# Quantitative Monographs
## What happened to Value, and when will it return?

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**"We live in a world where Value isn't working"… don't we?**

Wherever you look, whoever you ask – returns to Value have been poor in recent years. Recently we wrote about how Demographics will lead to lower growth rates in the future – it will be hard to see how we achieve an upward re-rating in valuation multiples in this environment.

**Free Cash Flow is the potential to pay dividends**

Dividend Yield has been king of the Value factors since the 2008 financial crisis. In light of what we know about future growth rates we have investigated several multi-period valuation models that use free cash flow to equity forecasts. We have taken this approach because free cash flow is indicative of the potential to pay dividends and discounted free cash flow to equity valuation serves as a parsimonious framework to remove the impact of accruals on earning power and to estimate intrinsic value.

**A better mousetrap…**

The success of a Value strategy depends greatly on how the factor is defined – those of a defensive nature, that focus on the ability of firms to generate and distribute cash to shareholders, are likely to do well going forward.

**… that works in the current environment**

Whilst the returns are not stellar, Free Cash Flow yield is still delivering returns for investors and importantly we believe will continue to do well. Based on our results, we suggest combining Free Cash Flow valuation models with a quality filter and a qualitative overlay to avoid value traps.

**Figure 1: Value factors - rank correlation with subsequent returns (Asia ex Japan ex Financials, 12m horizon)**
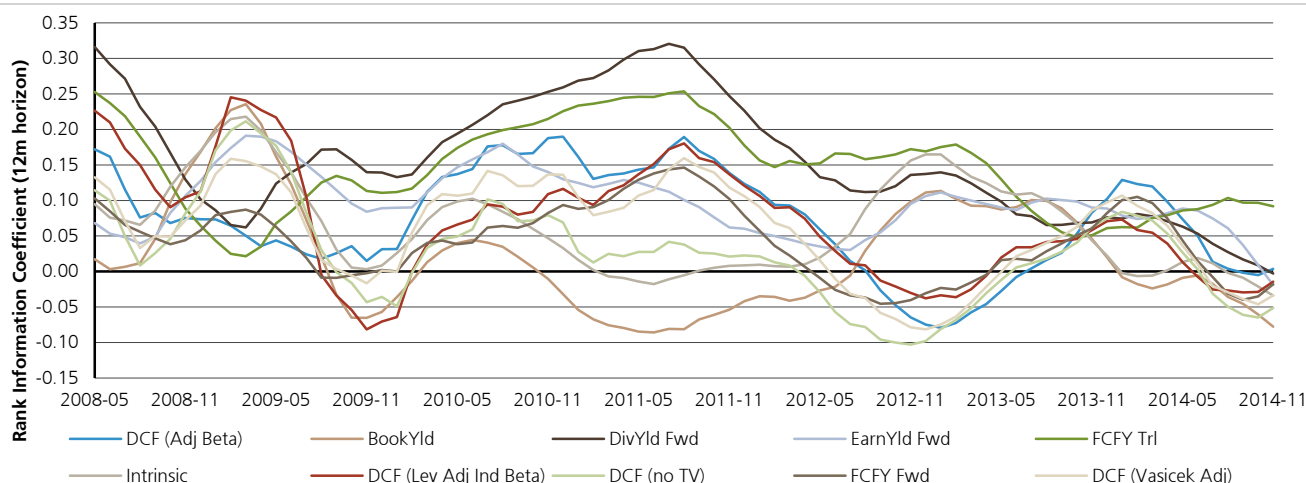


Source: UBS Quantitative Database. A Rank IC > 0 indicates a positive relationship between valuation and future return at that point. The chart shows the 6-months rolling average IC through time to ease interpretation. The universe is DJ Asia ex Japan, ex Financials.

# Executive Summary

Many times in recent weeks conversations have turned to the subject of Value:

- What has happened to Value?

- Why isn't it working?

- When will it start working again?

These questions are of pivotal concern to quantitative investors, whose models almost always have some Value component – one of the oldest but perhaps still most confusing risk factors. In this note we review the recent performance of Value and consider why it seems to have stopped working, when it might return and whether all Value factors are affected equally.

Academic research tells us that investors preference is for simple valuation heuristics such as valuation multiples – these have performed very poorly in recent years. Whilst Value still has positive information content in Europe and Asia, the performance of Value factors is generally flat at best: Value still carries information, but it is a weaker driver of future returns than it has been over past years.

**Investors still prefer simple valuation heuristics such as earnings multiples**

Our recent note on [Demographics](#) highlighted our view that growth rates are slowing. As a result we believe that wide spread upward re-ratings in valuation multiples due to higher earnings growth are less likely to occur. However, as we show in the report, the success of a Value strategy depends greatly on how the factor is defined – those of a defensive nature, that focus on the ability of firms to generate and distribute cash to shareholders, are likely to do well going forward.

**Slowing growth rates mean a rerating due to higher growth is unlikely**

Unlike the dividend discount model, which focuses on dividends to be paid, free cash flow is indicative of the *potential* to pay dividends. A free cash flow-based model allows us to remove the impact of accruals and estimate intrinsic value. The Free Cash Flow model is indicative of ability to pay dividends through a cycle more so than Dividend Yield.

**Defensive Value factors are those most likely to work…**

Value's long-term outperformance is often criticised as a premium that can only be harvested effectively through small-cap stocks. We show that Value is still working – but its returns – as for those of the market – will be suppressed as investors get used to a world of demographically-driven lower growth rates and lower realised risk premia.

**… don't expect double digit returns going forward though**

We show how DCF models are technically superior to single period models – capturing each company's growth profile as well as the risks around that growth. However we also remind readers that DCF models themselves are very sensitive to assumptions on terminal growth rates and discount rates, which require long term forecasts.

**Free Cash Flow yield – and DCF models …if you are confident about the assumptions**

Given the heightened levels of macroeconomic risk at the current time it is therefore not surprising that investors are focussing on data that is nearer at hand. Free Cash Flow yield is a good combination of reported actual data, free of forecasting biases, with a cleaner numerator that has the desirable properties of being an indicator of future growth and dividend payments.

# Introduction

When you ask an investor these days what they think about Value, the answer is a shrug of the shoulders. Isn't it all about Dividend Yield, Low Beta and Large Caps[1]? There are certainly sound reasons (see our Demographics note for more details) why these factors should continue to work strongly into the future.

Market thirst for income and defensive characteristics shows no signs of abating any time soon. What about other valuation signals? Is anything still working? Since the 2008 financial crisis you could be forgiven for thinking not – but all is not lost for Value investors. But when will that be? Market opinion is that this won't happen until "Growth" reappears – whenever that is. Certainly the performance of traditional Value signals has been pretty weak in the last year:

**Figure 2: Recent performance of traditional Value factors (excluding Financials)**

| | Not Sector Neutral | | | | Sector Neutral | | | |
|---|---|---|---|---|---|---|---|---|
| | BookYld | DivYld Fwd | Earn Yld Fwd | Intrinsic | BookYld | DivYld Fwd | Earn Yld Fwd | Intrinsic |
| Asia ex JP (all Caps) | -3.0% | -4.2% | -0.9% | 2.2% | -0.8% | -6.7% | 0.0% | 0.0% |
| Asia ex JP (Large Caps) | 3.5% | -7.8% | 1.4% | 4.9% | 3.5% | -7.8% | 1.4% | 4.9% |
| Europe (all Caps) | -10.4% | -5.6% | -2.7% | -7.4% | -6.8% | -5.2% | 0.3% | -4.6% |
| Europe (Large Caps) | 1.1% | -5.9% | 0.4% | 3.7% | -6.9% | -2.9% | 0.5% | -3.8% |

Source: UBS Quantitative Database. Long-Short performance of Value in the 12 months to 30th November 2015.

Given that most valuation models use a similar combination of short-horizon factors – how do we do something slightly different, while keeping some sort of company-value anchor?

In this note we look at a number of Free Cashflow-based models, as well as doing some revision on when Value factors, and which, work through the cycle.

## Haven't we been here before?

There is international evidence for a persistent value premium (Fama and French, 1998). Our colleague Nick Baltas considered the arguments in our recent Academic Research Monitor looking at Value Investing. Evidence tells us Value is either a compensation for risk or the result of a behavioural bias[2].

Consider the following:

- Equity risk premia are at markedly different levels from those understood when much of the literature on Value was written; and

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[1] Our monograph Understanding Size Investing discusses the connection between size returns and oligopolies, which is relevant to the "Dividend Yield outperforming" discussion.
[2] Our monograph Understanding Value discusses our views on the risk premia vs behavioural story.

- Have recent events – record low interest rates, demographics and yield demand, quantitative easing – changed those behavioural biases?

Even if the nature of Value has not fundamentally changed, it has certainly been affected by the above. Continued macro uncertainty flows onto uncertainty about growth – is there even any growth at all? The outlook for Growth cannot be separated from what is happening with Value. In particular the outlook for Cyclical Value, whose performance comes largely from earnings and multiple re-ratings at the start of an upturn, does not look promising at this stage.

In this note we look at recent history (using data since 2007). There is considerable literature on this subject but we aim to focus on how the factors are performing currently.

# Background and Literature Review

Not long after the dawn of fundamental analysis of the kind promoted by Graham and Dodd (1934), analysts started placing less emphasis on a company's asset base and increased their attention toward estimating a company's future earnings. Indeed, studies have found that stock price movements are more correlated with changes in earnings than other financial metrics including book value (Stickells, 1980; Black, 1980).

As equity markets became more sophisticated, sell side earnings estimates became a key piece of information by providing consensus expectations, which in turn allowed for the expression of anti-consensus expectations by individual brokers. I/B/E/S have compiled consensus earnings estimates since 1976 (though later for global markets) and professional investors have used these and individual broker estimates to inform valuation calculations – even by way of reference to the forward PE ratio – while making investment decisions ever since.

As equity markets continue to become more sophisticated, another shift in analyst focus is taking place. Earnings forecasts are coming under the microscope; firstly in regards to non-cash items or accruals, which can often distort a company's true earning power (Mohanram, 2014; Radhakrishnan and Wu, 2014). There is an increasing number of sell side analysts providing cash flow forecasts in addition to earnings forecasts (DeFond and Hung, 2003). Secondly, the market is becoming more interested in the appropriate risk premium to attach to those forecasts as evidenced by the rise in scenario based valuation (Joos, Piotroski and Srinivasan, 2012).

While sell side cash flow forecasts can be used to inform valuation calculations, the average broker and the average fund manager utilising broker estimates are yet to use them to their full potential. In their review of the literature, De Ricquebourg and Clacher (2015) found widespread evidence that, despite the rise in cash flow forecasts, both sell side and buy side analysts generally prefer unsophisticated valuation techniques and heuristics, such as price earnings multiples, when valuing stocks and making recommendations. They also found that these methods failed to earn U.S. investors excess returns from 2002 to 2012. Finally, they found that discounting methods were not often used.

Although cash flow forecasts may be underutilised, research suggests that they are likely to contain useful information. DeFond and Hung (2002) concluded that analyst cash flow estimates help market participants interpret the information contained in earnings, and to assess firm viability. Using I/B/E/S consensus data from 1993 to 2009, Jung (2015) found that when analysts issue cash flow forecasts the cost of capital decreases because analysts issue more accurate short-term and long-term earnings forecasts. He also found that the prevalence of cash flow forecasts reduced information asymmetry because of a negative association with the probability of informed trading.

There are also several other studies that comment on analyst cash flow forecasts in relation to accrual estimation. Call, Chen and Tong (2013) found that analyst cash flow forecasts outperform time series cash flow forecasts in predicting the sign and magnitude of the accruals. Gordon, Petruska and Yu (2014) also found that analyst cash flow forecasts attenuate overestimation of the accrual component of earnings. If cash flow forecasts hold valuable information then we are naturally interested in a valuation model that will harness their potential to earn excess returns.

**Academic research shows that simple valuation models such as earnings multiples are still preferred by investors**

De Ricquebourg and Clacher (2015) provided us with some insight in their recent study for the U.S. market. In addition to some other valuation models, the authors investigated a discounted cash flow model with five years' of consensus cash flow forecasts and a terminal value that assumes that cash flows fade from the final cash flow forecast to zero over a ten year period. Their model discounted cash flows by the industry cost of capital. Unlike the strategies based on heuristics or recommendations, they found that investors can earn excess returns by using consensus analysts' cash flow forecasts in a discounted valuation model. Size-adjusted excess returns for the discounted cash flow model were between 3.1% and 3.8%.

So far we have reviewed studies that support the use of cash flow forecasts. However, the literature is by no means unanimous on this point. Givoly, Hayn and Lehavy (2009) argue that analyst cash flow forecasts are a naïve extension of their earnings forecasts. Lehavy (2009), while supportive of the idea that cash flow forecasts improve the accuracy of earnings forecasts, showed that there was no improvement in accuracy in the six month period before an earnings release.

## Our hypothesis

We hypothesise that free cash flow data are valuable but that the extent to which they can be used to systematically generate excess returns will depend largely on the valuation framework that is applied.

In our report we use free cash flow available to equity holders as the basis for our discounted cash flow valuation models. UBS free cash flow available to equity holders is defined as follows:

**Free Cash Flow to Equity is the potential to pay dividends**

$$Free\ cash\ flow\ available\ to\ equity holders$$

$$= Adjusted\ net\ income$$

$$+ Depreciation\ and\ amortisation$$

$$- Capital\ expenditure$$

$$- Increase\ in\ working\ capital$$

Technically adjustments may be made for interest and tax accruals. However, we use the provided definition to avoid the complexity of manual adjustments. It should be noted that free cash flow estimates submitted for the calculation of consensus data may be defined differently by different brokers.

