PM 0002

Name: 12-Month Active Return with One-month Lag

Formula:

$$\frac{Close_{i,-1}}{Close_{i,-13}} - \frac{Index_{-1}}{Index_{-13}}$$

Close is stock *i* month end closing price (FT Interactive Data).

Index is the S&P 500 Index month end closing price (FT Interactive Data).

Interpretation:

This factor measures the one-month lagged twelve-month market-adjusted return on a stock. The intuition is that a stock that has outperformed the S&P 500 over the last 12 months should continue to outperform. There have been many academic studies showing positive price momentum strategies over a medium term horizon (3-12 months) are good predictors of future returns. Empirically, this factor shows a strong predictive value, especially in the 6-month holding period.

HG 0025

Name: 3-year Growth in Trailing 12-Month Earnings per Share

Formula:

$$\frac{\sum_{t=1}^{4} EPSQ_{i,t-4}}{\sum_{t=1}^{4} EPSQ_{i,t-16}} - 1$$

Here, the denominator must be positive. Otherwise, the observation will be excluded.

EPSQ is the quarterly diluted earnings per share before extra items. If it is not available, the quarterly basic earnings per share before extra items is used.

Interpretation:

This factor measures the 3-year percentage change in EPS. EPS is the most well known factor used in stock valuation; therefore, we would expect companies that have been successful growing EPS in the past year will continue to provide strong EPS growth leading to strong future stock performance.

HG 0001

Name: 3-Year Compound Sales per Share Growth

Formula:

$$\sqrt[3]{\left(\frac{(\sum_{t=1}^{4} SalesQ_{i,t-4}) / (\frac{1}{4} \times \sum_{t=1}^{4} SharesQ_{i,t-4})}{(\sum_{t=1}^{4} SalesQ_{i,t-16}) / (\frac{1}{4} \times \sum_{t=1}^{4} SharesQ_{i,t-16})}\right)} - 1$$

SalesQ is the quarterly total revenue.

SharesQ is the quarterly number of total common shares outstanding.

Interpretation:

This factor measures the 3-year compound annual growth rate of sales. A high sales growth rate is a primary value driver and a barometer of potential earnings growth. Stocks with high revenue growth rate have a visible track record.

Rel5Y 0007

Name: 5-year Relative Forward Earnings-to-Price

Formula:

$$\frac{FWDEP_{i,0} - \frac{1}{60} \times \sum_{t=1}^{60} FWDEP_{i,t-60}}{\sqrt{\frac{60 \times \sum_{t=1}^{60} (FWDEP_{i,t-60})^2 - (\sum_{t=1}^{60} FWDEP_{i,t-60})^2}{60 \times (60-1)}}}$$

Where,

$$FWDEP_{i,0} = \frac{\sum_{m=1}^{4} QEPSEst_{i,m}}{Close_{i,0}}$$

QEPSEst is the consensus IBES® quarterly earnings forecasts for current fiscal quarter and next three fiscal quarters.

Close is the monthly stock closing price.

Interpretation:

This factor measures a company's forward E/P ratio relative to its 60-month average scaled by standard deviation of the forward E/P ratio. Intuition is that a company with a high factor value may be undervalued compared to its historical forward E/P. Additionally, companies with stable ratios will score highly in this factor due to scaling by the standard deviation.

LRS 0027

Name: Stock Return Volatility

Formula:

$$\sqrt{\frac{60\times\sum_{t=1}^{60}\left(\frac{Close_{i,t-60}}{Close_{i,t-61}}\right)^2-\left(\sum_{t=1}^{60}\frac{Close_{i,t-60}}{Close_{i,t-61}}\right)^2}{60\times(60-2)}}$$

Close is stock i's month end closing price (FT Interactive Data).

Interpretation:

Standard deviation of the distribution of stock returns is a widely used way to gauge a stock's investment risk. The higher the return volatility, the higher investment risk.

PM 0009

Name: 60-Month Alpha

Formula:

Step 1: Define the independent variable X and the dependent variable Y:

$$X_{i,t} = \frac{Index_{t-60}}{Index_{t-61}}, \quad Y_{i,t} = \frac{Close_{i,t-60}}{Close_{i,t-61}}$$

Close is stock *i* month end closing price (FT Interactive Data).

Index is the S&P 500 Index month end closing price (FT Interactive Data).

