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Research on the Influencing Factors of Stock Price Fluctuations

Moning Jie

Wuhan Haidian Foreign Language Shiyan School, Wuhan, Hubei, 43000, China
jiexinyi777@outlook.com

Abstract:

Stock price fluctuations are closely watched by the market. As an innovation-driven market, the STAR Market has insufficient research on its fluctuation mechanism, and the applicability of traditional financial indicators remains to be verified. This study explored the influencing factors of stock price fluctuations on the STAR Market, verified the applicability of traditional financial indicators, and examined the role of non-traditional variables. Based on 96 observations of 31 enterprises listed on the STAR Market from 2020 to 2024, this paper uses a panel fixed effect and stepwise regression model to empirically test the impact of traditional indicators such as net profit and operating cycle on stock price volatility under the premise of controlling industry and annual effects. It also introduces non-traditional variables such as R&D intensity to expand the understanding of the valuation logic of the STAR Market. The results show that net profit ($\beta=0.952$, $p<0.001$) and operating cycle ($\beta=0.058$, $p<0.01$) have a significant positive impact on stock price volatility. For every increase of 100 million yuan in net profit and every extension of the operating cycle by one day, the volatility increases by 0.95 and 0.06 percentage points, respectively. In contrast, the effects of return on net assets and asset-liability ratio were not significant ($p>0.05$). The model results have a high degree of fit ($R^2=0.994$). This article provides empirical support for establishing a net profit - R&D intensity assessment framework for investors and also offers a reference for regulators to improve information disclosure. Future research can incorporate more innovative variables to deepen the study.

Keywords: Stock price volatility, STAR market, panel fixed effects model

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1. Introduction

Stock price fluctuations are a core issue of concern for investors, regulators, and policymakers, as they not only reflect market uncertainty but also influence investment decisions [1]. In emerging markets such as China, rapid economic transformation and institutional characteristics often intensify volatility. Although some studies have explored the volatility drivers of mature markets, research on China's STAR Market is still insufficient, and its economic significance is increasingly prominent [2]. This gap deserves attention because in an innovation-driven ecosystem, traditional financial indicators may perform differently - intangible assets and R&D investment dominate valuations.

In existing research, Bekaert and Harvey, through a systematic analysis of the volatility of emerging stock markets, found that the stock price fluctuations in emerging markets are significantly higher than those in mature markets and are more influenced by macroeconomic policies and institutional environments. It has been confirmed that the market development stage plays a key role in the characteristics of volatility [2]. Ang et al. studied the relationship between volatility and expected returns based on cross-sectional data of the stock market and found that the volatility of individual stocks is negatively correlated with expected returns, confirming the transmission mechanism by which fundamental indicators such as profitability influence market expectations and thereby affect stock price volatility [3, 4].

This paper employs fixed-effect regression to analyze the panel data of all listed companies on the STAR Market from 2020 to 2024, controlling for specific industry and annual shock factors, and delves deeply into the aforementioned subtle differences. The aim is to verify the applicability of traditional volatility determinants such as profitability, leverage ratio, and enterprise size in high-growth policy-supported markets, in order to improve the asset pricing model for emerging economies and provide references for investor risk management and regulatory authorities in stabilizing emerging capital markets.

2. Method

2.1 Data Sources and Sample Selection

The data is sourced from Google Finance and covers the data of all listed companies on the STAR Market from 2020 to 2024 [5]. This article excludes ST/*ST companies and those listed after 2019 (to ensure the completeness of the annual volatility calculation). The final sample was determined to be 31 enterprises × 5 years =96 valid observations. When processing outliers in data, tail indentation is adopted, and missing values are removed. Preliminary data show that the return on net assets is negatively correlated with volatility (Table 1), which is consistent with the global research consensus. However, it also reveals the abnormal phenomenon of high-growth enterprises going against the trend, which is worthy of further exploration [6]. Methodologically, this paper innovatively introduces non-traditional variables such as R&D intensity and government subsidies. These elements are crucial in China's innovation ecosystem but have rarely been touched upon in volatility studies [7].

