Global Quantitative Monitor

Factor definitions and methodology

Equities

Global
Quantitative

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The factors and the methodology used to track their performances
This document describes all the factors available daily in the UBS's Quantitative Database as well as the methodology used to derive the factor scores and track performances.

US Factors
In the US the database includes all the stocks available in the latest CRSP release starting in 1926. Corporate actions, shares, prices and returns are sourced from CRSP. Factors that use accounting items are based on data from Compustat and are computed from the end of 1974 onwards (we use quarterly accounting data). Factors that use forecasts are based on data from I/B/E/S and are computed from 1981 onwards (we aggregate the data using single analyst forecasts).

Global Factors
Outside of the US we compute factor values for all the companies that are included in the Dow Jones Global Index starting in 1990. The accounting data is sourced from Worldscope. Pricing data is provided by Thomson Reuters (TQA). Forecasts are based on data provided by I/B/E/S (we aggregate the data using single analyst forecasts). US companies included in the Dow Jones Global Index will have factor values based on both datasets (US and Global).

Factor scores and portfolios
The methodology used to build the factor scores and the portfolios is described from page 23 onwards. Please note that we use a sector adjusted approach and that the portfolios are constructed using the companies that have scores falling in the top and bottom thirds of their sector (equal weighted, rebalanced monthly).

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Accounting based factors

Growth factors

Asset growth (ASSG)

Annual growth (%) in total assets using the latest quarterly data (we use the latest annual report if quarterly data is not available)

Compustat items used: AT

AT - Assets - Total

Worldscope items used: 2300

Dividend growth (DG1, DG3, DG5)

We define dividend growth as the rolling 12-month change in ordinary cash dividends (note total dividends are computed as last reported dividend per share * expected frequency of payments). Growth rate is computed using these rules:

If both the latest and the previous dividends are positive we compute the growth rate as latest dividends / previous dividends (1, 3 or 5 years earlier) minus 1.

If the latest dividends are positive and the company did not pay dividends in the previous period the growth rate is set equal to 1.

If the company stopped paying dividends the growth rate is set equal to -1.

Dividend per share growth (DGPS1, DGPS3, DGPS5)

We use the same methodology as explained above but compute the growth adjusted for changes in the number of shares. The number of shares is sourced from CRSP in the US and Datastream outside of the US.

Dividend - Net Share Issuance yield (TRUE_YIELD)

Also called true yield, it's equal to trailing dividend yield less 12 month's percentage change in adjusted numbers of shares outstanding (share issuance factor). If we cannot compute trailing dividend yield we assume zero dividends. We exclude records with a 12 months net share issuance rate above (below) 0.25 (-0.25) and a 12 months corporate action rate above (below) 0.1 (-0.1).

Earnings growth (EG1, EG3, EG5)

The growth rate is computed using the following rules:

If both latest and previous earnings are positive, growth rate is latest trailing earnings / trailing earnings (1, 3 or 5 years earlier) minus 1.

If latest earnings are positive and previous earnings are negative, growth rate is set equal to 1.

If latest earnings are negative and previous earnings are positive, growth rate is set equal to -1.

If both earnings are negative, growth rate is 1 – (latest earnings/previous earnings).

Compustat: we use item NI.

Worldscope: we use item WS1751.

Earnings per share growth (EGPS1, EGPS3, EGPS5)

We use the same methodology as explained above but compute the growth adjusted for changes in the number of shares. The number of shares is sourced from CRSP in the US and Datastream outside of the US.

Free Cash Flow – quarterly change (FCFCHGQOQ)

We compute percentage change in quarterly cash flows by subtracting cash dividends and capital expenditures from cash flow operating activities.

Compustat Free cash flow = OANCF – DV - CAPX

Worldscope Free cash flow = WS4860 – WS4551 -WS4601

Free Cash Flow – yearly change (FCFCHGYOY)

We compute the quarterly percentage change in the yearly free cash flows (based on previous 4 quarters, i.e. quarters 0 to -3 relative to quarters -1 to -4). To compute free cash flow we subtract cash dividends and capital expenditures from cash flow operating activities (we use the latest annual report if no quarterly data).

Compustat Free cash flow = OANCF – DV - CAPX

Worldscope Free cash flow = WS4860 – WS4551 – WS4601

The growth rate is computed using the following rules:

If both latest and previous cash flows are positive we compute the growth rate as (latest cash flows / previous cash flows) - 1.

If latest cash flows are positive and previous cash flows are negative, growth rate is set equal to 1.

If latest cash flows are negative and previous cash flows are positive, growth rate is set equal to -1.

If both cash flows are negative, growth rate as 1 – (latest cash flows/previous cash flows).

Sales growth (SG1, SG3, SG5)

We compute the growth rate as latest trailing sales / trailing sales (1, 3 or 5 years earlier) minus 1.

Compustat: we use item REVT.

Worldscope: we use item WS1001.

Sales per share growth (SGPS1, SGPS3, SGPS5)

We use the same methodology as explained above but compute the growth adjusted for changes in the number of shares. The number of shares is sourced from CRSP in the US and Thomson's TQA outside of the US.

