

**Meeting:** 1000, Albuquerque, New Mexico, SS 4A, Special Session on Financial Mathematics: The Mathematics of Derivative Securities

1000-90-15            **Anders Johansen\*** ([anders-johansen@get2net.dk](mailto:anders-johansen@get2net.dk)), Telgardsvej 119, 3050 Humlebaek, Denmark. *Origin of Crashes in 3 US stock markets: Shocks and Bubbles.*

This paper presents an exclusive classification of the largest crashes in Dow Jones Industrial Average (DJIA), SP500 and NASDAQ in the past century. Crashes are objectively defined as the top-rank filtered drawdowns (loss from the last local maximum to the next local minimum disregarding noise fluctuations), where the size of the filter is determined by the historical volatility of the index. It is shown that *all* crashes can be linked to either an external shock, *e.g.*, outbreak of war, *or* a log-periodic power law (LPPL) bubble with an empirically well-defined complex value of the exponent. Conversely, with one sole exception *all* previously identified LPPL bubbles are followed by a top-rank drawdown. As a consequence, the analysis presented suggest a one-to-one correspondence between market crashes defined as top-rank filtered drawdowns on one hand and surprising news and LPPL bubbles on the other. We attribute this correspondence to the Efficient Market Hypothesis effective on two quite different time scales depending on whether the market instability the crash represent is internally or externally generated. (Received June 14, 2004)