

Global Quantitative Research Monographs

Investing in Quality

Equities

Global
Quantitative

Why think about Quality right now?

We have entered a world of sub-par growth combined with high levels of gearing and elevated risk, which we believe is likely to last for the next ten years. In this environment, Quality is likely to outperform.

What is Quality?

Quality can be defined as high vs low quality, safe vs risky, or the change in quality, with each definition having its own application.

How does Quality perform?

Most stocks do well in an up-market, but high quality companies significantly outperform in down-markets. We investigate how to build a portfolio of companies that are likely to perform well throughout the cycle.

Is Quality priced in?

We find that high Quality companies trade at a premium to the market. However, changes in Quality are less efficiently priced.

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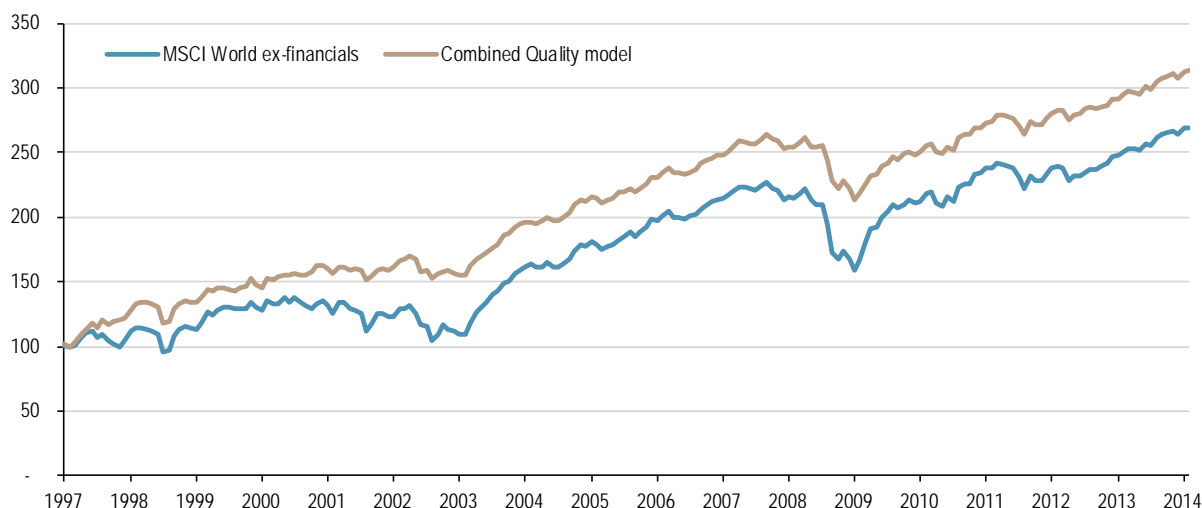
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Figure 1: Combined Quality Model vs MSCI World ex-financials equal weighted



Source: Thomson Reuters, UBS

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Executive Summary

Most investors believe that investing in good Quality companies at attractive prices is the right long term investment strategy. We highlight that at this point in time we believe that quality matters more than it has historically. We develop three approaches to defining Quality and demonstrate how they can be used to develop a portfolio that outperforms with low levels of volatility.

We believe that Quality matters right now for two reasons: firstly, from an economic perspective, we have entered into a world of structurally lower growth defined by ageing populations and rising dependency ratios. Secondly, as a result of the demographic dividend and consummate credit bubble we now find ourselves in a highly leveraged world with lower growth rates. As a consequence, we face heightened macro-economic risk which is likely to result in higher levels of volatility and correlation in the future. In this environment, good quality companies are likely to outperform.

We find that Quality can be defined from three perspectives, High Quality, Risky, and the Change in Quality, each with its own application. Each model has a clear relationship with future earnings growth, excess returns and volatility.

There are no surprises when intersecting the three Quality models. Each intersection improves the alpha on both the long and short sides. One interesting observation is that Low risk (Safe) companies with deteriorating fundamentals tend to underperform significantly. A likely explanation for this is that the investor clientele that are attracted to Safety are risk averse, as a result when the company's fundamentals begin to deteriorate, investors are likely to sell out rapidly.

In terms of valuation, absolute levels of Quality seem to be partially priced in, although High Quality companies tend to outperform and Low Quality companies underperform leading us to conclude that the effect is not fully priced. The change in Quality seems to be less efficiently priced with Declining Quality companies tending to enjoy a premium over both Improving and Neutral Quality during periods of 'irrational exuberance' in the market.

Furthermore, we find that the Value premium is significantly enhanced through the use of each of the three Quality models.

Finally, for illustrative purposes only, we found that we were able to build a Quality model based upon the three underlying models which delivered an excess return of 2.6% with volatility of 6.4%.

We have entered into a world of structurally lower growth defined by ageing populations and rising dependency ratios. In this environment, good quality companies are likely to outperform

The Value premium may be significantly enhanced through the use of each of the three Quality models

Why does Quality matter right now?

In our view, Quality matters for two reasons: firstly, from an economic perspective, we have entered into a world of structurally lower growth defined by ageing populations and rising dependency ratios. Secondly, as a result of the demographic dividend and consummate credit bubble¹ we now find ourselves in a highly leveraged world with lower growth rates. As a consequence, we face heightened macro-economic risk which is likely to result in higher levels of volatility and correlation in the future. In this environment good quality companies are likely to outperform.

We face heightened macro-economic risk which is likely to result in lower growth and higher levels of volatility and correlation in the future.

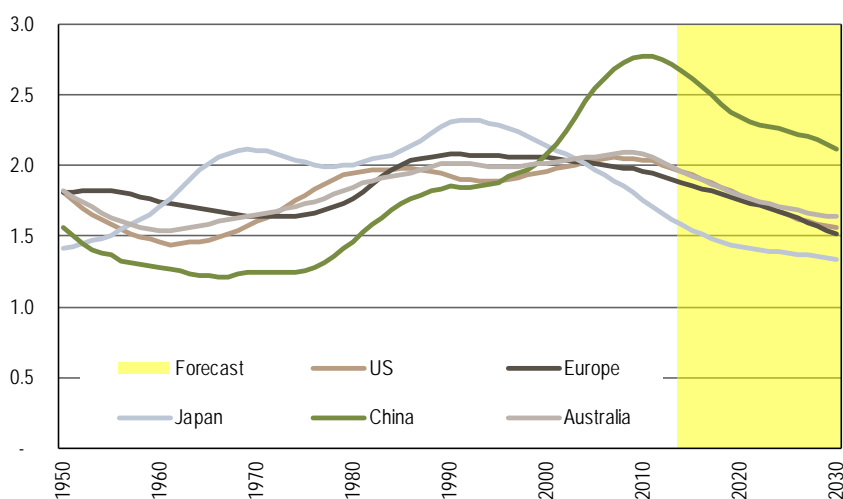
In this environment good quality companies are likely to outperform.

Demographics and growth

The Production Function holds that growth is a function of labour, capital and productivity. Of course in practice these variables are interdependent, as increases in the size and age of the labour force are likely to lead to increases in capital and improvements in productivity. As a consequence, understanding the demography of an economy, its trading partners and potential investors allows us to assess the likely growth rate of the economy.

Where to from here? Developed world populations are ageing, fertility rates are declining, longevity is increasing, and most importantly the 'Baby Boomers' are retiring. As the working age population declines relative to the number of dependants (the Dependency Ratio), economic growth is likely to slow. Research conducted by the BIS shows that a 3.5% increase in the dependency ratio is associated with a 0.6% reduction in future average annual growth (BIS Working Paper 318). Unfortunately, across the developed world (and China) we are now facing rising dependency ratios (inverse dependency ratios are shown inverted below).

Figure 2: Inverse dependency ratios across major economies



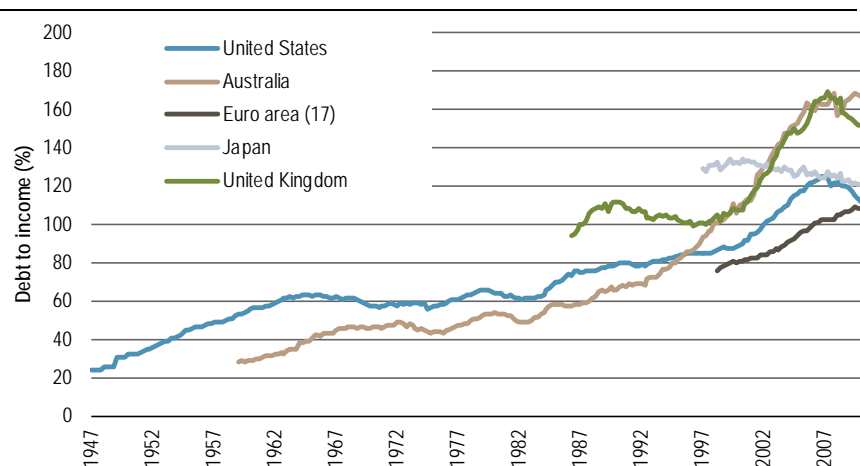
Source: Haver, UBS

¹ See "The Demographic Shockwave" Winter et al. 2013-09-05

The Credit Bubble and macro-economic risk

Futhermore, thanks to the combination of the Baby-Boomers reaching their peak earning potential between 1983 and 2008, the deregulation of the credit markets in 1983, and falling interest rates coupled with inflation targeting, debt levels around the developed world have increased dramatically.

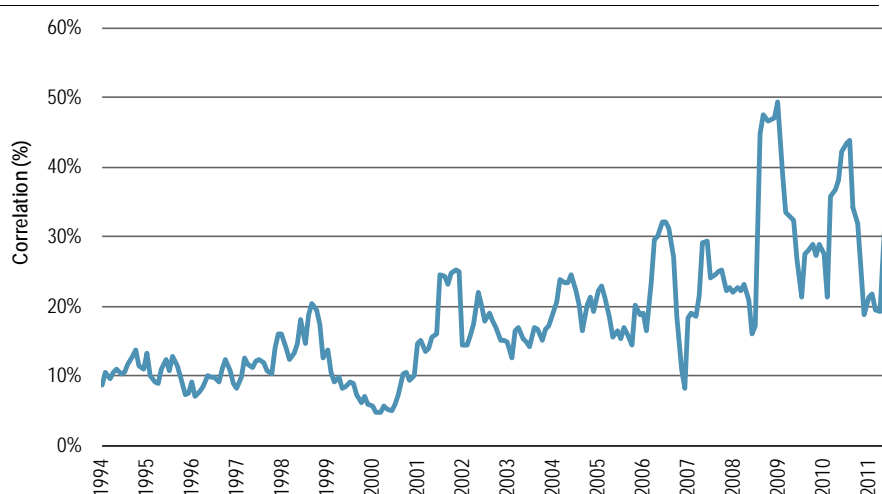
Figure 3: Household & NPISHS debt to disposable income %



Source: Haver, UBS

As a consequence of entering a world of structurally lower growth combined with higher levels of gearing, stocks are now demonstrating increased sensitivity to macro factors along with higher levels of correlation that are significantly more variable than they have been historically.

Figure 4: Average pairwise correlation across stocks²



Source: Thomson Reuters, UBS

² Pairwise correlation calculated using the MSCI World universe using weekly data over 26 weeks in US Dollars.

In a highly leveraged world of sub-par growth and elevated macro risk, we believe that defensive styles such as Quality are likely to outperform.

What is Quality?

Investors tend to think about Quality as either investing in high quality stocks, avoiding risky stocks or picking up on companies with improving quality, i.e. looking for companies that the market has overlooked as being low quality when in fact the fundamentals of the company have begun to improve. As a consequence, we define quality quantitatively as either, High Quality (HQ), Risk Alert (RA) or Change (Delta) in Quality (DQ).

Investors tend to think about Quality as either investing in high quality stocks, avoiding risky stocks or picking up on companies with improving quality.

Defining Quality

Ranking models... linear or binary?

The literature to date has approached the definition of Quality from two perspectives:

Firstly, a simple ranking model, which on the positive side is easy to define; however, its weakness is that it assumes that the relationship between each variable and stock market excess returns are best described by a linear relationship which is constant over time.

And secondly, a binary scoring model which Piotroski³ used to describe the nine factor F-score. The strength of this model is that it doesn't look at extremes, but rather aims to separate companies based on whether they meet minimum thresholds of investability and subsequently whether the fundamentals are improving or deteriorating. Each variable is assigned a score of '0' or '1' based upon whether the realisation is regarded as 'bad' or 'good'. The Delta Quality score is the sum of the twenty indicator variables.

We use both approaches in our definition of quality. We define High Quality and Risk Alert using a linear ranking model, and the Change in Quality using a binary scoring approach.

How we model Quality

We evaluate Quality factors based on their ability to predict future earnings growth, excess returns over the relevant benchmark, and volatility. Volatility is one of the most important factors as ultimately volatility is inversely correlated to earnings certainty, a quality measure.

Where we believe our research differs from other research is that we have tested each Quality factor across different economic regimes, as well as in up and down markets. This has led to a more intimate understanding of factors and how they perform.

We have excluded the Financial sector from our analysis as the metrics used across Industrials are not applicable within this sector. We will endeavour to write a follow up paper focussing specifically on Financials.

³ Piotroski, Joseph D. (2000). "Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers". The University of Chicago Graduate School of Business

We investigate twenty factors across profitability, financial health, efficiency, management signalling and risk, based on the extant literature as well as their merits as indicators of good quality investments.

We have conducted backtests on the MSCI World universe back to 1997. Within the regional results, we have tested MSCI Asia (including emerging markets). All returns are total returns in US Dollars. Backtests are conducted using equal weighted returns against an equal weighted benchmark rebalanced monthly. Both global and regional tests are unconstrained for sector and country.

