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Q-Series

How does deployed human capital relate to future returns?

Equities

Global

Quantitative

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The complexity of human capital potential and motivation

Human capital is intuitively a competitive advantage but it is hard to quantify. Despite recognition of its importance, there is no standard way to measure it, unlike traditional financial data, hence the market's struggle to determine its value. To help understand human capital we break it into two parts – potential (human capital assets: skills, knowledge and abilities) and motivation (the extent to which those human assets can perform at their peak efficiency). The complex interaction of these parts represents the value that organisations can capture from human capital.

Analysing the relationship between human capital and firm value

In this report we show how motivation (the extent to which human capital potential is deployed) – and employee satisfaction (a measureable proxy for motivation) relate to future returns. Leading academics have been able to show a strong connection between a human capital index, GDP growth and stock markets. We further develop this understanding by showing how relative employee satisfaction is related to individual companies' growth and financial statement quality metrics.

Evidence that employee satisfaction is related to future returns

We partnered with UBS Evidence Lab to assess and analyse 933,000 reviews on Glassdoor (a website that allows employees to rate their employers) and found that in sectors where human capital is a significant component of firm value, relatively high employee satisfaction gives those firms a competitive advantage over their peers. For example, there is a rank correlation of 0.3 between Glassdoor overall scores and future changes in Fundamental Growth metrics within Retailing.

Companies that are well positioned and less-well positioned

Our results show (for instance) that Costco (COST-US), Adobe (ADBE-US) and Salesforce.com (CRM-US) score well relative to their peers, and carry a favourable rating from UBS analysts, while Office Depot (ODP-US) and Tech Mahindra (532755-IN) have lower scores than their peers, while carrying less favourable ratings. Companies with higher employee satisfaction tend to outperform their peers over a long time horizon. A full list of related securities appears on page 5.

Executive Summary

In this report (the first of a series) we introduce a framework for understanding the various parts of what we refer to as human capital, and how they relate to financial metrics and future returns. We define human capital as the portion of firm value that is represented by the firms' employees, their knowledge, skills and motivation.

Importance and measurability

The growth rate of human capital displays a strong relationship with GDP and stock markets, according to a model (Berger et al., 2016) developed using data from the 1800s.

Market = Underlying growth rate (related to human capital) + multiples (related to risk tolerance)

There are two underlying factors that contribute to market returns: the underlying growth rate, which is related to the development of human capital, and market multiples, which are a function of risk tolerance.

As economies have transitioned over the decades from a manufacturing base more towards a knowledge base, the value of the pooled ideas, efforts and potential of the employees of a company has grown as a proportion of overall firm value.

Human capital can be a significant portion of firm value but is hard to measure

Many metrics to measure human capital have been proposed. However, the fact remains that human capital is hard to measure, particularly at a company level – accounting standards being either too rigid or too subjective when it comes to human capital – consequently, the market struggles to value it accurately.

Potential and motivation

Potential value and productive use

Understanding human capital requires understanding of two separate but interrelated areas: the value potential created by human assets and motivation that affects how efficiently or productively those assets are utilised.

Human capital **potential** relates to attributes employees possess that are of value to their employer: skills, degrees, connections, experience, and so on. These can be thought of as setting the maximum output of a system. We will delve into this further in future research.

Employee satisfaction is a means by which we can assess the value firms place on their human capital

Related to potential, **motivation** relates to aspects within a firm’s control, such as availability of tools and employee satisfaction, that relate to how efficiently human capital is used. The productivity of human capital can be thought of as the maximum output that can be gained given a level of potential. We refer to this as the amount of deployed human capital. This is the focus of this report.

Employee satisfaction is a measureable proxy for employee motivation. We discuss evidence of the link between satisfaction (something we can measure consistently across companies) and productivity. Compensation can be a driver of satisfaction, but so are aspects such as culture and corporate values. By pulling these levers, a company with equivalently qualified staff compared with its peers may outperform, since these factors drive higher employee productivity and efficiency.

Employee satisfaction helps drive Quality, Growth and long-term returns

Within industries where human capital forms a large component of firm value, firms with higher levels of employee satisfaction (the payoff of investment in human capital, be it through continuous training and development programmes, improving corporate culture, etc.) should have a competitive advantage over their peers. This should translate into improved levels of growth and other financial metrics in the future, and ultimately into long-term excess returns.

Gathering evidence

Partnership with Evidence Lab to assess Glassdoor data

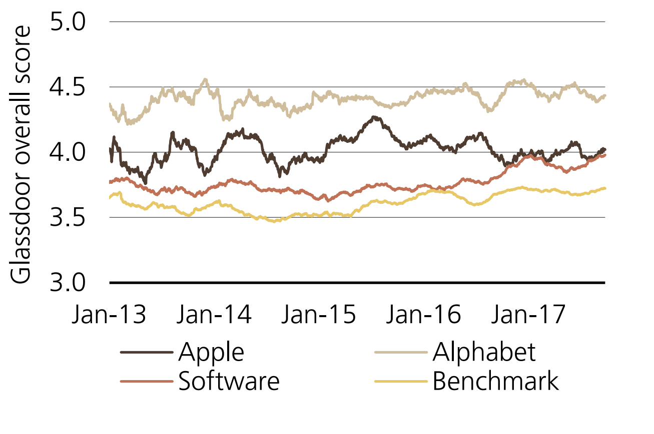
We partnered with UBS Evidence Lab to collect and process a history of employee satisfaction data from the Glassdoor website. We started with 933,000 individual reviews and distilled these down to 7,300 quarterly stock-level scores (across 70 companies) for our analysis. We assess the various Glassdoor data points and conclude that the overall Glassdoor score gives us the information we need for this study. We focus on the retailing and tech sectors as these have the best coverage within the UBS Evidence Lab data set.

Figure 1: Pivotal investor questions related to employee satisfaction

Pivotal question	What's the answer?
Are employee satisfaction scores just a proxy for Quality or Growth, and are they just a function of prior price appreciation?	Not necessarily, though there is a relationship between satisfaction scores and growth in Retail. Glassdoor scores are also higher in Small Caps, and in 'expensive' stocks. We found only a very weak relationship with prior price appreciation.
How do employee satisfaction scores relate to future changes in Financial Statement Quality and Growth?	Companies with high employee satisfaction scores generally have improving levels of growth and financial statement quality in the future.
What is the relationship between satisfaction scores and future returns?	We show that companies with higher employee satisfaction outperform their peers over a long horizon (years).

Source: UBS.

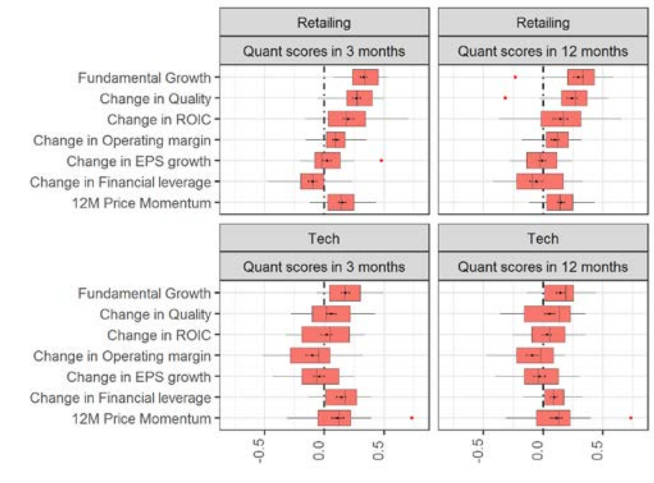
Figure 2: Illustrative history of satisfaction scores



Source: UBS Evidence Lab, Glassdoor.

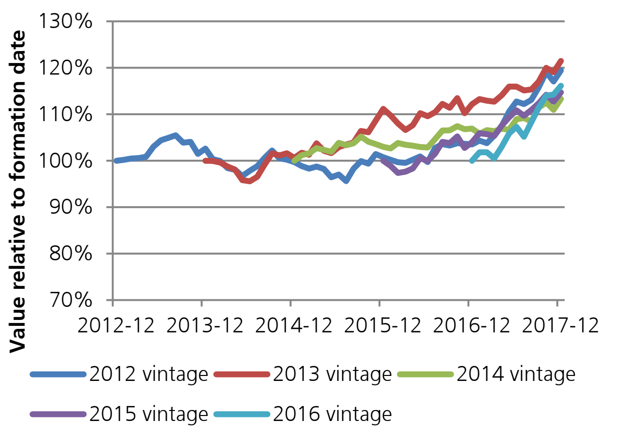
Our analysis shows evidence of a positive relationship between Glassdoor overall scores and future changes in Financial Statement Quality and Growth metrics, as measured by a rank correlation between scores.

Figure 3: Rank correlation between Glassdoor scores and future quant scores



Note: The boxes represent the range of quarterly correlations.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

Figure 4: Returns to portfolios of retailing stocks with higher Glassdoor overall scores



Note: Portfolios are initially equally weighted then the weights move with size. Portfolio total returns in US Dollars.

Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

We show that investing in companies that demonstrate stronger employee satisfaction than their peers can earn a positive return over and above known factors in sectors where human capital matters.

Research shows the market takes time to fully value intangibles such as human capital, even when evidence is presented, and we show evidence (see Figure 4 above for instance) that this does indeed take place, and happens over a long time horizon.

Key conclusions

- Understanding human capital requires understanding both potential (human capital assets) and motivation (drivers of satisfaction).
- The relevance of human capital varies between and within industries.
- Employee satisfaction is not fully explained by compensation or rising stock prices.
- Relative employee satisfaction has some relationship with future Quality and Growth changes, and with longer-term returns in the sectors we examined.

The authors would like to thank Ashley Shi for her contribution to this report.

Which stocks rate well and which rate poorly?

We take the concept introduced above of selecting the top half of stocks[1] within each of the sectors we looked at in this report (measured using Glassdoor overall scores from December 2017), and combine this with a fundamental overlay (stocks viewed favourably by our analysts, carrying a Buy rating). We also show stocks in the bottom half of their peers and not carrying a Buy rating.

These stocks should be thought of as representative of the ideas in this report rather than specific recommendations.

