Valuations are challenging. Achieving precision is of course impossible, but even the roughest of estimates can be extremely hard to derive without resorting to conjecture. Tiny changes to inputs make dramatic differences to the end result and yet are unknowable to any degree of accuracy. More often than not the whole process becomes an exercise in indulging confirmation bias. And yet, conceptually, they're somehow still important. If no effort is made to divine an asset's intrinsic worth, then its owners are less investors and more speculators. Betting on the beauty contest. The challenge is to at least rationalise the valuation process. To impart structure to the task and to ask at a minimum, what might our companies be worth *if* our more qualitative assumptions can be credibly supported?

To put all this into perspective, this note began life as a presentation given at our annual client update towards the end of 2018. Markets were high and had yet to encounter December's volatility, so price and valuation were forefront of many people's minds. The intention then was to address a basic but important question: *Are our stocks expensive?* Given the Lindsell Train's Global Equity representative portfolio's performance over the years - which as of end-2018 had returned a nominal 17.4% pa since its launch in March 2011 vs. the MSCI World benchmark's 10.7%[1] - and given that its composition has barely changed (with only three outright sales and three buys since inception), it's a good question to ask.

To start answering this, here is a table listing some vital statistics for our portfolio, showing the weighted average PE, earnings yield, and dividend yield as they sit today. None of these make the portfolio look especially cheap, particularly when compared to the corresponding MSCI World Index figures shown beneath. 'Reassuringly expensive' perhaps, but this is unlikely to be of much comfort for the nervous investor.

Weighted Average	PE	Earnings Yield	Dividend Yield
Global Equity Representative Portfolio	24x	4.2%	1.8%
MSCI World Index	17x	6.2%	3.0%

PEs and yields calculated using last available trailing 12 month or FY dividends and earnings where available, with averages weighted according to current portfolio positions. Source Lindsell Train, MSCI & Bloomberg, with all data to end 2018.

But do these figures tell the whole story? Let's investigate a little further and see if we can't shed some light on how future returns might look given the above numbers. Many will accept as granted the idea that high PEs tend to correlate with low future returns[2]. But for additional precision, some go further and attempt to quantify this heuristic by taking the earnings yield (i.e. the inverse of the PE ratio) as an explicit proxy for long-term future returns. This, for example, forms the foundation of the popular 'Fed model' of equity valuation[3] and is an approach advocated by a number of academics, not least Jeremy Siegel, an influential scholar whose opinions we take seriously. To quote directly from his essential *Stocks for the Long Run* book: "Since earnings are the ultimate source of value, the earnings yield [...] should be the best long-term guide to the real return that the market provides shareholders."

[1]Source: Morningstar Direct. Past performance is not a guide to future performance.

[2]Sanjoy Basu was one of the first to rigorously document this with his 1981 Journal of Finance article *Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis,* though as far back as 1940, Graham and Dodd warned in their book *Security Analysis* that "People who habitually purchase common stocks at more than about 20 times their average earnings are likely to lose   considerable money in the long run."

[3]This asserts that as competing assets, when fairly valued, the earnings yield of the market should roughly equal that of a long-term treasury bond. The Fed model (as presented in Lander et al. 1997) has enjoyed periodic empirical success (notably the second half of the 20th century) but ultimately suffers from a number of theoretical inconsistencies; not least the 'money illusion' comparison of a real equity yield with a nominal figure from bonds.

On this basis the market's projected return, from its yield, would be just over 6%. This is almost exactly in line with Siegel's calculations for the very long-term returns generated by equity markets in the past - which for the S&P500 averaged a real 6.5% pa between 1871 and 2012, during which time the median US earnings yield was an elegantly similar 6.7%. The coincidence of these figures clearly lends credibility to the idea that earnings yields have some predictive power.

What then does this imply about our portfolio? Well at just over 4%, if this really is our future total return then frankly, you might be better off buying the index.

But there's an important caveat that underpins this direct use of the PE or earnings yield. For it to approximate the future return of a company, index or, indeed fund, the internal rates of return earned by these entities must eventually normalise. In other words, any excess returns to equity must trend towards the prevailing reinvestment or discount rate[4]. Basically they need to average out.

That might sound unrealistic, but for lengthy periods of the market's history it's actually been quite a sensible default assumption. Capitalism, potent force that it is, is forever seeking ways to erode excess returns and as a result, outliers don't tend to last long. Reversion to mean is commonplace and high margins, high returns to equity and high growth rates really are hard to sustain. The 'average' company - the cornerstone around which indices are constructed - typically does see any excess returns competed away, explaining why the earnings yield of the market has been a decent predictor of returns. But importantly, we don't think this is a valid assumption for the exceptional companies that we invest in. Because in the long run we do expect them to maintain excess returns.

