Global Quantitative Research Monographs
Investing in Value

Equities

Global
Quantitative

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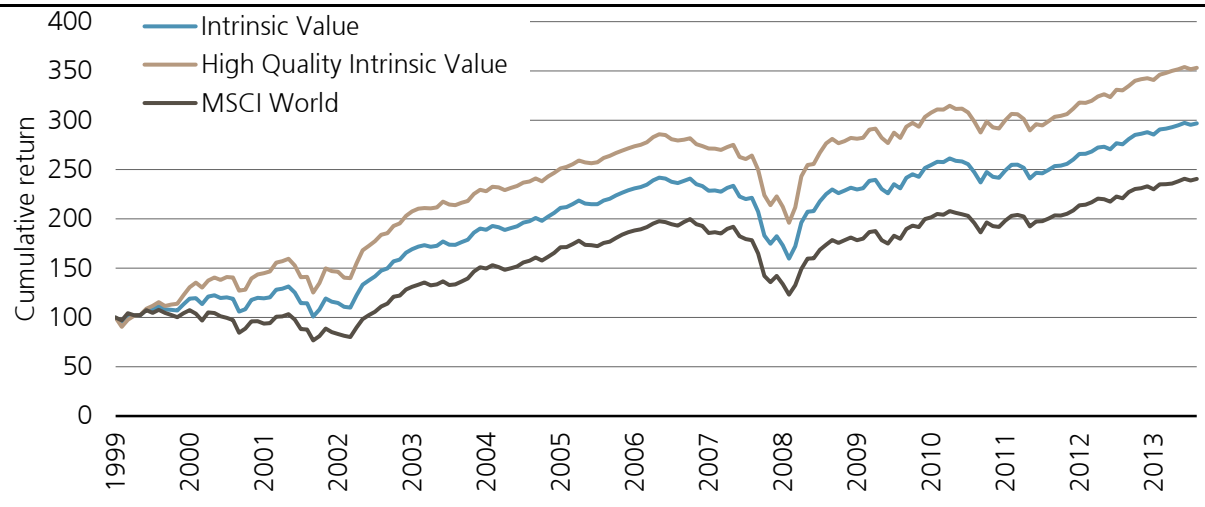
Post the Global Financial Crisis corporate earnings growth rates have slowed
In this environment defensive Value strategies have performed well, whilst risky Value strategies have struggled. Income stocks in particular are looking fully valued.

So where to from here - Value strategies: what works?
In a world of high earnings growth, investors focus on future earnings, as a consequence portfolios focussed on earnings yield perform best. However, when earnings growth rates slow, investors' focus on what they currently have, that is, book value and dividends.

Introducing our Intrinsic Value model
We have developed an intrinsic value model that distils value into two components; book value and the present value of expected future cash flows. Our model differs from traditional models in that we use cash flows instead of net income (thereby eliminating accruals), and we discount the cash flows using the volatility of cash flows.

How does the UBS Intrinsic Value model perform?
The UBS Intrinsic Value model with a Quality overlay outperforms the market by 7.7% per annum with a tracking error of 8.3% and an Information Ratio of 0.93. In the current environment, we recommend holding good Quality stocks with high Intrinsic Value to price.

Figure 1: Good Quality, High Intrinsic Value stocks vs MSCI World (equal weighted)



Source: Thomson Reuters, UBS, Universe: MSCI World

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Introduction

Post the Global Financial Crisis corporate earnings growth rates have slowed. In fact, seven years on from the start of the crisis we have only just exceeded pre crisis peak earnings.

In this environment defensive Value strategies (such as those focussed on high dividend yields) have performed well, whilst cyclical and risky Value strategies (such as those focussed on Price-to-Earnings (PE) and Price-to-Book (PB) ratios) have underperformed. Income stocks in particular are now looking fully valued. So, where to from here? And can high dividend yielding stocks run further?

The answer depends on the drivers of risky and cyclical Value versus defensive Value. There are two key drivers of Value today: slower global earnings growth, and an increased demand for income producing stocks.

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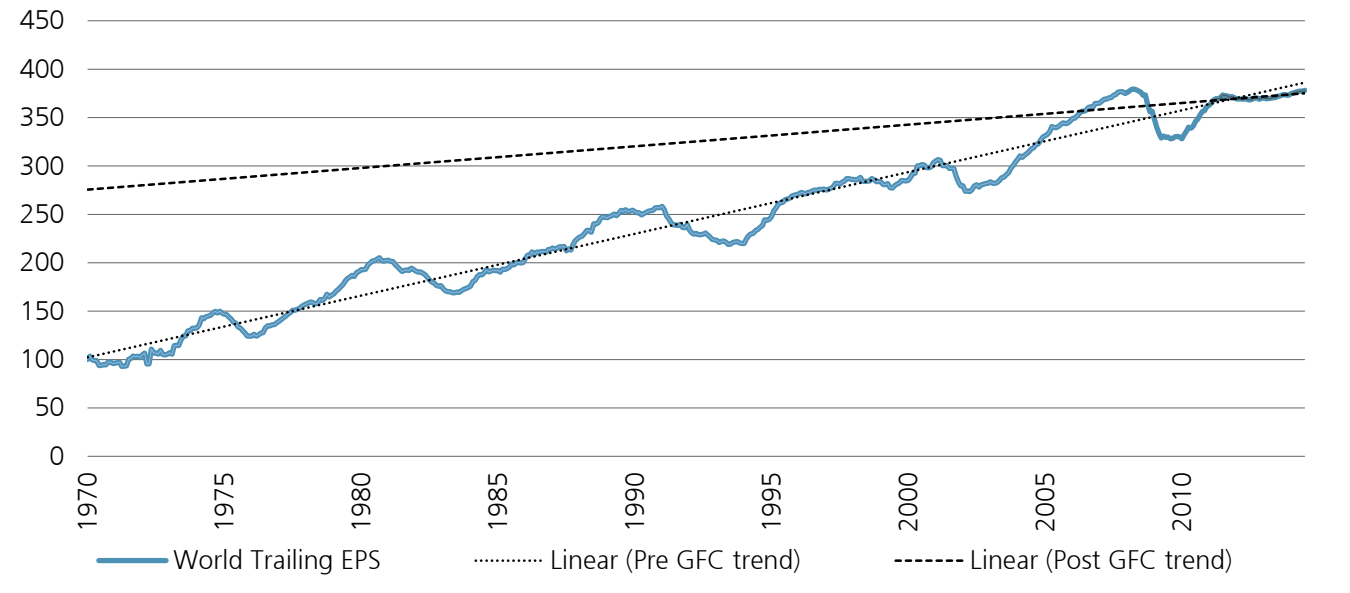
Slow growth

From 1983 to 2007 the world earnings growth rate averaged 8.4%. Post the Global Financial Crisis earnings growth rates have slowed and are now running at 1.6% over the past 12 months. To put this into context, long-term growth in the US (1870 to 2014) has averaged 4.8% per annum. As a consequence of this slower growth, risky and cyclical Value strategies have struggled, whilst defensive Value strategies have performed well.

Figure 2: World earnings index (cumulative simple active returns)



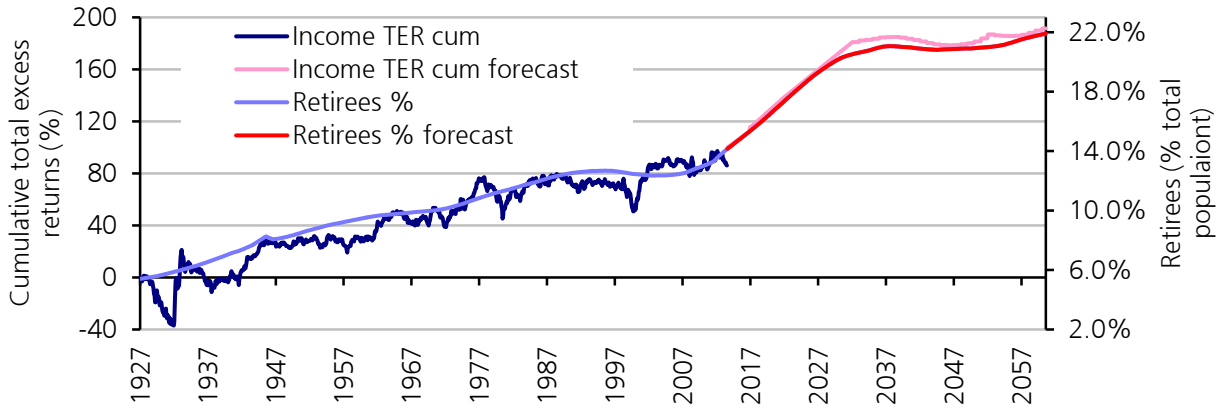
Source: Thomson Reuters, UBS; Universe: MSCI World

Note: Pre-GFC is defined as 1970 to 2007, Post-GFC is defined as 2011 to 2014.

Baby-Boomers retiring

At the same time as we are experiencing a world of significantly lower earnings growth we are also experiencing a significant increase in the percentage of the population that is retired. According to the Behavioural Lifecycle Theory (Shefrin & Thaler, 1988) as investors approach retirement they are likely to rotate their portfolios out of risky assets and into more defensive, income yielding assets. As a consequence of this shift there has been a significant pickup in demand for income producing stocks. (see Winter et al 2013).

Figure 3: Outperformance of high dividend yield relative to retirees as a percentage of the total population (US data)



Source: Thomson Reuters, Fama-French, Haver, UBS

As a result of lower earnings growth rates, and Baby-Boomers retiring and rotating their portfolios into income producing assets, defensive value strategies, especially income strategies, have performed well and are likely to continue to do so.

Given that high dividend yielding stocks are now looking fully valued, we develop an approach to investing in defensive value stocks without explicitly investing in high dividend yield as a strategy.

Understanding Value?

Value: Framing our discussion

Earnings yield (EY): Companies that look cheap on an earnings yield basis are typically either businesses whose earnings are in decline and are likely to recover with a shift in the economic cycle, or whose earnings have been significantly above historical trends and are likely to revert. As a result, companies that are cheap on an earnings yield basis are typically cyclical.

Book-to-price (BP): Companies that look cheap on a book-to-price basis are typically risky, 'deep value', or more appropriately described as 'distressed value'. The reason they are trading close to or below book value is that the market is pricing them in the absence of earnings and at a price the assets could be sold for.

Dividend yield (DY): Companies that look cheap on a dividend yield basis are typically mature businesses where growth has slowed and they are now paying out profits to shareholders as management struggle to find growth opportunities.

Of course each of these strategies is quite different and is likely to find you investing in very different stocks. Value stocks are represented in quintile five below.