Figure 5: Stocks in the top half of their peers and carrying a Buy rating

Sector	Ticker	Company name	Glassdoor overall score	UBS rating
Retailing	COST-US	Costco Wholesale Corporation	3.85	Buy
Retailing	HD-US	Home Depot, Inc.	3.62	Buy
Retailing	TJX-US	TJX Companies Inc.	3.54	Buy
Retailing	LOW-US	Lowe's Companies, Inc.	3.46	Buy
Tech	ADBE-US	Adobe Systems Incorporated	4.43	Buy
Tech	CRM-US	salesforce.com, Inc.	4.42	Buy
Tech	NTAP-US	NetApp, Inc.	4.40	Buy
Tech	MSFT-US	Microsoft Corporation	4.20	Buy
Tech	CSCO-US	Cisco Systems, Inc.	4.17	Buy
Tech	AAPL-US	Apple Inc.	4.06	Buy
Tech	EXPE-US	Expedia, Inc.	4.01	Buy
Tech	AMZN-US	Amazon.com, Inc.	3.99	Buy
Tech	INTC-US	Intel Corporation	3.98	Buy
Tech	4689-JP	Yahoo Japan Corporation	3.81	Buy
Tech	EBAY-US	eBay Inc.	3.71	Buy

Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor, FactSet.

Figure 6: Stocks in the bottom half of their peers and carrying a Neutral/Sell rating

Sector	Ticker	Company name	Glassdoor overall Score	UBS rating
Retailing	BBBY-US	Bed Bath & Beyond Inc.	3.38	Neutral
Retailing	ROST-US	Ross Stores, Inc.	3.30	Neutral
Retailing	WMT-US	Wal-Mart Stores, Inc.	3.28	Neutral
Retailing	KR-US	Kroger Co.	3.27	Neutral
Retailing	M-US	Macy's Inc.	3.11	Neutral
Retailing	ODP-US	Office Depot, Inc.	3.00	Sell
Retailing	WSM-US	Williams-Sonoma, Inc.	2.75	Neutral
Tech	IBM-US	International Business Machines Corporation	3.67	Neutral
Tech	SYMC-US	Symantec Corporation	3.62	Neutral
Tech	992-HK	Lenovo Group Limited	3.55	Neutral
Tech	507685-IN	Wipro Limited	3.52	Sell
Tech	CTSH-US	Cognizant Technology Solutions Corporation Class A	3.50	Neutral
Tech	ORCL-US	Oracle Corporation	3.47	Neutral
Tech	532281-IN	HCL Technologies Limited	3.29	Neutral
Tech	532755-IN	Tech Mahindra Limited	3.04	Sell

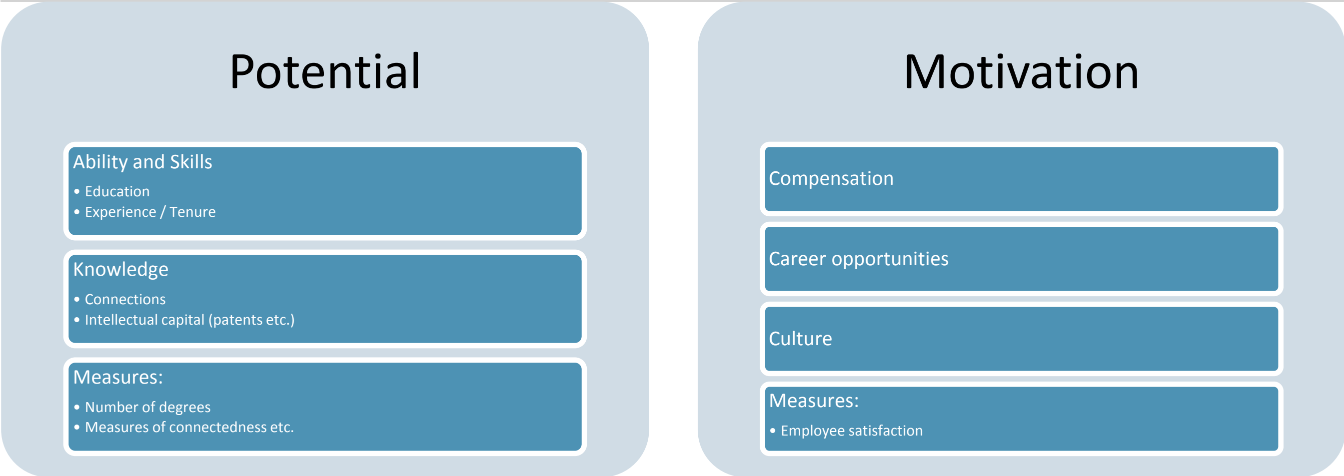
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor, FactSet.

[1] As a sanity check, we analysed the tech screen using our Portfolio Analysis System. The main sources of risk vs a US tech benchmark were from sub-sector tilts and a large-cap bias.

A conceptual framework for understanding human capital

In this report we introduce a conceptual framework for understanding human capital and how we might begin to ascribe value to it. We are not going to attempt to answer all the questions, but we introduce a way of thinking about human capital that will allow us to ultimately understand it in a similar way to other financial assets.

Figure 7: Distinct elements of human capital



Source: UBS.

Defining human capital

When we talk about human capital we are really thinking about two related concepts:

- **Potential:** The potential value created by human capital comes in the form of skills, knowledge and abilities – the human capital "assets" of a system, which are traditionally thought of as human capital. There are various metrics for these – number of degrees, number and quality of LinkedIn connections, and so on. These can be thought of as the maximum economic potential of a system.

- **Motivation:** The means and extent by which human capital assets are deployed effectively. The factors that drive motivation are both direct (compensation) and indirect (workplace culture, values, desirability as an employer etc.) - they encourage employee retention, development and the willingness to 'go the extra mile' (we measure this using employee satisfaction). This can be thought of as the level of productivity that can be achieved from a system of certain potential. We call this **deployed human capital**.

Potential + motivation = deployed human capital

As an analogy, consider a highway heading into a city. The potential represents how well that highway might function – it has four lanes and a high-quality surface. But that is only half the story; the other half is how it is used – are all lanes open, are there roadworks, are there good road markings and driver aids?

Potential and motivation are important together

We can think of human capital, efficiency and value creation in much the same way as we think of an industrial system:

- There is an asset, in this case the aggregated endeavours, ideas, efforts and future potential of the human beings that represent an entity. It can be invested in (for example through continuous education), or grown (in the sense that people can move within a free labour market); and
- There is asset utilisation: how many widgets are being produced by that asset? Is it operating at maximum long-term efficiency (which is not necessarily maximum output)? Has it been well looked after?

Figure 8: Human capital in different industries

Industry	Asset-heavy	Asset-light
Revenue	[identical]	
Source of capital	Physical capital	Human Capital
Return on Assets	Low	High
Examples	Manufacturing	Technology, Health Care

Source: UBS.

The combination of potential and motivation is the sweet spot

The combination of both the asset and its utilisation gives the most sustainable long-term value. Human capital works the same way – the maximum long-term value is created with the right combination of potential and motivation. Corporations can invest in human capital by these two separate means: hiring talented staff and developing them (the asset value side), and by creating an environment where those assets can flourish, being used productively and efficiently (the motivation side).

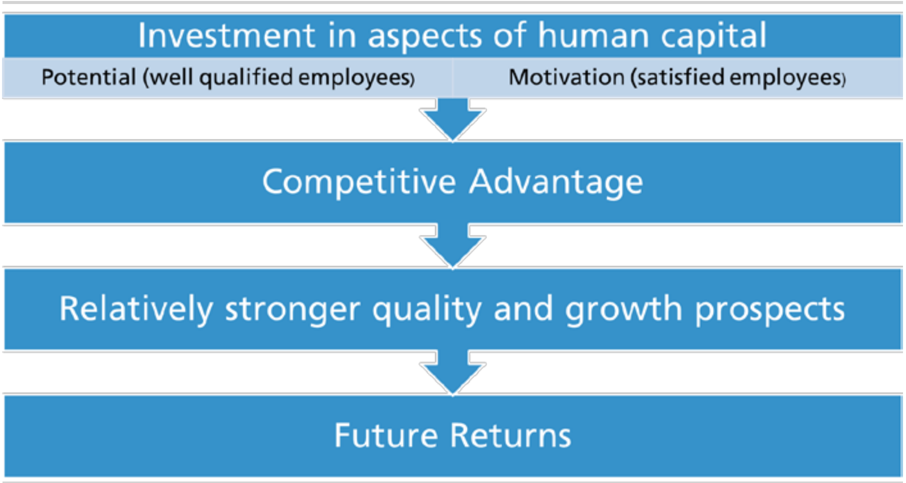
Going back to our road analogy, we can think of a company with low human capital and high motivation as a single-lane road, down which vehicles are travelling at high speed. A company with high human capital and low motivation could be thought of as a freeway with two lanes closed for roadworks.

Employee satisfaction is a means by which we can measure motivation. Satisfaction itself is not a human capital asset, though it clearly has value. Of course compensation is relevant to this but, as we show in this report, and as other research has found, culture and values play a part too. A set of the same employees with different levels of satisfaction would be expected to produce different results.

The journey from human capital to value

Figure 5 shows our view of how potential and motivation (collectively, human capital) are transformed into future relative returns.

Figure 9: Roadmap from investment in human capital to returns



Source: UBS.

Our hypothesis

As the market is a combination of individual companies, it seems that companies with *relatively* strong human capital – be it measured by potential (strong internal networks, shared knowledge), or motivation (a strong culture, satisfied employees) – should be in a better position than their peers.

We suggest that investment in human capital should create positive outcomes for businesses, which should reflect in future measures such as relative growth and financial statement quality. As Jim Collins notes in "Good to Great" (2001), it is not as much a case of endlessly investing in human capital as it is to identify the right employees at the outset and then create an environment in which they can thrive.

Our view is that we cannot easily treat human capital as a whole given our current level of understanding, but what we can do is analyse how each of the components of human capital relate to business performance and financial performance in general.

Assessing drivers individually

In this report, the first in a series, we begin a journey of looking at some of these drivers individually. New data sets provide us with constantly growing insight into this area, and we will make use of these data, with straightforward analytic techniques, to help develop our knowledge.

…starting with employee satisfaction

We focus specifically on motivation and employee satisfaction in this report, how it relates to the value of human capital more broadly, and we analyse evidence that employee satisfaction has a relationship with future business performance.

Although the authors are Quant analysts, we do not present this report as a robust quantitative model. Instead, we seek to present a credible conceptual framework for understanding how human capital relates to company value.

The Importance of human capital

The expression "employees are our most valuable asset" features heavily in many a corporate marketing presentation. What does this really mean? Why is human capital important at all? Having introduced our framework, we step back and look at how and why human capital is related to growth and valuation.

Our thesis is based on the assertion that there are two key drivers of the market:

- human capital – this is a driver of underlying earnings; and
- risk appetite – this is a driver of valuation multiples.

We support the theory that human capital creates outcomes (Berger et al., 2016). "Factors" such as Quality and Growth do not in themselves cause future returns – they are merely correlated with the true drivers. So what evidence do we have to support that theory?

Human capital is a major driver of growth

In 1776, Adam Smith recognised that the only way to grow – apart from demographics[2] – is to increase human capital. Human capital (and demographics) can either be thought of as external supply and demand drivers for financial assets, or internal drivers of value; this report looks at human capital from the latter point of view.

