Chapter 17
"An Analytical Approach to
Investments, Finance and Credit"

Valuation Analysis

Valuation Analysis Overview

- The chapter will introduce the following eight methods of valuating the company's enterprise value:
- Method 1: Using the current stock price as a basis of valuation
- Method 2: Intrinsic value and capital asset pricing model (CAPM)
- Method 3: Dividend discount model (DDM)
- Method 4: Comparable method using trading EBITDA multiples
- Method 5: Comparable method using acquisition EBITDA multiples
- Method 6: Discount cash flow method (DCF)
- Method 7: Leveraged buyout private equity expectation model (LBO)
- Method 8: Black-Scholes option pricing model

Valuation of Publicly Traded Companies.

Testing the current Stock Price

Methods 1-6: Valuation of Public Traded Companies

- **Method 1: Using the Stock Price as the Basis of Valuation**
  - The formula to value the firm or the enterprise value (EV) is as follows:

$$EV = MVE + D - C$$

where EV is enterprise value, MVE is the market value of the equity, D is the total debt outstanding, and C is the cash and cash equivalents of the company.

  - The stock price that represents the market value of each share when multiplied by the shares outstanding will give us the market value of the equity.

$$MVE = (SP \cdot SO)$$

where MVE is the market value of the equity, SP is the stock price and SO is the shares outstanding.

Methods 1-6: Valuation of Public Traded Companies

Method 1: Using the Stock Price as the Basis of Valuation

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METHOD #1 - Market Value / Using the Stock Price

Calculations →		SP	SO	SP * SO = EQ	D	C	EQ + D - C = EV
Company	**Symbol**	**Stock Price (as of 2/28/2020)**	**Stocks Outstanding ($000)**	**Equity Value ($000)**	**Debt (ST&LT) 12/31/2019 ($000)**	**Cash 12/31/2019 ($000)**	**Enterprise Value ($000)**
Hyatt	H	$ 76.23	102,060	7,780,000	1,612,000	961,000	**8,431,000**

Methods 1-6: Valuation of Public Traded Companies

- **Method 2: Intrinsic Value and CAPM**

  The expected return is calculated by applying the capital asset pricing model (CAPM):

$$E_r = Rf_r + \beta\,(M_r - Rf_r)$$

where E_r is the expected return, Rf_r is the risk-free rate, β is the beta of the company that is analyzed, and M_r is market return.

The formula for today's intrinsic value is

$$v_0 = \frac{D_1 + \rho_1}{1 + k}$$

where D_1 is the dividend expected to receive within a year, P_1 is the expected stock price a year from now, and k is the discount rate or expected rate of return.

Methods 1-6: Valuation of Public Traded Companies

- **Method 2: Intrinsic Value and CAPM**

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METHOD #2- Intrinsic Value

Using CAPM = k = Rf + (Beta * Premium)

Risk Free =	1.50%
Beta =	1.11x
Premium=	9.00%
Market Return (Rf + Premium)=	10.50%
RoR =	**11.5%**

Intrinsic Value = V0 = [E(D1) + E (P1)] / (1+k)

D1=	$0.76	
Analyst Est.	$1.25	(Average Earnings per share)
PE Multiple	18.98x	
Exp (P1)=	$90.00	(Avg Target by Analysts for 9/19)
k=	11.5%	
V0=	**$ 81.41**	

Hyatt's Enteprise Value	**8,959,302**

Methods 1-6: Valuation of Public Traded Companies

- **Method 3: Dividend Discount Model (DDM)**

To calculate such value using the DDM method, the analyst needs the expected price of the stock a year from the date of the analysis, the expected dividend per share paid within the year, and a discount rate, which derived using the capital asset pricing model (CAPM).

$$V = \frac{D1}{k - g}$$

where D_1 is the expected dividend, k is the discount rate, and g is the expected growth rate.

