Impact of the DeepSeek-R1 Model Launch on the Value of Chinese AI Concept Companies

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Abstract. On January 20, 2025, the open-source large model DeepSeek-R1 was launched in China, marking another major technological breakthrough in generative AI. As a representative of domestic large models, it quickly attracted significant market attention. This study selects 152 A-share listed companies from the artificial intelligence industry chain as the observation sample, and employs an event study method to quantitatively analyze abnormal stock price movements before and after the technology announcement. The results indicate that the release of new technology produced a significant positive impact on AI-related industries, with market sentiment turning optimistic in the short term, although a long-term adjustment trend is observed. Additionally, the study examines the market response characteristics of both upstream and downstream sectors in the AI industry. The reactions across different segments are asymmetric; upstream enterprises experience more volatile stock prices due to the risks of technological substitution and a structural contraction in market demand.

1 Introduction

In recent years, the rapid development of generative artificial intelligence (Generative AI) technologies—such as breakthroughs in large language models (LLMs) like ChatGPT and GPT-4—has had a widespread global impact. These models have demonstrated remarkable abilities in understanding context, processing large volumes of data, and generating content that aligns with human preferences [1]. Consequently, generative AI not only plays an important role in traditional industries such as finance, education, and healthcare [2], but also offers broad application prospects in fields such as art, entertainment, design, and scientific research [3].

As a frontier innovation in today's technology sector, generative AI is actively driving the transformation of industries and its influence is reflected in the capital markets. This is particularly evident in the performance of sectors related to technology stocks, chip stocks, and cloud computing. The release of ChatGPT not only established OpenAI as a globally recognized technology company but also triggered soaring stock prices among companies across the AI industry's upstream and downstream segments. For instance, Nvidia's market capitalization surged from 1 trillion to 2 trillion dollars within just nine months.

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On January 20, 2025, DeepSeek-R1 was released in China. As a representative of China's large models, DeepSeek quickly became the focal point of market attention. By employing the Group Relative Policy Optimization (GRPO) algorithm, Knowledge Distillation, and Long-CoT techniques [4], DeepSeek-R1 achieves performance levels comparable to those of the then top-tier closed-source models (ChatGPT 4 and ChatGPT 4o). Moreover, its training cost is only 3% to 5% of that of OpenAI's model [5]. More importantly, the DeepSeek-R1 model is available to researchers and developers worldwide in an open-source format, thereby challenging the proprietary dominance of Western AI giants. These advancements are expected to empower researchers in resource-limited environments, promote global collaboration, and drive breakthroughs across various fields. Open-source AI has the potential to redefine the technological landscape by providing advanced functionalities to underrepresented communities and encouraging ethical and inclusive innovation [6].

Thus, whether the release of DeepSeek-R1 will significantly influence the future development of China's AI industry, similar to the impact of ChatGPT, has become a focal point of interest among market participants and academics alike. Investigating the market reaction following DeepSeek's release can shed light on the commercialization process of domestic large models and their long-term effects on the Chinese capital market.

This study adopts an event study methodology to examine the impact of the DeepSeek-R1 model release on the value and market response of AI concept companies in the A-share market, considering both short-term and long-term effects. The event study method is a widely used tool in finance for assessing the impact of specific events on the market, and it has been extensively applied in numerous studies. Typically, expected return models are constructed using approaches such as the market model or the Fama-French five-factor model to quantitatively calculate abnormal returns (AR) and cumulative abnormal returns (CAR) during the event window, thereby evaluating the event's effect on stock prices [7] . Relevant studies have employed this approach to investigate the effects of various digital technology investments on firm value [8,9], and some research in the AI domain has applied it to examine the impact of technological breakthroughs on stock prices [2]. The practice of categorizing and comparing different segments of the industry chain in previous research has also provided methodological insights for this paper. Therefore, by grouping AI concept stocks into upstream computing power and downstream applications, this study aims to reveal the differential impacts of technological events on various segments, thereby offering a clearer understanding of the innovative breakthroughs and future opportunities, and providing support for subsequent research.

