Maximum Drawdown of a Brownian Motion

R Project for Statistical Computing

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Abstract

if $\hat{X}$(t) is a random process on [0,T], the maximum drawdown in defined as the largest drop from a peak to a bottom.This paper investigates the behavior of this statistic for a Brownian motion with drift. In particular, it gives an ∞ series representation of its distribution, and consider its expected value. When the drift is zero, it gives an analytic expression for the expected value, and for non-zero drift, it gives an ∞ series representation.For all cases, we compute the limiting T tends to ∞ behavior, which can be logarithmic (μ greater than 0), square root (μ equal to 0), or linear (μ less than 0).

1 Background

The maximum drawdown is a commonly used in finance as a measure of risk for a stock that follows a particular random process. Here we consider the maximum drawdown of a Brownian motion.

2 Usage

In this example we use edhec database, to compute true Hedge Fund Returns.

```
> library(PerformanceAnalytics)
> data(edhec)
> table.EMaxDDGBM(edhec)
```

```
                      Convertible Arbitrage CTA Global Distressed Securities
Annual Returns in %                  7.7020     7.6711                9.7510
Std Devetions in %                   2.0047     2.5131                1.8348
Expected Drawdown in %               1.7083     2.5086                1.2412
                      Emerging Markets Equity Market Neutral Event Driven
```

Annual Returns in %	9.3612	7.3936	9.3190
Std Devetions in %	3.8571	0.9006	1.8350
Expected Drawdown in %	4.4855	0.4418	1.2828

	Fixed Income Arbitrage	Global Macro	Long/Short Equity
Annual Returns in %	5.0675	9.4208	9.4015
Std Devetions in %	1.4171	1.7020	2.2174
Expected Drawdown in %	1.2693	1.1179	1.7631

	Merger Arbitrage	Relative Value	Short Selling
Annual Returns in %	8.3721	8.2317	3.2654
Std Devetions in %	1.1168	1.3195	5.5099
Expected Drawdown in %	0.5866	0.7941	14.0675

	Funds of Funds
Annual Returns in %	7.1270
Std Devetions in %	1.8212
Expected Drawdown in %	1.5320