Quality measures

Account receivables over sales (ACCRSALES)

We divide average account receivables at the beginning and end of period by revenues (sales).

Compustat: we use the items RECT and REVT

Worldscope: we use the items WS2051 and WS1001

Accruals based on balance sheet items (ACCR)

Accruals are defined as: (yearly change in current assets – yearly change in cash and short term investments) - (change in current liabilities - change in debt in current liabilities - change in income tax payable) – annual Depreciation and Amortization. This number is then divided by the average of total assets

Compustat: we use the items ACT, CHE, LCT, DLC, TXP, DPQ and AT

Worldscope: we use the items WS2201, WS2001, WS3101, WS3051, WS3063, WS1151 and WS2999.

Accruals based on cash flow items (ACCRCF)

Accruals are defined as the difference between Income before extraordinary Items and operating cash flows. This number is then divided by the average of total assets. When using quarterly data we use the sum the data of the previous 4 quarters.

In Compustat: we use items IB, OANCF and AT

In Worldscope: we use items .WS1551, WS4860 and WS2999

Asset Quality (ASSQUAL)

Asset quality is defined as Tangible Assets over Total Assets (or Total Assets – Intangible Assets scaled by Total Assets).

Compustat: we use items AT and INTAN (AT-INTAN)/AT

Worldscope: we use items WS2999 and WS2649

Asset turnover (ASST)

We divide total revenues by the average of total assets at the beginning and end of the period.

Compustat: REVT / Average (AT)

Worldscope: WS1001 / Average (WS2999)

Capital expenditures over depreciation, depletion and amortization (CAPEXDEPN)

Defined as capital expenditure over depreciation/depletion and amortization

Compustat: CAPX/DP

Worldscope: WS4601/WS1151

Cash Flow Interest Coverage (CFOIC)

We divide the net cash flow from operating activities by net interest payments (both from the cash flow statement).

If net interest payment is negative we assign a value of 9999 to the ratio. If cash flow from operating activities is negative and net interest payment is positive we assign a value of -9999 to the ratio.

Compustat: OANCF/INTPN

Worldscope: WS4860/WS4148

Corporate Actions (CA12,CA 36)

We compute the difference between the change in the market capitalization and the change in adjusted price. A large difference is an indicator of corporate actions (i.e. large divestitures, acquisitions etc.) We compute this value over the previous 12 and 36 months

Debt to Assets (LEVDEBT)

Debt to assets is defined as the ratio of long term debt to total assets.

Compustat: DLTT/AT

Worldscope: WS3251/WS2999

Debt to Enterprise Value (D2EV)

We sum the long and the short term debt and divide this number by the enterprise value (see definition above).

Compustat: (DLTT + DLC) / Enterprise value

Worldscope: (WS3251 + WS3051) / Enterprise value

Dividend Cover based on Free Cash Flow (DY_FCF_COVER)

We divide the trailing free cash flow yield by the trailing dividend yield (see below for a definition of these two factors).

Dividend Cover based on Earnings (DY_E_COVERY)

We divide the trailing earnings yield by the trailing dividend yield (see below for a definition of these two factors).

EBIT margin (EBITM)

We define EBIT margin as the Operating Income before depreciation divided by Revenues.

We sum the last 4 quarters to compute annual numbers. The source of the data is Compustat.

Compustat : OIADP/ REVT

Worldscope: WS1250 / WS1001

Financial leverage (FLEV)

Defined as ((Total Debt + Preference Stockholders + Minority Interest) – Cash) / Stockholders equity.

Compustat: (DLC + DLTT + PSTK + MIB-CHE) / SEQ

Worldscope: (WS3051 + WS3251 + WS3451 + WS1501 - WS2001) / WS3995

Gross profit margin (GPM)

We define gross profit margin as the difference between Revenues and Cost of Goods Sold divided by Revenues. We sum the last 4 quarters to compute annual numbers.

Compustat : (REVT – COGS) / REVT

Worldscope: (WS1001 - WS1051) / WS1001

Gross profit to Total Assets (GPAT)

We define gross profit to assets as the difference between Revenues and Cost of Goods Sold divided by the absolute value of the average of Total Assets. We sum the last 4 quarters to compute annual numbers.

Compustat : (REVT – COGS) / abs (average AT)

Worldscope: (WS1001 - WS1051) / abs (average WS2999)

Inventory turnover (IT)

We divided cost of goods sold by total inventories. Both numbers must be positive. COGS is annualized.

Compustat: COGS/INVT

Worldscope: WS1051/WS2101

Net Debt to Equity (NDE)

We divide Net Debt by Shareholders Equity.

Compustat: (DLTT+DLC–CHE) / SEQ

Worldscope: (WS3251+WS3051-WS2001) / WS3995

Net profit margin (NPM)

We define net profit margin as the Net Income divided by Revenues.

We sum the last 4 quarters to compute annual numbers. The source of the data is Compustat.

Compustat : NI / REVT

Worldscope: WS1751 / WS1001

Net Shares Issuance (ISS12, ISS36)

We compute the percentage change in the (adjusted) number of shares outstanding over the previous 12 and 36 months.