Free Cash Flow represents the cash a company generates from its ongoing operations, after taking into account the true costs of those operations. Free Cash Flow can either be returned to equity holders or reinvested in the business to drive future growth.

Unlike the dividend discount model, which focuses on dividends to be paid, free cash flow available to equity holders is indicative of the *potential* to pay dividends. While all accounting based valuation methods are equivalent given the same assumptions, discounted free cash flow available to equity holders valuation serves as a parsimonious framework to remove the impact of accruals on earning power and to estimate intrinsic value.

# Issues in Free Cash Flow Valuation

As with many things in life, there is an easy way and a hard way to do things.

Are single-period models the best way to look at Value? Seasoned stock analysts will argue "of course not". Growth companies look expensive and industries in structural decline look too cheap as every stock is forced onto the same growth profile.

With a cash flow model, there are several considerations:

- What is the horizon? Should we just use a single period? If so, should we look forward or backwards?

- What about more periods? The first year tells you only so much but ignores the growth. Where there is information about the future growth prospects we should use this.

- We use the Demographic implied growth rate to formulate our long-term growth assumptions.

- What is the terminal growth rate? Analyst long-term growth rate forecasts tend to be excessively optimistic – it is not uncommon to find perpetual growth rate forecasts of 10% or more in common use.

- What about the risk premium?[3]

- How do we form a sensible discount rate[4]? More specifically, how do we adjust for the riskiness of stocks – a single discount rate is too simplistic. We consider several approaches to adjusting the ex-ante risk premium, all of which start with Beta[5] as an initial indicator of a stock's systematic risk factor exposure.

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[3] Forecasting the risk premium is a complex topic beyond the scope of this note!
[4] The discount rate to apply to the cash flow estimates can be broken into two parts. Firstly, the opportunity cost of funds or the time value of money must be considered and we use the 10 year government bond yield as a proxy for the risk free rate to discount this opportunity cost. Secondly, the risk premium to assign to the cash flows must be considered. The gold standard for discount rate and specifically risk premium attribution is the CAPM as defined by Sharpe (1964) and Lintner (1965). However, the CAPM has come under fire in recent years because it fails to produce empirical results that are consistent with theory. This inconsistency is best highlighted by the growing literature on the low beta or "betting against beta" phenomenon where low beta stocks tend to outperform high beta stocks. These observations run counter to the theory that more risky stocks with higher betas should compensate investors with higher returns, which have inspired some commentators to remark that "the CAPM is dead" (Fama and French, 1996).
[5] We use a 60 month rolling window for our stock betas, which are calculated by FactSet.

## How we tackled the problem

In this note we compare the results of four multi-stage discounted FCF models to current market price:

- A 5-year[6] discounted FCF model, using a discount rate of the forecast risk-free rate plus a risk premium adjusted by the stock's historic beta[7],

- A 5-year discounted FCF model, using a discount rate of the forecast risk-free rate plus a risk premium adjusted using the process of Vasicek (this serves as a shrinkage estimator, see the appendix for more details),

- The model above but with no terminal phase, and

- A 5-year discounted FCF model, using a discount rate of the forecast risk-free rate plus a risk premium adjusted using a leverage-adjusted industry beta.

We also look at some single-period models:

- 12 months' trailing Free Cash Flow yield (our data makes use of interim reporting periods and is from FactSet Fundamentals); and

- 12 months' forward, time-weighted Free Cash Flow yield (using consensus mean full-year forecasts from the I/B/E/S Summary Estimates data set);

as well as some "traditional" value metrics:

- The last-reported Book Value to Price,

- The 12 months' forward (time weighted) consensus Earnings Yield,

- The 12 months' forward (time weighted) consensus Dividend Yield, and

- Our previously published "Intrinsic Value" which is a historic 3-year risk-adjusted cash flow model with a Book Value floor.

For our DCF models that use free cash flow forecasts, we used the mean summary estimate from the I/B/E/S estimates service. We time-weight the estimates, using a number of twelve-months-ahead periods rather than fiscal years such that the discounting is applied correctly. We did also consider using UBS' house forecasts however we have used consensus to be consistent with the other forward-looking factors[8].

For our terminal growth rates, we refer to our published Demographic-implied growth rates (available annually on a per-country basis) for the year in which explicit cash flow forecasts end, adjusted by an inflation estimate[9]. As a sanity check to this, we also looked at the 10-year bond yield as a proxy for growth expectations (real growth expectations and inflation expectations). For this note, where the measurement period is very short and the demographic and inflation

**We use the difference between the 12-months forward earnings yield the bond yield as a proxy for the equity risk premium**

**4 multi-stage DCF models were looked at, alongside 2 simpler FCF yield models and several other "Value" factors**

**Terminal growth: long term bond rate – or inflation adjusted demographic implied growth rate**

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[6] Where 3 or 4 years of forecasts are available instead of 5, we infer the future years' values using a terminal growth rate assumption.
[7] We use a 5-year monthly beta calculated relative to the local market, supplied by FactSet.
[8] I/B/E/S definition of Operating Cash Flow considers a company's net cash position over a given period, i.e. money received from customers minus taxes, interest payments, dividend payments and payments to suppliers. Free Cash Flow deducts maintenance capex from this number.
[9] We used a constant 2% inflation rate forecast – central bank models often use a rate in the 2-3% range. For a longer period or different inflation environment the Bond Yield is an alternative approach.

rates benign and relatively stable we consider this adequate – for a longer study we would need to consider this more thoroughly.

Our measurement period begins at the end of 2007, and portfolios are rebalanced monthly where appropriate. We recognise that Value signals tend to move slowly – as such the turnover is quite low. A longer rebalance horizon would flatter the absolute performance of all these factors however it would not dramatically affect the results of this study.

We look separately at performance within Europe and Asia (ex Japan), using the Dow Jones indices. To address the concerns that this may introduce a small-cap tilt to the results, we also repeat the analysis within the larger and more liquid equivalent MSCI universes, and report these results where appropriate.

We exclude Financials from all these models – and the benchmarks they are measured against, in the absence of any agreement on what constitutes free cash flow, for example, for a Bank. For Europe we measure all returns in Euros and for Asia in US Dollars.

**We exclude Financials. What is the Free Cash Flow for a bank?**

## What does a multi-period Free Cash Flow model look like?

In our initial data set we observed that the various DCF models agreed much more on the stocks the models considered were overvalued than those that considered undervalued. We attribute this to the significant differences between the DCF models being towards the terminal growth phase, with the nearer, less-discounted cash flows being treated relatively similarly.

**The various models agree more on which stocks are "expensive" than on undervalued stocks.**

For those stocks deemed extremely overvalued by the models, the price level on the denominator far outweighs the importance of the intrinsic value on the numerator. However, for those stocks deemed undervalued by the models, the way that intrinsic value on the numerator is defined becomes much more important; each model tells a slightly different story. As a consequence we observe consensus among the models when it comes to identifying extremely overvalued companies and a lack of consensus among the models when it comes to identifying undervalued companies.

In unreported results we also looked at the same models with a three-year discount phase rather than five years, again the results were similar (see below where we discuss the weight of the Terminal Value).

## Does using free cash flow forecasts create a bias?

In our initial sample of data we found that 12% of stocks were "overvalued" (a DCF valuation less than the current market value), 43% of stocks were broadly fairly valued (a V/P ratio of between 1 and 2) and 45% of stocks were undervalued (a V/P ratio of greater than 2), suggesting that DCF models of this nature tend to overvalue companies relative to the market's "real" valuation[10]. Nonetheless in our opinion this presents no issue when comparing companies in a ranking (relative) sense. For this reason we also keep companies with a negative V/P ratio.

Certainly forecasting free cash flows requires some significant resource to model, and thus these forecasts are generally available more for larger stocks; however

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[10] These statistics are measured over the whole time period – at any point in time the proportion that are over- or under-valued could be markedly different given the use of market beta to adjust the ERP.

these estimates cover the large majority of the universe of stocks we have used for this report.

The literature on free cash flow forecasts doesn't really acknowledge these tilts except implicitly comparing size adjusted returns.

We should note that Value generally offers a small low-beta bias. Our value portfolios (discussed later) generally had a long-side beta of around 0.90 and a short-side beta of around 1.05.

## How much of the DCF valuation is represented by the terminal value?

Across all the DCF models we have proposed, across sectors and through the history from 2007, the proportion of the DCF valuation that is represented by the terminal value is consistently in the 70-80% range.

**Terminal Value generally represents 70-80% of DCF valuation across these models**

Interest rates have fallen to historic lows during the period of this paper (and were relatively low by historic standards to start with) – clearly lower interest rates imply that the Terminal Value will be larger proportion of the valuation.

One important strength of multi-period valuation models is capitalising forecasts beyond the first year. Capitalising later forecasts to a greater extent than near-term forecasts (especially if they are higher than 1 year forecasts) could mean the model is capable of identifying growth names more effectively.

The emphasis on Terminal Value will remain high as long as rates stay low. The implication is that yard sticks like 12 months' forward PE ratios will be even less relevant than in the past if rates stay low.

# Results

We first assess our Value metrics using Information Coefficients – the rank correlation between scores and subsequent returns, over a 1-, 3- and 12-month horizon. The IC allows evaluation of the information content of the signal independent of portfolio construction mechanism. Noting the cyclicality of the IC we pay attention to both a time series plot and summary data.

The chart below shows the 12m horizon IC of the various value factors we looked at, for the Asia-ex-Japan constituents of the Dow Jones indices. You see similar results in Europe and also within larger caps (See Appendix B for full details).

Some difference in the results between Asia and Europe is of course expected. The latter is a more mature market, without the weight in EM, a different growth and inflation profile and possibly different investor preferences and attitudes, in part led by differing demographics.

Several things immediately stand out:

- Not all value factors appear to have information at the same time. At times there is significant dispersion (and at times very little).

- Dividend Yield, long the king of the Value factors, appears to have returned to the pack;

- Trailing Free Cash Flow yield is consistently positive, and has had the highest current IC and the highest risk-adjusted IC.

**Figure 3: Value factors - rank correlation with subsequent returns (Asia ex Japan ex Financials, 12m horizon)**
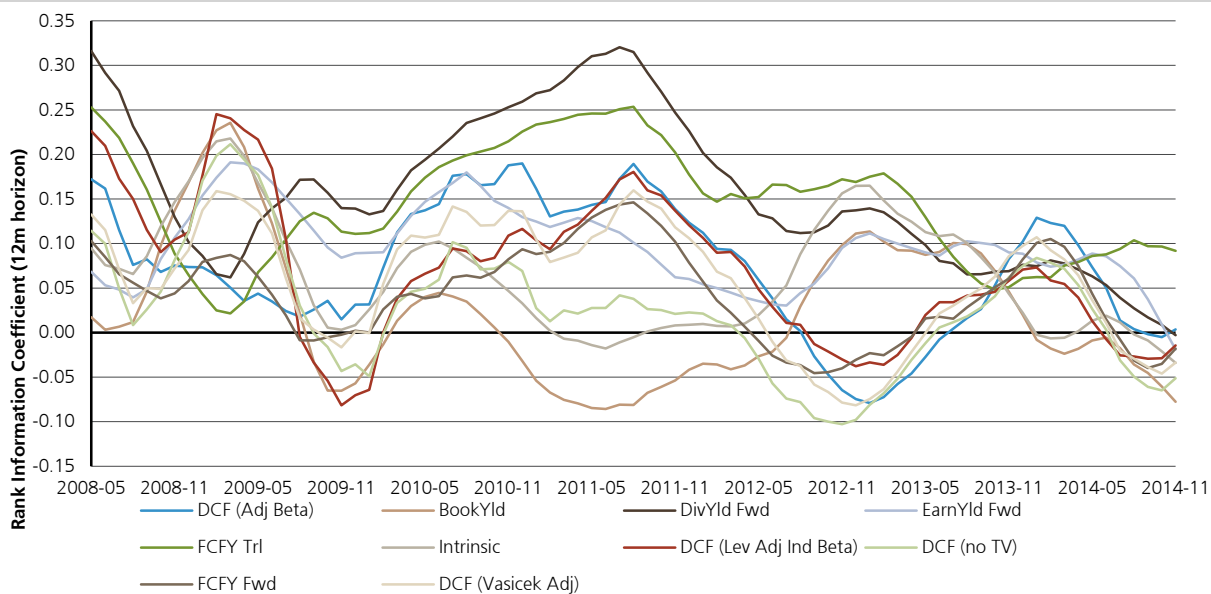


Source: UBS Quantitative Database. A Rank IC > 0 indicates a positive relationship between valuation and future return at that point. The chart shows the 6-months rolling average IC through time to ease interpretation. The universe is DJ Asia ex Japan, ex Financials.

The DCF valuation models all had similar results – it seems to a certain extent the various discount rate scenarios are picking up on the same effect.

Within Asia, absolute ICs have been low in the last two years compared to recent history, and we see the same within large caps, though trailing Free Cash Flow yield still remains positive. Appendix B shows these results in detail. In Europe the ICs of most Value factors are flat at best, even within a broad universe.

The results within sector require some interpretation – for example, in the Energy sector, Dividend Yield tends to favour producers rather than explorers, the latter of which tend to have no dividends or earnings, or Telecoms where you tend to have a polarity of large incumbents (which often offer a relatively high yield) vs smaller incumbents whose Value may be in the out-years.

