

Valuing High Growth Firms: Almaden Technologies¹ **Case Study²**

The subject firm for the problems represented in this case is Almaden Technologies, a fictional firm for which hypothetical values have been presented. The Income Statement, Balance Sheet, and Other Financial Information used herein are also used in support of building a body of Corporate Finance In-Class Problems and Case Studies.

Almaden Technologies (AT), a Utah County start up with an innovative drone technology, has approached your private equity firm with a proposal to partner and fund its capital needs as it goes through its growth phases from corporate infancy to relative maturity.

The firm has developed iLenz, a “GoPro” style camera system coupled with a GPS pointer with sufficient accuracy to make it a highly desirable platform for numerous expected disruptive technologies envisioned in the expanding drone space.

The firm’s founders invested \$2.5 million of their own funds, now held on the firm’s books as 250,000 shares of common stock. AT also received another \$2 million in funding from an angel investor in exchange for accumulative preferred stock with a 20% reinvested dividend contract for 5 years that can either be redeemed by the firm at that point, converted to \$5 million in preferred at a 15% dividend rate, or converted into common stock based on a \$35 per share valuation.

The firm had \$1.799 million in sales last year and is projecting \$3.22 million in sales for the current year (year 0) with an operating EBIT of \$414,000. The firm is committed to keeping its Sales, Administrative and Depreciation expenses at the percentage of sales projected for the current year. It is currently reinvesting all of its pretax income to R&D up to a maximum annual R&D budget of \$10,000,000. The firm is projecting revenues, expenses, EBIT, and NOPLAT based on a 10 year forecasted projection. The firm currently accounts for R&D as an expense to limit its tax liability.

The firm’s flagship drone, Mercury 1.0, retails for \$2,100 based on a wholesale to retail markup of 50%, has a landed cost to the firm of \$600 per unit for the hardware and packaging, and an estimated cost of \$200 per unit for the software. The product development and marketing teams are confident they can sustain a 35% growth rate for the next 5 years and 20% for the following three year, after which time they expect sales to grow at 10% annually based on continually integrating technological innovations into the product to keep it fresh and relevant. The firm’s operations manager is confident the hardware and packaging, and software costs can be reduced to \$525 and \$150 if the firm can increase sales volume to 3,000 units.

The firm is seeking an equity investment of \$10 million based on a total valuation of \$25 million (\$15 million current valuation plus \$10 million new equity investment), plus another \$5 million credit line at 12% interest to fund inventory purchases. The firm is expected to only use as much of the equity line as necessary to buy inventory for a given year, so the equity line is used, all or in part, at the beginning of the year and paid off at the end of the year.

¹ This problem and solution set is intended to present an abbreviated discussion of the included finance concepts and is not intended to be a full or complete representation of them or the underlying foundations from which they are built.

² This problem set was developed by Richard Haskell, PhD (rhaskell@westminstercollege.edu), Gore School of Business, Westminster College, Salt Lake City, Utah (2015).

With the \$10 million equity investment the firm plans to launch Quick Silver 1.0 (QS 1), an industrial drone with a payload capacity of 20 pounds using the iLenz technology. It expects to sell 1,000 QS 1.0 units in the year following a two-year testing and FAA approval period year, for which it is ready to begin upon receipt of funding. It expects sales of QS 1 to increase by 75% for the following 5 years before declining to a 40% growth rate for two years (all based on interest by FedEx, UPS, EBay and other industrial application users), before settling in at a 10% growth rate for the foreseeable future based on continually integrating new technology into the product to allow it to increase payload while keeping costs from rising. The firm plans to sell each QS 1.0 for \$10,000.00 direct to corporate customers and expects a landed cost to the firm for hardware and packaging of \$6,000, plus \$1,500 for software based on 1,000 units, and is confident it can reduce its costs to a total of \$6,000 per unit with annual volume of greater than 2000 units.

The current 10 year Treasury is listed at 2.57% with TRS expectations for common and preferred stocks in this industry at 11% and 9% respectively. The beta assigned to the firm's common and preferred stocks are 1.85 and 1.6 respectively.

