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Financial Forecasting Using Time Series Models: Evidence from iFlytek

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ABSTRACT

A financial analysis of iFlytek, a bellwether in China's artificial intelligence industry, reveals that while the company's assets have been consistently expanding, its profitability has been on a continuous decline in recent years. Therefore, this paper attempts to apply time series models to forecast the company's net profit for the period 2025–2027, aiming to provide decision-making insights for both investors and management.

KEYWORDS

Financial Analysis; iFlytek; Time Series Models

1. INTRODUCTION

The current global economic landscape is undergoing profound adjustments, posing significant challenges to business survival and development. In dynamic and complex capital markets, stakeholders such as managers and investors can assess a company's financial position by reviewing its financial statements. Effective financial analysis helps firms understand their strengths and weaknesses. On this basis, financial forecasting systematically evaluates future financial conditions by integrating historical data with internal and external factors. Scientific financial forecasting contributes to strategic planning, optimal resource allocation, and risk prevention, thereby enhancing organizational resilience and promoting high-quality development.

This paper focuses on the artificial intelligence (AI) industry, taking iFlytek, a leading AI enterprise, as the research subject. It first conducts a financial analysis of the company and then applies time series models to perform financial forecasting, offering references for management's operational decisions.

2. FINANCIAL ANALYSIS

Financial statements capture core data related to a company's operating, investing, and financing activities over a specific period, directly reflecting its operating results and financial condition [1]. Financial statement analysis refers to the systematic review and in-depth interpretation of data from key financial statements—namely the balance sheet, income statement, and cash flow statement—to extract critical information such as asset size and structure, profitability level, and cash flow directions. This helps both internal and external users understand the company's financial condition [2].

Table 1. Financial Statement Data of iFLYTEK, 2021-2024 (Unit: [100 million RMB])

Item	2021	2022	2023	2024
Balance Sheet				
Cash and Cash Equivalents	58.70	43.46	35.63	33.87
Notes and Accounts Receivable	79.17	103.62	126.10	153.07
Total Assets	313.94	328.59	378.31	414.79
Total Liabilities	140.57	160.12	200.99	227.64
Total Owners' Equity	173.37	168.47	177.32	187.15
Total Liabilities and Owners' Equity	313.94	328.59	378.31	414.79
Debt-to-Asset Ratio	44.78%	48.73%	53.13%	54.88%
Income Statement				
Operating Revenue	183.14	188.20	196.50	233.43
Selling Expenses	26.93	31.64	35.84	40.83
Research and Development Expenses	28.30	31.11	34.81	38.92
Financing Expenses	-0.10	-0.79	0.15	1.35
Total Profit	14.97	2.48	4.20	2.29
Net Profit	16.11	4.99	6.13	5.07
Net Profit Margin	8.80%	2.65%	3.12%	2.17%
Return on Total Assets (ROA)	5.73%	1.55%	1.73%	1.28%
Cash Flow Statement				
Net Cash Flow from Operating Activities	8.93	6.31	3.50	24.95
Net Cash Flow from Investing Activities	-25.79	-17.04	-39.79	-33.05
Net Cash Flow from Financing Activities	23.79	-3.18	28.30	5.39
Ending Cash and Cash Equivalents Balance	55.44	41.73	33.83	31.11

As shown in the table, iFlytek's total assets increased from RMB 31.394 billion in 2021 to RMB 41.479 billion in 2024, indicating that the company is in a stable development phase. However, notes and accounts receivable surged by 93.34% over the four-year period, accounting for an increasingly larger proportion of total assets, which suggests certain collection risks. Furthermore, from 2021 to 2022, total liabilities were lower than owners' equity, indicating that the company relied primarily on internal financing for growth. Starting in 2023, total liabilities exceeded owners' equity, with non-current liabilities increasing from RMB 3.930 billion to RMB 7.192 billion, reflecting the company's reliance on external funding for development. Finally, the debt-to-asset ratio has continued to rise, indicating an elevated level of leverage. Overall, while the company's assets have been expanding consistently, attention should be paid to the risks arising from high receivables and increasing financial leverage.

