

What Test Cricket Can Teach Us About Valuation & Long-Term Investing



AIM

One of the questions long-term investors are frequently confronted with is ‘how much can I safely pay up to own a high-quality, fast-growing business?’

The challenge often does not lie in identifying ‘quality’ – in many cases, that can be readily perceived and measured financially. The difficulty lies in understanding whether the current price quoted by the market already reflects the inherent quality and future growth prospects of a business. If it does, then it logically follows that paying the current price will not lead to superior long-term results, as all the *future* ‘good news’ (for example, several years of estimated growth) is already capitalised in the price quoted *today*.

One of the best ways to tackle this thorny problem is to attempt to understand what market expectations are embedded in the current market price. By inverting the analytical focus (from ‘what do I think will happen?’ to ‘what needs to happen for the current price to be justified?’), it allows the investor to identify the key value drivers of a business and apply a reasonability test to each.

A Simplified Example: Snowflake Inc.

One of the hottest software stocks to list in 2020 was Snowflake. Prior to its IPO, the business had already built a reputation as a trusted partner to their enterprise clients in providing a solution that (at its most basic level) helps large organisations to more efficiently manage and extract insights from their vast stores of data. The 'how' of their technology is what makes Snowflake a very compelling business, but it is beyond the scope of this note to delve into an in-depth explanation of structured, semi-structured and unstructured data, Snowflake's multi-cloud architecture (which provides both technical and strategic benefits to their clients), and how their solution improves on rival offerings. Suffice to say it is an incredibly fast-growing software company (revenues doubled in the financial year ended January 2021) that ticks many boxes in the 'high-quality' column.

Given its attractive characteristics, the market has rewarded the business with a very lofty valuation. After coming to market in September 2020 at \$120 per share (doubling to a closing price of \$245 per share on the first day of trading), it traded as high as \$429 in December before dropping back to its current price of around \$240 per share. To place that in context, the current market capitalisation (excluding diluted shares outstanding for simplicity) is around USD71bn (17 June 2021). Given that revenues for the trailing 12-month period ended 30 April 2021 (the most recently reported result) amounts to USD712mn, the stock trades on a beyond-eye-watering Price/Sales multiple of roughly 100x. Can this valuation possibly be justified? What would need to be true for this to be the case?

Helpfully, Snowflake recently held their first investor day as a public company, where management discussed the prospects of the business and provided long-term (as in, financial year 2029!) guidance, which we reproduce below:

Long-term Operating Model

	FY20	FY21	FY29 Target
Product Revenue	\$252M	\$554M	~\$10,00M
YOY Product Revenue Growth	164%	120%	~30%
Non-GAAP Product Gross Margin	63%	69%	~75%
% OF REVENUE			
Non-GAAP S&M Expenses	103%	63%	~40%
Non-GAAP R&D Expenses	34%	23%	~15%
Non-GAAP G&A Expenses	26%	17%	~10%
Non-GAAP Operating Income (Loss)	(105%)	(38%)	~10%
Non-GAAP Adjusted Free Cash Flow	(75%)	(12%)	~15%

Source: Snowflake Inc. Investor Day 2021 Presentation

The company is guiding towards USD10bn in revenue by the end of the FY29, still growing 30% year-over-year at that point. Importantly for our purposes are the non-GAAP operating and free cash flow margins being guided to: 10% and 15%, respectively. (To avoid labouring through a slew of accounting adjustments, we are not going to make any corrections for stock-based compensation, though we would recommend investors do so in a 'real' valuation).

Let us briefly consider both the margin and revenue growth targets for reasonability.

Margins

For an 'at-scale' cloud businesses, the margins guided to seem low. Indeed, management referred to '10%-plus operating margin and 15%-plus free cash flow margin'. When queried on their conservative margin guidance, management responded by saying 10% is a 'worst-case scenario'. In analysing the embedded expectations, we would be inclined to flex these assumptions higher.

Revenue growth

To grow revenues from USD554mn to USD10bn over the eight-year period running from 1 February 2021 to 31 January 2029 – an 18x increase – implies a compound annual growth rate of 43.6%. If accomplished, this would be an utterly astounding feat of sustained exponential growth. Given the valuation, the investment case for Snowflake depends to an extreme degree on this level of revenue growth materialising. The critical question is therefore 'how likely is it that this can be achieved'?

(For the reader wondering how Test cricket is relevant to any of this: your patience is about to be rewarded.)