**Figure 4: IR (Rank IC scaled by volatility) within GICS sector – Asia ex Japan**

| | Cons Disc | Cons Stpls | Energy | Healthcare | Industrials | Info Tech | Materials | Telecoms | Utilities |
|---|---|---|---|---|---|---|---|---|---|
| DCF (Adj Beta) | 0.71 | 0.47 | 0.36 | 0.16 | 0.11 | 0.32 | 0.14 | -0.06 | 0.33 |
| BookYld | 0.43 | -0.35 | 0.35 | 0.51 | 0.42 | 0.21 | 1.26 | -0.50 | 0.20 |
| DivYld Fwd | 0.62 | 0.83 | 0.89 | 1.05 | 1.77 | 1.69 | 1.55 | 0.85 | 0.87 |
| EarnYld Fwd | 0.80 | 0.06 | 0.83 | 0.76 | 1.81 | 1.57 | 0.82 | 0.61 | 0.49 |
| FCFY Trl | 1.20 | 0.87 | 0.74 | 0.56 | 1.53 | 2.15 | 1.14 | 1.05 | 1.23 |
| Intrinsic | 0.63 | -0.09 | 1.19 | 0.56 | 1.24 | 0.26 | 1.52 | -0.63 | 0.82 |
| DCF (Lev Adj Ind Beta) | 0.33 | 0.32 | 0.36 | 0.17 | 0.31 | 0.06 | -0.16 | -0.04 | 0.39 |
| DCF (no TV) | 0.32 | 0.22 | 0.20 | 0.17 | 0.05 | 0.26 | -0.08 | -0.15 | 0.45 |
| FCFY Fwd | 0.34 | 0.68 | 0.25 | 0.13 | 0.00 | 0.83 | 0.40 | 0.08 | 0.49 |
| DCF (Vasicek Adj) | 0.52 | 0.26 | 0.30 | 0.07 | 0.07 | 0.21 | 0.03 | 0.16 | 0.32 |

Source: UBS Quantitative Database. Measured from December 2007 to January 2015. Annualised IC is scaled by the volatility of the IC over the period.

We know from our literature review that the market pays a lot of attention to near-term, conventional value metrics in the short term. The period tested has been characterised by low interest rates and less dispersed betas so the discount rate has been less important, so the current environment may be masking the true potential of the DCF models.

Models that make use of forecast data also have more room for error, or mis-estimation. This doesn't mean that DCF models should be overlooked but it does remind us of their sensitivity to the inputs used – the transfer of their technical superiority comes down to how they are used in practice.

## Factor Score correlations

Before we conduct any further analysis we need to make sure our newly proposed models aren't telling us something else by loading up on factors we already know about – we look at the average rank correlation to assess this. These results are for Asia; the results for Europe are similar.

**Figure 5: Correlation between yield and other selected factors – Asia ex Japan**

| | Beta | BookYld | Delta Quality | DivYld Fwd | EarnYld Fwd | FCFY Trl | High Quality | Intrinsic | Size |
|---|---|---|---|---|---|---|---|---|---|
| DCF (Adj Beta) | -0.236 | 0.072 | 0.098 | 0.262 | 0.190 | 0.239 | 0.152 | 0.186 | -0.012 |
| DCF (Lev Adj Ind Beta) | -0.054 | 0.081 | 0.099 | 0.233 | 0.211 | 0.260 | 0.165 | 0.164 | -0.034 |
| DCF (no TV) | 0.032 | 0.157 | 0.042 | 0.217 | 0.240 | 0.229 | 0.056 | 0.208 | -0.067 |
| FCFY Fwd | -0.030 | 0.069 | 0.101 | 0.284 | 0.241 | 0.310 | 0.128 | 0.137 | -0.064 |
| DCF (Vasicek Adj) | -0.048 | 0.116 | 0.061 | 0.213 | 0.202 | 0.208 | 0.076 | 0.177 | -0.047 |

Source: UBS Quantitative Database. Measured from December 2007 to January 2015. Universe is DJ Asia ex Japan, ex Financials.

Unsurprisingly there is a strong correlation between all the proposed models and FCF Yield, and also with Dividend Yield and Quality, which is promising, both in terms of picking a defensive value factor, and something that works. We do note a consistent size (small cap) bias, something which is commonly seen in the literature on Value.

From an analytical standpoint, we suggest that cash flow forecasts are more likely to be overly optimistic in smaller companies, especially with regards to future growth rate assumptions. One might expect a larger range of possible cash flow outcomes for smaller companies given where they are in their lifecycle - given that larger range, optimism bias will be more pronounced for those companies.

## Cross-sectional Value deciles

We look at the annualised average excess returns of our Value factors, broken into (sector-neutral) deciles. Whilst not monotonic, we observe the general, and expected pattern that cheaper stocks are still outperforming expensive stocks since 2007, though. This gives us confidence that Value, and specifically defensive Value factors, are still working.

**Book Yield and 12-months-forward Free Cash-Flow Yield are the least consistent**

Each of these charts is of the risk-adjusted return (Sharpe ratio – annualised excess return scaled by annualised standard deviation of return).

**Figure 6: Decile Risk-Adjusted Returns - Asia-ex-Japan (excluding Financials) - All Caps**
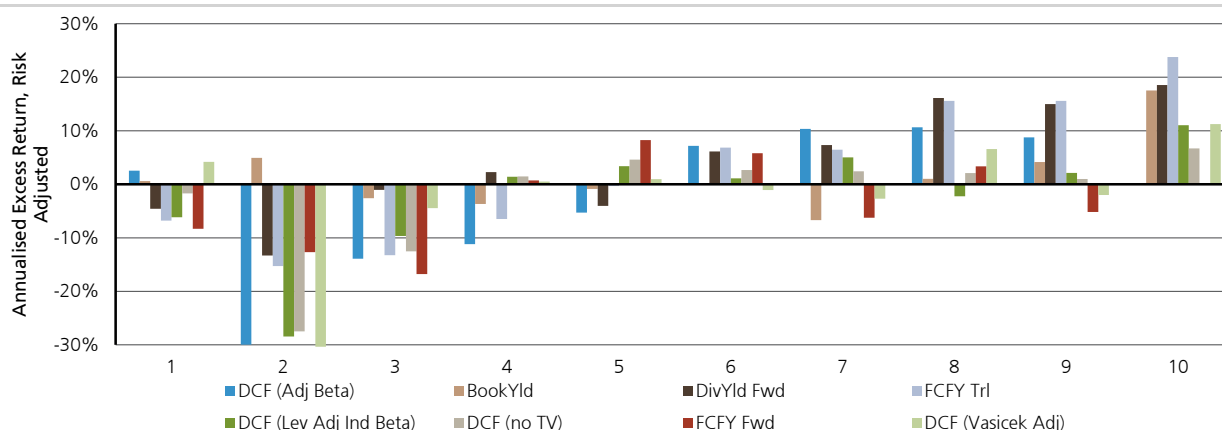


Source: UBS Quantitative Database. Data is for Asia-ex-Japan since December 2007. Average annualised risk-adjusted returns are broken out by sector-neutral Value decile.

We observe that Decile 1 (the most expensive stocks) doesn't behave as it "should", though this is a pattern we often see when looking at extremes of Value, we attribute this to being stocks where the value metric or level is irrelevant or discounted by the market.

But what about large caps? In the larger-cap stocks within Asia-ex-Japan, the results are much the same:

**Figure 7: Decile Risk-Adjusted Returns – Asia-ex-Japan (excluding Financials) - Large Caps**
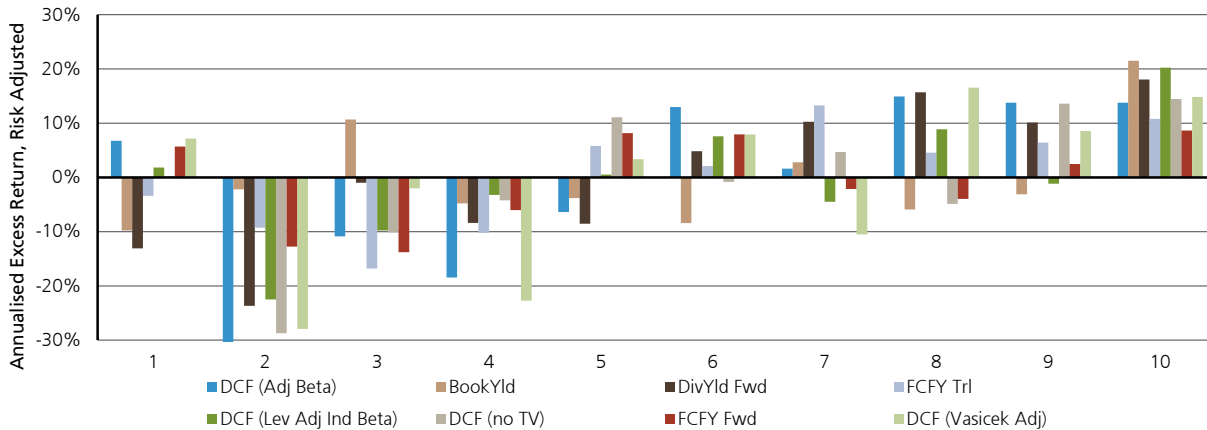


Source: UBS Quantitative Database. Data is for Asia-ex-Japan since December 2007. Large Cap stocks are proxied by the MSCI AC Asia ex Japan (excluding Financials) universe. Average annualised risk-adjusted returns are broken out by sector-neutral Value decile.

For Large Caps in Europe the results are a little more mixed: it appears that Value works better in selecting expensive stocks at the moment, though we note that trailing Free Cash Flow Yield is again working effectively:

**Figure 8: Decile Risk-Adjusted Returns – European large caps (excluding Financials)**
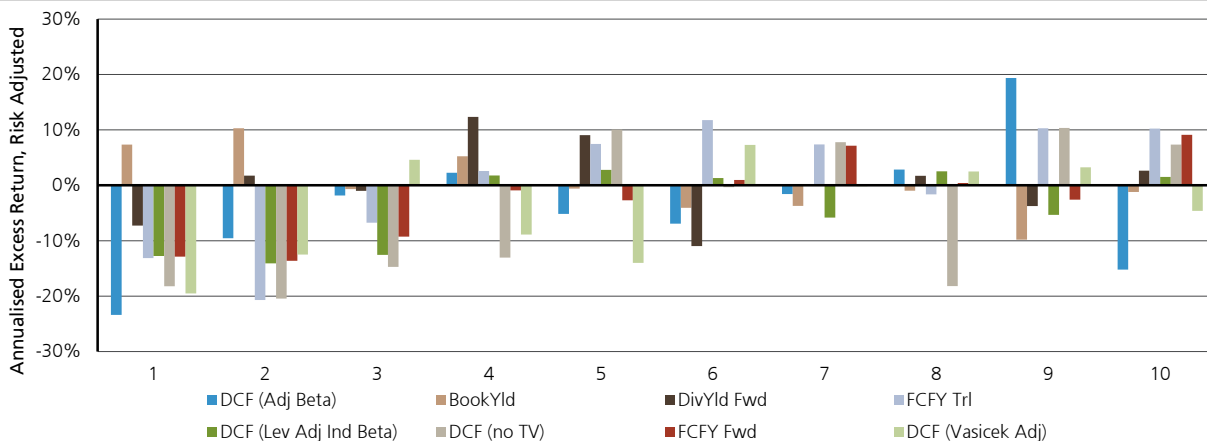


Source: UBS Quantitative Database. Data is for Europe since December 2007. Large Cap stocks are proxied by the MSCI Europe (ex Financials) universe. Average annualised risk-adjusted returns are broken out by sector-neutral Value decile.

The pronounced returns in the tails could have implications for the optimum weight for value strategies, as well as reminding us of the importance of addressing extremes when creating Value portfolios. In our note Lessons from Behavioural Finance we discuss the importance of aligning our weights with our highest convictions.

## Portfolio Simulations

We perform some basic portfolio simulations to get a feel for the returns from investing in the factors that we discuss above. Portfolio construction of Value factors is a complex area and we make a number of significant simplifying assumptions. Our intention is not to describe investable portfolios but to give an indication of factor performance in recent times.

- We split the universe (ex-Financials) into thirds and measure the performance of "Cheap minus Expensive"

- We use sector-neutral versions of each Value factor.

- We use cap-weighted portfolios to avoid concerns with liquidity[11]. To achieve sector neutrality with cap weighted portfolios we reweight the stocks such that the sector weights are in line with the universe sector weight (e.g. if Utilities are 15% of the universe then the "Cheap" third will have 15% by weight in Utilities. We report the cap-weighted results in this note (equally weighted results available on request).

- We resample the portfolio monthly and returns are free of transaction costs (we note that Value factors generally have low turnover).

- We scale each portfolio such that it has an ex-ante Beta of 1.

In Appendix C we present the time series of 12 month rolling returns. Statistical measures over the period somewhat flatter the returns due to the strong performance of Value early in the period.