Figure 5: Metrics evaluated within each model

	High Quality	Risk Alert	Delta Quality
Profitability			
Cash-flow to assets	Ranked		Binary
Change in cash-flow to assets			Binary
Gross profit to assets	Ranked		Binary
Change in gross profit to assets			Binary
Return on assets	Ranked		Binary
Change in return on assets			Binary
Return on assets: variation - sector neutral	Ranked		Binary
Accruals (Sloan definition)	Ranked		Binary
Change in accruals			Binary
Operating cash-flow			Binary
Cash Flow Variation	Ranked		Binary
Financial health			
Change in Current Ratio			Binary
Debt to Assets - sector neutral	Ranked		Binary
Change in Debt to Assets			Binary
Efficiency			
Change in Sales to Assets			Binary
Gross margins	Ranked		Binary
Change in gross margins			Binary
Management signalling			
Equity issuance	Ranked		Binary
Risk			
Distance to Default		Ranked	Binary
Volatility		Ranked	Binary
Price Momentum		Ranked	

Source: UBS

For full details of each variable, please see Appendix A.

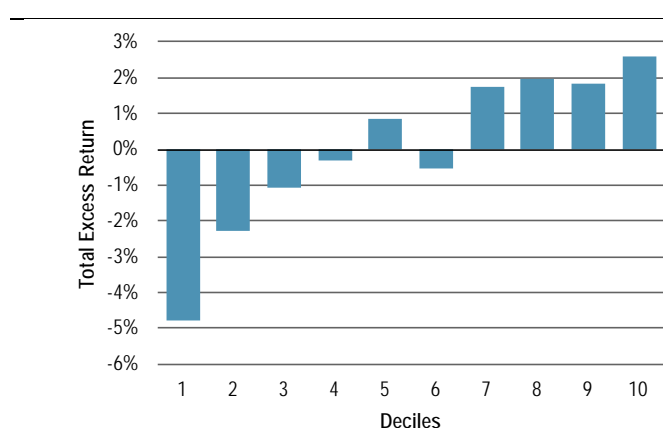
How does Quality perform?

High Quality

Firstly, companies that score well tend to exhibit positive excess returns over the benchmark with low levels of volatility over the twelve months post score formation (that is, post their annual reporting date). High scoring companies also tend to have growing earnings with low levels of dispersion in earnings outcomes. Those that score poorly tend to demonstrate negative excess returns with high levels of volatility and high dispersion in earnings outcomes, reinforcing the unpredictable payoff associated with low quality companies.

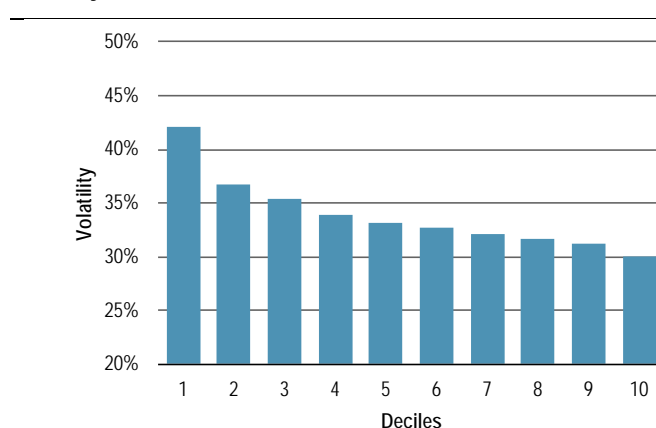
Note: in all decile ranks, decile 10 is regarded as desirable, and decile 1 as undesirable.

Figure 6: High Quality: total excess returns



Source: Thomson Reuters, UBS

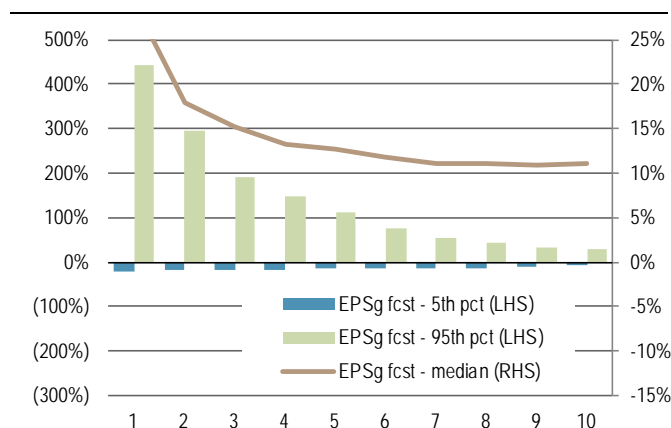
Figure 7: High Quality: subsequent volatility (12m, monthly)



Source: Thomson Reuters, UBS

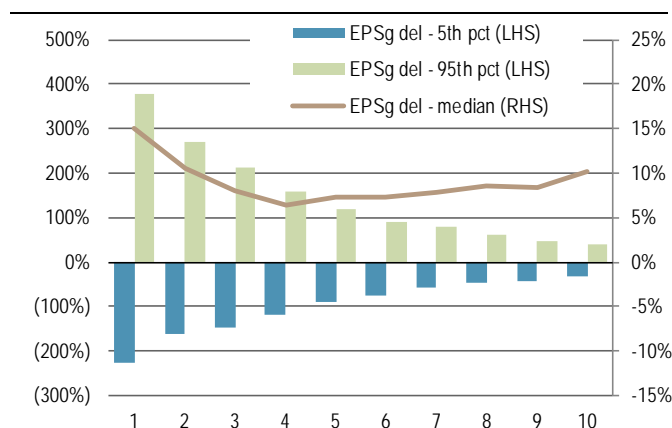
It is interesting to note that whilst the forecast earnings growth rates for low quality companies demonstrates significant dispersion, the delivered earnings growth rates demonstrate even higher dispersion with significantly worse downside risk.

Figure 8: High Quality: forecast earnings growth rate



Source: Thomson Reuters, UBS

Figure 9: High Quality: delivered earnings growth rate



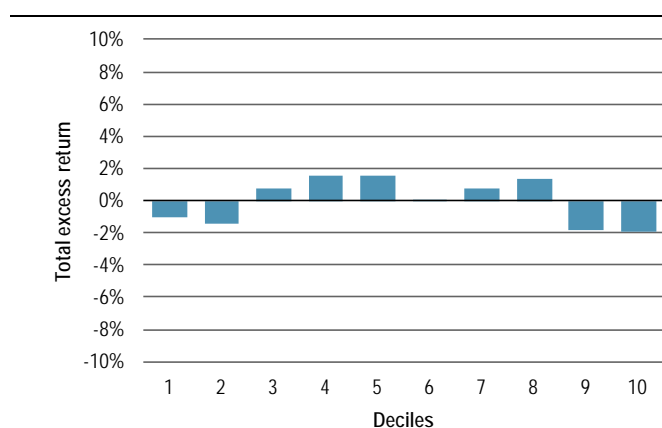
Source: Thomson Reuters, UBS

Performance in up and down markets

Understanding factor performance in both up and down markets is critical to help us understand how the factor is likely to perform through the investment cycle.

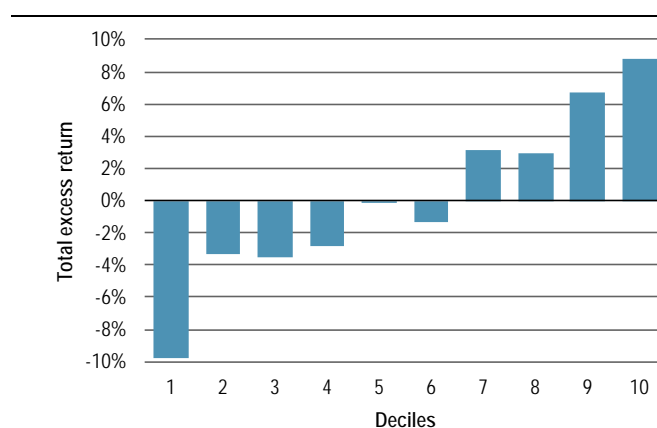
In down markets, there is a high dispersion of returns with high Quality companies tending to outperform whilst low Quality companies tend to underperform, as expected. What we find really interesting is that in up markets, there seems to be little dispersion in returns, high quality companies tend to underperform slightly (deciles 9 and 10), average quality companies tend to outperform – these are what we would typically describe as cyclical businesses (deciles 3 to 8), but importantly, low quality companies tend to underperform. In other words, this analysis suggests low quality companies are seldom worth owning.

Figure 10: High Quality: total excess returns in up-markets



Source: Thomson Reuters, UBS

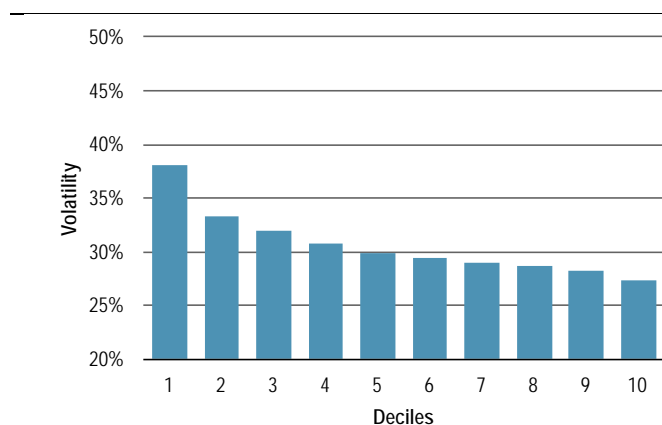
Figure 11: High Quality: total excess returns in down-markets



Source: Thomson Reuters, UBS

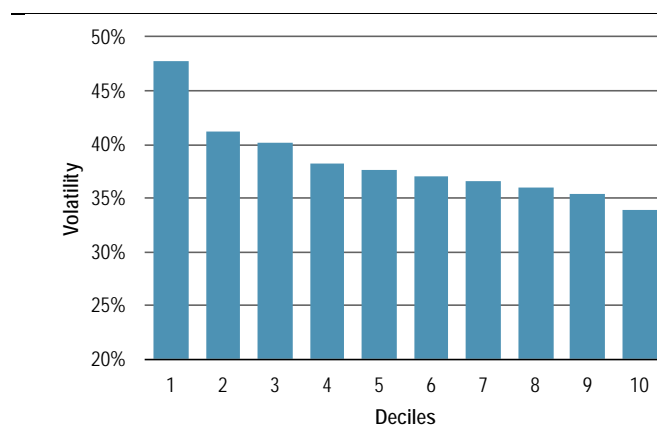
The relationship with volatility remains constant in both up and down markets, with only the magnitude changing.

Figure 12: High Quality: subsequent volatility (12m, monthly) in up-markets



Source: Thomson Reuters, UBS

Figure 13: High Quality: subsequent volatility (12m, monthly) in down-markets



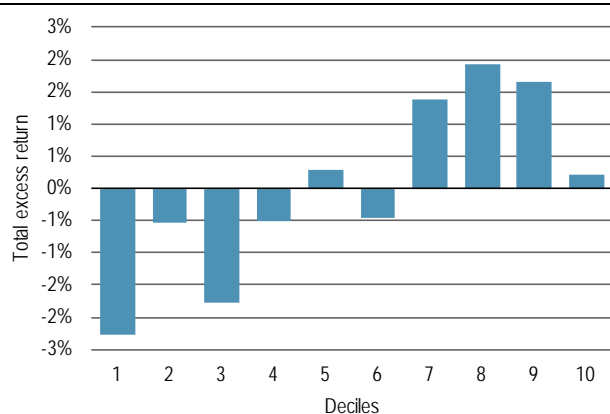
Source: Thomson Reuters, UBS

Risk Alert

The Risk Alert model aims to highlight companies that constitute safe versus risky investments. As a consequence, we are more interested in the low scoring end of the spectrum.

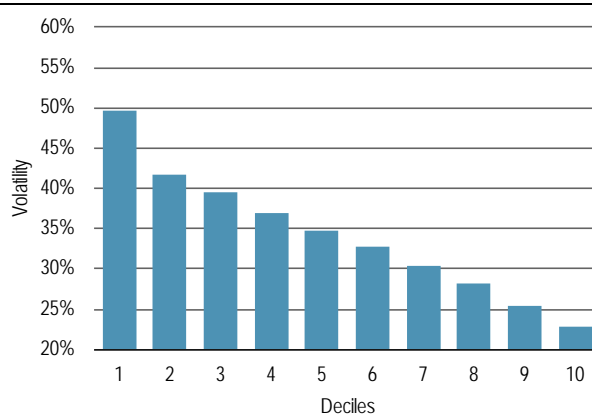
Firstly, companies that score poorly tend to exhibit negative excess returns over the benchmark with higher levels of volatility over the twelve months post score formation. Low scoring companies also tend to have negative earnings growth rates with high levels of dispersion in earnings outcomes. Those that score well tend to demonstrate positive excess returns with low levels of volatility and low dispersion in earnings outcomes.

