

Searching for Alpha: Tangible Benefits of Intangibles

Brand, Respect & Intellectual Capital

- **Two Part Report** — We investigate company intangible value from two perspectives: investment strategies based on Brand Value; and, a quantitative approach to infer intangible value from financial statements.

Global Brand Value

- **Quantifying Brand Value** — We extract brand value through rankings based on (1) estimates from brand valuation companies, specifically BrandZ for our study (2) industry surveys conducted by business press: Barron's survey in our case.
- **Diversified Sectors and Country Distributions** — Contrary to common perception, top brands are identified across various sectors, not just consumer-focused ones. On the country front, whilst the top brands list has been dominated by developed world, emerging market brands have increased their presence in recent years, especially China.
- **Strategies based on Brand Rankings Outperform** — We consider three investment strategies based on the top 30 rankings, improvers / new comers and brand value versus current market cap. We show that there are alphas to be had in strategies derived from both BrandZ top brands and Barron's "Most Respected Companies".

Inferring Intangible Asset Value

- **Deriving a Value for Intangibles** — Intangible value can be defined as the sum of a company's Intellectual Capital: an aggregation of the knowledge capital, organizational structure and social/economic partners of an organization.
- **Modeling Intellectual Capital** — A challenge to measuring Intellectual Capital is its intangible nature. We investigate a methodology to infer the value of Intellectual Capital through the use of financial statement data.
- **Overall Results are Positive but Data is a Challenge** — Intellectual Capital is modeled through three components: Relational, Structural and Human Capital. While empirical risk-adjusted returns are positive, coverage limitations in data items such as R&D and Staff Expenses provide a challenge to applying this methodology to a broad cross-section of stocks.

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See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Quantifying Intangible Value: Two Perspectives

Intangible Assets – non-monetary assets without physical substance from which future economic benefits are expected

According to IAS 38, an “intangible asset is an identifiable non-monetary asset without physical substance. An asset is a resource that is controlled by the entity as a result of past events (for example, purchase or self-creation) and from which future economic benefits (inflows of cash or other assets) are expected.”

Two approaches:

In order to capture the value of intangibles, two approaches are examined in this report that entail (1) estimating brand value through the use of a brand evaluation company or score-based surveys conducted by business press and others; (2) deriving it directly from the accounts of a company.

1) Estimating brand value through brand consultants or surveys

The first approach explicitly calculates the intangible value that is directly attributed to the brand. The reputation of a company can be vital for its survival, especially so during market turmoil. As consumers cut back on spending when the economy slows, they tend to seek out those “trusted” brands that are deemed, or are perceived to be quality-assured and less risky. For investors, the same logic applies when it comes to buying shares of a company. Uncertain times mean higher risk aversion which leads to a search for higher quality companies – better safe than sorry – where the management are perceived to be capable of steering the company through the “storm”.

These brands and perception about company management are an intangible quality of companies that in many cases are the “heart” of the company. Academic literature on brand value has been plentiful whilst the studies focused on survey-based data are few and far between. In the first part of our research, we aim to evaluate brand value and industry surveys and examine the characteristics of companies that are deemed to have brand value or respect and discuss potential investment applications that can add alphas to investors’ portfolio.

2) Derivation of brand value from company accounts, quantifying Intellectual Capital.

For the second approach examined in our study, we discuss a novel framework for characterizing firms with respect to their intangible assets. This framework is based on a contemporary theoretical Knowledge Management concept, namely Intellectual Capital. We utilize current methodological developments that show how to quantify a firm’s Intellectual Capital based on publicly and widely available financials.

Intellectual Capital is comprised of three core components:

- Human Capital
- Structural Capital
- Relational Capital

Combining these three components provides a measure of a firm’s Intellectual Capital (IC) and the investment thesis is that those firms with high IC outperform those with low IC over a number of different time periods.

Can portfolios based on these intangibles outperform the market?

Ultimately, we want to answer the following question – is company-level intangible value priced efficiently in the markets, i.e. can the rankings based on both approaches help predict the future outperformance of stocks, compared to the markets?

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Global Brand Value

What does Brand Value Mean?

Brand valuation – estimated NPV of cashflow or future earnings attributable to a brand.

There are several brand valuation companies in the market which evaluate top brands in the world, e.g. Interbrand, BrandZ and Brand Finance etc. Broadly speaking, the fundamental valuation steps each of these firms undertakes are not that dissimilar with some focusing on estimating NPV of cashflow generated by brand and others looking at future financial earnings attributed to brand. For our study we have chosen BrandZ™, developed by Millward Brown Optimor (a WPP company), as we find its approach to incorporate consumer surveys into their brand evaluation appealing. We believe what consumers or customers say about these brands / companies should play a significant part in brand evaluation. In addition to this outright evaluation method, we also consider industry-wide surveys that provide quantitative scores on companies. Below we detail the steps both of these approaches take to arrive at the final brand valuation or rankings.

BrandZ™ Approach¹

We use the BrandZ™ database as our medium for brand evaluation...

The aim of the valuation is to offer faster and better informed decision-making for companies as it helps identify where value is derived. BrandZ have stated that they are the only valuation company that disaggregates all of the financial and other component factors of brand value and gets to the core - how much brand alone contributes to a company.

They start at the firm level to determine how many brands are associated with that company. Some companies only own one brand and thus, all corporate earnings come from that brand, e.g. Red Bull. In other cases, firms can own many brands for which they apportion the earnings of the corporation across a wide portfolio of brands, e.g. Coca Cola owns multiple brands such as Coca-Cola, Fanta and Sprite etc).

Step 1: Calculating Branded Earnings

Using annual reports etc and an 'attribution rate', Branded Earnings can be derived...

To make sure they apply the relevant portion of corporate earnings to the brand, they firstly obtain financial information from annual reports and other sources, such as Kantar Worldpanel.

Following that, they derive an "Attribution Rate" (in percentage term) and multiply company earnings by this metric to arrive at Branded Earnings. These earnings refer to the amount that is directly attributed to a particular brand.

Step 2: Calculating Financial Value

...and are multiplied by the Brand Multiple to get a Financial Value for the brand...

In this step, they look to assess the prospects of future Branded Earnings. Predicting future Branded Earnings requires adding another component to their BrandZ formula, called "Brand Multiple" which is a multiple of current Branded Earnings.

It is similar to the calculation used by analysts to determine the fair market value of stocks such as P/E or P/B. They use information supplied by Bloomberg to help calculate the Brand Multiple. They take the Branded Earnings and multiply by the Brand Multiple to arrive at the future Branded Earnings potential, which is termed "Financial Value".

¹ The methodology described here is based on publications from Millward Brown Optimor. For further information, please contact Elspeth Cheung (elspeth.cheung@millwardbrown.com)

...qualitative input from over 2 million consumers is also taken into account...

...to come up with a unique 'Brand Contribution'

Step 3: Determining Brand Contribution

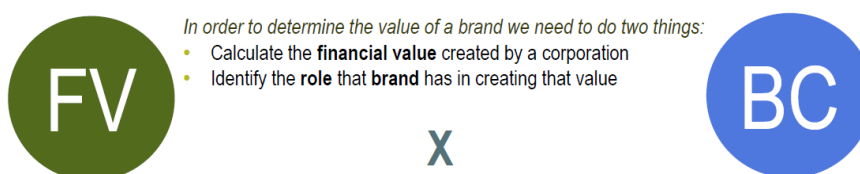
Although the value of the branded business is determined, this value is still not quite the core value that they seek. To arrive at BrandZ final Brand Value, they separate a few more layers, such as the rational factors that influence the value of the branded business, for example price, convenience, availability and distribution.

Because a brand exists in the mind of consumers or customers, they assess the brand's uniqueness and its ability to stand out from the crowd, generate desire and cultivate loyalty. This unique role played by brand is called "Brand Contribution".

In order to obtain such information, they acquire customer viewpoints by conducting worldwide ongoing, in-depth quantitative research, online and face-to-face, building up a global picture of brand on a category-by-category and a country-by-country basis. Their research now covers over two million consumers and more than 50,000 brands in over 30 countries.

Step 4: Calculating Brand Value

Figure 1. BrandZ Valuation Methodology



Source: Millward Brown Optimor

Financial Value x Brand contribution = Brand Value

Now that the Financial Value (FV) is derived and Brand Contribution (BC) is calculated, multiplying the two together yields the final Brand Value, a figure that's expressed in US dollars.

How is 'Respect' Measured?

Akin to brand value assessment, there are also multiple surveys such as Fortune's "World Most Admired Companies", Forbes' "World's Most Reputable Companies", and Barron's "World's Most Respected Companies". All these surveys are designed to measure the general perception of companies from business people and investors' perspective. We use Barron's data in our research as it has the longest history for covering companies worldwide, amongst all surveys we have come across.

Barron's² surveys money managers annually about their views of the world's 100 largest companies, based on stock-market capitalization in mid April as determined by Dow Jones Indexes. Their latest survey, conducted in late May and early June with the help of Beta Research in Syosset, N.Y., elicited responses from investors ranging from proprietors of small advisory firms to the chief investment officers of large asset management companies overseeing billions of dollars.

Survey participants were asked to select one of four statements reflecting their view of each company: Highly Respect, Respect, Respect Somewhat, or Don't Respect. Different multiples were then assigned to each response, with the highest accorded to Highly Respect, and a mean score was tabulated for each company. In the case

² The methodology described is sourced from Barron's website. For further information, please contact Lauren Rublin (lauren.rublin@barrons.com)

of ties, the higher ranking is awarded to the company with the most Highly Respect votes. The managers were also asked to rank the attributes they consider most important in determining respect for corporations, and were invited to contribute comments on individual companies. In our study, we focus on the rankings based on the mean scores of “respect” from the survey.

Top 100 brands taken annually from BrandZ and Barron's – mapped to the company level.

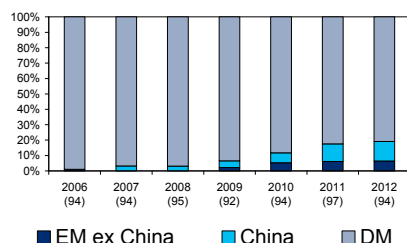
Data & Methodology

We collected the top 100 annual rankings from both BrandZ and Barron's from 2006 to 2012 and mapped them onto the company level. As some brands belong to privately owned companies, we have removed them from the list, leaving only tradable firms in the investible universe. For those brands that come from the same company, the brand values are aggregated to arrive at a total brand value for the company. Since both rankings include companies in emerging markets, we use MSCI AC World index in USD as the benchmark to measure performance of the strategies. For all portfolios discussed in the following section, they are rebalanced annually and are "buy and hold" for the rest of the year until the new rankings become available.

According to BrandZ, the starting universe is "global" and then they screen for the 500 largest brands within the following industries as defined by them -

- Apparel
- Beer
- Cars
- Fast Food
- Financial Institutions
- Insurance
- Luxury
- Oil & Gas
- Personal Care
- Retail
- Soft Drinks
- Technology
- Telecom Providers

Figure 2. China, EM ex China vs DM

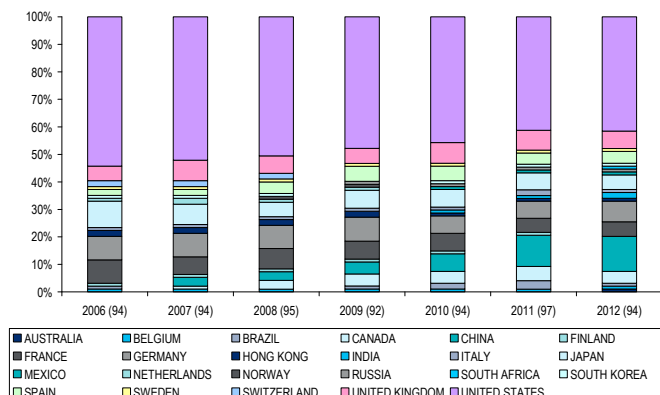


Source: Citi Research, Millward Brown Optimor

Once those 500 brand names are identified, they subsequently (i) confirm/verify the universe with their industry experts within the WPP group and (ii) conduct their own research to make sure they have included all the brands eligible for Global Top100/ category rankings following the steps highlighted in the previous section. The charts overleaf show the country and GICS sector distributions of top ranked brand value companies through time. In total, brands or companies from 23 countries have featured on the list. It is interesting to note that the number of Chinese brands have increased substantially in the last four years (see Figure 2).

