A Valuation Analysis on China Satellite Communications Co., Ltd.

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Abstract. As the commercial space industry is booming, its importance to a country is growing. China Satellite Communications Co., Ltd. (hereinafter referred to as "CASC"), as an important enterprise in the commercial space industry, its enterprise value and recognition by the capital market are of great significance to the whole industry. This paper makes a comprehensive assessment of the investment value of CASC through P/E valuation analysis, DCF analysis, sensitivity analysis, fundamental analysis and financial index analysis, and analyses the business model and development prospects of the commercial space industry in the current context, so as to provide investors with a reference basis for their investment decisions. Through the research and comparison of these methods, the results of P/E analysis and DCF analysis have a certain degree of bias, and both of them overestimate the value of the stock and the company to a certain extent, while fundamental analysis, financial indicator analysis and sensitivity analysis are more explanatory of CASC's financial status, development trend and other aspects.

Keywords: Financial valuation, DCF model, sensitivity analysis, China Satellite Communications Co., Ltd.

1. Introduction

In the early 1980s, with the conclusion of the Cold War and the reduction in the intensity of the space race, the commercial space industry experienced a period of significant growth [1]. Nowadays, the world is in the pre-launch phase of intensive satellite launches, and the focus of investors' attention and capital investment is gradually shifting from the traditional industry to the commercial space sector [2]. The global commercial space market is undergoing a period of sustained expansion, representing a new source of economic growth and a key indicator of national scientific and technological capabilities. The extensive industrial chain and extensive reach of commercial spaceflight have the potential to drive the development of numerous related industries, including electronics, materials, machinery and communications. This can lead to the formation of industrial clusters and the promotion of regional economic growth.

In recent years, China's commercial spaceflight has shifted from a nascent stage to a period of rapid development, and the system has been gradually improved [3]. It has become an important supplement to China's aerospace industry and has injected new momentum into the accelerated development of new productive forces. China Satellite Telecommunications Corporation (CSC) is a prominent satellite communication service provider in China. It holds a national basic telecommunication business license and a value-added telecommunication business license, and is the sole basic telecommunication operator in China that possesses independently controllable commercial communication and broadcasting satellite resources. The company's main business is satellite space segment operation services, mainly providing satellite radio and television broadcasting and communication services [4]. It has a significant competitive advantage and a strong market position in this field. Considering the ongoing advancement of satellite communication technology and the increasing market demand for such services, China Satellite Telecommunications is poised for significant business growth.

The objective of this study is to conduct a comprehensive valuation analysis of CASC Company, with a particular focus on its market value and growth potential. This will be achieved through a

detailed examination of CASC's industry position, business scope, financial position, technological advantages and competitive market environment. The findings of this analysis will provide valuable insights and references for both investors and CASC itself.

2. Price-earnings ratio analysis

The price-to-earnings ratio (P/E ratio) is defined as the stock value divided by earnings per share. In this study, three companies in the industry that are comparable in size and strength to CASC have been selected. Companies that are very different in scale and scope of operation from CASC have been excluded [5]. As can be observed from Table 1 below, the industry average price-to-earnings ratio is 69.24. CASC's earnings per share in 2023 are estimated to be $0.0826 per share. Additionally, CASC has released a total of 42,243,854,400 shares in 2023, according to the latest data. The formula enables us to ascertain that the value of CASC's shares in 2023 is $69.24 x 0.0826, equating to a stock price of $5.72 per share. This yields an enterprise value of $24.163 billion.

Table 1. Price-to-earnings ratio across industries.

Company Name	P/E Ratio
Aisino Corporation	57.77
Aerospace Electronics	71.12
Zhongtian Rocket	78.84

The current total market capitalization of 86.18 billion disclosed by China Aerospace Corporation is considerably larger than the P/E valuation result, which suggests that China Aerospace's market capitalization is overvalued and that the market is exhibiting excessive optimism regarding the company. However, in the commercial aerospace industry, the industry average P/E ratio has a significant impact on the valuation results. If only the three companies in Table 1 are used to calculate the industry average P/E ratio, the resulting valuation may deviate considerably from the true valuation of CASC. This is because the industry average P/E ratio may be influenced by a few companies that are not fully representative of the industry.