2005-2016 Corporate Income Tax Rates

Taxable Income Over	But Not Over	Tax Rate
-	50,000	0.15
50,001	75,000	0.25
75,001	100,000	0.34
100,001	335,000	0.39
335,001	10,000,000	0.34
10,000,001	15,000,000	0.35
15,000,001	18,333,333	0.38
18,333,334		0.35

1. Based on the firm's self-assigned valuation, what value is being assigned to the founder's stock?

Assigned Valuation	25,000,000
Less new equity	-10,000,000
Less preferred (book value)	<u>-2,000,000</u>
Current shareholder value	13,000,000
Divided by shares outstanding	<u>250,000</u>
Current per share value	52.00

2. What are the projected sales for years 1-10?

Year	Units Sold	Units Sold	Revenues
0	2300	0	3,220,000.00
1	3105	0	4,347,000.00
2	4192	0	5,868,450.00
3	5659	1000	17,922,407.50
4	7639	1750	28,195,250.13
5	10313	3063	45,063,587.67
6	12376	5359	70,920,055.20
7	14851	9379	114,580,628.74
8	17821	16413	189,080,738.87
9	19603	22978	257,228,070.57
10	21564	32170	351,885,838.56
11	23720	35387	387,074,422.42

3. What is the projected EBIT for years 1-10?

EBIT for year 0 is given as 414,000.00 and we're told that the firm's Selling & Admin (S&A) expense is constant as a percentage of sales (revenues). To find S&A, start with revenues (3,220,000) and deduct the cost of hardware and software based on the volumes you calculated in (2), above (1,840,000), and finally deduct the remaining EBIT (414,000). This yields a value of 966,000.00, which is the S&A expense. Divide this expense by revenue to find the percent of revenue S&A represents, and then use this to determine your ongoing S&A values as follows:

Year	Revenues	Hardware & Software	Selling & Admin	EBIT
0	3,220,000.00	1,840,000.00	966,000.00	414,000.00
1	4,347,000.00	2,095,875.00	1,304,100.00	947,025.00
2	5,868,450.00	2,829,431.25	1,760,535.00	1,278,483.75
3	17,922,407.50	11,319,732.19	5,376,722.25	1,225,953.06
4	28,195,250.13	15,656,638.45	8,458,575.04	4,080,036.63
5	45,063,587.67	25,336,461.91	13,519,076.30	6,208,049.46
6	70,920,055.20	40,510,004.29	21,276,016.56	9,134,034.35
7	114,580,628.74	66,297,942.65	34,374,188.62	13,908,497.47
8	189,080,738.87	110,507,921.81	56,724,221.66	21,848,595.40
9	257,228,070.57	151,102,268.68	77,168,421.17	28,957,380.72
10	351,885,838.56	207,573,472.11	105,565,751.57	38,746,614.88
11	387,074,422.42	228,330,819.32	116,122,326.72	42,621,276.37

4. What is the projected NOPLAT for years 1-10?

To calculate NOPLAT, we'll use the relationship $NOPLAT = EBIT \times (1-T)$. We have EBIT and to find the appropriate T (tax rate) simply apply EBIT to the tax table provided. Then divide the calculated tax by EBIT to arrive at the tax rate. With this you can identify values for NOPLAT as follows:

Year	EBIT	NOPLAT	Adjusted Tax	Adjusted Tax Rate
0	414,000.00	273,241.32	140,758.68	0.34
1	947,025.00	625,037.82	190,024.68	0.34
2	1,278,483.75	843,800.60	434,683.16	0.34
3	1,225,953.06	809,130.34	416,822.72	0.34
4	4,080,036.63	2,692,825.50	1,387,211.14	0.34
5	6,208,049.46	4,097,313.96	2,110,735.50	0.34
6	9,134,034.35	6,028,463.99	3,105,570.36	0.34
7	13,908,497.47	9,140,525.02	4,111,449.01	0.3428
8	21,848,595.40	14,201,589.42	5,507,154.05	0.35
9	28,957,380.72	18,822,299.88	6,112,869.65	0.35
10	38,746,614.88	25,185,302.09	6,750,538.66	0.35
11	42,621,276.37	27,703,832.05	7,425,592.77	0.35

