Equities: A Guide to Valuation

One of the most common - perhaps *the* most common - rationales for investing in an asset, and particularly an equity, is underpinned by the belief that the intrinsic value of the asset is greater than the price at which it can presently be purchased. While there is no knowing when – or even if – the market will recognise the mispricing, the strategy of buying an undervalued asset and waiting for its true value to be reflected in the market price – often termed value investing - has arguably been the most successful style of investing since it was theorised by Ben Graham and subsequently popularised by his student, Warren Buffet. While not as widespread, or indeed as successful, as it once was, value investing still forms the basis of many investment strategies today and the importance of its underlying principals should not be overlooked.

The value of an asset is often defined as the sum total of its discounted future cash flows. Perhaps the purest way of calculating this value is by performing a Discounted Cash Flow (DCF). For an equity, a DCF involves forecasting the free cash flows (FCF) of the company for a set time period of typically 5-10 years and applying a discount rate (due to the premise that the value of a pound received in five years is not the same as the value of a pound received today) to calculate their present values. The FCFs generated by the business after the forecast period are encompassed in the *terminal value* figure. In practice, this is calculated by applying an appropriate multiple to the final forecast period FCF and applying an appropriate discount rate in order to obtain its present value, while in academia the Gordon Growth Model is typically used, which values the FCF after the forecast period as a growing perpetuity.

An example of a simple DCF is provided below, using British American Tobacco (LSE:BATS) as an example.

	TODAY: 21-07-21					31-Dec-21 0.444	31-Dec-22 1.444	31-Dec-23 2.444	31-Dec-24 3.444	31-Dec-25 4.444	Terminal Value (multiple)	Terminal Value (GGM)
	Actuals					**Forecast Period**						
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2026
Revenue	£ 14,130.00	£ 19,564.00	£ 24,492.00	£ 25,877.00	£ 25,776.00	£ 26,807.04	£ 27,879.32	£ 28,994.49	£ 30,154.27	£ 31,360.45		
YoY Growth	-1%	38.5%	25.2%	5.7%	-0.4%	4.0%	4.0%	4.0%	4.0%	4.0%		
(-) COGS	£ 3,733.00	£ 5,033.00	£ 4,597.00	£ 4,461.00	£ 4,447.00	£ 4,759.24	£ 4,949.61	£ 5,147.60	£ 5,353.50	£ 5,567.64		
Gross profit	£ 10,397.00	£ 14,531.00	£ 19,895.00	£ 21,416.00	£ 21,329.00	£ 22,047.80	£ 22,929.71	£ 23,846.90	£ 24,800.77	£ 25,792.80		
Margin	73.6%	74.3%	81.2%	82.8%	82.7%	82.2%	82.2%	82.2%	82.2%	82.2%		
(-) Operating expenses	£ 5,141.00	£ 7,362.00	£ 9,863.00	£ 11,003.00	£ 10,007.00	£ 10,867.00	£ 11,301.68	£ 11,753.75	£ 12,223.90	£ 12,712.86		
EBIT	£ 5,256.00	£ 7,169.00	£ 10,032.00	£ 10,413.00	£ 11,322.00	£ 11,180.79	£ 11,628.02	£ 12,093.15	£ 12,576.87	£ 13,079.95		
Margin	37.2%	36.6%	41.0%	40.2%	43.9%	41.7%	41.7%	41.7%	41.7%	41.7%		
(-) Tax @ ETR	£ 1,182.60	£ 1,765.37	£ 2,568.19	£ 2,717.79	£ 2,751.25	£ 2,753.27	£ 2,863.40	£ 2,977.94	£ 3,097.05	£ 3,220.94		
(+) D&A	£ 494.00	£ 723.00	£ 800.00	£ 994.00	£ 985.00	£ 890.01	£ 925.61	£ 962.63	£ 1,001.14	£ 1,041.19		
(-) CapEx	£ 586.00	£ 791.00	£ 758.00	£ 664.00	£ 511.00	£ 785.80	£ 817.24	£ 849.93	£ 883.92	£ 919.28		
(+) Sale of PP&E	£ 93.00	£ 95.00	£ 38.00	£ 34.00	£ 44.00	£ 38.67	£ 38.89	£ 40.52	£ 39.36	£ 39.59		
(-) Increases in NWC	£ 1,918.00	£ 801.00	-£ 2,108.00	£ 539.00	-£ 239.00	£ 1,673.90	£ 288.68	£ 300.22	£ 312.23	£ 324.72		
Unlevered Free Cash Flow	£ 2,156.40	£ 4,629.63	£ 9,651.81	£ 7,520.21	£ 9,327.75	£ 6,896.50	£ 8,623.21	£ 8,968.21	£ 9,324.16	£ 9,695.78	£ 14,121.13	£ 9,918.79
Discount Factor						0.9585	0.8714	0.7922	0.7202	0.6547	£ 119,182.36	£ 128,815.41
Present Value						£ 6,610.46	£ 7,514.15	£ 7,104.34	£ 6,714.83	£ 6,347.69	£ 78,026.92	£ 84,333.54