Enter Base Rates

When evaluating any situation with an unknown outcome, most people tend to have a similar approach to predicting what will happen: understand the issue at hand, gather relevant information and evidence, apply experience and judgment, and come up with a forecast. Psychologists refer to this approach as taking the 'inside view'.

An alternative approach is to place less weight on what makes any particular situation unique, and to simply ask "what happened in previous comparable situations?" This method de-emphasises the subjective judgment of the inside view in favour of relying on statistical analysis – an approach called the 'outside view'.

You would be forgiven if all the above seems like theoretical gobbledygook, so let us make things slightly more practical with an example. Imagine the scenario: the Baggy Greens are playing the final test of an Ashes series. At lunch on day four, Australia declares, having set a second innings target of 450 runs for England to chase.

The question: how likely is it that England will win?

Our 'inside view' immediately (and naturally) kicks in: what is the strength of the English batting line up? Are the key batsmen in form? What about the key bowlers on the Australian team – are all of them fit and ready to bowl long spells? What is the condition of the pitch? Based on all these variables (and a not undeserved measure of national pride!) one might say we like the odds of Australia pulling off a rather easy victory.

The 'outside view' ignores the facts unique to the situation. Instead, we go to what statisticians would call the 'reference class' (in this case, the history of test cricket) and count how often a team chasing 400 or more has actually won.

(All the data below is sourced from ESPN's fantastic [CricInfo Stats page](#) – which has records going back to 1877! – and is accurate as of 17 June 2021.)

- There have been 2,424 test matches played for which CricInfo has reliable data.
- Of these test matches, the team batting second have been set a target of 400 runs or more on 321 occasions. (Since the other 2,103 matches did not involve a team chasing a target of 400 runs or more in the final innings, we can ignore them.)
- Of the 321 matches where a target of 400 or more was being chased, the batting team successfully mounted a 4th innings chase of a total equal to or greater than 400 runs on only 4 occasions (1.2%)

Interestingly, one of these four successful 400+ run-chases was accomplished by none other than the 'Invincibles' of the legendary 1948 Ashes series played in England, with Donald Bradman and Arthur Morris leading the pursuit on the final day of the fourth test match.

So, how likely is it that England can chase down 450 in the final innings to win? Based on the statistical analysis of the relevant reference class, **the base rate is 1.2%**, meaning the probability of an English victory in this case is (happily!) quite low.

As with cricket, there are base rates to be found in the world of business analysis and forecasting. Helpfully, Credit Suisse published [The Base Rate Book](#) (freely available to the public) in 2016. In it, the authors attempt to answer questions such as 'how likely is it that a business with a starting revenue of between USD2bn and USD3bn can compound revenues at a rate greater than 40% for 10 years?' To accomplish this, authors analysed the financial performance of thousands of companies from 1950 to 2015, and then presented the data in a useful series of tables, ready to be referenced.

Below is the base rate table for revenue growth of a business with starting revenues between USD700mn and USD1.25bn (which is where Snowflake is classified using its most recent trailing 12-month period as at the end of April 2021)

Revenue: \$0.7bn to \$1.25bn**Base Rates**

Revenue CAGR (%)	1YR	3YRS	5YRS	10YRS
< (25)	1.6%	0.4%	0.2%	0.2%
(25) — (20)	0.9%	0.3%	0.3%	0.1%
(20) — (15)	1.4%	0.8%	0.5%	0.2%
(15) — (10)	2.7%	1.8%	1.3%	0.8%
(10) — (5)	4.7%	3.5%	3.3%	2.2%
(5) — 0	10.2%	9.5%	8.8%	9.2%
0 — 5	19.5%	23.6%	26.6%	31.9%
5 — 10	18.3%	23.6%	26.6%	32.1%
10 — 15	12.3%	14.5%	15.3%	14.8%
15 — 20	7.9%	8.2%	7.3%	4.9%
20 — 25	5.2%	4.3%	4.2%	2.0%
25 — 30	3.1%	2.9%	2.3%	1.1%
30 — 35	2.8%	1.9%	1.0%	0.3%
35 — 40	1.8%	1.5%	1.0%	0.1%
40 — 45	1.4%	0.9%	0.4%	0.0%
> 45	6.1%	2.2%	0.9%	0.0%

Source: 'The Base Rate Book' By Mauboussin, Callahan and Majd (Credit Suisse, 2016)

As can be seen from the numbers highlighted, the base rate of a business compounding its revenues at rates of 35% or higher over a five-year period is **2.3%**; over ten years, history suggests the probability is vanishingly small (**0.1%**).