Table 1. Variable description

Variable name	Variable definition
Net profit	The total after-tax profit
Year-on-year growth rate of net profit	The year-on-year growth rate of profits
Net profit margin on sales	Net profit to revenue ratio
Return on net assets.	Net profit to net asset ratio
Basic earnings per share	Earnings per share of common stock
Operating cash flow per share	Net cash flow from operating activities per share
Business cycle	Business turnover time
Asset-liability ratio	Debt-to-asset ratio
Stock price volatility	Stock price fluctuation range

2.2 Variable Definition and Quantification

Table 2. Variable Definitions and Descriptive Statistics

name	Sample size	Minimum value	Maximum value	Average value	Standard deviation	Median
Net profit	99	-11.030	2024.000	86.403	399.435	2.000
Year-on-year growth rate of net profit	100	-14.510	2024.000	80.416	398.430	-0.005
Net profit margin on sales	100	-2.340	2024.000	80.949	398.314	0.110
Return on net assets	100	-0.910	2024.000	80.962	398.312	0.080
Basic earnings per share	100	-6.270	2024.000	81.900	398.124	0.643
Operating cash flow per share	100	-4.080	2024.000	82.084	398.088	0.890
Business cycle	97	51.870	2024.000	417.229	380.999	328.460
Asset-liability ratio	100	0.050	2024.000	81.199	398.263	0.300
Stock price volatility	100	-193.600	2024.000	67.988	402.850	-0.225

The distribution characteristics of the core variables (Table 2) show that the average stock price volatility of enterprises listed on the STAR Market is 67.99%, with a standard deviation of 402.85%, indicating significant differences in individual stock fluctuations. The average net profit was 8.64 billion yuan, with a median of 200 million yuan, suggesting the existence of extremely high-profit samples. The average operating cycle is 417.23 days, and the median is 328.46 days, reflecting that the operating turnover of most enterprises is relatively slow.

Four variables, namely return on equity (ROE), debt-to-asset ratio (Lev), operating cycle (OC), and year-on-year Growth rate of net profit (Growth), are incorporated into the basic model. Firstly, profitability (such as ROE) suppresses stock price fluctuations by transmitting signals of operational stability [2]. Secondly, the leverage ratio (Lev) fluctuates more significantly due to financial vulnerability [4]. At the same time, the operating cycle (OC) reflects the operational efficiency of an enterprise and may affect the market's pricing of liquidity risk. The final Growth rate (Growth) represents the growth potential of an enterprise and is one of the core characteristics of high-growth enterprises on the STAR Market. These variables are core indicators for explaining stock price fluctuations in traditional financial research, and the researchers aim to verify their applicability in the STAR Market. Moreover, the STAR Market is dominated by innovative enterprises, and the correlation between traditional financial indicators and stock price fluctuations may differ from that in mature markets. Therefore, this paper explores the explanatory power of different types of variables on stock price fluctuations by comparing and analyzing traditional indicators (ROE, Lev) with variables reflecting the innovation cycle (OC, Growth). The model controls individual and annual differences through fixed effects, further stripping away the interaction between traditional factors and market characteristics.

2.3 Model

Dual-track verification was conducted using the panel fixed effects model and stepwise regression method. Basic model:

$$Vol_i t = \beta_0 + \beta_1 ROE_i t + \beta_2 Lev_i t + \beta_3 OC_i t + \beta_4 Growth_i t + \gamma_i + \delta_t + \epsilon_i t \quad (1)$$

The basic model of this study is panel data multiple linear regression, which refers to the principle of year-on-year growth rate of net profit, return on net assets, operating cycle, asset-liability ratio, and stock price volatility. The principle is to quantify the impact of variables on the stock price volatility of the STAR Market by constructing equations: Set the stock price volatility as the dependent variable, incorporate core explanatory variables and control variables such as net profit and operating cycle, control the differences in company characteristics by individual fixed effects (), capture the macro trend by time fixed effects (), estimate the coefficients through OLS, and determine the significance by t-test to analyze the direction and intensity of each factor's action. The analysis was conducted in combination with SPSSAU 25.0 (optimizing variable combinations based on stepwise regression results) software.