Figure 14: Risk Alert: total excess returns



Source: Thomson Reuters, UBS

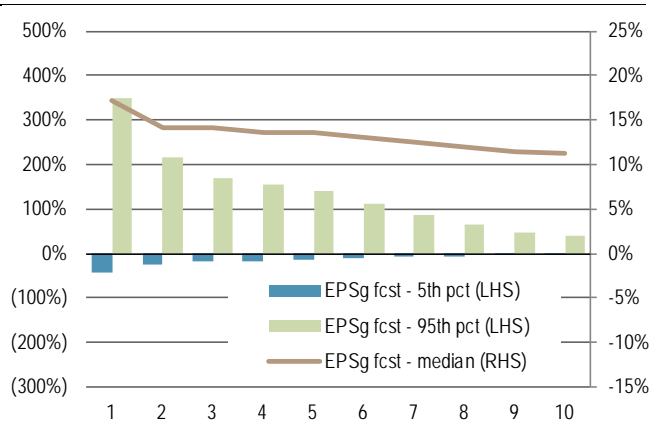
Figure 15: Risk Alert: subsequent volatility (12m, monthly)



Source: Thomson Reuters, UBS

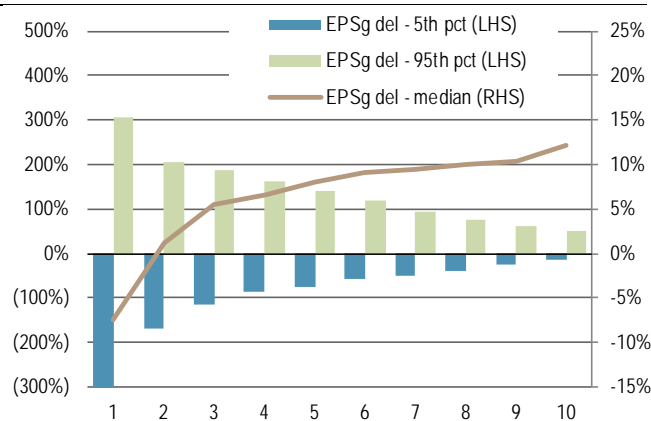
Forecast earnings growth rates for risky companies demonstrate significant dispersion, however, the delivered earnings growth rates demonstrate even higher dispersion with significantly worse downside risk.

Figure 16: Risk Alert: forecast earnings growth rate



Source: Thomson Reuters, UBS

Figure 17: Risk Alert: delivered earnings growth rate



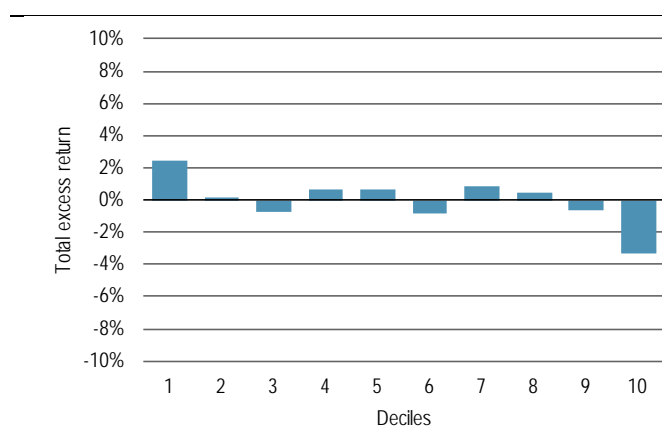
Source: Thomson Reuters, UBS

Performance in up and down markets

In down markets, there is a high dispersion of returns with Safe companies tending to outperform whilst Risky companies tend to underperform, as expected.

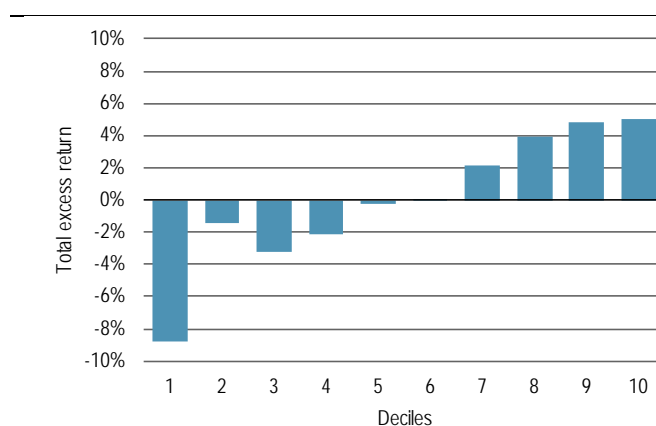
In up markets, there is little dispersion in returns, Safe companies tend to underperform slightly (deciles 9 and 10), and Risky companies tend to outperform. These are unpredictable stocks which by definition are highly geared, highly volatile companies that are likely to do well in a risk rally.

Figure 18: Risk Alert: total excess returns in up-markets



Source: Thomson Reuters, UBS

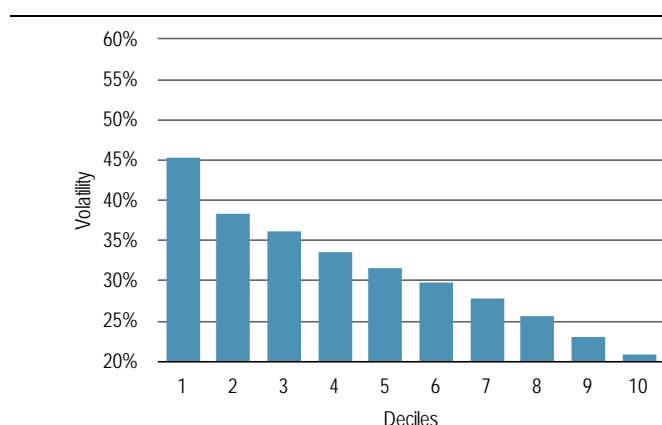
Figure 19: Risk Alert: total excess returns in down-markets



Source: Thomson Reuters, UBS

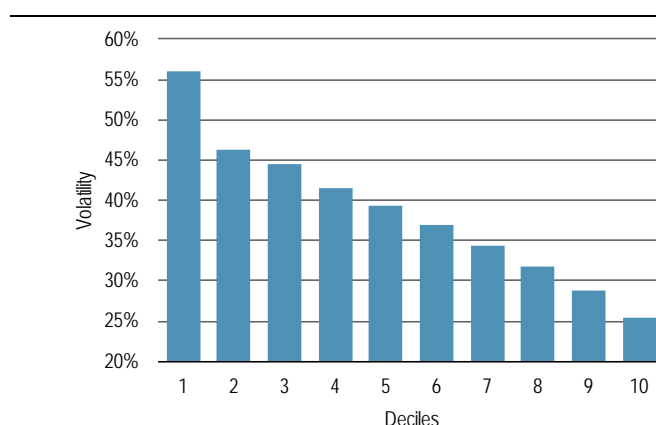
Given that volatility is one of the inputs into the model it is unsurprising that the relationship with volatility is constant in both up and down markets, with only the magnitude changing.

Figure 20: Risk Alert: subsequent volatility (12m, monthly) in up-markets



Source: Thomson Reuters, UBS

Figure 21: Risk Alert: subsequent volatility (12m, monthly) in down-markets



Source: Thomson Reuters, UBS

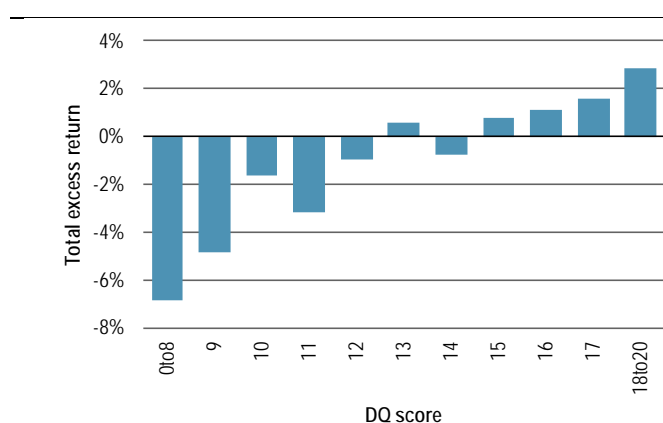
Delta Quality

The Delta Quality model aims to highlight companies that exhibit either improving or deteriorating fundamentals.

Firstly, companies that score well tend to exhibit positive excess returns over the benchmark with lower levels of volatility over the twelve months post score formation. High scoring companies also tend to have positive earnings growth rates with low levels of dispersion in earnings outcomes. Those that score poorly tend to demonstrate negative excess returns with high levels of volatility and high dispersion in earnings outcomes.

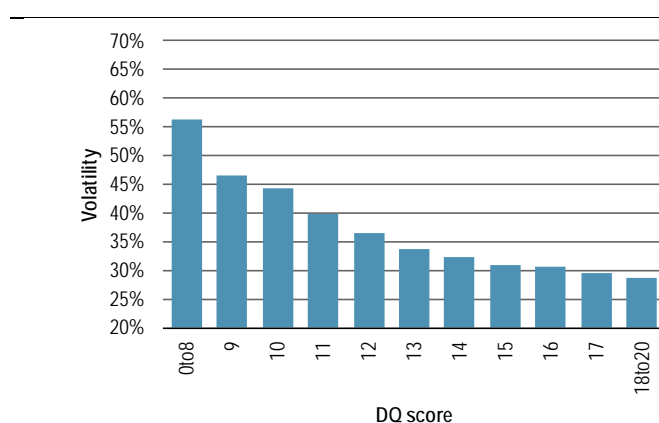
Note, as we are using a binary scoring model, there are very few companies at either extreme, as a consequence we group scores 1 to 8 and 18 to 20.

Figure 22: Delta Quality: total excess returns



Source: Thomson Reuters, UBS

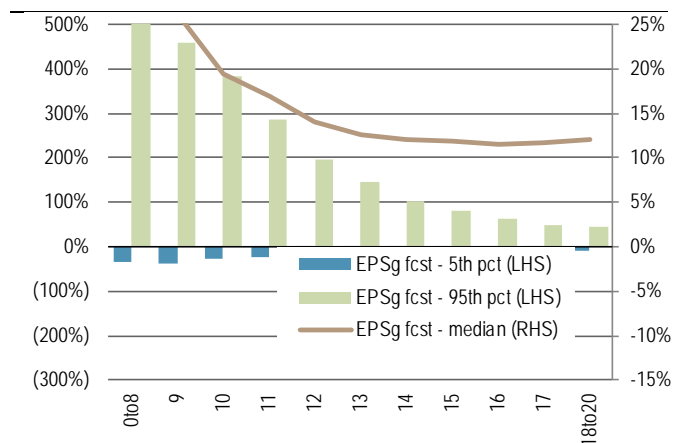
Figure 23: Delta Quality: subsequent volatility (12m, monthly)



Source: Thomson Reuters, UBS

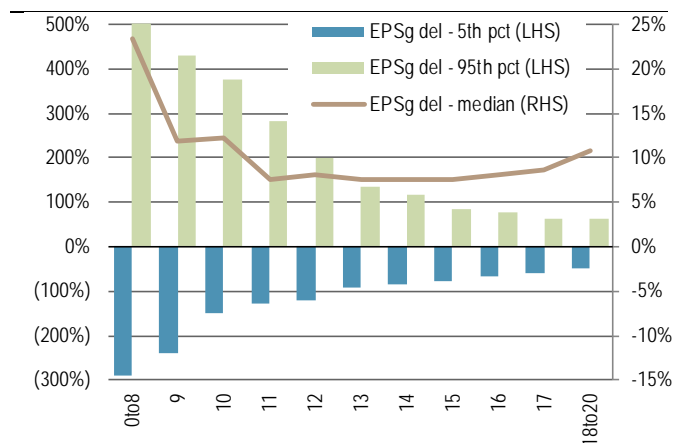
Again, the forecast earnings growth rates for deteriorating quality companies demonstrate significant dispersion, and the delivered earnings growth rates demonstrate even higher dispersion with significantly worse downside risk.

Figure 24: Delta Quality: forecast earnings growth rate



Source: Thomson Reuters, UBS

Figure 25: Delta Quality: delivered earnings growth rate



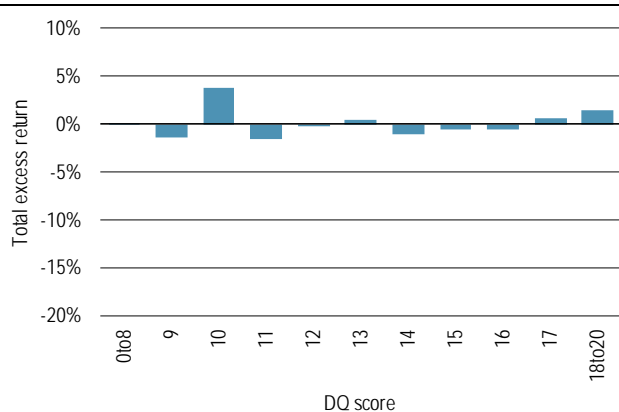
Source: Thomson Reuters, UBS

Performance in up and down markets

In down markets, there is a high dispersion of returns with high scoring companies tending to outperform whilst low scoring companies tend to underperform.

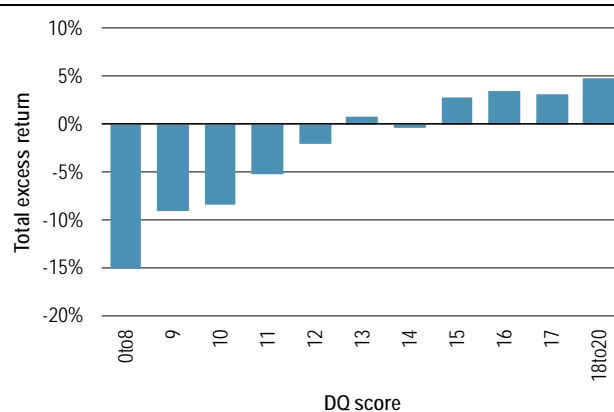
In up markets, there is little dispersion in returns, high scoring companies tend to outperform slightly (scores 17 to 20).