3. DCF analysis

The free cash flow (FCF) of a firm can be calculated as follows:

$$FCF = net\ profit + depreciation - capital\ expenditure - change\ in\ net\ working\ capital \quad (1)$$

Net working capital is defined as working capital minus current liabilities [6]. By calculating the financial data of each item from 2020 to 2023, the average growth rate of each item can be obtained. The average growth rate of net profit is 5.38%, the average growth rate of depreciation is 7.25%, the average growth rate of capital expenditure is 14.78%, and the average growth rate of the change in net working capital is -20.32%. This yields the projected free cash flow of CASC over the subsequent five-year period, as illustrated in Table 2.

Table 2. Forecasted future cash flow (in billions).

	2020	2021	2022	2023	2024	2025	2026	2027	2028
Net Profit	0.49	0.57	0.92	0.35	0.37	0.39	0.41	0.43	0.45
Net Profit Growth Rate	16.97%	61.36%	-62.19%	5.38%	5.38%	5.38%	5.38%	5.38%	5.38%
Depreciation	9.62	10.51	10.65	11.84	12.70	13.62	14.61	15.67	16.80
Depreciation Growth Rate	9.21%	1.34%	11.21%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%
Capital Expenditure	1.37	1.36	2.40	1.65	1.89	2.17	2.49	2.86	3.28
Capital Expenditure Growth Rate	-1.09%	76.62%	-31.19%	14.78%	14.78%	14.78%	14.78%	14.78%	14.78%
Change in net working capital	0.66	0.12	1.81	-0.11	-0.09	-0.07	-0.06	-0.05	-0.04
Growth rate of change in net working capital	-82.27%	-23.29%	44.60%	-20.32%	-20.32%	-20.32%	-20.32%	-20.32%	-20.32%
Fc	8.08	9.60	7.37	10.65	11.26	11.91	12.58	13.28	14.01

The subsequent stage is to ascertain the discount rate. In this paper, the risk-free rate of return is set at the 10-year Treasury bond yield of China, which stood at 2.15 per cent in 2024. Subsequently, the market risk premium is calculated(R_m-R_f), and the return on the first day of each month of 2020-2023 of the SSE indexes is employed to ascertain the mean monthly return, which is then converted into the mean annual market return. The mean annual return was calculated to be 8.15%.

The next step is to calculate beta. This paper employs the definition of beta and utilizes the appropriate software to determine that beta is equal to 1.03. The next step is to calculate the cost of equity, Rs. In accordance with the CAPM model, the result is Rs = 8.33%. In this paper, the cost of debt capital (R_d) is calculated using the 5-year treasury rate, which was issued in 2024 and has a value of 1.72%.

The subsequent step is to ascertain the debt-to-capital ratio (K_d) and the equity-to-capital ratio (K_s). The debt-to-capital ratio (K_d) is calculated by dividing the total liabilities by the total assets, while the equity-to-capital ratio (K_s) is determined by dividing the total owner's equity by the total assets [6]. The projected growth rates for the period spanning 2020 to 2023 are presented in Table 3 below.

Table 3. Projected growth rates from 2020 to 2023.

	2020	2021	2022	2023
Total liabilities	28.66	33.33	32.27	31.84
Total assets	182.9	191.1	224.4	226.6
Total owners' equity	154.2	157.8	192.1	194.7
Rate of growth of K_d	11.30%	-88.53%	602.56%	-
Rate of growth of K_s	-2.06%	3.67%	0.37%	-

A calculation of the income tax rate (t) for CASC, which has been established at 12%, enables the following to be determined:

$$W_a = K_d * (1 - t) * R_d + K_s * R_s = 2.71\% \quad (2)$$

Subsequently, the value of V is determined to be 57,992 million. A review of the company's financial report indicates that CASC will issue a total of 42,243,850,400 shares in 2023. The share price per share is calculated to be 13.73 yuan, which is derived by dividing the total share value of 57.992 billion yuan by the total number of shares, which is 42,243,850,400.

