Artificial Intelligence in China: National Strategy, Policy and Governance Evolution, and the Impact of AI Deployment at Home and Abroad

Index

1) Introduction

Artificial Intelligence has become a world-changing technology (Allen and West, 2018).
AI tools have become increasingly affordable and sophisticated, reshaping everyday life (Suleyman, 2023).
Generative AI is a type of artificial intelligence that can create new content, such as text, images, or videos, based on user prompts by learning from a large dataset of examples. It uses algorithms to identify patterns in the data and generate original outputs that resemble the input it was trained on.
This type of Artificial Intelligence has been protagonist of intense development in the last years, transforming in one of the most versatile and widespread technologies in the market (Suleyman, 2023; Kaushik, 2025).
As AI has been becoming a powerful tool, different governments have been trying to pursue in the global race for AI development and application mastery (Park and Chang, 2022; Wang et al., 2025; OECD, 2021; World Bank, 2021).
China has been planning to be a protagonist of this century (Rachman, 2018), especially on the technology sector: in fact China has already announced to the world years ago, in the New Generation Artificial Intelligence Development Plan (promulgated by the State Council on July 20, 2017), that it intends to become the global leader in Artificial Intelligence (AI), both in terms of developing and deploying the technology as well as governing it with appropriate laws and regulations (The State Council of the People's Republic of China, 2017).
Since then, China has expanded and consolidated its AI governance and law framework, defining a clear growth strategy to position the country as a major global AI innovation hub by 2030 (World Bank, 2021; OECD, 2021); China aimed for its AI theories, technologies, and applications to generally reach the world in a leading level (Deng and Dai, 2025).
The success of DeepSeek, a Chinese Artificial Intelligence company founded in July 2023 by Liang Wenfeng, a former hedge fund entrepreneur, has challenged and, in some cases, surpassed larger and more established Western competitors (Perrigo and Pillay, 2025).
Its AI model has been often described as being an “upended AI”, due to the cutting-edge technical capabilities at, apparently, a fraction of the cost of the main U.S. competitors, such as OpenAI’s ChatGPT (Metz, 2025; Jiang, Gao and Karniadakis, 2025).

DeepSeek's rise and its rapid disruptive entrance in the market is a concrete symptom of a multitude of investments and reforms in China's AI sector in the last years: the semi-monopolistic grip of U.S. big techs' grip on the AI panorama has been challenged by a relatively smaller unique Chinese counterpart thanks to years of ad-hoc investments to generate a proficient AI habitat (Goodwin, 2025; Metz, 2025; Zou and Zhang, 2024; Forbes Breaking News, 2025).
China has hence become a leader of one of the most potentially powerful and versatile technology in human history (He, 2017; Huyue Zhang, 2024a; Kaushik, 2025).

2) Research Scope and Methodology

The aim of this research is to understand, analyze and assess the evolution of AI development and deployment in China.

The research fundamental question is: What is China's current strategic position in the global race for Artificial Intelligence, and what actions and motivations underpin its efforts to achieve AI leadership? Furthermore, what are the national and international implications of China's AI deployment?

Given the international consequences of Chinese AI models, such as DeepSeek-R1, that rival the monopolistic grip on AI development of the U.S. big techs (e.g. Meta, OpenAI), it's important to know how China managed its disruptive entrance in the global AI hub.

The research will consist in two main parts: a literature review and a case study.

The literature review will be split essentially in three main arguments: current nature and role of AI in the world (i.e. the AI race), assessment of China's AI development strategy and the evolution of the Chinese legal governance of AI and its data control, review of empirical impact of AI in China.

For the literature review we will use a variety of different sources: books, encyclopedias, journal articles, legal documents, reliable news articles and blog posts, reports, scientific papers, websites, working papers. The nature of the source will depend on the topic of the issue.

To report concrete consequences of the development of the Chinese AI ecosystem, the second part will be a case study of the Chinese AI firm DeepSeek, focusing on its development, characteristics and, most importantly, the impact of the release of its latest model (i.e. DeepSeek-R1).

Given the recent nature of the case study, and hence the scarcity of peer-reviewed academic papers, we will integrate and cross-check various types of sources, such as blog articles, journal articles, media and news articles, research papers, websites and working papers.

Non-academic sources will be critically assessed for credibility, consistency, and cross-verified with reliable institutional or technical sources.

3) Literature Review

3.1) Artificial Intelligence: Definition, Applications and Emerging Challenges

Artificial Intelligence is defined as "the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings" in the Encyclopedia Britannica (Copeland, 2025).

Russell and Norvig (2021) defined AI as the study of agents that perceive their environment and take actions to maximize their chances of success.

AI systems are created by combining algorithms, large datasets, and specialized computing resources. As such they are systems that may be able to operate in an intentional, intelligent and adaptive manner (Allen and West, 2018).

A dominant approach today is machine learning, particularly deep learning, where models autonomously improve their performance by recognizing patterns in data without being explicitly programmed for every task (Goodfellow et al., 2016). Modern AI models, such as large language models (e.g. ChatGPT and DeepSeek AI), are trained using transformer architectures on massive datasets through self-supervised learning techniques (Vaswani et al., 2017).

Large Language Models (LLMs) are advanced AI systems trained on vast text datasets using transformer architectures. They generate human-like text by predicting word sequences and are capable of tasks like summarization, translation, and dialogue (Vaswani et al., 2017; Brown et al., 2020). Recently, the process for LLMs construction has been optimized with techniques of post-training and pure reinforcement learning (Guo et al., 2025; Kaushik, 2025). Once developed, AI systems act following a perception-reasoning-action cycle: they collect information, process it through internal models, and take adaptive actions to achieve specific goals, often operating autonomously under uncertainty (Russell and Norvig, 2021).

The possible fields capable of AI application and implementation are many; following Kaushik's research (2025), we are now going to illustrate some of the most recent advances in Artificial Intelligence deployment and usage.

Generative AI is a type of AI that can create realistic content and simulate various scenarios. Text-to-Image Models allow users to generate detailed images based on textual descriptions, enhancing creativity and design workflows.

Text Generation models with advanced language models, such as

GPT-4, produce coherent, contextually relevant text, streamlining content creation for industries such as journalism, marketing, and education. Additionally, Generative AI plays a critical role in producing datasets for training AI models, especially in cases where real-world data is limited or sensitive.

In the Healthcare sector AI systems are adept at analyzing medical images, such as X-rays, MRIs, and CT scans, to detect anomalies like tumors, fractures, and other conditions with high precision. Machine learning algorithms expedite drug discovery processes by predicting molecular interactions and optimizing chemical compounds, significantly reducing time and costs and can be used for personalized medicine practices.

Modern LLMs, such as DeepSeek-R1, can also be leveraged to enhance efficiency to accelerate clinical workflows, and can be integrated into hospital information systems (HIS) to make the operations flows more efficient. The models can also foster patient empowerment by enabling clearer communication, simplifying the interpretation of complex medical information, and offering individualized health management strategies (Wang, He and Liang, 2025).

AI is also applied for the creation of many autonomous systems: self-driving vehicles and drone technology are enhanced by AI systems, that equip them with advanced perception and decision-making capabilities. The industry 4.0 is possible thanks to autonomous robots and machinery powered by AI, that is optimizing manufacturing processes by improving efficiency, reducing errors, and minimizing human intervention.

Quantum computing is poised to transform AI by tackling computationally intensive tasks with quantum machine learning (QML).

Additionally, the integration of AI and edge computing has enabled real-time decision-making in resource-constrained environments, bringing low-latency processing and energy efficiency. AI could also be integrated with IoT to develop different new technologies, such as predictive maintenance, smart homes, and wearable devices, fostering a connected ecosystem.

Lastly, AI is exploited in the creativity and entertainment sector.

AI composers and AI-driven virtual characters are revolutionizing music, gaming, virtual reality, and animation. AI recommendation systems analyze user preferences to deliver tailored content, enriching user experiences across streaming platforms and social media, and thereby revolutionizing the marketing approach of many businesses.

While AI can be a powerful and versatile tool, the challenges encountered to generate a proficient AI habitat are many: the necessary high computational power and expensive hardware are not the only foundations necessary.

As Russell and Norvig (2021) highlight in their discussion on the philosophical foundations of AI, the development of intelligent systems inevitably raises profound questions about consciousness, autonomy, moral responsibility, and the long-term consequences of creating machines that may surpass human capabilities.

AI need solid governance that depends not only on the transparency of algorithms but mostly on the control, ownership, and stewardship of data, which fundamentally shapes how AI systems operate and whom they serve (Floridi et al., 2018; Zuboff, 2019; OECD, 2024a).

AI hence rely on data: data availability, quality, privacy and security are mandatory for its deployment. Scarce data control may create transparency, reliability and bias issues. It is also necessary not only to control AI input, but also its output: AI needs a solid regulatory framework and unified ethical governance directives to be implemented, integrated and deployed safely and sustainably (Kaushik, 2025; Huyue Zhang, 2024b; Yadong, 2022; He, 2017; Whittaker et al., 2018; Zuboff, 2019).