Step 2: Calculate the slope ($Slope_{i,0}$) of stock *i* in last 60-month period:

$$Slope_{i,0} = \frac{60 \times \sum_{t=1}^{60}(X_t \times Y_{i,t}) - (\sum_{t=1}^{60} X_t) \times (\sum_{t=1}^{60} Y_{i,t})}{60 \times \sum_{t=1}^{60}(X_t)^2 - (\sum_{t=1}^{60} X_t)^2}$$

Step 3: Calculate the mean of X and Y in the same 60-month period separately:

$$\overline{X}_0 = \frac{1}{60} \times \sum_{t=1}^{60} X_t \ \ \& \ \ \overline{Y}_{i,0} = \frac{1}{60} \times \sum_{t=1}^{60} Y_{i,t}$$

Step 4: Calculate the intercept (α) of stock i in the same 60-month period:

$$\alpha_{i,0} = \overline{Y}_{i,0} - Slope_{i,0} \times \overline{X}_0$$

Interpretation:

The 60-month alpha measures the amount by which a stock has outperformed or underperformed the market on a risk-adjusted (Beta) basis. There have been many academic studies showing that over a period of 3-5 years, momentum strategies tend to show a price reversal relationship, especially when held for at least one year. This factor clearly demonstrates that stocks that have outperformed the market over the trailing 5 years tend to underperform going forward, while stocks that have underperformed the last 5 years tend to outperform the market going forward.

EQ 0007

Name: Accounting Accruals

Formula:

$$\frac{\sum_{t=1}^{4} IBQ_{i,t-4} - \sum_{t=1}^{4} OCFQ_{i,t-4}}{AssetsQ_{i,-4}}$$

IBQ is the quarterly income before extra items.

OCFQ is the quarterly cash flow from operations. Since it reflects year-to-date figure, it is adjusted in the calculation.

ATQ is the quarterly reported total assets.

Interpretation:

Large positive accruals indicate that earnings are much higher than the cash flows generated by the firm. The difference arises as a result of a relative slowdown in business conditions or a book-keeping mischief. (Because of accounting conventions as to when, and how much, revenues and costs are recognized). A lower accrual ratio indicates a higher earnings quality.

DV 0014

Name: Book-to-Market

Formula:

$$\frac{BVEquity_{i,0} / SharesQ_{i,0}}{Close_{i,0}}$$

BVEquity is the latest book value of the common equity.

Close is the stock closing price.

SharesQ is the quarterly number of common shares outstanding.

Interpretation:

Conventional wisdom suggests that the book-to-price ratio (B/M) is one of the most straightforward and effective investment factors. Book value is from the value of the common equity from accounting perspective while the price is the market valuation. A favorite of strict value investors, the B/M ratio gives some idea of whether you're paying a little or a lot for what would be left of the company if it went out of business immediately. Value firms have higher book-to-market ratios than growth firms. In their well-known three factors model, Fama and French suggest that the B/M ratio is a proxy for risk.

LRS 0008

Name: Current Ratio

Formula:

$$\frac{CurAst_{i,0}}{CurLia_{i,0}}$$

CurAst is the quarterly reported total current assets.

CurLia is the quarterly reported total liabilities.

Interpretation:

The current ratio is the best-known ratio in determining short-term financial strength. It indicates the number of times that current assets will pay off current liabilities, Ratios, which greatly exceed the acceptable range, may indicate that the company is not aggressive enough in putting current assets to work, or the possibility of hidden financial problem.

LRS 0056

Name: Total Debt to Total Assets

Formula:

$$\frac{Debt_{i,0}}{Assets_{i,0}}$$

Debt is the quarterly reported total debt.

Assets is the quarterly reported total assets.

Interpretation:

The ratio is an alternative measure of firm's leverage. It allows the inclusion of negative equity firms, which are often eliminated from universe or classified as low leverage firms in traditional leverage measures. Higher debt-to-assets ratio suggests higher firm leverage.

LRS 0054

Name: Dividend Coverage Ratio

Formula:

$$\frac{\sum_{t=1}^{4} CoreEPS_{i,t-4}}{DIV_{i,0}}$$

CoreEPS is stock *i*'s quarterly earnings from operations;

DIV is stock *i*'s most recent indicated annual dividends;

Interpretation:

A comparison of earnings and dividend payout to see whether the company has enough money coming in to cover what goes out to shareholders. Dividend coverage should be ample; a company earning barely enough to cover its dividend, or even less than the dividend it pays, will sooner or later have to cut its dividend. At the very least, dividend increases are impossible, and management's flexibility with respect to reinvestment and other issues is limited.