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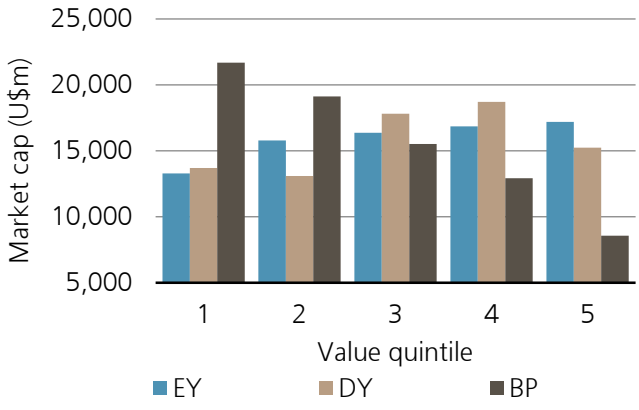
High earnings yield and dividend yield stocks tend to be larger (in terms of market capitalisation) with the exception of quintile five of dividend yield where the average size drops off. The reason for this is that a significant proportion of high dividend yielding stocks tend to be businesses that are in structural decline where the dividend is unlikely to be supported by earnings.

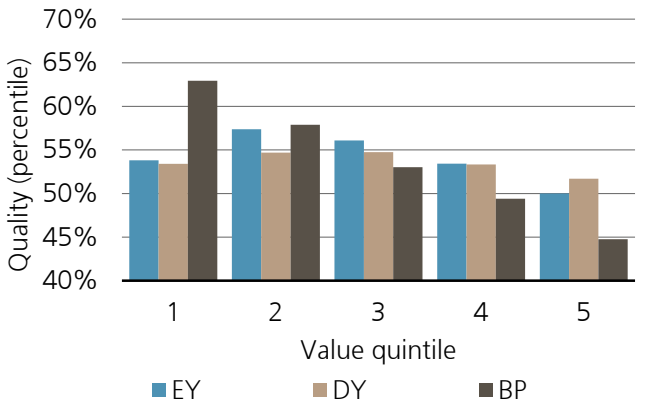
There is a strong relationship between book-to-price and size, with cheap stocks generally smaller (figure 4). There is also a significant relationship between our Absolute Quality metric (see 'Investing in Quality', Winter et al. ,2013) and book-to-price with cheap companies exhibiting significantly lower quality scores. There does not appear to be a significant relationship between Absolute Quality and earnings or dividend yield (figure 5).

Figure 4: Market cap of value quintiles



Source: Thomson Reuters, UBS; Universe: MSCI World

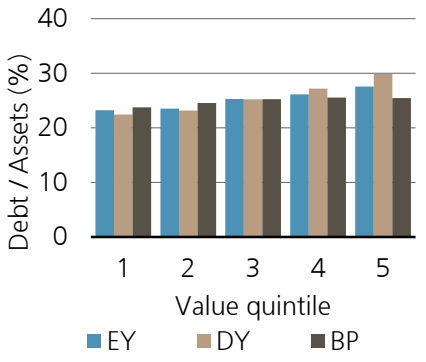
Figure 5: Quality percentile of value quintiles



Source: Thomson Reuters, UBS; Universe: MSCI World

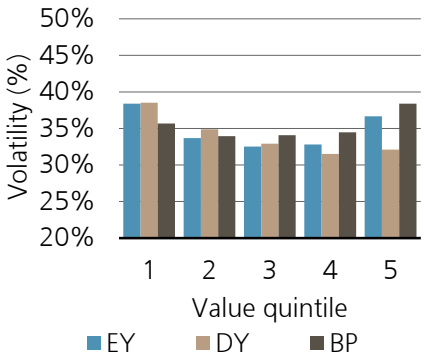
What is interesting is that in general Value stocks are more highly geared (figure 6). However, whilst high earnings yield and high book-to-price are more volatile (figure 7), high dividend yielding stocks exhibit significantly lower levels of volatility. As a consequence, cheap stocks on an earnings yield and book-to-price basis have very poor Merton (distance to default) scores, high dividend yielding stocks do indeed look less risky (figure 8).

Figure 6: Debt to assets



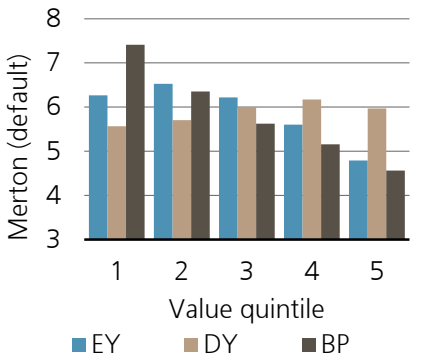
Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 7: Volatility



Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 8: Merton distance to default



Source: Thomson Reuters, UBS; Universe: MSCI World

As a consequence of these characteristics, we can classify high dividend yielding stocks as tending to display more defensive characteristics, whilst high book-to-price stocks tend to be more risky, and high earnings yield stocks tend to be under cyclical pressure, but are unlikely to be 'distressed' as they tend to be larger in size and of average Quality.

'Cyclical', 'defensive' and 'risky' value

Macroeconomic risk

Cyclical and defensive stocks have different sensitivities to macroeconomic risks. That is to say that cyclical stocks are more sensitive to weaknesses in the economic cycle than defensive stocks. As a result, cyclical value (EY) tends to underperform defensive value (DY) during the contraction and recession phases of the cycle and outperform during the recovery and expansion phase.

Understanding 'duration'

From a behavioural perspective, another way of thinking about the cyclical versus defensive characteristics of value is in terms of 'duration'. Within the equity market duration can be thought of as the certainty of returns that investors anticipate (Montier, 2004). Stock returns can be split into two components, capital appreciation and dividends. Given that future earnings are less certain than current dividends, the higher the dividend yield the shorter the duration on the stock. As future earnings growth rates increase, investor risk appetite increases, the equity risk premium falls, and cyclical stocks outperform defensive stocks. However, as earnings growth falls, investor risk appetite decreases, and defensive stocks perform well.

So what works now?

In a world of high earnings growth rates (the case for most of the past 30 years), investors have focussed on future earnings. As a consequence value strategies focussed on earnings yields performed well.

However, when earnings growth rates slow, investors focus on what they currently have, that is book value and dividends. As a consequence, defensive value (high dividend yielding stocks) tends to perform well.

So what is working in a post Global Financial Crisis world? With earnings growth rates remaining tepid corporate management have increased the payout to shareholders through dividends and buybacks. This has had the effect of increasing yields making those companies more attractive to 'income clientele'. With Baby-boomers approaching/entering retirement, the income clientele is a rapidly growing cohort. As a consequence, high dividend yielding stocks have performed well.

Can defensive value outperform risky and cyclical value? The answer depends upon your outlook for earnings growth. If you believe that earnings growth rates are likely to pick up from here and bond yields are likely to move higher, then cyclical and risky value are likely to perform well in such a scenario. However, if you believe that earnings growth rates are likely to remain tepid, then defensive value is likely to outperform.

We have attempted to develop a more intuitive way of thinking about value that is likely to overcome the problem of timing a switch between cyclical and defensive value. Furthermore, given that defensive value stocks are looking expensive, our approach provides an alternative to investing in defensive value without explicitly investing in dividend yield as a factor.

Introducing our Intrinsic Value model

We have developed an intrinsic value model that distils value into two components: book value and the present value of expected future cash flows. This approach to valuation stems from the Edwards-Bell-Ohlson (EBO) residual income model formalised in Ohlson (1995). In essence the model investigated in this monograph is a residual operating cash flow model because we use the average of a firm's net cash flows from operating activities over the last three years as a proxy for its earning power instead of its expected net income.

We have developed an intrinsic value model that distils value into two components: book value and the present value of expected future cash flows.

From a fundamental perspective, it makes sense to think of the value of a business as its net asset base (its book value) plus the sum of expected cash flows discounted at an appropriate rate. One advantage of taking this approach to valuation is that it considers the assets of the firm as well as the earning power of those assets. In contrast, conventional value metrics do not capture both parts of the value equation. For example, simply focussing on high book-to-price stocks tends to result in investments of the distressed value kind. These companies might not necessarily have the ability to generate cash flows for owners going forward. Similarly, focussing on a high forward earnings yield multiple would overlook the net asset base of companies. Furthermore, low earnings yield companies may not be attractive investments if the opportunity cost of funds as well as the quality and volatility of earnings are considered.

From a fundamental perspective, it makes sense to think of the value of a business as its net asset base (its book value) plus the sum of expected cash flows discounted at an appropriate rate.

By using book value and the present value of cash flows, our intrinsic value model captures both parts of the value equation. It also overcomes the limitations of a simple PE multiple in three ways:

Firstly, using cash flows instead of expected net income "lifts the veil" on those companies with low earnings quality because, unlike net income, net cash flow from operations is not affected by accruals[1].

Secondly, the model uses a hurdle rate that incorporates a time varying risk free rate.

Thirdly, the model incorporates the volatility of historical cash flows as a risk premium thereby emphasizing cash flow stability.

[1] Although book value is affected by accruals, we are especially interested in the quality of the earnings stream so we elect to measure the earnings stream exclusive of accrual accounting.

Literature Review

In 1938 John Burr Williams first articulated the idea that the value of any business is the present value of its future dividends. This led to the development of the dividend discount model (DDM) and provided the basis for specifying the relation between equity values and accounting variables. In the case of the EBO model these accounting variables include book value and earnings. Although there have been independent derivations of this model throughout history, theoretical papers written by Ohlson (1990, 1995) and Ohlson and Feltham (1995) are often credited for formalising the residual income model.

The EBO model is often considered as an alternative to the DDM for valuation in practice (Palepu, Bernard and Healy, 1996). However, it is important to realise that the EBO model and the DDM are equivalent under the same set of assumptions. Dechow, Hutton and Sloan (1999) conclude that while the EBO model is a restated and restricted version of the standard DDM, it "provides a parsimonious framework for incorporating information in earnings, book value and earnings forecasts in empirical research" (Dechow et al., 1999, p3).

In the literature there is a debate on the best way to specify the residual income model for the purposes of empirical research. The difference in recommended models and empirical conclusions may be explained by the fact that some studies focus on a model's ability to explain contemporaneous stock prices while others focus on a model's ability to predict future stock returns. The distinction is important because models using similar inputs might perform differently depending on the way the research is framed. In an effort to gain insight about the performance of different versions of the residual income model and to motivate the model specification used in this monograph, we review four widely cited empirical studies.

In their empirical study, Frankel and Lee (1998) evaluated two sets of residual income models. In both sets of models abnormal earnings in the final forecast period are assumed to continue in perpetuity. In one set of models the researchers used consensus analyst forecasts to arrive at intrinsic value, V_f, and in the second set of models they used historical earnings to arrive at intrinsic value, V_h. They found that V_f and V_h explain 70% and 49% of cross-sectional variation in stock prices respectively. The researchers also identified predictable errors in analyst forecasts and suggested that an investment strategy using a residual income model could be improved by adjusting for these errors. They reported that different discount rates had little effect on their results. The results of this study provide support for a residual income model based on analysts' earnings forecasts. However, it is interesting to note that they did not report the results of a back test for a model using historical earnings.