While early AI development was heavily constrained by hardware and compute limitations, most modern challenges relate to the implementation, regulation, and ethical integration of AI systems. As AI becomes a general-purpose technology embedded across critical sectors, the absence of robust governance frameworks, rather than a lack of computing power, poses the greatest risk to its safe and beneficial deployment. Hence, national and international governance systems play a central role in shaping AI's future trajectory (Kaushik 2025; Whittaker et al., 2018; Floridi et al., 2018; Zuboff, 2019; World Bank, 2021).

3.2) The Global AI Race and China's Strategic Position

The launch of ChatGPT in 2022 by the American firm OpenAI marked a milestone in generative Artificial Intelligence, positioning the United States as the initial frontrunner in global AI leadership (Dunn, 2025). Other various national ecosystems have emerged and evolved, each shaped by distinct policy frameworks, levels of investment, and strategic priorities (World Bank, 2021; Park and Chang, 2022).

In the United States, the private sector drives AI innovation, supported by federal agencies such as DARPA, the Joint Artificial Intelligence Center (JAIC), and the National AI Research Resource. While the absence of comprehensive federal privacy legislation remains a challenge, the U.S. benefits from an open innovation environment, a strong venture capital ecosystem, and public-private collaboration on AI infrastructure and data sharing (Park and Chang, 2022).

While smaller ecosystems, such as South Korea, are evolving rapidly, transitioning from fast-followers to early movers in niche areas like robotics and semiconductors (Park and Chang, 2022), the AI race remains largely dominated by the U.S. and China.

The European Union occupies an intermediate position. It leads in areas such as AI ethics, regulation, and academic research, underpinned by initiatives like the Digital Europe Programme and the AI Act (European Commission, 2020 and 2024). However, the EU continues to stay behind in terms of private-sector investment and lacks globally dominant "big tech" firms, limiting its influence over AI deployment and commercialization (Madiega and Ilnicki, 2024).

China, by contrast, has pursued a state-driven model of AI development, characterized by centralized planning, national AI strategies, and close collaboration between the government and major tech firms such as Baidu, Tencent, and Alibaba. This approach prioritizes national competitiveness, open data repositories, and heavy R&D investments (Park and Chang, 2022; Wang et al., 2025).

The release of DeepSeek AI in early 2025 marked a pivotal moment in China's AI trajectory. As the first large-scale Chinese model to publicly match Western benchmarks in multilingual processing and reasoning, DeepSeek demonstrated the country's capacity to compete at the frontier of AI development (Deng and Dai, 2025; Metz, 2025). This event signaled a shift from catch-up to leadership, reinforcing China's position as the most serious challenger to U.S. AI dominance.

The Chinese AI ecosystem represents therefore the strongest comprehensive alternative to U.S. dominance in the sector, both in terms of scale and strategic ambition (Park and Chang, 2022; Wang et al., 2025).

AI leadership has become part of the global geopolitical power equilibrium: recent U.S. export controls on advanced semiconductors have prompted Chinese AI firms to innovate within these constraints, leading to significant developments such as DeepSeek

AI. These adaptations highlight the dynamic interplay between policy decisions and technological capabilities, underscoring the importance of considering hardware access in discussions of AI governance (Cosgrove, 2025; Huyue Zhang, 2025).

While hardware infrastructure remains important, it has increasingly become a secondary factor in efficient AI development and deployment. Instead, data management, AI governance, and the scope of action defined by local policy frameworks are now considered the core determinants of AI success (Floridi et al., 2018; OECD, 2024a; Cosgrove, 2025) and have hence become one of the top priorities of the governments (Dobberstein, 2024; European Commission, 2024; Wang et al., 2025; Yadong, 2022).

3.3) Policy and Governance Evolution of AI in China

China's actual AI development started in the late 1970s following Deng Xiaoping's economic reforms emphasizing science and technology as the country's primary productive force (Zhaxing, 2016).

Yang and Huang (2021), with a statistic analysis of 294 central-level China's AI policy documents, created a map of the Chinese technological policy development: the policy-issuing time and its corresponding stages are on the x-axis, while the number of policy documents is on the y-axis. Core policy documents and their timepoints are also highlighted based on the nature of the policy and experts' opinions (Fig. 1).

Concrete policy development started in the 90's, while AI started to be considered a core element of the technological landscape (and, therefore, a key to the strategic development plan of the country) only since 2017.

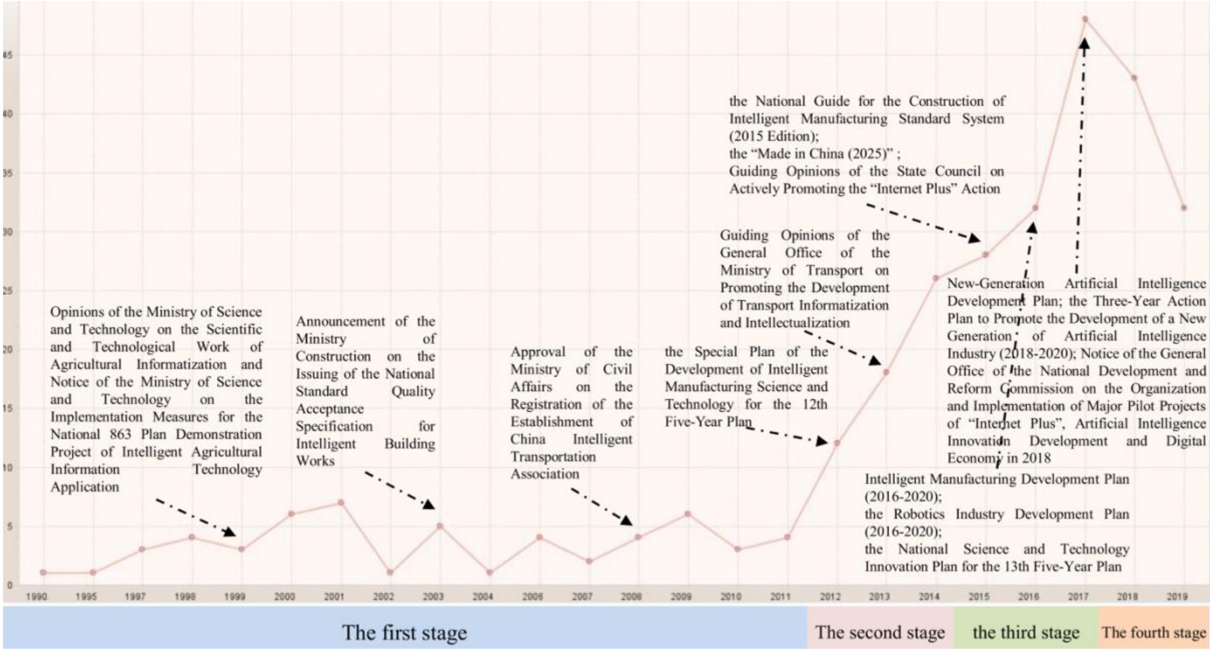

Figure 1 - Quantitative map of the evolution of AI policies in China.

Source: Yang, C. and Huang, C. (2022).

We will focus on the fourth stage and on the latest trends to understand the rationale underlying the development and application of Artificial Intelligence in China.

Today, Chinese president Xi Jinping considers secure, reliable, and trustworthy shared AI a powerful tool to create a world economy characterized by innovation (Xinhua, 2024).

Governance wise, the AI development process in Beijing has its first major milestone in the New Generation of Artificial Intelligence Development plan (AIDP): this document, issued by China's State Council on July 20, 2017, is the foundation of China's AI strategy and governance, as it's the blueprint of all the major compulsory steps and objectives to make China a world AI leader (The State Council of the People's Republic of China, 2017).

Three major phases are framed in the AIDP: to match global AI technology levels and establish a competitive AI industry by 2020, to achieve world-leading AI breakthroughs and integrate AI into key industries by 2025 and to become the world's major AI innovation center by 2030.

Even considering only the rise of DeepSeek AI, which we'll evaluate later in the research, we can confidently state that this timeline seems efficiently followed and applied all over the country.

The main areas of focus are many, i.e. AI R&D and Innovation (investing in deep learning, cross-media intelligence, autonomous systems, and AI-driven decision-making), AI

Industry Development (fostering smart manufacturing, autonomous vehicles, healthcare AI, and financial AI), AI Governance & Ethics (developing legal frameworks, ethical standards, and safety regulations), Integration with Society (using AI for smart cities, public services, and national security) and Military-Civilian Integration (leveraging AI for defense applications).

The AIDP also aims at the construction and implementation of robust infrastructures and, most importantly, policy support to create a strong backbone for Artificial Intelligence development and distribution: data security, privacy and governance are the key factors highlighted by the China State Council (The State Council of the People's Republic of China, 2017).

Additionally, China has identified the following nine major technology areas to focus its government planning and support on by 2018, per the Implementation Plan for “Internet Plus” Artificial Intelligence 3-Year Initiative (He, 2017): Core AI technologies, Public information service platforms for computing (such as clusters for large-scale deep learning), Smart homes, Smart Vehicles, Smart unmanned transportation applications (such as unmanned aerial vehicles (UAVs)), Smart security (for example , through face recognition softwares), AI-enabled end user applications, Smart wearable devices and Smart robots.

