

Domestic and International Factor Construction

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We estimate the international version of the Carhart (1997) four-factor model. For each country, we construct a domestic and international version of the four factors: the market factor (MKT), the size factor (SML), the book-to-market factor (HML) and the momentum factor (MOM). The factor construction is based on monthly stock returns in U.S. dollars from Datastream.

For the U.S. factors, we use the data posted on Kenneth R. French's website.¹ For international data obtained from Datastream, we screen and exclude non-common stocks such as REITs, closed-end funds, warrants, etc. We also exclude those firms that are incorporated outside their home countries as well as those indicated by Datastream as duplicates. To filter out the recording errors in Datastream, we assign missing values to R_t and R_{t-1} if $(1+R_t)(1+R_{t-1}) < 0.5$ and at least one of them is greater than or equal to 300%. R_t is the stock return in month t . In addition, in view of Datastream's practice to set the return index to a constant once a stock ceases trading, we treat those constant values as missing values in the inactive file.

In the first step we determine domestic factors for each country. The domestic market factor is given by the excess return in U.S. dollars of the country's equity index return over the U.S. treasury bill rate. We calculate country indexes returns using MSCI country market indices obtained from Datastream. For the size and book-to-market factors we follow a methodology similar to Fama and French (1993). All stocks reporting a market capitalization at the end of June and a positive book-to-market ratio are double sorted into two size groups and three book-to-market classifications. Half the stocks are classified as large-cap (B) and the other half as small-cap (S). For the book-to-market classification, the bottom 30% of firms are classified as L , the middle 40% as M , and the highest 30% as H . The intersection of the rankings allows for six value-weighted portfolios: HB , MB , LB , HS , MS , and LS . Formally, we define

$$SMB = \frac{1}{3}(HS + MS + LS) - \frac{1}{3}(HB + MB + LB)$$
$$HML = \frac{1}{2}(HB + HS) - \frac{1}{2}(LB + LS).$$

¹Please see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

The monthly returns for *SMB* and *HML* are then calculated from July in one year to June in the next. The momentum factor (*MOM*) is constructed on a monthly basis, where we rank stocks at the end of month $t - 1$ based on their cumulative returns from $t - 13$ to $t - 2$ (i.e., prior 2–12 month returns by skipping month $t - 1$) and market value at the end of $t - 1$. Stock inclusion in the portfolio construction requires non-missing values for the cumulative return and market value. For the market-cap classification, half of the stocks are again classified as large-cap (*B*) and the other half as small-cap (*S*). For the past returns classification, the bottom 30% are classified as *LR* (low return), the middle 40% as *MR*, and the highest 30% as *HR*. The momentum factor is defined as

$$MOM = \frac{1}{2}(SHR + BHR) - \frac{1}{2}(SLR + BLR).$$

If a country has fewer than 100 stocks qualifying for the portfolio construction, we set *SMB*, *HML*, and *MOM* factors as missing for the respective year.

A country’s international factors are calculated in a second step as the weighted average of the respective domestic factors of all other countries, where the weights are given by the relative stock market capitalization of each foreign country at the beginning of the year. The stock market capitalization data are obtained from World Development Indicator.

0.1 SAS and STATA Variable Definitions

MktRf_Dom, SMB_Dom, HML_Dom, and MOM_Dom refer to the domestic market factor and the SMB, HML, and MOM factors, respectively. MktRf_Int, SMB_Int, HML_Int, and MOM_Int are the international factors. Rf_Dom and Rf_Int are the one-month U.S. treasury bill rate.

References

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