If an economy has large numbers of young skilled people then that is good demographically, but Smith makes it clear that it is also good for society as a whole: "*The acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship…may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, and which, though it costs a certain expense, repays that expense with a profit*" *(Smith, 1776).*

Smith is not alone in his conclusion. In his book "Common Stocks and Uncommon Profits", Fisher concludes: "most investors may not fully appreciate the profits from good labour relations".

The largest component of aggregate wealth … its relationship with macro variables fraught with difficulty

In their seminal paper, Berger, Pukthuanthong and Roll (2016) considered human capital as the largest component of aggregate wealth, but also considered its relationship with macroeconomic variables fraught with difficulty due the lack of a measurable value of that capital. They propose a model of human capital, relating recorded labour rates to economic indicators such as equities and GDP, and extrapolate it to the modern era.

Their findings highlight that human capital substantially contributes to GDP growth, and to that of the stock market. From a simplistic point of view we can say the market is driven by two factors – an underlying growth rate, driven in part by human capital, with an overlay of risk appetite.

Therefore, it seems that measuring and valuing a company's human capital is as important as understanding its physical and financial assets in assessing its true economic position.

[2] We have written extensively on demographics – see Q-Series: What will demographics mean for growth and stock market returns? The relationship between demographics and human capital is complex and beyond the scope of this report.

The returns to human capital accrue not only to organisations but to individuals and society as a whole. Recent OECD data[3] suggest an incremental return to individuals of 5% for completion of a secondary education and up to 23% for degree-level education, with positive results from all countries. Furthermore, there is a multiplier effect, by which education and skill can engender a development of ideas in those around them, leading to a greater return to society as a whole.

Human capital is incredibly hard to measure directly

Intangibles present valuation challenges

Yet, for its importance to the aggregate economy, as Berger et al. (2016) have shown, there are no clear ways to measure human capital without a liquid market in that capital, or a suitable methodology for achieving such a valuation. There is no standard accounting that captures the value of human capital, although this is not unique – the same problem affects many other intangible assets:

- Intellectual property such as brands and patents.
- Structural advantages such as regulation.
- Competitive moat factors.
- Platforms and user bases, etc.

All of these present valuation challenges. The only occasion where the value of human capital is realised is in M&A situations, where it shows up as part of acquisitions of goodwill – but even then, one cannot easily de-thread the contribution of human capital from these other intangibles.

Can compensation be used as a proxy?

One could think of total compensation as a proxy for an individuals' market value, but still that would need to be adjusted by several environmental factors, for example a talented person earning some notional salary in a motivating role and strong organisation would presumably require a large premium to work in a different or less desirable role in a different company, despite having the same human capital potential.

Human capital and valuation premia

The factors affecting simple (price/book) valuations are numerous (enough to fill many volumes of academic literature), affecting both the valuations of sectors and stocks within sectors.

Figure 10: Examples of factors affecting valuation premia

Examples of factors that drive price/book levels	Examples of factors that drive changes in price/book levels
Growth potential	Falling interest rates (over the majority of recent history)
Capital intensity	Market participants valuing companies from their earnings rather than the asset base
Human capital	

Source: UBS.

Sectors such as technology, healthcare, and even finance and retailing, are driven to some extent by intellectual property, relationships and ideas. They increasingly rely on the endeavours of employees as information- and knowledge-gatherers, thus relying on human capital.

[3] "Education at a Glance", OECD 2009.

For others, operational matters are most relevant; for example, the utilities sector is driven by maximising efficiency in a regulated environment, and mining stocks are driven by operational efficiency, and external supply and demand, and human capital matters relatively little to investors.

Human capital sectors tend to have higher P/B – but this is just an observation

It follows that these companies where intangible assets are significant carry a valuation premia. We cannot say that this premia is down to human capital as there are a number of these hard-to-measure items, and the value of human capital can be small or large for individual companies within sectors, however, as a general rule, "human capital sectors" tend to carry a relative valuation premium.

Previous UBS research on human capital

We build on the previous work of UBS' ESG analysts Julie Hudson and Hubert Jeaneau[4], who identified sectors where human capital is a material component of valuation and looked at various indicators of employee satisfaction. They identified five investment themes linked to human capital:

(1) High employee satisfaction as an asset.

(2) Meritocracies.

(3) Companies potentially under-investing in labour.

(4) Organisations striving to implement structural changes.

(5) Cultures potentially at risk of complacency.

Our analysts deemed human capital to be a material issue in two-thirds of global sectors, but with different impacts according to sector. The report identified four key human capital issues and we relate these to the sectors most impacted:

Figure 11: Understanding how human capital matters: UBS ESG Analyser survey results

Human capital issue	Potential impacts	Examples of sectors affected
Customer and sales focus	Positive impact on customer satisfaction, motivated sales force driving top line growth	Restaurants, food retail
Innovation	R&D productivity, ability to differentiate	Biotech, chemicals, pharma
Working conditions & labour relations	Labour disruption, lower productivity, cost inflation	Mining, autos
Availability of skilled labour	Competition for talent generating cost inflation	Oil, oil services, mining

Source: UBS.

[4] Q-Series: Corporate Culture: Relevant to investors? (2013)

The relationship between motivation and future returns

Employee satisfaction is a measureable proxy for employee motivation – and luckily some very well-known research guides us as to its value, as presented by Edmans (2011) in his paper relating employee satisfaction to long-term returns. A portfolio of the "100 Best Companies to Work For in America" delivered 4% excess returns from 1984-2005, after considering other factors. There are two important findings from Edmans' research:

- Employee satisfaction is correlated with shareholder returns, and that relationship is not entirely explained by compensation.
- The stock market does not fully value such intangibles as human capital, even when presented with independent evidence.

The combination of these factors implies that although human capital factors have some relationship with future returns, the ability to quantify that relationship is not straightforward and, hence, takes time to flow into equity prices.

The relationship between human capital and future value is not straightforward – hence it takes time to flow into equity prices

Some aspects of human capital are of course valued and realised quickly by the market; for example, senior management changes. Appointments (and terminations/resignations) of CEOs and other key executives can be market-moving events. We plan to return to this topic in a separate report. Here, we examine whether this translates into relatively positive future financial metrics, and over what horizon. The development of social media and the ability to process large amounts of unstructured data present us with a toolkit to examine this in a new way.

If we attempt to draw a relationship between satisfaction and future share price performance we must accept, as Edmans (2011) found, that we are dealing with long-term drivers that will not necessarily translate into immediate gains for investors. We propose that the relationship takes place via long-term changes in commonly understood investment themes such as Quality and Growth, which themselves are leading indicators of future returns[5].

Our evidence

In partnership with UBS Evidence Lab, we created measures using data from the Glassdoor website. Glassdoor is a website where employees and former employees anonymously review their employers and management. Glassdoor covers a diverse user population where users' profiles are fairly distributed across different sectors such as age, income, education (Moniz 2015), so even though we are sampling a sometimes small and variable number of employees (e.g. Facebook has more reviews per employee than IBM), it is still considered to form a representative sample.

The use of data from Glassdoor allows us an insight into the level at which employees feel valued and are satisfied within their organisations – we know from Berger et al. (2016) and Edmans (2011) that this satisfaction should distil into improved financial performance.

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[5] See our reports Global Quantitative Research Monographs: Investing in Quality (2014) and Quantitative Monographs: Investing in Growth (2015).

Glassdoor gives us two sources of information via individuals' reviews.

(1) A series of numeric scores:

- A rating on Culture and Values.
- A rating on Compensation & Benefits.
- A rating on the quality of Senior Management[6].
- An overall rating, being a weighted combination of these.

(2) Content from several text fields (for example, users state Pros, Cons and "Advice to management").

Many academic studies focus on the text comments, rightly seeing them as a rich seam of information as to the important drivers within a sector or company; however, in our study we use the numeric scores as a means to understand the relationship between opinions and financial performance.

The use of Glassdoor data is not new in the body of research into human capital.

We link this data with the underlying foundations of human capital value and demonstrate this value can be realised as financial value.

UBS Evidence Lab examined Glassdoor reviews data covering the period January 2012 to December 2017, for the listed companies on which it had collected sample data (includes many large-cap companies, mainly US and European, reflecting the Glassdoor user base). The reviews cover subsidiaries of the companies located elsewhere and, for simplification, we remove those with complex parent/subsidiary relationships. We attempt to screen anomalies (e.g. a large number of positive reviews on a single day) using the R *AnomalyDetection* package developed by Twitter[7]. Our sample set began with 933,000 individual reviews, of which about 20,000 were removed by our anomaly detection processes.

We weight these daily review scores (using the log of the number of reviews per day) to form a quarterly score. As well as the "overall" score we look at the scores in the "Compensation and Benefits", "Culture and Values" and "Senior Management" categories (treated in the same way), as well as a derived score, which we discuss later. We consider both the average and the standard deviation of scores, as the distribution of the scores may give us additional information.

We restrict our coverage to those companies with consistently >30 reviews per quarter, and 20 quarters of data; this significantly reduces the number of companies (and gives a noticeable, but not exclusive, large-cap tilt). Overall, we ended up with a sample of around 6,400 quarterly stock-level scores (across 64 companies), across the sectors that we use in this study.

We apply best practices for the screening of Glassdoor data

Consistent with UBS Evidence Lab's best practices for using Glassdoor data, this study only includes those reviews submitted by current employees (i.e. only those reviewers that worked for the company being rated at the time they submitted their review). There are of course many residual biases from the motivations behind voluntary participation in an online survey; however, the volume of literature based on Glassdoor reassures that these do not detract from the value of the data.

[6] There are also several other component scores that we do not consider.
[7] https://anomaly.io/anomaly-detection-twitter-r/. We remove 0.01% of both positive and negative reviews in a 90-day window at company level. The underlying algorithm is a Seasonal Hybrid ESD built upon the Generalized ESD test, which employs the time series decomposition and robust statistical metrics.

How employee satisfaction fits into the investment process

Much of the academic literature relating to Glassdoor in particular is focused on demonstrating contemporaneous linkages, for example:

- studying the text of Glassdoor responses, grouping them into categories, and determining the most important categories at an industry level; or
- looking at the relationship between Glassdoor scores and security prices (in particular, long term returns).

While both of these approaches are of interest, from a practitioner's point of view we are most concerned about how these human capital-based metrics interact with the traditional measures investors use to value companies – to give a full picture of a company's ~~and~~ human and financial capital.

In this report, we consider the nature and robustness of the Glassdoor data, and whether we can establish a relationship between Glassdoor-derived scores and future levels of quantitative valuation metrics. We suggest that investors consider the proportion of firm value that is created by the endeavours of the firm's employees as part of the valuation process, and focus on stocks with higher employee satisfaction scores relative to their peers.