The government has been establishing, during the years, different actors and institutions to maintain a strong grip on AI development: the most important regulatory body is the Cyberspace Administration of China (CAC), which is responsible of Internet regulation, overseeing cybersecurity, data governance, online content control, and digital policy implementation. It was established in 2014, evolving from the State Internet Information Office (SIIO), and it operates directly under the leadership of the Central Cyberspace Affairs Commission, chaired by the General Secretary of the Chinese Communist Party, i.e. Xi Jinping (Lucero, 2019; OECD, 2024b).

The CAC plays a crucial role in maintaining state control over the internet, aligning with the broader ideological centralization of the Chinese Communist Party (CCP): it ensures that AI, cyberspace, and online platforms comply with national security, political, and economic objectives (OECD, 2024b).

Lucero (2019) views the CAC as part of a broader trend of bureaucratic centralization in China, that ensures party oversight over tech firms; Chinese companies, including AI firms, must comply with CAC regulations, reinforcing state dominance over digital and AI spaces. He concludes that the aim of the CAC, and basically all other major governmental entities that have surveillance power on technological development, is to enforce "order" (秩序) in cyberspace, viewing the internet and AI as tools for state control rather than purely for technological progress.

Many (Roberts ed al., 2020; Yadong, 2022), with him, criticize the Chinese approach to AI governance that prioritizes AI as a tool for state power and efficiency rather than individual rights.

As Zuboff (2019) argues, the tendency to a central control of data in the AI era, fueled by information asymmetry and inefficient policy frameworks, is a concrete danger for societies.

This may also create a regulation in China that lacks clear definitions, allowing an unstable enforcement and policy direction, damaging the citizen's welfare.

Others, such as Huyue Zhang (2024b), highlight the industry-friendly approach the government has had: a permissive regulatory approach gives Chinese firms a competitive advantage against their U.S. and European counterparts, and therefore an industry growth. Huyue Zhang (2024b), however, also signals that there's little protective value for the Chinese's public, and the law leniency risks creating potential regulatory lags that could escalate into AI-induced accidents and even disasters.

On one hand we have industry growth and short-term competitive advantage over the European and U.S. counterparts (Huyue Zhang, 2024b), on the other ambiguous legislation that may damage local communities and citizens' rights (Roberts ed al., 2020; Yadong, 2022; Huyue Zhang, 2024b).

Since the AIDP's inception, China has implemented several key reforms and initiatives to advance its AI capabilities, and the policy framework has been evolving since then.

The most important steps of policy development content and application to list for the research scope are the following:

- Guidelines about the general implementation of AI (Ministry of Science and Technology of The People's Republic of China, 2019; National Standardization Administration et al., 2020; Standing Committee of the National People's Congress, 2021) and about AI content generation, e.g. deepfakes (Reuters staff, 2025c), for providers and users and creation of new institutional committees for AI regulation and standards for risk assessment and control (Reuters staff, 2024).

- Promotion of Open-Source AI models, e.g. Alibaba, Baidu, and Tencent, by the Chinese government, to decentralize AI development, tap into global talent, and reduce development costs, flooding the market with powerful and cheap AI models, thereby positioning itself competitively on the global stage (Yoon 2025).
- Maneuvers for integration of AI into the Real Economy, such as the launch, on March 2024, of the "AI+ Initiative" (Dobberstein, 2024), by Premier Li Qiang, aiming to integrate AI technologies into various sectors of China's real economy (Jiang, 2024). This initiative focuses on enhancing industrial productivity and fostering economic growth through AI-driven innovations.
- Governmental efforts to the development of Indigenous AI models, preferably Open-Source, such as DeepSeek and Manus. The emergence of AI startups like DeepSeek exemplifies this drive, showcasing China's commitment to fostering homegrown technological advancements and reducing reliance on foreign technologies (Reuters staff, 2025a and 2025c).
- Global AI Governance Initiatives such as the "Global AI Governance Initiative" on October 2023 and others public appeals (Xinhua, 2024), advocating for international cooperation in AI governance. This initiative emphasizes building AI policy dialogues with developing countries and highlights concerns over AI safety risks, including data misuse and potential exploitation by malicious actors.

Additionally, China, in the last years, has always publicly stated that their main objectives of the policies and government intervention on AI ecosystem remain the promotion of AI development, maintenance of AI safety, development the AI governance system, rise of public participation, improvement of literacy and quality of life, and increase of social well-being (Ministry of Foreign Affairs The People's Republic of China, 2024).

3.4) Current Chinese AI Legal Framework and Ecosystem

Today China's government plays a crucial role in AI distribution and development in China (Sheehan, 2023).

As already illustrated , the government has been trying, through its organs, such as the CAC, and continuously releasing new policies, to control AI development and implementation. To assure that the AI industry follows the governments ideologies, new policies regarding data ethics and compliance were released, such as the “New Generation of Artificial Intelligence Ethical Codes“ (Ministry of Science and Technology of The People’s Republic of China, 2021), the “Data Security Law of the People's Republic of China” (Standing Committee of the National People’s Congress, 2021) and the “Interim Measures For The Administration Of Generative Artificial Intelligence Services” (Cyberspace Administration of China, 2023).

These last policy updates make the whole AI ecosystem converge to a rigid moral code (and, hence, subjected to hard censorship): it is forbidden to use AI against national ethics and all information must pass through and be processed by the CAC.

A preliminary draft of China’s proposed AI Law that has circulated among legal scholars, published on March 2024 ,show instructions to AI developers what government approved material they can use train their LLMs and in what situations AI developers, providers and users are liable for misuse of AI tools: for example, it is mandatory to block illegal/harmful content (e.g., deepfakes, misinformation) and to label AI generated content, and possible fines round up to RMB 50M or 5% of annual turnover for violations; criminal liability for severe cases (Digital Rule of Law Institute at East China University of Political Science and Law, 2024).

It is interesting to notice that, in this law draft, personal/family use, academic research, and open-source AI (and so, theoretically, Deepseek AI) are exempt, and Military AI must be regulated separately by the Central Military Commission.

Huyue Zhang (2024a) introduces a new analytical framework to analyze China’s actual regulatory framework: the “dynamic pyramid model”; she states that the unique Chinese regulatory model comprises of three main features that are dynamically interconnected each to another: hierarchy, volatility and fragility. Therefore, the Chinese system has the government at the center of regulatory and monitoring power, has been continuously mutating in the last years and has many ambiguous and weak rulesets that aim to control all the data processed and the content generated by Artificial intelligence tools.

Sheehan (2023), on the other hand, thinks that the underlying structure of China’s AI regulations to date share three main similarities: the choice of algorithms as a point of entry, the building of regulatory tools and bureaucratic know-how and the vertical and iterative approach that is laying the groundwork for a capstone AI law.

Basically, Chinese AI regulations focus on algorithms to create AI, more than training data or computing power, as it may happen in other countries; Deepseek AI itself has brought an innovative algorithm, by optimizing the algorithm architecture to improve the utilization efficiency of computing power, it has challenged the traditional model that prioritizes computing power. Then build ad-hoc regulatory tools and develop specific bureaucratic AI know-how to utilize for future policies (we can notice this with more and more frequent and complex policy emanations in the last years, i.e. from 2017) and follow an and approach with policies.

Iterative because if the government deems a regulation it has issued to be flawed or insufficient, it will simply release a new one that plugs holes or expands the scope, as it did with the generative AI draft regulation expanding on previous measures.

Vertical because it is different from horizontal regulations, such as the European Union's AI Act, that are comprehensive umbrella laws attempting to cover all applications of a given technology.

Zou and Zhang (2024) report that the interim measures for the management of generative AI services ("the Measures") that Chinese regulators have been implementing since July 2023 yes aim to mitigate various risks associated with public-

facing generative AI services, particularly those concerning information content safety and security, but reflect tensions between the different policy objectives of the government (i.e. the CCP). These objectives are many and may collude one with another: the main focus is, as forementioned, the ascension of China as a world AI hub and leader (The State Council of the People's Republic of China, 2017), but the layers are many and the different policies aim to achieve all core objectives.

We can summarize the process China's government follows to formulate and promulgate AI governance regulations that we have cited in this research (i.e. the iter legis foundations) using the model reported from Sheenan (Fig. 2).