2 Hypothesis development

Some studies have shown that after the release of ChatGPT, the value of companies in related industries experienced a significant positive impact [10]. However, long-term event studies may only provide weak statistical evidence [9]. Other research on the impact of ChatGPT's release on the Chinese fund market indicates that its effects on different AI-related industries vary, possibly because the application of ChatGPT technology in China remains limited [11]. These findings suggest that breakthroughs in new AI technologies may have a positive effect on the market, but long-term adjustments driven by concerns about the realization of technological innovations and expectations cannot be ruled out. These phenomena provide theoretical support for this study and offer insights for examining the market response following the release of DeepSeek-R1.

Based on the analysis above, this paper proposes the following hypotheses:

H1: After the release of the DeepSeek-R1 model, AI concept stocks in the A-share market will exhibit significantly positive abnormal returns. In other words, during the event window, the cumulative abnormal return (CAR) will be significantly greater than zero.

H2: In the long term, as further information is disclosed and market sentiment stabilizes, the cumulative abnormal return (CAR) will gradually retract.

H3: Due to differences in technological maturity and commercialization progress between the upstream computing power sector and the downstream applications sector in the AI industry chain, the impact of the DeepSeek-R1 release will be significantly heterogeneous between the two segments.

3 Data and methodology

The data for this study primarily targets AI concept stocks in the A-share market. The AI industry is categorized into two segments based on the industry chain: the upstream computing power sector and the downstream application sector. To ensure data diversity and representativeness, this study utilizes the lists of AI computing power concept stocks and AI application concept stocks from the Wind database, covering stocks from the Main Board (Shanghai Main Board, Shenzhen Main Board), the STAR Market, and the ChiNext Board. The final sample includes 152 AI industry companies and 29,893 daily stock price observations.

This study employs the event study method to calculate the cumulative abnormal returns (CAR) of the selected sample companies before and after the release of the DeepSeek-R1 model. The event study method evaluates the impact of an event on stock prices by comparing the actual stock returns of a company after the event with the expected normal returns had the event not occurred [12]. This method effectively addresses endogeneity issues caused by bidirectional causality and noise events [13]. The event date is set as January 20, 2025. The estimation window for this study is 120 trading days [14], which spans from 140 trading days to 20 trading days before the event date (to avoid interference from the event window).

To calculate the expected returns, this study employs the standard Market Model for event study:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

(1)

Where $R_{i,t}$ is the expected return of stock i on day t, and $R_{m,t}$ is the market return (represented by the CSI 300 index), α_i and β_i represents the regression coefficient of stock i. Additionally, the random component is what $\varepsilon_{i,t}$ stands for.

To calculate the expected returns, since logarithmic returns have the property of additivity, they are more stable in multi-period cumulative calculations, making them suitable for long-term return calculations and capable of accumulating returns over multiple time windows. Therefore, this study uses this calculation method, with the formulas as follows:

$$R_{i,t} = \ln\left(\frac{close_{i,t}}{close_{i,t-1}}\right)$$

(2)

$$R_{m,t} = \ln\left(\frac{marketclose_t}{marketclose_{t-1}}\right)$$

(3)

Where $close_{i,t}$ is the closing price of stock i on day t, and $marketclose_t$ is the closing index level of the market on day t.

Thus, the abnormal returns (ARs) are calculated as the expected return from the observed return:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t})$$

(4)

Then, the ARs values over the event window are summed up to obtain the cumulative abnormal return (CAR) for stock i during the event window, calculated as:

$$CAR[t_1, t_2] = \sum_{t=t_1}^{t_2} AR_{i,t}$$

(5)

4 Result and discussion

4.1 Baseline result

This study takes January 20, 2025—the day the DeepSeek-R1 model was released—as the event date and selects 152 AI concept stocks from the A-share market as the research sample. The event study method is used to analyze the market reaction to this event. By estimating the sample observations within the event window, predicting the expected return during the estimation window, and using the CSI 300 index as the market benchmark, the cumulative abnormal returns (CAR) for different event windows are obtained. Table 1 presents the descriptive statistics of the CAR for various event windows, including the number of samples (N), mean, standard deviation (sd), minimum (min), and maximum (max) values.

Table 1. Descriptive Statistics.