5. Based on the data provided, what valuation would you assign this firm using a DCF/DG model?

To calculate the firm's value we'll use PV_{DCF} for the forecast (explicit) period plus the PV_{CV} to assign a present value of the continuing value (CV). We have values for NOPLAT so we're really using an augmented form of the DCF/DG model in which $D_1 = NOPLAT_1$, $r = WACC$, and $g =$ growth rate of the firm's revenues, which we're given as 10% for both the M 1.0 and QS 1.0 product lines. There's no need to include some amount that might represent the investment being made in the firm as we're not seeking to calculate and NPV or IRR. We simply want to calculate a value for the firm, which we can then consider relative to the valuation the firm has assigned to justify the new equity capital it seeks to raise.

To calculate these values we first calculate WACC for the firm, and we'll use a WACC as of Year 1. This might seem counter-intuitive and you might argue for using the WACC at year 0, but the likely addition of a debt via the credit line and the near certainty the firm will use it compels me to use Year 1. This might suggest the credit line and new equity are mutually exclusive, which, given the information provided, they may well be. In this case the firm's capital structure includes common stock as equity, preferred stock and we'll use the credit line as long-term debt. We'll find R_E via the CAPM model using values for the firm's common stock, $R_P = .20$ as the percent dividend being paid the preferred shareholders as a function of the book value of preferred shares, and $R_D = .12$ as the interest rate on the firm's credit line (debt) as a function of the book value of that credit line.

To calculate R_E with the CAPM model we'll use $R_F = .0257$, $R_M = .11$, and a beta of 1.85, each of which are given. So $R_E = R_F + (R_M - R_F) \times \beta = .0257 + (.11 - .0257) \times 1.85 = .1817$ or 18.17%. We'll use the

book value of the firm's common stock (2,500,000), preferred stock (2,000,000) and the credit line balance for the firm's debt. The credit line is to be used for annual inventory purchases (used at the first of the year and paid at the end of the year as noted). The Year 1 inventory cost based on the projected sales units equals 2,095,875. To find the tax rate used in WACC we'll use the adjusted tax (.34) we calculated to arrive at NOPLAT. Recall that the firm isn't declaring any taxable income and as such has not real tax rate, although it might be debatable as to whether or not the firm's strategy in this respect is legitimate. As such we can calculate WACC as follows:

$$\begin{aligned} \text{WACC} &= \left(\frac{E}{V} \times R_E\right) + \left(\frac{P}{V} \times R_P\right) + \left(\frac{D}{V} \times R_D\right) (1-T) \\ &= \left(\frac{2,500,000}{6,984,000} \times .1817\right) + \left(\frac{2,000,000}{6,984,000} \times .20\right) + \left(\frac{2,095,875}{6,984,000} \times .12\right) (1 - .34) \\ &= .379 \times .1817 + (.3032 \times .20) + (.3178 \times .12 \times .66) \\ &= .1547 \text{ or } 15.47\% \end{aligned}$$

With a calculated WACC to use as a discount rate, we can calculate the PV_{DCF} as follows:

Year	CASH FLOW (NOPLAT)	PV _{CF}	ACCUMULATED VALUE
1	625,037.82	541,316.67	541,316.67
2	843,800.60	632,892.63	1,174,209.30
3	809,130.34	525,598.12	1,699,807.42
4	2,692,825.50	1,514,916.27	3,214,723.69
5	4,097,313.96	1,996,295.22	5,211,018.91
6	6,028,463.99	2,543,766.83	7,754,785.74
7	9,140,525.02	3,340,310.78	11,095,096.52
8	14,201,589.42	4,494,669.79	15,589,766.31
9	18,822,299.88	5,159,155.66	20,748,921.97
10	25,185,302.09	5,978,582.30	26,727,504.27
11	27,703,832.05		

The PV_{DCF} is equal to the Accumulated Value at year 10 or 26,727,504.27.