The importance of a relevant peer group

Investment in human capital -> positive outcomes for businesses

Much academic research considers human capital across the entire market. We take a different view: first, one should identify where human capital is most relevant, and then identify measures that relate to human capital, and whether they help the investment process in that universe.

We limit our study to look at sectors where we consider the value of human capital and intellectual property to be significant components of the company valuation, and where we have usable Glassdoor data. From earlier discussion of the importance of intellectual property, we have some idea of what these sectors are. We focus on two "hybrid" sectors[8]:

As we are talking about human capital, it makes sense to use a classification based on an employee perspective

- **Retailing.** Aside from tech, this sector has the largest number of Glassdoor reviews. We exclude restaurants (mainly fast food operators).
- **Tech.** We include internet retailers such as Amazon in this group. Perhaps unsurprisingly, this group provided the largest number of individual reviews. It is also of the most interest to us, being the industry group with the highest level of idiosyncratic drivers – those that systematic and quantitative models struggle most with[9].

We also assume that human capital is an important aspect of the valuation of the healthcare sector – particularly the pharmaceutical and medicine sub-sectors;

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[8] For the purposes of this study, we consider our hybrid sectors to be more sensible than GICS for the purposes of this study. For example, while GICS classifies Amazon under the Consumer Discretionary / Retailing sector, it fits better alongside Facebook, Google and Apple from a human capital perspective. In an ideal world we would further break groupings down by size, which would differentiate start-ups from well-established players but this is unlikely to affect our results materially because most of the companies we look at are larger capitalisation names within their sectors.

[9] Please refer to our report Q-Series: Active vs Passive: What is the Future of Active Management" (2017).

however, there are limited Glassdoor data for these sectors (as well as a limited number of listed operators).

We use these hybrid sectors throughout this report to help illustrate our findings. Despite there being hundreds of thousands of Glassdoor reviews in our initial data set, once we have narrowed down to those we have data for, there are fewer companies we have to work with, as Figure 12 shows us; however, these hybrid sectors give us more robust results than narrower definitions.

Figure 12: Number of companies within the analysis set, split into our hybrid sectors

Note: The chart shows the number of companies within each hybrid sector, where we have at least 20 quarters of data.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

We suspect there are also many other factors that affect Glassdoor scores, such as the effects of size. For example, as tech start-ups morph into the next Microsoft or Google, corporate culture may well change as the firms grow. This is a topic for another day – the amount of Glassdoor data (both in terms of stocks and history) doesn't afford us this insight.

Understanding the pivotal questions

It is important for us to understand two related, but distinct relationships:

- the relationship between Glassdoor scores and *current* levels of well-known investment styles (quant factors); and
- the relationship between Glassdoor scores and *future* levels of well-known quant factors.

In the following section of our report we analyse this relationship by asking a series of pivotal questions that a critical investor might ask.

Pivotal Question 1: Which factors are Glassdoor scores related to?

Is it momentum?

The first assumption we encountered prior to assessing the Glassdoor data was that employees are satisfied "because the stock price is going up". There is some evidence of this, but its statistical significance is weak.

It is possible this is an effect that is restricted to more senior employees (the more equity a person has in a business, perhaps the more this clouds their views of the company). We did not have salary or position data in our Glassdoor data set but this is an interesting area for future research. It is also possible that this effect is present for a smaller number of companies – one could see how this might be the case in small tech start-ups or recent IPOs.

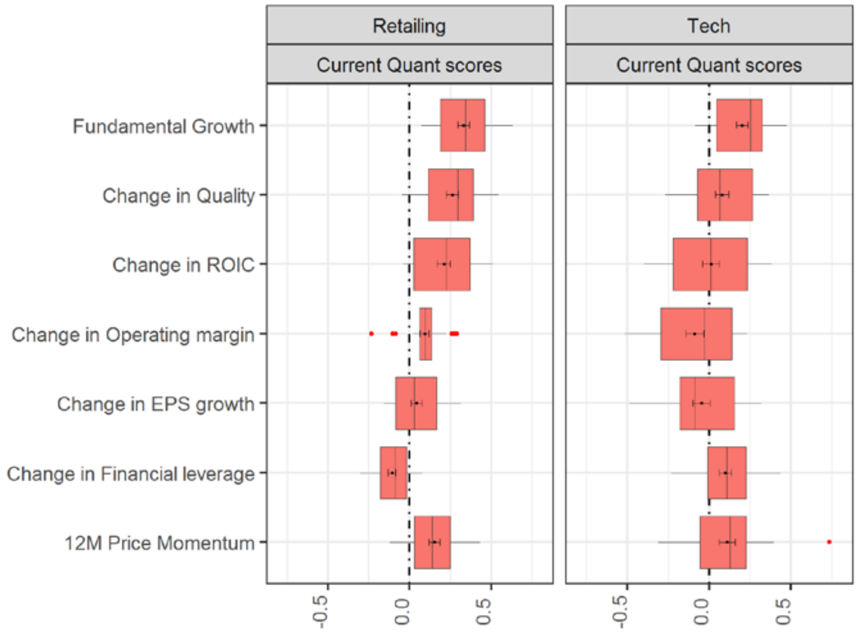
Is it just a noisy version of Quality or Growth?

Previous academic research (Luo et al., 2016) has documented a relationship between Glassdoor scores and Quality (as a broad concept, rather than a financial statement metric), and we seek to explore this in a financial sense, as well as the relationship with leverage, growth and profitability metrics.

The easiest way to look at these connections is presented in Figure 13, a rank correlation between the Glassdoor overall score and a selection of common quant factors. A positive number suggests a relationship between the Glassdoor and quant scores. We run correlation per quarter – the bars represent the range of correlation coefficients over time.

Glassdoor scores are high in stocks with improving Growth and Quality

Figure 13: Rank correlation between Glassdoor scores and contemporaneous quant scores



Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor. The boxes represent the range of quarterly correlations.

The clearest findings here are reflective of those in related literature: that positive Glassdoor scores are related to improving financial statement quality and growth in the retailing sector, with a generally positive correlation over time. The relationship in tech, and with other factors such as margins and ROIC, is unclear (and we don't have a fundamental explanation why this would be the case).

For our quantitative scores, we look generally at "change" factors – 12-month changes in ROIC, EPS growth, margins and leverage. Our Delta Quality and Fundamental Growth scores are already formulated using change metrics. The reason is, it is generally improvements in these metrics, rather than the levels themselves (which can be stable over time)[10], which are drivers of returns.

To give us another perspective, we carried out a cross-sectional regression of the overall Glassdoor scores on a selection of common risk factors, the results of which are shown in Figure 14.

Figure 14: Results of cross-sectional regression of Glassdoor scores on common risk factors

Variable	t-statistic	p-value
Intercept: Glassdoor score	87.2	0.0000
Fixed Effects: Region	9.1	0.0000
Fixed Effects: Sector	21.6	0.0000
Fixed Effects: Quarter	9.9	0.0000
Beta	3.8	0.0002
Momentum	0.8	0.4488
Value	-7.3	0.0000
Quality	5.1	0.0000
Size	9.9	0.0000

Note: The results are obtained from a panel regression within the tech and retailing sectors. A higher t-statistic (or lower p-value) indicates stronger significance. The intercept (highlighted) refers to the significance of the overall Glassdoor score.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

There are a couple of points we take away from this analysis:

Relationships with Value, Size, time and sector

- Glassdoor scores in aggregate carry significant loadings, particularly to value (companies with high scores tend to be "expensive") and size (smaller stocks tend to have higher levels of employee satisfaction within the sample).
- There isn't a significant relationship with momentum. Several among us suspected high satisfaction might have come from strong prior stock price performance but this doesn't appear to be the case.
- Time period and sector effects are significant. Glassdoor scores work better in some sectors than others and behave differently through time (the region effect may be telling us that Glassdoor scores are more relevant in the US where Glassdoor has a higher profile).
- The r-squared of this model (~35%) suggests Glassdoor scores are significantly affected by these factors; however, they are still significant on their own.

We should caution[11] that simple linear regressions used in this way can give misleading results and that supposedly orthogonal factors are actually not so – we do not assume that employee satisfaction is one of these factors; however, we would like to understand the relationship to common risk factors.

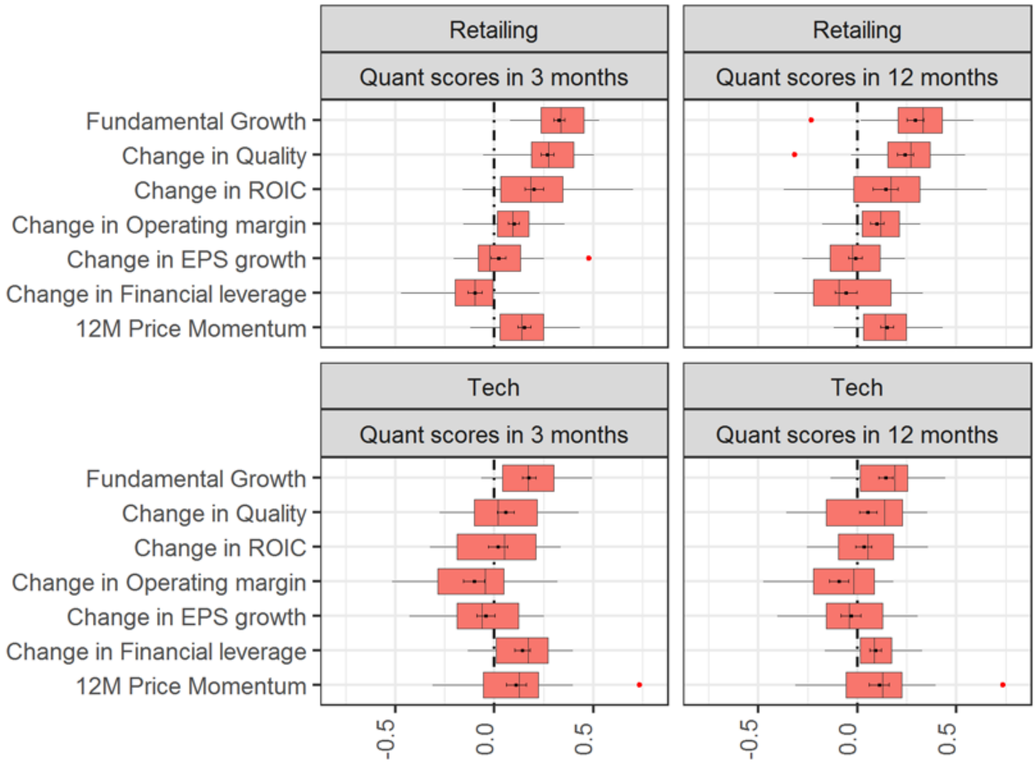
[10] In the Appendix, we show the serial correlation for both the Glassdoor and quant scores.
[11] See Should smart beta factors be orthogonalised? (2017).

