

Alarm index of the major crashes in Korean financial market via Log Periodic Power Law and Pattern recognition

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Abstract

We investigate the different aspects of the domestic and global crises in Korean financial market by predicting market crashes. LPPL and JLS model are employed to predict the burst of the financial bubble. Then we construct the alarm index based on the pattern recognition method and compare the best performing characteristics for both domestic and global crisis.

Keyword: Log-Periodic-Power-Law, JLS Model, Market Crash, Alarm Index, Pattern Recognition

1. Introduction

During last decades, the financial market in Korea have suffered from various financial crises. Unlike the outbreak of the financial crisis in the United States which is globally contagious in most of times, a financial crisis in Korean market can be classified in terms of domestic and global. In this paper we employ the Johansen-Ledoit-Sornette (JLS) model, a market crash model studied in many previous econophysics literatures, and the pattern recognition technique to develop an alarm index forecasting the future market crash [1,2,3]. Then we compare the characteristics of the alarm index between the domestic and global crisis.

2. Method

The crucial outcome of this research is an alarm index generated from JLS model and pattern recognition.

2.1. JLS Model

The hazard rate of the noise trader log-periodically oscillates and crashes at certain critical point in the JLS model. Price dynamics ahead of the critical point is as follows,

$$\log p(t) = \log p_c - \frac{\kappa}{\beta} \{B_0(t_c - t)^\beta + B_1(t_c - t)^\beta \cos[\omega \log(t_c - t) + \phi]\} \quad (1)$$

where $p(t)$ is the price before the critical point and β, ω and ϕ are the parameters.

2.2. Pattern recognition and alarm index

Pattern recognition technique allows us to predict the most probable crash point. Prediction of the crash can be obtained by genetic algorithm applied in the Log-Periodic-

Power-Law(LPPL) function. We also consistently change the start date, end date and time interval to produce numerous critical points in different settings. Then we spot the interval of the parameter values with high-forecasting performance and select the best performer of the past market crash by combining of the parameters. The alarm index warns the market crash when the combination of the parameters in the future includes many best performer.

3. Discussion

We investigate the different aspects of the market crash occurred from each domestic and global crisis in the Korean financial market by setting the best parameters for the alarm index. Analysis reveal that the difference between the characteristics of domestic and global crisis is distinctive. Even though a domestic crisis is not infectious to the world, it still negatively affects its own economy. Thus our finding is dedicated to make provision for future market crash through the well-performing alarm index for a financial market of the small and developed countries.

References

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