Beta Suite

WRDS Research Team, November 2016
Updated: August 2021

Overview:

WRDS Beta Suite is a powerful web based tool allowing researchers to calculate stocks' loading on various risk factors in a timely way. The tool is designed with flexibly in mind, capable of handling monthly, weekly and daily rolling regression on common set of market risk factors.

Methodology:

Frequency of Study

The Beta Suite allows users the flexibility of different frequency of study and choices of risk models. More specifically, users can choose one of the three return frequencies:

- Daily
- Weekly
- Monthly

Risk Models

Risk models for regression can be chosen from the following four specifications:

- Scholes Williams Beta (only for daily frequency)

  We follow the methodology described in Scholes and Williams (1977) and estimate the β_{SW} as the following[1]:

$$\beta_{SW,i} = \frac{\sum(\ln(1+r_{i,t}) \times mr3_t) - (\frac{1}{n_i}) \times \sum \ln(1+r_{i,t}) \times \sum mr3_t}{\sum(ln(1+mr_t) \times mr3_t) - (\frac{1}{n_i}) \times \sum \ln(1+mr_t) \times \sum mr3_t}$$

  Where

  - mr_t = value weighted market return on day *t*
  - $mr3_t = \ln(1+mr_{t-1}) + \ln(1+mr_t) + \ln(1+mr_{t+1})$
  - $r_{i,t}$= daily return of stock *i* on day *t*
  - n_i=number of non-missing returns for stock *i* during the year

[1] Discussion can also be found at http://www.crsp.com/products/documentation/crsp-calculations

- CAPM Market Model

  $r_{i,t} - rf_t = \alpha_i + \beta_i(mktrf_t - rf_t) + \varepsilon_{i,t}$

  Where

  - $r_{i,t}$= stock *i* return during period *t*
  - $mktrf_t$= Fama French Excess Rerturn on the Market during period *t*

- Fama French 3 Factor Model (*mktrf, smb, hml*)

  $r_{i,t} - rf_t = \alpha_i + \beta_{i,mkt}(mktrf_t - rf_t) + \beta_{i,smb}SMB_t + \beta_{i,hml}HML_t + \varepsilon_{i,t}$

  Where

  - $r_{i,t}$= stock *i* return during period *t*
  - $mktrf_t$= Fama French Excess Rerturn on the Market during period *t*
  - SMB_t= Fama French Small Minus Big (Size) factor during period *t*
  - HML_t= Fama French High Minus Low (Value) factor during period *t*

- Fama French & Carhart 4 Factor Model (*mktrf, smb, hml, umd*)

  $r_{i,t} - rf_t = \alpha_i + \beta_{i,mkt}(mktrf_t - rf_t) + \beta_{i,smb}SMB_t + \beta_{i,hml}HML_t + \beta_{i,umd}UMD_t + \varepsilon_{i,t}$

  Where

  - $r_{i,t}$= stock *i* return during period *t*
  - $mktrf_t$= Fama French Excess Rerturn on the Market during period *t*
  - SMB_t= Fama French Small Minus Big (Size) factor during period *t*
  - HML_t= Fama French High Minus Low (Value) factor during period *t*
  - UMD_t= Carhart Up Minus Down (Momentum) factor during period *t*

Estimation and Minimum Window

Users can specify the length of the *Estimation Window* used for the regression. For example, if monthly frequency is selected, user can specify a rolling 60-month estimation window by entering number 60.

Minimum Window can also be customized by user. For example, in a monthly frequency regression, if one wants to include results where minimum 36 months of valid returns are present, the researcher can enter number 36 in the minimum window field.

Idiosyncratic and Total Volatility

Idiosyncratic Volatility (IVOL) is calculated based on the methodology described in Ang et al. (2006). It is the volatility of the difference between realized returns and expected returns (based on respective risk models, such as FF3).

Total Volatility (TVOL) is calculated straightforwardly as the volatility of the realized returns of the underlying security.

Reference:

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