Consistent with Frankel and Lee (1998), Dechow et al. (1999) also found evidence of predictable errors in analysts' forecasts and went on to draw further conclusions. They reasoned that these predictable errors arise due to analysts being over-optimistic or over-pessimistic in their forecasts. The researchers found that residual income models that incorporate analysts' forecasted earnings are superior to residual income models that use current earnings for *explaining contemporaneous stock prices* but that the opposite is true for *predicting future stock returns*. These results led the researchers to conclude that investors naively price analysts' errors into current stock prices. Here we also find a logical basis for the use of historical earnings, instead of analyst forecasts, as an estimate of future earnings when specifying a model for a value-based investment strategy. Dechow

et al. (1999) used a constant discount rate of 12% for all models and tested several persistence factors for abnormal earnings.

Lee, Myers and Swamainathan (1999) modelled the time-series relation between price and intrinsic value as a co-integrated system for the Dow. Like Frankel and Lee (1998), they investigated residual income models based on consensus analyst forecasts of earnings as well as those based on historical earnings. They also assumed that abnormal earnings persist in perpetuity after the last forecast period.

Results indicated that the V/P ratio is more stationary and exhibits faster mean reversion than traditional value measures. The researchers showed that using a time varying risk free rate is the primary contributor to success on the basis of a model's predictive ability and tracking error for which they create an "efficient frontier". While their findings suggested that using analysts' forecasts are more efficient than using historical figures, models using historical earnings still performed well with one such model falling on their efficient frontier.

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Ali, Hwang and Trombley (2002) replicated the Frankel and Lee (1998) study with a longer data series. They also tested the significance of returns around earnings announcements after adjusting for risk factors including size. They concluded that the ability of the models to earn abnormal returns around earnings announcements suggests market inefficiency. Ali et al (2002) also investigated the same model based on historical earnings used by Dechow et al. (1999). On the basis of regression analysis, they concluded that models based on analyst forecasts are better for predicting future abnormal returns. We note, however, that the poor relative performance of the Dechow et al. (1999) model is likely due to its static discount rate rather than the use of historical earnings on the basis of the findings in Lee et al. (1999) above[2].

[2] The poorer showing may also be due to the use of a lower persistence factor, which would result in a greater emphasis on book value than on the present value of future earnings.

Model Specification

To summarise the derivation of the residual income model; an accounting principle known as the clean surplus relation allows for dividends to be specified in the following manner:

$$d_t = b_{t-1} + x_t - b_t$$

Where d_t represents the dividends paid during the period, b_{t-1} and b_t are beginning and ending book value respectively and x_t represents the net expected income for the period. Substitution into the DDM and algebraic manipulation leads to:

$$V_0 = b_0 + \sum_{t=1}^{\infty} \frac{x_t - r b_{t-1}}{(1+r)^t}$$

Where b_0 is current book value, $x_t - r b_{t-1}$ is the abnormal earnings in year t, r is the discount rate. The above equation is often presented as a one-stage model as follows:

$$V_0 = b_0 + \frac{b_0(ROE - r)\omega}{1 + r - \omega}$$

Where b_0 is current book value, ROE is the firm's future return on equity, r is the discount rate and ω is a persistence factor for abnormal earnings. The persistence factor can take any value between zero and one, where one assumes the amount of abnormal earnings will persist in perpetuity and zero assumes no persistence in abnormal earnings.

In this monograph we use a one-stage model with the following assumptions:

1. Instead of using a firm's expected net income, we use the average of "Net Cash Flow – Operating Activities" over the last three years as a proxy for its earning power, which allows for the use of what we refer to as the cash flow yield, CFY[3,4]. The decision to use historical figures is motivated by the evidence of predictable errors in analysts' forecasts (Frankel and Lee, 1998; Dechow et al., 1999).

2. We use a discount rate, specified as follows:

   $$r = r_f + \sigma_c$$

   Where r_f is the yield on 10-year government bonds, σ_c is the standard deviation of cash flows from operations divided by book value. Using a time varying risk free rate incorporates the opportunity cost of funds at the beginning of each investment period, which we specify as monthly. Using the volatility of cash flows as a risk premium places an emphasis on cash flow certainty.

[3] Net Cash Flow – Operating Activities.
[4] Although using operating cash flows instead of net income technically violates the clean surplus relation, ultimately it is expected to result in the selection of undervalued stocks with a higher degree of confidence because there is no room for aggressive accounting to influence the earnings stream.

3. As in Frankel and Lee (1998); Lee, et al (1999); and Ali et al (2002) we assume that cash flows persist in perpetuity so our persistence factor is assumed to be equal to one and falls out of the model[5].

The above assumptions lead to the final version of the model investigated in this monograph where we define intrinsic value as:

$$V_0 = b_0 + \frac{b_0(CFY - r)}{r}$$

Where b_0 is the book value from the most recent annual report obtained by multiplying book value per share by common shares outstanding, CFY is the cash flow yield obtained by dividing the three-year average of Net Cash Flow – Operating Activities by book value and r is the discount rate calculated as the sum of the yield on 10-year government bonds and the standard deviation of Net Cash Flow – Operating Activities, divided by book value. To compute the standard deviation of cash flows we use a 10-year period (with a minimum of at least a five year period).

[5] Although competitive forces are expected to erode abnormal cash flows over time, the three year average cash flow measure may already have some erosion in abnormal cash flows built in. Furthermore, this approach places more emphasis on the present value of cash flows so that book value does not dominate the value equation.

Comparing Value strategies

Why sector neutral?

Based on previous research by James Sefton et al. (2005), we know that regional value premia are cyclical, highly correlated and are consistent with an explanation based on macroeconomic risk, whilst global industry-based premia accrue more evenly, have lower correlations, and appear consistent with a mispricing explanation. As a consequence, we run all our tests on a sector neutral basis.

Methodology:

All charts in the body of the report refer to MSCI World as our benchmark. Regional results are in the appendices. Testing is done using the MSCI World benchmark, with the exception of Asia where we use MSCI AC Asia ex Japan, and Australia where we use the ASX 200.

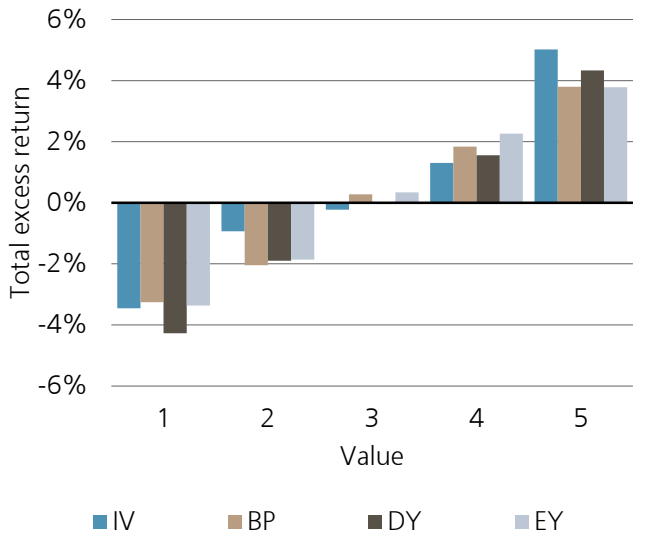
All tests are based on equal weighted quintiles against an equal weighted benchmark in US Dollars unless otherwise stated. Quintile 5 is defined as 'desirable' and quintile 1 as 'undesirable'. With respect to Value, quintile 5 is cheap and quintile 1 expensive.

With respect to Value, quintile 5 is cheap and quintile 1 expensive.

Returns and risk

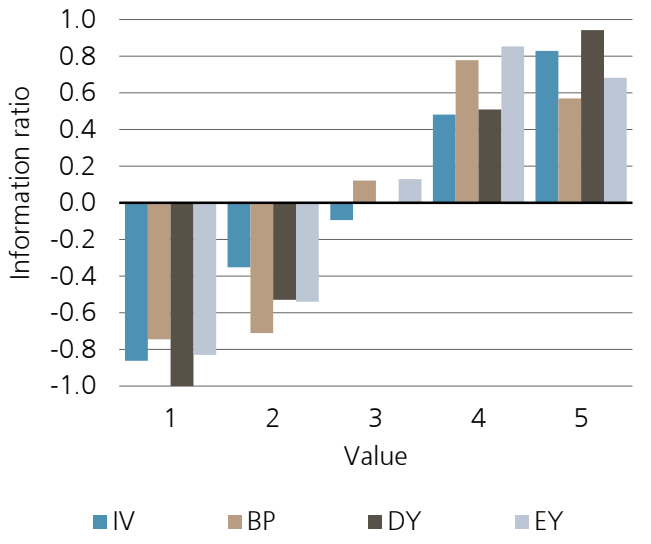
Overall, the Intrinsic Value model is the best performing long only model and shares first place with dividend yield on a long/short basis. Both significantly outperform both earnings yield and book-to-price. On a risk adjusted basis dividend yield performs best which is unsurprising given its tilt towards defensive stocks (large, low volatility).

Figure 9: Total excess returns



Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 10: Information ratios

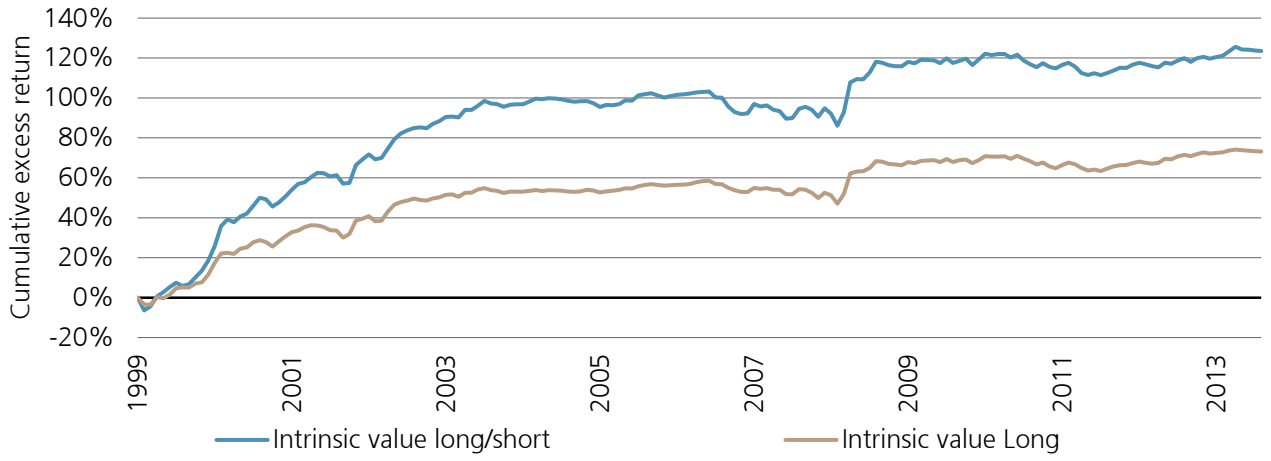


Source: Thomson Reuters, UBS; Universe: MSCI World

When does it work?