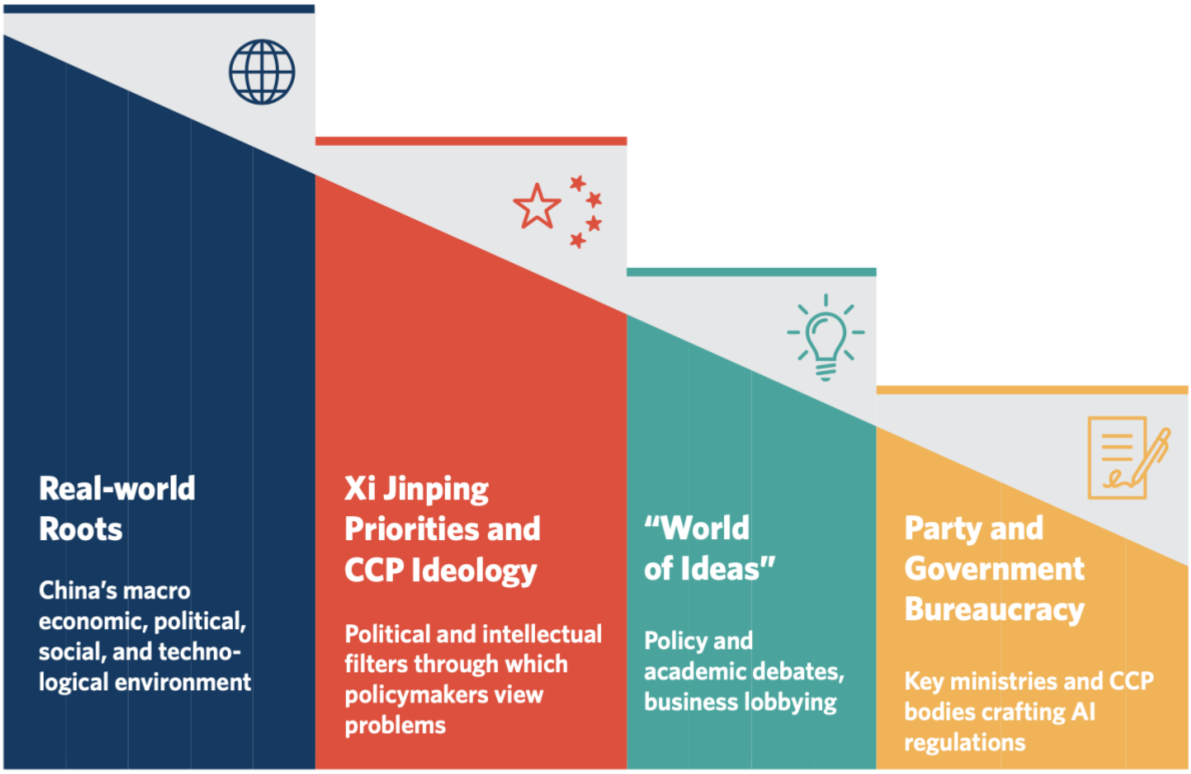

Figure 2 - The Policy Funnel of China's AI Governance.
Source: Sheehan, M. (2023).

This first part of the research has aimed to explain the roots and origin of Chinese AI policies: why and how they are made, who are the decision-making actors and what effects they aim to produce.

In the end of this first part, we can state that China has constructed one of the most systematic AI regulatory frameworks in the world, and hence one of the most prolific and proficient terrain for creation and development of AI tools (e.g. DeepSeek, Doubao, and Kimi), with its approach of "legislation first, ethical guidance, and classified governance" (Deng and Dai, 2025; Huyue Zhang, 2024a and 2024b).

The ambiguity of legislation is present, and the governance challenges are many, but the Chinese system, even if with a strong State control and data centralization, remain solid and efficient, and this approach to AI, different from the western one, is a strong competitive advantage for China (Huyue Zhang, 2024a and 2024b).

3.5) Empirical Evidence of AI Impact in China

Locally, AI has been radically changing many aspects of China's socioeconomic ecosystem, often improving efficiency and allocation of resources.

In this section we will focus on reporting empirical evidence of AI ascension and implementation in the country, and, hence, the results brought from years of policy and governance development and, ultimately, the genesis of a proficient AI habitat.
Since the data retrieved for the research scope is derived from different deep statistical analyses, the explicative formulas presented may not coincide with the ones reported in the papers. No substantial modifications have been made to the underlying models, but they have been re-written in a simpler way to show the mathematical nature of the relationship between AI adoption and its local impact (linear, non-linear).
Generally, mathematical formulas will be reported if they help clarify the conceptual framework.
To deepen the statistical inferences, please refer to the sources listed in the bibliography.
The areas of analysis are going to be the following (in order): industry, economy, financial markets, society and military forces.
Hypothetically, the deployment of Artificial Intelligence (AI) was expected to reduce operational costs while enhancing efficiency and driving revenue growth across industries (He, 2017). Moreover, effective policy frameworks and strong governmental support were considered essential to overcoming significant barriers to AI adoption, such as high implementation costs, limited awareness, and the lack of adequately trained technical professionals (Barton et al., 2017).
These projections have increasingly become a reality. In China, traditional industries are now facing mounting labor costs, largely driven by a declining working population and slower demographic growth. In response, AI has emerged as a key enabler of industrial transformation, reducing operational costs, boosting efficiency and productivity, and ultimately contributing to revenue generation. A prominent example is XAG, a Guangzhou-based agricultural technology company supported by Sinovation Ventures. XAG deploys drones, autonomous vehicles, and sensors to automate essential agricultural tasks such as seeding, pesticide spraying, crop monitoring, and weather tracking. Notably, the company's R150 autonomous crop-spraying vehicle has also been adopted in the United Kingdom for use on apples, strawberries, and blackberries. Additionally, the innovation is not only startup-driven: established firms like EP Equipment, a lithium-powered forklift manufacturer founded over three decades ago in Hangzhou, have also embraced AI. With backing from Sinovation Ventures, the company

has launched autonomous forklift models capable of self-navigation within factories and warehouses (Lee, 2021).

The transformative role of AI is also supported by robust empirical evidence. For instance, recent statistical analyses show that AI fosters industrial upgrading (IS) by encouraging technological innovation and stabilizing industrial structures, particularly in large urban centers (Zou and Xiong, 2022).

Moreover, AI has been found to optimize firms' labor skill structures, increase investments in research and development (R&D), and amplify technology spillover effects, thereby significantly enhancing enterprise-level innovation (Han and Mao, 2023).

This wave of technological advancement is closely intertwined with strategic policy initiatives. One notable not forementioned example is China's Robotics Industry Development Plan (2016–2020), which aimed to complement AI advancements through corresponding developments in physical automation infrastructure. The plan included ambitious yet largely realized goals, such as increasing the annual output of industrial robots produced by domestic brands, boosting the annual sales of service robots, and significantly raising robot density within priority sectors for automation (The State Council of the People's Republic of China, 2022; He, 2017).

Building on the momentum of this initial strategy, China introduced a subsequent five-year plan for 2021–2025, aimed at further consolidating its global leadership in robotics. The current plan emphasizes achieving breakthroughs in key technologies while expanding the use of advanced robotics in high-impact sectors such as automobile manufacturing, aerospace, and logistics (Si, 2021). These efforts collectively illustrate how China is orchestrating a coordinated push across policy, industry, and innovation ecosystems, to foster a more efficient, automated, and competitive industrial landscape.

With robust statistical evidence we can state that AI policy development has had noticeable positive effects on the Chinese economy, both micro and macro-economically, creating a fertile environment for AI innovation, development and integration in the Chinese Nation.

First, we can use the Cobb-Douglas equation to express an aggregate output (in this case $GDP = Y$) as a function of total-factor productivity ($TFP = A$), capital input (K), labor input (L), and the two inputs' respective shares of output (α and β are the share of contribution, i.e. elasticity, for K and L respectively):

$$Y(K,L) = A * K^{\alpha} * L^{\beta}$$
$$with\ 0 < \alpha < 1, 0 < \beta < 1$$

Total factor productivity is not a direct input for GDP but is a measure of productive efficiency in that, hence it measures how much output can be produced from a certain amount of inputs; under simple assumptions, a growth in TFP becomes the portion of growth in output not explained by growth in traditionally measured inputs of labor and capital used in production.

While demonstrating that the implementation and diffusion of AI technologies in China's economy has had a direct and positive effect on Gross Domestic Product remains complex, requiring in-depth analysis of multiple stochastic variables, Luo et al. (2024) find compelling evidence that:

1. AI innovation exerts a substantial and highly robust positive influence on China's Total Factor Productivity (TFP);
2. This effect is mediated through industrial structure upgrading and the enhancement of human capital;
3. The impact of AI technology innovation on TFP is shaped by contextual factors such as the degree of marketization, financial development, and the quality of digital infrastructure;
4. As TFP improves, the marginal contribution of AI innovation to productivity gains continues to grow in significance.

Fan et al (2025), on the other hand, highlight a strong impact in the microeconomic environment: the AI shock has led to an increase in the corporate labor income share, i.e. the portion of a company's total income or revenue that is allocated to the compensation of its workers.

Hence, thanks to the AI shock and related policy interventions, firms tend to allocate a higher share of income to labor, especially skilled labor, improving wage outcomes for certain worker categories in specific sectors.

One potential explanation is that the positive effect of AI on production factors necessitates a collaboration between machines and humans, thereby stimulating demand for highly skilled personnel and scientific researchers. This, in turn, raises the proportion of skilled labor within firms and affects micro-level income distribution. On the other hand, IT specialists have become cheaper, leading to an increase in AI startups, but their bargaining power in wage negotiations has been strengthened all thanks to AI local policies.

The policies fundamentally may have increased the proportion of employee income in capital gains and promote shared prosperity (Fan et al., 2025)

The impact of AI on financial markets is a complicated multilateral and multivariable measure, hence we will focus only on some variables easily interpretable, using reliable data and strong empirical scientific research.

