Analysis of the Information Trembling Characteristics and the Linked Trembling Pattern of Stock Prices

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Abstract. There are many modes of stock price operation, and in many cases, the way stock prices change their trend is often caused by some sudden event or information, which is called trembling. The price of the relevant target stock fluctuates due to this kind of trembling information, and the intensity of the fluctuation is determined by the strength of the trembling information characteristics. Similarly, the magnitude of the trembling in the stock price is also determined by investors' recognition of this information characteristic. Through extensive observation and analysis of stocks in the stock market, it is found that this stock price trembling characteristic has broad representativeness. Based on the universality of trembling characteristics, this article selects representative targets for systematic analysis, providing investors with an investment style that conforms to market rules, which is still of great benefit.

Keywords: Information characteristics, Trembling characteristics, Trembling function, Stock price trembling test

1 Introduction

The stock market is the most active and traded market in today's capital market, and the price changes of major stock markets in the world follow certain rules. In addition to a series of conclusions drawn from technical analysis in securities investment, the stock market itself exhibits a unique operating mode. Taking the Chinese stock market as an example, let's first take a set of examples:

Table 1. Examples of Stock Price Trembling.

Stock target	Time period of stock price trembling	Trembling amplitude	Trembling information trait	Stock price linkage mode
Hanwuji	2025.7.11-2025.8.28	523.00-1587.90	The United States' suppression of China's chip technology	Unilaterally rising in a convex pattern
Changcheng jungong	2025.6.18-2025.8.13	13.60-67.82	Concept of Military Power	Two consecutive limit up modes

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			tion of AI models	with opening limit up
Xiandao zhineng	2025.8.18-2025.9.24	26.62-68.76	New energy equipment manufacturer	Starting from the daily limit up and completing the upward trend through repeated swing mode
Shanghai xiba	2025.6.20-2025.9.9	36.00-110.47	Breakthrough in Solid State Battery Patents	Complete the uptrend in an upward trend pattern

The changes in stock prices of these examples in Table 1 during their independent time periods cannot be perfectly explained by fundamental or technical analysis. So the stock price changes shown in these examples should follow other patterns.

It is obvious that the sudden changes in stock prices in the examples in Table 1 are all caused by the instantaneous changes in their information characteristics. As shown in the table above, the surge in Hanwuji was due to the suppression of related industries in China by the United States and the expectations of Chinese people for domestic substitution. Meiri hudong is due to the domestic substitution of AI models. Changcheng jungong is based on the concept of a military power, Shanghai Xiba's expectations are based on solid-state batteries. Xiandao zhineng is based on expectations for the future development of the new energy industry.

These stocks experience fluctuations in stock prices during a specific period of time, not because their texture has fundamentally changed in the short term, but because their information characteristics have changed during this period, forming a consistent market expectation.

2 Trembling Mathematical Model

Generally speaking, trembling is a change in the original state caused by a specific factor, The Trembling Theory was proposed by René Thom[1]. A mathematical model primarily used to describe the abrupt behavior of a system under continuously changing parameters. Including two types: one is a complete change of the original state; Another type is temporary state change.

There are many mathematical models for trembling, including single factor models, two factor models, and multi factor models, all of which can find suitable application scenarios in economics. Due to the many factors that can cause changes in stock prices, these factors interact and influence each other. Moreover, each stock has its own suitable influencing factors, which are complex to analyze and difficult to extract related patterns in a complex environment. Based on this, through simplified processing, the information that can most affect the current stock price is listed separately and viewed as the only factor that affects the stock price in the short term. The trembling information characteristics in Table 1 are the most important characteristics that affect the corresponding stock prices and are in line with the trembling situation of stock prices.

The mathematical theory of trembling in applied economics points out that the causes of trembling are random and have strong signal amplification. The factors that cause trembling may be accidental, but they should be strengthened by inducing factors that infinitely amplify the process and have broad market responsiveness. Therefore, the trembling caused by accidental factors are strengthened[2] , and ultimately evolve into clear trembling information characteristics, thereby driving the linkage tremor of stock prices and completing the sudden change of stock prices.

A typical trembling model is described as: Assuming that the market game is in an environment of relatively fair information, market participants are generally able to receive fair communication of information. At this point,the induction mechanism of tremor comes into play. In the process of stock price changes, participants closely monitor the generation of trembling factors. Once the trembling information is confirmed, the market immediately responds, and trembling occurs as a result[3]. At this point, participants enter an absolute game position, thereby driving the linkage of stock prices.