The Intrinsic Value model adds most of its value during periods of low earnings growth and commensurate high cross-sectional volatility in the equity markets. These have occurred during the Tech Wreck (2000 to 2003), the bounce post the GFC (Q1 2009), and the subsequent recovery (mid 2012 to today). Whilst volatility is currently close to its all-time lows, we don't expect it to remain there. As a consequence any pick-up in cross sectional volatility should improve the returns to Intrinsic Value quite significantly.

Figure 11: Cumulative excess returns to Intrinsic Value



Source: Thomson Reuters, UBS; Universe: MSCI World

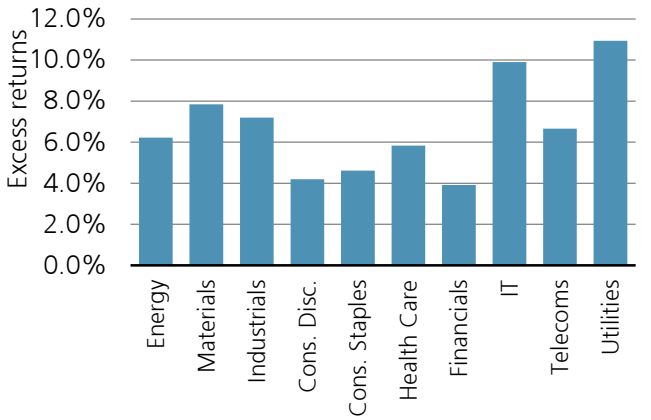
Does it work across sectors and size?

By virtue of the fact that it makes sense to think of the value of a business as its net asset base (its book value) plus the sum of expected cash flows discounted at an appropriate rate, the Intrinsic Value model should work across sectors as well as size.

We find that the model works well across all sectors with no obvious biases. It seems to work better within the smaller cap end of the index (test conducted sector neutral). However, the back test in this instance was conducted against the MSCI World, a large cap index.

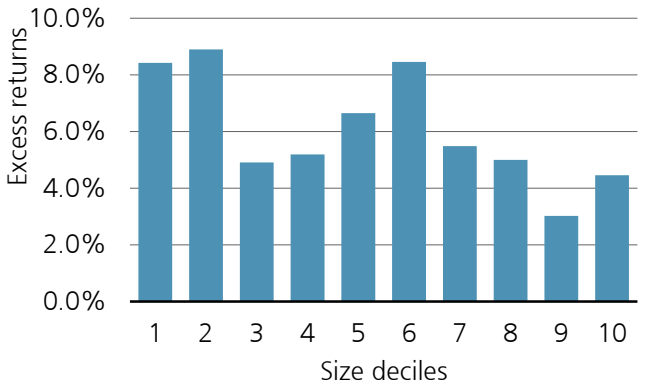
The improvement in performance at the smaller end of the spectrum is potentially driven by the small cap tilt of book-to-price as a value factor (see figure 4 on page 5).

Figure 12: Long/short excess returns by sector



Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 13: Long/short excess returns by size decile

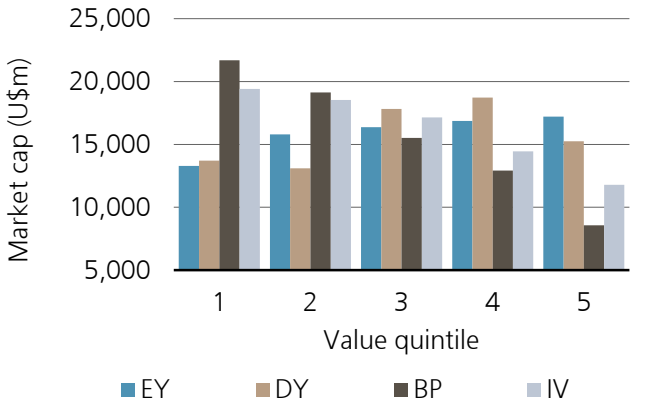


Source: Thomson Reuters, UBS; Universe: MSCI World

Understanding the characteristics of Intrinsic Value

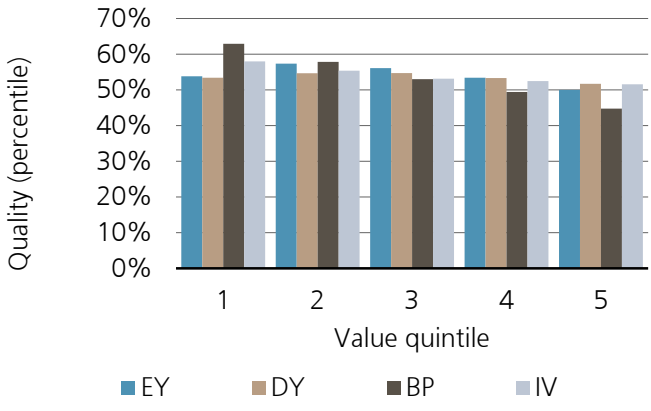
Overall, we find that Intrinsic Value tends to have a smaller cap bias, but no meaningful Quality bias. Gearing levels for Intrinsic Value are in line with those of earnings yield, but below those of book-to-price. Volatility levels are slightly lower than those of earnings yield. As a consequence, the Merton scores show an improvement over those of earnings yield. This is significant as Merton scores of five are regarded as acceptable, whilst those of four or below are problematic. That is, once a company scores four or less the probability of underperformance increases significantly.

Figure 14: Market cap of Value quintiles



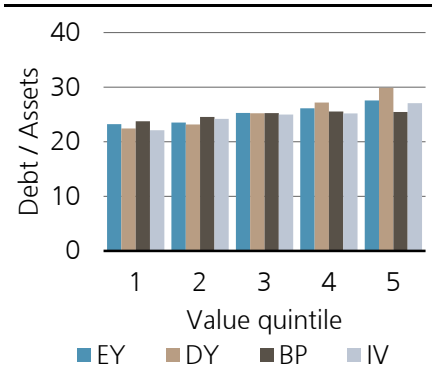
Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 15: Quality of Value quintiles



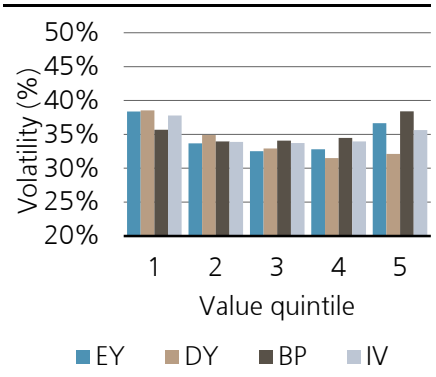
Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 16: Gearing of Value quintiles



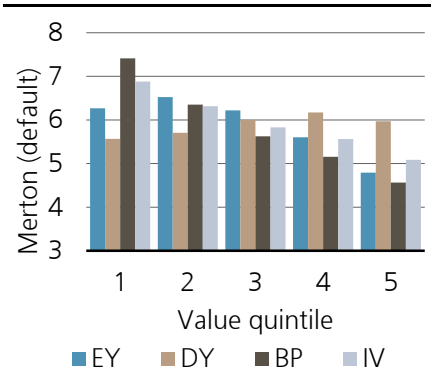
Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 17: Volatility of Value quintiles



Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 18: Merton (DD) of Value quintiles

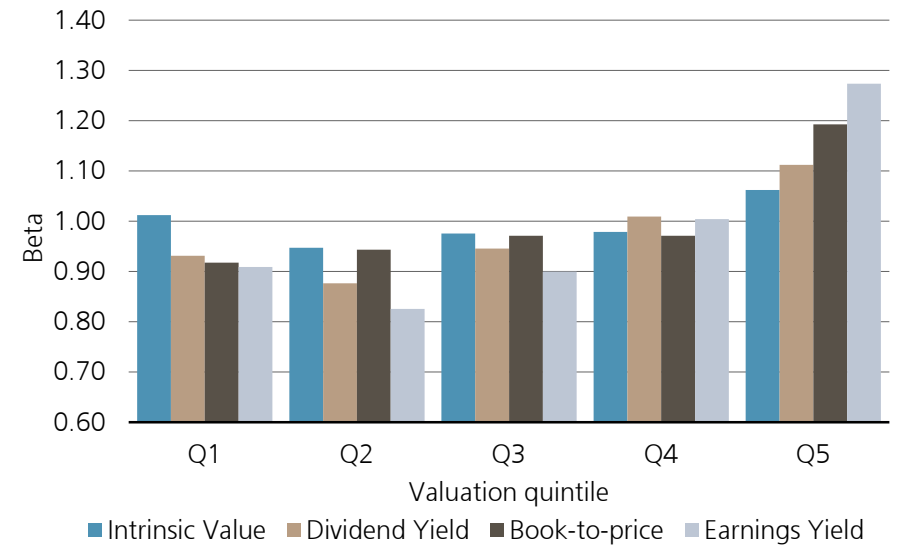


Source: Thomson Reuters, UBS; Universe: MSCI World

What we find really interesting is that when we create portfolios (splitting the universe into quintiles) the Intrinsic Value Q5 portfolio has a lower beta than any of the other Value factors.

The significant improvement in Merton scores and lower betas reinforces the difference between Intrinsic Value and Dividend yield as displaying more defensive characteristics versus book-to-price and earnings yield displaying more risky or cyclical characteristics.

Figure 19: Value portfolio betas



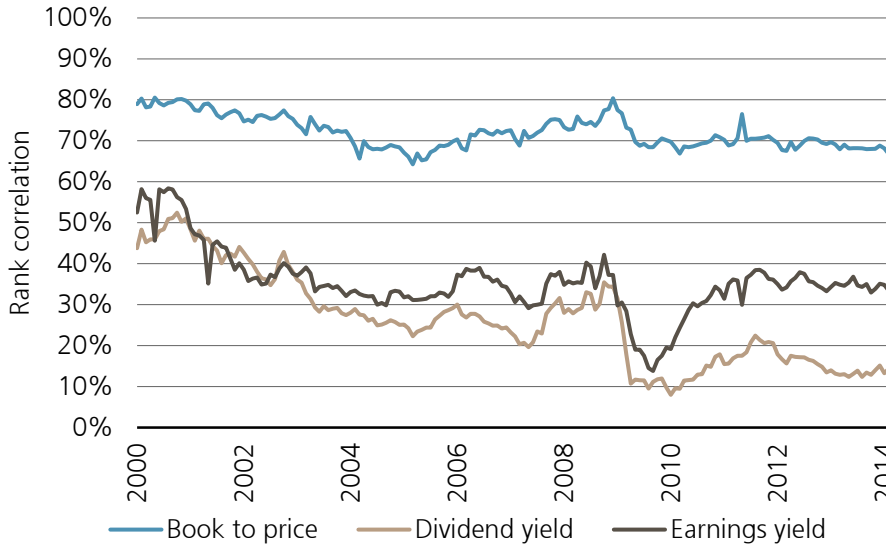
Source: Thomson Reuters, UBS; Universe: MSCI World

What factors are we picking up on?