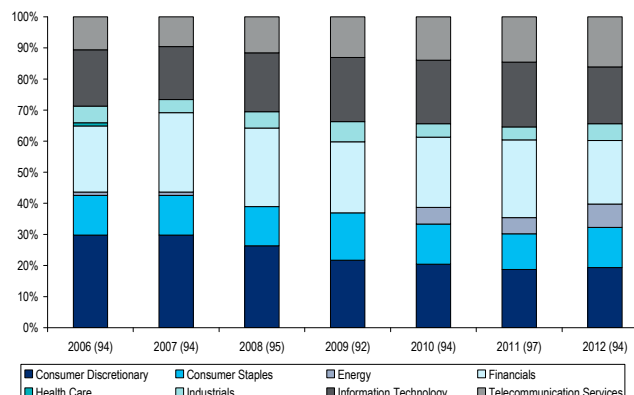
On the sector level, as opposed to the general perception that brand is all about consumer-focused sectors, Figure 4 demonstrates that it is clearly not the case. However, noticeably, Utilities sector is absent from the ranking every year.

Figure 3. BrandZ Top Brand: Country Distribution



Source: Citi Research, Millward Brown Optimor

Figure 4. BrandZ Top Brand: Sector Distribution

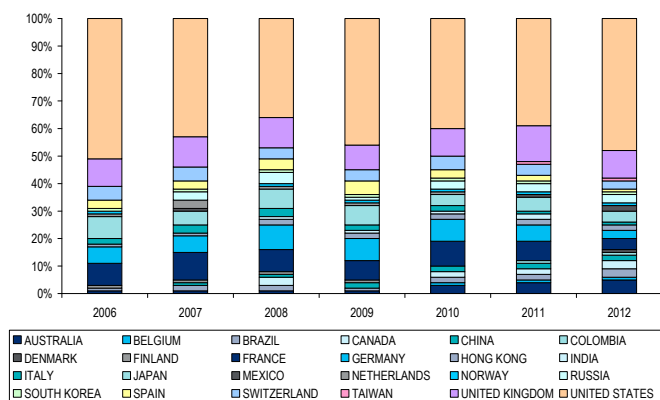


Source: Citi Research, Millward Brown Optimor

Since the valuation date is mid-March every year for BrandZ, and the final ranking report is published in May, we have lagged the data to 31 May each year to mitigate any look-ahead bias in our testing.

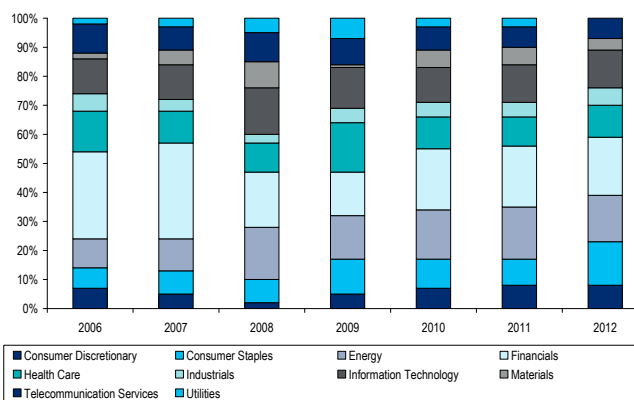
For Barron's top 100 Most Respected companies, the data also goes back to 2006 and is available on an annual basis. The advantage of their list is that all stocks are tradable large cap companies. The country and sector distributions of the top ranked firms are in Figure 5 and Figure 6. Compared to BrandZ, there have also been companies from over 20 countries that feature on Barron's list, with more stocks coming from emerging markets. On the sector front, all 10 GICS sectors have appeared on the lists since 2006, although Utilities did not make it into this year's top 100.

Figure 5. Barron's Most Respected: Country Distribution



Source: Citi Research, Barron's

Figure 6. Barron's Most Respected: Sector Distribution



Source: Citi Research, Barron's

Barron's annual survey is normally conducted in spring and the result is announced before summer. Consequently, we have lagged the data points to the end of June each year before any performance of a strategy based on their rankings is calculated.

Investment Applications

To answer the question of whether or not these rankings have the ability to help predict future stock returns, we consider three investment strategies derived from the rankings, in the following section.

Top 100 Ranked Companies

Buy and hold each of the top 100 companies

As a starting point, we use the entire list of 100 companies from BrandZ and Barron's to test profitability of a buy-and-hold strategy. For BrandZ, a portfolio is formed at the end of May every year and only rebalanced annually. The same setup applies to Barron's list with the only difference being the portfolio formed at the end of June each year.

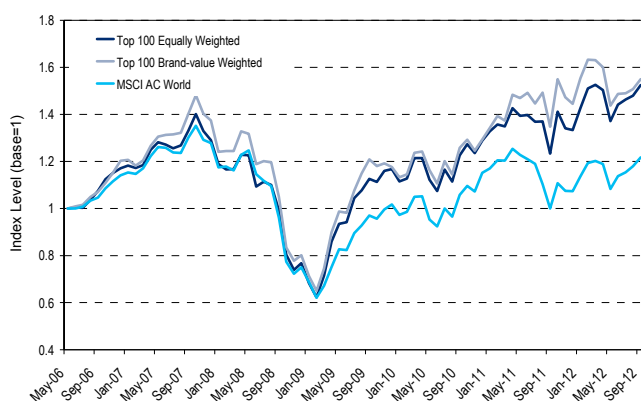
The charts below show the cumulative returns for both rankings. At the first glance, Barron's result might appear disappointing. However, one should bear in mind that the key screening criteria for the companies to be considered in the survey is that they have to be the biggest companies on the date of market-cap valuation. Thus, it should come as no surprise that the performance of such buy-and-hold strategy based on Barron's would literally deliver the market return.

Brand value weighted and equally weighted BrandZ portfolios...

...strong outperformance since the peak of the GFC with a flight to Quality.

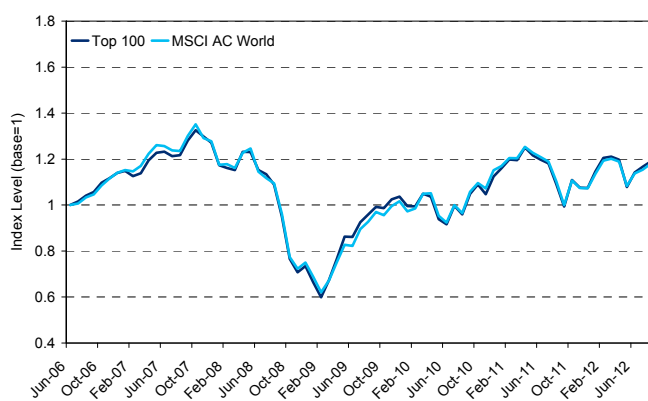
The brand-value weighted BrandZ portfolio delivers better returns but at the expense of higher risk, resulting in a lower risk-adjusted return compared to the equal-weighted case. BrandZ Top 100 performance paints an interesting picture in that the outperformance of the strategy really comes to light after the peak of the global financial crisis and when systemic risk subsided. Recall that we stated earlier that these "trusted" big brands should fare better in the time of trouble as consumers or customers are drawn to them. Figure 7 supports our prior as the performance gap widened during the first Greek Crisis and on-going Eurozone Sovereign Crisis.

Figure 7. BrandZ Top 100: Wealth Curve (May 2006 – Sep 2012)



Source: Citi Research, Millward Brown Optimor

Figure 8. Barron's Top 100: Wealth Curve (Jun 2006 – Sep 2012)



Source: Citi Research, Barron's

The summary statistics in the tables overleaf suggest that both BrandZ strategies deliver an annual return of about 7% with market-like volatility. Sharpe ratios are twice as high as the index itself. On a relative basis, the information ratio is decent at 0.78 with 4% active return and 6% tracking error per annum. For Barron's, as observed from the wealth curve, it achieves market returns since the strategy holds the biggest 100 companies.

Figure 9. BrandZ Top 100: Performance Statistics

| | Equally Weighted | Brand-value Weighted | MSCI AC World |
|---------------------------|------------------|-------------------------|------------------|
| Annualised Return | 6.88% | 7.16% | 3% |
| Annualised Risk | 19% | 23% | 20% |
| Sharpe Ratio | 0.36 | 0.32 | 0.16 |
| Annualised Excess Return | 4% | 5% | |
| Annualised Tracking Error | 6% | 8% | |
| Information Ratio | 0.78 | 0.58 | |

Source: Citi Research, Millward Brown Optimor

Figure 10. Barron's Top 100: Performance Statistics

| | Equally Weighted | MSCI AC World |
|---------------------------|------------------|---------------|
| Annualised Return | 3.27% | 3.19% |
| Annualised Risk | 21% | 20% |
| Sharpe Ratio | 0.16 | 0.16 |
| Annualised Excess Return | 0.1% | |
| Annualised Tracking Error | 4% | |
| Information Ratio | 0.03 | |

Source: Citi Research, Barron's

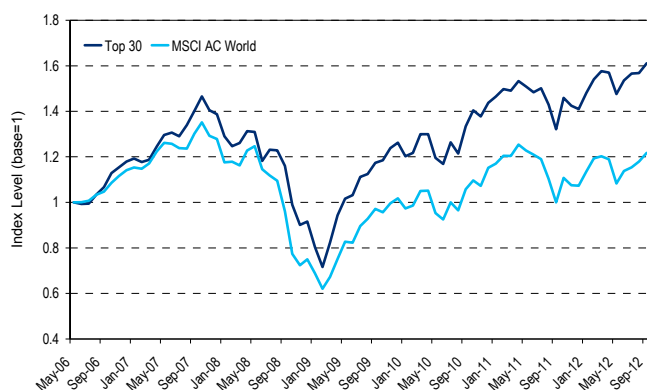
Focusing on Top 30 Names

The earlier results highlight there is investment opportunities in companies that feature in these rankings, particularly from BrandZ. However, the portfolio construction of Barron's strategy does not differentiate if company A is ranked number 1 and company B is ranked 100 – both are in the portfolio with the same weight. Consequently, here we concentrate on the top 30 names on both lists and investigate if there is more alpha to be had in the top names.

Top 30 names extracted each year from BrandZ and Barron's for a similar buy and hold strategy...

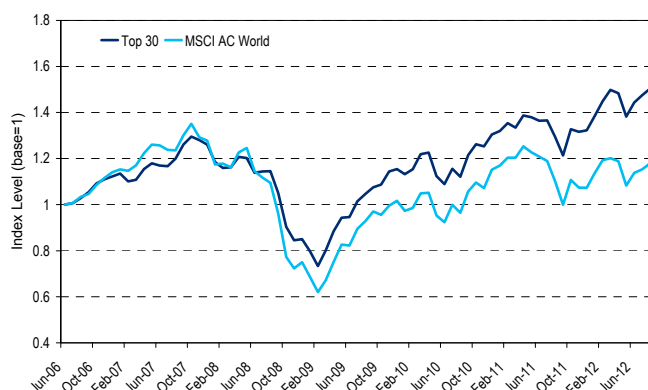
We extract the top 30 names from each list every year in their respective month and form an equal-weighted portfolio. As per before, the portfolio is rebalanced annually. Figure 11 and Figure 12 depict the cumulative performance of these strategies over our sample period. For both BrandZ and Barron's rankings, focusing on the top 30 names yields stronger returns. The improvement is especially pronounced for Barron's where the outperformance reaches 30%, from nearly 0% before.

Figure 11. BrandZ Top 30 Cumulative Performance (May 2006 – Sep 2012)



Source: Citi Research, Millward Brown Optimor

Figure 12. Barron's Top 30 Cumulative Performance (Jun 2006 – Sep 2012)



Source: Citi Research, Barron's

...improves both absolute and risk adjusted returns.

The performance statistics confirm improvements across both return and risk spectrums. Top 30 names from both lists achieve information ratio of over 0.70 and on an absolute basis, lower risk than the market.

Figure 13. BrandZ Top 30: Performance Statistics

| | BrandZ | MSCI AC World |
|---------------------------|--------|---------------|
| Annualised Return | 8% | 3% |
| Annualised Risk | 19% | 20% |
| Sharpe Ratio | 0.41 | 0.16 |
| Annualised Excess Return | 5% | |
| Annualised Tracking Error | 7% | |
| Information Ratio | 0.75 | |

Source: Citi Research, Millward Brown Optimor

Figure 14. Barron's Top 30: Performance Statistics

| | Barron's | MSCI AC World |
|---------------------------|----------|---------------|
| Annualised Return | 7.01% | 3.19% |
| Annualised Risk | 16% | 20% |
| Sharpe Ratio | 0.45 | 0.16 |
| Annualised Excess Return | 4.4% | |
| Annualised Tracking Error | 6% | |
| Information Ratio | 0.71 | |

Source: Citi Research, Barron's

Below we show the current top 30 brands and top 30 most respected companies based on BrandZ and Barron's respective 2012 rankings.