EM 0020

Name: Most Recent Earnings Surprise

Formula:

$$\frac{EPSAct_{i,0} - EPSEst_{i,0}}{StdevEPSEst_{i,0}}$$

$EPSAct_{i,0}$ is the most recent actual quarterly earnings per share tracked by I/B/E/S®, $EPSEst_{i,0}$ and $StdevEPSEst_{i,0}$ represent the mean estimate and the standard deviation of individual analysts' forecasts for the same fiscal period.

Interpretation:

It measures the earnings surprise in terms of the number of standard deviations it is above or below the consensus earnings estimate. That is, the greater the positive ratio the greater the earnings surprise above the earnings estimate while the smaller the negative ratio the greater the earnings surprise below the earnings estimate. There's no earnings surprise when the ratio equals zero; the actual earnings per share is in line with the consensus earnings estimate. Positive or negative earnings surprises are associated with higher or lower returns.

MQ 0027

Name: Free Cash Flow Return Invested Capital

Formula:

$$\frac{\sum_{t=1}^{4}\left(OCFQ_{i,t-4} - CapExQ_{i,t-4} - DivQ_{i,t-4}\right)}{\sum_{t=1}^{4} InCapQ_{i,t-4}}$$

OCFQ is the quarterly operating cash flow. Since it reflects year-to-date data, it is adjusted in the calculation.

CapExQ is the quarterly capital expenditures. Since it reflects year-to-date data, it is adjusted in the calculation.

DivQ is the quarterly cash dividends.

InCapQ is the quarterly reported invested capital.

Interpretation:

It allows an investor to look through the various accounting choices that a company can make to portray earnings. As most accounting regimes are rich in balance sheet accruals, this factor is able to identify the real economic return a company generates. The premise behind backing out capital expenditures and dividends is that these are optional and therefore should be set aside to see how much income a company is really generating. The dividend could always be suspended, after all, and even capital intensive firms can usually limp along for awhile on reduced capital outlays. The goal is the same as with cash flow: to look behind the smoke and mirrors sometimes associated with net income.

DV 0006

Name: Leading 12-Month Mean Earnings Yield

Formula:

$$\frac{\sum_{t=1}^{4} QEPSEst_{i,t}}{Close_{i,0}}$$

QEPSEst is the consensus IBES® quarterly earnings forecasts for current fiscal quarter and next three fiscal quarters.

Close is the stock closing price.

Interpretation:

This factor examines the relationship between the next 12-month earnings estimates and stock prices. As all previously disclosed earnings figures should be priced into the stock, future returns should be linked to future earnings. Investors are usually forward-looking in the sense that they want to know how a company will do in the future. Companies expected to grow and have higher earnings in the future should have a lower earnings yield than companies in decline.

DV 0005

Name: Forward Free Cash Flow to Price

Formula:

$$\frac{\frac{1}{4}\times\sum_{t=1}^{4}(SharesQ_{i,t-4})\times\sum_{t=1}^{4}(QEPSEst_{i,t})+\sum_{t=1}^{4}(DPQ_{i,t-4})-\sum_{t=1}^{4}(CapExQ_{i,t-4})}{\frac{1}{4}\times\sum_{t=1}^{4}(SharesQ_{i,t-4})\times Close_{i,0}}$$

SharesQ is the quarterly number of common shares outstanding.

DPQ is quarterly depreciation expenses.

CapExQ is quarterly capital expenditure. Since it reflects year-to-date figure, it is adjusted in the calculation.

Close is the stock closing price.

QEPSEst is the consensus IBES® earnings forecast for current fiscal quarter and next fiscal three fiscal quarters.

Interpretation:

Free cash flow per share (FCF) attempts to determine the cash flow that will be generated that is available for discretionary use by management. This free cash flow could be used to pay debt or distributed to shareholders. Depreciation is added in to approximate cash flow while capital expenditure is subtracted as discretionary investment in the company by management. We would expect companies with relatively high levels of FCF per share to price to have relatively high future performance, as they are generating cash that could be distributed to shareholders.

LRS 0064

Name: Implied Volatility

Formula:

$$\frac{PutVol_{i,t} + CallVol_{i,t}}{2}$$

Where

PutVol is the Black-Scholes implied volatility of the put option on stock i with strike price nearest to the current stock price and the nearest expiration date.