In terms of profitability, operating revenue grew steadily from RMB 18.314 billion to RMB 23.343 billion. However, net profit declined sharply from RMB 1.611 billion in 2021 to RMB 0.507 billion in 2024, exhibiting a divergence between revenue growth and profit decline. This may be attributable to iFlytek's strategy of continuously increasing marketing and administrative expenditures to expand market share, which has driven steady revenue growth but has simultaneously squeezed profit margins. From the perspective of profitability metrics, the net profit margin has shown an overall declining trend, which in turn has led to persistently low return on total assets (ROA). This indicates that both the company's capital profitability and asset profitability have experienced varying degrees of decline in recent years.

In terms of cash flows, net operating cash flow improved significantly to RMB 2.495 billion in 2024, indicating enhanced collection capabilities and improved earnings quality. Investing cash flow remained negative, primarily due to increased capital expenditures on fixed assets and R&D investments, suggesting that the company is still in an expansion phase. Financing activities generated

a net inflow of RMB 0.539 billion in 2024, a notable contraction compared to 2023, which may be attributed to higher debt repayments.

3. FINANCIAL FORECASTING

Any methods and tools equipped with financial forecasting capabilities can help enterprises achieve real-time monitoring and management of various financial data and information. In particular, forecasting and evaluating a company's future profitability helps clarify its long-term strategic development direction, seize market opportunities, and thereby uncover and capitalize on growth potential [3]. Specifically, Python demonstrates superior accuracy and flexibility in data processing, visualization, and predictive analytics [4]. The ARIMA model, proposed by George Box and Gwilym Jenkins in 1970, is a statistical forecasting model with strong interpretability [5]. Owing to its parsimonious structure and well-established theoretical framework, it has been widely applied to short-term forecasting in economics, finance, and other fields over the past several decades [6].

Since financial data are time series data, this paper applies time series models to forecast major items across iFlytek's three core financial statements. First, quarterly net profit data from 2014 to 2024 are used as the series {X} for time series forecasting in Python, and the series plot is presented in Figure 1. The plot preliminarily indicates that the series is non-stationary, exhibiting obvious trend and seasonal fluctuation characteristics. Given the non-stationarity of the original series, a first-order difference is applied (as shown in Figure 1). The differenced series fluctuates around zero with no apparent trend. The Augmented Dickey-Fuller (ADF) unit root test is then conducted to further verify stationarity, leading to the determination of the differencing order *d* = 1, as presented in Table 2.

