GLM Smoothing Index

R Project for Statistical Computing

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Abstract

The returns to hedge funds and other alternative investments are often highly serially correlated.Gemanstsy,Lo and Markov propose an econometric model of return smoothingand develop estimators for the smoothing profile.The magnitude of impact is measured by the smoothing index, which is a measure of concentration of weight in lagged terms.

1 Background

To quantify the impact of all of these possible sources of serial correlation, denote by R_t,the true economic return of a hedge fund in period t; and let R_t satisfy the following linear single factor model:

$$R_t = \mu + \beta\delta_t + \xi_t \tag{1}$$

Where $\xi_t, \sim N(0,1)$ and $\text{Var}[R_t] = \sigma^{\ 2}$

True returns represent the flow of information that would determine the equilibrium value of the fund's securities in a frictionless market. However, true economic returns are not observed. Instead, R_t^0 denotes the reported or observed return in period t; and let

$$R_t^0 = \theta_0 R_t + \theta_1 R_{t-1} + \theta_2 R_{t-2} + \cdots + \theta_k R_{t-k} \tag{2}$$

$$\theta_j \epsilon [0,1] where : j = 0, 1, \cdots, k \tag{3}$$

and

$$\theta_1 + \theta_2 + \theta_3 \cdots + \theta_k = 1 \tag{4}$$

which is a weighted average of the fund's true returns over the most recent k + 1 periods, including the current period.

2 Smoothing Index

A useful summary statistic for measuringthe concentration of weights is :

$$\xi = \sum_{j=0}^{k} \theta_j^2 \tag{5}$$

This measure is well known in the industrial organization literature as the Herfindahl index, a measure of the concentration of firms in a given industry where θ_j represents the market share of firm j. Becaus ξ_t is confined to the unit interval, and is minimized when all the θ_j 's are identical, which implies a value of 1/k+1 for ξ_i ; and is maximized when one coefficient is 1 and the rest are 0. In the context of smoothed returns, a lower value of implies more smoothing, and the upper bound of 1 implies no smoothing, hence we shall refer to θ_j as a "**smoothingindex**".

3 Usage

In this example we use edhec database, to compute Smoothing Index for Hedge Fund Returns.

```
> library(PerformanceAnalytics)
> data(edhec)
> GLMSmoothIndex(edhec)

                 Convertible Arbitrage CTA Global Distressed Securities
GLM Smooth Index             0.3487825  0.1866095             0.3187229
                 Emerging Markets Equity Market Neutral Event Driven
GLM Smooth Index        0.3022908              0.2046973    0.3580198
                 Fixed Income Arbitrage Global Macro Long/Short Equity
GLM Smooth Index              0.3090088     0.252546          0.277132
                 Merger Arbitrage Relative Value Short Selling Funds of Funds
GLM Smooth Index        0.2292355      0.2917355     0.2348319      0.2873716
```