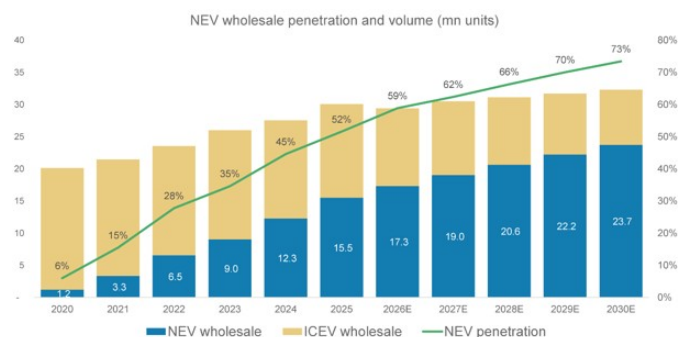


Exhibit 16: Meanwhile, Chinese firms are rapidly driving down material costs through scale and localization

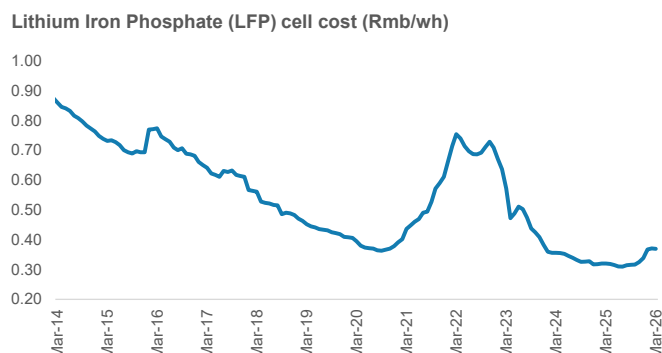
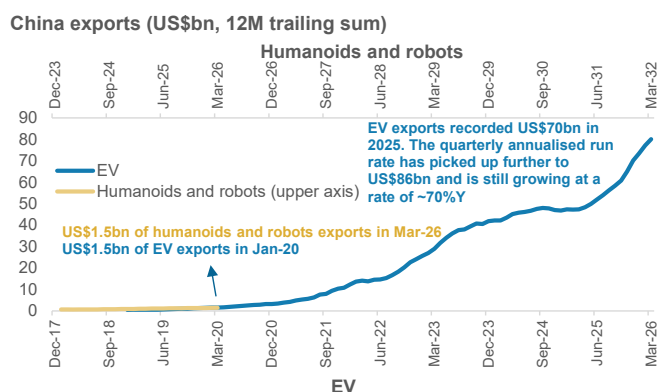


Exhibit 18: China's humanoids and industrial robot industry resembles the EV industry in its early stage, with current exports in 2025 comparable to EV exports in 2019



Competition – U.S., Japan, and South Korea: different paths in the robotics race

The United States, Japan, and South Korea are each pursuing their own strategies. Here's how these competitors compare.

United States: The U.S. excels in foundational technologies vital to advanced robotics, particularly in AI software and semiconductor chips. American tech firms dominate global AI algorithm development, high-performance computing (such as NVIDIA's AI chips), and robotics R&D. Companies like Boston Dynamics (Atlas, Spot), Agility Robotics (Digit), and Apptikon (Apollo) are leading the way in robotics design and control software. Tesla is also making waves with its planned Optimus humanoid, targeting small volume production in 2H26 and mass production in 2027.

However, the U.S. approach often focuses on building high-spec, high-cost prototypes for advanced applications—manufacturing, logistics, space, defense—and emphasizes extensive testing before scaling up. This reflects how U.S. firms are

financed: they prioritize perfecting technology and proving use cases, sometimes at the expense of speed to market.

A major challenge is the lack of a domestic mass-production ecosystem for hardware. American firms rely heavily on China's manufacturing base for components. For example, Tesla tested components from global makers, including from China. But Tesla has required Chinese suppliers to move production out of China as a precondition of becoming a supplier, which may limit the use of components from China in the model that is slated for production in 2H26. .