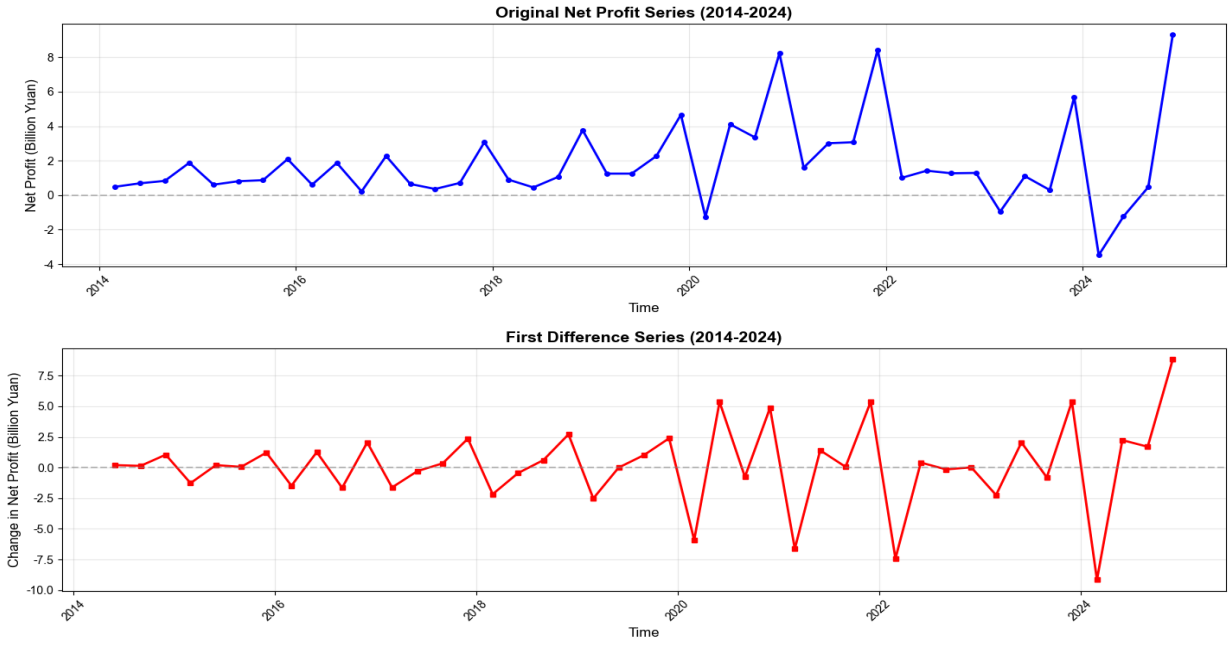

Figure 1. Original and First-Order Differenced Net Profit Series (2014-2024)

Table 2. ADF Test Results for Original, First-Order, and Second-Order Differenced Series

	Original Series	First-Order Differenced Series	Second-Order Differenced Series
ADF Statistic	-1.495637	-3.680539	-2.535821
p-value	0.535669 > 0.05	0.004395 < 0.05	0.1070 > 0.05
Conclusion	Non-stationary (accept H_0)	Stationary (reject H_0)	Non-stationary (cannot reject H_0)

Second, a white noise test (Ljung-Box test) is conducted. The autocorrelation function (ACF) and partial autocorrelation function (PACF) plots (shown in Figure 2) reveal that the series does not fall entirely within the ±2 confidence bands, confirming that the series is non-white noise and suitable for time series modeling. Furthermore, based on the tailing-off and cutting-off patterns, the model is preliminarily identified as ARIMA (1, 1, 0). However, due to strong seasonality in the data (as shown in Figure 3), the lower AIC value of the SARIMA model (as presented in Table 3), and the economic intuition that the MA (1) structure captures the impact of random shocks on net profit, the optimal model is determined to be SARIMA (0, 1, 1) (0, 1, 1, 4), with an MA (1) non-seasonal component.