VARIABLES	N	mean	sd	min	max
CAR [-10, 0]	1,672	-0.019	0.085	-0.287	0.288
CAR [-15, 0]	2,432	-0.072	0.093	-0.321	0.221
CAR [-20, 0]	3,192	-0.135	0.129	-0.445	0.410
CAR [0, +10]	1,672	0.059	0.159	-0.284	1.042
CAR [0, +15]	2,432	0.026	0.201	-0.362	1.126
CAR [0, +20]	3,192	0.036	0.212	-0.375	0.983
CAR [-1, +1]	456	-0.018	0.070	-0.252	0.321
CAR [-2, +2]	760	-0.015	0.083	-0.276	0.294
CAR [-5, +5]	1,672	-0.001	0.092	-0.307	0.342
CAR [-10, +10]	3,192	0.046	0.172	-0.297	1.106
CAR [-15, +15]	4,712	-0.040	0.218	-0.500	1.273

Based on the results presented in Tables 1 and 2, the abnormal returns during the pre-event window are significantly negative and exhibit considerable volatility, indicating that the market had already priced in negative expectations. This reflects investors' concerns regarding technological substitution risks. As the event window extends, the negative cumulative effect becomes significantly stronger, the pessimism about technological substitution gradually accumulates over the long term.

In the post-event window, the CAR is significantly positive, demonstrating that market sentiment surged following the event. Most investors held an optimistic view, with some stocks showing cumulative abnormal returns as high as 100%, implying that expectations of technology implementation generated excess returns and attracted substantial capital inflows. However, certain stocks continued to decline, indicating that market concerns had not been entirely allayed. All in all, the release of DeepSeek-R1 has a positive impact on AI concept stocks in the A-share market, which aligns with our expectations and supports Hypothesis 1.

With the extension of the event window, the CAR begins to decline. This may be attributed to short-term information asymmetries and irrational investment behaviors, where initial positive news triggered a surge and herd behavior [15]. As doubts about the pace of technology commercialization increased and information asymmetries eased, the long-term value of the technological breakthrough needed to be verified in specific contexts.

Consequently, market sentiment shifted from "optimistic hype" to "rational assessment," which is consistent with Hypothesis 2.

Table 2. Market reactions to the launch of Deep seek-R1.

Event window	CAR	t-stat	t-p	z-stat	z-p
before the event date					
[-10,0]	-0.019	-9.392	0.000	-12.742	0.000
[-15,0]	-0.072	-37.982	0.000	-31.785	0.000
[-20,0]	-0.135	-59.444	0.000	-41.781	0.000
after the event data					
[0,+10]	0.059	15.208	0.000	16.726	0.000
[0,+15]	0.026	6.457	0.000	-1.576	0.115
[0,+20]	0.036	9.743	0.000	2.702	0.007
From before to after the event date					
[-1,+1]	-0.018	-5.506	0.000	-7.195	0.000
[-2,+2]	-0.015	-5.022	0.000	-7.397	0.000
[-5,+5]	-0.001	-0.403	0.687	-0.542	0.588
[-10,+10]	0.046	15.029	0.000	13.375	0.000
[-15,+15]	-0.040	-12.549	0.000	-25.634	0.000

Analysis of the cross-window data reveals that, except for the CAR within the narrow window of [-5, +5] which is not significant, the CAR in the short-term window is significantly negative. The concentrated negative reaction within this narrow window might be related to the disclosure of technical details on the event day, such as the Group Relative Policy Optimization (GRPO) algorithm. The market interpreted this as indicative of lower training costs, which could potentially reduce GPU demand. In the medium-term window, the CAR for [-10, +10] is significantly positive, suggesting that the market began to digest the new information and that sentiment converged. In the long term, with the CAR for [-15, +15] averaging -4.0%, the comprehensive impact before and after the event reflects a long-term correction. As further information was disclosed and the market adjusted rationally, the cumulative abnormal returns of AI concept stocks exhibited a gradual decline, with stock prices stabilizing due to commercialization falling short of expectations and the exposure of technological substitution risks. This outcome remains consistent with Hypothesis 2.

In summary, the release of the DeepSeek-R1 large model has a significant positive impact on the A-share market. In the short term, market attention focuses on the "cost reduction and efficiency improvement" logic, but as time progresses and the overheated sentiment is absorbed, the market becomes more rational and adopts a cautious stance regarding the feasibility of commercialization in the long run.