While we will analyze Deepseek AI ascension and its main effects in the international stock market reality in the next chapter, it is important to demonstrate empirically that, among the many different impacts, AI has also been influencing the Chinese internal stock market.

An important variable that investors consider before an investment is stock liquidity: liquidity in stocks is defined as the degree to which a stock can be bought or sold without impacting its price. Stocks with higher liquidity will have sufficient outstanding shares and adequate demand and supply.

Simply put, it’s the number of buyers and sellers present in a market.

It's safer to invest in stocks with higher liquidity. Moreover, securities with low liquidity usually have a higher risk premium, mainly to compensate for higher risk. Therefore, illiquid stocks usually trade at a discount to their counterparts with high liquidity.

Zhong et al (2023), through a measure of the AI applications of Chinese listed firms based on text analytics on annual reports from 2007 to 2020, found that AI applications increase stock liquidity, and the effect of AI on increasing stock liquidity is more significant in SOEs (State-Owned Firms) and high-tech firms.

While we’ve previously reported that AI has radically changed the industry sector (Lee, 2021; Zou and Xiong, 2022; Han and Mao, 2023) and the operations system of enterprises, stock liquidity is increased by AI more by enhancing market attention rather than directly improving firm performance.

Artificial Intelligence usage in a firm is viewed as a positive factor, therefore attracting more investors and making its shares more stable in the market.

AI diffusion and implementation has ultimately changed many aspects of the life of Chinese communities, from social interactions to citizens' welfare.

Since the sectors and variables to analyze citizens' well-being can be many (if not converge to an unlimited series of possible indicators), we'll analyze AI impact using a set of three representative indexes:

1. CEI: Carbon Emissions Inequality reflects the unequal distribution of carbon emissions and their consequences across income levels, regions, and social groups; it is a valuable indicator of environmental justice and, hence, long-term societal well-being (Ma et al., 2025).

   A high CEI's value is a symptom of income inequality, with the wealthiest individuals that tend to have much higher carbon footprints due to consumption and travel habits.

   Hence, CEI is an interesting index to measure social disparity.

   Ma et al (2025) managed to formulate a correlation between CEI and Artificial Intelligence adoption (AI).

   CEI has been calculated from the county-level carbon emissions data, while the AI variable is based on the density of robot installation.

   The simplified formula is the following:

$$CEI(AI) = \alpha + \beta_1 * AI - \beta_2 * AI^2$$
$$with\ \alpha, \beta_1, \beta_2\ estimated\ coefficents > 0$$

   The research examines AI's impact on CEI , showing an initial increase in disparities, followed by a decrease as AI technology matures, indicating an inverted U-shaped relationship.

   To show the graph's shape, an exemplificative graph can be drawn with the coefficients set at standard values $\alpha = 1,\ \beta_1 = 0.5,\ \beta_2 = 0.1$ (Fig. 3).

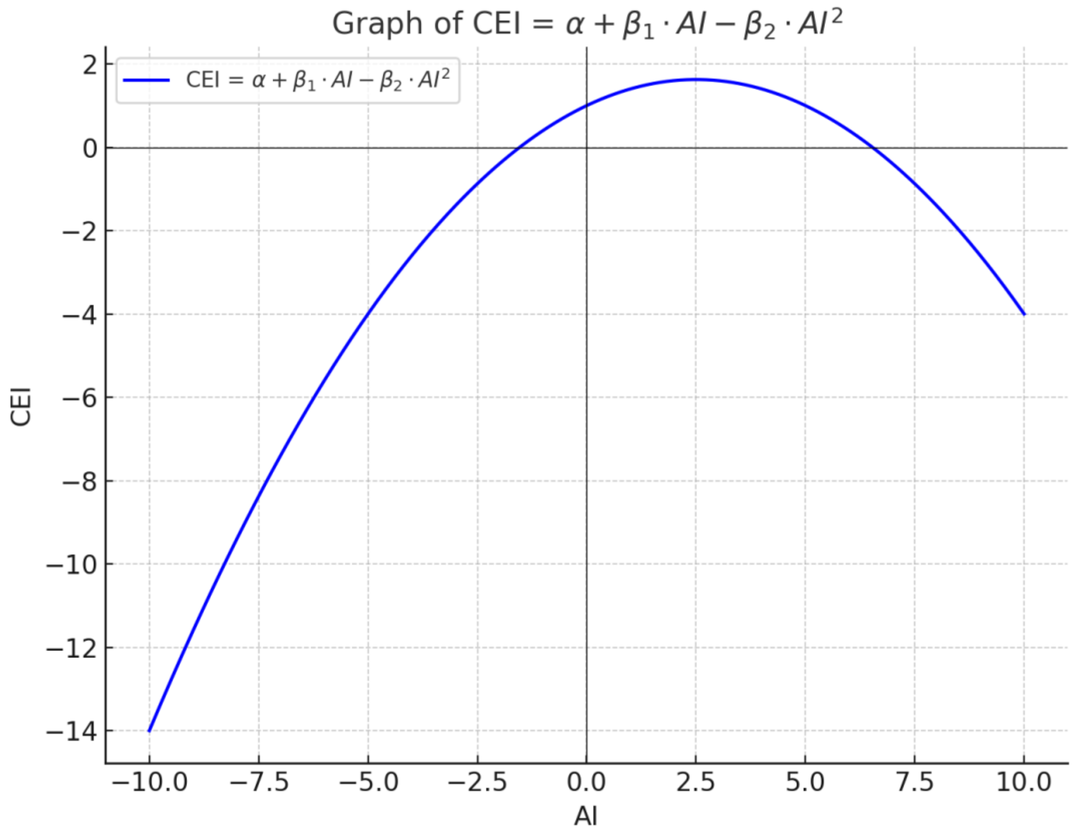

Figure 3 - Exemplificative graph of CEI-AI U-inverted correlation.
Adapted from: Ma, D., Zhu, Y. and Lee, C.-C. (2025).

The authors individuate in four different Chinese regions: the advanced eastern region with high urbanization and developed high-tech industries; the balanced central region focused on manufacturing and infrastructure; the western region, less developed but improving with government support; and the northeast, an industrial hub experiencing slowed growth due to structural adjustments (Fig. 4).

AI significantly affects CEI in China's economically advanced eastern and central regions, with the impact less pronounced in the less developed western and northeastern areas.

It is noted that possible influence channels are industrial structure upgrading and income inequality.

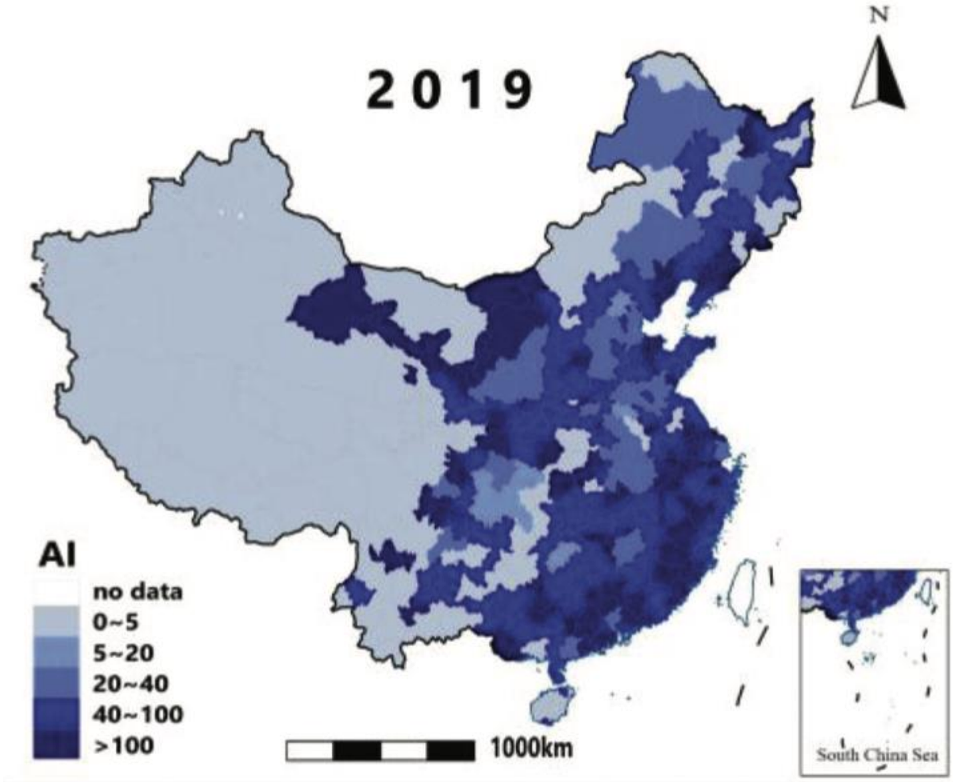

Figure 4 - AI adoption distribution in China (latest data retrievable from 2019).
Source: Ma, D., Zhu, Y. and Lee, C.-C. (2025).