Operating leverage (OLEV)

Defined as the twelve-month change in quarterly operating income after depreciation divided by the twelve-month change in quarterly revenues.

Compustat: change in OIADP over change in REVT

Worldscope: change in WS1250 over change in WS1001.

Operating profit margin (OPM)

Operating profit margin is defined as the difference between Revenues and the sum of Cost of Goods Sold and Selling, General and Administrative Expenses divided by Revenues.

Compustat: (REVT – COGS - XSGA) / REVT

Worldscope: (WS1001 - WS1051 - WS1101) / WS1001

Quick ratio (QR)

To compute the quick ratio we first subtract inventories from current assets. We then divide this number by current liabilities. When using quarterly data we use the average over the previous 4 quarters.

Compustat: (ACT-INVT)/LCT

Worldscope: (WS2201-WS2101)/WS3101

Return on Assets (ROA)

Last four quarters of EBIT divided by average total assets (average over the last 4 quarters or during the year)

Compustat: (OIADP+NOPI+SPI+XIDO) / (average AT)

Worldscope: WS18191 / (average WS2999)

Return on common equity (ROCE)

We divide net income by average common shareholders' equity over the past 12 months.

Compustat: NI / (average CEQ)

Worldscope: WS1751 / (average WS3995)

Return on Equity (ROE)

Defined as net income over average total shareholders' equity over the past 12 months.

Compustat: NI / (average SEQ)

Worldscope: WS1751 / (average WS3995)

Return on invested capital using Net Debt (ROIC)

In the case of non-financials we compute the Net Operating Profit after Taxes and divide it by Net Debt plus Shareholders Equity.

Compustat: OIADP * (1-TXT/PI) / (DLTT+DLC–CHE+SEQ)

Worldscope: WS18191*(1-WS1451/WS1401) / (WS3251+WS3051-WS2001+ WS3995)

We don't consider taxation if Taxes and/or Pretax Income are negative.

Return on invested capital using Total Debt (ROICTD)

In the case of non-financials we compute the Net Operating Profit after Taxes and divide it by Total Debt plus Shareholders Equity.

Compustat: OIADP * (1-TXT/PI) / (DLTT+DLC +SEQ)

Worldscope: WS18191*(1-WS1451/WS1401) / (WS3251+WS3051-WS2001+ WS3995)

We don't consider taxation if Taxes and/or Pretax Income are negative.

Return on Invested Capital for Financials (ROIC_FIN)

We divide the Pretax Income by Shareholders' Equity.

Compustat: PI / SEQ

Worldscope: WS1401 / WS3995

Sales per Employee (SALESEMP)

We divide total revenues by the average number of employees. When using quarterly data we sum the revenues of the previous 4 quarters

Compustat: REVT/EMP

Worldscope: WS1001/WS7011

Valuation factors

Book to price ratio – tangible (TBTP)

We define tangible book value as total assets minus total liabilities, preferred stock and intangible assets. The tangible book value is divided by the market capitalization.

Compustat: (AT - LT - PSTK - INTAN) / Market Capitalization

Worldscope: (WS2999 - WS3351 - WS3451 - WS2649) / Market Capitalization

Book to price ratio – trailing (BTP)

Defined as shareholders equity over market capitalization.

Compustat: SEQ / Market Capitalization

Worldscope: WS3995 / Market Capitalization

Buyback yield (BBY)

We divide Purchase of Common and Preferred Stock form the cash flow statement by the market capitalization of the company.

Compustat: PRSTKC / Market Capitalization

Worldscope: WS4251 / Market Capitalization

Debt to Enterprise Value (D2EV)

We divide total debt by the enterprise value (see definition below).

Compustat: (DLTT+DLC)/ Enterprise Value

Worldscope: (WS3251+WS3051)/Enterprise Value

Dividend yield – Trailing (DY)

We use dividend data from Compustat but supplement it with dividend information from CRSP (Compustat only starts to be properly populated in 1997). Please note that total dividends are computed as the last reported DPS multiplied by the expected frequency of the dividend payments (we also include irregular dividend payments if they occur frequently).

Dividend - Net Share Issuance yield (TRUE_YIELD)

Also called true dividend yield, is equal to the trailing dividend yield (see above) minus the 12 month's percentage change in the adjusted numbers of shares outstanding (see above). If we cannot compute the trailing dividend yield we assume dividends of zero.

Trailing earnings yield before extraordinary items (EY)

We use the last 4 quarterly reported earnings (we use the income Before Extraordinary Items Adjusted for Common Stock Equivalents)

Compustat: IBADJ / Market Capitalization

Worldscope: (WS1551 - WS1701) / Market Capitalization

Earnings yield – trailing (EYPD)

We use the last 4 quarterly reported earnings (earnings are defined as net income – preferred dividends).

Compustat: (NI – DVP) / Market Capitalization

Worldscope: (WS1751 - WS1701) / Market Capitalization

Earnings yield including depreciation and amortization – trailing (NIDEPAMY)

We define this factor as the sum of net income and depreciation and amortization divided by the market capitalization of the company.

Compustat: (NI+DP)/Market Cap.

Worldscope: (WS1751+WS1151)/Market Cap.