BATS operates in an industry which benefits from a high level of repeat revenue due to the nature of nicotine addiction. Their products are also non-discretionary and thus sales are largely insensitive to the economic environment. Following a period of relative stagnation between 2009 and 2015, BATS grew revenue at a CAGR of 16.2% in the five years between 2016 and 2020. Gross margins reached a record high of 82.8% in 2019, while EBIT margins also increased over the period. Despite this, an increasing focus on issues relating to environmental, social and governance (ESG) in recent years has contributed to BATS' share price underperformance. The stock currently trades at the same price it did in November 2011 and its price-to-earnings ratio of 10 is far below its average of 19 since listing in August 1998.

DCF requires a number of assumptions to be made regarding the future operations of the company and analysing previous performance is an important – though not imperative – element of estimating future performance. If we assume that BATS' revenue growth will normalise to 4% per annum over the next five years and the company will achieve a gross profit margin and operating profit margin in line with its fairly stable three-year averages, we can forecast earnings before interest and tax (EBIT) through to 2025. BATS has had an effective tax rate averaging 24.6% over the last five years. Assuming this remains unchanged, this can be used to forecast BATS' tax payments, too.

Given that depreciation and amortisation (D&A) are non-cash expenses and are subtracted to calculate operating income, they must be added back after deducting cash taxes to derive FCF. Conversely, investments in property, plant & equipment (CapEx) which add to the assets of the business are not directly expensed on the income statement but rather are depreciated away (as an operating expense) over the assets' useful lives. Since investments made during any given year do in fact represent cash outflows, CapEx for the year should be deducted when calculating FCF. There are more sophisticated ways of forecasting CapeEx and D&A, although for simplicity we can use a historic average of BATS' Sales/CapEx ratio to forecast CapEx and then apply a historic average of the CapEx/D&A ratio (i.e., how much BATS re-invests for every unit of depreciation) to calculate BATS' depreciation and amortisation expense going forward. While these ratios have not been particularly stable in recent years, it is a reasonable assumption that they will mean revert after a period of volatility. BATS has also regularly sold property, plant & equipment, which represents a cash inflow. We can assume that this trend will continue for the next five years and thus forecast proceeds from the sale of PP&E based on a 3-year moving average of historic figures.

The final metric required to calculate FCF is changes in working capital – that is, changes in the amount of capital required to run to the business on a day-to-day basis. Once again, there are several more complex methods of forecasting this figure although for the purposes of this article, we can use historic average of inventory, payable and receivables days, as well as cash, to forecast the amount of working capital BATS is likely to invest in the business.

