

Investment Value in China's Artificial Intelligence Industry

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Abstract. At present, various AI products are increasingly connected with people, playing a crucial role in their lives. It can be seen from the report on China's artificial intelligence industry that the market size of China's AI market is growing rapidly with great development potential. Moreover, investing in China's AI market is also the top choice for numerous investors. Hence, this paper focuses on studying the development trend and potential problems of companies in China's AI market, and eliciting relevant investment suggestions, through analyzing three representative China firms- iFLYTEK, Baidu, and HUNDSUN. To analyze, this research uses the CAPM model and the calculation formula of WACC to calculate the WACC, and evaluate their profitability by calculating their gross profit margin and net income margin respectively. From the results, it can be seen there exists profitability issue of iFLYTEK and Baidu, due to the main factor that they are trying to develop in new fields resulting in high R&D expenses and selling expenses generated without a significant result in their revenue. The profitability of HUNDSUN seems optimistic, yet its R&D expenses and COGS are also increasing significantly in 2021, which are used to maintain the market share of core businesses, develop new businesses and upgrade core technologies. For those companies, they diversify their business structure for further growth opportunities due to their core business markets are close to saturation; however, this will also increase their business risk. Currently, in conclusion, the great development chances of China's AI market coexist with risks.

Keywords: Artificial Intelligence; Profitability; Business Structure.

1. Introduction

1.1 Background

At present, various products of artificial intelligence are gradually entering and closely connecting with everyone's life. There is an increasing number of automobiles equipped with intelligent voice interaction systems, and household appliances are becoming more and more intelligent due to the application of AI technology. Influenced by COVID-19, students, especially primary school and middle school students, need to use learning machines, such as iFLYTEK's T10 or Baidu's Xiaodu G16, to deal with their school work while taking an online course at home. In addition, numerous new fields like automatic driving, intelligent medic, or intelligent finance, have gradually developed with more corporations starting to enter those fields. According to the report on China's artificial intelligence industry, the market size of China's AI market continued to grow from 15.4 billion yuan in 2016 to 196.3 billion yuan in 2021, with a compound annual growth rate of 69.79%. Although China's AI market started relatively late compared with the American AI market, it can be seen there is a huge room in China's AI market for development currently, with a particularly optimistic prospect for continuous growth. Moreover, investing in the artificial intelligence market is also a popular choice for numerous investors.

1.2 Related Research

Li analyzed the current development status of China's AI industry and the industrial chain of artificial intelligence and then analyzed the layout of major China's AI enterprises which mainly involve fields such as the intelligent city, intelligent transportation, intelligent voice, including iFLYTEK, Ali, Tencent, and Baidu, respectively analyzing each company's status of development as well as the advantage and characteristic of their products. Besides, the author researching the possible development direction of the AI industry based on the aspect of personalized recommendation, interaction, and advertising, concludes that there would be great benefits in the basis of combination

with radio and television networks [1]. Ma et al. analyzed the current macro environment of China's AI market, respectively researching the strength, weaknesses, opportunities, and threats of the AI industry via the SWOT model. The authors then study the viability of the investment in the AI market, concluding that the level of the AI market and the distribution of corresponding categories of corporations are clear, creating a good condition for investment. Besides, the authors state the investment prospect of the AI industry is optimistic but risk also exists [2].

Ren studied the market share of China's AI industry that which has been increasing in recent years. Then, the author researched the market share of major AI companies in China's intelligent voice market as iFLYTEK, Baidu, and Apple. Moreover, the author concluded that there are four factors, support of government's policies, the thriving markets, intelligent voice technology of mature and broad applications of intelligent voice, contributing to the huge potential of the development of China's intelligent voice industry [3]. Hao et al. studied the application of intelligent voice recognition technology in television and the application scenario as recognition of TV images. The authors then analyzed a large number of problems that intelligent voice recognition technology is facing currently, such as hard to recognize the voice in a noisy environment, low rate of dialect recognition, and unable to automatically correct the wrong words pronounced by speakers. Furthermore, the authors concluded that intelligent voice recognition technology has a huge market prospect in the development of intelligent devices which would attract more companies to attend this industry [4]. Lian and Zeng researched the market scale of China as well as the international intelligent voice market, concluding that intelligent voice has broad application prospects in automobiles. Then, the authors analyzed several factors, such as the limitation of available resources for automobile control systems, which would challenge the development of automobiles' intelligent voice interaction. However, the authors suggest there is a bright future in this industry if those companies successfully solve these problems [5]. Xie researched that the revenue of iFLYTEK has been increasing in recent years and the revenue of the main business occupies the largest proportion of the total revenue. iFLYTEK is greatly supported by government policies and subsidies. The author also analyzed a problem of iFLYTEK in that its cost of R&D is higher than the net income in 2019, showing its relatively low profitability compared with other corporations in the same industry [6]. Lin and Yu stated that iFLYTEK's Short-term Liquidity has been increasing in recent years by researching the current ratio with quick ratio, contending its good performance of long-term liquidity by analyzing leverage.