Below is a second table of figures (again comparing our portfolio to the index) to offer support for this last claim. As you can see the weighted average (nominal) ROE of our investee companies is currently well above the wider index average, just as it's well above most estimates of the prevailing or historic earnings reinvestment rate. Fortunately when we look back at the histories of our companies - as suggested by the 20 year average ROE figure in the table - we see that this current high ROE has also been sustained for decades. It is important to emphasise that this 20 year figure (representing the period between 1998 and 2017) is an artificial construct, derived by applying the current portfolio holdings and weightings to the historical ROE figures for each company. Our intention is to show that the companies we currently own have, thus far, done an unusually good job, for an unusually long time, of protecting their unusually high returns, and find this the simplest way to express this in a single figure. But please do take it with a healthy pinch of salt. We're alert to the potential misdiagnoses that data mining can effect (as James O'Shaughnessy so wonderfully puts it in his classic *What Works on Wall Street* "If you torture the data enough, they will confess to anything.") and have discussed this issue more fully in our previous note *Great Expectations.*

Weighted Average	ROE	20yr Average ROE	Earnings Retention	20yr Average Dividend Growth
Global Equity Representative Portfolio	**22%**	**19%**	**58%**	**12%**
MSCI World Index	12%	11%	50%	6%

Return on Equity is calculated as the ratio of FY net profits to common equity. The 20 year average figures represent historic nominal ROE and per share dividend growth data for the individual holdings in the Lindsell Train Global Equity strategy, arithmetically averaged across the period (where available) and again weighted according to end 2018 portfolio positions. **As a result, the figures aren't representative of the strategy's actual historic ROE or dividend growth** (those figures are presented on the graph below and in our 2019 note *Great Expectations*) **and are provided for information only.** For consistency the MSCI growth figure is also presented as an arithmetic adjusted average, though not wholly different to the geometric figure (i.e. 6.3% vs. 5.5%). Source Lindsell Train, MSCI & Bloomberg, with all data to end 2018.

[4]The mathematical rationale for this is as follows: The Gordon growth dividend discount model gives the rate of return *r,* as the combination of the dividend yield and rate of dividend growth, which in turn is given by the return on equity or *ROE* multiplied by 1-minus the dividend payout rate *PR*. If the dividend yield is expressed in terms of the earnings *E* multiplied by the payout rate divided by price *P*, then the total return will be given by the following equation: $r = E(PR)/P + ROE(1-PR)$. If (and only if) we assume that all earnings can be reinvested at the expected rate of return then the ROE will approximate *r* and can be cancelled from both sides of the equation, leaving the expected return as the ratio of earnings to price, i.e. the earnings yield. If we can't make this assumption then (unless all earnings are always paid out) the ROE remains an Important variable in the equation. Thomas Philips' 1999 Journal of Portfolio Management article; *Why do valuation ratios forecast long-run equity returns?* provides a thorough run through of this argument. Of course, the Gordon model makes a number of potentially unrealistic assumptions (such as constant growth and payout rates) which should be kept in mind during the following

Nevertheless, lastingly above-average rates of return, assuming they really exist, make a real difference to future prospects. At high rates (i.e. above the discount rate) of return, the reinvestment of earnings leads to profitable, value creating growth; growth of earnings and growth of dividends. Trying to find companies that can do this, sustainably, for long periods of time is central to our investment approach. Technically speaking, the formula for this growth is simply the ROE multiplied by the ratio of retained earnings, and as you can see above, the 58% reinvestment rate of our companies multiplied by their past average ROE, gets us fairly close to their historic dividend growth over the past 20 years, which has averaged roughly 12% pa - double that of the index.

So if we are invested in companies whose internal rates of return don't regress to some grand mean, then we will need a different estimator of future returns - the earnings yield won't work. We can instead return to the standard dividend discount model that states simply that expected returns should be a combination of the reinvested dividend yield (i.e. the component that reflects valuation) and its growth. Given the numbers from the above tables, we might then expect the growth component (c.11%, assuming that this really is sustainable into the future) to dominate over the current more modest yield (1.8%) for our portfolio in the future.

This lessens the relevance of the starting valuation and is essentially us benefiting directly from our companies' underlying ability to compound. So, even if we start with a high PE, and by extension a low earnings or dividend yield, returns could still look pretty respectable. Clearly this is at best a rough guide (we have little faith in any precise predictions) but it's a way to think about, and underline the importance we place on, the ability of our companies to compound earnings. Compound being the operative word.