Figure 26: Delta Quality: total excess returns in up-markets



Source: Thomson Reuters, UBS

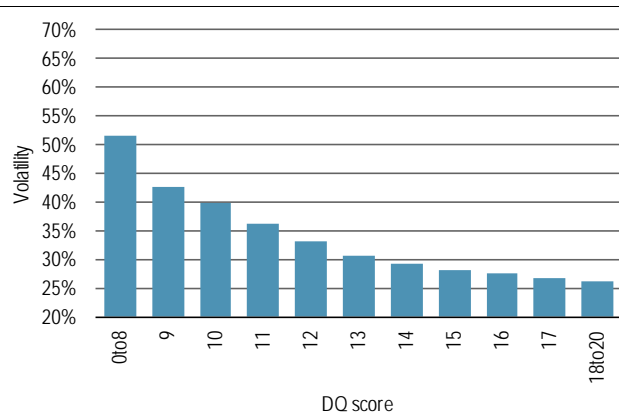
Figure 27: Delta Quality: total excess returns in down-markets



Source: Thomson Reuters, UBS

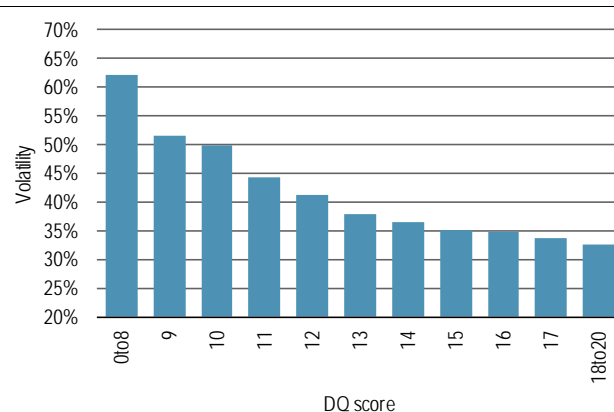
The relationship with volatility remains constant in both up and down markets, with only the magnitude changing.

Figure 28: Delta Quality: subsequent volatility (12m, monthly) in up-markets



Source: Thomson Reuters, UBS

Figure 29: Delta Quality: subsequent volatility (12m, monthly) in down-markets



Source: Thomson Reuters, UBS

Note, the High, Low and Delta Quality model results are robust when tested on a sector neutral basis.

Digging into the detail

Performance metrics of each of the three Quality models:

Figure 30: Performance of each individual Quality model

Model	Intersection	Total Excess Return	Volatility	Sharpe	T-stat
High Quality	High Quality	2.4%	4%	0.55	2.30
High Quality	Neutral Quality	0.4%	2%	0.19	0.79
High Quality	Low Quality	-3.0%	5%	-0.65	-2.72
Risk Alert	Safe	1.4%	7%	0.19	0.80
Risk Alert	Neutral	-0.7%	2%	-0.30	-1.24
Risk Alert	Risky	-1.3%	13%	-0.10	-0.44
Delta Quality	Improving	1.9%	5%	0.41	1.71
Delta Quality	Stable	-0.5%	2%	-0.32	-1.35
Delta Quality	Deteriorating	-9.0%	14%	-0.64	-2.66

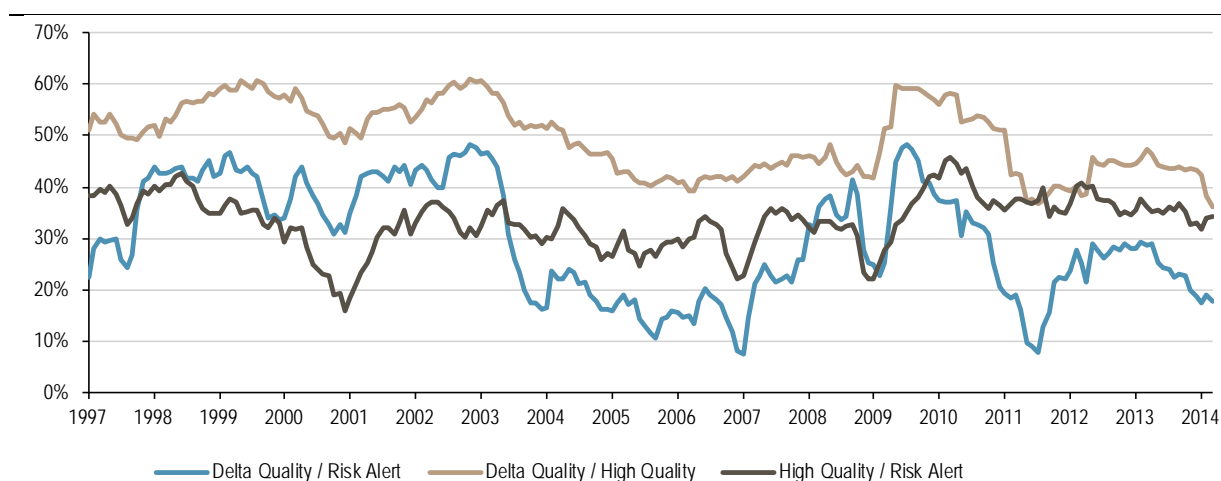
Source: Thomson Reuters, UBS

Why three Quality models, aren't they all the same?

Looking at the rank correlations of the three Quality models demonstrated that the Delta Quality and High Quality models have the most commonality with an average correlation of 49%, whilst the other two have less commonality with a 33% correlation High Quality and Risk Alert, and a 30% correlation between Delta Quality and Risk Alert.

This indicates that each model is indeed picking up on a different view of Quality.

Figure 31: Rank correlations of the Quality models



Source: Thomson Reuters, UBS

Show me that it's not just volatility

In order to prove that the Quality models are not just picking up on a volatility effect, we double sorted each model with volatility and tested for subsequent excess returns.

For the High Quality and Risk Alert models, each month we split all the companies into ten deciles based on historical (12 month) price volatility. After that we performed a second split within each of these baskets based on the quality score, creating ten quality sub-baskets within each volatility basket. Finally we aggregate all the baskets belonging to the same quality decile into 10 volatility-adjusted quality factors. The table shows the average excess return for the volatility-adjusted basket.

Figure 32: High Quality and Risk Alert models excess returns adjusted for volatility

	<< Highest Volatility			Deciles of Volatility						Lowest Volatility >>
	1	2	3	4	5	6	7	8	9	10
High Quality Model	-3.5%	-2.7%	-1.4%	-0.3%	-0.2%	1.6%	1.0%	1.8%	2.2%	2.3%
Risk Alert Model	-1.0%	-1.2%	-0.3%	-0.6%	-1.1%	-0.2%	1.1%	-0.1%	1.8%	1.6%

Source: Thomson Reuters, UBS

For the Delta Quality model, we split the groups by volatility decile each month, and then show the average excess return within each volatility/delta quality combination.

Figure 33: Delta Quality model excess returns adjusted for volatility

	<< Highest Volatility			Deciles of Volatility						Lowest Volatility >>
	1	2	3	4	5	6	7	8	9	10
Delta Quality Model										
Declining Quality	-18.9%	-16.8%	-9.7%	-6.4%	-9.0%	-10.3%	-6.1%	-15.9%	0.9%	-1.5%
Stable Quality	-9.0%	-4.7%	-3.0%	-5.9%	-2.6%	-1.8%	-1.5%	-0.9%	-0.9%	-1.3%
Improving Quality	-3.5%	-5.3%	-4.8%	-0.6%	-0.9%	2.0%	0.3%	1.0%	1.0%	-0.9%

Source: Thomson Reuters, UBS

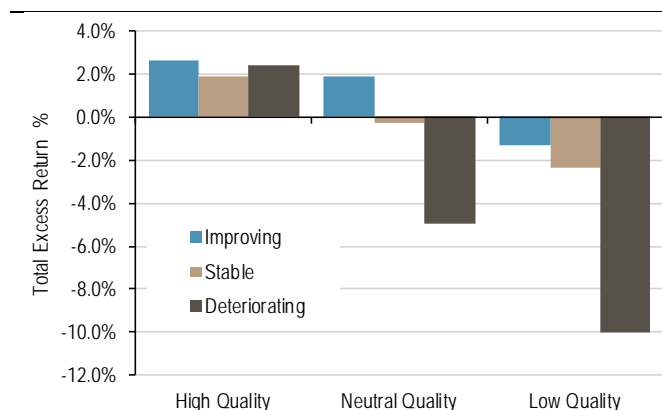
Across all three Quality models there is a consistent excess return relationship after adjusting for volatility. As a result, we can conclude that there is indeed a Quality premium over and above volatility.

Understanding the Quality model intersections

High Quality and Delta Quality

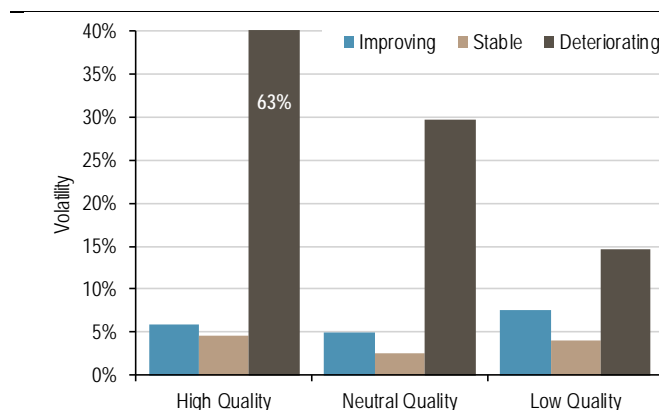
The returns within the intersection analysis are monotonic with intersections improving returns. Note the slight outperformance of High Quality companies that are deteriorating in terms of their Quality. This result is highly volatile and not significant.

Figure 34: HQ and DQ: total excess returns



Source: Thomson Reuters, UBS

Figure 35: HQ and DQ: volatility

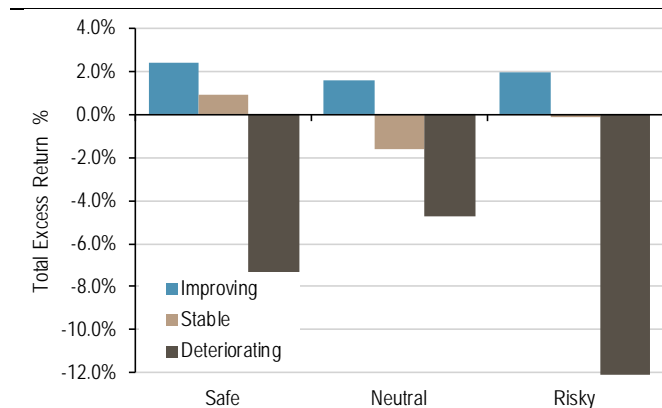


Source: Thomson Reuters, UBS

Risk Alert and Delta Quality

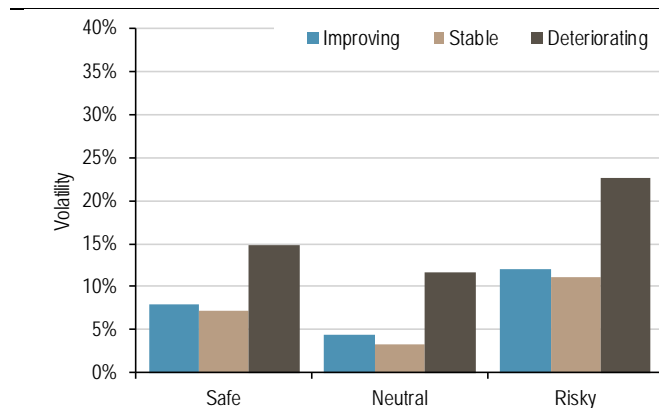
The key point here is that this analysis suggests companies whose fundamentals would ordinarily be regarded as Safe (ie low volatility, lower levels of gearing, and good stock price momentum) are exceptionally poor performers once the company's fundamentals begin to deteriorate. A likely explanation for this is that the investor clientele that are attracted to Safety are risk averse, as a result when the company's fundamentals begin to deteriorate, investors are likely to sell out rapidly.

Figure 36: RA and DQ: total excess returns



Source: Thomson Reuters, UBS

Figure 37: RA and DQ: volatility

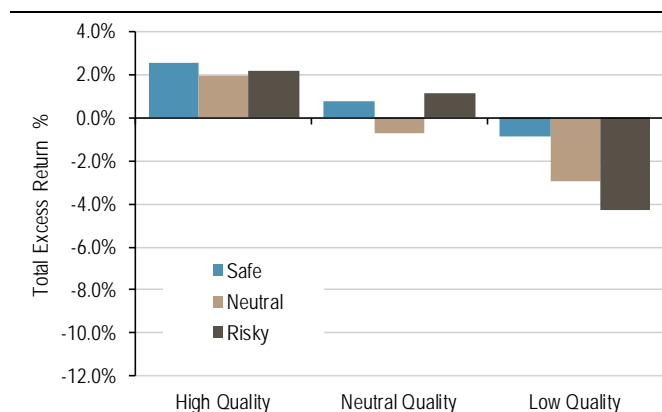


Source: Thomson Reuters, UBS

High Quality and Risk Alert

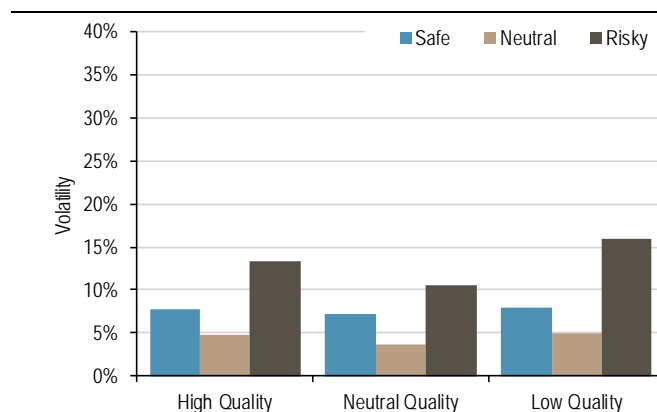
As expected, High Quality, Safe stocks outperform Low Quality, Risky stocks.