Figure 15. BrandZ Top 30 Brands for 2012

| SEDOL | Company Name | Country | Sector | Brand Value (USD Mn) | Citi Research Recommendation | ETR* |
|---------|-------------------------|----------------|----------------------------|----------------------|------------------------------|------|
| 2046251 | Apple | United States | Information Technology | 182,951 | N/R | |
| 2005973 | IBM | United States | Information Technology | 115,985 | 1 | 29% |
| B020QX2 | Google | United States | Information Technology | 107,857 | 1 | 18% |
| 2550707 | McDonald's | United States | Consumer Discretionary | 95,188 | 2 | 10% |
| 2588173 | Microsoft | United States | Information Technology | 76,651 | 1 | 19% |
| 2206657 | Coca-Cola | United States | Consumer Staples | 74,286 | 1 | 26% |
| B2PKRQ3 | Marlboro | United States | Consumer Staples | 73,612 | 2 | 16% |
| 2831811 | AT&T | United States | Telecommunication Services | 68,870 | 1 | 17% |
| 2090571 | Verizon | United States | Telecommunication Services | 49,151 | 2 | 5% |
| 6073556 | China Mobile | Hong Kong | Telecommunication Services | 47,041 | 1 | 13% |
| 2380498 | GE | United States | Industrials | 45,810 | 1 | 21% |
| B16GWD5 | Vodafone | United Kingdom | Telecommunication Services | 43,033 | 1 | 32% |
| B1G1QD8 | ICBC | China | Financials | 41,518 | 2 | -3% |
| 2649100 | Wells Fargo | United States | Financials | 39,754 | 2 | 6% |
| B2PZN04 | Visa | United States | Information Technology | 38,284 | 2 | 5% |
| 2517382 | UPS | United States | Industrials | 37,129 | 1 | 20% |
| 2936921 | Walmart | United States | Consumer Staples | 34,436 | 1 | 20% |
| 2000019 | Amazon | United States | Consumer Discretionary | 34,077 | 1 | 19% |
| B7TL820 | Facebook | United States | Information Technology | 33,233 | 1 | 42% |
| 5842359 | Deutsche Telekom | Germany | Telecommunication Services | 26,837 | 1 | 20% |
| 4061412 | Louis Vuitton | France | Consumer Discretionary | 25,920 | 1 | 17% |
| 4846288 | SAP | Germany | Information Technology | 25,715 | 1 | 13% |
| 5756029 | BMW | Germany | Consumer Discretionary | 24,623 | 2 | 12% |
| B0LMTQ3 | China Construction Bank | China | Financials | 24,517 | 1 | 14% |
| B0FXT17 | Baidu | China | Information Technology | 24,326 | 3 | -7% |
| 2424006 | HP | United States | Information Technology | 22,898 | 3 | 0% |
| 2661568 | Oracle | United States | Information Technology | 22,529 | 1 | 19% |
| 6900643 | Toyota | Japan | Consumer Discretionary | 21,779 | 2 | 9% |
| B121557 | MasterCard | United States | Information Technology | 20,759 | 1 | 12% |
| 2026082 | American Express | United States | Financials | 20,198 | 1 | 17% |
| AVERAGE | | | | | | 15% |

Source: Citi Research, Millward Brown Optimor, DataCentral

* Expected Total Return: calculated based on Citi Research estimates

Figure 16. Barron's Top 30 Companies for 2012

| SEDOL | Company Name | Country | Sector | Market Cap (USD Mn) | Citi Research Recommendation | ETR* |
|---------|-----------------------|---------------|------------------------|------------------------|---------------------------------|------|
| 2046251 | Apple | United States | Information Technology | 555,059 | N/R | |
| 2005973 | IBM | United States | Information Technology | 219,806 | 1 | 28% |
| 2550707 | McDonald's | United States | Consumer Discretionary | 87,532 | 2 | 9% |
| 2000019 | Amazon | United States | Consumer Discretionary | 105,491 | 1 | 19% |
| 2180201 | Caterpillar | United States | Industrials | 55,404 | 2 | 8% |
| 2595708 | 3M | United States | Industrials | 60,560 | 2 | 3% |
| 2517382 | United Parcel Service | United States | Industrials | 70,206 | 1 | 19% |
| 2206657 | Coca-Cola | United States | Consumer Staples | 166,758 | 1 | 25% |
| 7123870 | Nestle | Switzerland | Consumer Staples | 204,667 | 2 | 5% |
| 2463247 | Intel | United States | Information Technology | 108,215 | 2 | 5% |
| 2270726 | Walt Disney | United States | Consumer Discretionary | 88,135 | 2 | 0% |
| 2326618 | Exxon Mobil | United States | Energy | 420,835 | 1 | 8% |
| B2PZN04 | Visa | United States | Information Technology | 112,557 | 2 | 4% |
| 2026082 | American Express | United States | Financials | 63,450 | 1 | 18% |
| 2073390 | Berkshire Hathaway | United States | Financials | 213,988 | N/R | |
| B020QX2 | Google | United States | Information Technology | 223,542 | 1 | 18% |
| 2915500 | United Technologies | United States | Industrials | 71,265 | 2 | 5% |
| 2779201 | Schlumberger | United States | Energy | 92,306 | 1 | 21% |
| 2588173 | Microsoft | United States | Information Technology | 240,206 | 1 | 19% |
| 2714923 | Qualcomm | United States | Information Technology | 99,833 | 1 | 23% |
| 2704407 | Procter & Gamble | United States | Consumer Staples | 189,318 | 1 | 18% |
| 2764296 | Kraft Foods | United States | Consumer Staples | 47,117 | 2 | 8% |
| 2838555 | Chevron | United States | Energy | 216,308 | 1 | 19% |
| 2434209 | Home Depot | United States | Consumer Discretionary | 92,527 | 1 | 1% |
| 6435145 | Honda Motor | Japan | Consumer Discretionary | 53,891 | 1 | 39% |
| 6900643 | Toyota Motor | Japan | Consumer Discretionary | 121,435 | 2 | 7% |
| 2649100 | Wells Fargo | United States | Financials | 179,026 | 2 | 5% |
| 7103065 | Novartis | Switzerland | Health Care | 145,628 | 2 | 4% |
| 2002305 | Abbott Laboratories | United States | Health Care | 102,791 | 3 | -5% |
| 2681511 | PepsiCo | United States | Consumer Staples | 107,104 | 2 | 9% |
| | | | | | AVERAGE | 12% |

Source: Citi Research, Barron's, DataCentral

* Expected Total Return: calculated based on Citi Research estimates

Improvers / New Comers

**New entries and improvers to BrandZ /
Barron's underperform Top 30 portfolios,
relative to the benchmark...**

**... BrandZ improvers have higher
absolute returns, coupled with higher
risk**

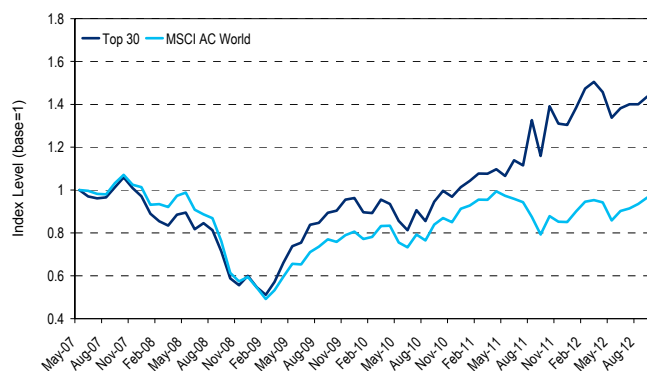
Another question we have in mind is whether or not companies that have improved their rankings or are newly listed in the top 30³ can deliver better returns. We construct our portfolio as follows – each year we calculate the percentage change of companies' rankings or scores. For companies that are newly included on the list, they automatically get the top improver ranking. Together with top improvers that have featured in both years, we form the top 30 portfolios from both BrandZ and Barron's lists.

The charts below demonstrate the outperformance of such strategies. Bearing in mind that the starting year for improvers is 2007, the performance is not directly comparable to the results earlier. Thus, we have added the comparable statistics from the earlier cases to aide comparison. Overall, the improvers / new comers outperform the top 30 strategy based on BrandZ on an absolute return basis but at the expense of higher risk, as financial stocks on BrandZ improver list contribute to

³ The top 10 new comers/improvers and top 10 decliners are available in the Appendix – Global Brand Value (2).

higher returns but also significant volatility. For Barron's, stocks with improved rankings underperform the top 30 list on both a return and risk basis. Nonetheless, it is clear that improvers / new comers have historically yielded additional returns over the benchmark.

Figure 17. BrandZ Top 30 Improvers (May 2007 – Sep 2012)



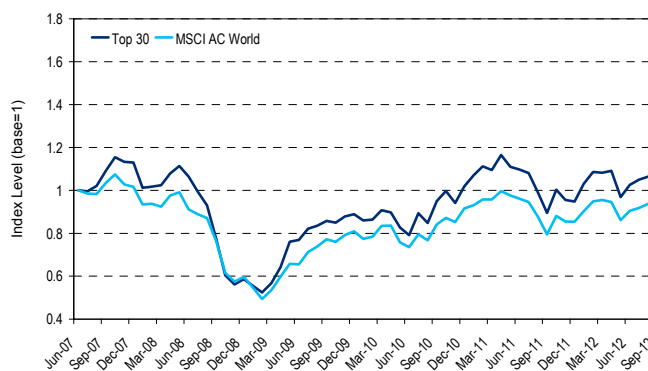
Source: Citi Research, Millward Brown Optimor

Figure 19. BrandZ Top 30 Improvers: Performance Statistics

| | BrandZ Improver | Comparable BrandZ Top 30 | MSCI AC World |
|---------------------------|-----------------|--------------------------|---------------|
| Annualised Return | 7.0% | 4.2% | -0.7% |
| Annualised Risk | 25.5% | 20.2% | 21.1% |
| Sharpe Ratio | 0.28 | 0.21 | -0.03 |
| Annualised Excess Return | 7.5% | 4.7% | |
| Annualised Tracking Error | 14.3% | 7.7% | |
| Information Ratio | 0.52 | 0.61 | |

Source: Citi Research, Millward Brown Optimor

Figure 18. Barron's Top 30 Improvers (Jun 2007 – Sep 2012)



Source: Citi Research, Barron's

Figure 20. Barron's Top 30 Improvers: Performance Statistics

| | Barron's Improver | Comparable Barron's Top 30 | MSCI AC World |
|---------------------------|-------------------|----------------------------|---------------|
| Annualised Return | 1.55% | 5.2% | -0.62% |
| Annualised Risk | 25% | 16.7% | 21% |
| Sharpe Ratio | 0.05 | 0.31 | -0.32 |
| Annualised Excess Return | 2.1% | 5.7% | |
| Annualised Tracking Error | 8% | 6.5% | |
| Information Ratio | 0.26 | 0.87 | |

Source: Citi Research, Barron's

Brand Value or Score over Market Cap

Scaling brand value by size to minimize size bias in the BrandZ / Barron's portfolios.

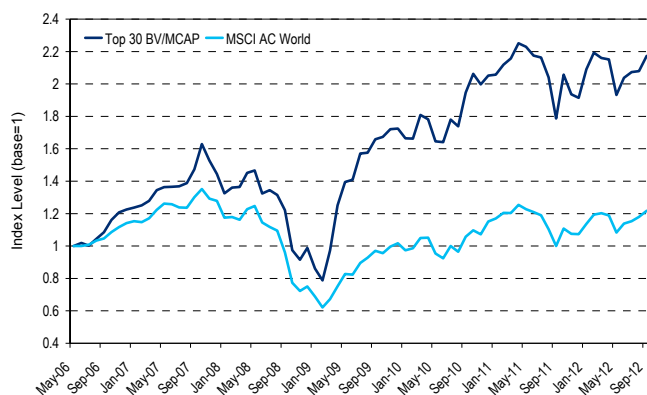
Since the starting point for both BrandZ and Barron's is to look for the biggest brands or companies in the world, the order of rankings can be potentially skewed towards larger companies. That is, generally, better ranked companies are also the larger ones. In order to mitigate the inherited size bias, we scale brand value and mean score by the company's market cap. In the case of BrandZ value, this metric effectively measures the proportion of future earnings that are attributable to brand value relative to the current value of a company as priced in the market. Consequently, companies that have higher brand value over its market cap would be ranked higher. Higher ratios could reflect the markets' under-appreciation of brand contribution to future earnings.