**Sector-Neutral Value: Cap-Weighted Thirds**

**Figure 9: Last 12 months' return to Value (Sector Neutral)**

| | DCF (Adj Beta) | BookYld | DivYld Fwd | Earn Yld Fwd | FCFY Trl | Intrinsic | DCF (Lev Adj Ind Beta) | DCF (no TV) | FCFY Fwd | DCF (Vasicek Adj) |
|---|---|---|---|---|---|---|---|---|---|---|
| Asia ex JP (all Caps) | -0.5% | -0.8% | -6.7% | 0.0% | -5.8% | 0.0% | -6.1% | -5.9% | -1.5% | -3.8% |
| Asia ex JP (Large Caps) | -5.2% | 3.5% | -7.8% | 1.4% | -4.7% | 4.9% | 0.5% | -1.3% | 1.0% | 3.9% |
| Europe (all Caps) | -4.3% | -6.8% | -5.2% | 0.3% | -0.1% | -4.6% | -7.2% | -5.8% | -6.9% | -6.3% |
| Europe (Large Caps) | -4.4% | -6.9% | -2.9% | 0.5% | 2.4% | -3.8% | -6.9% | -3.8% | -6.6% | -4.1% |

Source: UBS Quantitative Database. Results exclude Financials. 12 months to 30 November 2015. For details on the construction mechanism please refer to the above commentary.

12-month rolling returns in Asia have faded to slightly negative for most factors in the last two years, and we see similar, though less amplified results in large caps. In Europe Value has generally not produced significant returns since the financial crisis, though is seems actual (as opposed to forecast) Free Cash Flow is still being rewarded.

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[11] The results with equally-weighted portfolios followed a similar pattern though the absolute magnitude of the results was higher.

The returns to Value tend to come from different "sides" of the Value spectrum. In bull markets [12] expensive stocks tend to perform in line with the market whilst cheap stocks outperform – in bear markets the opposite tends to be true.

Without controlling for sectors one can see evidence that Value has been working somewhat better when allowed to pick sectors, although the results are far from consistently positive.

**Figure 10: Last 12 months' return to Value (not Sector Neutral)**

|  | DCF (Adj Beta) | BookYld | DivYld Fwd | Earn Yld Fwd | FCFY Trl | Intrinsic | DCF (Lev Adj Ind Beta) | DCF (no TV) | FCFY Fwd | DCF (Vasicek Adj) |
|---|---|---|---|---|---|---|---|---|---|---|
| Asia ex JP (all Caps) | 0.3% | -3.0% | -4.2% | -0.9% | -4.8% | 2.2% | -2.3% | -2.9% | -0.4% | 0.4% |
| Asia ex JP (Large Caps) | -5.2% | 3.5% | -7.8% | 1.4% | -4.7% | 4.9% | 0.5% | -1.3% | 1.0% | 3.9% |
| Europe (all Caps) | -4.1% | -10.4% | -5.6% | -2.7% | 2.8% | -7.4% | -3.8% | -5.4% | -5.1% | -1.2% |
| Europe (Large Caps) | 4.3% | 1.1% | -5.9% | 0.4% | -5.6% | 3.7% | 0.3% | -1.5% | 2.2% | 4.5% |

Source: UBS Quantitative Database. Results exclude Financials. 12 months to 30 November 2015. For details on the construction mechanism please refer to the above commentary.

**We should of course be careful not to extrapolate too much from a backtest with such a short window and a unique set of economic conditions – even within which the performance of Value is far from constant.**

We report summary statistics at Appendix D.

**Figure 11: Risk-adjusted return (Sharpe ratio) of various Value factors since 2007 (Asia ex Japan)**
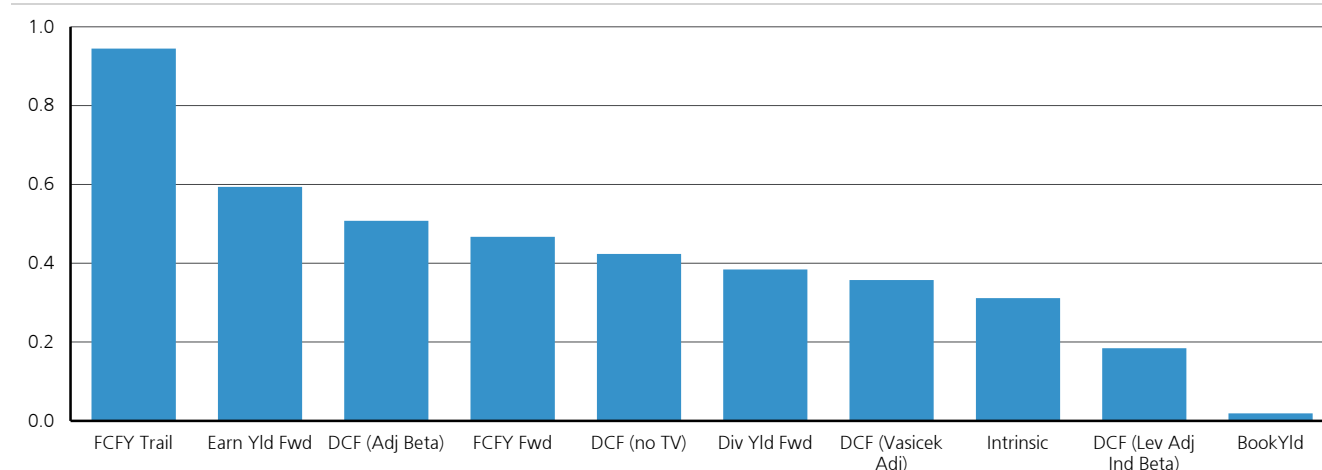


Source: UBS Quantitative Database. Annualised return divided by annualised standard deviation of returns from December 2007 to November 2015. Universe is DJ Asia ex Japan (excluding Financials).

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[12] Our Investing in Value note discussed this in more detail

## The intersection of Value and Quality is still the place you want to be

We looked at our preferred combination of Value and Change in Quality: in our previous publication Investing in Value we have seen that the intersection of Increasing Quality and Value was the best combination; here we look at 3 of the Value metrics we discuss in this note, and pleasingly we note similar patterns using this recent data.

**Figure 12: Average annualised excess returns, Quality/Value intersection, Asia ex Japan**

| Model | Change in Quality | Value Decile (10: Most Preferred) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| DCF (Vasicek Beta Adj) | Decreasing | 6.0% | -13.5% | -10.3% | -15.7% | -24.3% | -19.4% | -16.2% | 9.4% | 11.5% | -1.6% |
| | Stable | 1.2% | -12.7% | -1.3% | -1.0% | 1.7% | -0.5% | -1.4% | -1.7% | -5.2% | 2.8% |
| | Increasing | -3.6% | -6.2% | 1.3% | 8.5% | 3.7% | 5.8% | 5.6% | 8.8% | 4.7% | 17.7% |
| Trailing FCF Yield | Decreasing | -6.3% | -10.3% | -10.6% | -4.6% | -12.8% | -10.9% | -7.1% | -0.1% | 0.5% | -3.8% |
| | Stable | 1.4% | -3.5% | -4.1% | -3.6% | -0.4% | 2.2% | 0.7% | 2.6% | 2.4% | 8.2% |
| | Increasing | 2.0% | -4.0% | 4.1% | 7.5% | 8.4% | 6.0% | 6.5% | 10.4% | 11.7% | 15.1% |
| Dividend Yield (fwd) | Decreasing | -8.0% | -13.9% | -15.3% | -15.5% | -3.7% | -4.6% | 0.5% | -4.9% | 3.8% | 10.9% |
| | Stable | -3.1% | -2.5% | -2.5% | 2.6% | -3.6% | 1.0% | 0.9% | 4.7% | 2.1% | 4.5% |
| | Increasing | 16.7% | 0.6% | 14.0% | 6.6% | 6.9% | 10.1% | 7.3% | 10.6% | 11.9% | 13.1% |

Source: UBS Quantitative Database. Measured from December 2007 to January 2015. The numbers displayed are the average annualised excess return, cross-sectionally, for that combination of Quality and Value. Universe is DJ Asia ex Japan, excluding Financials.

These results are for Asia ex Japan, we see similar results in Europe, and in large caps (in both Europe and Asia).

# Isn't it getting a bit crowded in here?

To some extent FCF yield – be it short term or discounted longer-term – is a proxy for what is working (what the market wants) – growth potential and visible cash flows – and that is no bad thing.

As a result of this, particularly in the recent year as the effectiveness of the dividend yield strategy has declined somewhat, there is the potential for high Free Cash Flow Yield to become crowded as investors search for alternatives.

These charts show our Style Crowdedness Indicator for Asia-ex-Japan and Europe for a number of factors and we note that this is indeed the case:

**Figure 13: Style Crowdedness Indicators for Asia-ex-Japan**
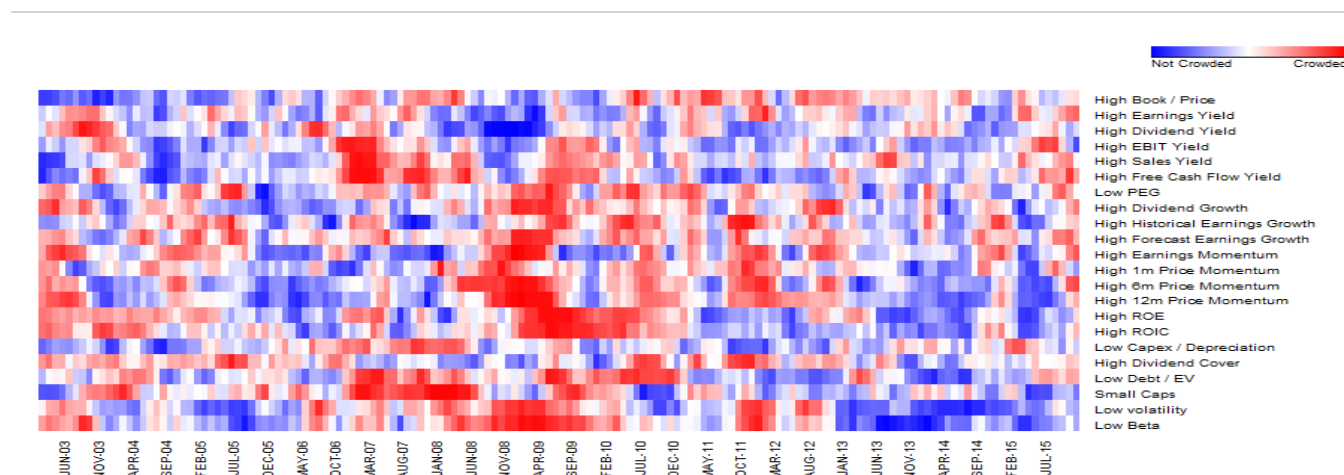


Source: UBS Quantitative Database. MSCI AC Asia ex Japan universe.

And similar results within Europe:

**Figure 14: Style Crowdedness Indicators for Europe**
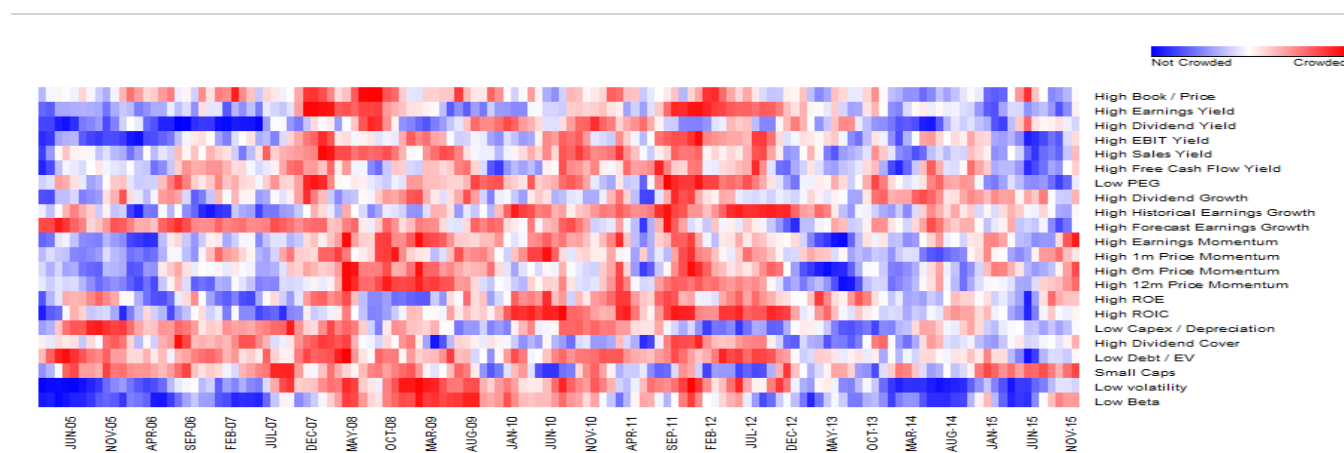


Source: UBS Quantitative Database. MSCI Europe universe.

We note that Value styles in particular can remain 'crowded' for some time. Our research on crowded trades suggests keeping an eye on stock-level absolute valuation and sentiment (e.g. via earnings revisions or price momentum) as a way to avoid mean-reversion of crowded trades.

## What does the relative performance of the DCF models tell us?

Our hypothesis was that analyst cash flow estimates have value but need to be used in the right framework to earn excess returns – our brief analysis tells us that that framework is not an easy thing to specify. We suggest a few reasons why near-term estimates have strong predictive power:

- Trailing free cash flow numbers, using quarterly or semi-annual data, give us our most accurate view into what is going on in the company – the regularity of updates (compared to annual forecasts) act to reduce risk;

- There are a lot of moving parts in any terminal growth rate assumption – it is hard enough to forecast the next period let alone something five years out – and macroeconomic factors – direction and level of interest rates, FX, and inflation, are all of heightened and primary concern at the moment;

- These same factors introduce significant uncertainty into what the appropriate discount rate to be used for future cash flows is;

- Analysts (and the market that prices these factors) are almost certainly using higher terminal growth rates than the demographics imply, e.g. for much of Europe the Demographics-implied growth rate has turned negative – our view is that the market has yet to fully price these in.