Japan: Japan has long been a pioneer in robotics – its companies like Fanuc and Yaskawa dominated industrial robots, and Honda's Asimo set the standard for advanced humanoids as far back as 2000. Yet Japan's humanoid robots largely remained research projects, never scaling to mass production. In recent years, Japanese firms have focused on industrial and service robots, leaving cutting-edge humanoid R&D to smaller labs and universities. Japan's advantages remain in precision engineering and hardware reliability: in 2023, it accounted for about 38% of global industrial robot production by value and exported nearly 80% of its output.

However, when it comes to humanoids, Japan is playing catch-up. Companies such as Toyota and SoftBank are conducting R&D, and there is interest in service robots for Japan's aging population, but no concerted push for mass production. Even Japan's top robot makers are deeply connected to China's ecosystem for components, and one of the "Big Four" (Germany's KUKA) is owned by a Chinese firm.

South Korea: South Korea stands out for its intensive robot use and high-tech industry, though its humanoid manufacturing is at an early stage. Korea leads the world in robot density—with over 1,000 industrial robots per 10,000 workers, more than double China's level. Conglomerates like Samsung, LG, and Hyundai have deep expertise in electronics and automation, forming a strong base for robotics innovation. Hyundai's acquisition of Boston Dynamics in 2021 signaled Korea's interest in humanoids, with a timeline of deployment of Boston Dynamics Atlas on the production line in 2029.

The government launched a "K-Humanoid Alliance" to foster collaboration toward global leadership by 2030, and Hyundai plans to deploy advanced humanoid robots in factories by 2028. Korean firms are strong in industrial and collaborative robots and benefit from advanced 5G infrastructure for robot communication.

Trade Dynamics: Humanoids vs. EVs – Less Pushback?

Rise of Chinese EVs has been met with protective measures: Major auto-producing regions have viewed the flood of affordable Chinese cars as a competitive threat. Europe, for instance, launched an anti-subsidy investigation in 2023 over Chinese EV imports, and countries like India have raised tariffs on imported EVs to shield domestic manufacturers. Automobiles account for roughly 8% of global manufacturing output by value – and virtually every country has incumbent auto firms and labor unions, which has meant that policymakers have to take action to guard this sector.

But humanoid robotics is an entirely new sector with no entrenched local industry: In contrast, the nascent stage of humanoids means that Chinese humanoid robots may not encounter the same degree of protectionism. In fact, many developed economies are grappling with aging workforces and labor shortages, and humanoid robots – if they prove effective – could be welcomed as a solution rather than resisted as a competitive import.

Notably, some of the first Chinese industrial humanoids are being co-developed or tested in partnership with Western firms: for example, UBTECH has partnered with European automaker Audi on robotics in factories, and several Chinese startups have demonstrated their robots at global tech fairs (such as Japan's iREX or the Consumer Electronics Show in the US) to drum up international interest. In Europe, where governments have been cautious about Chinese telecom and automotive equipment, there has been little sign of concern about importing Chinese robots – German and other European companies are already among customers of China's robot makers, given Europe's own need for automation tools.

The risks of protectionism are still high: If humanoid robots become as strategically important as semiconductors or telecom equipment, concerns about security or technological dependence could rise. Export controls or investment restrictions might come into play, especially around advanced AI capabilities.

Positive micro developments but mindful of potential macro challenges

Will humanoids avoid the involution challenge: The past experience of the development of significant industrial clusters within China has often invoked the issues of excessive investment and competition leading to poor returns and excess capacity. In turn, this has created the macro challenge of persistent deflationary pressures.

Crowded field, uncertain returns: The current exuberance around humanoid robots in China has led to an explosion of new entrants. According to the NDRC, over 150 companies are now vying in this industry. They range from established tech giants to tiny startups, many of them unveiling similar-looking bipedal prototypes. This raises the specter of a fragmented market where too many firms chase the same goals, driving down prices and margins for all. This again raises parallels with the "involution" where intense competition led to falling prices and thinning profits. The "price war" in 2023–24 caused prices of some new electric SUVs to be slashed to below their original level amid a fight for market share, squeezing weaker players.