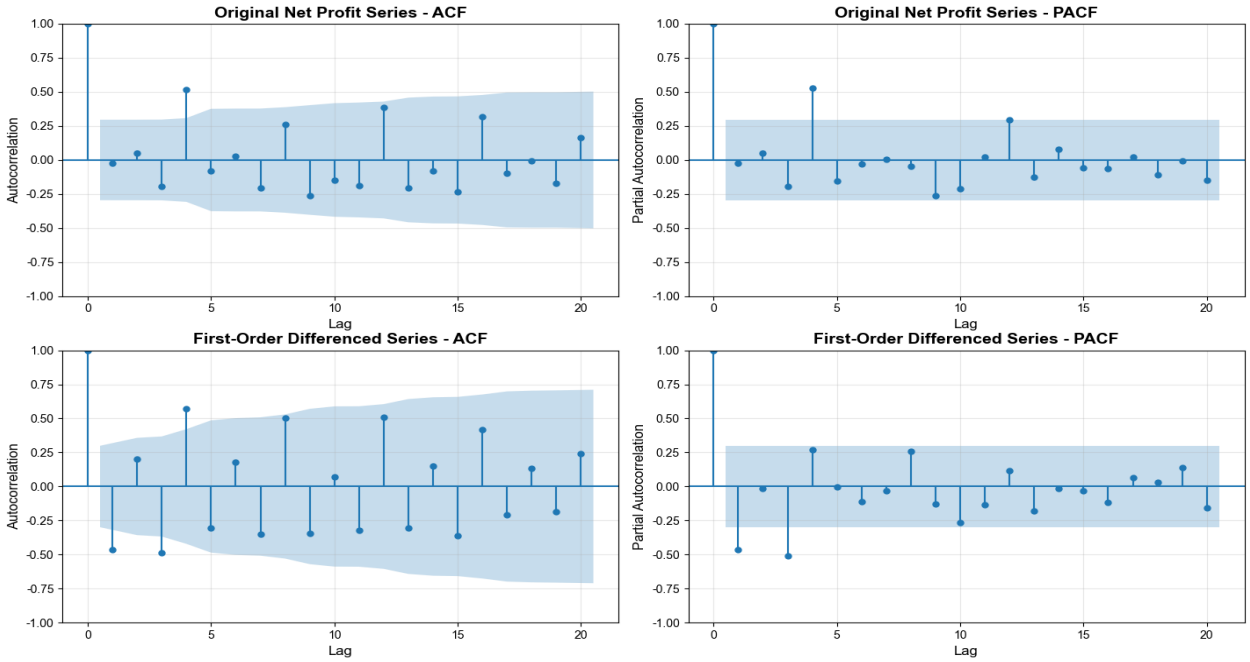

Figure 2. Autocorrelation and Partial Autocorrelation Function Plots

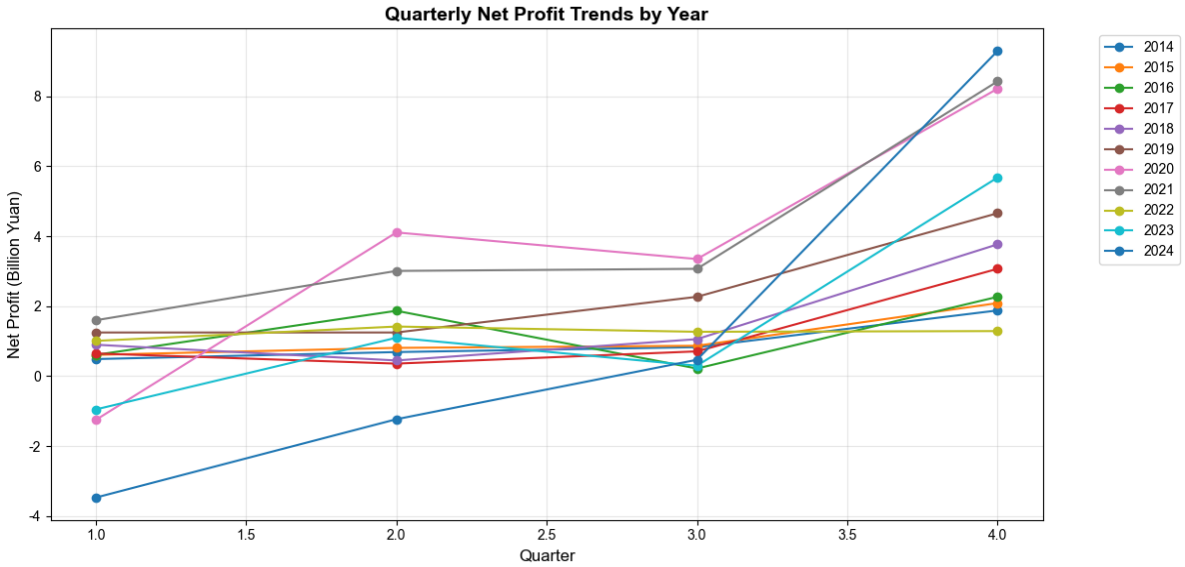

Figure 3. Quarterly Net Profit Trend Chart

Table 3. Model Comparison Results

Model Type	AIC	BIC
ARIMA (1, 1, 0)	1800.98	1804.50
SARIMA (1, 1, 1) (1, 1, 0, 4)	1610.31	1616.96
SARIMA (1, 1, 1) (0, 1, 1, 4)	1608.48	1615.14
SARIMA (1, 1, 0) (1, 1, 0, 4)	1613.25	1618.24
SARIMA (0, 1, 1) (0, 1, 1, 4)	1607.08	1612.07
SARIMA (1, 1, 1) (1, 1, 1, 4)	1610.26	1618.58

Accordingly, the SARIMA (0, 1, 1) (0, 1, 1, 4) model is employed to forecast iFlytek's quarterly net profit for 2025–2027, as illustrated in Figure 4.