Only time will tell whether our assumptions are anything near valid - given all this uncertainty, it is perhaps not surprising that investors appear to be placing more reliance on models with near-term estimates given the uncertain future outlook.

## Why does Book Value look so bad?

One consistent theme through all our results is that Book Value has performed very poorly throughout the period – at its best it has performed in line with other Value factors and at times has significantly underperformed. In our recent paper on [Investing in Value](#) we categorised Value factors broadly as follows:

- Book Value – compensation for distress risk

- Earnings Yield – cyclical value

- Dividend Yield (and Cash Flow) – defensive value

As we discussed in this note, the combination of quantitative easing and record low interest rates has upset the risk-reward balance to some extent – indeed highly-leveraged asset-light companies have performed strongly in recent years.

# Conclusions

Academic research tells us that investors preference is for simple valuation heuristics such as valuation multiples – these have performed very poorly in recent years.

In this paper we outline how Free Cash Flow can be considered the *potential* to pay dividends or return capital to investors, or to be reinvested for future growth, and we introduced and reviewed models that make use of Free Cash Flow in a valuation framework to form a superior valuation factor.

Demographics will be a driver of lower growth rates into the future. In this environment investors are likely to continue to favour Defensive Value - companies with the ability to generate cash and pay dividends at a reasonable valuation. These factors tend to have lower beta and volatility as a side-effect – which is no bad thing in the current environment.

**Free Cash Flow yield – and DCF models …if you are confident about the assumptions**

We show how DCF models are technically superior to single period models – capturing each company's growth profile as well as the risks around that growth. However we also remind readers that DCF models themselves are very sensitive to assumptions on terminal growth rates and discount rates, which require long term forecasts.

Given the heightened levels of macroeconomic risk at the current time it is therefore not surprising that investors are focussing on data that is nearer at hand. Free Cash Flow yield is a good combination of reported actual data, free of any forecasting biases, with a cleaner numerator that has the desirable properties of being an indicator of future growth and dividend payments.

## How to invest in Free Cash Flow Yield

We recommend combining Free Cash Flow valuation with Quality and a qualitative overlay to avoid value traps. In our stock lists we first start by avoiding low quality (both low absolute quality and declining quality). We listen to the market by excluding stocks on our "Bear Ideas" screen and those that carry a "Sell" rating from UBS analysts, and then look for the best Free Cash Flow Yield opportunities within each sector.

# Stock lists

In each region we select stocks that were Neutral or High in terms of our High Quality Model, Stable or Improving in terms of our Delta Quality model, are not flagged by our "Bear Ideas" model, and do not carry a "Sell" rating from UBS' fundamental analysts. We then select the two stocks with the highest trailing free cash flow yield in each sector (excluding Financials).

**Figure 15: Europe (MSCI Europe, excluding Financials)**

| Industry Group | Security Name | Symbol | Country | Trailing FCF Yield | Recommendation | Price Target | PT Currency |
|---|---|---|---|---|---|---|---|
| Consumer Discretionary | PEUGEOT SA | UG.FP | FR | 76.2% | Neutral | 16 | EUR |
| Consumer Discretionary | PROSIEBENSAT.1 MEDIA SE | PSM.GY | DE | 14.3% | | | |
| Consumer Staples | HEINEKEN HOLDING NV | HEIO.NA | NL | 7.5% | | | |
| Consumer Staples | KONINKLIJKE AHOLD NV | AH.NA | NL | 7.5% | Neutral | 18.5 | EUR |
| Energy | TENARIS SA | TEN.IM | IT | 8.6% | Buy | 29 | USD |
| Energy | ENI SPA | ENI.IM | IT | 6.8% | Buy | 17 | EUR |
| Health Care | SHIRE PLC | SHP.LN | GB | 9.4% | Buy | 62 | GBP |
| Health Care | SANOFI | SAN.FP | FR | 6.3% | Neutral | 90 | EUR |
| Industrials | BOSKALIS WESTMINSTER | BOKA.NA | NL | 11.8% | | | |
| Industrials | PRYSMIAN SPA | PRY.IM | IT | 10.5% | | | |
| Information Technology | HEXAGON AB-B SHS | HEXAB.SS | SE | 5.9% | Buy | 333 | SEK |
| Information Technology | AMADEUS IT HOLDING SA-A SHS | AMS.SQ | ES | 5.7% | Neutral | 44 | EUR |
| Materials | NORSK HYDRO ASA | NHY.NO | NO | 14.9% | Neutral | 32 | NOK |
| Materials | BOLIDEN AB | BOL.SS | SE | 9.3% | Buy | 160 | SEK |
| Telecommunication Services | TDC A/S | TDC.DC | DK | 13.5% | Neutral | 39 | DKK |
| Telecommunication Services | ORANGE | ORA.FP | FR | 11.2% | Neutral | 15.9 | EUR |
| Utilities | GAS NATURAL SDG SA | GAS.SQ | ES | 13.1% | Neutral | 19 | EUR |
| Utilities | ENDESA SA | ELE.SQ | ES | 10.5% | Neutral | 20 | EUR |

Source: UBS Quantitative Database

**Figure 16: Asia ex Japan (MSCI AC Asia ex Japan, excluding Financials)**

| Industry Group | Security Name | Symbol | Country | Trailing FCF Yield | Recommendation | Price Target | PT Currency |
|---|---|---|---|---|---|---|---|
| Consumer Discretionary | DONGFENG MOTOR GRP CO LTD-H | 489.HK | CN | 17.2% | Buy | 12.5 | HKD |
| Consumer Discretionary | JARDINE CYCLE & CARRIAGE LTD | JCNC.SP | SG | 17.1% | | | |
| Consumer Staples | THAI UNION GROUP PCL | TU.TB | TH | 13.1% | Buy | 24.5 | THB |
| Consumer Staples | WILMAR INTERNATIONAL LTD | WIL.SP | SG | 12.3% | | | |
| Energy | SK INNOVATION CO LTD | 096770.KP | KR | 26.8% | | | |
| Energy | PTT EXPLOR & PROD PUBLIC CO | PTTEP.TB | TH | 23.4% | Buy | 93 | THB |
| Health Care | SINO BIOPHARMACEUTICAL | 1177.HK | CN | 4.6% | Neutral | 6.9 | HKD |
| Health Care | DR. REDDY'S LABORATORIES | DRRD.IS | IN | 2.9% | Neutral | 4750 | INR |
| Industrials | AIR CHINA LTD-H | 753.HK | CN | 31.7% | Buy | 7 | HKD |
| Industrials | HYUNDAI DEVELOPMENT CO-ENGIN | 012630.KP | KR | 29.1% | Neutral | 46500 | KRW |
| Information Technology | INNOLUX CORP | 3481.TT | TW | 82.8% | Neutral | 11 | TWD |
| Information Technology | INOTERA MEMORIES INC | 3474.TT | TW | 16.8% | Neutral | 30 | TWD |
| Materials | TAIWAN FERTILIZER CO LTD | 1722.TT | TW | 44.1% | | | |
| Materials | POSCO | 005490.KP | KR | 27.1% | Buy | 215000 | KRW |
| Telecommunication Services | PCCW LTD | 8.HK | HK | 31.1% | | | |
| Telecommunication Services | KT CORP | 030200.KP | KR | 17.8% | Neutral | 34000 | KRW |
| Utilities | HUANENG POWER INTL INC-H | 902.HK | CN | 25.8% | Neutral | 7.2 | HKD |
| Utilities | GLOW ENERGY PCL | GLOW.TB | TH | 14.4% | Buy | 97 | THB |

Source:  UBS Quantitative Database

**Figure 17: North America (MSCI North America, excluding Financials)**

| Industry Group | Security Name | Symbol | Country | Trailing FCF Yield | Recommendation | Price Target | PT Currency |
|---|---|---|---|---|---|---|---|
| Consumer Discretionary | GAMESTOP CORP-CLASS A | GME.UN | US | 18.3% | | | |
| Consumer Discretionary | SCRIPPS NETWORKS INTER-CL A | SNI.UN | US | 11.3% | Neutral | 60 | USD |
| Consumer Staples | WESTON (GEORGE) LTD | WN.CT | CA | 11.1% | | | |
| Consumer Staples | WAL-MART STORES INC | WMT.UN | US | 7.4% | Neutral | 64 | USD |
| Energy | VALERO ENERGY CORP | VLO.UN | US | 12.1% | | | |
| Energy | TESORO CORP | TSO.UN | US | 9.1% | | | |
| Health Care | AMERISOURCEBERGEN CORP | ABC.UN | US | 13.5% | Buy | 122 | USD |
| Health Care | GILEAD SCIENCES INC | GILD.UW | US | 11.7% | Buy | 138 | USD |
| Industrials | ADT CORP/THE | ADT.UN | US | 13.0% | | | |
| Industrials | DELTA AIR LINES INC | DAL.UN | US | 10.5% | Buy | 64 | USD |
| Information Technology | APPLE INC | AAPL.UW | US | 11.5% | Buy | 130 | USD |
| Information Technology | EBAY INC | EBAY.UW | US | 11.1% | Buy | 34 | USD |
| Materials | NUCOR CORP | NUE.UN | US | 13.8% | Buy | 47 | USD |
| Materials | TURQUOISE HILL RESOURCES LTD | TRQ.CT | CA | 13.4% | | | |
| Telecommunication Services | CENTURYLINK INC | CTL.UN | US | 16.0% | Buy | 36 | USD |
| Telecommunication Services | VERIZON COMMUNICATIONS INC | VZ.UN | US | 10.0% | Neutral | 48 | USD |
| Utilities | OGE ENERGY CORP | OGE.UN | US | 6.8% | | | |
| Utilities | PUBLIC SERVICE ENTERPRISE GP | PEG.UN | US | 3.1% | Neutral | 42 | USD |

Source: UBS Quantitative Database

**Figure 18: Japan (Topix 500, excluding Financials)**

| Industry Group | Security Name | Symbol | Country | Trailing FCF Yield | Recommendation | Price Target | PT Currency |
|---|---|---|---|---|---|---|---|
| Consumer Discretionary | IIDA GROUP HOLDINGS CO LTD | 3291.JT | JP | 18.7% | | | |
| Consumer Discretionary | HONDA MOTOR CO LTD | 7267.JT | JP | 16.7% | Neutral | 4000 | JPY |
| Consumer Staples | LAWSON INC | 2651.JT | JP | 7.1% | | | |
| Consumer Staples | SUGI HOLDINGS CO LTD | 7649.JT | JP | 6.0% | | | |
| Energy | JAPAN PETROLEUM EXPLORATION | 1662.JT | JP | 2.2% | | | |
| Health Care | TOHO HOLDINGS CO LTD | 8129.JT | JP | 11.6% | | | |
| Health Care | NICHI-IKO PHARMACEUTICAL CO | 4541.JT | JP | 10.1% | | | |
| Industrials | SANKYU INC | 9065.JT | JP | 17.0% | | | |
| Industrials | IWATANI CORP | 8088.JT | JP | 16.7% | | | |
| Information Technology | RYOSAN CO LTD | 8140.JT | JP | 11.9% | | | |
| Information Technology | RICOH CO LTD | 7752.JT | JP | 11.4% | | | |
| Materials | MITSUBISHI GAS CHEMICAL CO | 4182.JT | JP | 19.1% | | | |
| Materials | MITSUBISHI CHEMICAL HOLDINGS | 4188.JT | JP | 18.1% | Neutral | 780 | JPY |
| Telecommunication Services | NIPPON TELEGRAPH & TELEPHONE | 9432.JT | JP | 11.8% | Buy | 5400 | JPY |
| Telecommunication Services | NTT DOCOMO INC | 9437.JT | JP | 6.5% | Neutral | 2300 | JPY |
| Utilities | CHUBU ELECTRIC POWER CO INC | 9502.JT | JP | 17.2% | | | |
| Utilities | TOHO GAS CO LTD | 9533.JT | JP | 6.1% | | | |

Source: UBS Quantitative Database

**Figure 19: Australia (S&P/ASX 200, excluding Financials)**

| Industry Group | Security Name | Symbol | Country | Trailing FCF Yield | Recommendation | Price Target | PT Currency |
|---|---|---|---|---|---|---|---|
| Consumer Discretionary | NINE ENTERTAINMENT CO HOLDIN | NEC.AT | AU | 12.3% | Buy | 1.65 | AUD |
| Consumer Discretionary | SKY NETWORK TELEVISION LTD | SKT.AT | AU | 9.4% | Neutral | 4.9 | NZD |
| Consumer Staples | COCA-COLA AMATIL LTD | CCL.AT | AU | 3.8% | Neutral | 9.35 | AUD |
| Consumer Staples | WESFARMERS LTD | WES.AT | AU | 3.8% | Neutral | 41.5 | AUD |
| Energy | WOODSIDE PETROLEUM LTD | WPL.AT | AU | 13.6% | Neutral | 33.1 | AUD |
| Energy | OIL SEARCH LTD | OSH.AT | AU | 6.4% | Neutral | 7.65 | AUD |
| Health Care | ESTIA HEALTH LTD | EHE.AT | AU | 8.4% | Buy | 9.1 | AUD |
| Health Care | RESMED INC-CDI | RMD.AT | AU | 4.4% | Buy | 70 | USD |
| Industrials | DOWNER EDI LTD | DOW.AT | AU | 18.3% | | | |
| Industrials | PROGRAMMED MAINTENANCE SERV | PRG.AT | AU | 11.9% | Buy | 3.15 | AUD |
| Information Technology | IRESS LTD | IRE.AT | AU | 4.7% | | | |
| Information Technology | ALTIUM LTD | ALU.AT | AU | 4.0% | | | |
| Materials | PACT GROUP HOLDINGS LTD | PGH.AT | AU | 14.0% | Neutral | 4.2 | AUD |
| Materials | NORTHERN STAR RESOURCES LTD | NST.AT | AU | 12.7% | | | |
| Telecommunication Services | M2 GROUP LTD | MTU.AT | AU | 5.0% | Neutral | 9.4 | AUD |
| Telecommunication Services | TPG TELECOM LTD | TPM.AT | AU | 3.0% | | | |
| Utilities | AGL ENERGY LTD | AGL.AT | AU | 2.2% | Neutral | 16.5 | AUD |