Figure 38: HQ and LQ: total excess returns



Source: Thomson Reuters, UBS

Figure 39: HQ and LQ: volatility



Source: Thomson Reuters, UBS

Figure 40: Performance of Quality model intersections

Model 1	Intersection	Model 2	Intersection	Total excess return	Volatility	Sharpe	T-stat
High Quality	High	Delta Quality	Improving	2.6%	6%	0.44	1.82
High Quality	High	Delta Quality	Stable	1.8%	5%	0.40	1.67
High Quality	High	Delta Quality	Deteriorating	2.4%	63%	0.04	0.12
High Quality	Neutral	Delta Quality	Improving	1.9%	5%	0.38	1.57
High Quality	Neutral	Delta Quality	Stable	-0.3%	3%	-0.11	-0.44
High Quality	Neutral	Delta Quality	Deteriorating	-4.9%	30%	-0.17	-0.65
High Quality	Low	Delta Quality	Improving	-1.3%	8%	-0.17	-0.72
High Quality	Low	Delta Quality	Stable	-2.4%	4%	-0.59	-2.44
High Quality	Low	Delta Quality	Deteriorating	-10.0%	15%	-0.68	-2.83
Risk Alert	Safe	Delta Quality	Improving	2.4%	8%	0.30	1.26
Risk Alert	Safe	Delta Quality	Stable	0.9%	7%	0.12	0.51
Risk Alert	Safe	Delta Quality	Deteriorating	-7.5%	15%	-0.50	-2.07
Risk Alert	Neutral	Delta Quality	Improving	1.6%	4%	0.35	1.47
Risk Alert	Neutral	Delta Quality	Stable	-1.6%	3%	-0.51	-2.12
Risk Alert	Neutral	Delta Quality	Deteriorating	-4.8%	12%	-0.41	-1.70
Risk Alert	Risky	Delta Quality	Improving	2.0%	12%	0.16	0.68
Risk Alert	Risky	Delta Quality	Stable	-0.1%	11%	-0.01	-0.04
Risk Alert	Risky	Delta Quality	Deteriorating	-12.1%	23%	-0.54	-2.22
Delta Quality	High	Risk Alert	Safe	2.5%	8%	0.33	1.37
Delta Quality	High	Risk Alert	Neutral	2.0%	5%	0.42	1.72
Delta Quality	High	Risk Alert	Risky	2.2%	13%	0.17	0.69
Delta Quality	Neutral	Risk Alert	Safe	0.8%	7%	0.11	0.45
Delta Quality	Neutral	Risk Alert	Neutral	-0.7%	4%	-0.19	-0.80
Delta Quality	Neutral	Risk Alert	Risky	1.1%	11%	0.10	0.43
Delta Quality	Low	Risk Alert	Safe	-0.8%	8%	-0.11	-0.44
Delta Quality	Low	Risk Alert	Neutral	-3.0%	5%	-0.61	-2.52
Delta Quality	Low	Risk Alert	Risky	-4.3%	16%	-0.27	-1.12

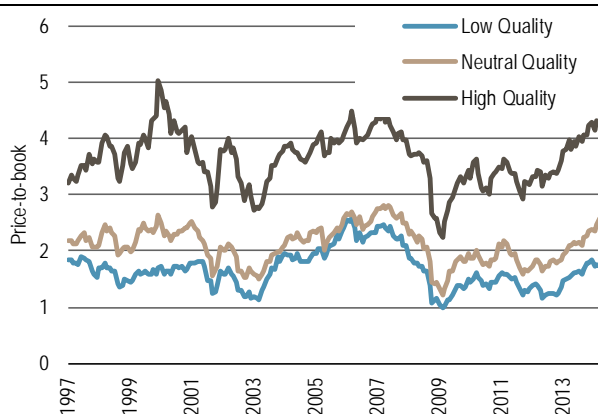
Source: Thomson Reuters, UBS

Surely it's priced?

In order to assess whether Quality is priced in, we assess the average price-to-book of each third of each Quality model.

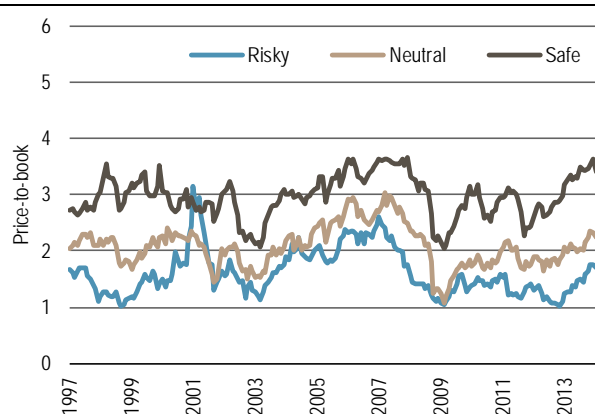
Overall, we found that absolute quality, that is our High Quality and Risk Alert models, are partially priced. High Quality and Safe companies are always more expensive than Neutral Quality and Neutral Risk companies, which are always more expensive than Low Quality and Risky companies.

Figure 41: High Quality: Price to Book



Source: Thomson Reuters, UBS

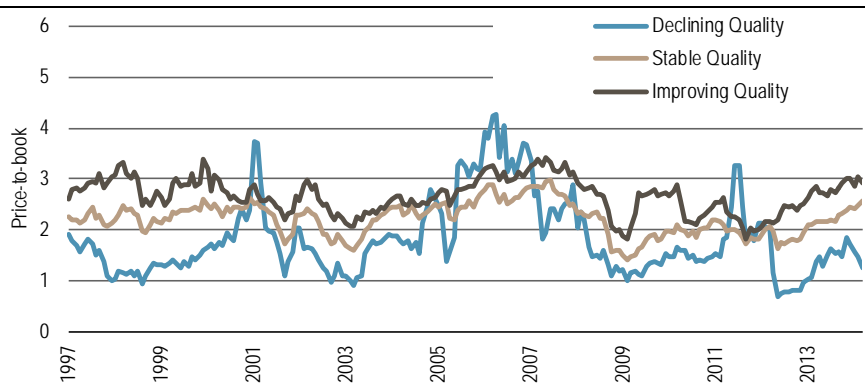
Figure 42: Risk Alert: Price to Book



Source: Thomson Reuters, UBS

However, we found that the change in quality, our Delta Quality model, is less efficiently priced. There are points in time when companies with deteriorating fundamentals are bid up to high levels. These mispricing effects line up with periods of 'irrational exuberance' such as the Tech Bubble, the Resource Bubble and the post GFC recovery.

Figure 43: Delta Quality: Price to Book

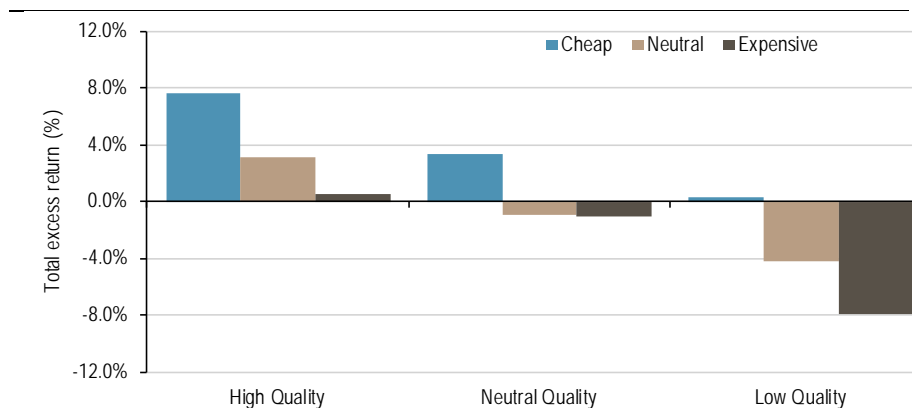


Source: Thomson Reuters, UBS

So where's the opportunity?

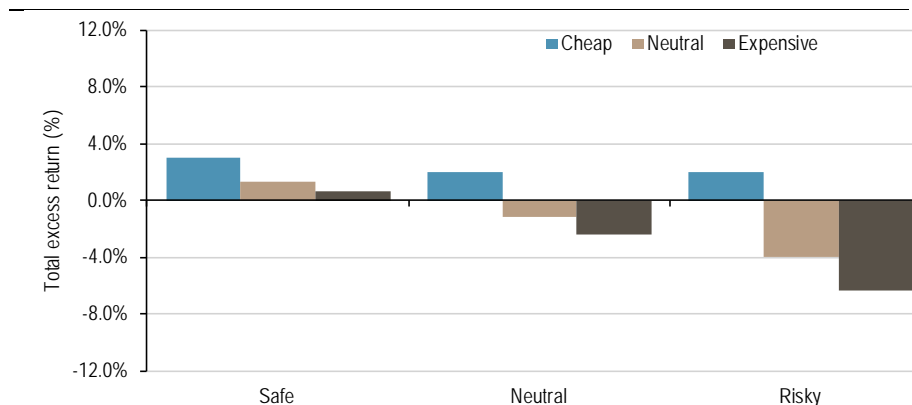
In order to demonstrate where the opportunity set lies, we intersected each model with Price-to-Book. Overall, we found a significant improvement in the Value premium amongst High Quality, Safe Quality and Improving Quality stocks, whilst on the other extreme, we found there to be a significant penalty associated with Low Quality, Risky and Deteriorating Quality, expensive stocks.

Figure 44: High Quality Value Premium: total excess returns



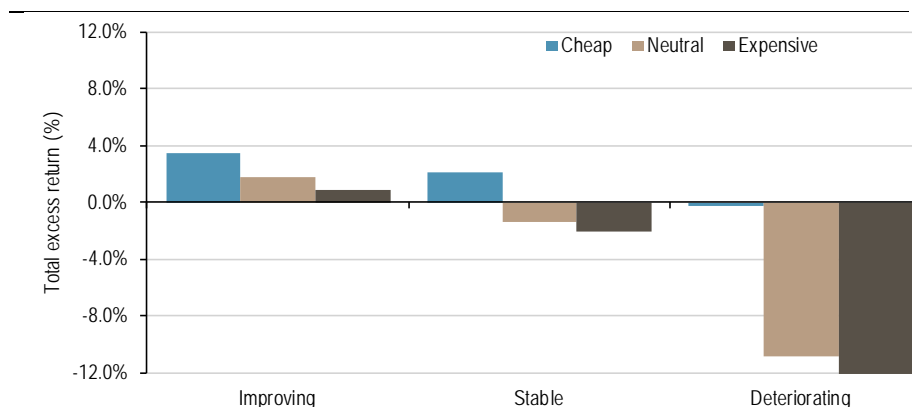
Source: Thomson Reuters, UBS

Figure 45: Risk Alert Value Premium: total excess returns



Source: Thomson Reuters, UBS

Figure 46: Delta Quality Value Premium: total excess returns



Source: Thomson Reuters, UBS

Figure 47: Performance of Quality model intersections with Value (Price-to-Book)

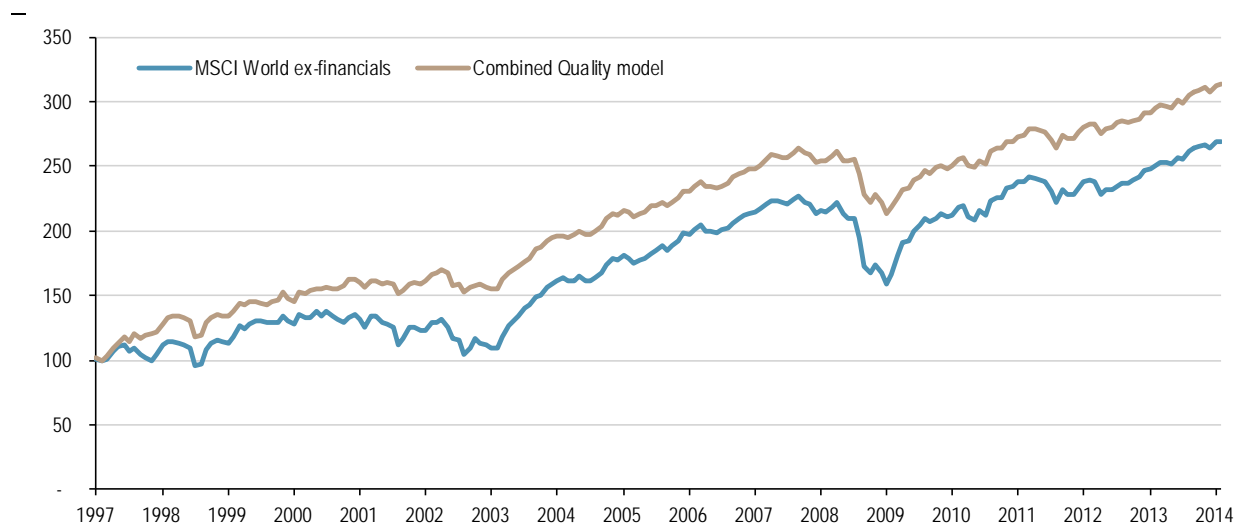
Quality model	Description	Valuation	Total excess return	Volatility	Sharpe	T-stat
High Quality	High	Cheap	7.6%	31%	0.24	5.64
High Quality	High	Neutral	3.2%	28%	0.11	5.31
High Quality	High	Expensive	0.6%	29%	0.02	1.07
High Quality	Neutral	Cheap	3.4%	31%	0.11	5.45
High Quality	Neutral	Neutral	-1.0%	29%	-0.03	-1.96
High Quality	Neutral	Expensive	-1.0%	32%	-0.03	-1.35
High Quality	Low	Cheap	0.3%	42%	0.01	0.38
High Quality	Low	Neutral	-4.2%	34%	-0.12	-5.70
High Quality	Low	Expensive	-7.9%	39%	-0.21	-6.25
Risk Alert	Safe	Cheap	3.0%	25%	0.12	4.34
Risk Alert	Safe	Neutral	1.3%	24%	0.06	3.22
Risk Alert	Safe	Expensive	0.6%	27%	0.02	1.35
Risk Alert	Neutral	Cheap	2.0%	32%	0.06	3.19
Risk Alert	Neutral	Neutral	-1.2%	31%	-0.04	-2.23
Risk Alert	Neutral	Expensive	-2.4%	36%	-0.07	-3.08
Risk Alert	Risky	Cheap	2.0%	49%	0.04	1.84
Risk Alert	Risky	Neutral	-4.0%	40%	-0.10	-3.75
Risk Alert	Risky	Expensive	-6.3%	47%	-0.13	-3.35
Delta Quality	Improving	Cheap	3.4%	27%	0.13	5.05
Delta Quality	Improving	Neutral	1.8%	26%	0.07	3.65
Delta Quality	Improving	Expensive	0.9%	27%	0.03	1.65
Delta Quality	Stable	Cheap	2.1%	35%	0.06	3.65
Delta Quality	Stable	Neutral	-1.4%	31%	-0.04	-3.01
Delta Quality	Stable	Expensive	-2.0%	33%	-0.06	-3.43
Delta Quality	Deteriorating	Cheap	-0.3%	61%	0.00	-0.11
Delta Quality	Deteriorating	Neutral	-10.9%	49%	-0.22	-3.99
Delta Quality	Deteriorating	Expensive	-12.5%	51%	-0.24	-3.81

Source: Thomson Reuters, UBS

Building a combined Quality model

We take a simple intersection approach to the final Quality model by taking the intersection of High Quality stocks with Improving Quality, and eliminate any stocks that fall into the Risky category of the Risk Alert model. The intersection has an average of 171 stocks in it at any point in time. Overall, the model outperformed the benchmark by 2.6% per annum, with 6.4% volatility, a Sharpe ratio of 0.40 and a t-stat of 1.65.

