Abstract

The driving forces behind cryptoassets' price dynamics are often perceived as being dominated by speculative factors and inherent bubble-bust episodes. Fundamental components are believed to have a weak, if any, role in the price-formation process. This study examines five cryptoassets with different backgrounds, namely Bitcoin, Ethereum, Litecoin, XRP, and Dogecoin between 2016 and 2022. It utilizes the cusp catastrophe model to connect the fundamental and speculative drivers with possible price bifurcation characteristics of market collapse events. The findings show that the price and return dynamics of all the studied assets, except for Dogecoin, emerge from complex interactions between fundamental and speculative components, including episodes of price bifurcations. Bitcoin shows the strongest fundamentals, with on-chain activity and economic factors driving the fundamental part of the dynamics. Investor attention and off-chain activity drive the speculative component for all studied assets. Among the fundamental drivers, the analyzed cryptoassets present their coin-specific factors, which can be tracked to their protocol specifics and are economically sound.

Keywords: Cryptocurrency, Bitcoin, Cusp catastrophe model, Crash

JEL Classification: C52, G12

Catastrophe modeling

2 languages

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From Wikipedia, the free encyclopedia

This article refers to the use of computers to estimate losses caused by disasters. For other meanings of the word catastrophe, including catastrophe theory in mathematics, see catastrophe (disambiguation).

Catastrophe modeling [1] (also known as **cat modeling**) is the process of using computer-assisted calculations to estimate the losses that could be sustained due to a catastrophic event such as a hurricane or earthquake. Cat modeling is especially applicable to analyzing risks in the insurance industry and is at the confluence of actuarial science, engineering, meteorology, and seismology.

Bifurcation theory

21 languages

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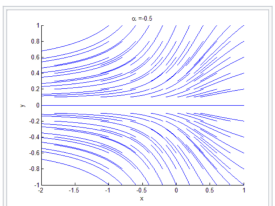
From Wikipedia, the free encyclopedia

Bifurcation theory is the mathematical study of changes in the qualitative or topological structure of a given family of curves, such as the integral curves of a family of vector fields, and the solutions of a family of differential equations. Most commonly applied to the mathematical study of dynamical systems, a **bifurcation** occurs when a small smooth change made to the parameter values (the bifurcation parameters) of a system causes a sudden 'qualitative' or topological change in its behavior.[1] Bifurcations occur in both continuous systems (described by ordinary, delay or partial differential equations) and discrete systems (described by maps).

The name "bifurcation" was first introduced by Henri Poincaré in 1885 in the first paper in mathematics showing such a behavior.[2] Henri Poincaré also later named various types of stationary points and classified them with motif.[clarify]



Phase portrait showing saddle-node bifurcation

Wavelet Coherence a bi-variate framework used to study the interaction between different time series and their evolution over a continuous time and frequency space. In comparison to the wavelet correlation analysis, wavelet coherence can effectively identify regions of high co-movement in the time–frequency space.

The cusp catastrophe model is an innovative approach for investigating a phenomenon that consists of both continuous and discrete changes in one modeling framework. However, its application to empirical health and behavior data has been hindered by the complexity in data-model fit. 13. 10. 2017

CHECK - ZEEMAN 1974 ! + CRITICISM
BARUNIK & VOSVRDA 2009

← CUSP CATASTROPHE MODEL

Realized variance

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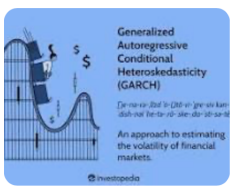
Realized variance or **realised variance** (RV, see spelling differences) is the sum of squared returns. For instance the RV can be the sum of squared daily returns for a particular month, which would yield a measure of price variation over this month. More commonly, the realized variance is computed as the sum of squared intraday returns for a particular day.

The realized variance is useful because it provides a relatively accurate measure of volatility[1] which is useful for many purposes, including volatility forecasting and forecast evaluation.

GARCH is a statistical model that can be used to analyze a number of different types of financial data, for instance, macroeconomic data. Financial institutions typically use this model to estimate the volatility of returns for stocks, bonds, and market indices.



Garman Klass Volatility

Garman Klass is a volatility estimator that incorporates open, low, high, and close prices of a security.

Garman-Klass volatility extends Parkinson's volatility by taking into account the opening and closing price. As markets are most active during the opening and closing of a trading session, it makes volatility estimation more accurate.

Garman and Klass also assumed that the process of price change is a process of continuous diffusion (geometric Brownian motion). However, this assumption has several drawbacks. The method is not robust for opening jumps in price and trend movements.

Despite its drawbacks, the Garman-Klass estimator is still more effective than the basic formula since it takes into account not only the price at the beginning and end of the time interval but also intraday price extremums.

Researchers Rogers and Satchel have proposed a more efficient method for assessing historical volatility that takes into account price trends. See Rogers-Satchell Volatility for more detail.

Garman-Klass Volatility Formu

$$\sigma_{GK} = \sqrt{\frac{1}{2T}\sum_{t=1}^{T}\ln\left(\frac{h_t}{l_t}\right)^2 - \frac{2\ln 2 - 1}{T}\ln\left(\frac{c_t}{o_t}\right)^2}$$

Where:

T — Number of days in the sample period

o_t — Open price on day t

h_t — High price on day t

l_t — Low price on day t

c_t — Close price on day t

DATABASES -> DATA DESIGN

Crypto Fear & Greed Index

Each day, we analyze emotions and sentiments from different sources and crunch them into one simple number: The Fear & Greed Index for Bitcoin and other large cryptocurrencies.

The main difference between proof of work and proof of stake is that proof of stake relies on crypto staking, while proof of work relies on crypto mining. These methods add new "blocks" of transactions to the historical record, and both provide a way for users to earn additional crypto.

10. 2. 2023