We select the top 30 names from both lists based on the scaled brand value and mean score from BrandZ and Barron's respectively. And as per before, we construct an equal-weighted portfolio based on the top 30 names for each.

BrandZ Brand Value / Market Cap – impressive returns with IR approaching 1.0

On an absolute basis, the total risks of these two strategies are higher than before. The performance based on BrandZ is impressive, achieving an information ratio of almost 1.

**Figure 21. BrandZ Top 30 based on Brand Value / Market Cap
(May 2006 – Sep 2012)**



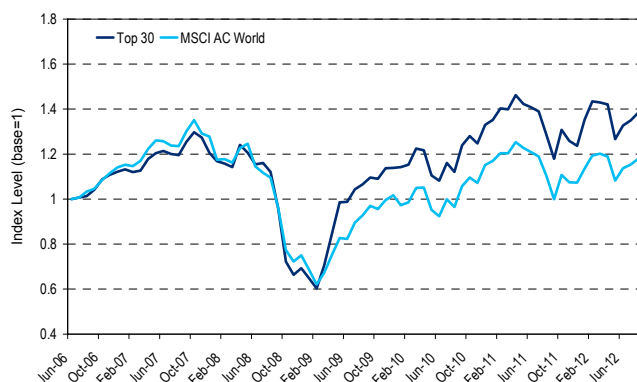
Source: Citi Research, Millward Brown Optimor

**Figure 23. BrandZ Top 30 based on Brand Value / Market Cap:
Performance Statistics**

| | BrandZ | MSCI AC World |
|---------------------------|--------|---------------|
| Annualised Return | 13% | 3% |
| Annualised Risk | 26% | 20% |
| Sharpe Ratio | 0.51 | 0.16 |
| Annualised Excess Return | 11% | |
| Annualised Tracking Error | 11% | |
| Information Ratio | 0.97 | |

Source: Citi Research, Millward Brown Optimor

**Figure 22. Barron's Top 30 based on Score / Market Cap
(Jun 2006 – Sep 2012)**



Source: Citi Research, Barron's

**Figure 24. Barron's Top 30 based on Score / Market Cap:
Performance Statistics**

| | Barron's | MSCI AC World |
|---------------------------|----------|---------------|
| Annualised Return | 5.75% | 3.19% |
| Annualised Risk | 23% | 20% |
| Sharpe Ratio | 0.25 | 0.16 |
| Annualised Excess Return | 3.0% | |
| Annualised Tracking Error | 8% | |
| Information Ratio | 0.36 | |

Source: Citi Research, Barron's

More EM stocks appear once size bias is controlled

Given the strong return from BrandZ BV/MCAP top 30 names, we show the current list of companies overleaf as a comparison to the straight top 30 brand names. As evident on the list, more companies from emerging market feature here, particularly Chinese companies.

Figure 25. BrandZ Top 30 BV/MCAP for 2012

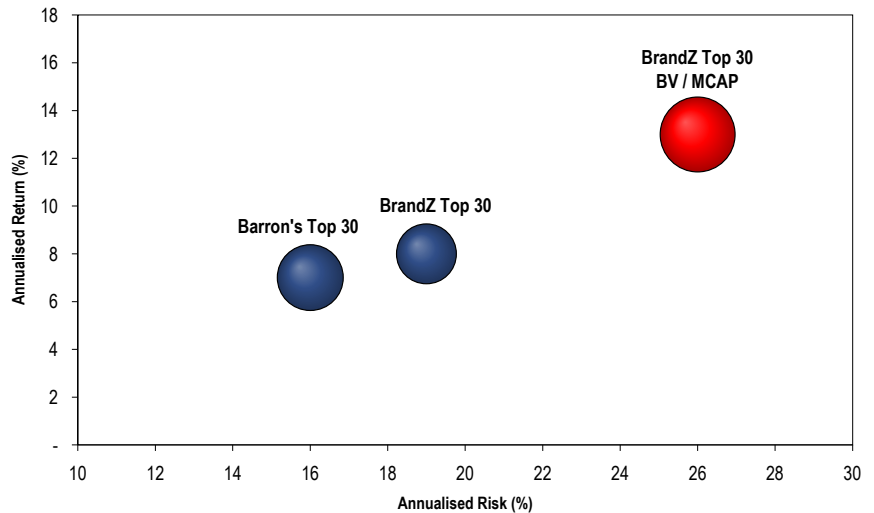
| SEDOL | Company Name | Country | Industry Group | M.Cap (USD Mn) | Citi Research Recommendation | ETR* |
|---------|----------------------------|---------------|----------------------------|-------------------|---------------------------------|------|
| 2561572 | Manitoba Telecom Services | Canada | Telecommunication Services | 2,239 | N/R | |
| 6442327 | Airtel | India | Telecommunication Services | 18,989 | 1 | 16% |
| B60LZR6 | Agricultural Bank of China | China | Financials | 140,813 | 1 | 8% |
| 6100368 | ICICI Bank | India | Financials | 22,506 | 1 | 15% |
| 5497102 | Volkswagen | Germany | Consumer Discretionary | 90,668 | 2 | 1% |
| 6559335 | China Telecom | China | Telecommunication Services | 48,141 | 2 | 0% |
| 7634394 | Telecom Italia | Italy | Telecommunication Services | 17,751 | 2 | 33% |
| B1G1QD8 | ICBC | China | Financials | 231,227 | 2 | -3% |
| 2550707 | McDonald's | United States | Consumer Discretionary | 87,532 | 2 | 10% |
| 5756029 | BMW | Germany | Consumer Discretionary | 52,201 | 2 | 12% |
| 5842359 | Deutsche Telekom | Germany | Telecommunication Services | 49,298 | 1 | 20% |
| 6291819 | Sinopec | China | Energy | 92,197 | 2 | -10% |
| 6718976 | China Life | China | Financials | 83,517 | 2 | -2% |
| B01FLR7 | Ping An | China | Financials | 62,716 | 1 | 17% |
| 5641567 | Carrefour | France | Consumer Staples | 17,130 | 2 | -17% |
| 6073556 | China Mobile | Hong Kong | Telecommunication Services | 222,907 | 1 | 13% |
| B020QX2 | Google | United States | Information Technology | 223,542 | 1 | 18% |
| 6821506 | Sony | Japan | Consumer Discretionary | 11,978 | 2 | 8% |
| 7111314 | Zara | Spain | Consumer Discretionary | 79,511 | 1 | 3% |
| 4061412 | Louis Vuitton | France | Consumer Discretionary | 81,106 | 1 | 17% |
| 2517382 | UPS | United States | Industrials | 70,206 | 1 | 20% |
| 5176177 | Orange | France | Telecommunication Services | 29,321 | 3 | 2% |
| 6129277 | NTT DoCoMo | Japan | Telecommunication Services | 60,855 | 2 | 29% |
| B01CT30 | Tencent/QQ | China | Information Technology | 65,213 | 1 | 18% |
| B2PZN04 | Visa | United States | Information Technology | 112,557 | 2 | 5% |
| B0LMTQ3 | China Construction Bank | China | Financials | 188,394 | 1 | 14% |
| 2005973 | IBM | United States | Information Technology | 219,806 | 1 | 29% |
| 2206657 | Coca-Cola | United States | Consumer Staples | 166,758 | 1 | 26% |
| 2424006 | HP | United States | Information Technology | 27,231 | 3 | 0% |
| | | | | | AVERAGE | 11% |

Source: Citi Research, Millward Brown Optimor, DataCentral

* Expected Total Return: calculated based on Citi Research estimates

In summary, we show that the rankings based on BrandZ brand value and Barron's survey consist of information that can help investors to achieve better returns, compared to the benchmark. In terms of portfolio implementation, we believe strategies based on these brand names or companies can be employed in a core-satellite framework as a separate alpha source.

Figure 26. Brand Strategy Comparison (size of the bubble indicates the magnitude of the Sharpe Ratio)



Source: Citi Research, Millward Brown Optimor, Barron's

Turnover and Correlation with Style Composites

Having seen the performance in the previous section, two natural questions that spring to mind are (1) how high is the turnover? (2) how correlated are the rankings to those based on common style factors?

Low turnover in comparison to typical active strategies

We summarise the turnover (one-way) statistics per year for the top 100 and top 30 names based on the original rankings and the ones scaled by market cap. Evidently, the turnover based on BrandZ is very low considering only one rebalance trade is required every year. Even when focusing on just the top 30 names, the turnover does not increase markedly. When scaled by market cap, the top 30 names do have higher turnover but still are relatively low compared to typical active strategies.

BrandZ stocks are generally more expensive...

To answer the second question, we calculate the rank correlation based on the common style composites. The correlations indicate that companies on BrandZ's list are more expensive with higher growth, lower risk and higher quality. The fact that on average the correlations with style composites are lower than 20% suggests the rankings encompass other dimensions that are not fully captured by these typical style factors.

...with higher growth prospects...

...and of higher Quality/lower Risk

Figure 27. BrandZ Ranking

| | Top 100 Turnover | Top 30 Turnover |
|------|------------------|-----------------|
| 2007 | 10% | 13% |
| 2008 | 8% | 9% |
| 2009 | 10% | 13% |
| 2010 | 12% | 13% |
| 2011 | 10% | 9% |
| 2012 | 7% | 10% |

Source: Citi Research, Millward Brown Optimor

Figure 28. BrandZ Value/ Market Cap

| | Top 30 Turnover |
|------|-----------------|
| 2007 | 18% |
| 2008 | 10% |
| 2009 | 31% |
| 2010 | 24% |
| 2011 | 20% |
| 2012 | 21% |

Source: Citi Research, Millward Brown Optimor

Figure 29. BrandZ Value Spearman Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom | Earnings Mom |
|---------|-------|--------|----------|---------|-----------|--------------|
| 2006 | -7% | 17% | 10% | 16% | -23% | -11% |
| 2007 | -22% | 8% | 6% | 19% | -4% | -13% |
| 2008 | -16% | 10% | 13% | 23% | 16% | 15% |
| 2009 | -24% | 9% | 15% | 11% | 0% | -5% |
| 2010 | -16% | 18% | 34% | 19% | 4% | -14% |
| 2011 | -22% | 13% | 27% | 32% | 16% | -6% |
| 2012 | -38% | 26% | 33% | 34% | 33% | 3% |
| AVERAGE | -21% | 14% | 20% | 22% | 6% | -5% |

Source: Citi Research, Millward Brown Optimor

Figure 30. BrandZ Value / Market Cap: Spearman Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom | Earnings Mom |
|---------|-------|--------|----------|---------|-----------|--------------|
| 2006 | -29% | 32% | 10% | 9% | -12% | -14% |
| 2007 | -49% | 39% | 23% | 14% | 19% | -7% |
| 2008 | -27% | 37% | 21% | 3% | -1% | 8% |
| 2009 | -21% | 19% | 3% | 12% | -3% | 0% |
| 2010 | -20% | 32% | 26% | 11% | -10% | 6% |
| 2011 | -18% | 19% | 23% | 9% | 17% | 11% |
| 2012 | 5% | 1% | 1% | -17% | -22% | 4% |
| AVERAGE | -23% | 26% | 15% | 6% | -2% | 1% |

Source: Citi Research, Millward Brown Optimor

In terms of Barron's mean score rankings, turnover is slightly higher than BrandZ's when looking at the overall list's turnover and top 30 names. For mean scores scaled by market cap, the turnover doubles but one should bear in mind that these names are all mega caps and thus easily tradable.

Barron's stocks are significantly more expensive, of lower risk and of higher quality.

Compared to BrandZ, the companies on Barron's list appear to have significantly higher valuation, lower risk and higher quality characteristics. On average, the correlations with style factors are higher but not over +/-50%.