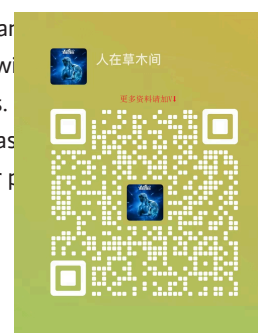


Exhibit 19: Intense competition drove prices down to nearly half of their original price amid a fight for market share

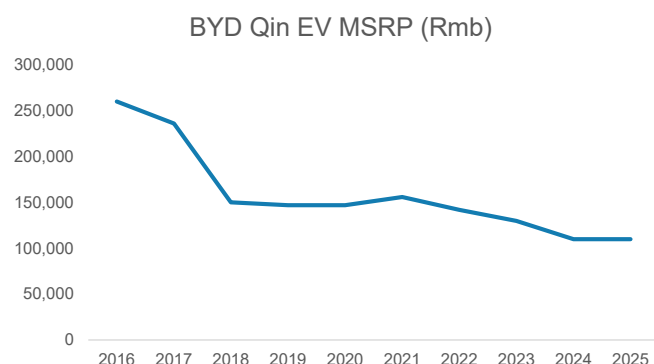
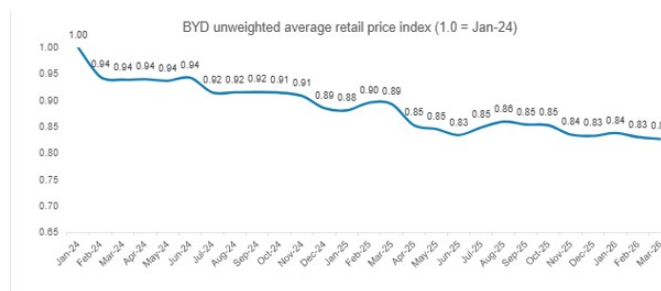


Exhibit 20: Domestic EV prices remain subdued into 2026



Watching out for risks of excessive competition and its implications for pricing power in the industry: The periodic oversupply in sectors ranging from steel to solar panels to property has contributed to bouts of deflation. In the context of robotics, a rapid rise in robot supply is likely to keep prices of automation equipment on a downward trajectory, which is a double-edged sword. Cheaper robots make faster global adoption possible – potentially boosting productivity and containing inflation for end products. But excessive supply expansion can create the problem of pricing power and returns for the industry.

The jury is out: While there are similarities between how the humanoid industry is developing with previous strategic emerging industries, one key difference is that policymakers are pursuing anti-involution currently – a sign that there is awareness of the challenges posed by excessive competition and excess capacity.

Specific to the humanoid robotics industry, the NDRC stated in late November 2025 that it “is working to ensure the sound, orderly development” of the industry. It noted that there are already over 150 companies and cautioned against “risks such as a glut of homogeneous production.” In the near term, the intensity of the competitive landscape will be key to watch, because it will influence whether companies will be trying to achieve scale at the cost of returns, which tends to result in the buildup of excess capacity and affects the sustainability of profits and returns.

At the current juncture, it may still be too early to gauge the path forward of how the demand and supply dynamics will shape up – or how rapid growth and achieving scale will be balanced against achieving sustainable profitability. At the same time, there are also risks associated with labour replacement if there is broad-based humanoid robotic adoption, which will in turn mean job losses (in particular at the lower end) and weaker income growth. This can be a second channel which may give rise to disinflationary pressures, though this may also be offset, in part, by policy measures.

As it is, policymakers are already contemplating measures to address AI-induced job disruptions. Official media had reported earlier in the year that policy documents to address the impact of AI on employment may be issued soon. Our economics team for China also points out that major structural shocks to the labor market have at times catalyzed significant reforms in China. A notable example is the establishment of the basic social security system following the large-scale SOE layoffs in 1997-99.