

Business Risk of the Artificial Intelligence Industry in China

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Abstract. As one of the rapidly growing markets, artificial intelligence (AI) has seen increased adoption in recent years, As China's AI market has great investment potential, this research analyzes the business risks of Chinese AI enterprises in three different fields – iFLYTEK, TOPBAND and Inspur Electronic Information. By calculating asset beta value and analyzing multivariate factors, this research is committed to providing investors with inspiration for investment in China's AI market. The consequence of the research shows that the riskiest corporation is iFLYTEK, followed by TOPBAND and Inspur Electronic Information. This result is caused by internal factors - operating business categories, R&D, and external factors - the competition in the market segment and the intensity of government support. Through multivariate factor analysis, this research suggests that investors should pay more attention to the R&D capabilities of Chinese AI enterprises, the degree of competition in their market segments, and the degree of government policy support.

Keywords: Artificial Intelligence; Smart Speech Recognition; Intelligent Control Solution; AI Computing; Business Risk.

1. Introduction

1.1 Background

Artificial intelligence (AI) is an effective tool that has shown its potential for financial investment. With the development of computing power and other precondition, AI as one of the main directions of scientific and technological development has been widely adopted in various industries in recent years. China is one of the largest markets in the world, and the potential for the AI market in China is huge. In this context, this research selects three representative corporations from China in different branches of the AI area for analysis, attempting to provide enlightenment for investors.

1.2 Related Research

According to Szalavetz's research in 2019, the definition of AI is a system that combined software and hardware that can process, and learn data from various sources, and provide assistance to the task which can only be performed by humans in the past. The involvement of AI in business provides upgrades to the companies by improving the business process and enhancing the backward connection. In addition, AI solution providers in the dependent market economies represent a new driven power of growth which is called technology-oriented entrepreneurship [1]. Kim's research in 2022 found that AI technologies can provide a certain level of automation for repetitive and complex tasks. With the development of the AI industry, AI which meets important business needs is increasingly being used in various industries. Through the insights AI generates, it complements the decision-making of human labor and significantly reduces the cost of forecasting. In addition, AI has the potential capability to change the way corporations operate and innovate [2].

Previous research from Duvnjak and Gorse shows that AI has the capability to model complex nonlinear processes without having to assume the relationships between input variables and output variables, the properties of AI have proven successful in simulating complex scenarios such as the tourism and environmental fields. Therefore, it plays an important role in complex modeling in the 21st century [3]. As AI develops with increasing computing power, a complex algorithm, and available data, it is capable to enhance the performance of various industries. In the medical field, AI has been proven that can improve clinical care performance in all areas of medicine. Based on the advantage of big data, AI tools can provide a more personalized medication regimen for each patient

at any time, which has the potential to change medical practices [4]. The application of AI in business can improve the efficiency of enterprises. Generally, AI has been deployed as a substitute for human labor which focuses on the automation of common and low-level tasks. Research shows that in service sectors such as banking, and human resource recruitment, AI has the potential to create massive financial profitability for the enterprise [5].

Benayoun and Lang's study shows that in the top ten dynamic economies, approximately 120 million jobs in the labor market will be replaced by the development of AI technologies. In terms of the market size of AI, compared to \$7 billion in 2018, it is forecast to reach \$90 billion by 2025 [6]. In China, the market value of artificial intelligence has shown a trend of rapid growth. Statistics from AskCI Consulting provide that the AI market value in China has reached RMB 128 billion compared to RMB 15.4 billion in 2016 [7]. The outline of the 14th Five-Year Plan focuses on the "new generation of artificial intelligence". In addition, the Chinese government's policies in new infrastructure construction and the digital economy have promoted the upgrading of industrial intelligence. In terms of the distribution of the AI industry in China, the leading enterprises are mainly involved in the fields including but not limited to intelligent recommendation, UAV, smart transportation, face recognition, and speech recognition [8]. According to Lai, the AI industry in China is in the early stages of growth. The whole industry develops rapidly, and enterprises compete fiercely on the technical level and application levels. At present, China's AI industry is facing multiple difficulties including international geopolitics and talent shortage [9].

1.3 Objective

This research studies three representative corporations in different circuits of China's AI industry calculates their asset beta values and analyzes their business risks from multiple perspectives to enlighten investors. The framework of this research is as follows: Firstly, it introduces the development status of the AI industry in China and then provides a description of relevant literature research. Followed by the research model and the research findings and discussion, and finally the conclusion.