4. Sensitivity analysis

Step 1. Conduct a sensitivity analysis on the weighted average cost of capital (WACC), as illustrated in Table 4 below.

Table 4. Sensitivity analysis on the WACC

WACC	0.71%	1.71%	2.71%	3.71%	4.71%
stock valuation	616.06	597.57	579.92	563.06	546.95

Step 2. A sensitivity analysis was conducted on the risk-free rate, the results of which are presented in Table 5 below.

Table 5. Sensitivity analysis on the risk-free rate.

risk-free rate	0.15%	1.15%	2.15%	3.15%	4.15%
stock valuation	579.92	579.92	579.92	579.92	579.92

Step 3. (3) A sensitivity analysis was conducted on the average growth rate of net profit, as illustrated in Table 6 below.

Table 6. Sensitivity analysis on the average growth rate of net profit.

Average growth rate in net profit	3.38%	4.38%	5.38%	6.38%	7.38%
stock valuation	579.49	579.99	579.92	581.09	581.66

The data presented above demonstrates that the valuation of shares is particularly susceptible to fluctuations in the weighted average cost of capital (WACC) when there are significant alterations in the WACC. Consequently, changes in the WACC will result in corresponding shifts in the valuation of shares. The share price valuation is not sensitive to the risk-free interest rate and the average growth rate of net profit. The WACC, as a key variable in the valuation model, has a significant impact on the share price valuation. In contrast, the impact of the risk-free interest rate and the average growth rate of net profit is relatively small. This is mainly because of their limited impact on the WACC and the market expectation that these factors may have been considered. The influence of the average net profit growth rate on share price valuation is primarily manifested in the terminal value calculation. However, if the company's cash flow projections have already incorporated the anticipated growth rate, the impact of the change in the growth rate on the present value may be counterbalanced by the alteration in the discount rate. Furthermore, if the market anticipates the growth rate to be reflected in the current share price, the actual change in the growth rate will have a diminished impact on the share price valuation.

5. Fundamental analysis

5.1. Macro-Level

In the context of globalization and the concomitant increase in trade and information exchange among countries, the demand for satellite communications is rising. According to the relevant statistical data, the global satellite communicator market size is projected to grow from approximately $297 million in 2023 to $525 million by 2030, representing a compound annual growth rate of 8.2 per cent.

China has implemented a series of policies designed to facilitate the growth of the commercial space industry [7]. The prospect of encouraging private capital to participate in commercial spaceflight has attracted the attention of numerous investment organizations [8].

As indicated by pertinent data, the global satellite communications market reached a valuation of over $120 billion in 2023. This figure is anticipated to grow further considering the numerous communication satellite launches and applications currently underway. In 2024, the Chinese satellite communications market reached the market size is estimated to reach 40.4 billion yuan by the end of

2024, with an average annual compound growth rate of approximately 10.98% over the subsequent five-year period (2023-2027). This would result in a projected market size of 54 billion yuan by the end of 2027.

5.2. Industry-Level

China Satcom represents the second largest fixed communications satellite operator in Asia and the sixth largest in the world. It is the market leader in China's satellite communications market, with a market share exceeding 80 percent.

According to the statistics provided by the UCS, as of 1 May 2022, the total number of satellites in orbit for communication purposes worldwide reached 3,624. The number of launches by SpaceX of the U.S. reached 2,219 satellites, representing 61.23% of the global total (see Figure 1). CASC has a presence in the global communications satellite operation field, but the gap with the U.S. Company is significant.