Source: UBS Quantitative Database

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# UBS Equity Quantitative Research publications

## Monographs

| Title | Date |
| --- | --- |
| Dynamic Asset Allocation | Nov-15 |
| Who benefits from automation? | Nov 15 |
| The Spectre of Equity-Bond allocation | Nov-15 |
| Q-Series® How will demographics shape investing? | Nov-15 |
| Surfing the Macro Wave | Sep-15 |
| Why blame Risk-parity and CTAs? | Sep-15 |
| Cash or Shares? DRPs in Australia | Sep-15 |
| Bonds are better: asset allocation in target dated… | Sep-15 |
| Where are the best dividends? | Aug-15 |
| Low-risk investing: perhaps not everywhere | Jul-15 |
| Lessons from Behavioural Finance | Jul-13 |
| The madness of crowds | Jul-15 |
| Understanding Size Investing | Jun-15 |
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| Profiting from cross-asset seasonality | Apr-15 |
| Extending our quality model to Financials | Mar-15 |
| Stock selection using machine learning | Jan-15 |
| Where are the crowded trades? | Jan-15 |
| Investing in Growth | Jan-15 |
| Harvesting Cross-Asset Value | Dec-14 |
| How to avoid 'Torpedoes' | Nov-14 |
| US Quantitative Conference Highlights | Nov-14 |
| What happens when volatility normalises? | Oct-14 |

## Academic Research Monitor

| Topic | Date |
| --- | --- |
| Value Investing | Dec-15 |
| UBS Market Microstructure Conference | Oct-15 |
| Equity Risk Premium Forecasting & Market Timing | Sep-15 |
| Behavioural Investing Patterns | Jul-15 |
| Quality and Size Investing | May-15 |
| UBS Quantitative Conference Highlights | Apr-15 |
| Smart Betas, Factors and Style Investing | Feb-15 |
| Momentum Investing | Jan-15 |
| Investment Strategies and Textual Analysis Signals | Dec-14 |
| Commodity Risk & Institutional Investing Habits | Nov-14 |
| Index Membership, Investor (in)attention to News & Spurious Correlations | Sep-14 |
| Forecasting the Equity Risk Premium | Aug-14 |
| Implied Cost of Capital & Shorting Premium | Jun-14 |
| European Quantitative Conference Highlights | May-14 |
| Trend Following | Mar-14 |
| Factor investing & Quality | Feb-14 |
| Quality & Gross Profitability | Jan-14 |
| Minimum variance: valuation, concentration and exchange rates | Dec-13 |
| Liquidity & back test overfitting | Oct-13 |
| News and its effect on asset prices | Sep-13 |
| Asset pricing & skewness | Aug-13 |
| Timing momentum & risk parity | Jul-13 |

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# Appendix A: Discounted FCF Model specification

In this monograph we use a four-stage discounted cash flow model with the following assumptions:

We use consensus forecast data for expected cash flows for the next 3-5 periods. Specifically, we use the IBES item called Free Cash Flow to Equity.

We use a discount rate determined by the traditional CAPM, except for a Vasicek (1973) adjustment made to the beta coefficient. The adjustment improves the statistical accuracy of the risk premium. The discount rate is specified as follows:

$$r = r_f + \beta_{vasicek}(r_m - r_f)$$

Where $r_f$ is the yield on 10-year government bonds, $r_m$ is the consensus 12 month forward earnings yield of the local market and $\beta_{vasicek}$ is specified as follows:

$$\beta_{vasicek} = \frac{SE_{sector}{}^2}{SE_{sector}{}^2 + SE_{company}{}^2} \times \beta_{company} + \frac{SE_{company}{}^2}{SE_{sector}{}^2 + SE_{company}{}^2} \times \beta_{sector}$$

Where $SE_{sector}$ is the standard error of all the company betas[13] for companies within a particular sector in cross-section, $SE_{company}$ is the standard error of the company beta over time. The Vasicek (1973) adjustment applies the largest adjustment to those betas with the highest standard error and the least adjustment to those with the smallest.

We assume that cash flows grow at the expected rate of GDP growth into perpetuity. The growth rate is determined by the GDP model in our recent work on demographics.

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The above assumptions lead to the final version of the model, where we estimate the value of a company as:

$$V_0 = \frac{FCFE_1}{(1+r)^t} + \frac{FCFE_2}{(1+r)^{t+1}} + \frac{FCFE_3}{(1+r)^{t+2}} + \frac{\dfrac{FCFE_3 \times (1+g)}{r-g}}{(1+r)^{t+3}}$$

Where $FCFE$ is the UBS or consensus free cash flow to equity forecast, $r$ is the discount rate, $g$ is the growth rate in perpetuity (which we proxy with the demographic-implied growth rate and inflation forecast as discussed in the paper) and $t$ is an estimate of the time until $FCFE$ is earned by the firm.

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[13] We use a 5-year monthly beta calculated relative to the local market, supplied by FactSet.

# Appendix B: IC results

These results show the rank correlation between the Value model score and the subsequent return over the next 12 months. Financials are excluded.

**Figure 20: 12m rank IC – Asia ex Japan ex Financials – All Caps**
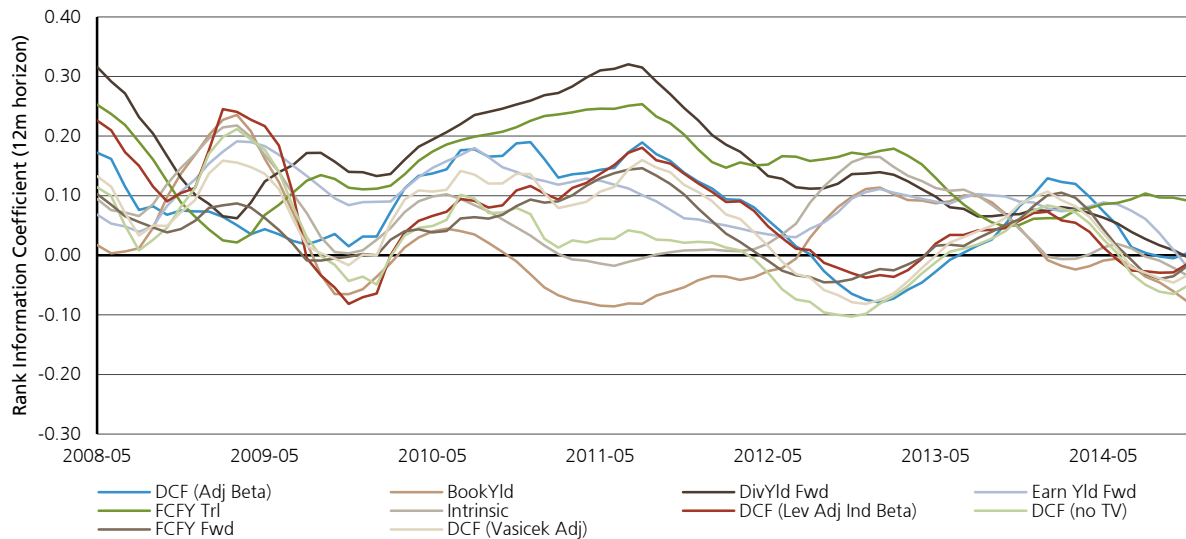


Source: UBS Quantitative Database. Universe is DJ Asia ex Japan, ex Financials.

**Figure 21: 12m rank IC – Asia ex Japan ex Financials – Large Caps**
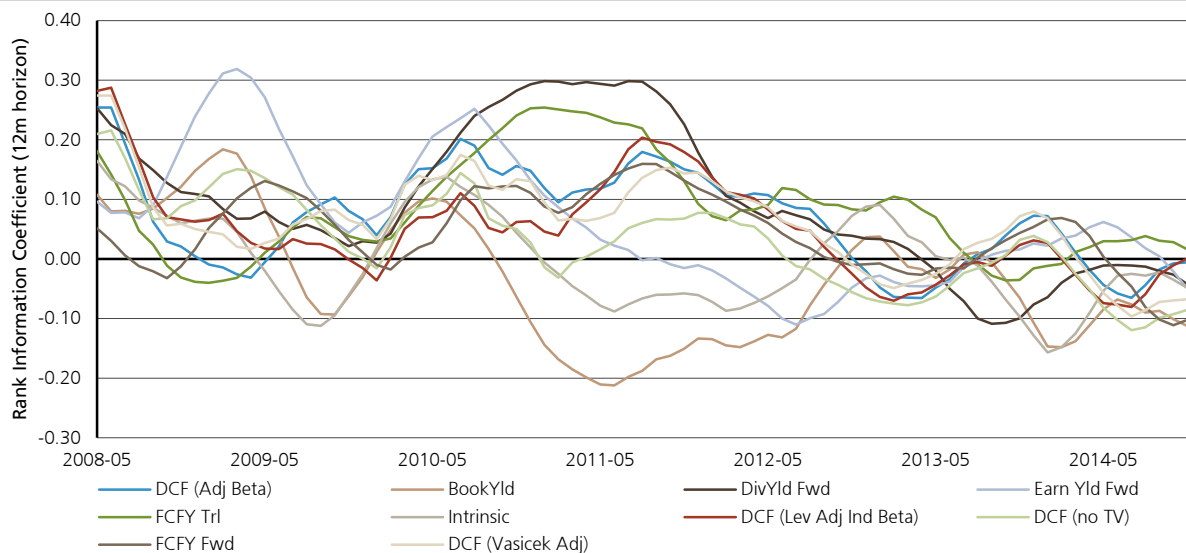


Source: UBS Quantitative Database. Universe is MSCI AC Asia ex Japan, ex Financials.

**Figure 22: 12m rank IC – Europe ex Financials – All Caps**
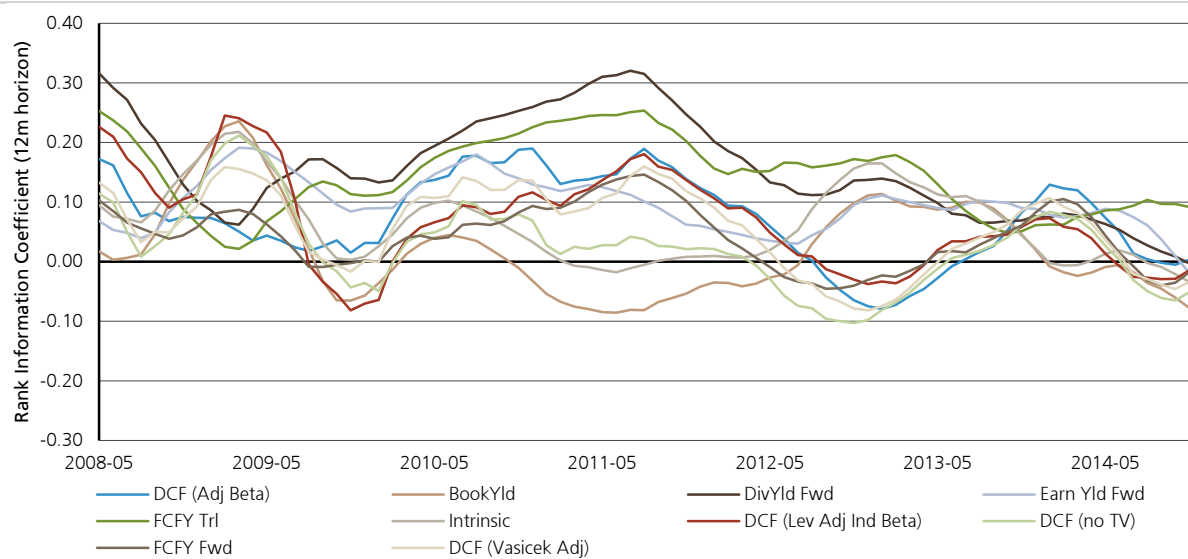


Source: UBS Quantitative Database. Universe is DJ Europe, ex Financials.