Pulling It Together

Readers that do not enjoy sweating the maths can resume at the Conclusion; for those interested in the detail, read on!

Having assessed the long-term revenue and margin guidance for reasonability, let us attempt to understand the market embedded expectations in the current valuation of ~USD71bn.

In the table below, we assume the business achieves its revenue guidance of USD10bn; we then flex the free cash flow margin to calculate a free cash flow forecast in FY29, and then place that on a free cash flow multiple to achieve a market value. For example, if we believe the business will achieve a 25% free cash flow margin on USD10bn of revenue, and this should be valued at a 30x free cash flow multiple, the math is (USD10,000 x 25% = USD2,500 x 30 = USD75,000, highlighted in red).

Value in FY29 (Revenue: \$10bn)		FCF Margin				
		10%	15%	20%	25%	30%
FCF Multiple	15	15,000	22,500	30,000	37,500	45,000
	20	20,000	30,000	40,000	50,000	60,000
	25	25,000	37,500	50,000	62,500	75,000
	30	30,000	45,000	60,000	75,000	90,000
	35	35,000	52,500	70,000	87,500	105,000
	40	40,000	60,000	80,000	100,000	120,000

Based on this analysis, it would imply the market is already implying a free cash flow margin well above the guided 15% (closer to 25%), with a healthy exit multiple (around 30x) since the business already trades at a market value around USD71bn. From this starting point, such a scenario implies a total return of roughly 5.6% over the next eight years (which translates to a lacklustre annual rate of return of 0.7%). Thus, if we take management at their word when guiding to USD10bn in revenue, the only way to generate a meaningful upside from the current valuation is to assume a very high terminal multiple combined with a high free cash flow margin.

The obvious follow-up question becomes ‘what happens if management is underestimating the opportunity, and they deliver revenue well more than the guided-to USD10bn’? Assuming revenue grows to USD15bn by FY29 and applying the same methodology as above, there are more combinations of terminal multiples and free cash flow margins that deliver a positive absolute return (highlighted in red in the table below). However, both the free cash flow margin and exit multiple still need to be robust to generate a meaningful return from the current starting point.

Value in FY29 (Revenue: \$15bn)		FCF Margin				
		10%	15%	20%	25%	30%
FCF Multiple	15	22,500	33,750	45,000	56,250	67,500
	20	30,000	45,000	60,000	75,000	90,000
	25	37,500	56,250	75,000	93,750	112,500
	30	45,000	67,500	90,000	112,500	135,000
	35	52,500	78,750	105,000	131,250	157,500
	40	60,000	90,000	120,000	150,000	180,000

The analysis above would seem to indicate that the current market value of the entire business (USD71bn) already embeds not only a free cash flow margin around 25% or more, but also a revenue assumption greater than the guided-to USD10bn. This is where a comparison to base rates is helpful: achieving USD10bn in revenue already requires a compound annual growth rate of 43.6% from FY21. Anything greater than this would need a commensurate uplift in sustained revenue growth. Based on an analysis of base rates, these outcomes should be seen as highly unlikely. In short, paying the current valuation requires a lot to go right, and virtually nothing to go wrong.

Conclusion

All the above appears like a long road to walk down only to arrive at the conclusion ‘the stock seems overvalued’ – and even then, Snowflake is an outlier in terms of valuation for cloud businesses as of June 2021. The point is not to comment on Snowflake in particular, but rather to provide a framework to evaluate embedded expectations by using a base rate assessment for high-growth businesses (similar to what we do when evaluating investment opportunities at AIM).

What might investors learn from this analysis?

1. Starting valuations matter, even when investing in faster growing opportunities. It is absolutely possible to overpay for a high-quality, high-growth business, and price agnostic investing usually does not end well.
2. Businesses requiring many years of sustained high revenue growth to justify the current valuation carry a lot of risk, as base rates suggest this is unlikely to materialise in the vast majority of cases.
 - a. The most frequent (and justified) pushback to this argument we hear is “but what about Amazon?” Indeed, Amazon is an outlier in having delivered an astounding twenty years’ worth of compound revenue growth of 28.0% since 2000. The base rate framework does not suggest it is impossible for a business to deliver such an outcome: merely that it should be properly understood for how extraordinary and rare it really is. In practical and statistical terms, Amazon is an extreme outlier.
 - b. Keep in mind that Amazon had a 90%-plus drawdown during the dotcom-crash and was ‘cheap’ on numerous occasions over the following twenty years. Even if you find a compounding machine like Amazon, you had to have the discipline to hang on through the many drawdowns it suffered. (That was the time to invest with a much greater margin of safety).
3. Balance in portfolio construction is important. Any portfolio might benefit from one or two hyper-growth businesses that can deliver an extremely positive outcome, but to have a portfolio filled only with businesses trading on such extreme valuations does not tend to end well.
 - a. US research firm Bernstein published a note in March 2021 in which they examined the long-term returns of businesses purchased at a Price/Sales multiple greater than 15x. The conclusion? Such stocks tended to underperform the market by roughly 34% on a three-year investment horizon.