Let μ represent the trembling rate, indicating the effective ratio of various factors causing trembling, Δf representing the possible choices of multiple parties in the game, i.e., the extent to which participants respond to trembling signals[4], at this moment

$$\mu = \mu_0 \cdot e^{-\beta \Delta f} \tag{1}$$

Among them, μ_0 represents the initial trembling rate and β is the response intensity. It can be seen that once trembling is responded to, its change will be an exponential evolution. Reflected in the stock price, it manifests as a continuous limit up or limit down of the stock price, and the stock price undergoes extreme emotional evolution.

The dynamic equation of the trembling stock price can be described as:

$$\frac{dx}{dt} = \tau(1-\tau)\left(\Delta f - \mu \ln\left(\frac{x}{1-x}\right)\right) \tag{2}$$

Δf represents the degree of response of participants to the trembling signal, τ indicates the response rate of trembling strategy, x indicates the selection rate when facing multiple trembling signals.

This equation indicates that investment strategies increase the diversity and specificity of choices through signal trembling, thereby promoting the volatility of trembling stock prices[5].

Trembling are highly likely to occur, and any possible change in information can serve as a guiding factor for trembling, provided that this information change can resonate with participants and guide the pursuit of funds, thus establishing trembling[6].

Trembling of Hanwuji in Table 1 conforms to various characteristics of trembling. The company itself has an average operating situation and does not possess trembling

characteristics compared to the development of similar companies. Based on non-market factors, public information pushed this company to the brink of trembling, and the market expected it to be able to replace American company Nvidia domestically. This scarce characteristic information in the market led to a concentration of market funds pouring into the company's stock, causing the company's stock price to rise from 523 yuan to 1587 yuan within a month, completing the company's stock price trembling.

3 Comparison of Information Trembling Characteristics

The stronger the information characteristics that cause trembling, the stronger the fluctuations that usually bring to the relevant stock prices. The reason for this is that on the one hand, the feedback strength of funds on relevant information is often based on whether the consensus of market funds can be reached. The trembling information traits shown in Table 1 have strong timeliness, whether it is Hanwuji, Xiandao zhineng , or Meiri hudong, It is all based on the comprehensive suppression of China's chip industry by the United States, and the market response effect generated by the comprehensive replacement of equipment, chips, and software.

Due to the exponential position of Δf the market's response to trembling trait variability in the variability formula, a small increase in response of μ can lead to drastic fluctuations in variability.

At the same time, based on the service of the Fujian ship in China and the global dominance of the United States, Changcheng jungong was able to become active twice and achieve a trembling in stock prices, thanks to the information characteristics of chips.

Although Shanghai Xiba has a breakthrough in solid-state battery patents, its information characteristics are not as strong as those of chips and aircraft carriers. Therefore, although the stock price has shown an upward trend, there have been few consecutive limit up during this period, indicating that the information characteristics of the stock are not good.

Before the Meiri hudong was clearly a premeditation of information characteristics. From October 8, 2024 to May 23, 2025, the stock experienced a turnover rate of up to 894.3%, with an average daily turnover rate of 11.43%. The chips were almost firmly held in the hands of the manipulators, and on the day of the launch, three limit up sessions were opened, in conjunction with the market's recognition of the volatile information. The CEO of Nvidia also affirmed the trembling information, and basically did not give other investors with information retention any opportunity to chase after the rise.

4 The Equilibrium Formation Process of Trembling

The initiation of information traits is based on various accidental factors, but from a market perspective, it is also inevitable. By chance, this information trait is destined to

appear in a certain aspect of the market and has a certain degree of randomness. It is inevitable that information characteristics will emerge, because new information appears in the market every day, and some of the information that investors are concerned about will inevitably become the trigger for stock price trembling, causing resonance in the market and forming changes in the characteristics of related stocks, leading to corresponding stock price fluctuations.

Due to the rapid transmission of these trait changes through modern information technology, the changes in information traits also exhibit characteristics of rapid changes, which are quickly transmitted between markets, thereby expanding the role of these traits and causing rapid fluctuations in related stock prices, resulting in price surges and drops.

From the examples in Table 1, it can be clearly seen that the volatility of these stocks starts from the limit up of the stock, forming a continuous trembling of the stock price until the stock price reaches a new equilibrium.

According to the trembling formula, the degree of response to information traits Δf has its own specificity, and the market's feedback on various information traits can be measured by the strength of stock price increases, especially in the early stages of stock price increases. This level of response requires time to verify, and the ultimate size of Δf is determined by a complete tremor process.

Table 2. Reasons for stock price trembling and the extent of their continuation.