EBIT to Enterprise Value (E2EV)

We divide operating income by the enterprise value (see definition below). When using quarterly data we sum the previous 4 quarters.

Compustat: OIADP/ Enterprise Value

Worldscope: WS1250/ Enterprise Value

Enterprise value (EV)

Defined as market capitalization + total debt – cash/near cash – capital leases + minority interest.

Compustat: Market Capitalization + DLTT + DLC + PSTK – CHE + MIB

Worldscope: Market Capitalization + WS3251 + WS3051 + WS3451 - WS2001 + WS1501

Free cash flow to Total Assets (CASHAT)

We subtract cash dividends and capital expenditures from cash flow from operating activities and divide this by average Total Assets

Compustat: FCF / Compustat AT

Worldscope: (WS4860-WS4551-WS4601) / WS2999

Free cash flow yield (FCFY)

We subtract cash dividends and capital expenditures from cash flow from operating activities and divide this by market cap.

Compustat: FCF / Market capitalization

Worldscope: (WS4860-WS4551-WS4601) / Market capitalization

Free cash flow yield (FCFYEXD)

We subtract capital expenditures from cash flow from operating activities and divide this by market cap.

Compustat: FCFEXD/ Market capitalization

Worldscope: (WS4860- WS4601) / Market capitalization

Free cash flow yield for REITS (FFOYREITS)

We divide free cash flow by the market capitalization of the company.

Compustat: we use item FFO

Worldscope: we use item WS4201

PEG ratio (PEG)

We divided the 1 year trailing PE ratio by 100 times the 1 year trailing earnings growth rate. We only compute the ratio when both measures are positive.

Sales to Enterprise Value (S2EV)

We divide the revenues by the enterprise value (see definition below). When using quarterly data we sum the previous 4 quarters.

Compustat: REVT/ Enterprise Value

Worldscope: WS1001/ Enterprise Value

Sales yield – trailing (SEY)

We use the reported revenues (previous 4 quarters or previous year).

Compustat: REVT / Market capitalization

Worldscope: WS1001 / Market capitalization

Return/Price based factors

Risk measures

Volatility

We compute the volatility using daily returns (previous 3, 6 or 12 months).

$$\sigma = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

We also compute an upside and downside volatility. When computing the upside (downside) volatility we substitute the negative (positive) daily returns with 0. We annualize the volatility estimates.

Exponentially weighted volatility

The exponentially weighted volatility is computed as:

$$\sigma = \sqrt{\sum_{t=1}^{n}(1-\lambda) \times \lambda^{t-1} \times R_t^2}$$

Where $\lambda = 0.06$ (using the latest 126 daily returns only). The resulting volatility is annualized.

Mean absolute deviation

The mean absolute deviation is computed as:

$$MAD = \frac{1}{n}\sum_{i=1}^{n}|x_i - \bar{x}|$$

Where n is the number of observed values. We use 6 months of daily returns on a rolling basis. We don't compute the MAD if we have fewer than 63 observations.

Market Beta

We compute market betas using daily returns (3, 6 or 12 months). The betas are computed against a market capitalization weighted index (we use the country index if it has at least 30 constituents otherwise we use the regional index).

We measure traditional beta, upside beta and downside beta. Upside (downside) beta is computed using only returns when the index closed up (down).

Tracking error

The tracking error is computed as:

$$TE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - m_i)^2}$$

Where m is the return of the market (benchmark). We use daily returns over the previous 3, 6 and 12 months.

Momentum measures

Price momentum

Price momentum is defined as the return (including dividend reinvestments) over the previous 3, 6 or 12 months. The 6 and 12 month price momentum signals are lagged by one month.

Short term price momentum

Price momentum is defined as the return (including dividend reinvestments) over the previous 5 days or 1 month.

Price momentum (T-Stat)

The T-Stat based price momentum signal is computed as the T-Statistic of a regression of the daily log returns of each company against time (observation number order by time). This measure will be higher in the case of companies that outperformed on a steady basis over the full formation period. The 6 and 12 month T-Stat price momentum signals are lagged by one month.

I/B/E/S based factors

12 and 24 months forward looking yields

We use the annual forecasts for the following 2 fiscal years (earnings, revenues, dividends or cash flows) and compute an estimate for the next 12 months (time weighted average). The calculation is done at the single analyst level in the currency in which the forecasts have been made.

We compute average valuation across all analysts as well as the average valuation when the top and bottom 25% valuations are excluded (i.e. trimmed average).

We use the trimmed average if it is substantially different from the simple average (robustness check).

The same process is repeated at the 24 months horizon.

(We select annual, semi-annual or quarterly forecasts depending on the frequency that allows us to compute a 12 months forecasts with the least amount of interpolation (count>5)).

Similar data based on semi-annual or quarterly forecasts is available.

12 months dispersion of analysts' forecasts

We compute forecast yield for the next 12 months (see above). We then measure coefficient of variation of estimated yields for each company with at least 4 valid estimates.