2. Model and Data

2.1 CAPM Model

This research uses the Capital Asset Pricing Model (CAPM) to analyze the business risk of the selected corporations. It is one of the return models based on the expected return equilibrium of risky assets. The Capital Asset Pricing Model:

$$r^a = rf + \beta a * (\bar{r}m - \bar{r}f) \quad (1)$$

Where r^a stands for the expected return of the stock, $\bar{r}f$ is the risk-free rate which represents the time value of the money; $\bar{r}m$ represents the expected market return; $(\bar{r}m - \bar{r}f)$ represents the equity market premium. βa is asset beta which reflects a stock's performance relative to the broader market. The larger the absolute value of asset beta, the larger the change range of earnings is relative to the broader market. The smaller the absolute value is, the smaller the change is. In addition, if the asset beta value is negative, it means that the direction of change is opposite to the market, that is, it falls when the market rises, and it rises when the market falls. With the CAPM model, this research compares the asset beta value of each selected corporation to analyze the business risk level.

2.2 Data

iFLYTEK is an enterprise that focuses on smart speech recognition, natural language processing, and machine learning. In the smart speech recognition business, iFLYTEK has the international leading technical advantage. In addition, iFLYTEK creates China's first open AI platform - iFLYTEK

Open Platform to further the development of the AI industry. It provides one-stop AI solutions for developers as well as customized application services and products to consumers, which are mainly applied in smart education, smart healthcare, working offices, and smart city scenarios. In the smart education area, smart educational products from iFLYTEK have been adopted by 32 provincial-level places in China and foreign markets such as Singapore and Japan. In the smart healthcare area, medical test robot has been extensively adopted by medical institutions. In other business areas, iFLYTEK products including but not limited to iFLYTEK Input Method, iFLYTEK AI Notebook, and iFLYTEK Smart Translator are widely accepted by Chinese consumers.

TOPBAND is an intelligent control solution provider which mainly engages in R&D, production, and sales of intelligent control system solutions. With "four electricity (electric control, motor, battery, power supply technology) and one network (IoT Platform)" as core technology, it provides various products and services for tools, home appliances, new energy, and industrial industries. In the intelligent tools industry, TOPBAND provides professional tools including electric tools and garden tools. In the new energy business, TOPBAND mainly focuses on providing AI products and systems including motor control and battery management systems. In terms of industrial industry, TOPBAND's main businesses are R&D, production, and sales the special industrial intelligent control solutions. In addition, the enterprise also provides comprehensive AI solutions for subdivided scenarios in the intelligent solutions industry. Relying on its technology advantages, TOPBAND is yielding its revenue from the global market.

Inspur Electronic Information is a provider of new IT infrastructure products, solutions, and services, with a leading position in server, AI computing, and open computing. As the only manufacturer in China with the capability to provide large-scale online transaction processing solutions and one of the world's 5 manufacturers that master the core technology of high-end information equipment such as high-end servers, large-scale storage, and key database, Inspur Electronic Information's IT infrastructure products share more than 20% of the global market and 30% of the Chinese market. In terms of AI business, Inspur Electronic Information has the capability of full-stack technology related to the AI platform and released the first intelligent computing center dispatching system AIStation. Generally, Inspur Electronic Information is operating on a global scale.

3. Results and Discussion

As shown in Table 1, the result shows that the riskiest corporation is iFLYTEK, followed by TOPBAND and Inspur Electronic Information. Based on the calculation and data from the annual reports of three corporations in 2021, this research analysis the business risks from internal factors (business categories, research & development (R&D)), and external factors perspectives.

Table 1. Calculation on Beta Asset of three corporations.