Overall, the rank correlation highlights that the model has a rank correlation of around 70% with book-to-price, and significantly less with earnings yield and dividend yield. This is unsurprising as book value underpins the Intrinsic Value model.

The rank correlation is echoed in a simple intersection analysis. Since 2000, of the stocks that fell into the cheapest quintile of Intrinsic Value, 56% were also cheap on a book-to-price basis, 38% on earnings yield, and 28% on a dividend yield basis.

Figure 20: Rank correlation of Intrinsic Value with other Value metrics



Source: Thomson Reuters, UBS; Universe: MSCI World

Good Quality, high Intrinsic Value

We know from prior research that the Value premium can be enhanced through the application of a 'Quality' screen (see Winter et al. "Investing in Quality" (2014). We apply the UBS Quality model as an overlay to the Intrinsic Value model and find that the intersection of the two models outperforms the market by 7.7% per annum with a tracking error of 8.3% and an Information Ratio of 0.93. In the current environment, we recommend holding good Quality stocks with high Intrinsic Value.

Note for the purposes of this example, we have used:

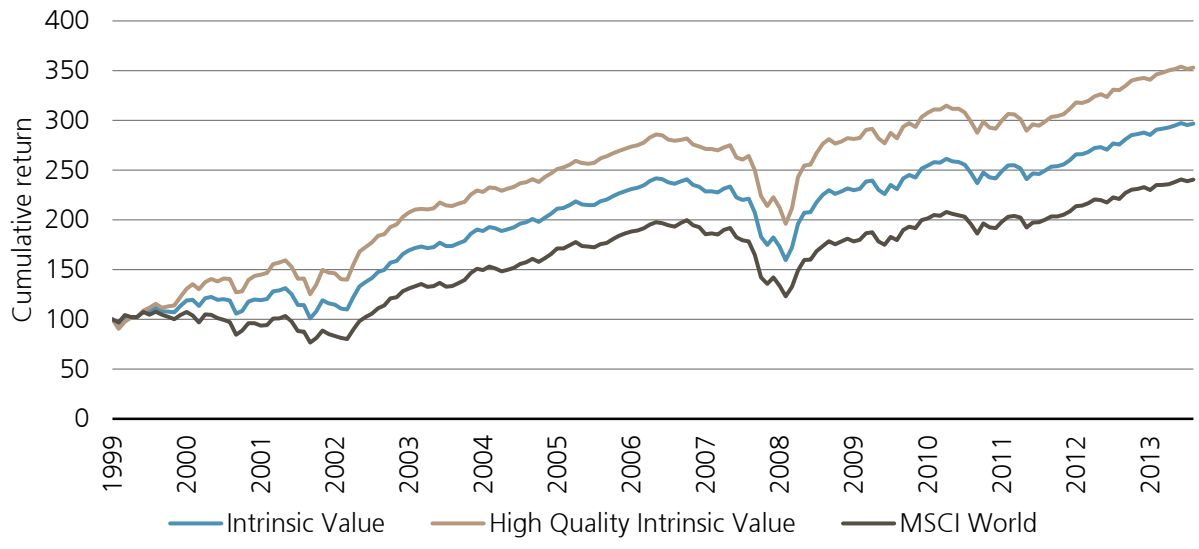
- Intrinsic Value: deciles 7-10
- Absolute Quality: deciles 7-10
- Delta Quality: scores 15-20
- Risk Alert: deciles 3-10

Figure 21: Performance metrics of Intrinsic Value and Quality

	Total return	Volatility	Sharpe (Rf=0)	T-stat
Benchmark	9.6%	17.5%	0.55	2.10
Intrinsic Value	13.5%	19.7%	0.69	2.62
Quality & Intrinsic Value	17.4%	22.5%	0.77	2.95

Source: Thomson Reuters, UBS; Universe: MSCI World

Figure 22: Good Quality, High Intrinsic Value stocks vs MSCI World (equal weighted)



Source: Thomson Reuters, UBS; Universe: MSCI World

Conclusion

Post the Global Financial Crisis corporate earnings growth rates have slowed. In fact, seven years on from the start of the crisis we have only just exceeded pre crisis peak earnings. In this environment defensive Value strategies have performed well, whilst cyclical and risky Value strategies have underperformed. Income stocks in particular are now looking fully valued.

As a result of lower earnings growth, and Baby-Boomers retiring and rotating their portfolios into income producing assets; defensive value strategies, especially income strategies, have performed well and if growth remains tepid are likely to continue to do so.

Given that "Prediction is very difficult, especially if it's about the future" (Niels Bohr), we have attempted to develop a more intuitive way of thinking about Value that is likely to overcome the problem of timing a switch between cyclical and defensive value. Furthermore, given that defensive value stocks are looking expensive, our approach provides an alternative to investing in defensive value without explicitly investing in dividend yield as a factor.

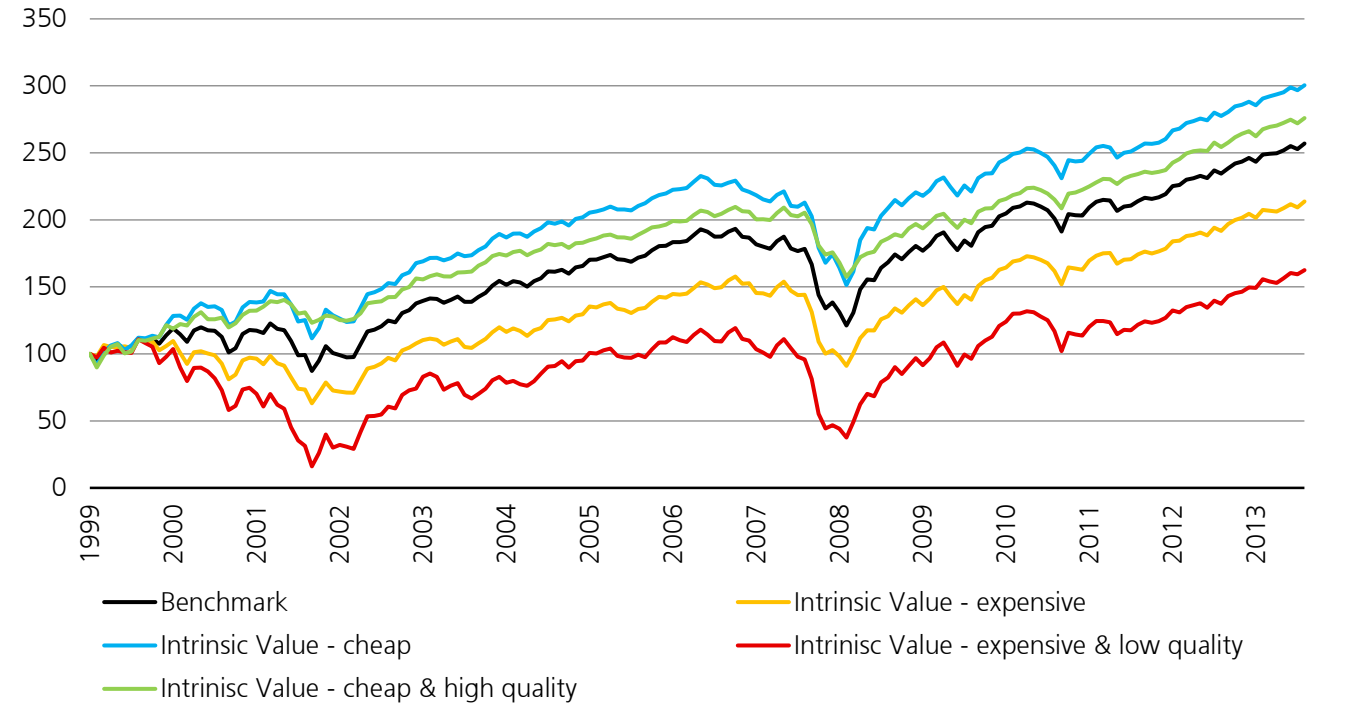
We have developed an Intrinsic Value model that distils value into two components: book value and the present value of expected future cash flows. Our model differs from traditional models in that we use cash flows instead of net income (thereby eliminating accruals), and we discount the cash flows using the volatility of cash flows.

The UBS Intrinsic Value model outperforms the market by 3.9% per annum with 4.3% tracking error and an information ratio of 0.89. The UBS Intrinsic Value model with a Quality overlay outperforms the market by 7.7% per annum with a tracking error of 8.3% and an information ratio of 0.93.

In the current environment, we recommend holding good Quality stocks with high Intrinsic Value relative to price.