The authors then analyze its profitability performance not well by researching its net profit margin on sales and return on net assets. Besides, the authors conduct research on its inventory turnover rate and return on total assets, concluding that iFLYTEK's total assets operating capacity is declining [7]. Pan contended that the profitability of iFLYTEK was decreasing from 2013 to 2016 by analyzing the financial ratio as the net profit margin on sales, and it greatly depended on government subsidies suggesting its profit stability is not in a good condition. Then the author concludes that the revenue created by its main business has decreased, and the ability of iFLYTEK net assets to create cash flow decreased as well [8]. Luo concluded that iFLYTEK's net asset interest rate and return on shareholders' equity have been at a low level, though the gross profit margin is relatively high. And according to the financial statement, the main reason for this problem is due to its high R&D expenses as well as existing problems with its internal management [9]. Yang researched the impact of equity incentives on company performance. First, the author states that after implementing the policy of equity incentive, iFLYTEK's return on the net asset has been increasing since 2017, which means its ability to profitability has been greatly promoted. Then, this policy could also improve the growth rate of net income but could not directly promote the turnover rate of accounts receivable. Besides, executing this policy could improve iFLYTEK's long-term solvency to some extent [10].

1.3 Objective

This paper is going to conduct research on the performance and profitability of corporations in current China's AI market, through the CAPM model and calculation of WACC as well as relevant

indicators to analyze three representative China companies in this market, which are iFLYTEK, Baidu, and HUNDSUN. Then, the main factors reflected by the analysis will be discussed that will result in the problem of profitability and their performance in the market. Moreover, the development trend of current China's artificial intelligence market will be concluded, and the relative investment reference will be eventually suggested.

2. Method

2.1 CAPM Model

CAMP model, referring to Capital Asset Pricing Model, shows the relationship between the expected return rate of assets and risk assets in the securities market, as well as how the equilibrium price is formed. In this formula, r_E represents the market value of equity capital of the target company; r_f means risk-free rate; β_E refers to the coefficient of Beta, which shows the systematic risk of the target corporation; $E(r_m)$ is the expected return rate of market m ; $E(r_m)-r_f$ represents the market risk premium, which is the difference between expected return rate of the market and risk-free rate.

$$r_E = r_f + \beta_E * [E(r_m) - r_f] \quad (1)$$

2.2 WACC

In this formula, r_E refers to the cost of equity capital and r_D is the cost of debt capital; D/V , meaning the market value of debt divides value, is the leverage; E/V , referring to the market value of equity divides value, means 1 minus leverage. Hence, WACC could also be calculated by this formula, $WACC = (1-L) * r_E + L * (1-T) * r_D$.

$$WACC = E/V * r_E + D/V * (1-T) * r_D \quad (2)$$

2.3 Profitability

2.3.1 Gross Profit Margin

In this formula, gross profit is the difference between the Revenue and the cost. Gross profit margin is an important indicator to measure the profitability of enterprises, the higher the gross profit margin, the better the profitability of companies.

$$\text{Gross Profit Margin} = \text{Gross Profit} / \text{Revenue} * 100\% \quad (3)$$

2.3.2 Net Income Margin

In this formula, net profit is profit multiplied (1-tax rate) as well as profit minus tax. Net income margin is another crucial indicator to measure the profitability of enterprises, the higher the gross profit margin, the better the performance of companies in the market.

$$\text{Net Income Margin} = \text{Net profit} / \text{Revenue} * 100\% \quad (4)$$

2.4 Data

2.4.1 iFLYTEK

iFLYTEK has long been engaged in the research of core technologies of artificial intelligence, and the main business can be mainly divided into intelligent education, intelligent city, intelligent medical, intelligent finance, and intelligent automobile. According to the 2021 annual report of iFLYTEK, its revenue for 2021 is 18.31 billion yuan, the gross profit is 7.53 billion yuan, the total profit is 1.497 billion yuan, and the net profit is 1.611 billion yuan.

