

# Price fluctuation by measuring potential risks and opportunities shown in the mar...

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## **Econphysics**

Econphysics is the study of advanced economy applied Physics knowledge to approach to the massive volume of stock data. The study was minor field in ten years ago, but its importance has been growing gradually as Econphysics can raise the reliability by the statistical and mathematical modeling predictions that are beyond economic theories. It helps us to predict much more accurate in price fluctuation by measuring potential risks and opportunities, shown in the market or news. Thus, Econphysics is mainly used for investigating the financial markets and indices in the research. [3]

## **Stock**

Stock is a type of assets to guarantee shareholder's right and duty, representing the possession of a corporation's property. The corporation issues stocks, which reflect its value in the market, to raise its funds [5]. As mentioned of the right and duty, the stock can be generally categorized in two ways: common stock and preferred stock. The difference between two stocks is the concentration of either voting right or profit [6]. In terms of profitability and growth potential, there are several types: blue-chip, yellow-chip, red-chip and green-chip. The blue-chip is the qualified, reliable and profitable stock offered by nationally well-known corporation; yellow-chip is quite similar to blue one, but the size of the corporation and the price of the stock are relatively lower than blue-chip; red-chip is the stock made by Hong Kong and Chinese government; green-chip is the stock in renewable energy and environmental industry.

## Price Fluctuation

Price fluctuation is displayed in stock market to indicate the current value of the corporation and imply the amount of stocks exchange. Similar to the economic market caused by both demand and supply of goods, stock market is changing every second due to whom want to buy or whom want to sell the value of the corporate. In fact, the stock information does not perfectly reflect the exact value of the firm because the performance and the value of the firm are not easy to be evaluated. Therefore, there are two main stock categories called value stock and growth stock. Value stock is the underestimated stock in terms of the firm's value or performance that is mostly stable, whereas growth stock is the overestimated stock to include growth potential and positive expectation for launching new flagship product.

Moreover, the price fluctuation will be measured by two major mathematical equations as shown below [1]:  $P_i$  represents  $i$ -th stock price at time  $t$ ;  $R_i$  indicates the price return. The equation follows logarithmic relationship between price return and prices at initial and final points. With the first equation, the second equation may arise:  $\sigma_i(t)$  refers volatility of the price return, defined as  $\sqrt{R_i^2 - \bar{R}_i^2}$ ;  $r_i$  indicates the normalized price return to fit the result in the normal distribution.

## Korea Stock Market (KOSPI)

Korea Composite Stock Price Index (KOSPI) is a representative stock market indicator in Korea, like American stock market (NASDAQ). The index is calculated in a way of dividing relative market capitalization into standard

market capitalization times 100. The total market capitalization of KOSPI is KRW 1.1 quadrillion, which is approximately HKD 7.8 trillion, in 2018 [8]. The value is the 13th biggest market capitalization in the world that is lower than the Hong Kong Exchanges having HKD 31 trillion for market capitalization [7].

Otherwise, the equation can be noted like  $\pi(x) > x^{-a}$ ,  $a \approx 3$ . Since the exponent is -3, it is also denoted as inverse cubic law. This value will be intensively investigated throughout the research [2]. Objectives

To analyze the nature of each stock market with graphical and mathematical approaches

To investigate the inverse cubic law of a price fluctuation in the stock markets

To distinguish both positive and negative tails of the normalized return distribution until the end of 4th week.

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