Working Capital Schedule

Assumptions	
No. Days	365
Inventory days	492
Payables days	232
Receivables days	52
Cash	2877.00

	2015	Actuals 2016	2017	2018	2019	2020	Forecast 2021	2022	2023	2024	2025
Revenue		£14,130.00	£19,564.00	£24,492.00	£25,877.00	£25,776.00	£26,807.04	£27,879.32	£28,994.49	£30,154.27	£31,360.45
COGS		£3,733.00	£5,033.00	£4,597.00	£4,461.00	£4,447.00	£4,759.24	£4,949.61	£5,147.60	£5,353.50	£5,567.64
Opening Net Working Capital		£7,509.00	£9,427.00	£10,228.00	£8,120.00	£8,659.00	£8,420.00	£10,093.90	£10,382.57	£10,682.80	£10,995.03
Closing Net Working Capital	£7,509.00	£9,427.00	£10,228.00	£8,120.00	£8,659.00	£8,420.00	£10,093.90	£10,382.57	£10,682.80	£10,995.03	£11,319.75
Changes in NWC		£1,918.00	£801.00	-£2,108.00	£539.00	-£239.00	£1,673.90	£288.68	£300.22	£312.23	£324.72
Cash	£1,963.00	£2,219.00	£3,356.00	£2,780.00	£2,649.00	£3,381.00	£2,877.00	£2,877.00	£2,877.00	£2,877.00	£2,877.00
Inventory	£4,247.00	£5,793.00	£5,864.00	£6,029.00	£6,094.00	£5,998.00	£6,418.59	£6,675.33	£6,942.35	£7,220.04	£7,508.84
Accounts Receivable	£2,355.00	£2,696.00	£3,306.00	£2,868.00	£3,369.00	£2,763.00	£3,829.49	£3,982.66	£4,141.97	£4,307.65	£4,479.96
Current Assets	£8,565.00	£10,708.00	£12,526.00	£11,677.00	£12,112.00	£12,142.00	£13,125.08	£13,535.00	£13,961.32	£14,404.69	£14,865.80
Accounts Payable	£1,056.00	£1,281.00	£2,298.00	£3,557.00	£3,453.00	£3,722.00	£3,031.18	£3,152.43	£3,278.52	£3,409.66	£3,546.05
Current Liabilities	£1,056.00	£1,281.00	£2,298.00	£3,557.00	£3,453.00	£3,722.00	£3,031.18	£3,152.43	£3,278.52	£3,409.66	£3,546.05
Net Working Capital	£7,509.00	£9,427.00	£10,228.00	£8,120.00	£8,659.00	£8,420.00	£10,093.90	£10,382.57	£10,682.80	£10,995.03	£11,319.75
Inventory days		566.42	425.27	478.70	498.61	492.30	492.26	492.26	492.26	492.26	492.26
Payables days		125.25	166.65	282.42	282.53	305.49	232.47	232.47	232.47	232.47	232.47
Receivables days		69.64	61.68	42.74	47.52	39.13	52.14	52.14	52.14	52.14	52.14

Between 2016 and 2020, BATS had an average cash balance of £2,877. Its inventory days (the average number of days BATS held inventory before selling it) averaged 492, while its payables days (the average number of days it took BATS to pay its suppliers) and receivables days (the average number of days it took customers to pay BATS) were 232 and 52, respectively. Using that information and applying it to forecasted revenue and COGS, we can forecast current assets and current liabilities, thereby calculating working capital. An increase (decrease) in working capital from one year to the next indicates more (less) capital is required to run the business on a day-to-day basis, which subsequently reduces (increases) the FCF generated by the business, all else being equal.

With changes in net working capital calculated, we're now in a position to forecast FCF for the next five years. Given that we haven't deducted interest expense, this version of FCF represents the cash flows available to all of BATS' capital providers. This version of FCF is also known as free cash flow to the firm (FCFF) or unlevered FCF.