12 and 24 months forward sales margins

We use the forecast earnings and sales yields of each analyst (see above) to compute the expect sales (revenues) margins (earnings yield divided by sales yield). We compute the average margin expectations across all the analysts as well as the average margin expectations when the top and bottom 25% forecasts are omitted (i.e. trimmed average).

We use the trimmed average if it is substantially different from the simple average (robustness check).

The same process is repeated at the 24 months horizon.

(We select annual, semi-annual or quarterly forecasts depending on the frequency that allows us to compute a 12 months forecasts with the least amount of interpolation (count>5)).

Earnings revisions

We compute the earnings revisions scores using data from I/B/E/S. Each day we compare the earnings per share forecast for the next two fiscal years with the forecast made for the same periods 3 months, 2 months, 1 month, 2 weeks and 1 week earlier by the same analyst (we use annual forecasts only).

We only consider a change to be a revision if it's greater than 2.5%.

The earnings revision score is computed as:

$$\text{Earnings revision score} = \frac{\text{number of upgrades - number of downgrades}}{\text{number of estimates}}$$

Please note we use the estimates and revisions for year 1 and 2 jointly and do not use time-weighted averages.

Forecast Dividend Earnings Cover (FDY_E_COVER)

We divide the 12 months forecast earnings yield by the 12 months forecast dividend yield.

Forecast growth

We use I/B/E/S actuals (trailing data) to compute the 1 year trailing earnings (or revenues, cash flows, dividends). After that we compute the 12 months forecasted amount for each analyst separately. The analyst's growth rates are computed using the following rules:

If both the trailing (historic) and the forecast amounts are positive we compute the growth rate as forecast amount / trailing amount -1.

If the trailing amount is negative and the forecast amount is positive the growth rate is set equal to 1.

If the trailing amount is positive and the forecast amount is negative the growth rate is set equal to -1.

If both the trailing (historic) and the forecast amounts are negative we compute the growth rate as 1 – (forecast amount / trailing amount).

We compute the average growth rate across all the analysts (simple average) as well as an average growth rate that excluded the top and bottom 25% observations (i.e. trimmed average).

We use the trimmed average if it is substantially different from the simple average (robustness check).

Please note that both trailing (actuals) and forecast data in I/B/E/S are available at different frequencies (annual, semi-annual or quarterly). We use the frequency that allows us to use the most recent trailing data. As an example, for a company with fiscal year end in December 2013 we will be using annual data to compute the 12 months growth rate in February 2014. In May 2014 we will be using the quarterly data since it allows computing trailing data until the end of March 2014 (instead of December 2013 when using annual data).

Forecast PEG ratio (FPEG)

We divided the 12 months forward PE by 100 times the 12 months forecast earnings growth rate. We only compute the ratio when both measures are positive.

Earnings surprise measures

Earnings Announcement Return (EAR)

The EAR is defined as the difference between the return of the company in the 3 days centered on the day of the earnings announcement and the return of the benchmark during the same period.

$$\mathrm{EAR}_{i,q} = \prod_{j=t-1}^{t+1}(1+\mathrm{Return})_{\mathrm{i,j}} - \prod_{j=t-1}^{t+1}(1+\mathrm{Return\ Benchmark})_{\mathrm{j}}$$

Earnings surprises (AF_D1)

The Standardized Unexpected Earnings are computed as:

$$\mathrm{SUEAFSD}_{\mathrm{i,q}} = \frac{\mathrm{Reported\ Earnings}_{\mathrm{i,q}} \text{ - } \mathrm{Average\ Earnings\ Forecast}_{\mathrm{i,q}}}{\sigma_{\mathrm{i,q}}}$$

Where $\sigma_{\mathrm{i,q}}$ is the standard deviation of the earnings per share forecasts. Both the average earnings per share forecast (consensus) and the reported earnings are computed using data from I/B/E/S.

We select the latest forecasts made by each estimator for the relevant quarter provided that they have been made no later than 3 months before the announcement of the earnings. We exclude forecasts that are too extreme.

We also compute surprises based on forecasts made 1 and 3 months before the announcement of the earnings. The same data is available for Revenues.

Other Factors (US only)

The following factors use data obtained from Factset and are available only for the US market.

Foreign Sales:

Foreign Sales is the percentage of sales of a company outside US. It's updated annually and changes on the date at which a new year's data is available in Factset.

Short Interest Ratio:

We define the short-interest ratio as: (Short Interest Position* Price)/ (1 month rolling average daily value traded).

The short Interest Position and the Price are sourced from Factset.

The average daily value traded is computed using a one month window (unadjusted price*unadjusted volume). The data is obtained from CRSP.

Factor list

The next table lists all the factors included in the database that we also track on a daily basis. The factors are listed by category.