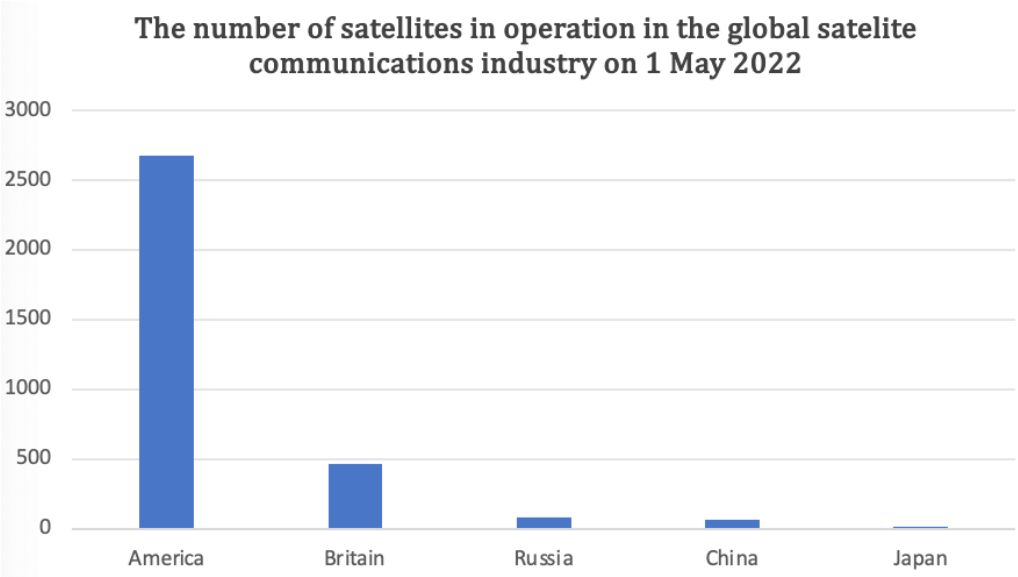

Fig 1. The number of satellites in operation in the global satellite communications industry.

During the developmental phase, CASC faced a multitude of industry-specific challenges. In terms of technical barriers, key technologies such as optical interplanetary links, radio frequency and third-generation semiconductor materials present significant challenges. To maintain a competitive edge in the market, continuous investment in capital and manpower is essential for technology research and development. Otherwise, the industry may face disadvantages.

In terms of financial barriers, satellite communications are a capital-intensive industry, necessitating robust financial strength and financing capabilities to sustain business development. The high cost of satellites and rockets, coupled with their lengthy construction cycles, presents a significant financial challenge. China Satcom, a subsidiary of the Aerospace Science and Technology Group, has secured sufficient financial stability through listing and financing, as well as fostering constructive relationships with domestic and international financial institutions.

In terms of qualification barriers, the Chinese telecommunications satellite operation industry is highly regulated and requires a license issued by the Ministry of Industry and Information Technology ('MIIT') to carry out commercial operations. This has the effect of raising the threshold of entry into the industry, while also imposing certain limitations on the expansion of CASC's business and market share.

CASC is similarly well-placed to compete in the industry:

(1) Resource Advantage: China Satellite is the sole operator in China that owns commercial communications satellites, with 16 commercial communications and broadcasting satellites and satellite transponder resources that span the C-, Ku-, and Ka-bands, thereby affording extensive coverage of communications and broadcasting signals.

(2) Client Relationship: CASC has a long-standing collaborative relationship with prominent clients, including Telekom Indonesia and CCTV. The company has a high level of customer retention, a substantial customer base, and a track record of stable operations.

(3) Industry Chain Coordination: CASC, a core subsidiary of the Aerospace Science and Technology Group, can leverage its position within the Group to form beneficial industrial chain synergies with other enterprises, thereby reducing costs and improving efficiency.

(4) Technological Innovation Capacity: CASC has conducted comprehensive research and exploration in areas such as high-throughput satellite technology and satellite Internet, and has pioneered the development of new technologies and business models.

5.3. Micro-Level

From 2020 to 2023, China Satcom's operating revenue and net profit attributable to the parent company will experience certain fluctuations, as shown in Table 7.

The intense competition in the global commercial space market, the accelerated growth of foreign enterprises in the domains of satellite launch and satellite Internet, the unstable global economic situation and trade disputes have all impacted CASC's collaboration with international clients and its revenue from international operations. In China, the combination of robust state backing for new infrastructure and a rapid digital transformation has resulted in a surge of private enterprises entering the commercial space sector, thereby intensifying market competition [9].

The net income attributable to the parent company in 2020 was 489 million, rising to 572 million in 2021 and then increasing sharply to 923 million in 2022. However, in 2023, there was a significant decline, with the net income attributable to the parent company falling to 349 million.