Figure 31. Barron's Ranking

| | Top 100 turnover | Top 30 Turnover |
|------|------------------|-----------------|
| 2007 | 15% | 17% |
| 2008 | 25% | 13% |
| 2009 | 24% | 13% |
| 2010 | 21% | 13% |
| 2011 | 11% | 17% |
| 2012 | 18% | 27% |

Source: Citi Research, Barron's

Figure 32. Barron's Ranking scaled by Market Cap

| | Top 30 Turnover |
|------|-----------------|
| 2007 | 33% |
| 2008 | 63% |
| 2009 | 53% |
| 2010 | 40% |
| 2011 | 23% |
| 2012 | 40% |

Source: Citi Research, Barron's

Figure 33. Barron's Value: Spearman Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom | Earnings Mom |
|---------|-------|--------|----------|---------|-----------|--------------|
| 2006 | -49% | 25% | 37% | 47% | -3% | 0% |
| 2007 | -48% | 15% | 48% | 53% | -7% | 23% |
| 2008 | -40% | 32% | 29% | 19% | 8% | 13% |
| 2009 | -39% | 18% | 34% | 42% | -12% | -4% |
| 2010 | -46% | 31% | 43% | 42% | 18% | 25% |
| 2011 | -51% | 28% | 44% | 31% | 37% | 16% |
| 2012 | -52% | 30% | 27% | 28% | 19% | 9% |
| AVERAGE | -47% | 26% | 38% | 37% | 8% | 12% |

Source: Citi Research, Barron's

Figure 34. Barron's Ranking scaled by Market Cap: Spearman Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom | Earnings Mom |
|---------|-------|--------|----------|---------|-----------|--------------|
| 2006 | -30% | 7% | -4% | -6% | 42% | 26% |
| 2007 | -40% | 41% | 13% | 5% | -6% | 18% |
| 2008 | -31% | 17% | 8% | -3% | 19% | 14% |
| 2009 | -29% | 2% | 16% | 11% | -4% | 6% |
| 2010 | -23% | 18% | 3% | 7% | 17% | 5% |
| 2011 | -19% | 18% | 10% | -6% | -13% | -9% |
| 2012 | -25% | 26% | -1% | 4% | -3% | 13% |
| AVERAGE | -28% | 19% | 6% | 2% | 7% | 10% |

Source: Citi Research, Barron's

Source of Returns

As shown previously, brand or respect rankings are not that highly correlated with common style factors on an ex ante basis although they do possess growth, quality and low risk characteristics. Given the backtest performance in the section earlier, we conduct Fama-French return attribution analysis on the top 30 cases and display those that have statistically significant alphas below.

Figure 35. Fama-French Regression (Jun 06 – Sep 12 for BrandZ and Jul 06 – Sep 12 for Barron's)

| Top 30 | Alpha (Annualised) | Market | Value | Large |
|-----------------------|-----------------------|--------|--------|-------|
| BrandZ | 5.75%* | 0.88* | -0.09* | -0.03 |
| Barron's | 4.28%* | 0.77* | 0.03 | 0.07 |
| BrandZ BV scaled MCAP | 11.48%* | 1.15* | -0.14* | -0.09 |

Source: Citi Research, Millward Brown Optimor, Barron's

*statistically significant at 95% confidence level

For BrandZ top 30 names, the annualised alpha is 5.75% after accounting for lower beta to the market and significant growth tilts. Barron's top names also deliver a significant annualised return of 4.28% with a more pronounced lower beta exposure to the market than BrandZ but no significant growth bias. When looking at brand value scaled by market cap metrics, BrandZ achieves an impressive, 11% plus annualised alpha despite the higher beta and growth tilts.

Furthermore, to verify whether or not the returns come from the momentum premium, we utilise Fama-French-Carhart regression and add momentum factor into the mix.

Figure 36. Fama-French-Carhart Regression (Jun 06 – Sep 12 for BrandZ and Jul 06 – Sep 12 for Barron's)

| Top 30 | Alpha (Annualised) | Market | Value | Large | Momentum |
|-----------------------|-----------------------|--------|--------|-------|----------|
| BrandZ | 5.67%* | 0.89* | -0.21* | -0.01 | -0.19* |
| Barron's | 4.28%* | 0.77* | 0.03 | 0.07 | 0.00 |
| BrandZ BV scaled MCAP | 11.48%* | 1.17* | -0.32* | -0.05 | -0.27* |

Source: Citi Research, Millward Brown Optimor, Barron's

*statistically significant at 95% confidence level

Alphas are significant in excess Fama-French-Carhart premiums.

It can be seen from the results above that some of the returns did come from momentum especially for those based on BrandZ. However, all alphas remain statistically significant in excess of market, value, size and momentum premiums.

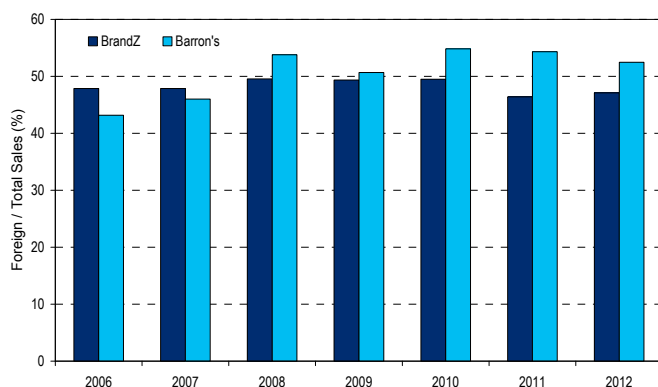
Other Characteristics

In addition to style factors, we are also interested in other fundamental and macro characteristics of these baskets. Specifically, are they mostly international companies that deliver higher dividend yields? Since they are large cap companies, are investors exposed to high macro active risk if they invest in them?

Top brands generate around 50% of sales in international markets...

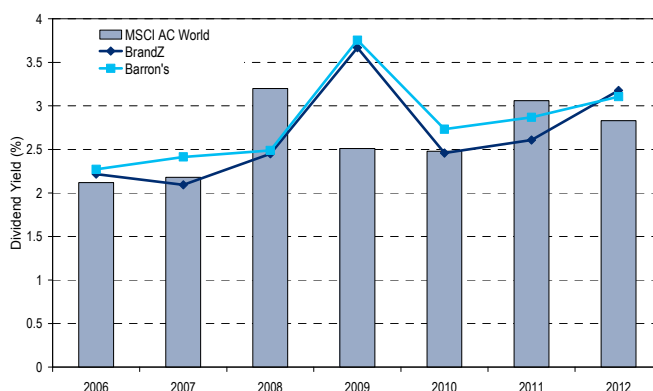
By utilising foreign to total sales percentage, we compute the average foreign revenue exposure of the top 100 companies from both BrandZ and Barron's. As Figure 37 shows, these companies have about 50% of sales that come from international markets. The number excluding China would be higher as most of the Chinese companies generate their revenues solely from the domestic market.

Figure 37. Foreign / Total Sales Exposure



Source: Citi Research, Worldscope

Figure 38. Dividend Yields



Source: Citi Research, MSCI, Worldscope, Factset

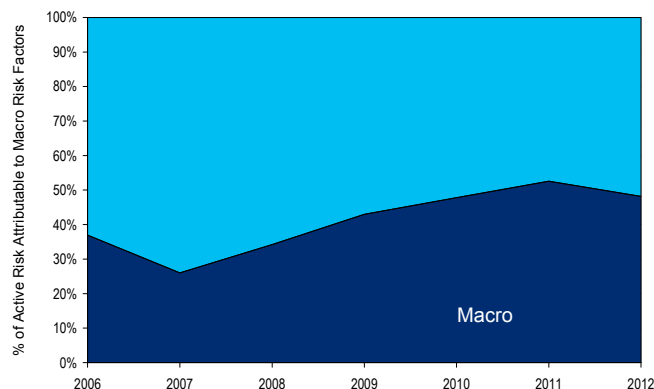
...dividend yields are generally higher...

In terms of dividend yield, we plot the average yields from both lists and compare them to the benchmark. Apart from two years, the average yields have been indeed higher than the market.

...but risk is not dominated by macro factors.

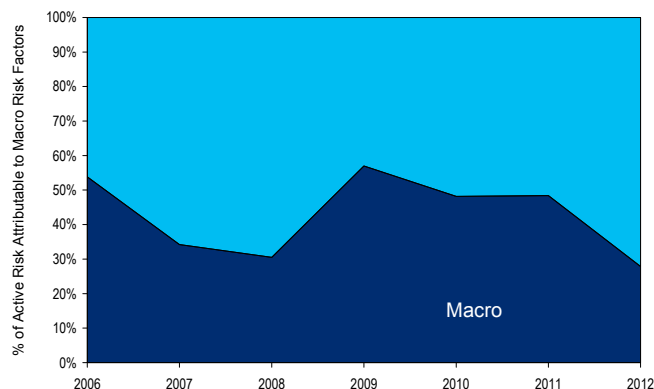
Since macro concerns have dominated the market in the past few years, we look at the risk decomposition of these baskets through the sample period and show the macro factor portion relative to the market. Generally speaking, the macro factors do not appear to dominate in either of these baskets in that on average the macro influence accounts for less than 50% of total active risk.

Figure 39. BrandZ Top 100 : Risk Decomposition



Source: Citi Research, Millward Brown Optimor

Figure 40. Barron's Top 100 : Risk Decomposition



Source: Citi Research, Barron's

Conclusion

In the first part of our report, we have examined the investment cases for strategies based on brand value and survey-based rankings. Specifically, we focus on brand value derived by BrandZ and “Most Respected Company” survey by Barron’s. We show, empirically, that brands or companies featured on these lists, particularly for companies that rank highly on these lists, have higher future returns based on a simple equally weighted construct.

As opposed to common perception that brands are associated purely with consumer-driven industries, both rankings exhibit diverse distributions across countries and sectors. On the country front, it is clear that emerging countries have had stronger presence in the brand space during recent years, especially China.

In terms of characteristics of these brands or companies, they appear to have higher growth, lower risk and high quality tilts. They also tend to have higher international exposure and deliver higher dividend yields than the market.

Lastly we show that even after accounting for well-known risk premiums, i.e. market, value, size and momentum, strategies based on the top 30 names have statistically significant alphas particularly the one based on BrandZ brand value scaled by market cap metric.

Future Work

As described earlier, both BrandZ and Barron’s focus on the top end of the size spectrum in the investible universe. One obvious area to explore in the future is whether or not we can come up with our own brand evaluation methodology which could be applied across the entire universe. As it stands, the lists are useful for investors who wish to set up a separate alpha strategy based on these rankings. However, from a pure quant investor’s perspective, it would be beneficial to allow a broader universe to be evaluated so that brand value can be added as a signal to quant alpha models.

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Inferring Intangible Asset Value

Studies on brand value look to document more general forms of intangibles.

Can financial statement analysis be used to infer intangible value – i.e. Intellectual Capital.

Human capital + Structural Capital + Relational Capital = Intellectual Capital

Inferring Intangible Asset Value – A Quantitative Approach

Brand Value that has thus far been studied in this report is one of the most popular marketing related forms of intangible value of a firm. It is a relatively new concept in the pure Accounting and Finance literature which has largely focused on generally narrow measures of a firm's intangible value, primarily R&D investments. More recent studies however have moved their focus to other sources and measures of intangible value such as Human Capital, Organization Capital, brand equity or customer equity, advertising, and others. These studies document that more general forms of intangibles are associated with firm market and real performance.

A recent paper by Angelopoulos, Giamouridis and Vlismas (2011)⁴ with the title:

"Inferring the Value of Intangible Assets"

introduces a novel, aggregate measure that encompasses several dimensions of a firm's intangible value. This measure is based on the theoretical concept of Intellectual Capital which is perhaps the most contemporary concept in "Knowledge Management". From a practical perspective, the measure examines whether financial statement analysis can be effective in inferring the intangible value of firms. This is the value of a firm that is not directly reported by financial statements, that is, the intellectual capital of a firm that encompasses the intangible value and "organizational knowledge". The authors argue that Intellectual Capital is comprised of three core components:

- Human Capital
- Structural Capital
- Relational Capital

Combining these three components provides a measure of a firm's Intellectual Capital (IC) and the conjecture is that those firms with high IC outperform those with low IC over a number of different time periods. This research was conducted using US data.

Brand Value which we examined in the previous section could be considered to be one sub component of Intellectual Capital and we apply this research methodology to the Europe stock universe and examine whether this proposed technique of modeling intangible value can be used in a traditional institutional funds management context.

⁴ <http://ssrn.com/abstract=1786285>

A Definition of Intellectual Capital

Intellectual Capital – aggregation of knowledge of human assets that is translated into economic value.

In terms of a formal definition of Intellectual Capital, it is one that describes the aggregation of knowledge of human assets, such as organizational structures and social partners of the organization, which is translated into economic value through the actions of an organization. With respect to the author's modeling of intangible value and in turn intellectual capital, the three components that they propose nicely fit into this formal definition.

Each component provides a within-industry relative rank of firms with respect to their Intellectual Capital. This setting is justified through a number of arguments. Companies in the same industry operate in the same regulatory environment, exhibit similar behaviour in the corporate finance arena, are similarly sensitive to macroeconomic shocks, and are exposed to similar supply and demand fluctuations. They use similar resources (inputs) to generate revenues, and follow similar accounting practices that in many instances may be different across industries.

Relational Capital

Relational Capital – accumulated knowledge and ability to create, develop and maintain customers.

