Damped oscillations in the ratios of stock market indices

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Abstract

A stock market index is an average of a group of stock prices with weights. Different stock market indices derived from various combinations of stocks may share similar trends in certain periods, while it is not expected that there are fixed relations among them. Here we report our investigations on the daily index data of Dow Jones Industry Average (DJIA), NASDAQ, and S&P500 from 1971/02/05 to 2011/06/30. By analyzing the index ratios using the empirical mode decomposition, we find that the ratios NASDAQ/DJIA and S&P500/DJIA, normalized to 1971/02/05, approached and then retained the values of 2 and 1, respectively. The temporal variations of the ratios consist of global trends and oscillatory components including a damped oscillation in 8-year cycle and damping factors of $7,183$ days (NASDAQ/DJIA) and $138,471$ days (S&P500/DJIA). Anomalies in the ratios, corresponding to significant increases and decreases of indices, only appear in the time scale less than 8-year cycle.

Keyword: Damped oscillation, Ratio of stock market indices

References

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