Pivotal Question 2: How do Glassdoor scores relate to future changes in Financial Statement Quality or Growth?

While a relationship between Glassdoor scores and Quality and Growth is a positive, this doesn't tell us anything about the future (correlation tells us nothing about causation). A more useful attribute to investors is whether Glassdoor scores can tell us anything about how Quality and Growth scores are likely to change in the future.

In Figure 15 we return to our correlation charts to review the relationship between Glassdoor scores and future changes in quant factors (given the relatively small amounts of data we are not expecting very large numbers here).

Figure 15: Rank correlation between Glassdoor scores and future quant scores



Note: The boxes represent the range of quarterly correlations.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

In retailing, there is evidence of a relationship between Glassdoor scores and future changes in Growth and Quality (and less strongly, in ROIC and margins). For tech stocks, the picture is less clear[12]. This leads us to think that in some sectors Glassdoor gives insight into operational rather than financial performance.

[12] Reasons for this may include the disparate nature of the tech sector, and the fact that many of these stocks are at an early stage of maturity and still focused on top-line growth, rather than balance sheet strength or profitability.

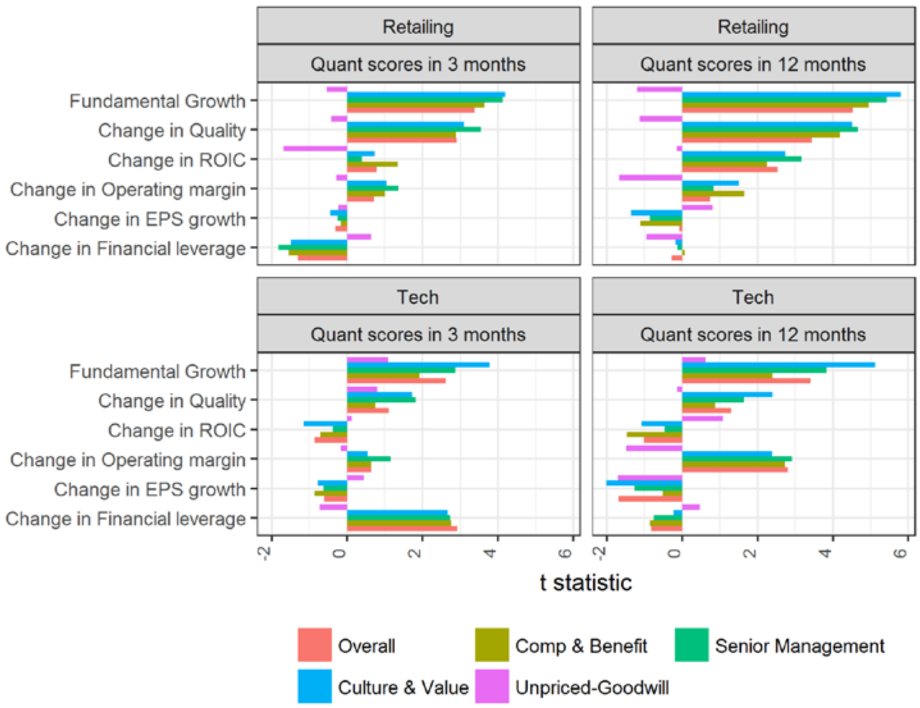
To establish a causality relationship we would need to have a longer data history to understand the relationship between changing Glassdoor scores (which generally move slowly, with few 'jumps') and changing factor scores[13]. We suspect these step-changes carry some information, but that information will probably have already been absorbed by the market; for example, a structural shift in business or management – we do not consider this aspect further here.

We are interested to see that there appears to be a weak positive relationship between Glassdoor scores and future price momentum. Whilst this may be due to many factors, it acts as confirmation that there is some kind of relationship between satisfaction and future returns within peer groups.

In Figure 16 we address this by illustrating the results of a regression where we regress the future levels of quant scores (which themselves are change factors) on the prior levels (which themselves are change factors) and the Glassdoor score. We make adjustments for the small sample size.

There is some residual information from Glassdoor scores after controlling for current scores

Figure 16: Regression of future quant scores on current quant and Glassdoor scores



Note: This is conducted as a panel regression across the data set. We use a Newey-West adjustment to the t-statistics to adjust for the sample size. The fixed effects we use are region (US vs Rest of World) and a size flag that splits the data.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

Given the relationship between Glassdoor and momentum, we also control for price momentum to check that we are not just picking up a momentum effect. To accommodate the small size of the data set and the number of regressions, we need to use a higher t-statistic hurdle rate than we might otherwise use, even if the data were normally distributed. We assume that a t-statistic of 3 (where we might otherwise say 2) gives us some level of comfort.

[13] We also need to account for the serial correlation inherent in all of these scores, to show that we are not just seeing an effect of growth predicting growth (in our Appendix we show that there is indeed some significant serial correlation of both the Glassdoor and quant scores).

We conclude that Glassdoor scores can indeed give some additional information about future changes in Growth and Quality in retailing. While not statistically significant, there also appears to be a positive link between Glassdoor scores and future growth in tech stocks. In the Appendix we have shown these correlations as a time-series, which supports our views on changing Quality and Growth.

Information about future changes in Quality and Growth in retailing

What is the relationship between the various Glassdoor "component" scores?

A user of Glassdoor data would naturally want to dig into the detail behind the overall score. We look at reviewers' ratings of Compensation & Benefits, Senior Management, and Culture & Values[14], thinking that these individual areas might relate to factors differently than the overall Glassdoor score.

We also consider the concept of "unpriced goodwill", that being the difference between the overall score and the Compensation & Benefits score, the amount by which employees are happy but not being paid to be happy. This may of course be captured to some extent by the Culture & Values score, but if the unpriced goodwill factor is useful, then this is indicative of our problem of human capital being valuable but hard to measure.

Do the components matter?

The key question is: do any of these components add any value from an investing point of view, or is looking at the overall score enough? If not, then our job is much easier.

In Figure 17 we consider the significance of the relationship between the various component scores and the quant factors we looked at earlier. As discussed, a p-value of number less than 0.01 gives us some confidence we are not just seeing statistical noise. Where the overall score has a significant relationship with a quant score, it is rare that the component scores are more significant. We aren't seeking to data-mine any more patterns from these results.

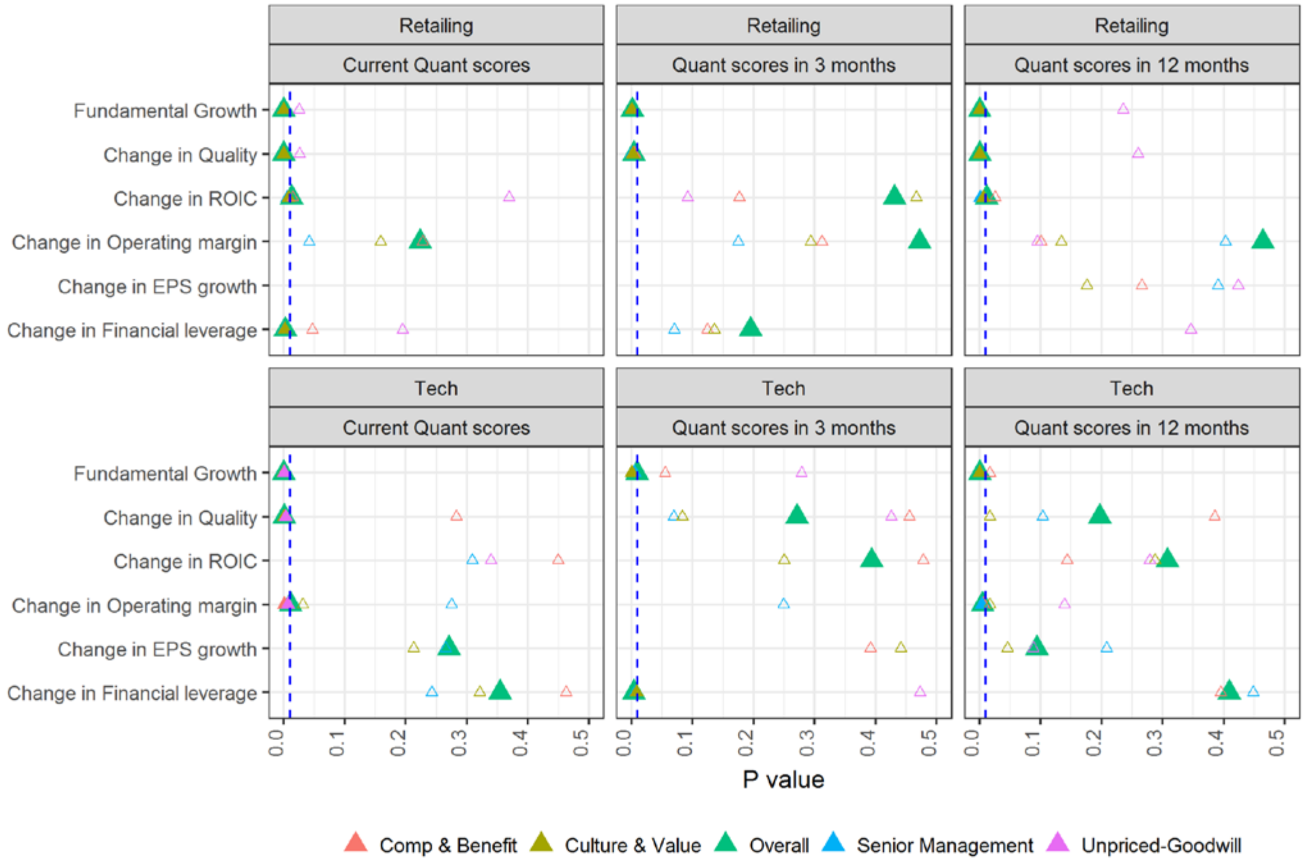
The overall score provides a good starting point

Clearly for certain analysis, such as analysing strategic direction or operational efficiency, or doing a deep-dive into certain stocks, one might consider the detailed scores but in general it seems that the overall score tells us enough for the purposes of this study. Based on observing these results, we would suggest that from an investment standpoint, the overall score does capture the overall picture at least as well as the components.

In the Appendix we also present a plot of the relationship between Glassdoor component scores and the current and future levels of quant factors. This is supportive of the above findings – the correlations are similar to those for overall.

[14] Glassdoor scores also cover Career Opportunities & Work/Life Balance, however Luo et al. (2016) and our intuition suggests these would be picked up by Culture & Values.