CV_{DG} is calculated via an augmented Dividend Growth model using Year 11 NOPLAT as the income variable (D_1) and the same g and WACC employed above as follows:

$$CV_{DG} = \frac{D_1}{WACC-g} = \frac{NOPLAT_{\text{Year 11}}}{WACC-g} = \frac{27,703,832.05}{.1547 - .10} = 506,820,054.16$$

PV_{CV} is the discounted present value of CV_{DG} and is calculated as follows:

$$PV_{CV} = \frac{CV_{DG}}{(1+WACC)^t} = \frac{506,820,054.16}{1.15477^{10}} = 120,310,862.12$$

The full valuation is $PV_{DCF} + PV_{CV} = 26,727,504.27 + 120,310,862.12 = 147,038,366.39$

6. Based on the data provided, what valuation would you assign this firm using a DCF/KVD model?

Assigning valuation based on the DCF/KVD model uses the same PV_{DCF} as the DCF/DG model forms, as such the NOPLAT, WACC, and g are also the same values. The continuing value calculation includes a value for ROIC (given in this case as .16 or 16%) and uses the KVD model for as follows:

$$CV_{KVD} = \frac{NOPLAT_1 \left(1 - \frac{g}{ROIC}\right)}{WACC - g} = \frac{27,703,832.05 \times \left(1 - \frac{.10}{.16}\right)}{.1547 - .10} = 190,057,550.62$$

PV_{CV} is the discounted present value of CV_{DG} and is calculated as follows:

$$PV_{CV} = \frac{CV_{KVD}}{(1+WACC)^t} = \frac{190,057,550.62}{1.1547^{10}} = 45,116,580.49$$

The full valuation is $PV_{DCF} + PV_{CV} = 26,727,504.27 + 45,116,580.49 = 71,844,084.77$

7. Explain any differences in value you find when using these two different model forms.

The two values are very different of course, with the valuation calculated using the DCF/DG model being roughly twice the valuation assigned using the DCF/KVD model. In each case the condition required for the model to produce consistently positive results have been met. For the DCF/DG model this is $r > g$. For the DCF/KVD model this is $g < WACC < ROIC$. But this reveals some of the disparity in value through the inclusion of ROIC, certainly a valid key value drive for a firm.

We might agree that a firm's ability to provide a positive return on investment, or invested capital, is a critical component of its valuation. That it is missing from the DCF/KVD model might motivate us to suppose the DCF/KVD valuation would be less than the DCF/DG valuation, when in fact, the opposite is accurate.

To understand why this might be an issue we can dig deeper and consider the firm's IGR and SGR and their relationship with ROIC. Both are measures of returns of certain asset or equity component, which certainly include some form of invested capital, and were we to find the firm's IGR and SGR to be less than the return we'd likely see that the IGR and SGR do not support a growth of 10% based on an ROIC of 16%.

8. Based on the valuation you assigned, what offer might you make to the firm?

This firm is seeking a \$10,000,000 investment based on a current valuation of \$15,000,000 (\$25,000,000 with the new equity investment included). Either of the valuation models used support significantly higher values, so it might suggest simply meeting the \$10,000,000 request would be prudent. However, the values assigned have used WACC as the discounting factor, which is appropriate as we look at the value from the standpoint of the firm, but perhaps less so if we think about this value from the standpoint of a would be investor. If we assign a discount factor (r) representing an investor's discount rate the valuations change of course.

I elected to arbitrarily assign an r of 25% supposing the private equity firm's expectations would be at least this much for a startup firm such as Almaden Technologies. Doing so changed the value

assignment from the DCF/DG and DCF/KVD models to 34,841,502.28 and 22,447,019.61, respectively. Given that the DCF/KVD model appears to be more robust with its inclusion of ROIC, it may be prudent to use 22,447,019.61 as the target valuation and offer the firm an equity investment based on this total valuation rather than the 25,000,000 the firm assigned itself.

Editorial Note

Were we to have calculated an NPV or IRR, we would have used \$25,000,000 as the cost in year 0 even though the firm is only seeking \$10,000,000 in additional equity capital. The reason for this is that the cash flows used to assign a value are 100% of the available cash flows and require 100% of the valuation to consider NPV and IRR. In this case IRR = 16.5% for the explicit forecast period, an amount greater than the expected WACC (15.47%) – which motivates an NPV of 1,727,504.27. These values are not used in assigning value to the firm, rather, they're derivatives of cash flows and initial valuation used for value assignment.