**Figure 23: 12m rank IC – Europe ex Financials – Large Caps**
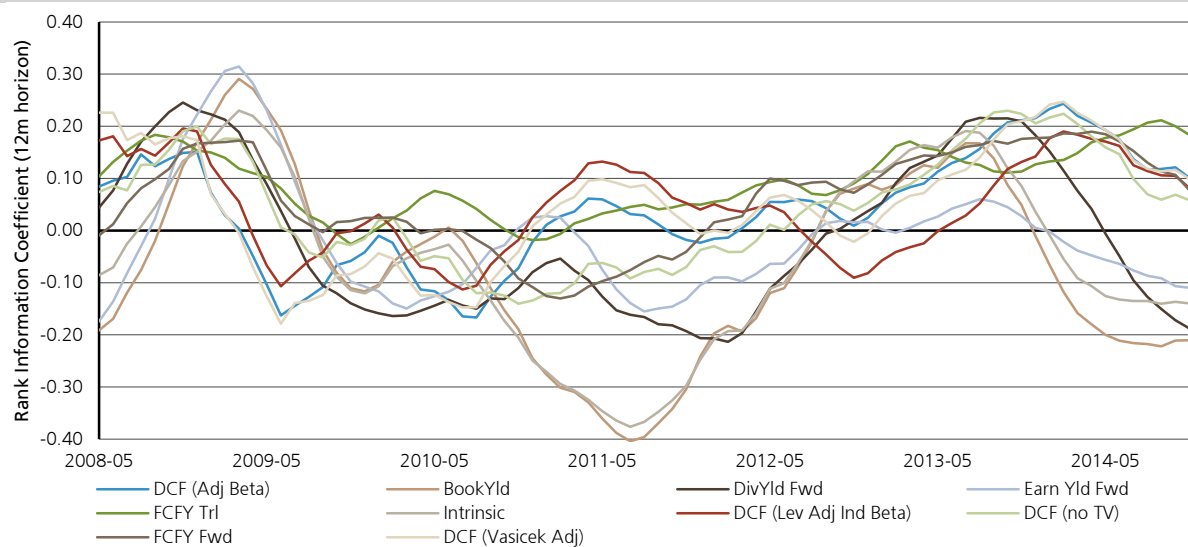


Source: UBS Quantitative Database. Universe is MSCI Europe, ex Financials.

# Appendix C: Backtest results

These results are cap-weighted and sector neutral unless otherwise stated. To form sector-neutral cap-weighted portfolios we reweight the portfolio back to benchmark sector weights e.g. if Utilities represent 10% of the benchmark then Utilities will form 10% of each portfolio. Results are calculating using long/short thirds portfolios, each side adjusted to be beta-neutral. Financials are excluded. Charts show the rolling 12m long-short return.

**Figure 24: 12m rolling returns – Asia ex Japan ex Financials – All Caps**
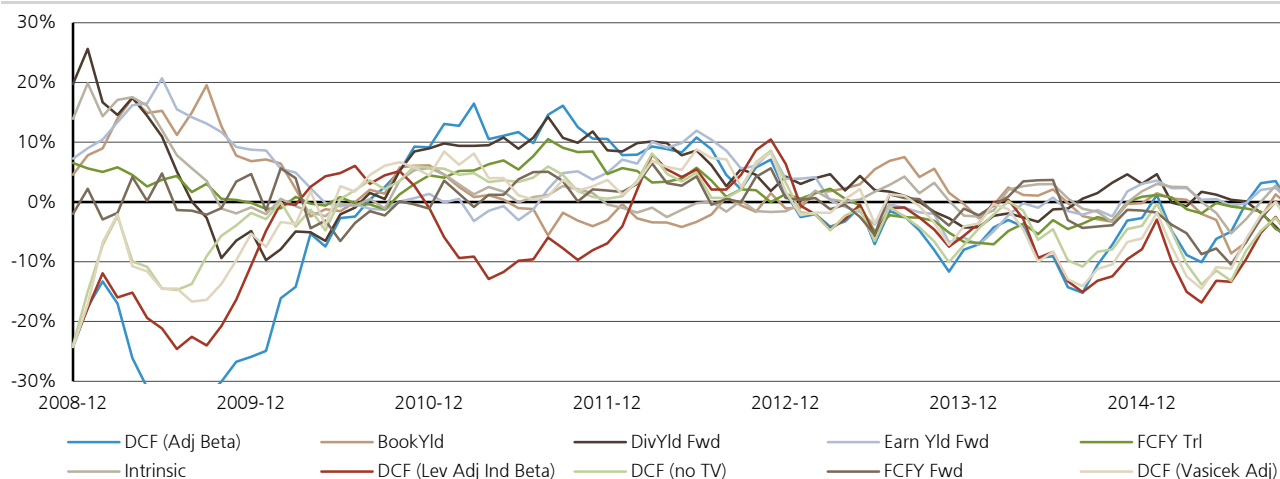


Source: UBS Quantitative Database. See the start of this section for detailed notes. Universe is DJ Asia ex Japan, ex Financials.

**Figure 25: 12m rolling returns – Asia ex Japan ex Financials – Large Caps**
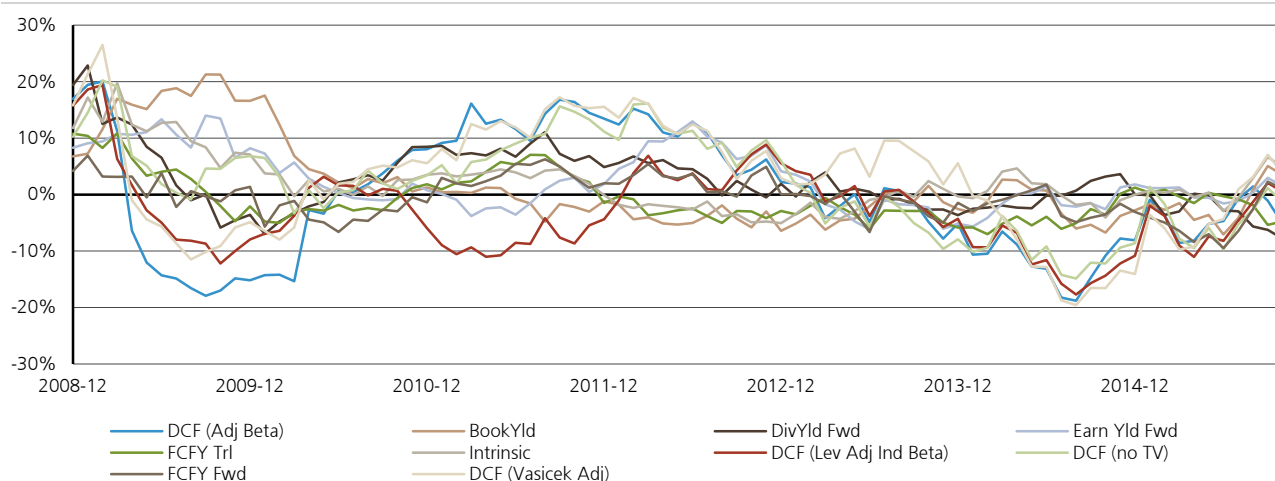


Source: UBS Quantitative Database. See the start of this section for detailed notes. Universe is MSCI AC Asia ex Japan, ex Financials.

**Figure 26: 12m rolling returns – Europe ex Financials – All Caps**
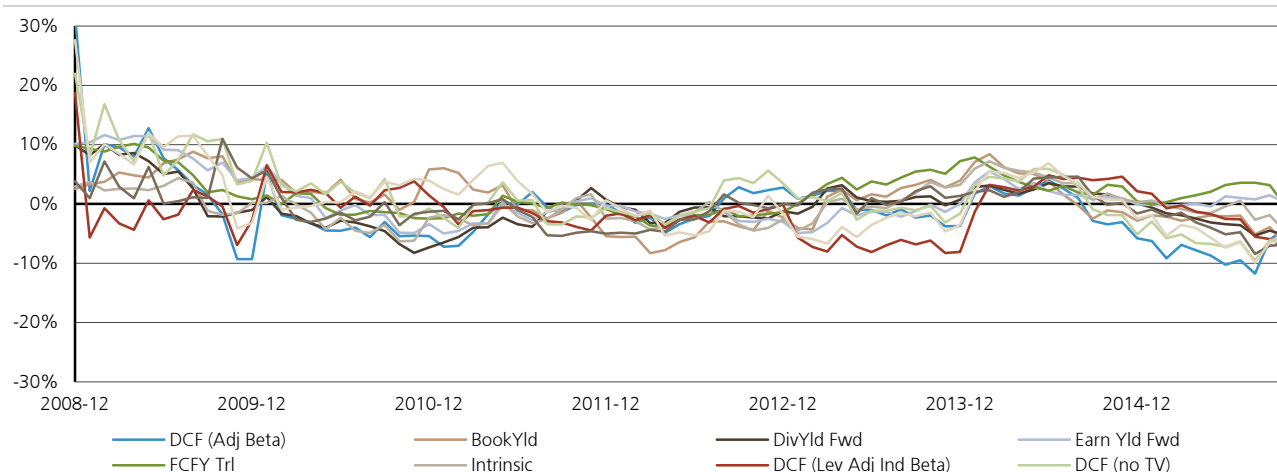


| | | | |
|---|---|---|---|
| —— DCF (Adj Beta) | —— BookYld | —— DivYld Fwd | —— Earn Yld Fwd |
| —— FCFY Trl | —— Intrinsic | —— DCF (Lev Adj Ind Beta) | —— DCF (no TV) |

Source: UBS Quantitative Database. See the start of this section for detailed notes. Universe is DJ Europe, ex Financials.

**Figure 27: 12m rolling returns – Europe ex Financials – Large Caps**
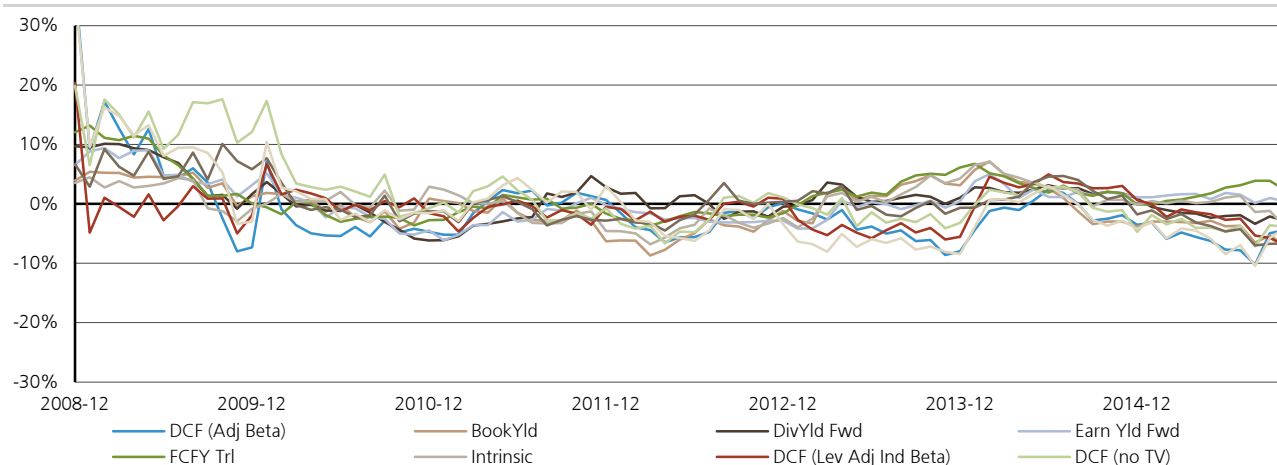


| | | | |
|---|---|---|---|
| —— DCF (Adj Beta) | —— BookYld | —— DivYld Fwd | —— Earn Yld Fwd |
| —— FCFY Trl | —— Intrinsic | —— DCF (Lev Adj Ind Beta) | —— DCF (no TV) |

Source: UBS Quantitative Database. See the start of this section for detailed notes. Universe is MSCI Europe, ex Financials.