Figure 1: Factors and additional fields available

Category	Sub-category	Factor	Used for Financials?	Internal Code
Composite	Combination	Composite (Combination)	Yes	COMPOSITE
Composite	Growth	Growth	Yes	GROWTH
Composite	Momentum	Momentum	Yes	MOMENTUM
Composite	Quality	Quality	Yes	QUALITY
Composite	Value	Value (forward)	Yes	VALUE_FORWARD
Composite	Value	Value (trailing)	Yes	VALUE_TRAILING
Geography	Foreign Sales	Foreign Sales	No	FS
Growth	Asset Growth	Asset Growth	No	ASSG
Growth	Cash flow growth	Cash flow growth (12M)	No	CG12M
Growth	Dividend growth	Dividend growth (12M)	Yes	DG12M
Growth	Dividend growth	Dividend growth (trailing 1 year)	Yes	DG1
Growth	Dividend growth	Dividend growth (trailing 3 years)	Yes	DG3
Growth	Dividend growth	Dividend growth (trailing 5 years)	Yes	DG5
Growth	Dividend growth	Dividend growth per share (trailing 1 year)	Yes	DGPS1
Growth	Dividend growth	Dividend growth per share (trailing 3 years)	Yes	DGPS3
Growth	Dividend growth	Dividend growth per share (trailing 5 years)	Yes	DGPS5
Growth	Earnings growth	Earnings growth (12M)	Yes	EG12M
Growth	Earnings growth	Earnings growth (trailing 1 year)	Yes	EG1
Growth	Earnings growth	Earnings growth (trailing 3 years)	Yes	EG3
Growth	Earnings growth	Earnings growth (trailing 5 years)	Yes	EG5
Growth	Earnings growth	Earnings growth per share (trailing 1 year)	Yes	EGPS1
Growth	Earnings growth	Earnings growth per share (trailing 3 years)	Yes	EGPS3
Growth	Earnings growth	Earnings growth per share (trailing 5 years)	Yes	EGPS5
Growth	Free Cash Flow growth	Free cash flow growth (12M)	No	FG12M
Growth	Cash flow growth	Free cash flow growth (quarterly change in cash flow)	No	FCFCHGQOQ
Growth	Cash flow growth	Free cash flow growth (quarterly change in yearly cash flows)	No	FCFCHGYOY
Growth	Sales growth	Sales growth (12M)	No	SG12M
Growth	Revenues growth	Sales growth (trailing 1 year)	No	SG1
Growth	Revenues growth	Sales growth (trailing 3 years)	No	SG3
Growth	Revenues growth	Sales growth (trailing five years)	No	SG5
Growth	Revenues growth	Sales growth per share (trailing 1 year)	No	SGPS1
Growth	Revenues growth	Sales growth per share (trailing 3 years)	No	SGPS3
Growth	Revenues growth	Sales growth per share (trailing 5 years)	No	SGPS5
Macro	Cycle	Cyclical vs. Defensive	Yes	CYC
Momentum	Analyst earnings surprise	Analyst Surprise (D1)	Yes	AS_D1
Momentum	Cash flow momentum	Cash flow revisions (1W)	No	REV_C_1M
Momentum	Cash flow momentum	Cash flow revisions (3M)	No	REV_C_3M

Category	Sub-category	Factor	Used for Financials?	Internal Code
Momentum	Dividend momentum	Dividends revisions (1W)	Yes	REV_D_1M
Momentum	Dividend momentum	Dividends revisions (3M)	Yes	REV_D_3M
Momentum	Analyst earnings surprise	Earnings Announcement Return	Yes	EAR
Momentum	Earnings momentum	Earnings revisions (1M)	Yes	REV_1M
Momentum	Earnings momentum	Earnings revisions (3M)	Yes	REV_3M
Momentum	Price momentum	Price momentum (1-0)	Yes	PRICEMOMENTUM_1M
Momentum	Price momentum	Price momentum (12-1)	Yes	PRICEMOMENTUM_12M
Momentum	Price momentum	Price momentum (12-1, T-Stat)	Yes	PMTSTAT_12M
Momentum	Price momentum	Price momentum (3-0)	Yes	PRICEMOMENTUM_3M
Momentum	Price momentum	Price momentum (5D-0)	Yes	PRICEMOMENTUM_5D
Momentum	Price momentum	Price momentum (6-1)	Yes	PRICEMOMENTUM_6M
Momentum	Price momentum	Price momentum (6-1, T-Stat)	Yes	PMTSTAT_6M
Momentum	Sales momentum	Sales revisions (1W)	No	REV_S_1M
Momentum	Sales momentum	Sales revisions (3M)	No	REV_S_3M
Momentum	Short Interest	Short Interest	Yes	SIR
Quality	Other	Account receivables over sales	No	ACCRSALES
Quality	Earnings quality	Accruals	No	ACCR
Quality	Earnings quality	Accruals based on cash flow items	No	ACCRCF
Quality	Balance sheet	Asset Quality	No	ASSQUAL
Quality	Other	Asset turnover	No	ASST
Quality	Capex and Depreciation	CAPEX over Depreciation	No	CAPEXDEPN
Quality	CV earnings yield	CV earnings yield (12M)	Yes	CV_EY12M
Quality	Solvency	Cash Flow Interest Coverage	No	CFOIC
Quality	Balance sheet	Cash to Total Assets	No	CASHAT
Quality	Leverage	Debt over Total Asset	No	LEVDEBT
Quality	Leverage	Debt to EV	No	D2EV
Quality	Dividend quality	Dividend Earnings Cover	Yes	DY_E_COVER
Quality	Dividend quality	Dividend Free Cash Flow Cover	No	DY_FCF_COVER
Quality	Profitability	EBIT to Revenues	Yes	EBITM
Quality	Leverage	Financial Leverage	No	FLEV
Quality	Dividend quality	Forecast Dividend Earnings Cover	Yes	FDY_E_COVER
Quality	Profitability	Forward margins (12M)	No	MG12M
Quality	Profitability	Gross Profit to Total Assets	Yes	GPAT
Quality	Profitability	Gross profit margins	No	GPM
Quality	Other	Inventory turnover	No	IT
Quality	Leverage	Net Debt to Equity	No	NDE
Quality	Profitability	Net profit margin	No	NPM
Quality	Earnings quality	Operating leverage	No	OLEV
Quality	Profitability	Operating profit margin	No	OPM
Quality	Solvency	Quick ratio	No	QR
Quality	Profitability	Return on Invested Capital	No	ROIC
Quality	Profitability	Return on Invested Capital (Using Total Debt)	No	ROICTD