Regional results: United States

Figure 23: Cumulative total returns to Intrinsic Value and Quality



Source: Thomson Reuters, UBS

Figure 24: Returns to Intrinsic Value and Quality

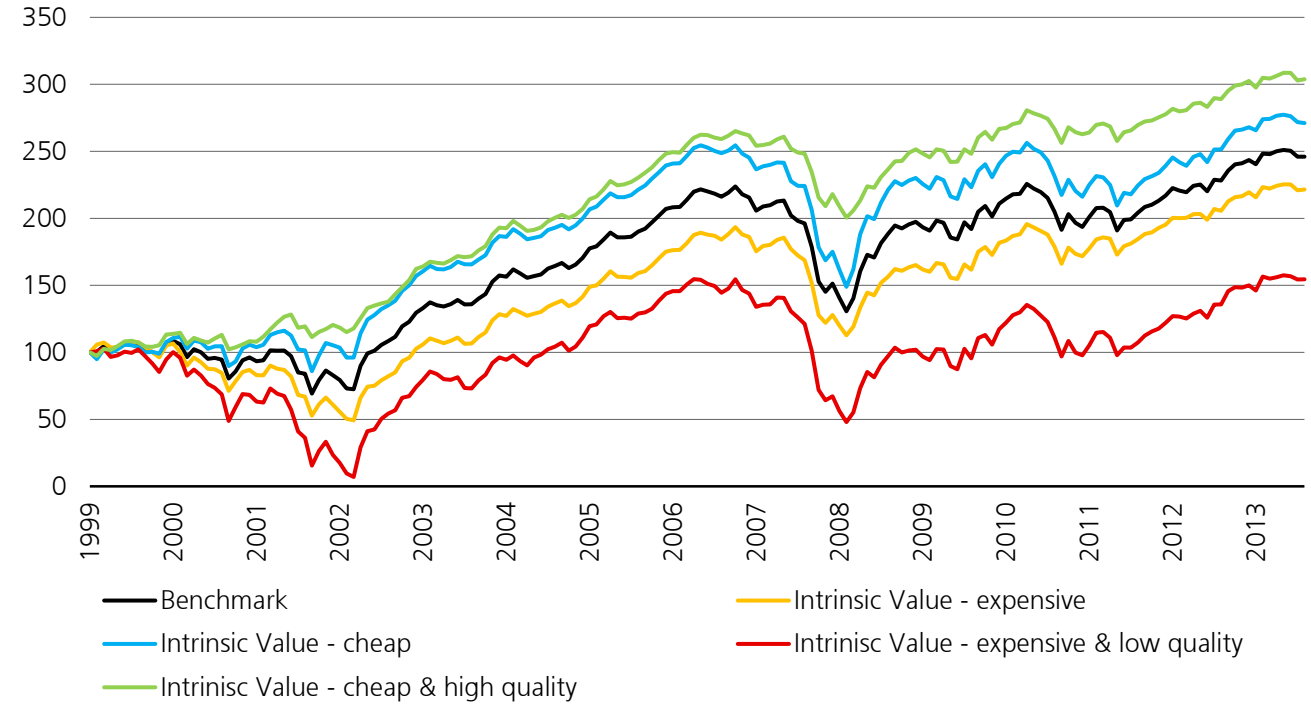
	Benchmark	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised total return	10.8%	7.8%	13.7%	4.3%	12.1%
Volatility	17.9%	17.4%	19.3%	22.4%	13.7%
Sharpe (Rf=0)	0.60	0.45	0.71	0.19	0.88
t-stat	2.29	1.71	2.72	0.73	3.35

	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised excess return	-3.0%	3.0%	-6.5%	1.3%
Tracking error	4.0%	4.1%	8.3%	8.4%
Information ratio	-0.74	0.74	-0.78	0.16
t-stat	-2.82	2.82	-2.98	0.59

Source: Thomson Reuters, UBS

Regional results: Europe

Figure 25: Cumulative total returns to Intrinsic Value and Quality



Source: Thomson Reuters, UBS

Figure 26: Returns to Intrinsic Value and Quality

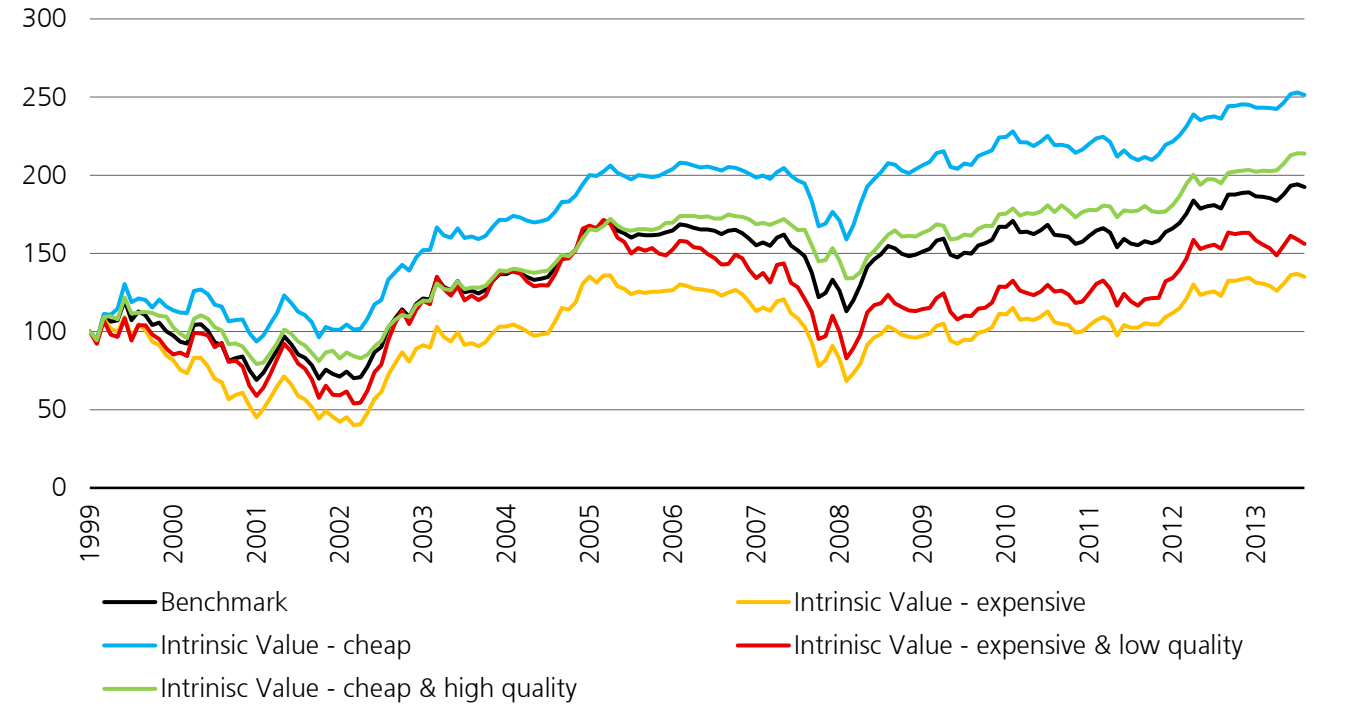
	Benchmark	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised total return	10.0%	8.3%	11.7%	3.7%	14.0%
Volatility	21.8%	20.4%	24.0%	25.4%	16.9%
Sharpe (Rf=0)	0.46	0.41	0.49	0.15	0.83
t-stat	1.75	1.56	1.87	0.56	3.16

	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised excess return	-1.7%	1.7%	-6.3%	4.0%
Tracking error	4.3%	4.4%	6.9%	8.6%
Information ratio	-0.39	0.39	-0.91	0.46
t-stat	-1.49	1.51	-3.47	1.77

Source: Thomson Reuters, UBS

Regional results: Japan

Figure 27: Cumulative total returns to Intrinsic Value and Quality



Source: Thomson Reuters, UBS

Figure 28: Returns to Intrinsic Value and Quality

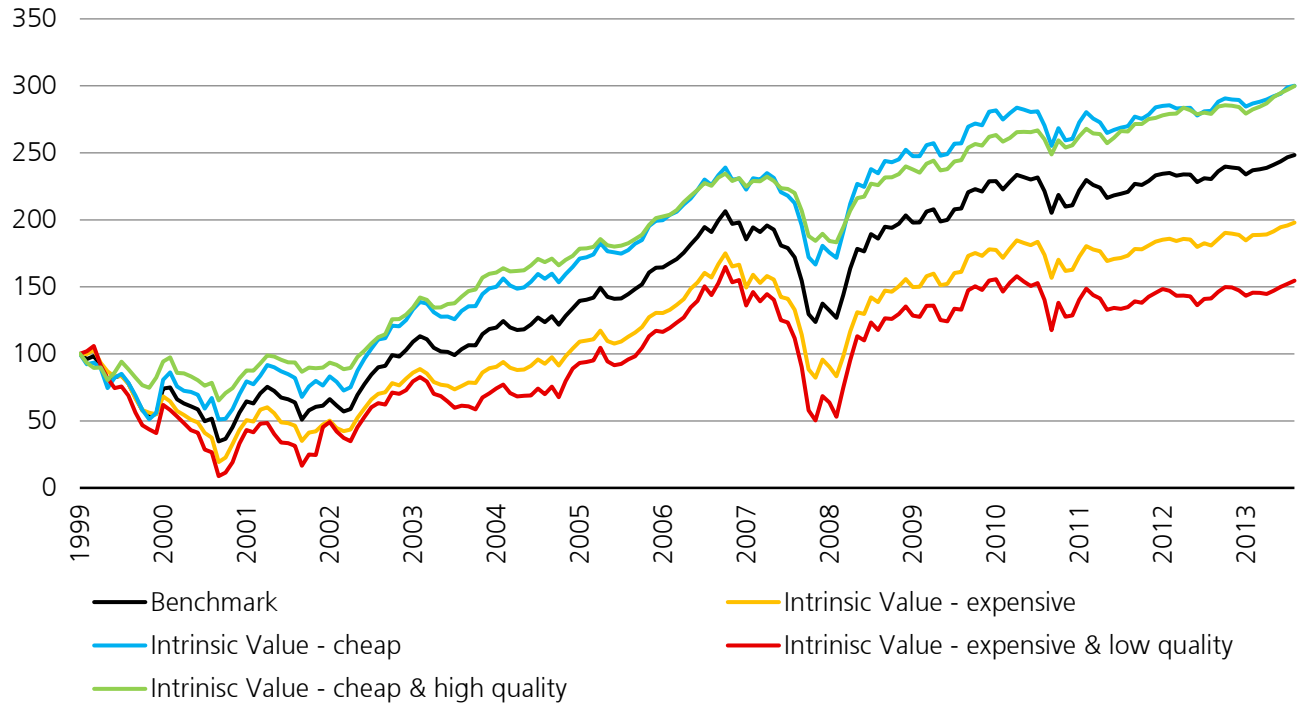
	Benchmark	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised total return	6.3%	2.4%	10.4%	3.8%	7.8%
Volatility	18.3%	19.0%	18.2%	23.2%	15.3%
Sharpe (Rf=0)	0.35	0.13	0.57	0.17	0.51
t-stat	1.33	0.48	2.18	0.63	1.96

	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised excess return	-3.9%	4.0%	-2.5%	1.5%
Tracking error	3.4%	3.4%	8.0%	7.4%
Information ratio	-1.17	1.18	-0.31	0.20
t-stat	-4.48	4.50	-1.19	0.76