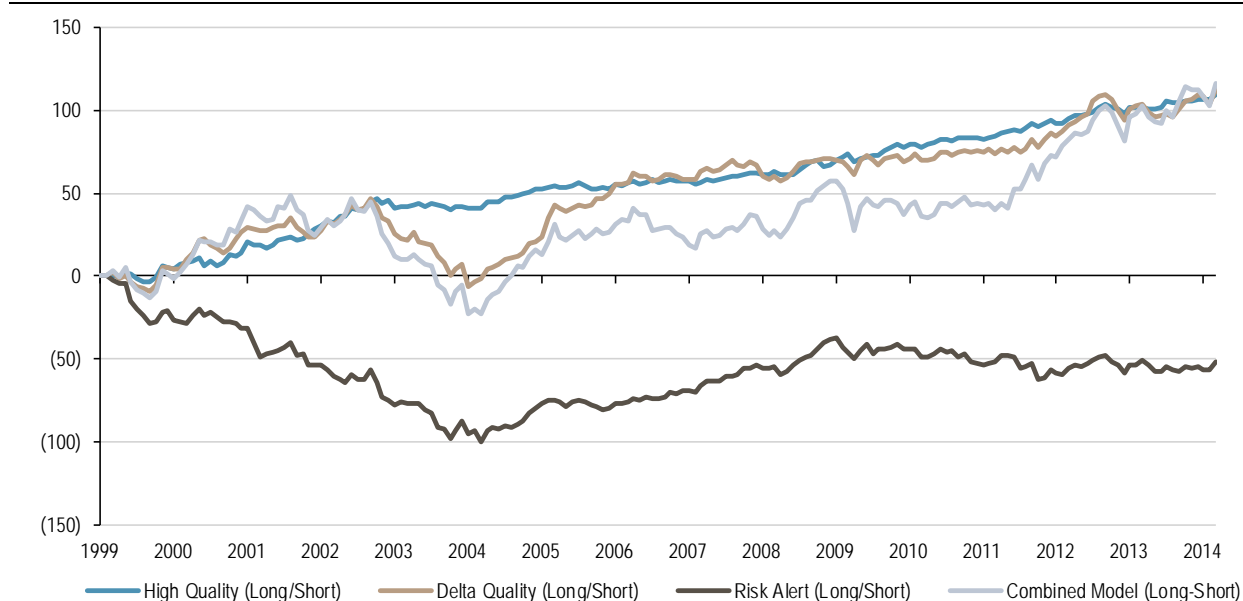
Figure 48: Combined Quality Model vs MSCI World ex-financials equal weighted.



Source: Thomson Reuters, UBS

Four factor alphas

Figure 49: High Quality model (Long Short) four factor alpha



Source: Thomson Reuters, UBS

The Annual 4-Factor Model alpha is the average annual excess fund return calculated following Carhart's (1997) four factor model approach. Specifically, each month the following model is run over the prior 24 months:

$$y = \alpha + \beta_1 (R_m - R_f) + \beta_2 SMB + \beta_3 HML + \beta_4 MOM + \epsilon$$

where y is the quality portfolio return, (R_m-R_f), SMB and HML are the market, size and value factors from Ken French's data library⁴ and MOM is a momentum factor calculated as per Carhart (1997). The parameter estimates are used to calculate the four factor alpha for the month. These values are then annualised using simple compounding.

Figure 50: Four factor alphas

	Ann Ret	Vol	Sharpe / IR	Tstat
High Quality (High-Low)	7.2%	6%	1.16	4.50
Risk Alert (Safe-Torpedo)	-3.4%	12%	-0.29	-1.12
Delta Quality (Improving-Declining)	7.4%	13%	0.57	2.22
Combined Model (Long Only)	2.1%	4%	0.49	1.89
Combined Model (Short Only)	-5.6%	18%	-0.32	-1.23
Combined Model (Long-Short)	7.7%	20%	0.39	1.52

Source: Thomson Reuters, UBS

⁴ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Conclusion

We believe that Quality matters right now for two reasons: firstly, from an economic perspective, we have entered into a world of structurally lower growth defined by ageing populations and rising dependency ratios. Secondly, as a result of the demographic dividend and consummate credit bubble we now find ourselves in a highly leveraged world with lower growth rates. As a consequence, we face heightened macro-economic risk which is likely to result in higher levels of volatility and correlation in the future. In this environment, good quality companies are likely to outperform.

We find that Quality can be defined from three perspectives, High Quality, Low (or risky) Quality, and the Change in Quality each with its own application. Each model has a clear relationship with future earnings growth, excess returns and volatility.

There are no surprises when intersecting the three Quality models. Each intersection improves the alpha on both the long and short sides. Two interesting observations are: firstly, Safe Quality (low risk) companies with deteriorating fundamentals tend to underperform significantly. A likely explanation for this is that the investor clientele that are attracted to Safety are risk averse, as a result when the company's fundamentals begin to deteriorate, investors are likely to sell out rapidly. Secondly, whilst there are relatively few companies in the Low Quality and Improving Quality intersection, companies that do manage to recover from a position of weakness tend to enjoy a significant re-rating.

In terms of valuation, absolute levels of Quality seem to be partially priced in, although High Quality companies tend to outperform and Low Quality companies underperform leading us to conclude that the effect is not fully priced. The change in Quality seems to be less efficiently priced with Declining Quality companies tending to enjoy a premium over both Improving and Neutral Quality during periods of 'irrational exuberance' in the market.

Furthermore, we find that the Value premium is significantly enhanced through the use of each of the three Quality models.

Finally, for illustrative purposes, we found that we were able to build a Quality model based upon the three underlying models which delivered an excess return of 2.6% with volatility of 6.4%.

So what can we do with this?

Based on this analysis, we believe long only managers should think about tilting their portfolios towards high quality stocks particularly those that are attractively priced. However, we need to be vigilant of the change in quality. If this declines significantly, these stocks should be removed. Importantly, low quality stocks should be avoided.

Similarly, long/short managers may benefit from shorting low quality stocks, but should be vigilant of the change in quality as a significant increase in the change in quality can cause a short squeeze.

Appendix A: Financial Statement items

Return on Assets: We use the latest reported full-year⁵ ROA. An ROA greater than or equal to 0 leads to a '1' quality score.

Change in Return on Assets: We use the year-on-year change (delta) in the above ROA measure. A change in ROA greater than or equal to 0 leads to a '1' quality score.

Operating Cash-flow: We use the latest reported full-year Cash Flow from Operations. Cash Flow from Operations greater than or equal to zero leads to a '1' quality score.

Accruals (Sloan definition): For our income accruals metric we use Net Income minus Operating Cash Flow scaled by average total. Cash Flow from Operations greater than or equal to Net Income leads to a '1' quality score.

Change in Current Ratio: We use the year-on-year change in the last reported Current Ratio. A current ratio that is increasing leads to a '1' quality score.

Change in Debt to Assets: We use the year-on-year change in the last reported Debt to. Decreasing debt to assets leads to a '1' quality score.

Change in Sales to Assets: We use the year-on-year change in the last reported Sales to average Total Assets. Increasing Sales to Assets leads to a '1' quality score.

Change in Margins: We use the year-on-year change in the last reported Gross Profit Margin (defined as Gross Income / Net Sales or Revenues). A change in Margin greater than or equals to 0 leads to a '1' quality score.

Issuance: We use 12-month change in the number of (adjusted) shares outstanding. A share count of less than 105% of the previous value leads to a '1' quality score.

Industry-controlled ROA variation: We consider the standard deviation of ROA for each company (using the definition above), for the previous 10 years of reported data (with a minimum of 5 years). The variation is z-scored within global industry groups (first GICS level). A low variation leads to a '1' quality score.

Industry-controlled Leverage: The debt-assets factor (as above) is z-scored within global industry groups (first GICS level). Low leverage relative to industry leads to a '1' quality score.

Gross Profitability: We use gross profits (Sales minus COGS and D&A) scaled by average total assets. A gross profitability margin greater than 10% leads to a '1' quality score.

Cash Flow relative to Assets: We use the latest reported full-year Cash Flow from Operations, scaled by average total assets. Positive cash flow of greater than 6% of average total assets leads to a '1' quality score.

⁵ If an announcement date for the financial data is available we use that. Otherwise we assume that financial data is published 75 days after the period end and we allow a 5 day lag for the information to be available in WorldScope.

Improving Gross Margins: We use the year-on-year change in the last reported Gross Profit Margin (defined as Gross Income / Net Sales or Revenues). A change in Margin greater than 10% leads to a '1' quality score.

Change in Gross Profitability: We use the year-on-year change (delta) in the above Profitability measure. A change in Profitability greater than or equal to 0 leads to a '1' quality score.

Change in Cash Flow relative to Assets: We use the year-on-year change (delta) in the above Cash Flow relative to Assets measure. A change in Cash Flow relative to Assets greater than or equal to 0 leads to a '1' quality score.

Change in Accruals: We use the year-on-year change (delta) in the above Accruals measure. A change in Accruals less than or equal to 0 (i.e. less accruals) leads to a '1' quality score.

Volatility: We use 12 months' historic price volatility, using US dollar prices. Stocks below the 80th percentile across all data achieve a '1' quality score.

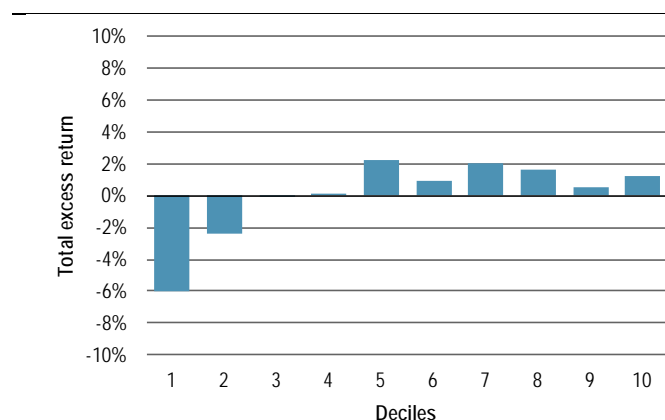
Distance to Default: We calculate distance to default using a proprietary implementation of the Merton model. A distance to default of greater than 3 leads to a '1' quality score.

Cash Flow Variation: We consider the standard deviation of cashflow for each company (using the definition above), for the previous 10 years of reported data (with a minimum of 5 years). Lower variation leads to a '1' quality score.