Relational Capital represents a company's accumulated knowledge and ability to create, develop and maintain conditions that serve the mutual long term interests of both the firm and its principal external partners, e.g. customers. Intangibles contribute to value creation by improving either customer acquisition (i.e. new customers) or customer retention rate (i.e. more purchases). For these companies the main financial implications are expected to be reflected on the firm's sales growth rate. Focusing solely on sales may however neglect information on the real investment growth. That is, to what extent an increase on assets leads to increased production and sales. This is addressed by integrating information on the real investment growth rate on the firm-level measure of Relational Capital. Using financial statement data, Relational Capital (RC) is defined as:

$$RC_INDEX_{i,t}^j = \frac{\Delta \left(\frac{S_{i,t}^j}{TA_{i,t}^j} \right)}{\frac{S_{i,t}^j}{TA_{i,t}^j}}$$

Where:

$S_{i,t}^j$ = last reported sales

$TA_{i,t}^j$ = last reported total assets

The ratio of sales to total assets is the turnover ratio of firm i in industry group j in fiscal year t . The numerator is the change in the asset turnover between fiscal years $(t-1$ to $t)$.

RC intensive firms have a superior knowledge of clients and a wide network of external partners.

The underlying institution of this component is that those companies that are RC intensive firms are those that have a superior knowledge of their client base and a wide network of external partners. These companies should be better positioned to utilize their available resources, tangible and intangible, to generate a higher rate of sales. The possibility that other components of IC influence the overall level of sales is accounted for in the construction of the respective measures.

This score is then transformed into a binary score such that it represents the stock level score relative to the stock's median industry group's level:

$$RC_SCORE_{i,t}^j = \begin{cases} 1 & \text{if } RC_INDEX_{i,t}^j - RC_INDEX_t^j > 0 \\ 0 & \text{if } RC_INDEX_{i,t}^j - RC_INDEX_t^j \leq 0 \end{cases}$$

where, $RC_INDEX_t^j$ is the median change of total assets turnover ratio of firms in industry group j between fiscal years t and $t-1$.

Structural Capital

Structural Capital – knowledge embedded into organizational routines and structures:

Structural Capital is the second component of Intellectual Capital considered. It is defined as the sum of the explicit organizational knowledge, which is incorporated within the organizational routines, rules or structures. Structural Capital (SC), comprises two sub-components: *Technological Capital* (R&D, IT infrastructure, intellectual and industrial property) and *Organizational Capital* (organizational structure and culture, information and telecommunication capabilities). Each sub-component is modeled separately and then combined.

Technical Capital: R&D...

Technological Capital is purely focused on R&D within a firm. A complication to R&D is the accounting treatment of this expense. For US stocks, under GAAP accounting, R&D can be expensed but under IFRS (specifically for Europe, and not necessarily IRFS either), companies have scope with respect to the accounting treatment they apply to R&D (i.e. to expense or capitalise). For the purpose of this analysis for Europe, we follow the working paper by applying a uniform R&D capital amortization rate of 20% to compute a companies R&D capital.

$$RDC_{i,t}^j = RD_{i,t}^j + 0.8RD_{i,t-1}^j + 0.6RD_{i,t-2}^j + 0.4RD_{i,t-3}^j + 0.2RD_{i,t-4}^j$$

Where:

$RD_{i,t}^j$ = last reported unamortized R&D expenditure for firm i , in industry group j at time t .

Organizational Capital: Selling , general and administrative expense

Organisational Capital is proxied using selling, general and administrative expense (SGA) for measuring investment on structural capital. However one complication is that the SGA expenses are also associated with RC. In order to neutralize the affect of SGA within RC, the authors fit the following cross-sectional model:

$$SGA_{i,t}^j = p_{0,t}^j + p_{1,t}^j RC_INDEX_{i,t}^j + u_sga_{i,t}^j$$

Where (all for firm i , in industry group j at time t):

$SGA_{i,t}^j$ = last reported SGA expenses.

$p_{0,t}^j$ = is a constant term accounting for inelastic SGA expenses required for the normal course of operations.

$p_{1,t}^j$ = is a coefficient associating the annual average SGA expenses with the level of RC

Then assuming a three year amortization period, Organisational Capital is estimated for firm i , belonging to industry group j in fiscal year t using the residuals calculated from the above equation:

$$OC_{i,t}^j = pu_sga_{i,t}^j + 0.66 pu_sga_{i,t-1}^j + 0.33 pu_sga_{i,t-2}^j$$

Where:

$pu_sga_{i,t}^j$ = is the positive (only included if positive) residual from the SGA model for firm i , in industry group j at time t .

Structural Capital is then defined as:

$$SC_INDEX_{i,t}^j = \frac{RDC_{i,t}^j + OC_{i,t}^j}{TA_{i,t}^j}$$

Like for RC, this score is then transformed into a binary score such that it represents the stock level score relative to the stock's median industry group's level:

$$SC_SCORE_{i,t}^j = \begin{cases} 1 & \text{if } SC_INDEX_{i,t}^j - SC_INDEX_t^j > 0 \\ 0 & \text{if } SC_INDEX_{i,t}^j - SC_INDEX_t^j \leq 0 \end{cases}$$

where, $SC_INDEX_t^j$ is the median ratio of Structural Capital over total assets in the industry group j .

Human Capital

Human Capital: aims to attribute excess productivity to excess human capital

Labor economics theory suggests that excess productivity of a firm is associated with excess Human Capital. Empirical evidence also documents strong correlations between labor income (or earnings) and other hard to measure attributes of human capital, such as ability and talent.

This approach utilizes these theories and thus attributes excess productivity to excess human capital. Abnormal output is measured using a two-stage approach. In the first stage, the average per employee annual wage cost is estimated for firms in the same industry group for a given fiscal year. The second stage involves estimating a cross-sectional regression model to determine a firm's abnormal output. The cross-sectional model is a Cobb-Douglas production function which is assumed to have a common form across firms in the same industry.

More specifically in the first stage the following cross-sectional model is used:

$$LC_{i,t}^j = w_{0,t}^j + w_{1,t}^j N_{i,t}^j + u_{i,t}^j$$

Where (all for firm i , in industry group j at time t):

$LC_{i,t}^j$ = is the labour cost of firm i , in industry grouping j in fiscal year t

$N_{i,t}^j$ = is the number of employees of firm i , in industry grouping j in fiscal year t

$w_{0,t}^j$ = is a constant term accounting for any fixed labour costs

In the second stage a firm's conditional normal output is calculated for a given fiscal year $Q_{i,t}^j = S_{i,t}^j / w_t^j$ (where $w_t^j \equiv w_t^j$ is the average annual per employee wage in the industry group j for a given fiscal year) through the following cross-sectional model:

$$\log(Q_{i,t}^j) = \log(a_{0,t}^j) + \log(a_{1,t}^j)RC_Score_{i,t}^j + \log(a_{2,t}^j)SC_Score_{i,t}^j + \log(TA_{1,t}^j) + a_{4,t}^j \log(N_{i,t}^j) + e_{i,t}^j$$

From the above regression, the error term is used as the abnormal output of a firm and by dividing by the number of employees gives the following factor score. Relating this to human capital, the ratio provides a measure of the productivity differences between firms within the same industry group.

$$HC_INDEX_{i,t}^j = \frac{e_{i,t}^j}{N_{i,t}^j}$$

Like for RC, this score is then transformed into a binary score such that it represents the stock level score relative to the stock's median industry group's level:

$$HC_SCORE_{i,t}^j = \begin{cases} 1 & \text{if } HC_INDEX_{i,t}^j - HC_INDEX_t^j > 0 \\ 0 & \text{if } HC_INDEX_{i,t}^j - HC_INDEX_t^j \leq 0 \end{cases}$$

where $HC_INDEX_t^j$ is the median ratio of Human Capital in the industry group j .

Intellectual Capital – Bring it all Together

All the binary scores from the three components are brought together to construct an Intellectual Capital Score. This is simply an aggregation of the component scores as such:

$$IC_SCORE_{i,t}^j = HC_SCORE_{i,t}^j + SC_SCORE_{i,t}^j + RC_SCORE_{i,t}^j$$

The IC score has a bound of zero to three. Companies with a score of zero are deemed to have the lowest Intellectual Capital. These companies have:

- Lowest productivity scaled by total assets [Human Capital];
- Lower R&D and SGA expense scaled by total assets [Structural Capital];
- Lower increases in total asset turnover than their sector peers [Relational Capital]

On the flip-side, those companies scoring a three have the highest IC and have the opposite of the points listed above.

Backtest conducted, ranking stocks each month on their Intellectual Capital scores.

Testing the Methodology

We conduct a straight-forward test of the methodology described above. The test consists of ranking stocks in the sample universe (MSCI Europe ex Financials) by the IC score at the end of each month. Once ranked, we split the universe into portfolios according to their score grouping (i.e. score 0, 1, 2, and 3). We then calculate the subsequent month's total return (in local returns) for each group of stocks (equally weighted) and rebalance these portfolios on a monthly basis.

The next section shows the results of this analysis over the sample period January 1995 to September 2012.

Data Requirements

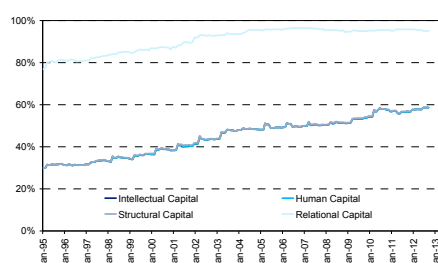
Data availability can be limited...

...on average coverage of all required data items is 50%.

One of the major limitations with this approach to inferring intangible value is the sparse data for many of the data items required for each component that makes-up Intellectual Capital. This comment relates to data in Europe and specifically for the MSCI Europe ex Financials as the investible universe.

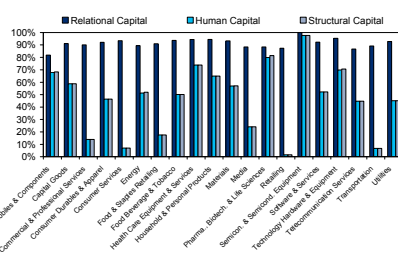
On average, the overall IC score coverage has been 50% of stocks in the MSCI Europe ex Financials. Given the binary score framework, HC and SC are the same as IC (that is, IC coverage has to equal the lowest component coverage) with only RC having "decent" coverage through time.

Figure 41. Stock Coverage for Intellectual Capital Components – MSCI Europe ex Financials



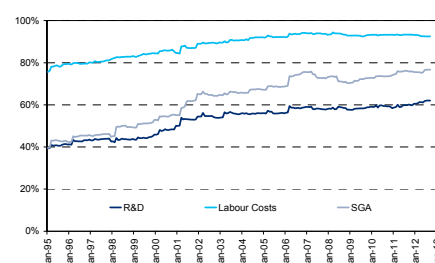
Source: Citi Research

Figure 42. Average Stock Coverage per Industry Group



Source: Citi Research

Figure 43. Stock Coverage for specific Data Items used in Methodology



Source: Citi Research

Figure 44. Worldscope Reported Data items used in methodology

Data Items

Sales/Revenue
Staff (Labour) Costs
Number of Employees
Total Assets
R&D (Research Expense)
Sales, General, Admin Expense

Source: Citi Research

On closer inspection of the individual data items that comprise of the components of Intellectual Capital, for R&D and SGA there are significant data limitations over time. For example, at the start of the sample period, data coverage for R&D is just over 40% and increases to 60% for the latest data points. While this coverage statistic is quite low, it doesn't necessarily mean that the data quality is poor for this particular data item. The very nature of R&D and its relevance to certain sectors results in lower coverage simply because many companies do not partake in R&D.

This highlights a potential limitation with this methodology to infer intangible value. Given the overall IC score is a composite of Human, Relational and Structural Capital scores and that the RC and SC are used within HC, the overall IC score becomes a function of the coverage of R&D. That, is the resulting coverage of IC is restricted to approximately those companies that conduct and report R&D.

Companies that have a high level of intangible value relative to their overall asset value, such as consumer companies with a high brand value, but have relatively small R&D or none at all, would be penalized under this methodology. While the following results show evidence of the efficacy of this strategy/methodology, it must be considered in the context of the reduced coverage.

Results - Intellectual Capital

Absolute risk adjusted returns of 0.65 look promising and are monotonic across portfolios.