4.2 Heterogeneity analysis

To explore the specific impact of the DeepSeek-R1 release on the AI industry and gain a deeper understanding of the underlying logic of this transformation, this paper follows the classification of popular concepts in Wind. The selected 152 AI concept stocks are categorized along the industry chain into upstream computing power

(chips/GPUs/servers/optical modules/cloud computing) and downstream applications (AI education/AI healthcare/AI finance/autonomous driving).

Among them, 15 companies operate in both upstream and downstream segments. To avoid attribution errors and ensure classification accuracy and purity, these companies are classified separately into a hybrid group. This approach enhances the scientific rigor of the study.

As a result, 38 AI computing power stocks and 99 AI application stocks are identified. Event studies are then conducted separately for these groups, with the results presented in Table 3.

Table 3. Market reaction of upstream and downstream segments after the launch of Deep seek-R1.

Event window	AI arithmetic industry companies (N=38)					AI application industry companies (N=99)				
	CAR	t-stat	t-p	z-stat	z-p	CAR	t-stat	t-p	z-stat	z-p
before the event date										
[-10,0]	0.021	5.496	0.000	5.397	0.000	-0.016	-6.219	0.000	-8.95	0.000
[-15,0]	-0.016	-5.208	0.000	-7.899	0.000	-0.056	-25.307	0.000	-22.505	0.000
[-20,0]	-0.050	-10.061	0.000	-12.302	0.000	-0.129	-46.483	0.000	-33.269	0.000
after the event data										
[0,+10]	0.151	14.71	0.000	14.353	0.000	0.049	11.162	0.000	12.818	0.000
[0,+15]	0.192	18.368	0.000	18.132	0.000	-0.005	-1.179	0.239	-7.671	0.000
[0,+20]	0.287	30.534	0.000	22.201	0.000	-0.014	-3.701	0.000	-8.852	0.000
From before to after the event date										
[-1,+1]	0.004	0.578	0.564	-1.514	0.130	-0.011	-2.857	0.005	-3.45	0.001
[-2,+2]	0.030	4.194	0.000	2.79	0.005	-0.013	-3.835	0.000	-4.933	0.000
[-5,+5]	0.024	5.737	0.000	6.038	0.000	0.000	-0.161	0.872	0.057	0.955
[-10,+10]	0.162	22.608	0.000	21.895	0.000	0.043	11.859	0.000	11.865	0.000
[-15,+15]	0.166	20.961	0.000	18.939	0.000	-0.052	-14.846	0.000	-25.382	0.000

Research findings indicate that for AI computing power concept stocks, the mean CAR increased from -5% during the 20-day pre-event window to 2% in the 10-day pre-event window. After the event, the CAR was significantly positive and continued to grow as the event window extended. Cross-window analysis shows that, except for the [-1, +1] window where the t-test results were not significant—possibly due to mixed market opinions on the event day with balanced bullish and bearish forces—when the window is extended, the low-cost nature of the R1 model might superficially imply a reduced demand for computing power. However, compared to actual application levels, the market still faces a substantial demand gap for computing power. Therefore, in the long run, the future market for the computing power industry remains considerable.

In contrast, for AI application concept stocks, the CAR was significantly negative before the event. After the event, the CAR for the [0, +10] window averaged 4.9%, suggesting that the implementation of new technology accelerated the penetration of application scenarios, with the market focusing on the potential for "cost reduction and efficiency improvement" in the short term. However, the CAR for the [0, +20] window fell to -1.4%, indicating that risks related to commercialization falling short of expectations should be taken into account, such as the long implementation cycles and long-term risks associated with industrial AI.

Overall, the research findings reveal a clear divergence in market reactions between the AI computing power and AI application sectors before and after the DeepSeek-R1 release.

Both types of companies were negatively affected by market pessimism prior to the event, particularly the AI application companies, which reflects greater sensitivity to technological substitution risks on the application side. However, after the DeepSeek-R1 release, both sectors experienced significant positive effects, with computing power companies outperforming application companies. This suggests that the market remains skeptical about the progress of commercialization on the application side, likely due to long implementation cycles and associated long-term risks. Hypothesis 3 is therefore supported.

4.3 Robustness test

To ensure that the experimental results are more scientifically reliable, we replaced the CSI 300 index with the CSI 1000 index as a benchmark for market returns in the stability test. The results are shown in Table 4.

Table4. Robustness test (CSI 1000 Index).