Appendix B: Regional Performance

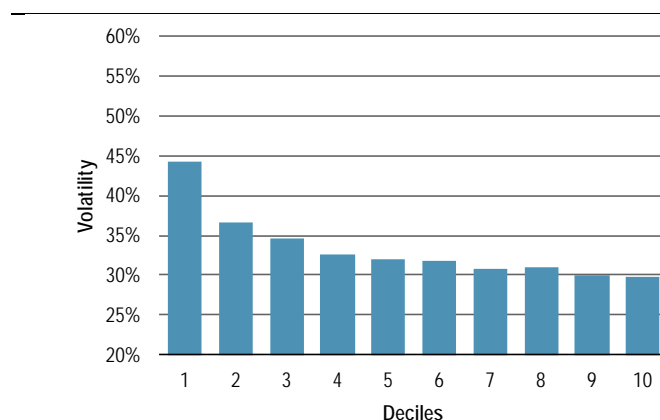
Regional performance High Quality

Figure 51: United States: total excess return



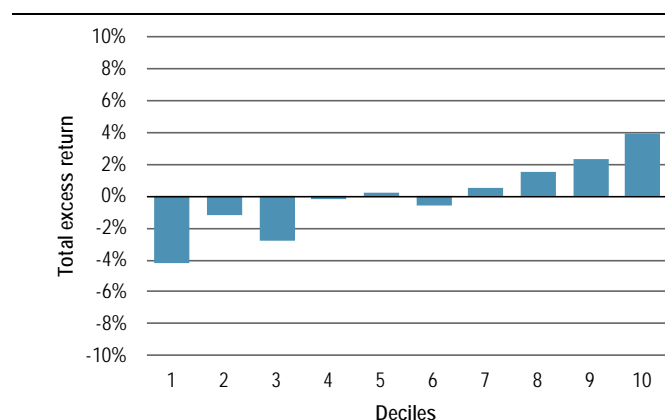
Source: Thomson Reuters, UBS

Figure 52: United States: subsequent volatility (12m, monthly)



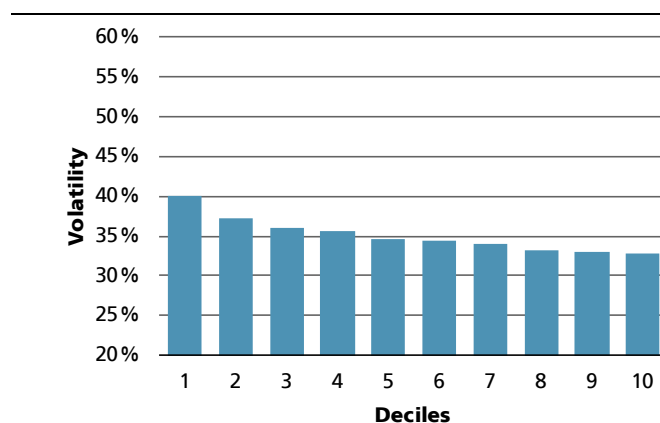
Source: Thomson Reuters, UBS

Figure 53: Europe: total excess return



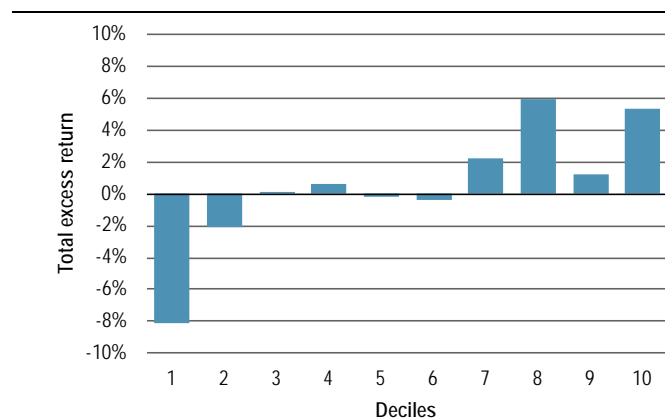
Source: Thomson Reuters, UBS

Figure 54: Europe: subsequent volatility (12m, monthly)



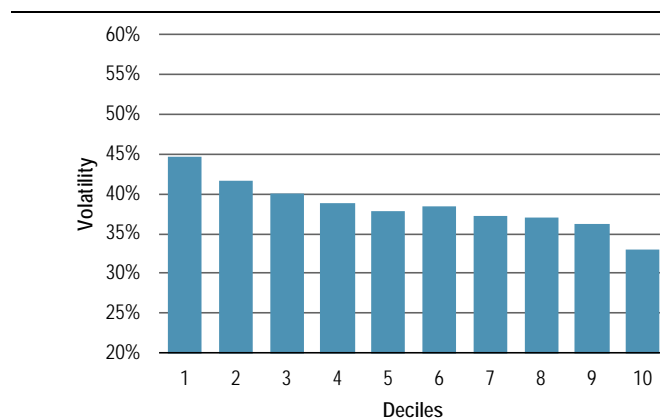
Source: Thomson Reuters, UBS

Figure 55: Asia: total excess return



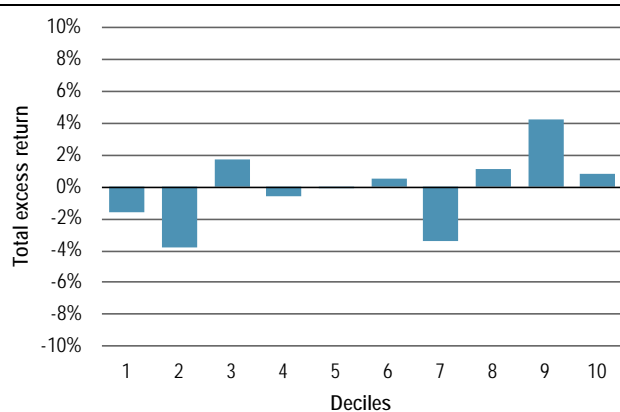
Source: Thomson Reuters, UBS

Figure 56: Asia: subsequent volatility (12m, monthly)



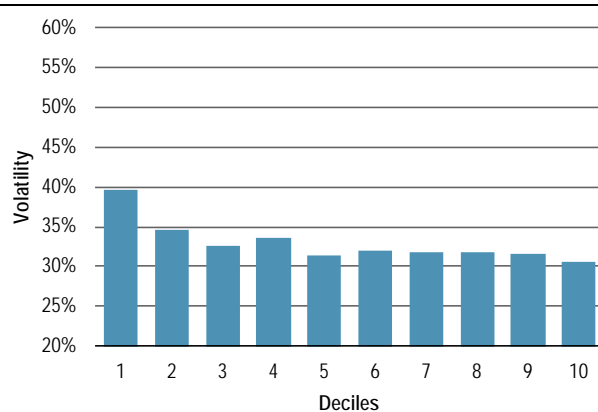
Source: Thomson Reuters, UBS

Figure 57: Australia: total excess return



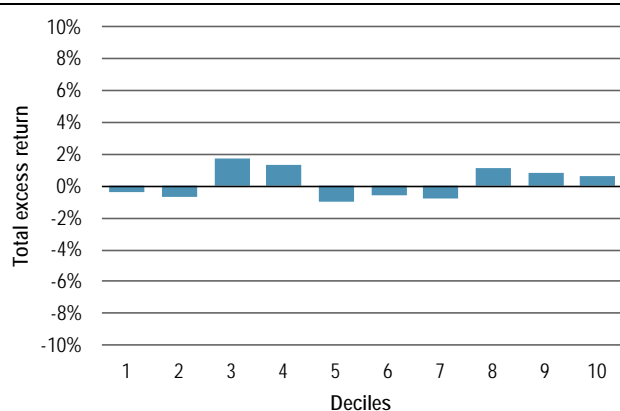
Source: Thomson Reuters, UBS

Figure 58: Australia: subsequent volatility (12m, monthly)



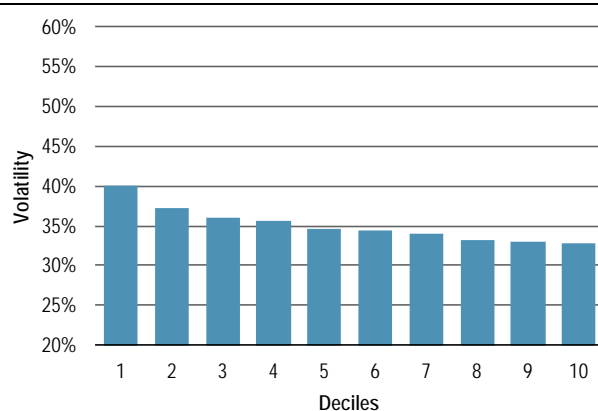
Source: Thomson Reuters, UBS

Figure 59: Japan: total excess return



Source: Thomson Reuters, UBS

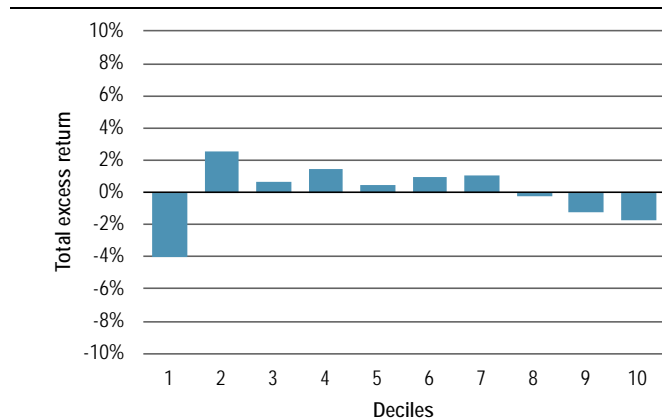
Figure 60: Japan: subsequent volatility (12m, monthly)



Source: Thomson Reuters, UBS

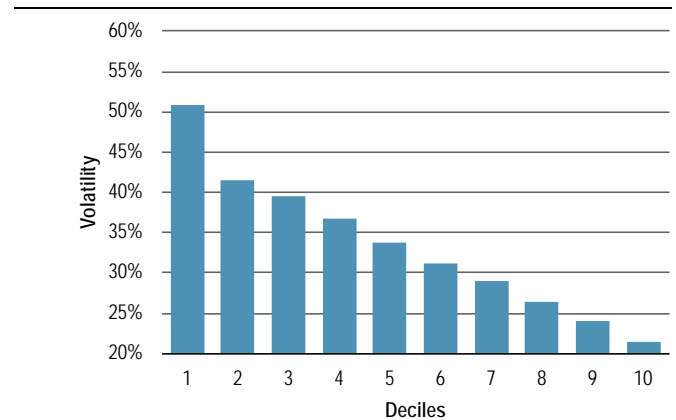
Regional performance: Risk Alert

Figure 61: United States: total excess return



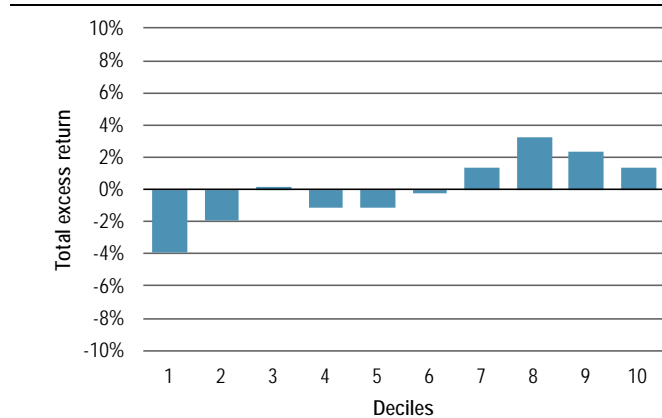
Source: Thomson Reuters, UBS

Figure 62: United States: subsequent volatility (12m, monthly)



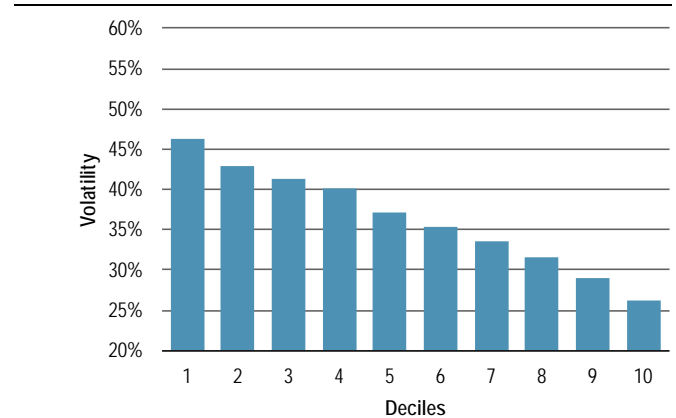
Source: Thomson Reuters, UBS

Figure 63: Europe: total excess return



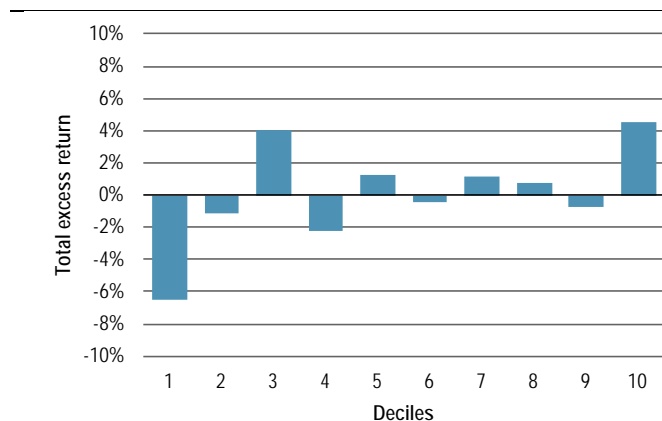
Source: Thomson Reuters, UBS

Figure 64: Europe: subsequent volatility (12m, monthly)



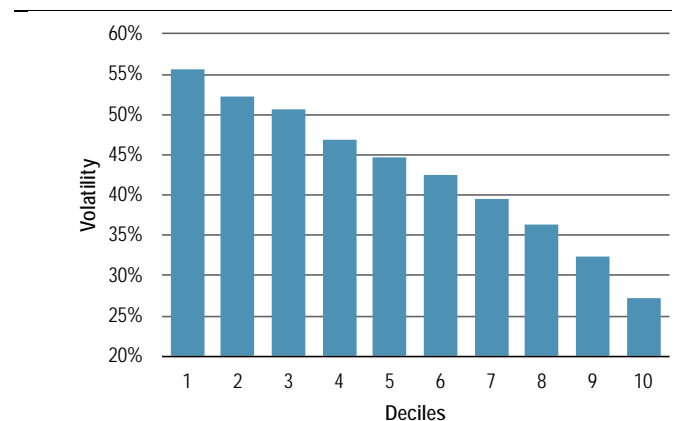
Source: Thomson Reuters, UBS

Figure 65: Asia: total excess return



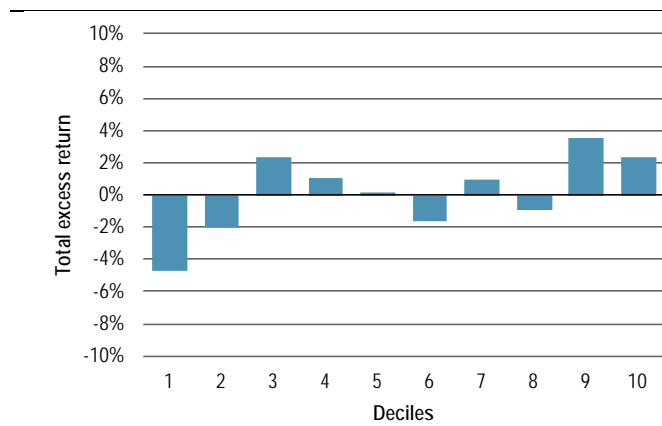
Source: Thomson Reuters, UBS

Figure 66: Asia: subsequent volatility (12m, monthly)