This analysis also chimes nicely with our Global Equity representative portfolio's performance up until now. If we dissect the 17.4% pa nominal return we can show it's also been driven largely by historic dividend growth, with only modest help from multiple expansion. When we started the portfolio in 2011, the weighted average PE was around 18x (vs. 14x for the MSCI World), so whilst it has risen over the subsequent seven years to 24x, this annualises at a contribution of 'just' 4% pa (vs. a 2% pa contribution from PE expansion for the index), so not nothing, but far from the entirety of our performance or even outperformance. Instead, dividends (with a yield of c.2% in 2011) and more importantly dividend growth (which when weighted each year and then arithmetically averaged has been 10% pa over the period) have driven our real returns. Though too short a time span to really draw any conclusions, the 5.5% (real) starting earnings yield hasn't so far done a good job of predicting returns.

But there are some big assumptions to address here. Firstly, as noted, the historic ROE growth of our companies needs to be sustainable. So our ability to select those that can preserve their high returns becomes critical. This is why we try to concentrate our portfolios around only the best we can find, but there's nothing guaranteed about our success here. If ROEs for our companies do fall (even temporarily) then the price can quickly follow suit as so much is expected of them.

Unfortunately, there's then also a second condition: that even if we do find companies where high ROEs are sustainable, other investors may disagree, and may come to penalise the shares for any perceived uncertainty, bidding down the price and causing future PEs to fall. This, over any finite holding period, could lead to a depreciation of capital that would hit total returns. Put another way, if when we started the portfolio valuations were much lower than today, and if rerating had been the main driver of returns then even with underlying compounding, you might rightly fear for the sustainability of our current high (relative to the market anyway) weighted average PE of 24. If this topples back to some more 'normal' level - as well it might - it will clearly dent returns.

However, we can model this, and show that, within a reasonable range, multiple compression needn't necessarily obliviate outperformance. The calculation is slightly complicated, as to determine the impact on total returns from a falling multiple we need not only to attenuate capital appreciation but also to deal with the reinvestment of dividends at changing prices, but it can be done iteratively (as discussed in our 2016 note *Re-evaluating Valuations*). The table below presents the results, showing, on the top line a modelled fund matching the starting stats of ours today, with the second line illustrating the same thing for a lower ROE example - here we've used the market's 20 year average 11%.

To summarise: If we assume that the past average ROE of our companies holds steady, and we project this forward another 20 years (two decades being a long time, but given our to-date Global Equity representative account's turnover figure of <5% pa

this is plausibly the sort of time horizon we're aiming for), then even if the average PE starts at 24 as it is today and falls to, for example, the market's current level of 17x, then *theoretical* returns over that period would still top 13% pa. This compares rather favourably to the projected results from the lower ROE example even if there, there's no attenuation to the earnings multiple. And indeed it also stacks up pretty well compared to any estimates of return based on the (real) earnings yield figure from the very first table.

ROE	Starting Dividend Yield	Starting PE	Ending PE	Projected 20 Year Return
22%	1.8%	24x	17x	+13.1% pa
11%	3.0%	17x	17x	+8.6% pa

Projected 20 year returns based on given constant ROEs, and PE changes as detailed. The example above is designed to illustrate a mathematical concept and does not reflect the current or future performance of the LT Global Equity strategy. The projected return calculation assumes ROEs are sustained for 20 years, that the PE falls from 24x to 17x (or is held at 17x for the 11% ROE example) and that 58% of earnings are reinvested (50% for 11% ROE example) at the same rates of return, with the rest paid out as dividends and used to buy more shares. Figures based on own assumptions, calculations, methodology and estimates.

We can then work back to show that if 'all' we ask of our theoretical fund is that it perform in-line with our modelled market's 8.6%[5], then under the same assumptions, we could back calculate and justify a true, warranted starting PE (i.e. the fair valuation) of as much as 46x - which is almost double the current level. If you only remember one thing from this note, then this justification for paying PE multiples in the thirties, forties and above for great companies should probably be it.
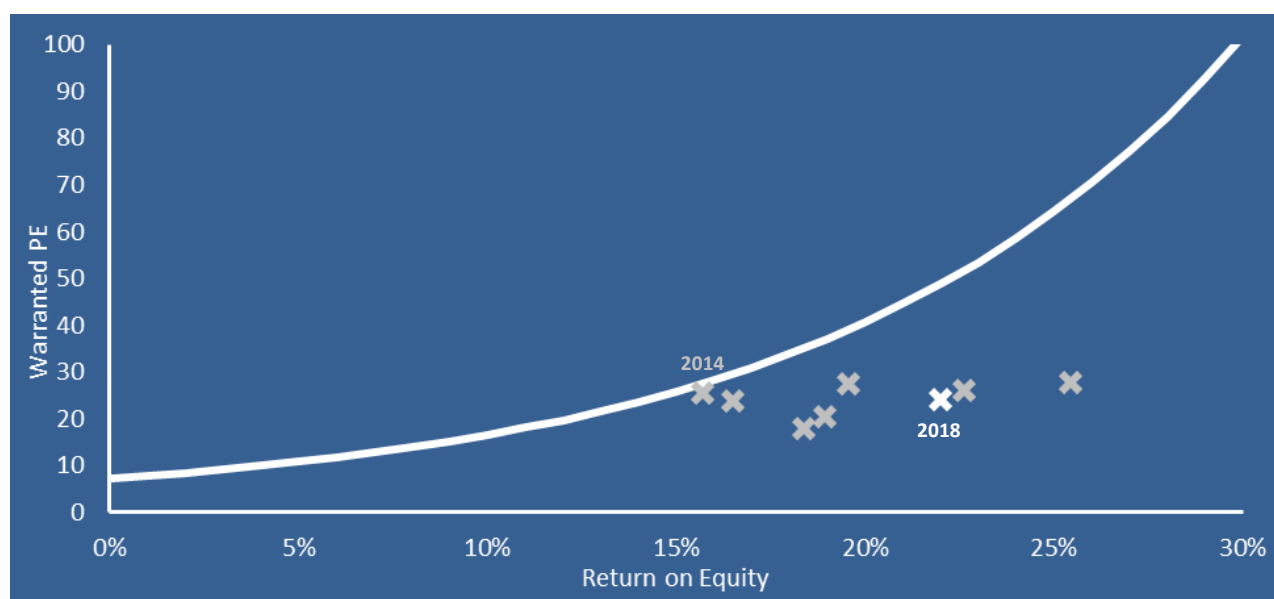

