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Introduction

Numerous academic studies have shown the existence of a momentum effect in stock performance. That is, stock performance tends to trend over time. The top performing stocks in one period tend to be the top performers in the subsequent period and under performing stocks in one period tend to underperform in the subsequent period. This observation has led a number of academics to use a momentum factor in addition to a value/growth orientation factor and a size factor as systematic risk factors as sources of stock and stock portfolio returns.

Morningstar has been scoring stocks on a monthly basis on value/growth orientation and size since the 1990s, with a major revision to its methodology implemented in 2002. In recognition of the significance of the momentum effect, Morningstar now also scores each stock’s past performance each month to form a momentum score.

Morningstar products will gradually release the momentum score for US equities in early November 2010. Momentum calculation for US open-end funds, closed-end funds and exchange-traded funds which invest in US equities will follow. Morningstar is currently working on updating the Morningstar regions classification in order to introduce the momentum score for US open-end funds, closed-end funds and exchange-traded funds that invest in non-US equities or a combination of US and non-US equities and non-US domiciled funds.
Calculate Six-Month Returns

From monthly total returns Morningstar calculates 6-month returns for each stock. Let

\[ N(t) = \text{the number of stocks for which Morningstar has complete total return data over months t-5 through t} \]

\[ R1(i,t) = \text{the 1-month return on stock i over month t in decimal form (13% is 0.13)} \]

\[ R6(i,t) = \text{the 6-month return on stock i over the 6 months ending month t in decimal form} \]

\[ R6(i,t) = \left( 1 + R1(i,t-5) \right) \left( 1 + R1(i,t-4) \right) \ldots \left( 1 + R1(i,t) \right) - 1 \]

Calculate Return Scores

Each month Morningstar calculates a return score for each stock based on these 6-month returns. The scores are based on percentile ranks spaced by float-adjusted market capitalization. The scores are spaced using market capitalization so that the micro-cap stocks do not dominate the scoring scale. Let

\[ V(i,t) = \text{the float-adjusted market capitalization of stock i at the end of month t} \]

\[ p(j,t) = \text{the position of the jth stock in ascending order by month t 6-month returns} \]

\[ CV(j,t) = \text{the cumulative float adjusted market-capitalization of stocks of the first j stocks sorted by month t 6-month returns} \]

\[ RS(i,t) = \text{the return score of stock i for month t} \]

By the definition of \( p \),

\[ R6(p(1,t)) \leq R6(p(2,t)) \leq \ldots \leq R6(p(N(t)),t) \]
Methodology

We calculate $CV(j,t)$ as follows:

$$CV(j,t) = \sum_{k=1}^{j} V(p(k,t), t)$$

Return scores are assigned as follows:

$$RS(p(j,t), t) = \frac{CV(j,t)}{CV(N(t), t)}$$

Note that each return score is a number between 0 and 1.

**Momentum Scores**

The momentum score of stock $i$ for month $t$, $MS(i,t)$, is simply the average of its return scores of the 6 months ending in month $t$:

$$MS(i,t) = \frac{RS(i,t-5) + RS(i,t-4) + \ldots + RS(i,t)}{6}$$

Note that the momentum score can only be calculated for stocks that have return scores for the previous 6 months. Since it is an average of return scores, which are between 0 and 1, it is also a number between 0 and 1. For display purposes, Morningstar multiples this value by 100.

The first time Morningstar calculates momentum the calculation is run for return scores for 6 months. Going forward after the close of each month Morningstar calculates the return scores for the current month-end on each stock. Morningstar uses a combination of the return scores for the current-month and the return scores from the prior 5 months to calculate a new set of momentum scores.