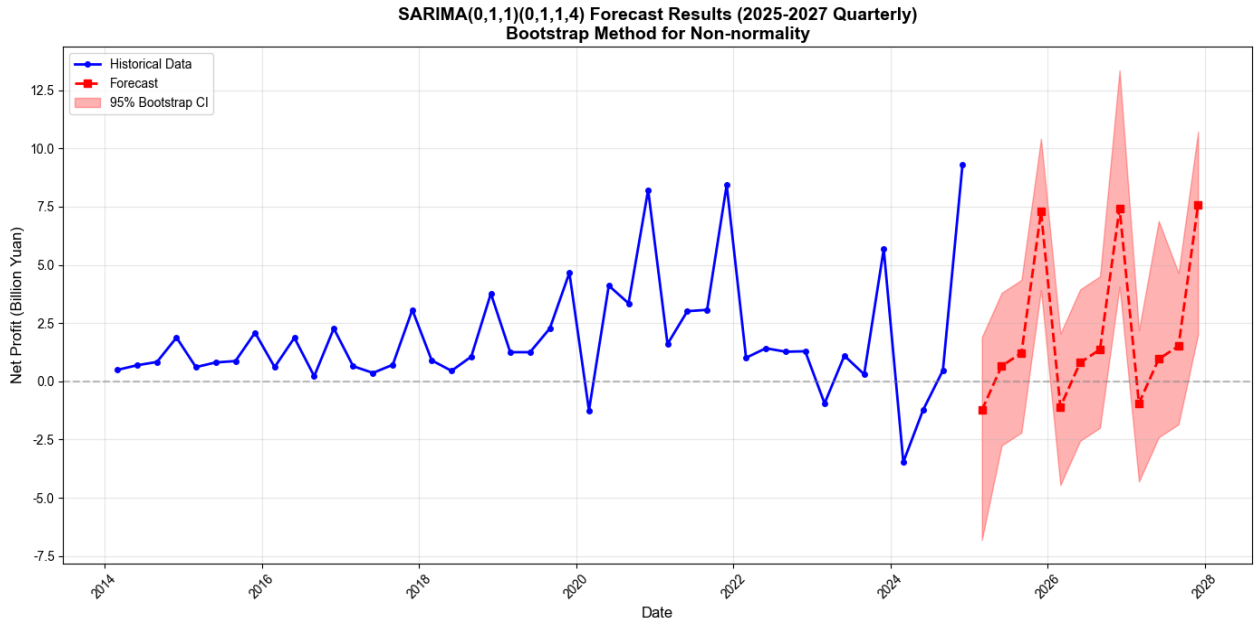

Figure 4. SARIMA (0, 1, 1) (0, 1, 1, 4) Model Forecast (95% Confidence Level)

To further validate forecast reliability, residual diagnostics are performed, with results presented in Figure 5. The results confirm that the residuals fall within the ±2 confidence bands, indicating that the residuals follow a white noise process. Therefore, the SARIMA (0, 1, 1) (0, 1, 1, 4) model is statistically valid, and the resulting forecasts are reliable. The detailed forecast values are presented in Figure 6.