Source: Thomson Reuters, UBS

Regional results: Asia

Figure 29: Cumulative total returns to Intrinsic Value and Quality



Source: Thomson Reuters, UBS

Figure 30: Returns to Intrinsic Value and Quality

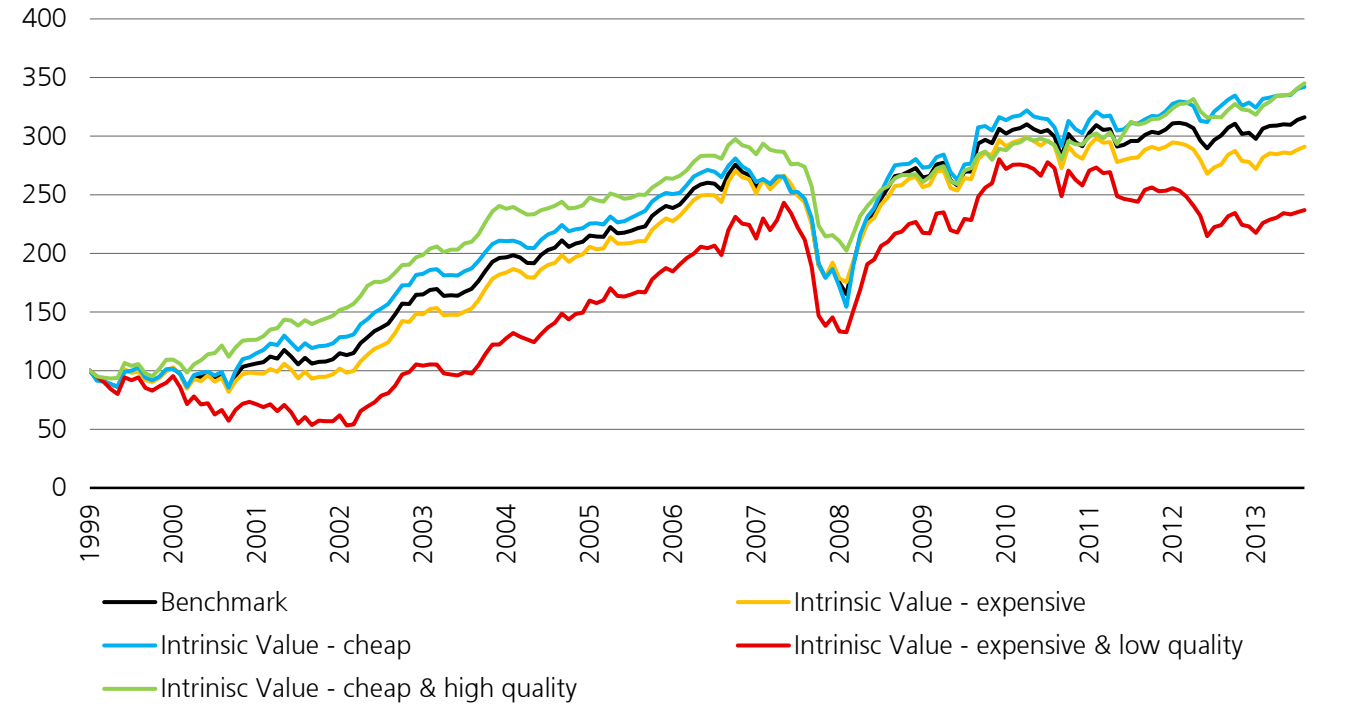
	Benchmark	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised total return	10.2%	6.7%	13.7%	3.7%	13.7%
Volatility	23.3%	23.0%	24.5%	28.9%	17.2%
Sharpe (Rf=0)	0.44	0.29	0.56	0.13	0.80
t-stat	1.67	1.11	2.14	0.50	3.04

	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised excess return	-3.5%	3.6%	-6.4%	3.5%
Tracking error	4.8%	4.9%	9.8%	9.5%
Information ratio	-0.73	0.72	-0.65	0.37
t-stat	-2.78	2.76	-2.50	1.41

Source: Thomson Reuters, UBS

Regional results: Australia

Figure 31: Cumulative total returns to Intrinsic Value and Quality



Source: Thomson Reuters, UBS

Figure 32: Returns to Intrinsic Value and Quality

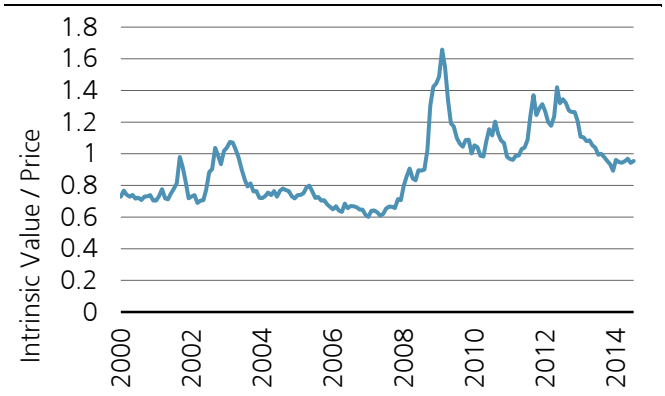
	Benchmark	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised total return	14.8%	13.1%	16.6%	9.4%	16.8%
Volatility	26.3%	25.8%	28.1%	30.3%	20.9%
Sharpe (Rf=0)	0.56	0.51	0.59	0.31	0.80
t-stat	2.15	1.94	2.26	1.18	3.07

	Intrinsic Value: expensive	Intrinsic Value: cheap	Intrinsic Value: expensive & low quality	Intrinsic Value: cheap & high quality
Annualised excess return	-1.7%	1.8%	-5.4%	2.0%
Tracking error	5.7%	5.9%	11.7%	11.0%
Information ratio	-0.30	0.30	-0.46	0.18
t-stat	-1.15	1.14	-1.77	0.68

Source: Thomson Reuters, UBS

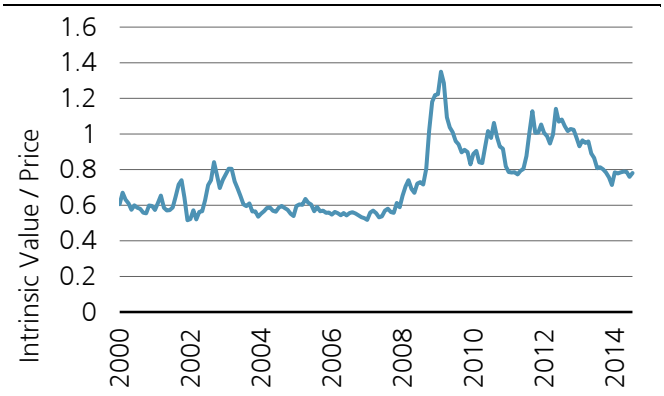
Appendix 1: The Intrinsic Value of the market

Figure 33: World



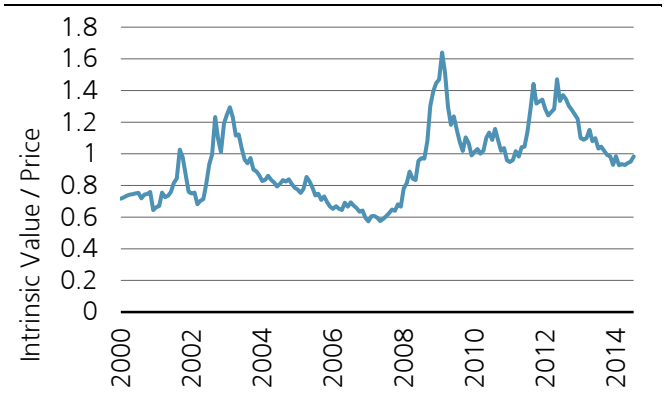
Source: Thomson Reuters, UBS

Figure 34: North America



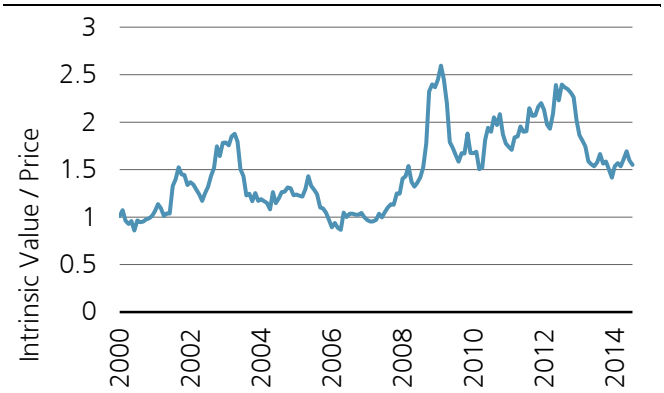
Source: Thomson Reuters, UBS

Figure 35: Europe



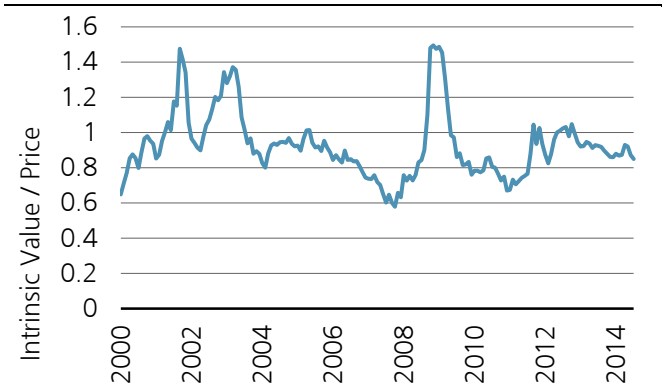
Source: Thomson Reuters, UBS

Figure 36: Japan



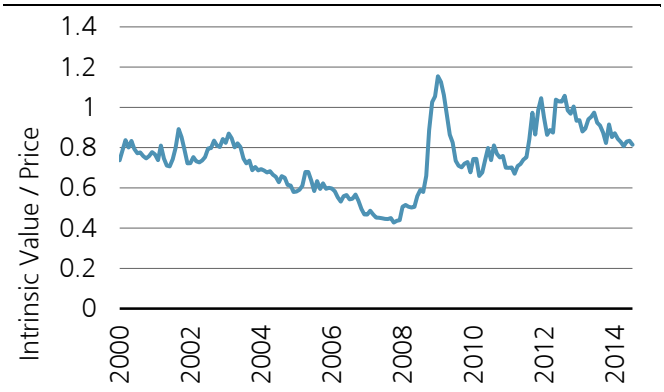
Source: Thomson Reuters, UBS

Figure 37: Asia ex Japan



Source: Thomson Reuters, UBS

Figure 38: Australia



Source: Thomson Reuters, UBS

Appendix 2: Intersection of Quality and Intrinsic Value

Figure 39: Intersection of Intrinsic Value with Absolute Quality, Delta Quality and Risk Alert Models