Figure 17: Significance of relationship between component scores and quant factors



Note: The fixed effects we use are region (US vs Rest of World) and a size flag that splits the data.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

Pivotal Question 3: Is there a direct relationship between Glassdoor scores and future returns?

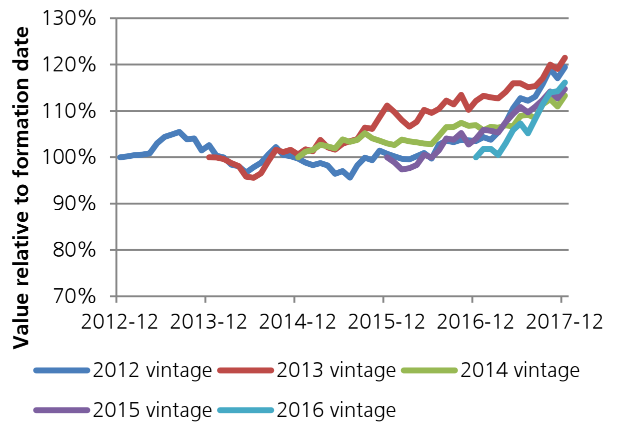
The results so far have shown there is some evidence of a relationship between Glassdoor scores and changes in Quality and Growth scores, which we know are factors that command a premium over the cycle, as well as a relationship with future price momentum. A natural follow-up to this is: "Can I invest purely on the basis of employee satisfaction and expect immediate returns?"

Edmans (2011) is sceptical, noting (with regards to information related to human capital) that the market takes time to incorporate this kind of intangible information, even when the evidence is presented. Nevertheless, if companies with relatively high human capital scores outperform their peers with lower human capital scores, then that is an effect investors can also use directly and immediately, rather than suffering the uncertainty of when the human capital impact would play out.

To answer this question we sampled the Glassdoor overall scores at the end of each calendar year, split the stocks in half using this score and created an equally weighted portfolio of stocks. We then measured the monthly returns to investors from holding these portfolios (i.e. one of the stocks with higher scores and one with lower scores) relative to a universe portfolio of both sets of stocks, until October 2017[15].

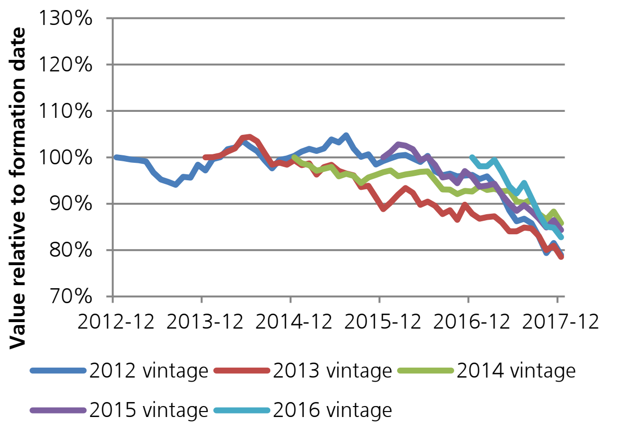
We present the results for retailing in Figure 18 and Figure 19, and for tech in the Appendix.

Figure 18: Returns to portfolios of retailing stocks with higher Glassdoor overall scores



Note: Portfolios are initially equally weighted then the weights move with size. Portfolio total returns in US Dollars.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

Figure 19: Returns to portfolios of retailing stocks with lower Glassdoor overall scores



Note: Portfolios are initially equally weighted then the weights move with size. Portfolio total returns in US Dollars.
Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

[15] Once the portfolios are formed, we don't rebalance or make any further changes – if a stock was removed it would make no further contribution to the returns. Typically, the portfolios are formed of 40-50 stocks.

There is some evidence of long-term outperformance for retailing companies with higher levels of employee satisfaction (and there are similar results in tech, which we present in the Appendix). We broke the portfolios out separately, rather than using a long-short test, so we could see whether the performance was symmetrical (it does seem to be). We do note that the outperformance is more pronounced in later years. Adding in the UBS analyst rating for the stocks did not significantly affect the results.

We have shown earlier that while Glassdoor scores stand on their own, there is a relationship particularly with Size and Value. As we showed in Jones et al. (2017) orthogonalising scores generally leads to unexpected results; returns of portfolios constructed using neutralised Glassdoor scores were lower (and noisier for the reasons outlined in this report).

Long-term returns of ~6%, but we caution to their significance

We also regressed the returns to our employee satisfaction signal on beta, size, value and momentum. The intercept (returns related to employee satisfaction) was nearly always positive, with an annual return of around 6%; however, due to the short history of data we cannot show a clear level of statistical significance.

Overall we suggest investors monitor their exposure to risk factors (particularly Size, Value and sector tilts) when considering measures of employee satisfaction.

No discernible difference in volatility

We did not observe a significant difference in (stock level) volatility between the two sets of portfolios. As the length and breadth of the data history grows, we will be able to understand the nature of these returns with greater statistical satisfaction.

Outperformance is delivered over a long horizon

The key point to be made is that any outperformance is delivered over a long time horizon – perhaps several years or more.

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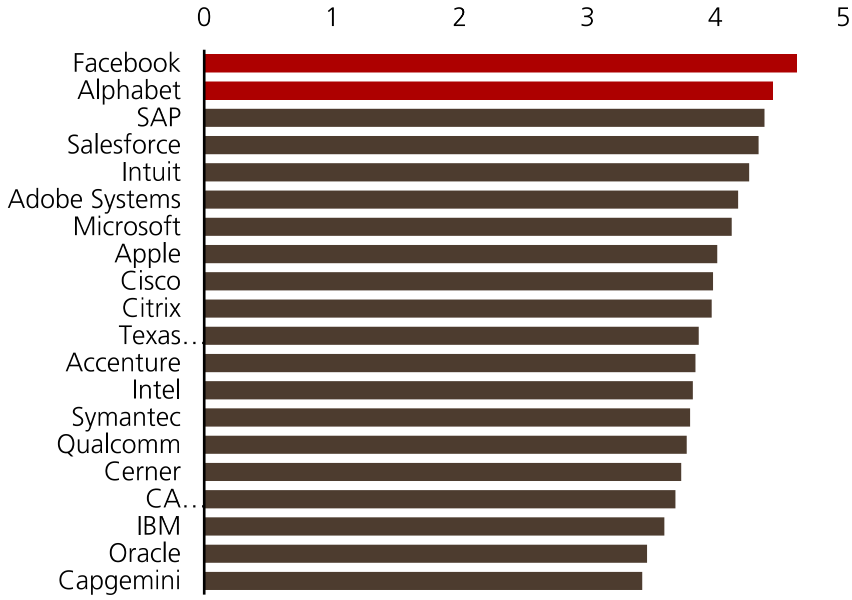
References and links to UBS research reports are included in the text.

Appendix A: Tech sector findings

We present some brief information related to Glassdoor scores in the tech sector. The competitive set used here was based on consultation with our analysts.

Facebook and Alphabet are leading companies within the set on the basis of job satisfaction (measured by Glassdoor overall scores).

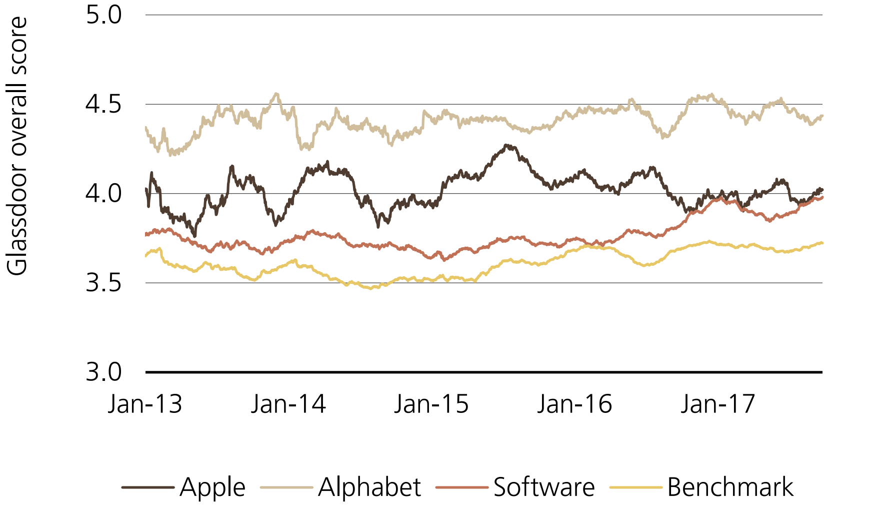
Figure 20: Overall satisfaction scores for select technology companies



Note: Scores sampled September 2017.
Source: UBS Evidence Lab, Glassdoor.

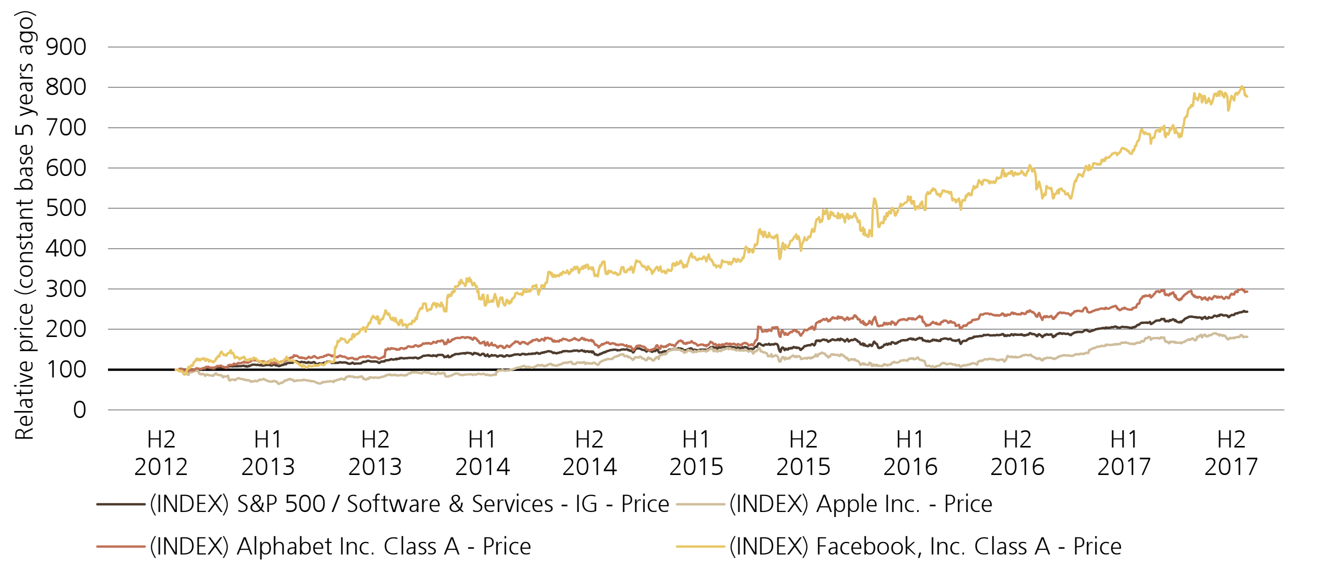
We focus on Apple and Alphabet in the time series charts below and compare them to the software and IT benchmarks. Figure 21 shows overall employee satisfaction, and Alphabet is consistently the clear leader. Apple also commands relatively high ratings but with more volatility. Both companies trend well ahead of the group aggregates. All time series charts use rolling 90-day aggregates. To give some perspective, in Figure 20 we show how the companies have performed over the past five years.