Fama-French factors account for a large proportion of returns and are generally significant

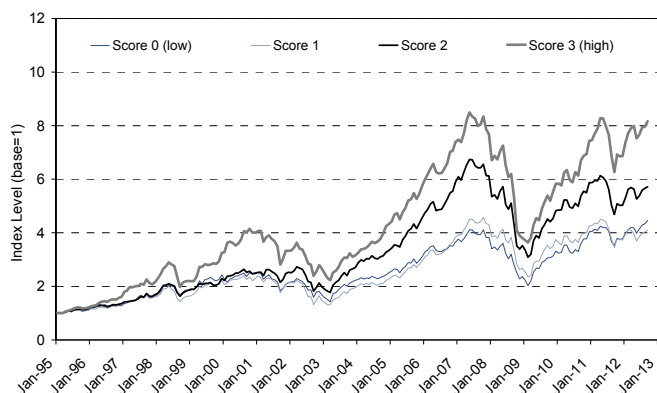
High IC stocks are pro-cyclical with small cap exposure

The overall results are promising⁵. The absolute risk adjusted returns across the score distribution are almost monotonic, with the lowest score portfolio (score 0) having higher returns and lower volatility than the next portfolio (score 1). We highlight this as it may suggest a misclassification error for some companies that may not have R&D data. The risk adjusted spread returns between the highest and lowest scores and the highest score less market are perhaps less flattering, having Sharpe Ratios of 0.31 and 0.39 respectively.

Extending the analysis on the risk adjusted returns to incorporate the main risk premia's, we find that these main risk factors – Market, Value/growth and Large/Small account for large proportion of the returns and these are almost all statistically significant. We find that companies that have a high level of Intellectual Capital as defined by this model are pro-cyclical and have small cap exposure. Value exposure is less important although not too much can be read into this result as the exposure (or lack of it) is not statically significant.

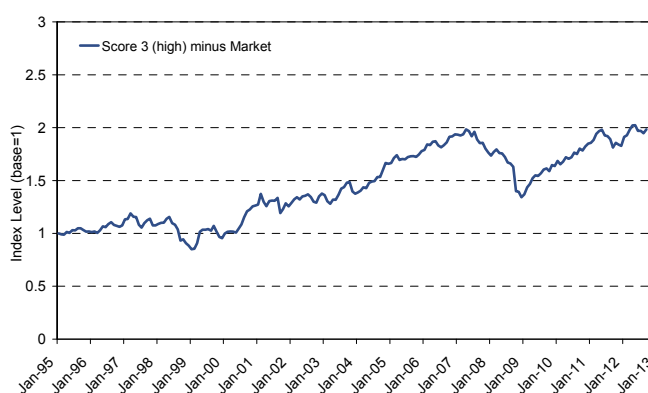
Analyzing the wealth curve in Figure 46, which are the market relative returns to investing in high IC companies, it shows a profile that has not been immune to the GFC but since then has delivered mostly stable, positive returns.

Figure 45. Wealth Curve for Scores – Intellectual Capital



Source: Citi Research

Figure 46. Wealth Curve for Score 3 minus Market – Intellectual Capital



Source: Citi Research

Figure 47. Performance and Risk Statistics – Intellectual Capital

| Risk Adjusted Performance | Score 0 (low) | Score 1 | Score 2 | Score 3 (high) | Score 3 – Score 0 | Score 3 - Market |
|-----------------------------|---------------|---------|---------|----------------|-------------------|------------------|
| Annualised Return | 8.83% | 8.30% | 10.37% | 12.62% | 3.31% | 3.96% |
| Annualised Volatility | 17.50% | 18.44% | 17.26% | 19.31% | 10.81% | 10.24% |
| Sharpe Ratio | 0.50 | 0.45 | 0.60 | 0.65 | 0.31 | 0.39 |
| Fama-French Risk Statistics | | | | | | |
| Alpha (annualized) | 4.72%* | 3.61%* | 5.48%* | 7.42%* | 2.70% | 3.12% |
| Market | 0.90* | 1.00* | 0.97* | 1.02* | 0.12* | 0.08* |
| Value | 0.29* | 0.28* | 0.11* | 0.04 | -0.25* | 0.28* |
| Large | -0.23* | -0.55* | -0.65* | -0.96* | -0.73* | -0.89* |

Source: Citi Research

*statistically significant at 95% confidence level

⁵ In the appendix we also run analysis on the returns to investing in those companies that have improving IC scores.

Results – The Components of Intellectual Capital

We also present results for the 3
underlying components of IC

Given that the IC score is a function of the individual component scores, we show the performance of each component to obtain a better understanding of the relative contribution of returns to the overall score. All charts are shown using the same scale for ease of comparison.

Relational Capital

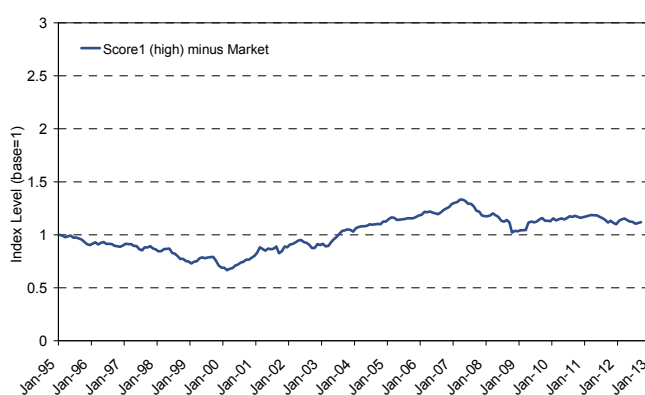
Of the three components, RC has perhaps the poorest risk adjusted returns – in particular for the market adjusted returns for Score 1 (high RC), the Sharpe Ratio is just over zero. Once neutralizing the returns for the main risk factors, the remaining alpha is basically whittled away. One interesting aspect of this is that this component has the largest coverage of the three suggesting that the poor results aren't due to poor coverage of data. Additionally, of the three components, it's the most straight-forward, being the percentage change in asset turnover.

Figure 48. Wealth Curve for Scores – Relational Capital



Source: Citi Research

Figure 49. Wealth Curve for Score 3 minus Market – Relational Capital



Source: Citi Research

Figure 50. Performance and Risk Statistics – Relational Capital

| | Score 0 (low) | Score 1 (high) | Score 3 – Score 0 | Score 3 - Market |
|------------------------------------|---------------|----------------|-------------------|------------------|
| Risk Adjusted Performance | | | | |
| Annualised Return | 8.05% | 9.13% | 0.99% | 0.64% |
| Annualised Volatility | 17.33% | 17.48% | 3.50% | 6.96% |
| Sharpe Ratio | 0.46 | 0.52 | 0.28 | 0.09 |
| Fama-French Risk Statistics | | | | |
| Alpha (annualized) | 3.28%* | 4.21%* | 0.93% | -0.09% |
| Market | 0.98* | 0.98* | 0.00 | 0.05* |
| Value | 0.16* | 0.16* | 0.00 | 0.41* |
| Large | -0.62* | -0.74* | -0.12* | -0.67* |

Source: Citi Research

*statistically significant at 95% confidence level

Structural Capital

The Structural Capital empirical results are the best of the three components and close to the results for the overall Intellectual Capital score. Unfortunately it is also one of the components with the poorest coverage so it is hard to read too much into the results.

Figure 51. Wealth Curve for Scores – Structural Capital



Source: Citi Research

Figure 52. Wealth Curve for Score 3 minus Market – Structural Capital



Source: Citi Research

Figure 53. Performance and Risk Statistics – Structural Capital

| | Score 0 (low) | Score 1 (high) | Score 3 – Score 0 | Score 3 – Market |
|------------------------------------|---------------|----------------|-------------------|------------------|
| Risk Adjusted Performance | | | | |
| Annualised Return | 8.82% | 10.58% | 1.69% | 2.10% |
| Annualised Volatility | 17.20% | 18.21% | 5.03% | 7.06% |
| Sharpe Ratio | 0.51 | 0.58 | 0.34 | 0.30 |
| Fama-French Risk Statistics | | | | |
| Alpha (annualized) | 4.22%* | 5.53%* | 1.31% | 1.23% |
| Market | 0.93* | 1.04* | 0.11* | 0.10* |
| Value | 0.26* | 0.12* | -0.14* | 0.37* |
| Large | -0.63* | -0.56* | 0.06* | -0.49* |

Source: Citi Research

*statistically significant at 95% confidence level

Human Capital

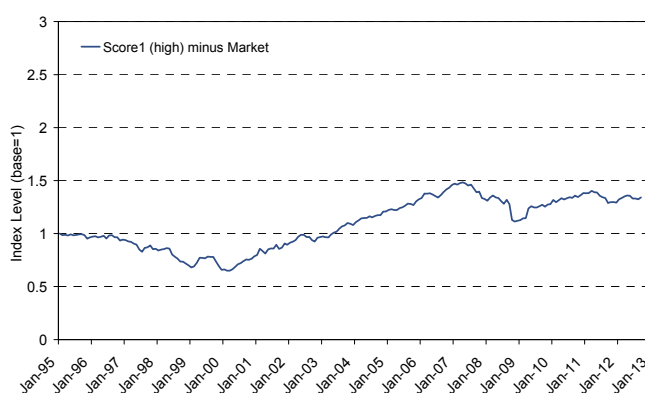
The results for Human Capital are slightly lower than for Structural Capital. Like for all the components, for the market relative portfolio, Human Capital has statistically significant positive exposure to Value and Small Caps.

Figure 54. Wealth Curve for Scores – Human Capital



Source: Citi Research

Figure 55. Wealth Curve for Score 3 minus Market – Human Capital



Source: Citi Research

Figure 56. Performance and Risk Statistics – Human Capital

| | Score 0 (low) | Score 1 (high) | Score 3 – Score 0 | Score 3 - Market |
|------------------------------------|---------------|----------------|-------------------|------------------|
| Risk Adjusted Performance | | | | |
| Annualised Return | 8.92% | 10.35% | 1.00% | 1.68% |
| Annualised Volatility | 18.18% | 17.37% | 6.20% | 7.96% |
| Sharpe Ratio | 0.49 | 0.60 | 0.16 | 0.21 |
| Fama-French Risk Statistics | | | | |
| Alpha (annualized) | 4.25%* | 5.42%* | 1.17% | 1.12% |
| Market | 1.02* | 0.94* | -0.07* | 0.01 |
| Value | 0.23* | 0.17* | -0.06 | 0.41* |
| Large | -0.33* | -0.87* | -0.54* | -0.80* |

Source: Citi Research

*statistically significant at 95% confidence level

Conclusion

From a purely theoretical perspective, this methodology quite neatly frames the problem of deriving a value of intangible assets. The decomposition of Intellectual Capital into three core components that drives overall intangible value – Relational, Structural and Human Capital – also nicely segues into the academic literature on the overall topic of Intangible assets and associated value. The empirical evidence we present is not as compelling as that presented in the original article. We stress that relative to the original article that uses an all-US universe, we use an institutional investible universe, i.e. MSCI Europe. This is to some extent expected given the inferior predictability of the signal in large cap stocks documented in the original article. In the original article the monthly alpha of portfolios sorted on the signal drops from about 1.4% (1st and 2nd size quintile) to 0.49% (5th size quintile).

Intellectual Capital – novel measure that encompasses several dimensions of a firms intangible value...

...easy to implement – relies on financial statement analysis...

...but data coverage is poor.

We believe that the Intellectual Capital measure is a novel aggregate measure that encompasses several dimensions of a firm's intangible value. The merit of this framework is that it relies on financial statement analysis and thus can be applied with publically and widely available accounting information. However, when applied in its original form, with a European set of companies that are considered investable from an institutional perspective, a few issues arise. The primary issue is that the data coverage with respect to some of the key data items such as R&D is very limited. As we highlight earlier, at the start of the sample period, data coverage for R&D is just over 40% and increases to 60% for the latest data points. This can be attributed to the fact that in Europe or IFRS accounting based countries, the accounting treatment can differ (relative to the US) as there is scope for capitalizing development component of the overall R&D cost (for example, Auto companies as compared to Pharmaceuticals companies).

We also view the overall framework in its current form as a rather computationally complex one. Although we like the intuition we believe there could be ways of simplifying the metrics while maintaining the intuition and the core premises of the overall approach.

The aim of this research is to examine an interesting, academic idea and apply to the European market in an applied context, or at least in fashion that practitioners would be familiar with. Additionally, our aim isn't to critique the approach but merely to understand whether it has potential application. In this regard, without some changes to the approach we feel that it has relatively limited application with European data on investable stocks (i.e. stocks of the MSCI Europe) over more simple approaches.