As previously mentioned, one can use the multiples approach or the GGM to calculate the terminal value. Taking the GGM as an example, we apply a long-term growth rate – that is, the rate at which we expect BATS to grow at ad infinitum – to the FCF in 2025 to calculate 2026 FCF. Then, we divide this figure by the weighted average cost of capital (WACC), which represents the rate of return required, on average, by BATS' capital providers. One can use the CAPM to derive the cost of equity and add the rate of interest on BATS' debt to calculate the WACC, however for simplicity, a rate of 10% seems appropriate and sufficiently high to compensate for BATS' financial and business risks. Since we believe that BATS will continue to grow its FCF every year, we subtract long-term growth rate from the WACC.

$$TV = \frac{FCF_{2026}}{WACC - r_{LT}} = \frac{£9,919}{10\% - 2.3\%}$$

This gives us the terminal value at 2025 of £128,815m. It is important to note that the valuation is particularly sensitive to the long-term growth rate and therefore this figure should be chosen carefully. It is typical for this value to be set equal to the rate of GDP growth in the economy, otherwise eventually the value of the company would exceed that of the economy, which is unrealistic. UK GDP growth has averaged just under 2.5% on an annual basis over the last 60 years, so that seems a reasonable rate to select. To discount the projected FCFs back to present value, we divide them by the WACC raised to the number (or fraction, in this case) of years hence the FCFs will fall. Summing the discounted terminal value and the FCFs between 2021 and 2025 gives us a total enterprise value for BATS of £118,719m. Subtracting net debt, preferred equity and minority interest yields an equity value of £77,760m and thus a share price of £33.98 – roughly 19% above its current price of £28.47.

Market Value		
Enterprise Value (m)	£	106,114.70
(-) Debt	£	43,968.00
(+) Cash	£	3,381.00
(-) Minority Interest	£	282.00
(-) Preferred Equity	£	90.00
Equity Value	£	65,155.70
No. shares outstanding		2288.6
Share price	£	28.47
PE		10.2x
Intrinsic Value		
Enterprise Value (m)	£	118,719.26
(-) Debt	£	43,968.00
(+) Cash	£	3,381.00
(-) Minority Interest	£	282.00
(-) Preferred Equity	£	90.00
Equity Value	£	77,760.26
No. shares outstanding		2288.6
Share price	£	33.98
Implied PE		12.2x
+/- current share price		19.3%

Notably, just under 60% of BATS' estimated intrinsic value is derived from the FCF it will generate after the forecast period. Therefore, assumptions regarding the long-term growth rate and the WACC are crucial. Another method of calculating the terminal value – which is used far more often in practice – is to apply an industry-average multiple to either EBIT or EBITDA at the end of the forecast period.

Comparable Companies								
Data correct at 19.07.2021								
Comps set								
	Market Capitalisation (GBPm)	Enterprise Value (GBPm)	LTM Total Revenue (GBPm)	P/BV - LTM	P/E - LTM	P/E - NTM	EV/EBITDA - LTM	EV/ EBITDA - NTM
Vector Group Ltd. (NYSE:VGR)	1,511.6	2,288.1	1,203.2	NM	16.3x	12.94x	8.4x	8.63x
Altria Group, Inc. (NYSE:MO)	64,007.0	81,559.7	15,114.7	-	20.3x	10.24x	9.6x	9.18x
Imperial Brands PLC (LSE:IMB)	14,524.4	25,592.4	16,963.0	3.3x	5.3x	6.28x	6.6x	6.67x
Scandinavian Tobacco Group A/S (CPSE:STG)	1,372.5	1,727.0	943.2	1.4x	12.5x	9.17x	7.4x	7.03x
Japan Tobacco Inc. (TSE:2914)	25,429.5	29,969.2	14,154.2	1.4x	11.3x	13.16x	7.1x	7.33x
PT Gudang Garam Tbk (IDX:GGRM)	3,607.7	3,229.8	5,863.8	1.2x	10.4x	9.23x	5.5x	5.31x
Philip Morris International Inc. (NYSE:PM)	112,685.1	132,767.3	21,292.9	NM	17.9x	16.13x	13.1x	12.38x
KT&G Corporation (KOSE:A033780)	6,558.7	5,033.5	3,418.4	1.2x	9.0x	10.41x	4.7x	4.64x
ITC Limited (NSEI:ITC)	24,966.0	23,083.7	4,810.6	4.2x	19.4x	16.48x	13.9x	11.92x
British American Tobacco p.l.c. (LSE:BATS)	62,844.3	103,803.3	25,776.0	1.0x	9.8x	8.4x	8.1x	8.6x
Mean	31,750.7	40,905.4	10,954.0	2.0x	13.2x	11.2x	8.4x	8.2x
Median	19,745.2	24,338.1	10,009.0	1.4x	11.9x	10.3x	7.8x	8.0x
High	112,685.1	132,767.3	25,776.0	4.2x	20.3x	16.5x	13.9x	12.4x
Low	1,372.5	1,727.0	943.2	1.0x	5.3x	6.3x	4.7x	4.6x