Figure 21: Time-series of overall Satisfaction scores since 2013



Source: UBS Evidence Lab, Glassdoor.

Figure 22: Relative price returns over five years for selected stocks

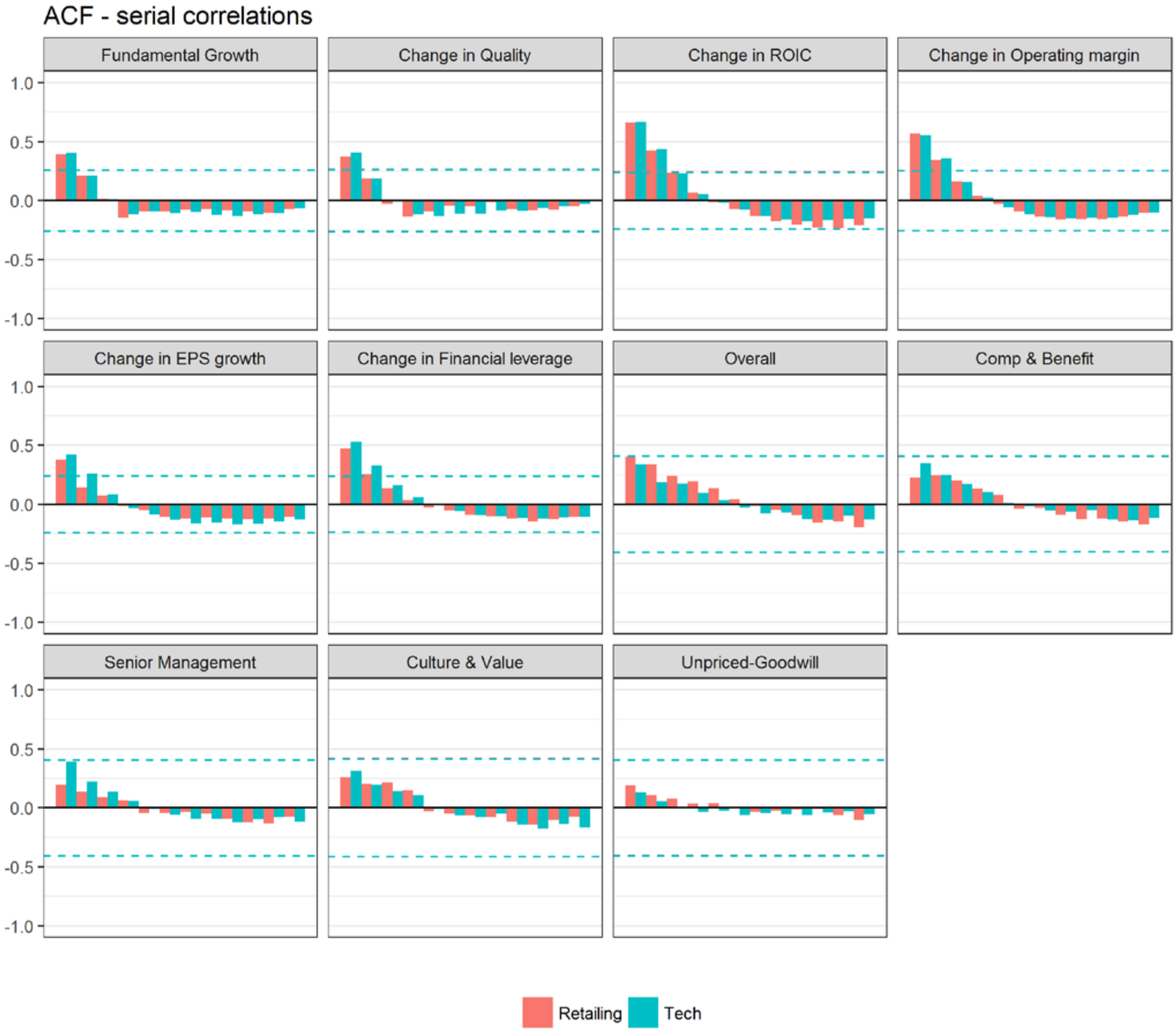


Source: FactSet.

Appendix B: Detailed data

The following charts show the serial correlation in the quant and Glassdoor scores used throughout this report. Glassdoor scores are quite 'sticky', and more so for the Culture & Value and Compensation scores, suggesting employees' views on these metrics are slow to change.

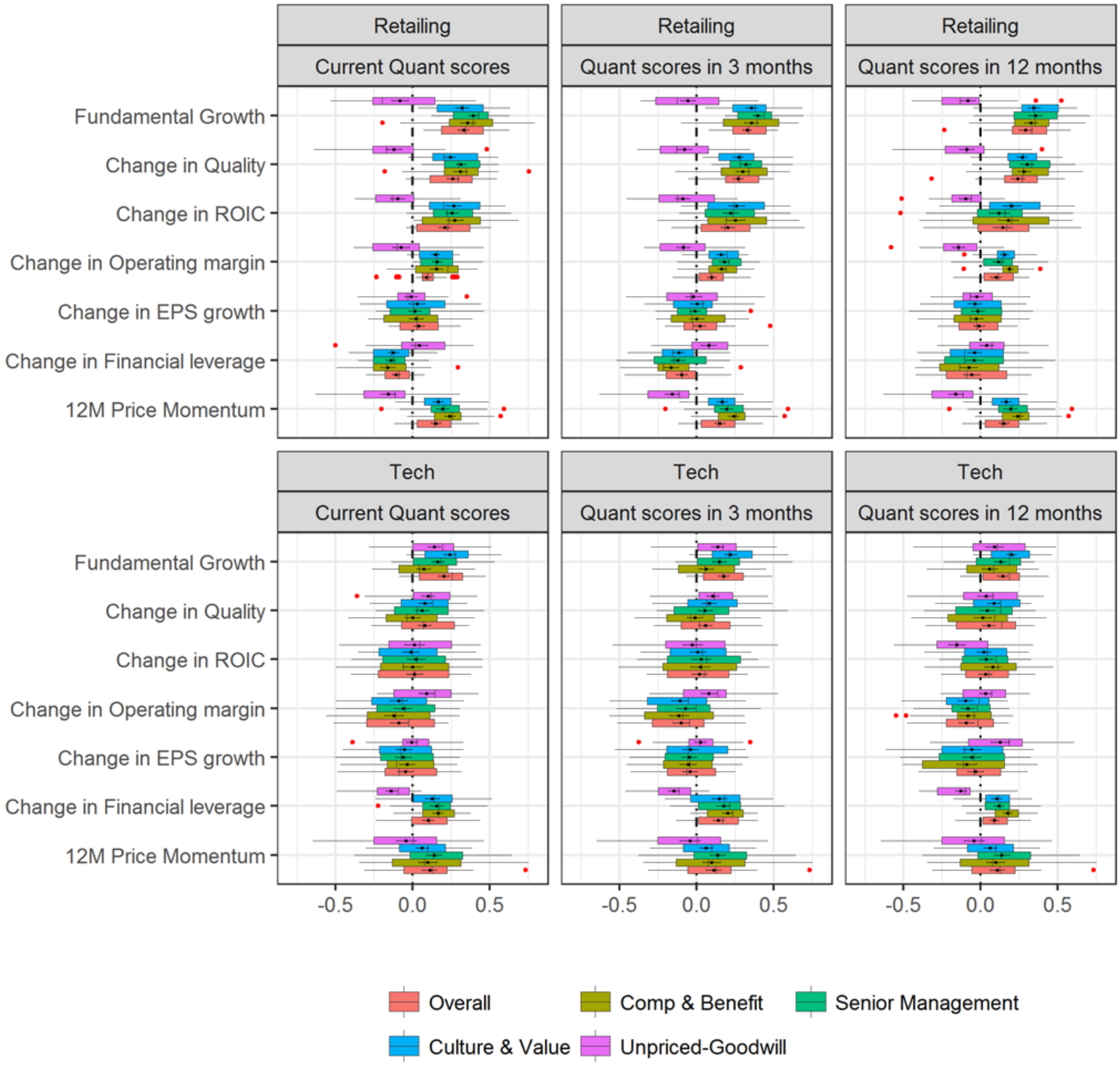
Figure 23: Quarterly serial correlation of Glassdoor and quant factors, reported via ACF test



Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor. ACF – auto-correlation is over a number of consecutive quarters.

The next chart shows the correlation of Glassdoor scores and current and future quant factors. Its main purpose is to support the point that the overall score carries much the same information as the detailed scores.

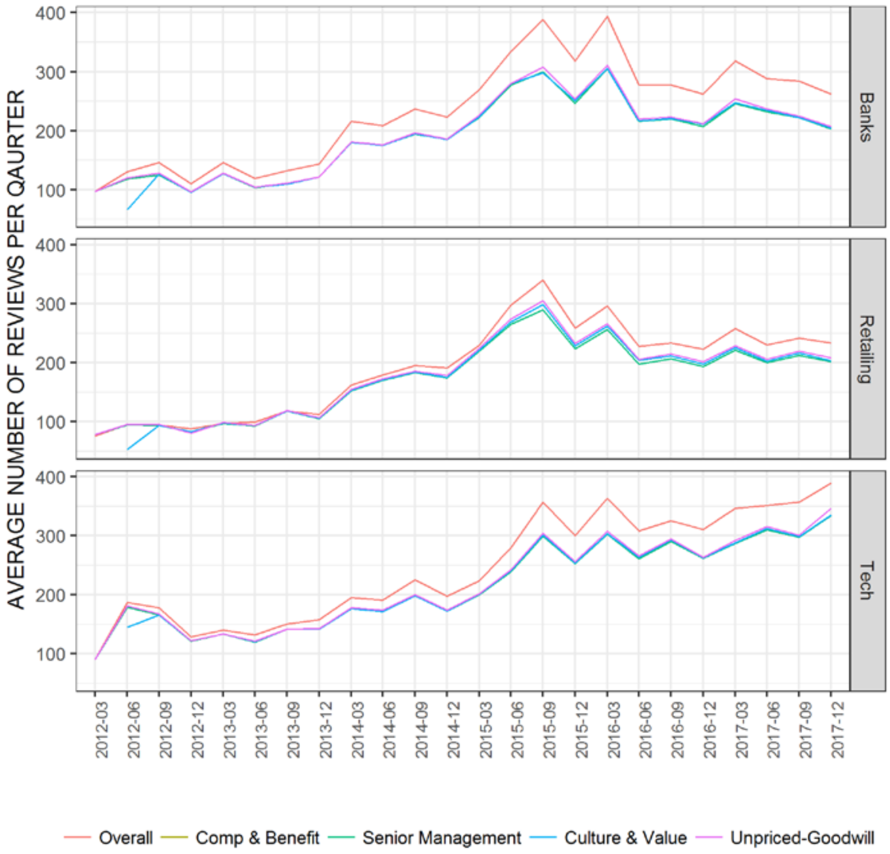
Figure 24: Correlation of Glassdoor detailed scores with current and future quant factors



Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

It is useful to see how the number of Glassdoor reviews has changed over time; clearly, the Glassdoor site has grown in popularity over the years, although has stabilised recently in certain sectors.