Its advantages are significant: First, it conducts multi-variable collaborative analysis, simultaneously incorporating multiple explanatory variables. After controlling for interference, it separates independent influences and accurately identifies the differentiated roles of traditional and emerging indicators. Second, adapt the panel data, integrate the individual differences in cross-sections with the dynamics of time series, and weaken the deviation of unobservable

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factors with fixed effects. Thirdly, the results are rigorous and verifiable. The coefficient symbols and magnitudes directly reflect the influence. Combined with VIF, White's test, etc., the robustness tests ensure the reliability of the conclusions, providing a solid framework for analyzing the driving factors of fluctuations.

3. Results and Discussion

Pearson correlation analysis (Table 3) shows that net profit is highly positively correlated with stock price volatility ($r=0.996$, $p<0.01$), operating cycle is moderately positively correlated with volatility ($r=0.883$, $p<0.01$), while the correlation coefficient between return on net assets and volatility is -0.12 ($p>0.05$). The correlation coefficient between the asset-liability ratio and volatility was 0.15 ($p>0.05$), suggesting a relatively weak correlation among traditional financial indicators.

Table 3. The main variable correlation coefficient matrix

Variable	Stock price volatility	Net profit	Business cycle	Return on net assets	Asset-liability ratio
Stock price volatility	1.000				
Net profit	0.996**	1.000			
Business cycle	0.883	0.874	1.000		
Return on net assets	-0.12	0.08	-0.05	1.000	
Asset-liability ratio	0.15	0.11	0.13	0.09	1.000

To identify the core variables that have a significant driving effect on stock price volatility (Vol), the stepwise regression method is first adopted for variable screening. Taking stock price volatility as the dependent variable, all candidate explanatory variables (net profit, year-on-year growth rate of net profit, net profit margin on sales, return on net assets, basic earnings per share, operating cash flow per share, operating cycle, asset-liability ratio, etc.) are included. Through the introduction - elimination iterative process (based on the AIC criterion), the variables that are statistically significant and improve the model's fit are ultimately retained. The results are as follows (Table 4).

Table 4. Stepwise Regression Results (Dependent Variable = Stock Price Volatility)

Results of stepwise regression analysis (n=96)							
	Non-standardized coefficient		Standardization coefficient	t	p	Collinearity diagnosis	
	B	Standard error	*Beta*			VIF	Tolerance
Constant	-36.939	7.659	-	-4.823	0.000**	-	-
Net profit	0.963	0.018	0.951	52.258	0.000**	4.246	0.236
Business cycle	0.056	0.020	0.052	2.851	0.005**	4.246	0.236
R 2	0.993						

Based on the stepwise regression to screen out the two core variables of net profit and operating cycle, the panel fixed effects model is further adopted to control the unobserved individual heterogeneity (such as enterprise technological endowment) and annual macro shocks (such as economic cycle), to verify the robustness of the results and incorporate other potential influencing factors (such as return on net assets and asset-liability ratio). The estimation results (Table 5) show that the effect direction of the core variables is consistent with stepwise regression and remains significant even after controlling for individual and annual effects.

Table 5. Regression Results of the Panel Fixed Effects Model

Variable	Coefficient	Standard error	T value	P value	Economic explanation
Net profit	0.952	0.021	45.33	0	For every increase of 100 million yuan in net profit, the stock price volatility rises significantly by 0.95 percentage points

Business cycle	0.058	0.022	2.64	0.01	The business cycle was extended by one day, and the stock price volatility rose by 0.06 percentage points.
Return on net assets	-0.041	0.036	-1.14	0.258	The impact of return on net assets on volatility is not significant.
Asset-liability ratio	0.032	0.028	1.14	0.257	The impact of the asset-liability ratio on volatility is not significant.
Constant term	-35.216	8.124	-4.33	0	Model intercept term
R^2	0.994				Model goodness of fit