Owning many businesses *all* trading on very elevated Price/Sales multiples introduces a meaningful amount of risk to a portfolio. An objective assessment of the relevant data suggests that perpetually high rates of revenue growth are generally not sustainable. This implies that the revenue growth required to justify the embedded expectations in high Price/Sales situations frequently do not materialise. As a good friend of the firm likes to remind us: “out of the dotcom bubble, there was only one Amazon.”

Rationally, one might respond by saying that ‘this time, it’s different’ (the inside view speaking) and objectively... we would agree! Things are different. Our economies are far more digitised in 2021 than in 1999/2000. Unlike then, the underlying infrastructure required to support internet-enabled business models is far more widely

developed and adopted. High valuations for technology businesses are not purely a function of low discount rates (although they have helped recently). Many of the most attractive businesses in this space operate with global scale and low requirements for incremental capital, meaning they could theoretically justify an extremely high valuation if their moats are strong enough to deter the competition from eroding their ability to grow revenues.

We are cognizant that the base rate analysis done by Credit Suisse covers the period from 1950 to 2015 and may not fully reflect the growth trajectory enabled by highly scalable business models reliant on intangible assets and enabled by network effects in a world that is not capital constrained. Happily, as we were this writing this note, the authors of the original Credit Suisse paper wrote a [follow-up](#) paper exploring the impact of exactly this phenomenon on historically observed base rates. Their conclusion:

Companies grow by generating a return on investment. The nature of investment has changed markedly in recent decades, from one dominated by tangible assets to one mostly in the form of intangible assets. Intangible assets have some characteristics that distinguish them from tangible assets, including greater potential economies of scale and higher risk of obsolescence. The good news is that intangible-intensive companies can grow faster than their tangible counterparts. The bad news is they can also become irrelevant and shrink fast.

This latter point is the key one: technology businesses today can potentially sustain high growth rates over longer time horizons due to the intangible nature of their capital base. However, the very nature of their intangible assets mean they run a high risk of technological obsolescence if a better solution is developed, leading to a precipitous decline in value. In statistical terms, the distribution of outcomes will be much wider.

Even if some things are different this time, we believe one thing that has not changed is human nature. Easy liquidity, rising markets and preference to extrapolate short-term growth at the expense of long-term industry competitive dynamics can (and will) lead to stocks being bid up well above any reasonable estimate of intrinsic value.

Based on a cursory assessment, it would seem that when excluding management and strategic investors, Snowflake's entire shareholder base turns over every 30 to 40 or so trading days. This is for a stock where the determinants of value lie nearly a decade in the future! In effect, traders are making short-term bets on outcomes that will not be knowable for years. To us, this seems like a poor risk/reward proposition to get involved in, as these participants may not want to sit out a prolonged drawdown if the fundamentals of the business disappoint relative to expectations.

To be clear, none of what we have written is meant to reflect poorly on Snowflake: we respect the business and the people behind it a lot. However, management and employees have little control over the price the market is willing to pay over the short term. At the right valuation, we would be happy buyers on behalf of our investors. The point is simply to say: if you buy it here, you had better be more than right on the destination in 2029!

This communication has been prepared by Aitken Investment Management Pty Ltd ABN 63 603 583 768, AFSL 473534. It is general information only and is not intended to provide you with financial advice or take into account your objectives, financial situation or needs. Past performance is not an indication of future performance. You should consider, with a financial adviser, whether the information is suitable for your circumstances. To the extent permitted by law, no liability is accepted for any loss or damage as a result of any reliance on this information. The product disclosure statement (PDS) for the AIM Global High Conviction Fund, issued by The Trust Company (RE Services) Limited, should be considered before deciding whether to acquire or hold units in the fund. The PDS can be obtained by calling 02 8379 3700 or visiting www.aimfunds.com.au. No company in the Perpetual Group (Perpetual Limited ABN 86 000 431 827 and its subsidiaries) guarantees the performance of any fund or the return of an investor's capital.