Fig. 1: Valuation chart showing warranted starting PEs for any given 20 year ROE figure. As for the prior table, warranted PE calculations assume ROEs are sustained for 20 years, that the PE falls or rises to reach 17x by year 20, that 58% of earnings are reinvested at the same rates of return and that the modelled period's performance at least matches the lower ROE illustration from that table. Figures based on own assumptions, calculations, methodology and estimates. The plotted portfolio data are weighted averages calculated as above for each year since the Fund began in 2011, with the 2014/2018 data points in grey/white and labelled. Source: Lindsell Train & Bloomberg, with all data to end 2018 where relevant.

We can actually run these calculations for a whole set of ROEs to compute warranted starting PE valuations for each, again using our modelled index's projected return as our discount rate. If we plot these warranted valuations then we effectively build out a valuation tool whereby warranted PEs can be read from the chart for any given projected, constant ROE. The curve

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[5]The eagle eyed might notice that market ROEs are currently a little way above the historic reinvestment rate, meaning that the initially discussed earnings yield approximation may not always hold, even for the 'average' stocks modelled here. How transitory this is remains to be seen. Of course the market's cost of equity could also have shifted up (as perhaps hinted by our higher than historic projected return), though given the concerns voiced over current prices, the more consensual view would probably say that, if anything, it has fallen.

on the graph in Fig. 1 illustrates this. I've then added a data point (in white and labelled '2018') to show our Global Equity representative portfolio as it sits today, with its weighted average PE of 24x and ROE of 22%. Happily, it sits well below the warranted valuation line, implying that as above, in theory at least, there's still plenty of upside on a 20 year view. As the representative portfolio is now approaching eight years old we can also see how this picture looked in the past and I've plotted (in grey) the weighted average ROEs vs. PEs for the portfolio for each year of its life up until now. As today, the portfolio has only once troubled our valuation line and has never been meaningfully above it. Note that year-on-year drops in the weighted average ROE (2014, as labelled, being the lowest) have done more to shift us closer to the line than jumps in the PE. These are the changes to watch out for.

But perhaps this is all getting a bit theoretical. In the messy real world, does it really make any sense to project ROEs 20 years into the future? Or to say that 'boring', staple companies like Diageo, Heineken or Unilever (the three biggest holdings in the Global Equity representative portfolio today) should trade on multiples approaching 30 or 40x earnings?

Well, for a final flourish, and to try and anchor the theory to reality, let's take a look at actual valuations paid for actual businesses similar to the ones we own. Here then are a few, hopefully relevant data points showing some big recent deals, at PE multiples that actually do approach the levels we've just discussed: for example Jim Beam was taken over by Suntory in 2014 for $14bn or an earnings multiple of 38x, whilst (bigger and better) Diageo currently trades on 23x. SABMiller was taken over by ABI in 2016 for $112bn or an earnings multiple of 41x, whilst Heineken trades on 21x. And Mead Johnson was taken over by Reckitt Benckiser in 2017 for $17bn or an earnings multiple of 31x, whilst Unilever trades on 21x. These were multi-billion dollar deals, done by serious people valuing the cashflows of their targets, and not we assume undertaken lightly.

Of course all this valuation work is wholly dependent on the sustainability of high returns and our real work begins with finding the rare companies that we think can meet this key criterion. This though has been an attempt to share with you at least some of the intellectual framework used when approaching the challenge of valuation.

James Bullock, Portfolio Manager

Lindsell Train Ltd

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Sources: Lindsell Train & Bloomberg

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