CallVol is the Black-Scholes implied volatility of the call option on stock i with strike price nearest to the current stock price and the nearest expiration date.

Interpretation:

The volatility measures derived from option prices are often used to proxy for stock's forward-looking risks. This factor calculates the Black-Scholes implied volatility from the nearest-to-expiration at-the-money put and call options. The results indicate that higher volatility stocks earned higher subsequent returns. It is consistent with the risk-reward theory that there is a premium for bearing higher expected risk.

RV 0003

Name: Current Industry Relative Trailing 12-Month Free Cash Flow-to-Price

Formula:

$$\frac{TTMFCFP_{i,0} - \frac{1}{n} \times \sum_{i=1}^{n} TTMFCFP_{i,0}}{\sqrt{\frac{n \times \sum_{i=1}^{n} (TTMFCFP_{i,0})^2 - (\sum_{i=1}^{n} TTMFCFP_{i,0})^2}{n \times (n-1)}}}$$

Here,

n is the total number of stocks within an industry in a certain test universe (Russell 1000/Russell 2000/Russell 3000/QSG 3000).

$$TTMFCFP_{i,0} = \frac{\sum_{m=1}^{4} \left(OCFQ_{i,m-4} - CapExQ_{i,m-4} - DivQ_{i,m-4} \right)}{Close_{i,0} \times \frac{1}{4} \times \sum_{m=1}^{4} SharesQ_{i,m-4}}$$

OCFQ is the quarterly operating cash flow. Since it reflects year-to-date data, it is adjusted in the calculation.

CapExQ is the quarterly capital expenditures. Since it reflects year-to-date data, it is adjusted in the calculation.

DivQ is the quarterly cash dividends.

Close is the monthly stock closing price.

SharesQ is the quarterly number of common shares outstanding.

Interpretation:

This factor measures a stock's current free cash flow-to-price ratio less the industry mean free cash flow-to-price ratio scaled by the standard deviation of the industry FCFP ratios. Stocks with a high factor value provide more free cash flow per dollar invested than the industry mean. Additionally, a stock with a greater ratio in an industry with relatively low standard deviation will stand out as exceptional. Therefore, we expect high factor values to lead to superior future returns.

DV 0007

Name: Indicated Dividend Yield

Formula:

$$\frac{DVIQ_{i,0}}{Close_{i,0}}$$

DVIQ is the quarterly indicated annual dividends.

Close is the stock closing price.

Interpretation:

The amount of indicated dividends represents the applicable quarterly dividends per share (determined by ex-dividend date) multiplied by 4. Dividends provide the easiest way to establish a value for a stock, as dividends provide a quarterly cash flow (theoretically in perpetuity), which can be discounted to current time t=0. Compared to the historical trailing 12-month dividend yield, the indicated dividend yield is a better indicator to reflect the future. It is much more common for dividend paying companies to raise or keep current dividend amount level than to cut it. A high dividend yield can support stock price and reduce the uncertainty of future cash return. Dividend payout policy is up to company management. Smaller-capitalization stocks tend to have higher yields.

EM 0007

Name: I/B/E/S® Long-term Growth Rate Estimates

Formula:

LTG

LTG is the I/B/E/S® Long-Term Growth Rate Forecast.

Interpretation:

This is the mean operating earnings growth rate estimated by I/B/E/S® analysts over the next full business cycle. Growth rate provides a robust view of a stock's longer term earnings expectations. Longer forecasts are often used to justify the high multiples of earnings some-times commanded by growth stocks. This also provides insight into extrapolation of past growth trends. Higher premiums are paid for 'growth' stocks, built on the rationale that a dollar of retained earnings in a firm with greater opportunities to invest at higher rates has a higher perceived investment value. One clear finding of the recent research is that long-term forecasts are both upward biased and extreme; that is, the higher a growth forecast is, the more upward biased it tends to be [Dechow and Sloan (1997), Rajan and Servaes (1997)]. If the weight placed on these forecasts overreaches the ability of analysts (and perhaps anyone else) to predict long-run performance, one would expect them to be contrary indicators of future stock performance.

LRS 0019

Name: Natural Logarithm of Market Capitalization

Formula:

$$Ln((Shares_{i,0} \times Close_{i,0})^3)$$

LN() returns the natural logarithm of a number. Natural logarithms are based on the constant e (2.71828182845904).

