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On the maximum drawdown during speculative bubbles

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Abstract

A taxonomy of large financial crashes proposed in the literature locates the burst of speculative bubbles due to endogenous causes in the framework of extreme stock market crashes, defined as falls of market prices that are outlier with respect to the bulk of drawdown price movement distribution. This paper goes on deeper in the analysis providing a further characterization of the rising part of such selected bubbles through the examination of drawdown and maximum drawdown movement of indices prices. The analysis of drawdown duration is also performed and it is the core of the risk measure estimated here.

Keywords: Risk measure; Drawdown; Speculative bubbles

1. Introduction

An insight in the long term behavior of portfolios is a delicate task in long term investment strategies. The need to consider extreme financial market events encompasses the investigation of large financial crashes, that were already classified as outliers with respect to the bulk of market drops, and often associated to the burst of speculative bubbles due to endogenous causes [1].

This paper aims at extracting risk features that characterize the rising part of such speculative bubbles.

Our data selection relies on the huge data analyses worked out by Johansen and Sornette [1,2]. In their several papers, they develop and support through empirical evidence the theory describing speculative bubbles due to endogenous causes like as systems close to some rupture point. In particular, large market indices drops ending speculative bubbles due to endogenous causes have been characterized through the occurrence of log-periodic-power laws (LPPL), interpreted as a signature of underlying cooperative phenomena among market agents (Fig. 1, Table 1). These results were related to analyses of drawdown movements of market indices prices (DD), thus providing systematic taxonomy of crashes [1,3,4]. Our analysis starts from this point and goes on inquiring drawdown market price movements, duration and size. The analysis of duration of drawdown movement is relevant in itself, considering the key role of time in catastrophic events like as large financial crashes are, that show a drop of prices within short time intervals [1,2,5]. The analysis of drawdown size requires as a preliminary step the selection among the several different definitions of drawdown that were

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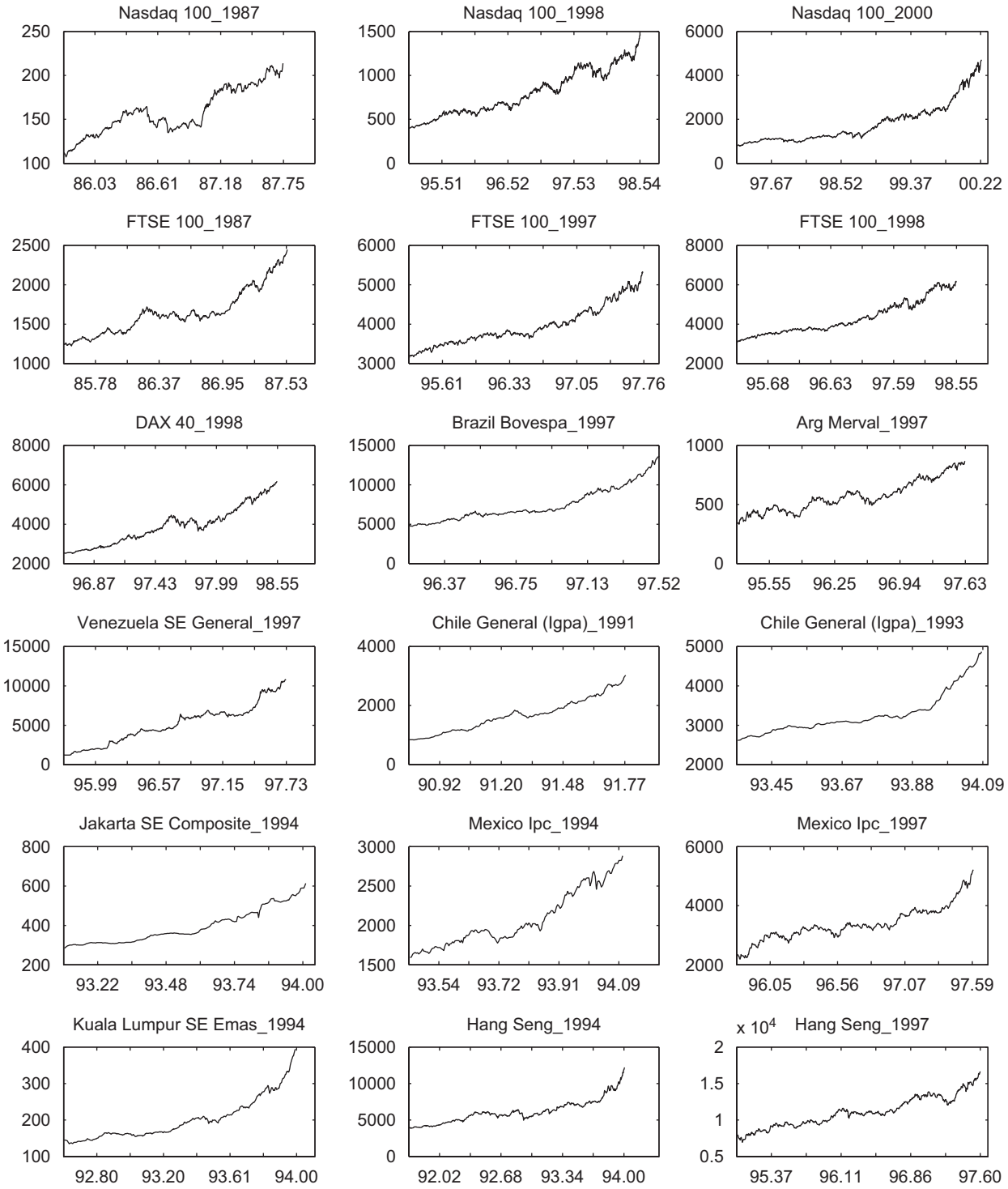

Fig. 1. Rising part of speculative bubbles selected. Large financial crashes were chosen in accord to [1]. The complete list is given in Table 1. Time is reported on x-axis, in accord with the notation used by Johansen and Sornette [1]. y-axis reports the value of each index.