2020	Inspur Electronic Information	TOPBAND	iFLYTEK
β_E	1.303	1.179	1.163
tax rate	10.47%	11.77%	8.34%
market value of equity (in millions)	38,712.59	9,093.08	90,257.60
market value of debt (in millions)	23,495.21	3,260.06	11,864.28
leverage(D/V)	0.378	0.264	0.116
β_A	0.844	0.896	1.038
2021	Inspur Electronic Information	TOPBAND	iFLYTEK
β_E	0.795	0.632	1.270
tax rate	6.00%	7.76%	-7.62%
market value of equity (in millions)	51,883.31	23,430.07	121,841.43
market value of debt (in millions)	30,642.58	4,490.11	14,056.80
leverage(D/V)	0.371	0.161	0.103
β_A	0.511	0.537	1.130

3.1 Internal Factors

3.1.1 Business Categories

From business categories perspectives, iFLYTEK owns the largest business category and Inspur Electronic Information has the least. Meanwhile, iFLYTEK products and services are highly customized compared to TOPBAND and Inspur Electronic Information with a relatively low level. However, the diverse business also indicates an increase in cost, especially when the products and services are highly customized, which provides an explanation for the highest asset beta value of iFLYTEK. In addition, iFLYTEK provides its products and services to both individual consumers and business enterprises, compared to the other two mainly sell to business enterprises. As a result, iFLYTEK needs to make different strategies and plans to cater to these two types of customers, this indicates that iFLYTEK paid higher costs for offline events which leads to a higher asset beta value.

3.1.2 Research & Development (R&D)

For iFLYTEK, the core business is smart speech recognition. However, it depends on the improvement of algorithmic and the upgrade of the industry chain, and obstacles in the smart speech recognition technology including but not limited to human voice separation, and multi-round interaction is still existed. For TOPBAND, the advantage of the main business originates from the self-developed achievements, including battery cell, balanced magnetic switch, and battery pack, eliminating the external dependence. Its R&D is mainly focusing on the new application scene of its battery instead of technology breakthroughs. As for Inspur Electronic Information, it has a relatively strong external dependence on the most profitable product - X86 servers, imported from Intel. Therefore, iFLYTEK takes a higher risk in R&D activities while TOPBAND's R&D is less risky as it is mainly for market exploitation. As for Inspur Electronic Information, with stable cooperation with suppliers, its business will be less influenced by the R&D activities. Moreover, from the financial indicator perspective, the ratio, R&D over revenue, is highest in iFLYTEK and lowest in Inspur Electronic Information. Since R&D is a risky activity in business, this provides a ground for the asset beta value outcome.

3.2 External Factors

3.2.1 iFLYTEK

iFLYTEK is facing a problem in its traditional main business, intelligence education products, and losing previous dominance in the middle and low-end products market. The representative products are T10 (6899 yuan), X3pro (4999 yuan), q20 (3199 yuan), and A10 (below 2000 yuan). The 2021 annual report of iFLYTEK suggests those products mentioned above all achieved great market performance last year. However, according to the list of JD's top-selling products in the first half of 2022, only T10 is still the highest-selling product in its price range market, which is the high-end product market. The loss of dominance in the medium and low-end market reduces iFLYTEK's market share, which increases business risk. Moreover, iFLYTEK's innovative business, intelligent automobiles, is threatened by new competitors. The main product is the Feiyu intelligent audio management system for automobiles. In the field of automotive intelligent voice interaction, according to the 2021 annual report, iFLYTEK has delivered more than 1200 models, and the cumulative carrying capacity of front-end vehicles is more than 39 million, accounting for more than 60% of the domestic market share. In the semi-annual report of 2022, however, the revenue of this business was only 169 million, decreasing 5.59% compared with the same period of the previous year, though the market scale of China's automobile intelligent voice interaction is still increasing in 2022. The development of iFLYTEK in the future market is limited, because from the current trend, some high-tech automobile companies, such as BMW, BYD, Mercedes Benz, and Honda, are also developing such AI voice interaction systems to be applied to their vehicles, and thus they occupy the market share of iFLYTEK to a large extent. Besides, iFLYTEK's market share is also being squeezed by other competitors who enter the industry later. Among those companies, there are companies like Cerence committing to developing products in the field of automotive intelligent

interaction, and companies like Baidu with complete databases and performing well in developing AI technology. Thus, it is hard to predict whether iFLYTEK will continue to maintain a continuous growth of market share in this market in the future, which would undoubtedly increase the business risk of iFLYTEK.

3.2.2 TOPBAND

In terms of policy perspective, in November 2021, the Chinese government released the 14th Five-Year Plan for the Deep Integration of Informatization and Industrialization [10], and the Industrial Research Institute released the 2023-2028 China Intelligent Controller Industry Panoramic Survey and Investment Consulting Report, which identifies the main tasks, including cultivating new products and new business models to promoting the digital transformation of industries, consolidating new integration development foundation, stimulate new vitality of enterprises, and cultivate a new ecology of cross-border integration. The deep integration of intelligence and digitalization with industry which will promote the further development of AI products. Meanwhile, the trend of applying AI technology in industrial manufacturing is enhanced, and the demand for intelligent controllers will increase. Therefore, TOPBAND will have a relatively bright future and it will have a low bankruptcy rate.