2.4.2 HUNDSUN

HUNDSUN, a financial software and network service provider mainly providing overall IT solutions for financial institutions and wealth management tools for individual investors, has incorporated artificial intelligence technology into its core business. According to HUNDSUN's 2021 annual report, its revenue is 5.47 billion yuan, the gross profit is 4.01 billion yuan, the total profit is 1.51 billion, and the net profit is 1.49 billion yuan.

2.4.3 Baidu

Baidu is a leading AI company with a strong Internet technology foundation providing AI chips, software architecture, and applications. According to the 2021 annual report of Baidu, its revenue is 124.5 billion yuan, the gross profit is 60.2 billion yuan, the total profit is 10.78 billion yuan, and the net profit is 7.59 billion yuan.

3. Financial Comparison

This research obtained the beta of iFLYTEK, Baidu, and HUNDSUN according to the query of the iFinD financial data terminal of Tonghuashun. The yield to maturity of the government bonds of China is selected to represent the risk-free rate with a residual maturity of more than 10 years on September 30, 2021. And according to the measurement results of risk premium released by China Alliance Appraisal Co., Ltd., the risk premium of China market is 6.94% in 2021. Then, the cost of equity is calculated based on the formula (1), and the cost of debt is based on the calculation of the debt interest rate of three companies in 2021. WACC is calculated eventually according to the formula (2). Moreover, gross profit margin and net income margin are calculated based on formulas (3) and (4) as well as the relevant data from the 2021 annual reports of iFLYTEK, Baidu, and HUNDSUN.

As shown in the tables, Baidu has the lowest WACC of 8.50% among the three corporations, which means it has the lowest average cost of the company's financing through equity and debt compared with iFLYTEK and HUNDSUN. iFLYTEK has the lowest gross profit margin among the three corporations, meaning it has a relatively low ratio of gross profit to revenue. Then, Baidu has the lowest net income margin, revealing that it has a comparatively low net income to revenue ratio.

Table 1. Calculation of WACC of three companies in 2021.

	iFLYTEK 002230	Baidu 09888	HUNDSUN 600570
β_E	1.01	1.07	1.12
r_f	3.84%	3.84%	3.84%
$r_M - r_f$	6.94%	6.94%	6.94%
tax rate	19.91%	29.57%	5.69%
cost of equity	10.85%	11.27%	11.61%
cost of debt	3.64%	2.04%	2.59%
market value of equity	121.9 billion	399.7 billion	69.8 billion
market value of debt	14.1billion	156.1billion	5.9 billion
WACC	10.03%	8.50%	10.90%

Table 2. Calculation of gross profit margin and net income margin of three companies in 2021.

	iFLYTEK 002230	Baidu 09888	HUNDSUN 600570
Revenue	18.3 billion	124.5 billion	5.5 billion
COGS	10.8 billion	64.3 billion	1.5 billion
Gross Profit	7.5 billion	60.2 billion	4.0 billion
Gross Profit Margin	41.13%	48.34%	72.99%
SG&A	3.8 billion	24.7 billion	1.1 billion
R&D	2.8 billion	24.9 billion	2.1 billion
Net Profit	1.6 billion	7.6 billion	1.5 billion
Net Income Margin	8.80%	6.10%	27.11%

4. Discussion

4.1 Analysis of WACC

According to table 1, the WACC of iFLYTEK, Baidu, and HUNDSUN are similar as whole. Among the three companies, iFLYTEK's WACC is 10.03%, maintaining a middle level among the three firms, revealing that the return on the investment of iFLYTEK must be no less than 9.78% if investors seek to make a profit on this investment project. Baidu has the lowest WACC of 8.50% compared with the other two firms, suggesting that the required return on the investment of Baidu is lower than iFLYTEK and HUNDSUN, which means that investors are more likely to gain profits on this project. In addition, HUNDSUN's WACC is 10.90%, which is the highest of the three companies. Its WACC reveals that the company's financing costs are higher than iFLYTEK and Baidu, meaning that investors need set the expected return on the investment of HUNDSUN to more than 10.73% to obtain the profit from the investment project.

4.2 Analysis of Gross Profit Margin

iFLYTEK has the lowest gross profit margin among the three companies. It has been analyzed that the main reason is the relatively high COGS, which is over a 10.78billion yuan. According to iFLYTEK's 2021 annual report, its COGS is mainly concentrated in the material cost in the software and information technology service industry, which accounts for the largest proportion of the cost, accounting for 55.62%. And the growth rate of material cost is also in a high-speed, which increased by 58.8% compared with 2020 the same period.