The instability of the international supply chain had a significant impact on the key components required for satellite manufacturing and launching, resulting in higher costs. Furthermore, exchange rate fluctuations had an impact on international business settlements, which in turn affected net profit. Furthermore, adjustments in regulatory policies had an impact on the company's business expansion and profitability. To reduce the procurement costs of satellites and rockets, China Satellite established long-term cooperative relationships with suppliers, implemented bulk purchasing and signed long-term contracts, among other strategies. Additionally, China Satellite improved the utilization rate of satellites and further reduced operating costs through technological innovation and optimized satellite operation management.

Table 7. Income and profit of CASC from 2020 to 2023.

Items	2020	2021	2022	2023
Gross operating income (billions)	2.71	2.63	2.73	2.62
Year-on-year growth in total operating income (%)	-0.87	-2.81	3.76	-4.3
Net profit attributable to the mother (billions)	0.49	0.57	0.92	0.35
Year-on-year growth in net attributable profit (%)	9.49	18.09	60.88	-62.21

CASC's products and services are employed extensively in a variety of fields, including communication services, aerospace, Beidou navigation and other sectors. This demonstrates the company's capacity for diversification and specialization. CASC possesses a robust service infrastructure and extensive broadcasting and communications capabilities, encompassing the entire Chinese territory, its neighboring regions and major areas along the 'Belt and Road' initiative.

6. Financial Indicator Analysis

6.1. Solvency Analysis

The gearing ratio is a measure of the extent to which a company's assets are financed through external liabilities. It is calculated by dividing the total liabilities by the total assets, as disclosed in the company's financial report. Based on this information, it can be inferred that China Guardian's gearing ratio will average approximately 15.06% over the 2020-2024 period.

The current ratio provides insight into the enterprise's short-term solvency, indicating the extent to which current assets can be leveraged to ensure the repayment of each dollar of liabilities. The enterprise's capacity to promptly realize assets is reflected in the quick ratio. The current ratio is defined as the ratio of current assets to current liabilities. The quick ratio is defined as the ratio of current assets minus inventory to current liabilities. The 2024 interim report from CASC reveals a current ratio of 4.44 and a quick ratio of 4.44. In the same industry, China Satellite Enterprises (600118), which has a similar level of strength, reveals a current ratio of 2.04 and a quick ratio of 1.53 in its 2024 interim report. In comparison, Aerospace Electronics Corporation (600879), another company with a similar level of strength, reveals a current ratio of 1.69 and a quick ratio of 0.84. The current ratio is 1.69 and the quick ratio is 0.84 in the 2024 interim report. Overall, CASC demonstrates superior performance.

6.2. Operating Capacity Analysis

In general, the efficiency of enterprise asset management is a key indicator of the daily operational performance of an enterprise. Commonly used ratios to assess operational capacity include inventory turnover, accounts receivable turnover, and total asset turnover, among others. For illustrative purposes, the Oriental Fortune website provides operational capacity indicators for CASC for the 2020-2024 period, as presented in Table 8 below.

Table 8. Turnover indicator of CASC from 2020 to 2024.

	2020	2021	2022	2023	2024
Inventory turnover day	2.733	2.229	2.567	3.340	2.587
Receivable turnover days	52.62	57.25	58.91	60.27	96.64
Total assets turnover	0.149	0.141	0.132	0.116	0.050

As evidenced by the data presented in the table, there is an overall decline in inventory turnover days and total asset turnover days, while accounts receivable turnover days demonstrate an upward trajectory. This suggests that inventory is realized expeditiously and that accounts receivable is on the rise year on year. Consequently, CASC's operational capacity can be characterized as average.

6.3. Profitability Analysis

In general, an enterprise's sales revenue represents its primary source of income. Additionally, its gross profit margin, net profit margin, and net asset margin can serve as indicators of its overall profitability. Table 9 presents the profitability indicators of CASC.

Table 9. Profitability indicator of CASC from 2020 to 2024.