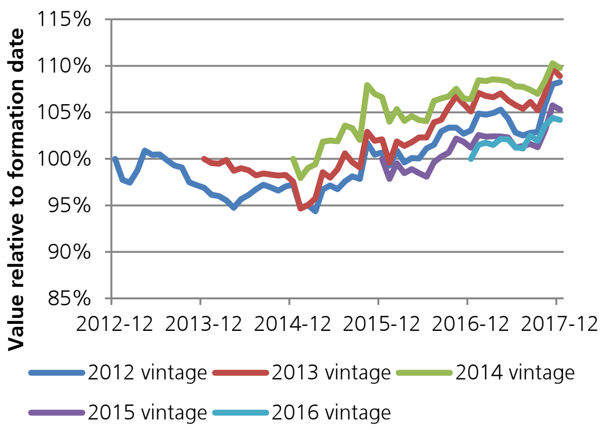
Figure 25: Number of Glassdoor scores per quarter, per sector



Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor.

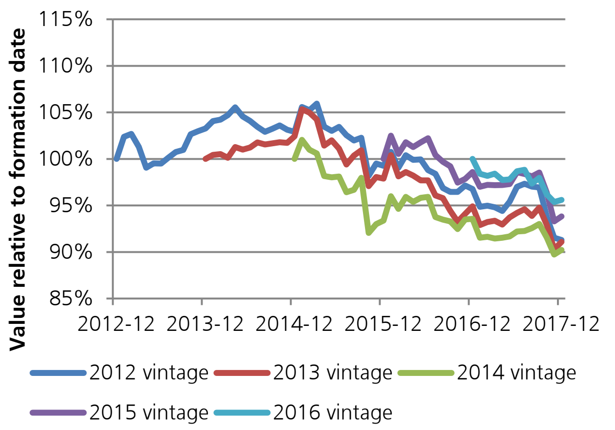
Much as with retailing, tech stocks with higher Glassdoor scores appear to outperform those with lower scores.

Figure 26: Returns to portfolios of tech stocks with higher Glassdoor overall scores



Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor. Portfolios are initially equally weighted then the weights move with size. Portfolio total returns in US Dollars.

Figure 27: Returns to portfolios of tech stocks with lower Glassdoor overall scores



Source: UBS Quantitative Database, UBS Evidence Lab, Glassdoor. Portfolios are initially equally weighted then the weights move with size. Portfolio total returns in US Dollars.

We have further considered the stability of correlations between the Glassdoor and quant scores over time, as average correlations only tell a part of the story. For the Quality and Growth change factors, the correlation is uniformly positive in retailing and generally positive in tech.

Figure 28: Time series of correlation between Glassdoor overall scores and future changes in quant scores

Source: UBS Quantitative Database, Glassdoor.

**UBS Evidence Lab provides our research analysts with rigorous primary research. The team conducts representative surveys of key sector decision-makers, mines the Internet, systematically collects observable data, and pulls information from other innovative sources. They apply a variety of advanced analytic techniques to derive insights from the data collected. This valuable resource supplies UBS analysts with differentiated information to support their forecasts and recommendations – in turn enhancing our ability to serve the needs of our clients.*

For this report, UBS Evidence Lab collected and processed a history of employee satisfaction data from the Glassdoor website from over 933,000 individual reviews. For our purposes, from these we created 7,300 quarterly stock-level scores, which we use for our analysis. The Glassdoor set includes scores in areas such as Compensation & Benefits, Culture & Values and views on Senior Management. While these are of varying interest depending on application, when comparing large pools of stocks we can overlook these and focus on the overall score, which gives much the same information.

Valuation Method and Risk Statement

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

Required Disclosures

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12-Month Rating	Definition	Coverage[1]	IB Services[2]
Buy	FSR is > 6% above the MRA.	46%	27%
Neutral	FSR is between -6% and 6% of the MRA.	39%	24%
Sell	FSR is > 6% below the MRA.	16%	13%
Short-Term Rating	**Definition**	**Coverage[3]**	**IB Services[4]**
Buy	Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.	<1%	<1%
Sell	Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.	<1%	<1%

Source: UBS. Rating allocations are as of 31 December 2017.
1:Percentage of companies under coverage globally within the 12-month rating category.
2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.
3:Percentage of companies under coverage globally within the Short-Term rating category.
4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

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Company Name	Reuters	12-month rating	Short-term rating	Price	Price date
Accenture[13, 16b]	ACN.N	Neutral	N/A	US$151.83	05 Feb 2018
Adobe Systems Inc[16b]	ADBE.O	Buy	N/A	US$190.27	05 Feb 2018
Alphabet Inc.[6b, 6c, 7, 16b, 22]	GOOG.O	Buy	N/A	US$1,055.80	05 Feb 2018
Amazon.com[16b, 22]	AMZN.O	Buy	N/A	US$1,390.00	05 Feb 2018
Apple Inc.[7, 16b]	AAPL.O	Buy	N/A	US$156.49	05 Feb 2018
Bed Bath & Beyond Inc.[16b]	BBBY.O	Neutral	N/A	US$20.52	05 Feb 2018
Capgemini	CAPP.PA	Buy	N/A	€103.30	05 Feb 2018
Cisco Systems Inc.[4, 6a, 6b, 7, 16b]	CSCO.O	Buy	N/A	US$38.78	05 Feb 2018
Cognizant Technology Solutions[4, 6b, 7, 16b]	CTSH.O	Neutral	N/A	US$73.29	05 Feb 2018
Costco Wholesale Corp[16b]	COST.O	Buy	N/A	US$182.77	05 Feb 2018
eBay[6b, 7, 16b]	EBAY.O	Buy	N/A	US$42.37	05 Feb 2018
Electronic Arts[4, 6b, 7, 16b]	EA.O	Buy	N/A	US$121.64	05 Feb 2018
EPAM Systems[16b, 18]	EPAM.N	Neutral	N/A	US$109.33	05 Feb 2018
Expedia[2, 4, 16b]	EXPE.O	Buy	N/A	US$125.05	05 Feb 2018
Facebook[16b, 22]	FB.O	Buy	N/A	US$181.26	05 Feb 2018
Fortinet Inc[13, 16b]	FTNT.O	Buy	N/A	US$43.83	05 Feb 2018
HCL Technologies	HCLT.BO	Neutral	N/A	Rs988.20	05 Feb 2018
Home Depot Inc.[16b]	HD.N	Buy	N/A	US$183.11	05 Feb 2018
IAC InterActive[16b]	IAC.O	Buy	N/A	US$140.24	05 Feb 2018
Inditex SA	ITX.MC	Buy	N/A	€27.37	05 Feb 2018
Intel Corp.[4, 6a, 6b, 6c, 7, 16b]	INTC.O	Buy	N/A	US$44.52	05 Feb 2018
International Business Machines Corp.[6c, 7, 16b]	IBM.N	Neutral	N/A	US$152.53	05 Feb 2018
Intuit Inc[16b]	INTU.O	Neutral	N/A	US$157.65	05 Feb 2018
Lenovo Group Ltd[16a]	0992.HK	Neutral	N/A	HK$4.28	05 Feb 2018
Lowe's Companies, Inc.[16b]	LOW.N	Buy	N/A	US$97.58	05 Feb 2018
Macy's Inc.[7, 16b]	M.N	Neutral	N/A	US$23.47	05 Feb 2018
Microsoft Corp.[4, 6a, 6b, 6c, 7, 16b]	MSFT.O	Buy	N/A	US$88.00	05 Feb 2018
NetApp Inc[16b]	NTAP.O	Buy	N/A	US$56.81	05 Feb 2018
Office Depot, Inc.[16b, 20]	ODP.O	Sell (CBE)	N/A	US$3.03	05 Feb 2018
Oracle Corporation[16b]	ORCL.N	Neutral	N/A	US$48.09	05 Feb 2018
Ross Stores[16b]	ROST.O	Neutral	N/A	US$76.90	05 Feb 2018
Salesforce.com Inc[16b]	CRM.N	Buy	N/A	US$107.65	05 Feb 2018
SAP[2, 7, 16b]	SAPG.DE	Neutral	N/A	€87.44	05 Feb 2018
Symantec Corp.[4, 16b]	SYMC.O	Neutral	N/A	US$26.79	05 Feb 2018
Tech Mahindra	TEML.BO	Sell	N/A	Rs629.20	05 Feb 2018
Tesco PLC[7]	TSCO.L	Buy	N/A	199p	05 Feb 2018
Tesla, Inc.[16b]	TSLA.O	Sell	N/A	US$333.13	05 Feb 2018
The Kroger Co[16b]	KR.N	Neutral	N/A	US$28.47	05 Feb 2018
The TJX Companies, Inc.[16b]	TJX.N	Buy	N/A	US$76.06	05 Feb 2018
Wal-Mart Stores[16b]	WMT.N	Neutral	N/A	US$100.09	05 Feb 2018
Williams-Sonoma, Inc.[16b]	WSM.N	Neutral	N/A	US$49.13	05 Feb 2018

Company Name	Reuters	12-month rating	Short-term rating	Price	Price date
Wipro Ltd.[16b]	WIPR.BO	Sell	N/A	Rs298.55	05 Feb 2018
Workday[16b]	WDAY.O	Sell	N/A	US$114.75	05 Feb 2018
Yahoo Japan[7]	4689.T	Buy	N/A	¥519	05 Feb 2018

Source: UBS. All prices as of local market close.
Ratings in this table are the most current published ratings prior to this report. They may be more recent than the stock pricing date

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