Baidu's gross profit margin is 48.43%, relatively higher than iFLYTEK but lower than HUNDSUN. According to Baidu's annual report for 2021, its COGS is 64.31 billion yuan, primarily consisting of content costs, traffic acquisition costs, depreciation costs, costs of goods sold, bandwidth costs, and other costs of revenues, which increased by 16.60% compared with 2020 of the same periods. The increase in COGS was primarily due to the following factors: an increase of 3.1 billion yuan in traffic acquisition costs, which reflected increasing union revenues and intensified traffic market competition, and an increase of 2.3 billion yuan in cost of goods sold, which was in line with the growth in sales of Xiaodu smart devices and AI solutions services. In addition, there is an increase of 995 million yuan in bandwidth costs, resulting from increased investment in infrastructure.

HUNDSUN has the highest gross profit margin of 72.99% compared with iFLYTEK and Baidu. According to the 2021 annual report of HUNDSUN, its revenue is 5.5 billion yuan, increasing 31.73% compared with 2020 in the same period, and its COGS is 1.49 billion yuan which is a relatively low proportion of revenue, meaning that the COGS is controlled within a reasonable range. Baidu's COGS increased by 55.31% compared with the same period in 2020, and the reason for the increase was primarily due to the growth of the company's software product business as well as the labor cost.

4.3 Analysis of Net Income Margin

iFLYTEK's net income margin is 8.80% in 2021. According to the profit statement, it could be accounted for the excessive financial expenses especially sales expenses of 2.69 billion yuan and R&D expenses of 2.83 billion yuan. Its sales expenses increased 29.19% and R&D expenses increased 27.99% compared with 2020 the same period, though its revenue also increased to a certain extent. The growth of iFLYTEK's sales expenses mainly comes from the increasing expenses of employee compensation, advertising, outsourcing business, and business services. In R&D, the number of iFLYTEK's R&D personnel increases from 6461 in 2020 to 8367 in 2021, with a growth rate of 29.50%. The R&D expenses of iFLYTEK are mainly invested in developing in new markets, including automobile intelligent voice interaction, intelligent finance, and intelligent medical, diversifying the business structure; On the other hand, are also maintaining the market share of its traditional main business-intelligent education, containing R&D of smart devices, translator, and electronic input system. As a result, the excessive growth rate of COGS and expenses with a relatively low increase in revenue caused its low net income margin.

Baidu's net income margin is only 6.10%, which is the lowest among the three corporations. According to the 2021 annual report, the main reason can be explained by the high SG&A as well as high R&D expenses that lead to low net profit and thus low net income margin. In 2021, its sales and distribution costs are 24.72 billion yuan, an increasing 36.87% compared with 2020 the same period, and its R&D expenses are 24.94 billion yuan, which increase of 27.80% compared to 2020 at the same time. Its R&D expenses are mainly invested in entering new markets- automobile intelligent voice interaction, automatic driving, and Xiaodu smart devices. In the field of automobile intelligent voice interaction, Baidu is facing fierce competition, not only from iFLYTEK with the highest market share in this market but also from Alibaba, Tencent, and other top automobile companies. Hence, though Baidu's revenue has been increasing, the high related costs and expenses as well as their high growth rate affect its performance of net income margin.

HUNDSUN's net income margin is 27.11% and its expenses are mainly R&D expenses which are 2.14 billion yuan and account for 38.92% of the revenue. HUNDSUN's R&D expenses are primarily invested in its traditional core business- large retail IT business and large asset management IT business as well as Data Risk and Infrastructure and Internet Innovation. In 2021, R&D expenses increased by 43% compared with the same period in 2020, mainly due to the technology development and upgrading of core products as well as the substantial expansion of the R&D team.

5. Conclusion

This paper uses the CAPM model with the relevant calculation to study the WACC of three representative companies in the field of artificial intelligence, analyzing the profitability of the three firms through research on their gross profit margin and net income margin. It is concluded that iFLYTEK and Baidu both have certain problems in profitability, for the main factor is that more COGS and R&D expenses were generated to be invested in new businesses diversifying business structure. The market where their traditional core businesses are located has become saturated, and thus they sought to enter new markets for continuous growth, but the current revenue has not yet shown significant results. As a result, this will bring them new opportunities for development with increasing business risks. The profitability of HUNDSUN looks good, but it can be seen from the annual report that its R&D expenses and COGS are also increasing significantly in 2021, which are used to maintain the market share of core businesses, develop new businesses, and upgrade core technologies. In conclusion, the current AI market is a combination of risks and opportunities. Hence, it is suggested that investors should focus on the issue of continuous profitability and increasing business risks of enterprises after entering new fields. Furthermore, investors should try to be rational and not let investment decisions be affected too much by market trends, whether investing in these three companies or other firms in the AI market.

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