	2020	2021	2022	2023	2024
gross margin	36.04	37.54	36.47	35.71	29.73
net interest rate	23.84	27.62	39.78	19.46	40.28
Earnings on net assets	4.26	4.85	7.44	2.29	2.64

As evidenced by the data presented in the table, CASC's earnings reached their highest point in 2022, followed by a notable decline in 2023. However, there was a substantial rebound in earnings in 2024. Overall, CASC demonstrated superior profitability.

7. Recommendations

The following recommendations are made to investors and CASC based on the above five methods, following an analysis of the valuation of CASC.

From the P/E ratio analysis, it is recommended that investors consider the influence of market dynamics and the company's short-term performance, while also undertaking a detailed examination of the company's long-term development strategy. For CASC to enhance its competitive advantage, it is essential to reinforce its business development and innovation strategies. This entails actively

engaging in the research and development, as well as the practical application, of 6G technology. This will not only bolster the company's core competencies but also facilitate the attainment of a more stable earnings profile. Additionally, it is crucial to implement effective cost control and risk management measures. This will ensure the company's financial resilience and enhance its reputation in the market. Furthermore, it is vital to priorities transparency and accountability to maintain investor confidence and stabilize the company's share price and price-earnings ratio [10].

It is recommended that investors pay close attention to CASC's investment strategy and asset renewal status, evaluate its capacity for sustainable development, consider the impact of changes in net working capital on cash flow and operational stability, and conduct a comprehensive risk assessment to inform their investment decisions. It is recommended that CASC adopt a prudent approach to adjusting its capital structure, reducing financing costs in a manner aligned with its strategic development and financial position. A well-considered plan for capital expenditure is also advised, with the objective of ensuring a positive return on investment and enhancing the efficiency of asset utilization.

Furthermore, it would be prudent to increase the proportion of debt financing, provided that the associated debt risk is effectively managed and financial leverage is employed to enhance the value of the company. Finally, it would be beneficial for CASC to strengthen its collaboration with financial institutions, with the aim of diversifying its financing channels and optimizing its financing efficiency.

From the fundamental analysis, investors should consider several factors, including the industry development trend, the company's competitive advantages and disadvantages, as well as its financial situation, when focusing on the development of CASC. It is recommended that CASC also develops and continuously improves its technical level and service quality to achieve sustainable development.

From the analysis of financial indicators, CASC can appropriately increase liabilities to improve the efficiency of the use of funds, strengthen the management of current assets to maintain good short-term solvency; continue to optimize the inventory management, reduce It is recommended that inventory costs be reduced, that an accounts receivable management system be established and improved, and that the speed of recovery of accounts receivable be increased. Furthermore, it is advised that investment in research and development be increased, that market channels be expanded to expand the market share, and that cost management be strengthened to reduce operating costs and improve profitability.

8. Conclusion

Considering the analyses and the industry characteristics of high investment, high risk, high return and long cycle inherent to the commercial space industry, the following conclusions may be drawn.

The P/E valuation analysis indicates that the market anticipates significant future earnings for China Satellite. It is therefore crucial to assess whether its projected growth can sustain the current market valuation, particularly considering its elevated P/E ratio.

The commercial aerospace industry is characterized by high capital intensity, a long payback period and reliance on debt financing. Consequently, the value of CASC is significantly influenced by the cost of capital. The risk-free interest rate is typically the opportunity cost of investing in stocks. CASC's insensitivity to this rate reflects its low correlation with macro interest rates due to its business model and industry characteristics. CASC's value is more reflective of its core competence than short-term earnings growth, which explains its insensitivity to the average growth rate of net profit.

A fundamental analysis of CASC reveals a highly competitive development environment, yet the company also possesses distinctive advantages, including satellite resources, favorable customer relationships, robust industry chain synergy, and a robust technological innovation capacity. However, fluctuations in CASC's operating results indicate the need for continued monitoring of market changes and adjustments to the company's business strategy.

Conversely, an analysis of financial indicators demonstrates that CASC exhibits robust solvency and a relatively limited financial risk profile. Additionally, the company's inventory management practices are highly efficient, optimizing the utilization of capital. Furthermore, CASC demonstrates notable profitability and a robust competitive edge in the market.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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