The magnitude of the effect is different among the regions but the core conclusion persists: AI adoption is correlated to a first rise and a subsequent fall of CEI.
Artificial Intelligence could promote societal and industrial progress in the long term: however, a proportionate allocation of technology investments across the region is mandatory to achieve this progress, given that disparities in technology spending across regions, particularly between developed coastal areas and less developed western regions, may exacerbate regional inequalities, as more developed eastern and central regions benefit disproportionately from technology investments.

2. PER: Provincial Ecological Resilience is defined by Zhang et al (2024) as the capacity local ecosystems to withstand or absorb external disturbance, specifically the pression caused by China's economic growth.
The authors construct a PER index to assess the sustainability of the advancement of ecological civilization building and the quality of the economic development.
As such, the index serves as a meaningful indicator of the health of the interaction between society and techno-economic progress.

The evaluation index system of PER is constructed using three dimensions: resilience, adaptability and resistance. Each dimension is built on different indicators.
Resilience includes three positive indicators: per capita area of public recreational green space, green covered area as % of completed area, local financial expenditure on environmental protection.
Adaptability also includes three positive indicators: integrated reuse of common industrial solid wastes, centralized treatment rate of sewage treatment plants, rate of domestic garbage harmless treatment.
Resistance, however, include a negative indicator, that is, industrial sulphur dioxide emission.
The independent variable AI, that represents AI adoption in the Chinese provinces, is measured by the logarithm of provincial AI patent applications.
Furthermore, two moderating independent variables are used: Government Environmental Efforts (GEA) and Public Environmental Concern (PEC).
GEA represents the governmental attention and is measured by the ratio of environmental protection-related keywords to the total number of subwords in the full text of Government Work Report.
PEC is measured by the logarithm of Baidu Haze Search Index (i.e. how many Chinese citizens searched words like "haze", "air pollution" and "PM2.5" on Baidu, the main web browser of China).
The authors find a positive correlation between AI and PER, with a moderating role of GEA and PEC in AI affecting PER.
We can simplify the linear correlation with the formula:

$$PER(AI) = \alpha + \beta_1 * AI + \beta_2 * AI * (GEA + PEC)$$
$$with\ \alpha, \beta_1, \beta_2\ estimated\ coefficents > 0$$

The authors also report that AI has a positive influence on PER significantly in the eastern regions but not in the non-eastern regions (it follows the conclusion about the AI adoption distribution map of the research about CEI of Ma et al.).

Moreover, it is important to note that, given the nature of the GEA variable and its moderate positive moderating role in the relationship between AI and PER, effective governmental policy efforts, even if not directly focused on AI, can still positively support AI adoption and application in ecological governance.

3. SC: Social Capital, intended as the amount of networks, relationships and social interactions among people, enables society to function effectively and is deeply influenced by AI usage in human-human relationships.

   Liu et al (2024) conclude that a correlation between AI use and social capital, considering both usage patterns and intensity, exist: therefore, AI use leads to more social relationships.

   AI use can be exemplified in two main fields: generative (e.g. Deepseek AI) and task-oriented (e.g. Google Translate).

   Generative AI users have a more significant correlation in having social capital than non-users. Task-oriented generative AI use is positively associated with offline bonding social capital but negatively with online bonding social capital. In contrast, the use of AI for a social scope is positively associated with having social capital on both dimensions (online and offline).

   In addition, the intensity and frequency of using generative AI are positively related to social capital, with more significant effects observed in online settings.

Ultimately, it is important to highlight the AI application to core sectors for international geopolitical dynamics, such as military forces.

Since Xi Jinping ascension in 2013, China has been investing in informatization or using information technology to improve command and control, aid precision strikes, and utilize space, cyber, and electromagnetic capabilities.

The main focus of the People's Liberating Army (PLA) is to catch up and ultimately surpass the United States militarily, working on strong network and cyber security, maintenance of communications in future high-intensity conflicts, and development trustworthy AI systems (Bresnick, 2024).

However, some experts are concerned about the effective use of AI-enabled military systems (e.g. data collection or development of high-end sensors) and PLA's apparent insufficient robust military standards and testing and evaluation practices. This could lead to untrustworthy AI military tools and, hence, potential collateral damage (Bresnick, 2024).

4) Case Study: DeepSeek

4.1) DeepSeek AI: Development and Technical Characteristics

DeepSeek is a Chinese Artificial Intelligence company founded in July 2023 by Liang Wenfeng, a former hedge fund entrepreneur (Perrigo and Pillay, 2025).

Its innovative approach in developing large language models (LLMs) that rival and sometimes even surpass existing industry leaders in both performance and cost-efficiency has shown the Chinese potential capabilities in the AI market. Headquartered in China, the company has positioned itself as a significant challenger to established AI entities (Perrigo and Pillay, 2025; Naseh et al., 2025).

The initial development culminated in a spate of public releases in late 2024, including the large language model "v3", which outperformed all of Meta's open-source LLMs and rivaled OpenAI's closed-source GPT4-o (Perrigo and Pillay, 2025).

This upended approach to the market caused, with DeepSeek releases in 2024, an internal price war in the Chinese AI sector that then rapidly expanded all over the world.

Deepseek is a true emblem of the disruptive potential of Chinese AI: years of constant efforts to build a florid AI Governance ecosystem has shown that the AI is not only an expensive and monopolistic business for big tech U.S. companies (Metz, 2025; Goodwin, 2025).

Since OpenAI ascension in late 2022, the prevailing notion had been that the most powerful AI systems could not be built without investing billions in specialized hardware resources, mainly chips. That would mean that only the biggest tech companies, such as Microsoft, Google and Meta, all of which are based in the United States, could afford to build the leading technologies. However, DeepSeek's engineers publicly stated that only approximately 2,000 Nvidia H800 chips, at an estimated cost of $5.6 million, are needed to train their new system, an amount roughly 10 times less than what Meta spent building its latest AI technology (Metz, 2025; Goodwin, 2025).

Core of Deepseek success has been indeed its cost-effective development and high performance, guaranteed through efficient innovative optimization techniques and resource management (Perrigo and Pillay, 2025; Guo et al., 2025).

Basically, the startup's engineers apparently demonstrated a more efficient way of analyzing data using the chips. Leading AI systems learn their skills by pinpointing patterns in huge amounts of data, including text, images and sounds. DeepSeek described a way of spreading this data analysis across several specialized AI while minimizing the time lost by moving data from place to place (Metz, 2025). This has also guaranteed an agile deployment of new models, allowing DeepSeek to respond swiftly to market demands and technological advancements.

Another strong competitive advantage is given by the open-source philosophy (i.e. the substantial code of the models is public and shared with other institutes and entities): by adopting an open-source model, DeepSeek has made its AI technologies accessible to a broader audience, including researchers and developers with limited resources. This approach fosters innovation and collaboration within the AI community (Perrigo and Pillay, 2025). Moreover, DeepSeek-R1 is released under the MIT License, allowing free use, modification, and distribution. The model and its variants are available on platforms like Hugging Face and GitHub.

DeepSeek versatile application is a key factor for its AI models: DeepSeek has been releasing several variants, including DeepSeek-R1-Zero and six distilled (i.e. lighter and faster) models based on architectures like LLaMA and Qwen, made to cater to different performance and resource requirements. Additionally, DeepSeek-R1 is integrated into major cloud platforms, including Amazon Bedrock, Amazon SageMaker, and Azure AI Foundry, making it accessible for enterprise applications (Amazon Web Services, 2025).

The latest DeepSeek LLM model (Deepseek-R1 AI), released on January 20 (2025), has ultimately demonstrated the magnitude of the disruptive potential of Chinese AI: using smaller distilled LLM models, which require significantly less processing power while replicating the capability of larger models, DeepSeek's R1 matched or exceeded OpenAI's equivalent, o1-mini, in important math and reasoning tests.

That performance generated a surge of interest: soon the DeepSeek app had overtaken ChatGPT and Temu to become the iPhone App Store's top free download, and DeepSeek was reporting delays in new registrations to use the app due to what it described as "large-scale malicious attacks" on its services (Dunn, 2025).

Through main reports of the DeepSeek team (Guo et al., 2025), and an independent peer-reviewed external comparative analysis (Jiang, Gao and Karniadakis, 2025) we can empirically visualize and evaluate the position of DeepSeek-R1 model in the world AI hub. LLM’s performances are evaluated using different benchmarks: the AIs undergo different standardized tests to assess their speed and accuracy in topics like English language, coding, mathematics. The higher the score (expressed in %) a model achieves, the better its technical performance is (Fig 5. and Fig. 6).

It is interesting to report that a recent paper, published by Apple's Machine Learning Research, objects the general validity of traditional machine learning benchmarks in the evaluations of LLRs (i.e. LLMs versions with deeper reasoning capabilities) and LLMs' performances. With specific controllable puzzle environments, the researchers claim to have proved that both frontier LLRs and LLMs face a complete accuracy collapse beyond certain complexities. Moreover, it appears that the LLRs exhibit a counter-intuitive scaling limit: their reasoning effort increases with problem complexity up to a point, then declines despite having an adequate token budget (Shojaee et al., 2025).

