# Barra China Equity Model (CNE5)

## Descriptor Details

## September 2013

The ten style factors of CNE5 comprise a total of 21 descriptors. This document defines these descriptors and their weights in the style factors. The descriptors are listed under the style factors to which they belong.

Style: **Beta**

Definition: 1.00 BETA

Components: BETA

Beta (β)

Computed as the slope coefficient in a time-series regression of excess stock return, $\boldsymbol{r_t - r_{ft}}$ , against the cap-weighted excess return of the estimation universe $\boldsymbol{R_t}$,

$$\boldsymbol{r_t - r_{ft} = \alpha + \beta R_t + e_t} \qquad (1)$$

The regression coefficients are estimated over the trailing 252 trading days of returns with a half-life of 63 trading days.

Style: **Momentum**

Definition: 1.00 RSTR

Components: RSTR

Relative strength

Computed as the sum of excess log returns over the trailing $T = 504$ trading days with a lag of $L = 21$ trading days,

$$\boldsymbol{RSTR = \sum_{t=L}^{T+L} w_t\left[ln(1 + r_t) - ln\left(1 + r_{ft}\right)\right]} \ , \qquad (2)$$

where, $\boldsymbol{r_t}$ is the stock return on day $t$, $\boldsymbol{r_{ft}}$ is the risk-free return, and $\boldsymbol{w_t}$ is an exponential weight with a half-life of 126 trading days.

Style: **Size**

Definition: 1.00 LNCAP

Components: LNCAP

Natural log of market cap

Computed by the logarithm of the total market capitalization of the firm.

Style: **Earnings Yield**

Definition: 0.68 · EPIBS + 0.11 · ETOP + 0.21 · CETOP

Components:

EPIBS — Analyst Predicted Earnings-to-Price
Earnings-to-price ratio forecasted by analysts.

ETOP — Trailing earnings-to-price ratio
Computed by dividing the trailing 12-month earnings by the current market capitalization. Trailing earnings are defined as the last reported fiscal-year earnings plus the difference between current interim figure and the comparative interim figure from the previous year.

CETOP — Cash earnings-to-price ratio
Computed by dividing the trailing 12-month cash earnings divided by current price.

Style: **Residual Volatility**

Definition: 0.74· DASTD + 0.16 · CMRA + 0.10 · HSIGMA

Components:

DASTD — Daily standard deviation
Computed as the volatility of daily excess returns over the past 252 trading days with a half-life of 42 trading days.

CMRA — Cumulative range
This descriptor differentiates stocks that have experienced wide swings over the last 12 months from those that have traded within a narrow range. Let $\boldsymbol{Z(T)}$ be the cumulative excess log return over the past $T$ months, with each month defined as the previous 21 trading days,

$$\boldsymbol{Z(T) = \sum_{\tau=1}^{T}\left[ln(1+r_{\tau}) - ln\left(1+r_{f\tau}\right)\right]}, \quad (3)$$

where, $\boldsymbol{r_{\tau}}$ is the stock return for month τ (compounded over 21 days) and $\boldsymbol{r_{f\tau}}$ is the risk-free return. The cumulative range is given by,

$$\boldsymbol{CMRA = Z_{max} - Z_{min}}, \quad (4)$$

where, $\boldsymbol{Z_{max} = max\{Z(T)\}}$,
$\boldsymbol{Z_{min} = min\{Z(T)\}}$
$T = 1,\ldots,12$

HSIGMA — Historical sigma (σ)
Computed as the volatility of residual returns in Equation 1,

$$\boldsymbol{\sigma = std(e_t)}. \quad (5)$$

The volatility is estimated over the trailing 252 trading days of returns with a half-life of 63 trading days.
**Note**: The Residual Volatility factor is orthogonalized to Beta to reduce collinearity.

Style: **Growth**

Definition: 0.47 · SGRO + 0.24 · EGRO +0.18 · EGIBS + 0.11 · EGIBS_s

Components:

SGRO — Sales growth (trailing five years)
Annual reported sales per share are regressed against time over the past five fiscal years. The slope coefficient is then divided by the average annual sales per share to obtain the sales growth.