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Appendix

Appendix – Global Brand Value

(1) Pearson Correlations of BrandZ and Barron's top 100 with Style factors

Figure 57. BrandZ Value Pearson Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom. | Est. Mom. | Size |
|---------|-------|--------|----------|---------|------------|-----------|------|
| 2006 | -14% | 18% | 16% | 25% | -22% | -14% | 57% |
| 2007 | -27% | 13% | 15% | 33% | -3% | -1% | 52% |
| 2008 | -26% | 15% | 17% | 38% | 20% | 19% | 61% |
| 2009 | -27% | 22% | 19% | 18% | 1% | -10% | 57% |
| 2010 | -23% | 27% | 27% | 32% | 6% | -7% | 47% |
| 2011 | -27% | 18% | 18% | 33% | 23% | 2% | 49% |
| 2012 | -32% | 28% | 25% | 33% | 39% | 3% | 65% |
| AVERAGE | -25% | 20% | 20% | 30% | 9% | -1% | 55% |

Source: Citi Research, Millward Brown Optimor

Figure 58. BrandZ Value / Market Cap: Pearson Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom. | Est. Mom. |
|---------|-------|--------|----------|---------|------------|-----------|
| 2006 | 1% | 20% | 5% | 2% | -1% | 3% |
| 2007 | -38% | 28% | 17% | 1% | 14% | -3% |
| 2008 | 6% | 21% | 6% | -8% | -9% | 9% |
| 2009 | 0% | -6% | 12% | 4% | -10% | 7% |
| 2010 | 6% | 16% | 25% | -4% | -35% | 3% |
| 2011 | 6% | 8% | 24% | -1% | 13% | 13% |
| 2012 | 8% | -5% | -2% | -34% | -28% | 1% |
| AVERAGE | -2% | 12% | 12% | -6% | -8% | 5% |

Source: Citi Research, Millward Brown Optimor

Figure 59. Barron's Ranking: Pearson Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom. | Est. Mom. | Size |
|---------|-------|--------|----------|---------|------------|-----------|------|
| 2006 | -44% | 25% | 38% | 48% | 0% | -3% | 36% |
| 2007 | -46% | 14% | 48% | 47% | -7% | 20% | 33% |
| 2008 | -38% | 28% | 32% | 21% | 8% | 11% | 33% |
| 2009 | -40% | 20% | 35% | 42% | -9% | -8% | 31% |
| 2010 | -44% | 28% | 46% | 46% | 17% | 17% | 28% |
| 2011 | -52% | 29% | 42% | 29% | 33% | 23% | 26% |
| 2012 | -50% | 28% | 34% | 24% | 21% | 12% | 31% |
| AVERAGE | -45% | 24% | 39% | 37% | 9% | 10% | 31% |

Source: Citi Research, Barron's

Figure 60. Barron's Ranking scaled by Market Cap: Pearson Correlation with Styles

| | Value | Growth | Low Risk | Quality | Price Mom. | Est. Mom. |
|---------|-------|--------|----------|---------|------------|-----------|
| 2006 | -27% | 10% | 2% | -11% | 35% | 20% |
| 2007 | -37% | 43% | 21% | 2% | -12% | 1% |
| 2008 | -5% | 4% | 2% | -1% | 5% | -3% |
| 2009 | -8% | -6% | -10% | -3% | 0% | 1% |
| 2010 | -7% | -2% | -8% | -3% | 11% | 4% |
| 2011 | 2% | 3% | 0% | -8% | -16% | -3% |
| 2012 | 0% | 1% | -4% | -6% | -10% | 1% |
| AVERAGE | -12% | 7% | 1% | -4% | 2% | 3% |

Source: Citi Research, Barron's

(2) BrandZ Top 10 Improvers and Decliners

Figure 61. BrandZ Top 10 Improvers / New Comers

| SEDOL | Company Name | Country | Sector | Market Cap (USD Mn) | Citi Research Recommendation | ETR* |
|---------|----------------------------------|---------------|----------------------------|---------------------|------------------------------|------|
| 6291819 | China Petroleum & Chemical Corp. | CHINA | Energy | 92,197 | 2 | -8% |
| 6215035 | Commonwealth Bank of Australia | AUSTRALIA | Financials | 95,721 | 1 | 8% |
| 6414832 | Kweichow Moutai Co. Ltd. | CHINA | Consumer Staples | 41,311 | N/R | |
| 6442327 | Bharti Airtel Ltd. | INDIA | Telecommunication Services | 18,989 | 1 | 20% |
| 6563206 | MTN Group Ltd. | SOUTH AFRICA | Telecommunication Services | 35,390 | 1 | 10% |
| 4617859 | Deutsche Post AG | GERMANY | Industrials | 24,289 | 1 | 8% |
| B7TL820 | Facebook Inc. | UNITED STATES | Information Technology | 23,287 | 1 | 42% |
| 5253973 | Hermes International S.C.A. | FRANCE | Consumer Discretionary | 29,697 | N/R | |
| B121557 | MasterCard Inc. CI A | UNITED STATES | Information Technology | 55,994 | 1 | 12% |
| 2842255 | Starbucks Corp. | UNITED STATES | Consumer Discretionary | 38,638 | 1 | 23% |

Source: Citi Research, Millward Brown Optimor, DataCentral

* Expected Total Return: calculated based on Citi Research estimates

Figure 62. BrandZ Top 10 Decliners

| SEDOL | Company Name | Country | Sector | Market Cap (USD Mn) | Citi Research Recommendation | ETR* |
|---------|----------------------------------|----------------|------------------------|------------------------|---------------------------------|------|
| 2117265 | Research In Motion Ltd. | CANADA | Information Technology | 4,587 | 3 | -44% |
| 6639550 | Nintendo Co. Ltd | JAPAN | Information Technology | 17,979 | 2 | 4% |
| 5902941 | Nokia Corp. | FINLAND | Information Technology | 10,592 | 2 | 1% |
| B037HR3 | Itau Unibanco Holding SA Pref | BRAZIL | Financials | 66,327 | 1 | 43% |
| 2295677 | Bank of America Corp. | UNITED STATES | Financials | 106,156 | 2 | 2% |
| 3134865 | Barclays PLC | UNITED KINGDOM | Financials | 47,347 | 1 | 58% |
| B1DYPZ5 | China Merchants Bank Co. Ltd 'H' | CHINA | Financials | 36,759 | 3 | -8% |
| B00FM53 | Banco Bradesco S/A | BRAZIL | Financials | 57,379 | 1 | 26% |
| 2407966 | Goldman Sachs Group Inc. | UNITED STATES | Financials | 59,088 | 1 | 15% |
| 5641567 | Carrefour S.A. | FRANCE | Consumer Staples | 17,130 | 2 | -17% |

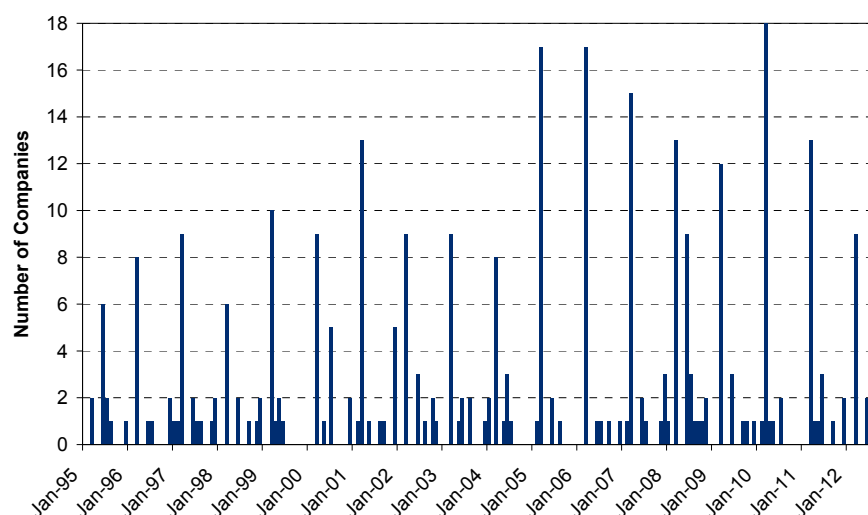
Source: Citi Research, Millward Brown Optimor, DataCentral

* Expected Total Return: calculated based on Citi Research estimates

Appendix – Improving Intellectual Capital Score

For our research using the methodology to calculate the intangible value of company, we have looked at the static scores, measuring IC, of companies through time. The motivation here is clearly to understand whether the market misprices intangible value and as the results show, broadly speaking, there is evidence to suggest that this is the case. A deviation from this analysis is to examine whether there is any mispricing with respect to companies that have improving IC scores, for example, where an IC score has moved from 2 to 3 (high IC). To examine this we set-up a test whereby we buy those companies that have had an improvement in their IC score from 1 or 2, to 3. We find that the average monthly returns to these companies are 1.16% with a monthly volatility of 11.7%. This compares to the results of buying companies with a score of just 3, of 1.16%, but with a monthly volatility of 5.6%. In general the high volatility can be explained by the very low stock breadth of this strategy (see Figure 63).

Figure 63. History of the number of companies with improving IC score



Source: Citi Research

Given the nature of using reported data we find that the bulk of IC score improves occurs around the end of the first quarter when financial statement data is reported to the market. On average, at this time we find that there are 11 companies in our sample that have improving IC scores, and the average return in the subsequent month is 3.4%. Unfortunately the results are not particularly robust given the limited breadth of the portfolio.

Appendix – Current Stock List: High Intellectual Capital

The following stocks listed in Figure 64 are currently ranked 3: high Intellectual Capital. As a different independent perspective, we show the current Citi Research fundamental stock recommendation for the stocks listed. Of the 21 stocks that are deemed to have high Intellectual Capital, only two stocks have a "3 (Sell)", while over half have a "1 (Buy)" recommendation.

Figure 64. European Stocks that have an Intellectual Score of 3 (High) for end of September 2012

| SEDOL | Company Name | Country | Industry Group | Market Cap (EUR Mn) | Citi Research Recommendation | ETR* |
|---------|-------------------------|----------------|---|------------------------|---------------------------------|------|
| B24CGK7 | RECKITT BENCKISER GROUP | United Kingdom | Household & Personal Products | 30,301 | 1 | 11% |
| 4588364 | MICHELIN | France | Automobiles & Components | 11,641 | 1 | 22% |
| 0059585 | ARM HOLDINGS | United Kingdom | Semiconductors & Semiconductor Equipment | 11,496 | 1 | -13% |
| B70FPS6 | JOHNSON MATTHEY | United Kingdom | Materials | 5,612 | 1 | 19% |
| 5596991 | UCB (GROUPE) | Belgium | Pharmaceuticals Biotechnology & Life Sciences | 4,858 | 2 | -6% |
| B1FH8J7 | SEVERN TRENT | United Kingdom | Utilities | 4,854 | 1 | 12% |
| 4005001 | UMICORE | Belgium | Materials | 4,462 | 2 | 0% |
| 0875413 | TATE & LYLE | United Kingdom | Food Beverage & Tobacco | 4,155 | 1 | 8% |
| B1YD5Q2 | ACTELION | Switzerland | Pharmaceuticals Biotechnology & Life Sciences | 4,150 | 2 | 2% |
| 0233527 | CRODA INTERNATIONAL | United Kingdom | Materials | 3,828 | 3 | -29% |
| 0457963 | IMI | United Kingdom | Capital Goods | 3,595 | 1 | 13% |
| 5713422 | METSO CORP | Finland | Capital Goods | 3,532 | 3 | -15% |
| 4808084 | SIKA INHABER | Switzerland | Materials | 3,326 | N/R | |
| B07KD36 | COBHAM | United Kingdom | Capital Goods | 2,878 | 2 | 10% |
| 5701513 | ELISA A | Finland | Telecommunication Services | 2,348 | 2 | -2% |
| B19DVX6 | INVENSYS | United Kingdom | Capital Goods | 2,247 | 1 | 19% |
| 5961544 | WILLIAM DEMANT HOLDING | Denmark | Health Care Equipment & Services | 1,825 | 2 | 5% |
| B17NY40 | ORION-YHTYMAE B | Finland | Pharmaceuticals Biotechnology & Life Sciences | 1,763 | N/R | |
| B88MHC4 | HUGO BOSS | Germany | Consumer Durables & Apparel | 1,748 | 1 | 22% |
| 5465358 | SALZGITTER | Germany | Materials | 1,358 | 1 | 31% |
| B06YV46 | NESTE OIL | Finland | Energy | 1,284 | 1 | 14% |
| | | | | | AVERAGE | 6% |

Source: Citi Research

* Expected Total Return: calculated based on Citi Research estimates

Global Quantitative Research Team

Figure 7. Global Quantitative Research Team

(for informational purposes only)

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Source: Citi Research

Notes

Notes

Appendix A-1

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|--|-----------------|------|------|-----------------|------|------|
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