Close is the close price.

Shares is the number shares outstanding.

Interpretation:

Some studies have shown that small-cap firms (capitalization) tend to outperform because they bear more risk.

PM 0039

Name: Put-Call Ratio

Formula:

$$\frac{\sum_{x=-3}^{3} PutOpenInt_{i,x,t}}{\sum_{x=-3}^{3} CallOpenInt_{i,x,t}}$$

PutOpenInt is the open interest in a put option contract for stock i at time t given strike price of x, where 0 is the at-the-money strike price

CallOpenInt is the open interest in a call option contract for stock i at time t given strike price of x, where 0 is the at-the-money strike price

Interpretation:

Many academics and market technicians believe that truly well informed traders will trade on information in the options market rather than the underlying equity market. Reasons for this supposition are abundant, including the inherent leverage in the options market as well as the absence of the "up-tick" rule when taking what is essentially a short position. This factor measures the open interest in the 7 nearest to the money put and call contracts, with the assumption that an open position in a put (call) implies a negative (positive) outlook for a stock.

HG 0049

Name: Reinvestment Rate

Formula:

$$\frac{\sum_{t=1}^{4}\left(EPSQ_{i,t-4} - DIVQ_{i,t-4}\right)}{\sum_{t=1}^{4}(BVEquity_{i,t-4}) / (\frac{1}{4} \times \sum_{t=1}^{4} SharesQ_{i,t-4})}$$

EPSQ is the quarterly reported diluted earnings per share before extra items. If the item is not available, the basic earnings per share before extra items is used.

DIVQ is the quarterly dividends per share by ex-dividend date.

BVEquity is the quarterly reported book value of common equity.

SharesQ is the quarterly reported total number of common shares outstanding.

Interpretation:

Rate of reinvestment is used to discriminate 'growth' companies that provide higher rates of returns on invested capital but reinvest earnings to generate internal growth rather than returning capital to shareholders. It is generally considered sound corporate policy, usually in the interest of shareholders, to retain an appropriate amount of an average year's earnings to finance internally, strengthen liquidity, invest in infrastructure and product expansion, prepare for "rainy days" and maintain dividend rate in low earnings years. If the firm has good prospects, we would expect a high reinvestment rate.

MQ 0016

Name: Return on Equity

Formula:

$$\frac{\sum_{t=1}^{4} IBQ_{i,t-4}}{\frac{1}{4} \times \sum_{t=1}^{4} EquityQ_{i,t-4}}$$

IBQ is the quarterly income before extra items.

EquityQ is the quarterly total equity.

Interpretation:

It is a widely used measure of how well a company is performing for its shareholders. It's a relatively straightforward benchmark that is easy to calculate, works for the great majority of industries, and allows investors to compare the company's use of its equity with other investments.

Return on Equity will to a certain degree; demonstrate the efficiency of the company's management of assets, the ability to meet competitive challenges and implement a pricing strategy, the ability to weather credit market conditions and to instill an overall financial policy and the ability to take advantage of fiscal incentives.

Additionally, it also captures the effects of financial leverage, i.e., returns on shareholder's investment after costs (which is fixed in many cases) of debt financing have been deducted. High ROE stocks are visible 'quality' stocks and sometimes trade on high multiples.

EM 0003

Name: Street Revision Magnitude

Formula:

$$\frac{MedianFY1EPSEst_{i,0} - MedianFY1EPSEst_{i,-3}}{MeanFY1EPSEst_{i,0}}$$

$MedianFY1EPSEst_{i,0}$ is current median I/B/E/S® earnings forecast for fiscal year 1.

$MedianFY1EPSEst_{i,-3}$ is the median I/B/E/S® earnings forecast for same fiscal year three months ago.

$MeanFY1EPSEst_{i,0}$ is current mean I/B/E/S® earnings forecast for fiscal year 1. If this mean estimate is negative, the observation will be excluded.

Interpretation:

This factor measures the consensus change in fiscal year 1 earnings estimates scaled by current mean EPS estimates, that is, the size of the typical revision. Using the change in median estimates can mitigate the impact of outliers. This factor identifies companies that analysts believe will deliver stronger earnings in the next fiscal year, which should lead to superior returns. Alternatively, this factor also identifies companies that analysts believe will miss previous earnings targets, leading to underperformance. Frequency of estimate revisions and magnitude of variation from mean estimates will increase in volatile macro environments.