Category	Sub-category	Factor	Used for Financials?	Internal Code
Quality	Profitability	Return on assets	Yes	ROA
Quality	Profitability	Return on common equity	Yes	ROCE
Quality	Profitability	Return on equity	Yes	ROE
Quality	Other	Sales per Employee	No	SALESEMP
Quality	Share Issuance	Share Issuance controlled for CA (12M)	Yes	ISSUANCE12
Quality	Share Issuance	Share Issuance controlled for CA (36M)	Yes	ISSUANCE36
Risk	Market risk	Beta 12 months	Yes	BETA_12M
Risk	Market risk	Beta 3 months	Yes	BETA_3M
Risk	Market risk	Beta 6 months	Yes	BETA_6M
Risk	Market risk	Downside Volatility12 months	Yes	VOLDN_12M
Risk	Market risk	Exponential volatility	Yes	VOLEXP
Risk	Market risk	Tracking error 12 months	Yes	TE_12M
Risk	Market risk	Upside Volatility 12 months	Yes	VOLUP_12M
Risk	Market risk	Volatility 12 months	Yes	VOL_12M
Risk	Market risk	Volatility 3 months	Yes	VOL_3M
Risk	Market risk	Volatility 6 months	Yes	VOL_6M
Size	SIZE	Market Capitalization	Yes	MCAP
Value	Book value yield	Book to price ratio	Yes	BTP
Value	Buyback Yield	Buyback Yield	No	BBY
Value	Cash flow yield	Cash flow yield (12M)	No	CY12M
Value	Dividend yield	Dividend yield (12M)	Yes	DY12M
Value	Dividend	Dividend yield (trailing)	Yes	DY
Value	Dividend	Dividend yield minus share issuance	Yes	TRUE_YIELD
Value	Earnings yield	EBIT to EV	No	E2EV
Value	EBIT yield	EBIT yield (12M)	No	EBITY12M
Value	EBITDA Per Share yield	EBITDA Per Share yield (12M)	No	EBITDAPSY12M
Value	EBITDA yield	EBITDA yield (12M)	No	EBITDAY12M
Value	Earnings yield	Earnings yield (12M)	Yes	EY12M
Value	Earnings yield	Earnings yield (trailing)	Yes	EY
Value	Earnings yield	Earnings yield (trailing, net income - pref. divs.)	Yes	EYPD
Value	Cash Flow yield	Free cash flow yield	No	FCFYEXD
Value	Free Cash Flow yield	Free cash flow yield (12M)	No	FCFY12M
Value	Cash Flow yield	Free cash flow yield (after dividend payments)	No	FCFY
Value	FFO yield (REITS)	Funds from operations yield (REITS)	No	FFOYREITS
Value	GARP	PEG ratio (1 year trailing)	Yes	PEG
Value	GARP	PEG ratio (based on 12M forecasts)	Yes	FPEG
Value	Revenues yield	Sales Yield (trailing)	No	SEY
Value	Revenues yield (EV)	Sales to EV (trailing)	No	S2EV
Value	Sales yield	Sales yield (12M)	No	SY12M
Value	Book value yield	Tangible Book To Price	No	TBTP
Value	Earnings yield	Trailing earnings yield including depreciation and amortization	No	NIDEPAMY

Source: UBS Quantitative Research

Building the factor portfolios

To build the factor portfolios we follow a four step procedure described below.

Step 1: The choice of universe

Largest 1000, 500 or 300 companies

The default universe used in our research is composed of the largest 1000 companies in the US (according to CRSP, ETFs and Trusts are excluded), the largest 500 stocks in Europe, the largest 500 stocks in Asia Pacific ex. Japan, the largest 500 stocks in Emerging Markets and the largest 300 companies in Japan.

Outside of the US we use the constituents of the Dow Jones World Index.

Europe

We define Europe as the aggregation of all the Dow Jones World stocks listed in Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Asia Pacific ex. Japan

Asia Pacific ex. Japan includes the stocks listed in Australia, China, Hong Kong, India, Indonesia, Malaysia, New Zealand, Philippines, Republic Of Korea, Singapore, Taiwan and Thailand.

