THE FAMA-FRENCH THREE FACTOR MODEL

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Last update (última actualización): 11/ 10 / 2017

The Fama-French portfolios are based on the company´s size as measured by:

- The market value of its Equity
  - o The total dollar market value of all of a company´s outstanding shares:
    - Company´s current stock price * number of outstanding shares

- The company´s book-to-market ratio (B/M)
  - o Used to find the value of a company by comparing the book value of a firm to its market value.

$$Book\ to\ market = \frac{Book\ value}{Market\ value}$$

  - Book value= Calculated by looking at the firm´s historical cost or accounting value. (Total Assets – Intangible Assets and liabilities)
  - Market value= Market capitalization

Stocks with high B/M ratios have higher returns. Small companies have higher returns.

The SML should have three factors rather than just one as in the CAPM (the beta):

1. The stock´s CAPM beta: measures the market risk of the stock.
2. The size of the company: measured by the market value pf its Equity (MVE)
3. The book-to-market (B/M) ratio

Using these 3 factors Fama and French in 1993 developed their **Fama-French three factor model**:

- 1st factor: Market Risk Premium= Market Return (RM) – Risk-free Rate (RF)
- 2nd factor: Ranking all actively traded stocks **by size** and then divided them into two portfolios:
  - o One consisting of small stocks
  - o One consisting of big stocks

  They calculated the return on each of these two portfolios and created a third portfolio by subtracting the return on the big portfolio from that of the small one. They called this the SMB (small minus big) portfolio.

  SMB is designed to measure the variation in stock returns caused by the size effect.
- 3rd factor: Ranking all stocks according to their book-to-market (B/M) ratios..
  - o H portfolio; the 30% of stocks with the highest ratios.
  - o L portfolio; the 30% of stocks with the lowest ratios.

  Then, they subtracted the return on the L portfolio from that of the H portfolio to derive the HML (High minus Low) portfolio.

The resulting model;

$$(\bar{r}_{i,t} - \bar{r}_{RF,t}) = a_i + b_i(\bar{r}_{M,t} - \bar{r}_{RF,t}) + c_i(\bar{r}_{SMB,t}) + d_i(\bar{r}_{HML,t}) + e_{i,t}$$

where,

$$\bar{r}_{i,t} = \text{Historical(realized)rate of return on Stock i in period t.}$$

$$\bar{r}_{RF,t} = \text{Historical(realized)rate of return on the risk-free rate in period t.}$$

$$\bar{r}_{M,t} = \text{Historical(realized)rate of return on the market in period t.}$$

$$\bar{r}_{SMB,t} = \text{Historical (realized) rate of return on the small-size portfolio minus the big-size portfolio in period t.}$$

$$\bar{r}_{HML,t} = \text{Historical (realized) rate of return on the high-B/M portfolio minus the low-B/M portfolio in period t.}$$

$$a_i = \text{Vertical axis intercept term for Stock i.}$$

$$b_i, c_i, \text{ and } d_i = \text{Slope coefficients for Stock i.}$$

$$e_{i,t} = \text{Random error, reflecting the difference between the actual return on Stock i in period t and the return as predicted by the regression line.}$$

The model is very useful in identifying the market´s reaction to news about a company.

We can use the Fama-French model to decompose the actual return of the company on the announcement day into the portion that is explained by the environment and the portion due to the company´s announcement.

$$\bar{r}_{i,t} = a_i + b_i\bar{r}_{M,t} + c_i\bar{r}_{M,t} + d_i\bar{r}_{HML,t} + e_{i,t}$$

==!!!This is an open research, so progressively this document will be updated.==

The bibliography used has been the following one:

- Corporate Finance: A Focused Approach. 6 Edition. 2015
- The Cross-Section of Expected Stock Returns. Fama and French. The journal of Finance. 1992.
- Common Risk Factors in the Returns on Stocks and Bonds. Fama and French. Journal of Financial Economics. 1993