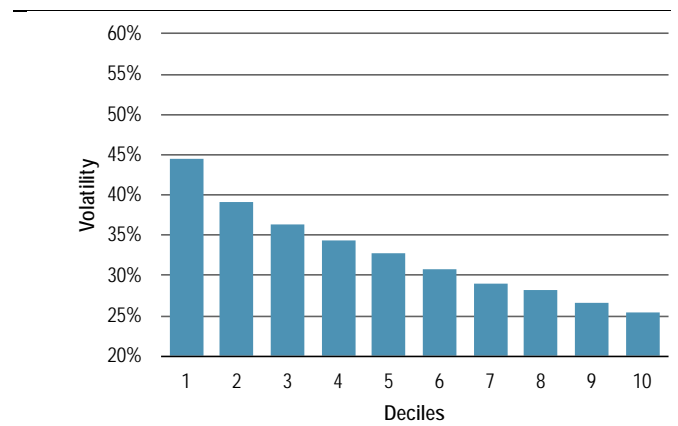
Source: Thomson Reuters, UBS

Figure 67: Australia: total excess return



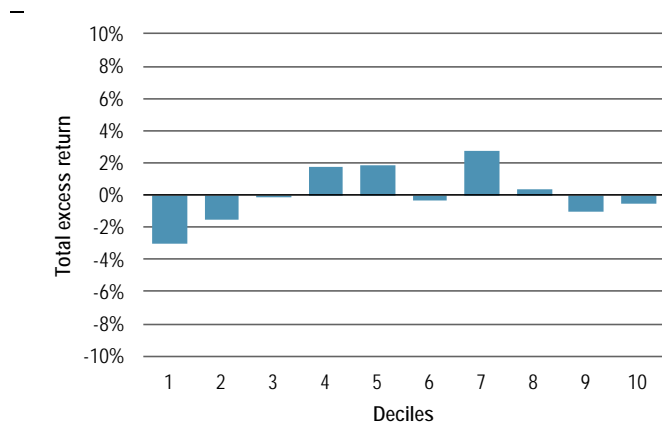
Source: Thomson Reuters, UBS

Figure 68: Australia: subsequent volatility (12m, monthly)



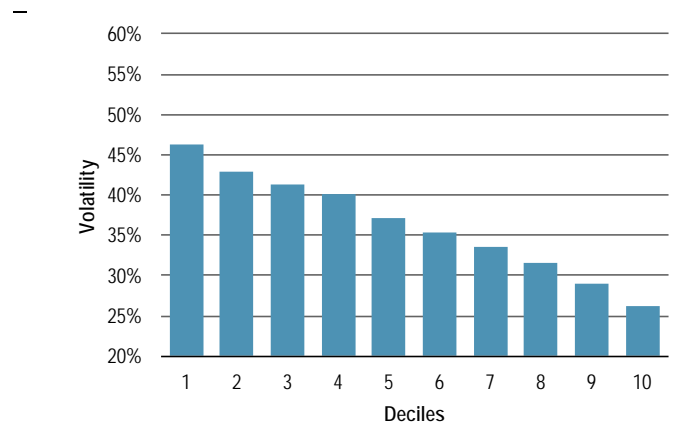
Source: Thomson Reuters, UBS

Figure 69: Japan: total excess return



Source: Thomson Reuters, UBS

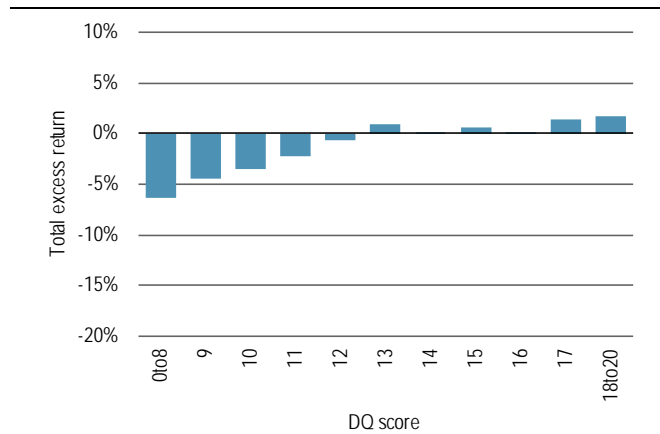
Figure 70: Japan: subsequent volatility (12m, monthly)



Source: Thomson Reuters, UBS

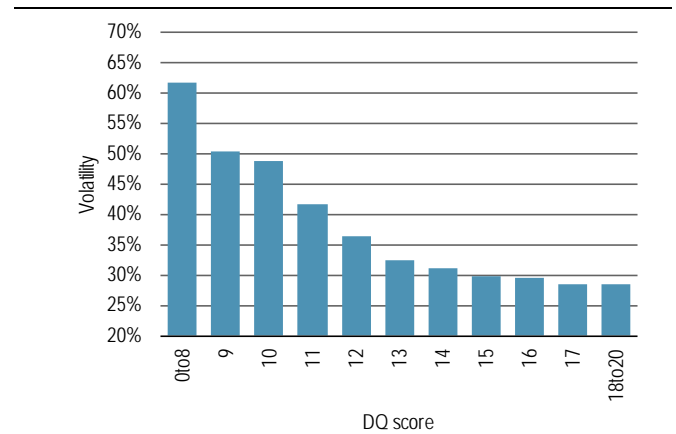
Regional performance: Delta Quality

Figure 71: United States: total excess return



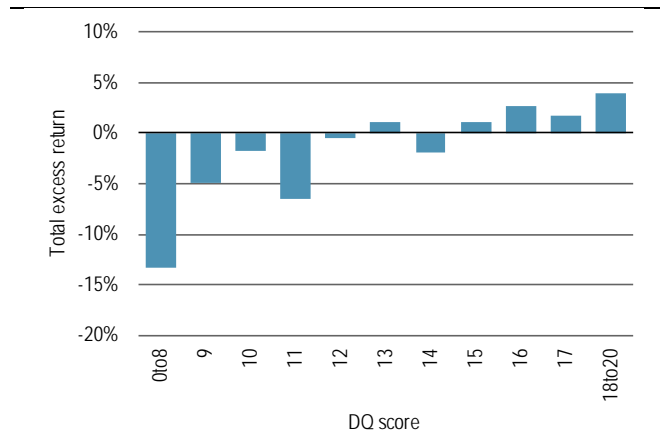
Source: Thomson Reuters, UBS

Figure 72: United States: subsequent volatility (12m, monthly)



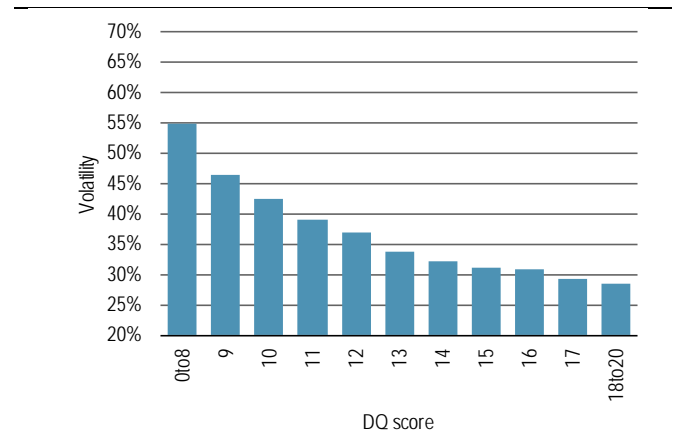
Source: Thomson Reuters, UBS

Figure 73: Europe: total excess return



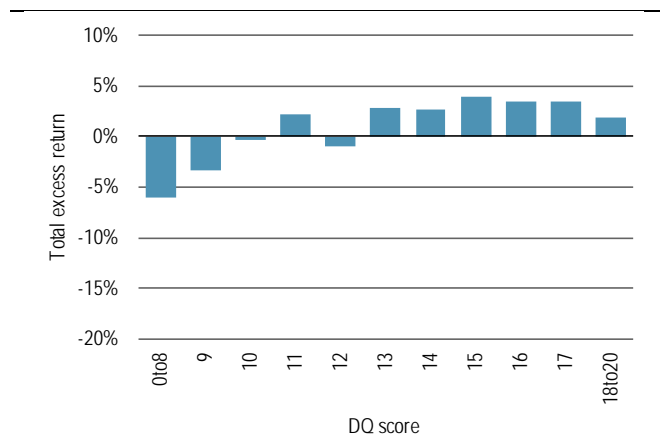
Source: Thomson Reuters, UBS

Figure 74: Europe: subsequent volatility (12m, monthly)



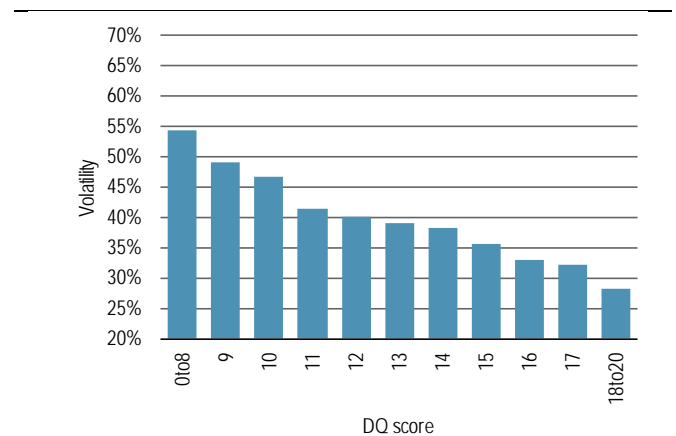
Source: Thomson Reuters, UBS

Figure 75: Asia: total excess return



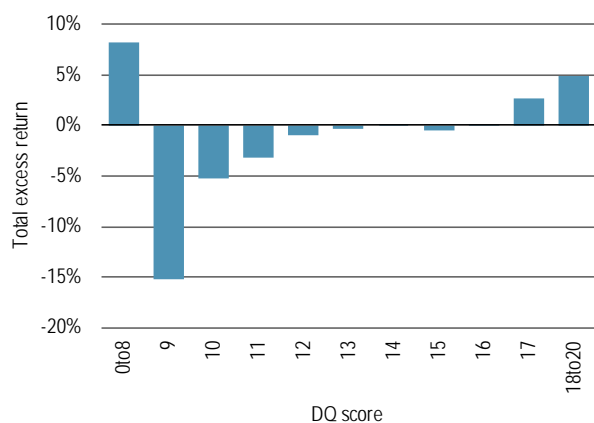
Source: Thomson Reuters, UBS

Figure 76: Asia: subsequent volatility (12m, monthly)



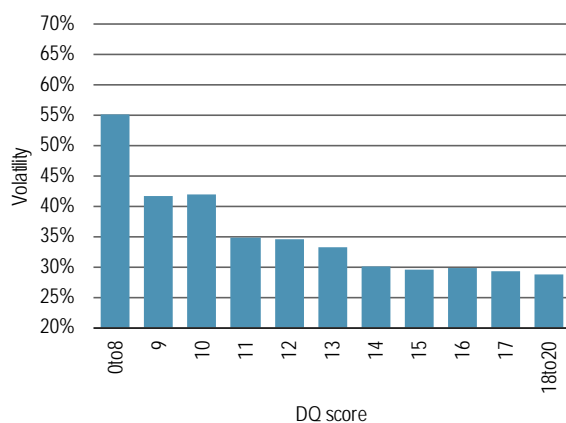
Source: Thomson Reuters, UBS

Figure 77: Australia: total excess return



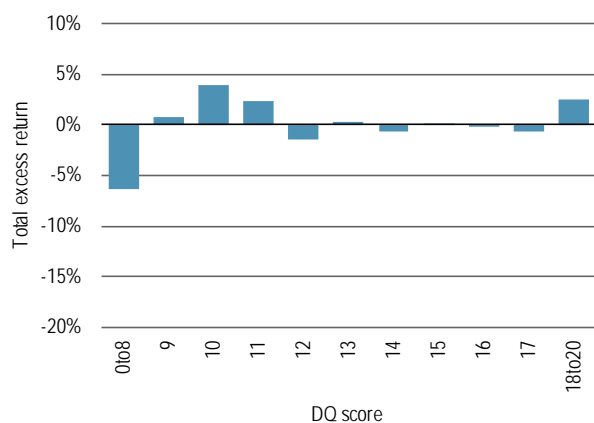
Source: Thomson Reuters, UBS

Figure 78: Australia: subsequent volatility (12m, monthly)



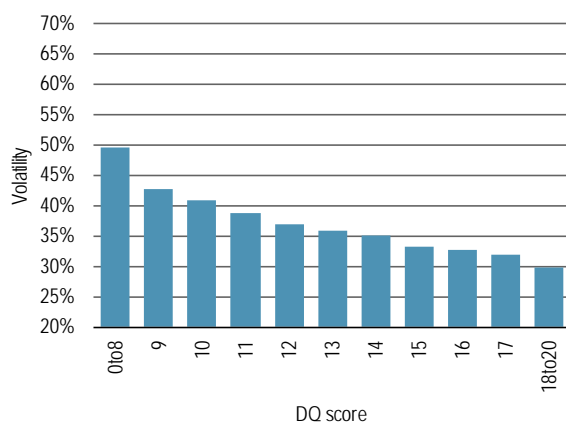
Source: Thomson Reuters, UBS

Figure 79: Japan: total excess return



Source: Thomson Reuters, UBS

Figure 80: Japan: subsequent volatility (12m, monthly)



Source: Thomson Reuters, UBS

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Sell	Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%

Source: UBS. Rating allocations are as of 31 March 2014.

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