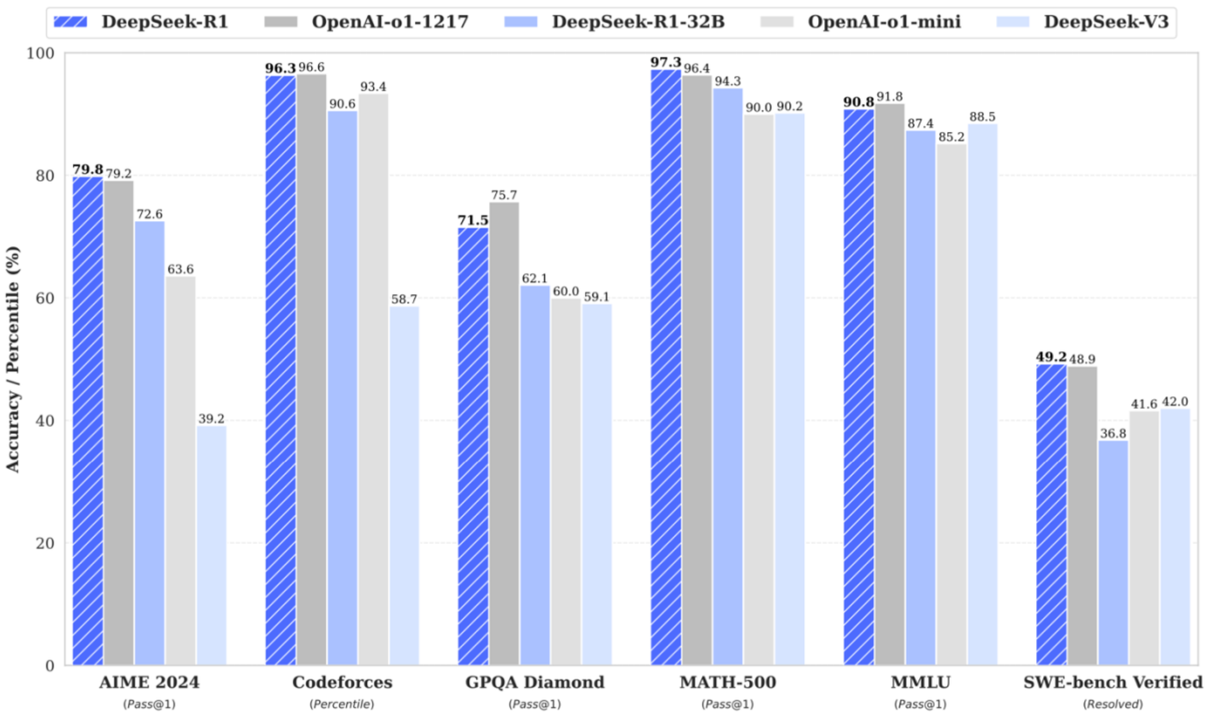

Figure 5 - Performance comparison between the latest DeepSeek and OpenAI models.

Source: Guo, D., Yang, D., Zhang, H., Song, J., Zhang, R., Xu, R., Zhu, Q., Ma, S., Wang, P., Bi, X., Zhang, X., Yu, X., Wu, Y., Wu, Z.F., Gou, Z., Shao, Z., Li, Z. and Gao, Z. (2025).

	Benchmark (Metric)	Claude-3.5-Sonnet-1022	GPT-4o 0513	DeepSeek V3	OpenAI o1-mini	OpenAI o1-1217	DeepSeek R1
	Architecture	-	-	MoE	-	-	MoE
	# Activated Params	-	-	37B	-	-	37B
	# Total Params	-	-	671B	-	-	671B
English	MMLU (Pass@1)	88.3	87.2	88.5	85.2	**91.8**	90.8
	MMLU-Redux (EM)	88.9	88.0	89.1	86.7	-	**92.9**
	MMLU-Pro (EM)	78.0	72.6	75.9	80.3	-	**84.0**
	DROP (3-shot F1)	88.3	83.7	91.6	83.9	90.2	**92.2**
	IF-Eval (Prompt Strict)	**86.5**	84.3	86.1	84.8	-	83.3
	GPQA Diamond (Pass@1)	65.0	49.9	59.1	60.0	**75.7**	71.5
	SimpleQA (Correct)	28.4	38.2	24.9	7.0	**47.0**	30.1
	FRAMES (Acc.)	72.5	80.5	73.3	76.9	-	**82.5**
	AlpacaEval2.0 (LC-winrate)	52.0	51.1	70.0	57.8	-	**87.6**
	ArenaHard (GPT-4-1106)	85.2	80.4	85.5	92.0	-	**92.3**
Code	LiveCodeBench (Pass@1-COT)	38.9	32.9	36.2	53.8	63.4	**65.9**
	Codeforces (Percentile)	20.3	23.6	58.7	93.4	**96.6**	96.3
	Codeforces (Rating)	717	759	1134	1820	**2061**	2029
	SWE Verified (Resolved)	**50.8**	38.8	42.0	41.6	48.9	49.2
	Aider-Polyglot (Acc.)	45.3	16.0	49.6	32.9	**61.7**	53.3
Math	AIME 2024 (Pass@1)	16.0	9.3	39.2	63.6	79.2	**79.8**
	MATH-500 (Pass@1)	78.3	74.6	90.2	90.0	96.4	**97.3**
	CNMO 2024 (Pass@1)	13.1	10.8	43.2	67.6	-	**78.8**
Chinese	CLUEWSC (EM)	85.4	87.9	90.9	89.9	-	**92.8**
	C-Eval (EM)	76.7	76.0	86.5	68.9	-	**91.8**
	C-SimpleQA (Correct)	55.4	58.7	**68.0**	40.3	-	63.7

Figure 6 - Performance comparison between DeepSeek-R1 and some of its competitors' models.

Source: Jiang, Q., Gao, Z. and Karniadakis, G.E. (2025).

We find compelling evidence that:

- Models like DeepSeek-R1(China), Claude Extended, and o3-mini-high (U.S.) drastically outperform general-purpose LLMs in complex math and science tasks.
- DeepSeek-R1, although slower than main competitors, is highly accurate and theoretically sound, especially in operator learning (i.e. it learns how an entire process or rule works rather than just memorizing examples faster than other models).
- Using different machine learning key benchmarks (e.g. AIME 2024, Codeforces, GPQA Diamond, MMLU, SWE-bench Verified), we find that Deepseek-R1 achieves high accuracy, comparable to OpenAI-o1-1217, one of OpenAI latest models, the predecessor of OpenAI o3, which is one of the most performative in the market.

However, these cutting-edge technical capabilities do not come without skepticism from the stakeholders: different experts question the validity of DeepSeek's performance claims, suggesting that the models may not be as robust as advertised or that the benchmarks used may not be entirely representative or truthfully showcased (Dunn, 2025; Perrigo and Pillay, 2025).

Also, there has been skepticism regarding the nature and long-term sustainability of DeepSeek's cost-effective development model, with concerns that it may not be financially viable in the face of increasing competition and the need for continuous innovation (Perrigo and Pillay, 2025).

Another aspect pointed out is the content censorship: as illustrated in the previous chapter, all data used to train Chinese LLMs is supervised by the CAC, and ultimately by the CCP. The algorithm, and therefore all of AI output, must also follow the rigid guidelines, such as the “New Generation of Artificial Intelligence Ethical Codes“ (Ministry of Science and Technology of The People’s Republic of China, 2021) and the “Interim Measures For The Administration Of Generative Artificial Intelligence Services” (Cyberspace Administration of China, 2023).

This creates essentially a content-firewall on all output generated by Chinese AI: DeepSeek-R1 chatbot struggles to answer questions about sensitive issues in China, such as the Tiananmen square massacre or the recognition of Taiwan as an independent country, often changing subject or stating that it is an argument beyond its scope (Goodwin, 2025; Naseh et al., 2025).

Since all the data imported in DeepSeek ultimately may pass through the CAC, fear of a breakage of the user data’s privacy is shared among the consumers: even though one of the pillars of the AIDP is the respect of data privacy, worries of user data manipulation by the CCP is widespread, creating skepticism about transparency and reliability especially in the U.S. (Phillips, 2025).

It is important to underly that non-Chinese LLMs already encountered contestations caused by privacy concerns, such as the €15 million fine issued in January (2025) by the Italian government in response to OpenAI’s methods of handling personal data that apparently were breaching EU privacy rules (Vielma, 2025).

4.2) The international impact of Deepseek-R1 model release

The initial public models of Deepseek AI, such as the v3 version, which, as already illustrated, radically disrupted the high-tech market, outperforming some of the more expensive and used U.S. models, pioneers of the global AI hub (Perrigo and Pillay, 2025; Naseh et al., 2025).

The more advanced R1 model released on January 20, capable of deep thinking and astonishing accuracy (Jiang, Gao and Karniadakis, 2025; Guo et al., 2025), not only brought a greater shock to the international AI panorama, but objectively constituted a milestone in the global development of complex LLM models (Perrigo and Pillay, 2025).

We will analyze the disruptive entrance in the market of DeepSeek-R1 starting from the stock market mayhem subsequent to its release to its influence in the global geopolitical equilibrium.