	World				North America				Europe				Japan				Asia				Australia			
Absolute Quality																								
Expensive	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**
Poor	-3.4%	4.4%	-0.77	-2.95	-4.3%	5.3%	-0.81	-3.11	-3.3%	5.2%	-0.63	-2.40	-1.6%	7.3%	-0.22	-0.85	-8.9%	14.5%	-0.62	-2.35	-1.6%	10.7%	-0.15	-0.57
Neutral	-1.3%	3.0%	-0.44	-1.69	0.2%	3.8%	0.06	0.24	-0.2%	4.6%	-0.05	-0.18	-3.8%	6.3%	-0.60	-2.30	-6.9%	7.7%	-0.90	-3.42	0.1%	7.9%	0.02	0.06
High	-0.5%	4.8%	-0.11	-0.41	-1.7%	5.8%	-0.29	-1.10	0.5%	6.5%	0.08	0.32	-3.1%	8.1%	-0.38	-1.46	-1.6%	8.3%	-0.20	-0.75	3.1%	8.9%	0.35	1.34
Cheap																								
Poor	-0.1%	7.7%	-0.02	-0.06	1.2%	8.4%	0.14	0.52	-3.2%	12.0%	-0.27	-1.02	7.7%	10.5%	0.73	2.80	-2.7%	11.3%	-0.24	-0.91	-4.1%	12.7%	-0.32	-1.22
Neutral	2.6%	3.4%	0.75	2.87	2.8%	4.6%	0.61	2.34	2.1%	4.4%	0.47	1.79	2.0%	4.7%	0.42	1.60	3.3%	6.8%	0.49	1.86	5.7%	8.7%	0.65	2.48
High	4.3%	4.8%	0.89	3.42	4.8%	6.0%	0.80	3.05	4.3%	6.0%	0.72	2.73	3.0%	7.5%	0.40	1.53	2.0%	10.1%	0.20	0.75	2.3%	9.2%	0.25	0.94
Delta Quality																								
Expensive	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**
Declining	-7.4%	9.4%	-0.79	-3.01	-7.5%	13.7%	-0.55	-2.09	-9.9%	14.2%	-0.70	-2.66	-6.6%	13.3%	-0.49	-1.88	-9.0%	18.9%	-0.48	-1.82	-3.5%	17.7%	-0.20	-0.75
Stable	-1.9%	2.8%	-0.69	-2.65	-1.9%	3.0%	-0.64	-2.43	-1.0%	4.2%	-0.25	-0.95	-2.2%	4.3%	-0.51	-1.95	-5.9%	6.5%	-0.91	-3.49	1.2%	7.0%	0.17	0.65
Improving	0.1%	5.2%	0.02	0.06	-0.7%	6.3%	-0.12	-0.44	2.6%	7.2%	0.37	1.40	-2.0%	8.3%	-0.24	-0.92	-2.3%	9.6%	-0.24	-0.93	2.5%	12.0%	0.21	0.81
Cheap																								
Declining	-6.3%	15.6%	-0.40	-1.54	-7.0%	19.0%	-0.37	-1.40	-11.4%	19.6%	-0.58	-2.21	8.9%	22.0%	0.40	1.50	-5.3%	15.0%	-0.35	-1.34	-12.8%	17.3%	-0.74	-2.82
Stable	2.1%	3.1%	0.68	2.58	2.7%	4.1%	0.65	2.48	0.9%	4.3%	0.21	0.80	3.5%	4.6%	0.76	2.92	1.3%	7.4%	0.18	0.68	5.0%	7.9%	0.63	2.42
Improving	3.4%	5.4%	0.63	2.39	3.2%	7.2%	0.45	1.72	3.1%	7.8%	0.40	1.52	2.1%	6.1%	0.34	1.29	4.8%	11.0%	0.44	1.67	3.4%	10.2%	0.34	1.27
Risk Alert																								
TER	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**	**T.E.**	**I.R.**	**T-stat**	**TER**
Risky	-2.8%	12.1%	-0.24	-0.90	-2.6%	14.5%	-0.18	-0.68	-3.7%	14.1%	-0.27	-1.01	-2.6%	12.9%	-0.20	-0.77	-16.9%	18.8%	-0.90	-3.41	-14.3%	23.4%	-0.61	-2.34
Neutral	-2.2%	3.6%	-0.61	-2.35	-0.7%	4.4%	-0.15	-0.57	-2.1%	4.8%	-0.44	-1.68	-2.4%	5.5%	-0.44	-1.69	-7.2%	9.8%	-0.74	-2.83	0.9%	7.8%	0.11	0.44
Safe	-0.4%	6.9%	-0.05	-0.20	-1.7%	8.5%	-0.19	-0.74	2.1%	9.2%	0.23	0.87	-3.0%	8.1%	-0.37	-1.42	-2.6%	11.2%	-0.23	-0.89	4.6%	8.8%	0.52	2.00
Cheap																								
Risky	1.0%	14.1%	0.07	0.27	1.7%	17.0%	0.10	0.37	-2.7%	16.2%	-0.17	-0.65	5.3%	12.9%	0.41	1.58	-0.9%	18.1%	-0.05	-0.18	-6.3%	18.0%	-0.35	-1.33
Neutral	2.9%	3.5%	0.82	3.13	3.8%	5.2%	0.73	2.80	1.1%	4.5%	0.24	0.90	5.1%	5.7%	0.90	3.44	0.9%	9.5%	0.09	0.36	5.0%	8.9%	0.55	2.11
Safe	1.7%	7.9%	0.22	0.85	1.7%	9.7%	0.18	0.67	3.4%	9.1%	0.38	1.45	-0.2%	8.0%	-0.02	-0.09	1.7%	10.4%	0.17	0.63	3.5%	10.7%	0.33	1.27

Source: Thomson Reuters, UBS; Universe: MSCI World, backtest 2000 – 2014, monthly rebalance.

Appendix 3: Intersection: Quality & Intrinsic Value

Figure 40: Total excess return of Intrinsic Value with UBS Absolute Quality and Delta Quality models

Total Excess Returns

Absolute Quality

Intrinsic Value Decile	1	2	3	4	5	6	7	8	9	10
1	-16%	-8%	-11%	-4%	1%	-1%	-2%	-4%	-2%	-4%
2	-11%	-1%	-2%	-2%	-3%	-4%	-4%	-2%	-3%	-1%
3	-11%	-2%	-3%	-6%	4%	1%	-1%	1%	-4%	1%
4	-8%	-4%	-2%	-1%	-4%	-6%	-1%	2%	2%	3%
5	-6%	0%	-1%	2%	-1%	3%	5%	0%	3%	4%
6	3%	1%	-4%	2%	1%	-6%	2%	2%	5%	6%
7	-3%	0%	2%	1%	-2%	0%	2%	4%	5%	8%
8	6%	3%	2%	0%	3%	2%	4%	6%	5%	2%
9	-2%	7%	-3%	-4%	3%	4%	6%	5%	10%	2%
10	4%	5%	9%	9%	8%	4%	5%	4%	5%	13%

Delta Quality

Intrinsic Value Decile	00to08	9	10	11	12	13	14	15	16	17	18to20
1	-12.3%	-6.6%	-4.9%	-14.9%	-3.4%	-4.7%	-1.5%	-2.9%	-1.3%	0.4%	-3.2%
2	-14.0%	-8.6%	-7.1%	-7.7%	-2.0%	-0.1%	-3.4%	-1.6%	-0.6%	1.3%	-0.1%
3	-9.1%	-4.4%	-2.0%	-2.5%	-1.5%	2.0%	-4.0%	-0.5%	-2.7%	1.1%	0.4%
4	-4.4%	-4.6%	-3.0%	-2.7%	-3.8%	0.8%	-1.5%	1.2%	0.7%	-0.8%	-0.5%
5	-4.5%	-3.6%	0.4%	-3.9%	1.6%	1.7%	0.9%	0.8%	3.3%	5.9%	5.4%
6	-4.0%	-3.0%	-2.2%	0.6%	2.6%	-1.3%	-0.9%	0.0%	-0.2%	3.1%	4.8%
7	-14.6%	0.4%	5.5%	0.0%	0.8%	-2.1%	1.3%	3.7%	0.2%	-1.0%	2.8%
8	-2.9%	-2.2%	5.1%	0.9%	2.6%	5.0%	3.6%	2.2%	2.5%	4.5%	-1.3%
9	-5.0%	0.0%	1.0%	-1.3%	-1.6%	3.1%	-1.1%	3.9%	2.7%	3.1%	4.0%
10	-4.2%	7.7%	2.8%	6.6%	0.4%	3.7%	8.5%	4.4%	5.1%	4.3%	3.5%

Sharpe Ratios

Absolute Quality

Intrinsic Value Decile	1	2	3	4	5	6	7	8	9	10
1	-0.73	-0.41	-0.59	-0.23	0.04	-0.08	-0.15	-0.33	-0.16	-0.39
2	-0.66	-0.08	-0.14	-0.14	-0.23	-0.34	-0.40	-0.17	-0.33	-0.10
3	-0.95	-0.15	-0.31	-0.67	0.37	0.06	-0.14	0.07	-0.37	0.11
4	-0.73	-0.36	-0.20	-0.11	-0.39	-0.69	-0.17	0.30	0.27	0.36
5	-0.57	0.00	-0.05	0.23	-0.16	0.27	0.51	-0.03	0.31	0.41
6	0.16	0.07	-0.38	0.27	0.15	-0.68	0.20	0.22	0.64	0.58
7	-0.13	-0.02	0.15	0.11	-0.28	0.01	0.19	0.45	0.55	0.65
8	0.39	0.18	0.18	0.01	0.31	0.23	0.52	0.70	0.58	0.14
9	-0.12	0.56	-0.27	-0.46	0.31	0.47	0.76	0.51	0.89	0.14
10	0.13	0.29	0.51	0.61	0.67	0.41	0.41	0.44	0.41	0.64

Delta Quality

Intrinsic Value Decile	00to08	9	10	11	12	13	14	15	16	17	18to20
1	-0.45	-0.36	-0.29	-0.87	-0.26	-0.37	-0.12	-0.22	-0.13	0.04	-0.19
2	-0.50	-0.48	-0.46	-0.57	-0.22	-0.01	-0.37	-0.20	-0.05	0.10	0.00
3	-0.40	-0.30	-0.14	-0.24	-0.16	0.23	-0.48	-0.06	-0.36	0.10	0.04
4	-0.22	-0.30	-0.22	-0.26	-0.41	0.11	-0.19	0.16	0.08	-0.07	-0.04
5	-0.14	-0.24	0.03	-0.35	0.17	0.22	0.12	0.10	0.44	0.60	0.47
6	-0.15	-0.19	-0.18	0.05	0.27	-0.17	-0.11	0.00	-0.02	0.28	0.38
7	-0.59	0.02	0.34	0.00	0.08	-0.26	0.18	0.48	0.03	-0.10	0.24
8	-0.11	-0.12	0.32	0.07	0.25	0.56	0.42	0.28	0.28	0.39	-0.10
9	-0.17	0.00	0.05	-0.10	-0.16	0.34	-0.13	0.41	0.30	0.31	0.36
10	-0.10	0.32	0.14	0.34	0.03	0.34	0.87	0.40	0.43	0.38	0.24

Source: Thomson Reuters, UBS; Universe: MSCI World, backtest 2000 – 2014, monthly rebalance

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