Stock target	Δf	β	μ_0	μ
Hanwuji	5.70	205	5.82	5.86
Changcheng jungong	30.04	395	10.01	9.63
Meiri hudong	32.00	288	7.94	20.57
Xiandao zhineng	7.38	158	6.14	5.65
Shanghai xiba	15.67	120	5.05	2.06

The validity period of the data in Table 2 corresponds exactly to the time in Table 1. Δf representing the degree of response, Whether trembling can be recognized by the market and to what extent trembling can continue often depends on the strength at the beginning stage of trembling. Here, we take the percentage change in the stock price of the target company over the past three days as a representation. The larger the value, the more positive the market response to the target stock; β representing the response intensity, the length of time that trembling can last, the longer the time, the higher the response intensity, and the larger the overall amplitude of trembling; μ_0 representing the initial trembling rate, The percentage change on the first day of tremor begin; μ represents the overall amplitude of tremor.

Table 2 shows that there is a positive correlation between the values of Δf and β, The larger the value of Δf, the greater the response intensity of the market to the relevant stocks, indicating that the market is prone to forming consistent expecta-

tions for the relevant stocks, and this expectation can continue. The market atmosphere is lively, and the stock price trembling greatly. μ_0 indicates that it will also significantly affect the size of β. The larger the value of μ_0, the larger the corresponding value of β, indicating that the initial volatility has a profound impact on the stock price.

5 Verification of the Feasibility of Stock Price Trembling

The data in Table 1 is sourced from real transaction data, while Table 2 is the result calculated based on the data in Table 1, and its authenticity is reliable. What needs to be considered here is whether these data have broad representativeness, so stocks can be randomly selected in the market and tracked and observed over a longer time span.

Randomly select two stocks, Zhongguo shiyou and Changjiang dianli, as reference targets in the stock market. According to the calculation methods in Tables 1 and 2, the corresponding data in Table 3 are obtained. Through data comparison, it is found that Zhongguo shiyou has a trembling characteristic from November 26, 2014 to December 26, 2015, during which the stock price experienced a trembling rise. However, due to the country's long-term commitment to green energy, it is difficult for the market to have more specialized information. Therefore, although Changjiang dianli has excellent profitability and can continuously expand its business, its stock price has been consistently rising for a long time, but the rate of trembling in the stock price in the short term is zero.

Table 3. Stochastic examples of Stock Price Trembling.

Stock target	Time period of stock price trembling	Trembling amplitude	Trembling information trait	Stock price linkage mode
Zhongguo shiyou	2014.11.26-2015.1.26	7.86-13.20	Market style changes lead to	Periodic loose monetary policy drives up stock prices
Changjiang dianli	Since its listing, the stock price has not experienced typical trembling	Nothing	No typical sudden characteristic information	Stock price trending upwards

Table 3 compares two randomly selected stocks, Zhongguo shiyou and Changjiang dianli, and finds that a stock will only have corresponding trembling prices if it possesses short-term trembling information characteristics, the direct cause of stock price trembling is the inherent trembling characteristic of stocks, The items Δf listed in Table 1 are the fundamental causes of stock price trembling. This observation is very important, as there should be a strict correspondence between information trembling traits and trembling prices. If there were no information trait trembling as a prerequisite, stock price trembling would not occur.

6 Conclusion

The examples in Table 1 are not deliberately selected as isolated cases. In the stock market, such examples are common and their trembling characteristics have broad representativeness. As long as investors in the market can form a market consensus in the face of these information characteristics, it is possible to generate stock price changes that conform to the characteristics of trembling. Most of these changes will also disappear due to the disappearance of trembling information characteristics, and the stock price will return to its original operating state.

It is evident from β in Table 2 that there are significant differences in market feedback for different characteristics of trembling information. In general, the trembling information traits that can be recognized by most investors have a longer duration and larger amplitude of stock price trembling. On the contrary, those trembling information traits that are not well recognized by market investors receive less attention from the market, have a shorter duration of trembling, and have smaller amplitude of stock price trembling.

Through random sampling of market stocks, it was found that although the trembling information trait is widely present in the market, not every stock has the information trait. Some stocks have been listed for many years without any recognized information trait by the market, so their stock price changes do not show corresponding trembling characteristics, such as Changjiang dianli in Table 3.

It should be emphasized here that the tremulous information trait is not related to the fundamentals of stocks, nor is it related to traditional technical analysis. It is more manifested as emotional changes and emotional identification in the market itself. Once market identification appears, the information trait will quickly transform into trembling price characteristics.

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