As forementioned, stockholders now ultimately views AI usage, implementation and development as key variables for the risk of their investments. Artificial intelligence use in a firm brings more investors, especially in high-tech firms and in SOEs, and the firms with more advanced AI tools have hence a competitive advantage for equity collecting (Zhong et al 2023).

While DeepSeek is not listed in any public stock exchange and has not yet announced any concrete IPO project (Selvaggio, 2025), the release of DeepSeek-R1 model caused financial damage to competitors.

The stock price of Nvidia' shares, company that produces the high-powered chips crucial to powering AI models, dipped about 17% on the subsequent Monday morning on fears that fewer AI chips may be necessary to train powerful AI than previously thought (Fig. 7). The S&P 500 and tech-heavy Nasdaq 100 fell sharply, down 1.8% and 3.2% around noon ET. Semiconductor stocks faced the steepest losses, while tech giants including Microsoft and Alphabet also dropped (Mott, 2025).

Many analysts attribute the stock drop mainly to the R1 model release (Mott, 2025; Rudolph, 2025).

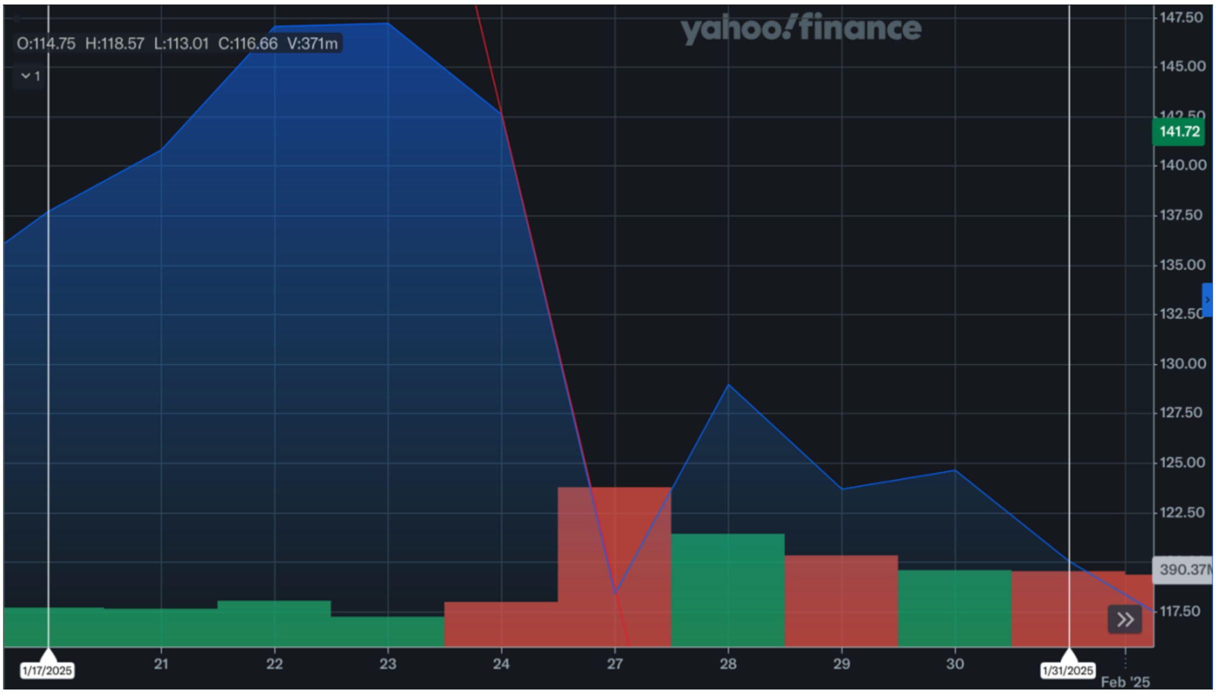

Figure 7 - Nvidia's stock price fluctuations during January 2025. The red line indicates the steepest price fall after DeepSeek-R1 release (24-27 January).
Adapted from: Yahoo Finance (2025).

Some financial analysts have stated that the debut of the new DeepSeek AI tool had blindsided investors who have been willing to accept the tech sector's historically stretched valuations as justified since the bull market took off in 2022 (Mott, 2025).
While the high-tech stock market has now partially recorrected itself, it’s important to highlight the risk of overvaluation of the high-tech stocks: Nvidia, Microsoft, Alphabet, Meta Platforms, Amazon, Apple, and Tesla account for about a third of the value of the S&P 500 (Mott, 2025; Slickcharts, 2025).
After the DeepSeek R1 shock, Bank of America analysts stated 19 of the 20 valuation metrics they had been tracking right before the R1 model release, were sitting at extreme levels. The S&P 500's trailing price-to-earnings ratio of 25.3 times, for example, was 70% above its 125-year average of about 15 times (Mott, 2025).
Hence, AI attracts investors and deeply influence the stock markets, but the risk of a presence of an AI investing frenzy that has been causing a financial bubble is unignorable. The global tech leaders, such as Meta's chief AI scientist Yann LeCun and Microsoft CEO Satya Nadella, promptly responded to the R1 release, to mitigate the stockholders panic, stating that it’s not that China is becoming the new AI advancement leader, but the nature of the AI market is changing, favorizing open-source models such as DeepSeek-R1, and

as AI gets more efficient and accessible, its use is going to skyrocket, turning it into a commodity (Goodwin, 2025).

To mitigate the tech stock meltdown, and hence to attract more investors and remain competitive, the big tech firms confirmed their multi-billions investment spendings in AI development, estimated to an amount of $300 billion AI capital expenditures through 2025, growing bigger in 2026. Microsoft alone announced a $80 billion investment for 2025 for data centers, while Meta confirmed their $60 billion project (Mott, 2025; Ren, 2025).

While DeepSeek apparently showed a way more cost-efficient way of developing advanced LLMs, big U.S. competitors have not stepped out from their multi-billion investments.

Analysts however have noted the possibility of potential overspending from the firms: the fact that a cutting-edge AI app has been developed with last-gen tech may damage the thesis that companies need to spend more and more on high-powered GPUs to keep up. This could interfere, for instance, in future demand for Nvidia's more expensive hardware, and hence damage its aggregate profits and equity value.

Additionally, to pursue the competitive advantage obtained from the shock of American high-tech firms caused by the R1 model release, China promptly announced more investments in local AI startup projects, like Manus, an AI agent capable of making decisions and executing tasks autonomously, with much less prompting required compared to AI chatbots like ChatGPT and DeepSeek (Reuters Staff, 2025a).

DeepSeek-R1 in 2025, like the launch of OpenAI's ChatGPT in 2022, has ultimately changed the trajectory of the development of the different national AI hubs (Park and Chang, 2022; Dunn, 2025).

As previously illustrated in this research, AI leadership has become a component of the backbone of international relationships: the United States president Donald Trump, after the impact on stock market of DeepSeek-R1 release, publicly recognized the inevitable superiority of the cost-efficiency of the AI model, and that should be a "wake up call" for American industries, that should "be laser focused on competing to win" the AI race (Forbes Breaking News, 2025).

DeepSeek also attracted the attention of Russia's largest bank, Sberbank. The Moscow-based bank has been partnering with Chinese researchers to develop AI technologies, marking one of the most high-profile collaborations in AI between the two nations (O'Connor, 2025).

This alliance in the AI field has strengthened the macro-dichotomy between U.S. and China-Russia, already fueled by contemporary geopolitical dynamics such as the Chip War between U.S. and China, the U.S. tariffs global effects and Russia's sanctions from the western political world (Cosgrove, 2025; Huyue Zhang, 2025; O'Connor, 2025).

The release of DeepSeek-R1 played a crucial role in the AI race, with potential geopolitical implications, particularly in the context of its strategic alliances and technological competition with the United States (O'Connor, 2025; Gray, 2025).

5) Conclusions

Artificial Intelligence, particularly generative models like large language models, has become a cornerstone technology influencing many facets of human life globally.

As a powerful and versatile tool, AI needs a solid regulatory framework and ethical governance, which depends not only on the transparency of algorithms but mostly on the control, ownership, and stewardship of data.

Data availability, quality, privacy and security are mandatory for AI's safe and effective deployment.

In this context, China has positioned itself as a major strategic competitor to the United States in the global AI race. Through a distinctive national AI agenda characterized by early legislative efforts, ethical guidance, and classified governance, China emphasizes policy-led AI development, focusing more on software innovation and regulatory frameworks than hardware dominance.

This strategy reflects motivations tied to technological sovereignty, economic modernization, and geopolitical influence under the Chinese Communist Party's direction. However, the CCP's approach raises concerns internationally due to its opacity, censorship practices, and ambiguous ethical standards.

Nationally, China's AI push has fostered a thriving innovation ecosystem, exemplified by breakthroughs such as DeepSeek-R1's launch in January 2025. This model's performance and cost-efficiency signal China's rising technological capabilities, challenging the U.S.'s dominance and underscoring that AI leadership is no longer monopolized.

Internationally, China's AI advancements have significant implications for global technological competition, governance norms, and geopolitical dynamics.

As China continues to expand its AI influence, it reshapes the competitive landscape, prompting strategic recalibrations by other powers and raising critical questions about the future balance of AI-driven power.

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