EGRO — Earnings growth (trailing five years)
Annual reported earnings per share are regressed against time over the past five fiscal years. The slope coefficient is then divided by the average annual earnings per share to obtain the earnings growth.

EGIBS — Long-term Predicted Earnings Growth
Long-term earnings growth forecasted by analysts.

EGIBS_s — Short-term Predicted Earnings Growth
Short-term earnings growth forecasted by analysts.

Style: **Book-to-Price**

Definition: 1.00 · BTOP

Components:

BTOP — Book-to-Price
Last reported book value of common equity divided by current market capitalization.

Style: **Leverage**

Definition: 0.38 · MLEV + 0.35 · DTOA + 0.27 · BLEV

Components:

MLEV — Market leverage
Computed as,

$$\boldsymbol{MLEV} = \frac{\boldsymbol{ME}+\boldsymbol{PE}+\boldsymbol{LD}}{\boldsymbol{ME}}, \quad (6)$$

where, $\boldsymbol{ME}$ is the market value of common equity on the last trading day, $\boldsymbol{PE}$ is the most recent book value of preferred equity, and $\boldsymbol{LD}$ is the most recent book value of long-term debt.

DTOA — Debt-to-assets
Computed as,

$$\boldsymbol{DTOA} = \frac{\boldsymbol{TD}}{\boldsymbol{TA}}, \quad (7)$$

where, $\boldsymbol{TD}$ is the book value of total debt (long-term debt and current liabilities) and $\boldsymbol{TA}$ is most recent book value of total assets.

BLEV — Book leverage
Computed as

$$\boldsymbol{BLEV} = \frac{\boldsymbol{BE}+\boldsymbol{PE}+\boldsymbol{LD}}{\boldsymbol{BE}}, \quad (8)$$

where, $\boldsymbol{BE}$ is the most recent book value of common equity, $\boldsymbol{PE}$ is the most recent book value of preferred equity, and $\boldsymbol{LD}$ is the most recent book value of long-term debt.

Style: **Liquidity**

Definition: 0.35 · STOM + 0.35 · STOQ + 0.30 · STOA

Components:

STOM — Share turnover, one month

Computed as the log of the sum of daily turnover during the previous 21 trading days,

$$\boldsymbol{STOM} = \mathbf{ln}\left(\sum_{t=1}^{21}\frac{V_t}{S_t}\right), \quad (9)$$

where, is $\boldsymbol{V_t}$ the trading volume on day $\boldsymbol{t}$ and $\boldsymbol{S_t}$ is the number of shares outstanding.

STOQ — Average share turnover, trailing 3 months

Let $\boldsymbol{STOM_\tau}$ be the share turnover for month $\boldsymbol{\tau}$, with each month consisting of 21 trading days. The quarterly share turnover is defined by,

$$\boldsymbol{STOQ} = \mathbf{ln}\left(\frac{1}{T}\sum_{\tau=1}^{T}\mathbf{exp}\left(\boldsymbol{STOM_\tau}\right)\right), \quad (10)$$

where, T = 3 months.

STOA — Average share turnover, trailing 12 months

Let $\boldsymbol{STOM_\tau}$ be the share turnover for month $\boldsymbol{\tau}$, with each month consisting of 21 trading days. The annual share turnover is defined by,

$$\boldsymbol{STOA} = \mathbf{ln}\left(\frac{1}{T}\sum_{\tau=1}^{T}\mathbf{exp}\left(\boldsymbol{STOM_\tau}\right)\right), \quad (11)$$

where, T = 12 months.

Style: **Non-linear Size**

Definition: 1.00 · NLSIZE

Components:

NLSIZE — Cube of Size

First, the standardized Size exposure (i.e., log of market cap) is cubed. The resulting factor is then orthogonalized to the Size factor on a regression-weighted basis. Finally, the factor is winsorized and standardized.

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[1] *As of September 30, 2012, as published by eVestment, Lipper and Bloomberg on January 31, 2013*

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