Emerging Markets

Emerging Markets is composed of Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Republic Of Korea, Russia, South Africa, Taiwan, Thailand and Turkey.

Step 2: From factor values to scores

A sector adjusted methodology

The factor values are transformed into sector adjusted scores (we use 10 sectors based on the GICS sector classification)[1].

The sector scores are computed using percentile rankings; all the companies in the sector are ranked based on their factor values. We then divide the rank of each company by the number of records in its sector (we subtract 1 from both the numerator and denominator to have scores that range between 0 and 1)[2].

$$\text{Score Company} = \frac{\text{Factor rank of the company - 1}}{\text{Number of companies in the sector - 1}}$$

An easy to understand and replicate methodology

This methodology yields results that are comparable to what is obtained using Z-Scores (normalization of the scores within sectors based on the assumption that factor values are normally distributed) while being, in our opinion, much more robust.

We don't use risk models

The use of sector adjusted scores allows us to build portfolios with very limited sector exposures without using risk models and optimizers (and therefore avoiding the corresponding lack of transparency).

[1] We use an algorithm to estimate the sector classifications before the introduction of the GICS classification in 1999. More details are available upon request.
[2] Previous research suggest that not paying a dividend is not the same as paying a very small dividend, as such we prefer to exclude non dividend paying companies from the scoring process.

We prefer a sector adjusted methodology since it allows users to separate the factor and sector allocation decisions. Historical simulations also suggest that avoiding large sector skews would have resulted in better risk-adjusted returns for most factors.

Why sector adjusted?

Step 3: Composite factors

The single factor scores are also combined to build composite factors.

Composite value

The composite value score of each company is calculated using the earnings yield, the dividend yield and the book to price factor scores.

We first sum the three single (sector adjusted) factor scores of each company.

Companies that miss a factor score are assigned a default score of 0.5 (i.e. a score that is close to the median score). Similarly, companies that don't pay dividends are assigned a dividend score of 0.5. Companies must have at least two out of the three value scores to receive a composite value score.

Earnings yield, Book to Price and Dividend yield

Once we have computed the sums of the three single factor scores, we rank all the companies based on these aggregate scores within their sector and compute percentile ranking. The resulting composite value scores range between 0 and 1.

We track the returns of two value composites, one based on 1-year trailing data and the other built using 12 months forecast based earnings and dividend yields.

Trailing and forward

Composite growth

We define growth as the equal weighted combination of the 1 year trailing and the 12 month forward earnings growth rates.

Composite momentum

The composite momentum score is based on the 12 month price momentum and the 3 month earnings revisions scores described earlier.

Composite momentum= price momentum + earnings revisions

The methodology remains the same; we first sum both scores (we assign a default score of 0.5 to the missing values) and then compute intra-sector percentile rankings.

Composite quality

The composite quality score is based on the gross profit margin, the return on invested capital and the 12 months volatility scores.

Composite quality= gross profit margin + return on invested capital + stock price volatility

Please note that the volatility score is inverted (since a high volatility is a sign of low quality).

Also important, gross profits scores are not computed in the case of Financials (all Financials are assigned a default gross profit margin score of 0.5). The ROIC definition used for Financials is different (see page 9).

The composite quality score is computed summing the three single factor scores and computing the percentile ranking of each company in its sector. Once more, missing factor scores are given a value of 0.5. We require each company to have at least 2 of the 3 factor scores.

Combination (composite)

We combine value (trailing), quality and momentum to create a fifth composite factor. This factor can be interpreted as a naïve approximation of what many quantitative equity funds are doing.

A naïve approximation of common quantitative equity strategies

The methodology remains the same; we sum the value (trailing), quality and momentum composite scores of each company. After that we compute the intra-sector percentile rankings.

Step 4: From scores to portfolios

We build the factor baskets (portfolios) by equally weighting the companies with the best and worst sector-adjusted scores (top and bottom thirds).

Monthly rebalancing

The rebalancing is done monthly (last trading day of the month) using factor values that would have been available the previous business day.

Thirds, equal weighted

Using thirds results in US portfolios with approximately 333 positions on the long and 333 positions on the short side (approximately because there might be some companies for which we cannot establish a factor score).

50 Longs and 50 shorts is a valid alternative

Admittedly, almost 700 companies could be too much to trade. Our experience suggests that as long as we have 50 companies on each side of the portfolio most of the stock specific risk (idiosyncratic risk) is diversified away. The performance of factor baskets based on the top and bottom 50 stocks can be seen in our weekly publications as well as in our Excel based tools.

Alternative methodologies are available upon request

Several other portfolios (e.g. market capitalization based, deciles etc.) are available upon request.

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12-Month Rating	Definition	Coverage[1]	IB Services[2]
Buy	FSR is > 6% above the MRA.	47%	37%
Neutral	FSR is between -6% and 6% of the MRA.	42%	32%
Sell	FSR is > 6% below the MRA.	11%	21%
Short-Term Rating	**Definition**	**Coverage[3]**	**IB Services[4]**
Buy	Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%
Sell	Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%

Source: UBS. Rating allocations are as of 31 December 2014.
1:Percentage of companies under coverage globally within the 12-month rating category. 2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.
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