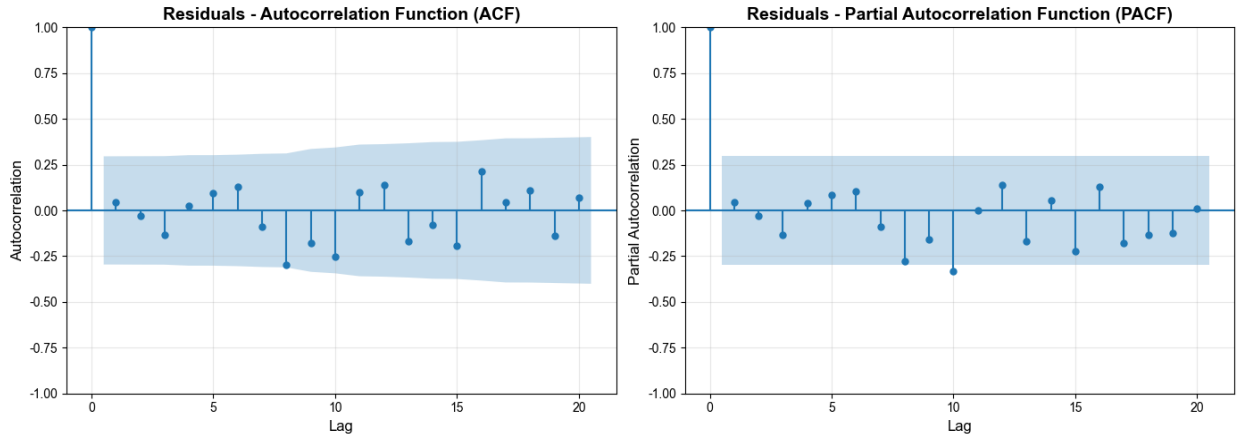

Figure 5. Residual White Noise Test

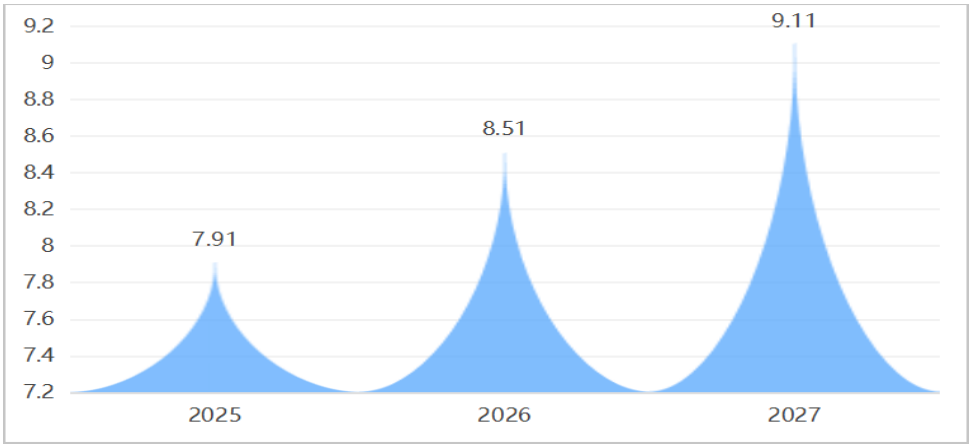

Figure 6. iFLYTEK Net Profit Forecast (2025-2027) [Unit: 100 million Yuan]

4. CONCLUSION

As a bellwether in the artificial intelligence industry, iFlytek saw its total assets increase from RMB 31.394 billion to RMB 41.479 billion over the 2021-2024 period, with operating revenue reaching RMB 23.343 billion. However, net profit declined sharply from RMB 1.611 billion to RMB 0.507 billion over the same period, exhibiting a divergence between revenue growth and profit decline. Rising accounts receivable, an increasing debt-to-asset ratio, and sustained net cash outflows from investing activities indicate that the company remains in a high-investment expansion phase. Based on the SARIMA model, this paper presents robust net profit forecasts for iFlytek covering 2025-2027. Nevertheless, the forecasts suggest that profitability will gradually recover, which would provide solid financial support for strategic investments and technology commercialization. Overall, while continuing its expansion, the company should strengthen accounts receivable management and cost control, guard against financial risks, and promote sustainable, high-quality development.

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