From the table above, we can observe that BATS' peer group average EV/EBITDA is 8.4x. Adding back D&A to the forecast EBIT in 2025 gives us EBITDA and then applying a multiple of 8.4x gives us a terminal value of £119,182 – slightly less than the terminal value calculated using the GGM. Discounting, then adding the terminal value to the discounted FCFs gives us an enterprise value of £112,407m, an equity value of £71,448m and a share price of £31.22. Relatively closer, but still 9.5% above the price at which BATS currently trades.

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(-) Minority Interest	£	282.00
(-) Preferred Equity	£	90.00
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Intrinsic Value		
Enterprise Value (m)	£	112,407.63
(-) Debt	£	43,968.00
(+) Cash	£	3,381.00
(-) Minority Interest	£	282.00
(-) Preferred Equity	£	90.00
Equity Value	£	71,448.63
No. shares outstanding		2288.6
Share price	£	31.22
Implied PE		11.2x
+/- current share price		9.7%

With both methods showing an intrinsic value for BATS above its current market price, it would appear that BATS is under-priced. While it may well be, there are a number of assumptions, both implicit and explicit, made throughout the valuation process and thus only investors with superior insight and complete confidence in their assumptions can be positive that their valuation holds. Further, market cycles and investor sentiment can delay – or postpone indefinitely - the re-rating of a company to the point where it makes little economic sense to invest, regardless of the magnitude of mispricing. A long-term investor weighing up the potential upside of investing in a company like BATS - with limited (outsized) growth prospects and inherently trading at a discount due to the nature of its core product – may consider testing the assumptions made throughout the valuation process and their relative impacts on the final price.

Share price sensitivity

Multiples approach

Exit Multiple	WACC				
	8%	9%	10%	11%	12%
10.4x	43.39	41.21	39.14	37.17	35.28
9.4x	39.00	37.00	35.10	33.28	31.55
8.4x	34.62	32.79	31.22	29.40	27.82
7.4x	30.23	28.58	27.01	25.52	24.09
6.4x	25.85	24.38	22.97	21.63	20.36

High	43.39
Mid	31.22
Low	20.36
Range	23.03

GGM Approach

LT Growth	WACC				
	8%	9%	10%	11%	12%
3.2%	62.52	48.86	39.23	32.06	26.52
2.8%	57.31	45.36	26.73	30.21	25.10
2.3%	51.82	41.57	33.98	28.13	23.49
1.8%	47.22	38.30	31.56	26.28	22.04
1.3%	43.31	35.46	29.42	24.63	20.73

High	62.52
Mid	33.98
Low	20.73
Range	41.79

Clearly, the GGM approach is more sensitive to the inputs of the model. This partly explains why the multiples approach is more frequently used in practice. While BATS' current market price may appear attractive when we assume a WACC of 10% and a long-term growth rate of 2.3%, increasing the WACC to 11% produces an intrinsic value of £28.13 – below the price at which it currently trades.

Ultimately, it is important to use a combination of valuation methodologies - together with intuition and thoughtful consideration of the strengths, weaknesses and risks of the business – when determining whether or not a stock is priced correctly. Even if the investment case remains intact after performing rigorous financial and sensitivity analyses, investors should mindful that, in the words of John Maynard Keynes, the stock market can remain irrational for longer than you can remain solvent.