# Appendix D: Summary Statistics

Factors with a T-Statistic >= 2 are highlighted

**Figure 28: Value Statistics**

| | | Cheap minus Everything | | | | | Cheap minus Expensive | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cap Weighted** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** |
| **Asia ex Japan - All Caps** | FCFY Trail | 2.4% | 4.4% | 0.55 | 1.55 | FCFY Trail | 9.0% | 9.5% | 0.94 | 2.66 |
| | Div Yld Fwd | 3.9% | 7.2% | 0.54 | 1.51 | Earn Yld Fwd | 5.9% | 10.0% | 0.59 | 1.67 |
| | Earn Yld Fwd | 2.9% | 5.6% | 0.52 | 1.47 | DCF (Adj Beta) | 6.8% | 13.3% | 0.51 | 1.43 |
| | Intrinsic | 2.2% | 5.5% | 0.39 | 1.11 | FCFY Fwd | 4.1% | 8.7% | 0.47 | 1.31 |
| | BookYld | 0.5% | 6.8% | 0.08 | 0.21 | DCF (no TV) | 5.0% | 11.8% | 0.42 | 1.19 |
| | DCF (Adj Beta) | -0.4% | 10.7% | -0.04 | -0.11 | Div Yld Fwd | 5.7% | 14.9% | 0.38 | 1.08 |
| | FCFY Fwd | -0.7% | 7.1% | -0.10 | -0.28 | DCF (Vasicek Adj) | 4.2% | 11.6% | 0.36 | 1.01 |
| | DCF (no TV) | -2.3% | 9.7% | -0.23 | -0.66 | Intrinsic | 3.0% | 9.7% | 0.31 | 0.88 |
| | DCF (Vasicek Adj) | -2.6% | 10.5% | -0.25 | -0.69 | DCF (Lev Adj Ind Beta) | 2.0% | 10.9% | 0.18 | 0.52 |
| | DCF (Lev Adj Ind Beta) | -3.2% | 9.6% | -0.33 | -0.93 | BookYld | 0.2% | 10.8% | 0.02 | 0.05 |
| **Cap Weighted** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** |
| **Asia ex Japan - Large Caps** | Intrinsic | 4.2% | 6.3% | 0.67 | 1.88 | DCF (Adj Beta) | 11.6% | 12.4% | 0.94 | 2.64 |
| | Div Yld Fwd | 3.9% | 7.0% | 0.56 | 1.57 | DCF (no TV) | 9.4% | 10.9% | 0.87 | 2.44 |
| | DCF (Adj Beta) | 4.0% | 9.2% | 0.44 | 1.23 | DCF (Vasicek Adj) | 9.9% | 11.7% | 0.85 | 2.39 |
| | Earn Yld Fwd | 2.5% | 5.8% | 0.43 | 1.21 | DCF (Lev Adj Ind Beta) | 7.1% | 11.2% | 0.64 | 1.79 |
| | BookYld | 2.1% | 6.9% | 0.30 | 0.86 | FCFY Trail | 5.8% | 9.5% | 0.61 | 1.72 |
| | DCF (Vasicek Adj) | 2.1% | 8.6% | 0.25 | 0.70 | FCFY Fwd | 4.7% | 9.0% | 0.52 | 1.46 |
| | FCFY Fwd | 1.3% | 6.1% | 0.22 | 0.61 | Div Yld Fwd | 6.1% | 12.3% | 0.49 | 1.39 |
| | DCF (no TV) | 1.7% | 8.5% | 0.20 | 0.57 | Earn Yld Fwd | 4.2% | 10.5% | 0.40 | 1.14 |
| | FCFY Trail | 0.6% | 4.6% | 0.12 | 0.34 | Intrinsic | 3.3% | 11.4% | 0.29 | 0.82 |
| | DCF (Lev Adj Ind Beta) | 0.0% | 8.6% | 0.00 | 0.00 | BookYld | 1.2% | 12.4% | 0.09 | 0.26 |
| **Cap Weighted** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** |
| **Europe - All Caps** | FCFY Trail | 4.1% | 4.4% | 0.94 | 2.64 | FCFY Trail | 8.6% | 7.7% | 1.13 | 3.17 |
| | DCF (Vasicek Adj) | 2.6% | 8.3% | 0.32 | 0.89 | DCF (Vasicek Adj) | 6.4% | 13.7% | 0.46 | 1.31 |
| | DCF (Adj Beta) | 1.9% | 8.1% | 0.23 | 0.65 | DCF (Lev Adj Ind Beta) | 3.7% | 13.0% | 0.28 | 0.80 |
| | FCFY Fwd | 0.0% | 5.5% | 0.01 | 0.02 | FCFY Fwd | 2.3% | 8.2% | 0.28 | 0.79 |
| | DCF (Lev Adj Ind Beta) | 0.0% | 6.8% | 0.01 | 0.02 | DCF (Adj Beta) | 1.8% | 10.7% | 0.17 | 0.48 |
| | DCF (no TV) | -0.4% | 8.6% | -0.04 | -0.13 | Div Yld Fwd | 0.0% | 9.4% | 0.00 | -0.01 |
| | Div Yld Fwd | -0.3% | 4.9% | -0.07 | -0.19 | DCF (no TV) | -0.4% | 10.7% | -0.03 | -0.09 |
| | Intrinsic | -1.3% | 6.0% | -0.22 | -0.62 | Earn Yld Fwd | -1.5% | 7.7% | -0.19 | -0.54 |
| | Earn Yld Fwd | -1.1% | 4.4% | -0.25 | -0.71 | Intrinsic | -3.0% | 10.3% | -0.29 | -0.82 |
| | BookYld | -2.0% | 7.3% | -0.27 | -0.77 | BookYld | -4.4% | 12.3% | -0.36 | -1.00 |
| **Cap Weighted** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** | **ValueModel** | **Return** | **Risk** | **Sharpe** | **TStat** |
| **Europe - Large Caps** | FCFY Trail | 4.3% | 4.7% | 0.92 | 2.59 | FCFY Trail | 8.7% | 8.1% | 1.07 | 3.02 |
| | DCF (Vasicek Adj) | 3.7% | 8.4% | 0.44 | 1.24 | DCF (Vasicek Adj) | 7.3% | 14.5% | 0.51 | 1.42 |
| | DCF (Adj Beta) | 0.9% | 9.4% | 0.10 | 0.28 | DCF (Lev Adj Ind Beta) | 3.4% | 12.9% | 0.26 | 0.74 |
| | Div Yld Fwd | 0.5% | 5.3% | 0.10 | 0.28 | FCFY Fwd | 1.5% | 8.4% | 0.18 | 0.51 |
| | DCF (Lev Adj Ind Beta) | -0.7% | 7.2% | -0.09 | -0.26 | Div Yld Fwd | 0.9% | 9.7% | 0.09 | 0.26 |
| | DCF (no TV) | -1.2% | 8.6% | -0.14 | -0.38 | DCF (Adj Beta) | 0.1% | 12.5% | 0.01 | 0.03 |
| | FCFY Fwd | -0.8% | 5.4% | -0.15 | -0.43 | DCF (no TV) | -2.1% | 12.5% | -0.17 | -0.47 |
| | Earn Yld Fwd | -1.2% | 4.5% | -0.27 | -0.76 | Earn Yld Fwd | -1.9% | 8.3% | -0.23 | -0.65 |
| | Intrinsic | -1.6% | 5.9% | -0.27 | -0.76 | Intrinsic | -3.3% | 10.5% | -0.32 | -0.90 |
| | BookYld | -2.1% | 6.2% | -0.33 | -0.93 | BookYld | -5.0% | 11.9% | -0.42 | -1.17 |

Source: UBS Quantitative Database. Financials are excluded.

**Figure 29: Value Statistics (Sector Neutral)**

| Cap Weighted | Cheap minus Everything | | | | | Cheap minus Expensive | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ValueModel | Return | Risk | Sharpe | TStat | ValueModel | Return | Risk | Sharpe | TStat |
| **Asia ex Japan - All Caps** | Earn Yld Fwd | 3.5% | 5.0% | 0.69 | 1.95 | Earn Yld Fwd | 6.9% | 9.3% | 0.75 | 2.10 |
| | Div Yld Fwd | 4.2% | 6.7% | 0.62 | 1.76 | FCFY Trail | 5.9% | 8.2% | 0.72 | 2.03 |
| | Intrinsic | 2.6% | 5.5% | 0.48 | 1.35 | Div Yld Fwd | 8.7% | 13.3% | 0.65 | 1.84 |
| | BookYld | 2.0% | 6.5% | 0.31 | 0.86 | Intrinsic | 3.9% | 9.4% | 0.42 | 1.18 |
| | FCFY Trail | 0.6% | 3.9% | 0.15 | 0.42 | DCF (no TV) | 5.4% | 13.3% | 0.41 | 1.15 |
| | FCFY Fwd | 0.3% | 7.3% | 0.04 | 0.12 | FCFY Fwd | 2.5% | 9.3% | 0.27 | 0.75 |
| | DCF (Vasicek Adj) | -4.5% | 10.5% | -0.43 | -1.22 | BookYld | 2.0% | 9.6% | 0.21 | 0.58 |
| | DCF (no TV) | -4.5% | 9.5% | -0.47 | -1.34 | DCF (Adj Beta) | 2.4% | 13.9% | 0.18 | 0.50 |
| | DCF (Adj Beta) | -5.5% | 11.2% | -0.49 | -1.38 | DCF (Vasicek Adj) | 1.8% | 14.1% | 0.13 | 0.37 |
| | DCF (Lev Adj Ind Beta) | -7.3% | 10.1% | -0.72 | -2.02 | DCF (Lev Adj Ind Beta) | -0.1% | 12.6% | -0.01 | -0.02 |
| **Asia ex Japan - Large Caps** | Earn Yld Fwd | 3.6% | 5.8% | 0.63 | 1.78 | DCF (no TV) | 11.8% | 10.5% | 1.12 | 3.15 |
| | Intrinsic | 3.5% | 5.8% | 0.61 | 1.71 | DCF (Vasicek Adj) | 11.8% | 11.8% | 1.01 | 2.83 |
| | Div Yld Fwd | 3.4% | 6.2% | 0.54 | 1.51 | DCF (Adj Beta) | 8.5% | 11.4% | 0.75 | 2.11 |
| | DCF (Vasicek Adj) | 3.7% | 9.0% | 0.42 | 1.17 | Earn Yld Fwd | 6.5% | 9.4% | 0.69 | 1.95 |
| | BookYld | 2.5% | 6.2% | 0.40 | 1.13 | DCF (Lev Adj Ind Beta) | 5.9% | 10.3% | 0.57 | 1.61 |
| | DCF (no TV) | 2.5% | 8.6% | 0.29 | 0.82 | Intrinsic | 4.8% | 10.0% | 0.48 | 1.36 |
| | FCFY Fwd | 0.8% | 6.2% | 0.13 | 0.37 | Div Yld Fwd | 4.9% | 11.5% | 0.43 | 1.21 |
| | DCF (Adj Beta) | 1.0% | 8.8% | 0.12 | 0.32 | FCFY Trail | 3.5% | 9.3% | 0.37 | 1.05 |
| | FCFY Trail | -0.5% | 4.6% | -0.11 | -0.32 | FCFY Fwd | 2.4% | 9.6% | 0.25 | 0.71 |
| | DCF (Lev Adj Ind Beta) | -1.7% | 8.2% | -0.20 | -0.57 | BookYld | 1.9% | 10.6% | 0.18 | 0.49 |
| **Europe - All Caps** | FCFY Trail | 1.8% | 3.2% | 0.57 | 1.60 | FCFY Trail | 5.9% | 7.4% | 0.79 | 2.22 |
| | Earn Yld Fwd | 1.0% | 3.5% | 0.29 | 0.80 | DCF (Vasicek Adj) | 4.6% | 9.0% | 0.51 | 1.43 |
| | DCF (no TV) | 2.2% | 8.3% | 0.26 | 0.73 | DCF (Lev Adj Ind Beta) | 2.5% | 8.2% | 0.31 | 0.86 |
| | DCF (Vasicek Adj) | 2.1% | 8.5% | 0.25 | 0.70 | DCF (Adj Beta) | 1.7% | 9.8% | 0.18 | 0.50 |
| | DCF (Adj Beta) | 1.0% | 9.5% | 0.11 | 0.30 | DCF (no TV) | 0.9% | 10.7% | 0.08 | 0.24 |
| | DCF (Lev Adj Ind Beta) | 0.7% | 9.1% | 0.08 | 0.21 | Earn Yld Fwd | 0.1% | 6.6% | 0.02 | 0.05 |
| | BookYld | -0.1% | 4.9% | -0.02 | -0.04 | Div Yld Fwd | 0.0% | 7.5% | 0.00 | 0.01 |
| | FCFY Fwd | -0.4% | 6.0% | -0.06 | -0.18 | FCFY Fwd | -1.1% | 8.4% | -0.13 | -0.36 |
| | Div Yld Fwd | -0.3% | 3.6% | -0.09 | -0.24 | Intrinsic | -1.7% | 7.8% | -0.22 | -0.62 |
| | Intrinsic | -0.7% | 4.3% | -0.17 | -0.48 | BookYld | -2.0% | 8.8% | -0.22 | -0.62 |
| **Europe - Large Caps** | FCFY Trail | 2.0% | 3.1% | 0.63 | 1.76 | FCFY Trail | 6.1% | 8.2% | 0.75 | 2.12 |
| | DCF (no TV) | 2.9% | 8.5% | 0.35 | 0.98 | DCF (Vasicek Adj) | 2.3% | 9.8% | 0.24 | 0.67 |
| | Div Yld Fwd | 0.9% | 3.4% | 0.25 | 0.71 | Div Yld Fwd | 1.7% | 7.4% | 0.23 | 0.66 |
| | DCF (Vasicek Adj) | 1.7% | 9.6% | 0.18 | 0.51 | DCF (Lev Adj Ind Beta) | 1.9% | 8.8% | 0.22 | 0.62 |
| | Earn Yld Fwd | 0.5% | 3.5% | 0.15 | 0.43 | DCF (Adj Beta) | 1.6% | 9.6% | 0.17 | 0.47 |
| | DCF (Adj Beta) | 1.2% | 9.2% | 0.13 | 0.36 | DCF (no TV) | 0.9% | 10.8% | 0.08 | 0.23 |
| | DCF (Lev Adj Ind Beta) | 0.9% | 9.1% | 0.10 | 0.27 | Earn Yld Fwd | -0.1% | 6.9% | -0.02 | -0.04 |
| | FCFY Fwd | 0.5% | 5.2% | 0.09 | 0.25 | FCFY Fwd | -1.5% | 8.2% | -0.18 | -0.51 |
| | Intrinsic | -0.3% | 4.1% | -0.07 | -0.18 | Intrinsic | -1.7% | 8.1% | -0.21 | -0.60 |
| | BookYld | -1.1% | 4.2% | -0.26 | -0.73 | BookYld | -2.9% | 8.5% | -0.35 | -0.97 |

Source: UBS Quantitative Database. Financials are excluded.

**Statement of Risk**

Our quantitative models rely on reported financial statement information, consensus earnings forecasts and stock prices. Errors in these numbers are sometimes impossible to prevent (as when an item is misstated by a company). Also, the models employ historical data to estimate the efficacy of stock selection strategies and the relationships among strategies, which may change in the future. Additionally, unusual company-specific events could overwhelm the systematic influence of the strategies used to rank and score stocks.

# Required Disclosures

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| 12-Month Rating | Definition | Coverage[1] | IB Services[2] |
|---|---|---|---|
| **Buy** | FSR is > 6% above the MRA. | 49% | 33% |
| **Neutral** | FSR is between -6% and 6% of the MRA. | 40% | 26% |
| **Sell** | FSR is > 6% below the MRA. | 12% | 18% |
| **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 30 September 2015.
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.
3:Percentage of companies under coverage globally within the Short-Term rating category. 4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

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