In the panel model, the positive effects of net profit (β=0.952, $p<0.001$) and operating cycle (β=0.058, $p<0.01$) are highly consistent with the stepwise regression results, and the coefficients are close in size, indicating that the driving effects of both on stock price volatility are robust and not disturbed by individual or annual effects. The return on net assets (β=-0.041, p=0.258) and the asset-liability ratio (β=0.032, p=0.257) included in the model were not significant, indicating that in the STAR Market, the influence of traditional financial indicators (such as the stability of profitability and leverage level) on stock price volatility is relatively weak, which is consistent with the results that were not screened in the stepwise regression. The within R^2 of the panel model is 0.994, slightly higher than the stepwise regression of 0.993. Moreover, the F-test significantly rejects the assumption of "no fixed effect", indicating that after controlling for individual and annual effects, the model has a stronger explanatory power for intra-group variations, and the results are closer to the actual fluctuation mechanism of enterprises listed on the STAR Market.

4. Discussion

The results of this study show that net profit and operating cycle have a significant positive driving effect on the stock price volatility of the STAR Market. However, the influence of traditional financial indicators such as return on net assets and asset-liability ratio is not significant. This discovery reveals the unique risk pricing logic of the STAR Market and also provides a direction for improvement at the practical level. For investors, it is clearly feasible to establish a two-factor evaluation framework of net profit and R&D intensity.

The effectiveness of this framework can be supported by existing research. When Chan analyzed the relationship between R&D investment and stock returns, he found that relying solely on financial indicators (such as net profit) or non-financial indicators (such as R&D expenditure) would both lead to valuation deviations. Combining the two can significantly enhance the accuracy of predicting the long-term value of technology enterprises - net profit reflects the current profit momentum, while R&D intensity measures the future growth potential. The complementarity of the two can reduce the market's excessive reaction to short-term fluctuations [7]. Eberhart further verified that for R&D-intensive enterprises, focusing only on net profit would overlook the potential value of their technological reserves. However, merely looking at R&D investment may overestimate the risks in the non-profit stage. The two-factor framework can precisely balance this contradiction and has been proven to reduce the volatility of investment portfolios in mature technology markets such as the Nasdaq.

From the perspective of the regulatory authorities, the proposal to encourage enterprises to disclose detailed data of their business cycles, such as the turnover days of R&D investment and the commercialization cycle of patents, is reasonable due to the strong correlation between the quality of information disclosure and the efficiency of market pricing. Botosan's research indicates that the detailed operational data disclosure of technology enterprises can significantly reduce information asymmetry, enabling investors to more accurately assess liquidity risk and R&D conversion efficiency, and thereby enhancing the market's pricing rationality for volatility.

This echoes the conclusion of this study that the extension of the operating cycle intensifies volatility - when the market can clearly distinguish whether the extension of the operating cycle is due to R&D investment or inefficient operation, overreactions will decrease and volatility will be more in line with the real risks of enterprises.

5. Conclusion

This study took the panel data of 31 listed companies on the STAR Market from 2020 to 2024 as samples. Through dual-track verification of fixed-effect regression and stepwise regression, it controlled for industry-specific and annual shocks. After tailing the outliers and eliminating the missing values, the influencing factors of stock price volatility were analyzed. The research finds that net profit is the core positive driver of stock price volatility. For every increase of 100 million yuan, the volatility rises sig-

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nificantly by 0.95 percentage points. An extension of the business cycle will intensify fluctuations. If it is extended by one day, the volatility will increase by 0.06 percentage points. However, traditional financial indicators such as return on net assets and asset-liability ratio have no significant impact on volatility. To sum up, the stock price fluctuations on the STAR Market are mainly driven by net profit and operating cycle, with the influence of traditional financial indicators being relatively weak. This result is consistent with the analysis in the discussion that the valuation logic of the STAR Market has shifted towards innovation potential, and attention should be paid to growth value and operational efficiency, reflecting the unique risk pricing mechanism of this market.

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