As for the external competitive factor, at present, there are many intelligent controller enterprises in China, and the competition pattern is scattered. The main reason is that intelligent controller products are selected quickly. In terms of market share, the leading enterprises in the intelligent controller industry are TOPBAND and H&T, with market shares of 23% and 19%. From the following figure, we find that TOPBAND has only one major competitor in the market. The marketing strategy of H&T is to attract big customers. The orders are relatively more stable and guaranteed. The R&D cost of the unit product can also be amortized, but the big customers have stronger bargaining power. TOPBAND attaches great importance to sci-tech customers. Sci-tech customers are usually small and have diverse needs, which leads to large R&D expenditures and slightly higher amortized costs per unit product. However, Sci-tech customers have relatively low bargaining power, or they can accept higher prices. In the era of intelligence, the market demand for science and innovation customers must be huge. TOPBAND, which attaches great importance to science and innovation customers, has more opportunities and shows faster growth. Therefore, TOPBAND shares are superior to H&T shares. And the remaining companies are far inferior to TOPBAND in many respects, they have little influence on TOPBAND's business, in this case, TOPBAND is risky but not high, and it has fewer risks than iFLYTEK.

3.2.3 Inspur Electronic Information

The Chinese government issued its latest announcement in 2021-2022, announcing that the policies will strongly support the construction of digital information infrastructure and gradually build a national integrated big data center system, and the government plans to increase the measured size of the big data industry from 10,000 billion yuan to 300 billion yuan within 2025, increasing the digital economy (big data servers, etc.) core industries from 7.8% to 10% of GDP. In terms of specific measures, the government will expand its investment in key companies in the big data industry, which is undoubtedly a major benefit for Inspur Electronic Information. At the same time, the government also announced that it will focus on supporting the digital construction of basic materials, key technologies, high-end components, and other core technologies of public relations, and the lack of core technology Inspur Electronic Information difficult to benefit from, weakening Inspur Electronic Information's competitiveness in the industry. But compared to the previously mentioned policy to Inspur Electronic Information brought good, this point of risk can be ignored, which means it has relatively low business risks. From the external competitor perspective, Inspur Electronic Information is taking its dominance in the market. Currently, its main products in the cloud computing industry are edge computing servers and accelerated computing servers. As to the edge computing servers, with the combination of edge computing and emerging technologies such as artificial intelligence, 5G, and IoT, edge computing servers are expected to be one of the fastest growing sub-markets in the

server market in the next five years. In this industry, Inspur Electronic Information has a market share of 35.5%, while the second place H3C has only 11.2%, which shows that Inspur Electronic Information has no strong competitor in the industry. As to the accelerated computing servers, due to the popularity of online shopping, the demand for accelerated computing servers from vendors has increased significantly, making the industry a huge potential.

4. Conclusion

This research finished the primary calculation of three corporations' asset beta values and analyzed the factors which may result in this consequence. For iFLYTEK, the declining share of the low and mid-range market makes it difficult to ensure that its machine learning capabilities can continue to grow as they have in the past. Second, the market outlook for automotive AI voice interaction systems is relatively limited to iFLYTEK, as more of the market share is taken up by high-tech and top-tier automotive companies. In addition, it is difficult to predict whether iFLYTEK can continue its sustained growth rate as more third-party software competitors enter the market. Therefore, these factors significantly increase the business risk for iFLYTEK. TOPBAND has the largest share in a less competitive market, with only one major competitor H&T. TOPBAND is strongly supported by government policies and these factors make TOPBAND's business relatively less risky. In contrast, Inspur Electronic Information has received support from government policies, and its main product, the edge computing server, is expected to be one of the fastest growing submarkets in the future server market. In addition, Inspur Electronic Information has the largest market share and few competitors. Therefore, these three factors result in a relatively low business risk for Inspur Electronic Information compared to iFLYTEK. Therefore, the business risk of iFLYTEK is the largest among the three companies. This research suggests that investors should pay more attention to the R&D capabilities of Chinese AI enterprises, the degree of competition in their market segments, and the degree of government policy support.

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