Event window	CAR	t-stat	t-p	z-stat	z-p
before the event date					
[-10,0]	-0.049	-23.829	0.000	-22.484	0.000
[-15,0]	-0.045	-24.33	0.000	-23.162	0.000
[-20,0]	-0.070	-30.839	0.000	-29.505	0.000
after the event data					
[0,+10]	0.011	2.953	0.003	-2.748	0.006
[0,+15]	0.008	1.903	0.057	-8.16	0.000
[0,+20]	-0.042	-11.212	0.000	-19.917	0.000
From before to after the event date					
[-1,+1]	-0.021	-6.762	0.000	-9.056	0.000
[-2,+2]	-0.023	-7.926	0.000	-10.034	0.000
[-5,+5]	-0.030	-12.888	0.000	-14.403	0.000
[-10,+10]	-0.032	-10.403	0.000	-19.141	0.000
[-15,+15]	-0.031	-9.734	0.000	-22.793	0.000

According to the robustness test results in Table 4, the analysis after replacing the market model (using the CSI 1000 index instead of the CSI 300) shows that the direction and significance of the CAR remain unchanged. It is significantly negative before the event and significantly positive after the event. This indicates that using the CSI 1000 index as the market benchmark for calculating market returns yields results consistent with using the CSI 300, and the significance is maintained.

It is noteworthy that across the event windows, the CAR is significantly negative, likely due to the stronger significance of the negative CAR before the event. This may be because the CSI 1000 index contains more stocks (compared to the CSI 300), which have stronger robustness, and the volatility of AI industry tech stocks is higher relative to the market itself.

Therefore, the change in the market benchmark does not affect the core conclusion, further supporting the reliability and robustness of the research.

5 Conclusion

With the release of the open-source DeepSeek-R1 large model, the AI industry has witnessed another revolutionary technological breakthrough, leading to growing attention regarding its impact on AI industry development. This paper employs an event study approach to examine

the effect of DeepSeek-R1 on the value of AI concept stocks in the A-share market. It analyzes the cumulative abnormal returns (CAR) across different event windows and investigates market reactions to breakthroughs in artificial intelligence technology, while also exploring the market response differences along the upstream and downstream segments of the AI industry.

The analysis indicates that the DeepSeek-R1 model has delivered a significant positive impact on AI concept companies in the A-share market. Market sentiment was optimistic following the technology release, with stock returns showing an upward trend. However, in the long term, concerns about the pace of commercialization and the future application prospects of the technology gradually emerged. Furthermore, market reactions were asymmetric across different segments of the industry chain. Upstream computing power stocks were affected by substitution risks and experienced considerable volatility. They initially declined sharply due to expectations of "cost reduction and efficiency improvement" brought by the new technology, but subsequently rebounded and surged as more information was disclosed and a substantial demand gap for computing power remained. In contrast, downstream application stocks benefited in the short term from expectations of technology implementation but later faced correction pressures after "overstretched expectations," as the market grew skeptical about their commercialization progress due to long implementation cycles and associated long-term risks.

Based on these findings, this paper offers the following policy and practical recommendations: Investors should focus on companies with shorter commercialization paths and strong technological adaptability while avoiding investments in upstream technology suppliers with inelastic demand. For the companies involved, upstream firms should continue to invest in research and development to address the computing power gap, while also planning strategic transitions toward emerging fields such as edge computing to mitigate substitution risks. Downstream companies should expedite scenario validation and explore ways to integrate new technology with traditional businesses, particularly in sectors like education and healthcare that have long commercialization cycles, in order to adapt to rapid market changes. Policymakers should strengthen support for domestic AI technologies, encourage companies to accelerate scenario validation and application implementation, and establish comprehensive risk monitoring and early warning mechanisms to address potential market fluctuations following technological breakthroughs. The emergence of DeepSeek has disrupted the Western AI giants' monopoly over advanced technology, presenting an opportunity to empower researchers in resource-constrained environments through open-source AI, promote global collaboration, and achieve breakthroughs across various fields, thereby redefining the technological landscape.

In addition, this study has certain limitations. Since the event occurred relatively recently, there remains a significant gap in related research. This paper is confined to analyzing market reaction characteristics and briefly discussing the underlying factors, without delving deeply into the mechanisms of impact. Future research should explore these mechanisms in greater detail.

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