Methods 1-6: Valuation of Public Traded Companies

- Method 3: Dividend Discount Model (DDM)

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METHOD #3- Dividend Discount Model (DDM)

Constant-Growth DDM (Gordon Model) V0 = D1 / (k-g)

D1 =	$0.76	
Expected Equity Return (k)=	11.49%	
Expected Growth (g @90% of Return) =	10.34%	historical
V0=	**$ 72.98**	

Expected HPR = E 9r) = [E (d1) + (E(p1) - P0) / P0

Dividend (d1)	$0.76	(No growth)
P1 = P0+D	$76.99	
P0	$ 76.23	
Exp. HPR=	**1.99%**	

Hyatt's Enteprise Value	**8,099,763**

Methods 1-6: Valuation of Public Traded Companies

- Method 4: Using Comparable Trading EBITDA Multiples

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METHOD #4 -Average EBITDA Industry Trading Multiples

		SP	SO	SP * SO = EQ	D	C	Q + D - C = E	E	EV / E	
Company	Symbol	Stock Price (as of 2/28/2020)	Stocks Outstanding ($000)	Equity Value ($000)	Debt (ST&LT) ($000)	Cash ($000)	Enterprise Value ($000)	EBITDA ($mm)	EBITDA Multiple	Beta
Choice Hotels International	CHH	$ 92.29	55,730	5,143,322	872,880	33,770	5,982,432	371,170	16.12x	0.96x
Hilton Worldwide Holdings Inc.	HLT	$ 95.71	286,860	27,455,371	9,160,000	538,000	36,077,371	1,910,000	18.89x	1.07x
Intercontinental Hotel	IHG	$ 55.13	182,030	10,035,314	2,840,000	199,000	12,676,314	925,000	13.70x	0.92x
Marcus Corporation	MCS	$ 26.72	22,990	614,293	486,360	26,690	1,073,963	141,700	7.58x	0.53x
Marriott International	MAR	$ 124.00	326,940	40,540,560	11,950,000	225,000	52,265,560	2,520,000	20.74x	1.28x
Park Hotels & Resorts Inc.	PK	$ 18.26	239,390	4,371,261	4,130,000	346,000	8,155,261	649,330	12.56x	1.41x
Wyndham Worldwide	WH	$ 50.95	96,430	4,913,109	2,160,000	94,000	6,979,109	573,000	12.18x	1.81x
Hyatt	H	$ 76.23	102,060	7,780,000	1,612,000	961,000	8,431,000	585,000	14.41x	1.11x

EBITDA * Average Multiple	585,000	14.69x	Average	14.54x 1.14x
			Outliers	14.69x

Hyatt's Enteprise Value	8,593,652
Less Debt	(1,612,000)
Plus Cash	961,000
Equity Value	7,942,652
Shares Outstanding	102,060
Value per Share	77.82

Methods 1-6: Valuation of Public Traded Companies

- Method 5: Using Comparable Acquisition EBITDA Multiples

METHOD #5 - Using Averge EBITDA Transaction Multiples (M&A Comparable Method)

Calculations		AP	SO	AP * SO = EQ	ND	EQ + ND = EV	E	EV / E
Target	**Acquirer**	**Acquisition Price /Share**	**Shares Outstanding**	**Equity Value ($mm)**	**Total Net Debt ($mm)**	**Enterprise Value (EV)**	**EBITDA (last reported)**	**EBITDA Multiple**
Hilton Hotels	Blackstone Group	$ 47.50	390,400,000	$ 18,544.00	$ 6,180.00	$ 24,724.00	$ 1,680.00	14.72x
Four Seasons*	Kingtom Hotels Int'l / Gates' Cascade	$ 82.00	33,078,000	$ 3,300.00	$ 278.68	$ 3,578.68	$ 112.18	31.90x
Fairmont/Rafles	Kingtom Hotels Int'l	$ 45.00	73,333,333	$ 3,300.00	$ 123.50	$ 3,423.50	$ 187.20	18.29x
Hilton International	Hilton Hotels Corp.			$ 5,578.00	$ -	$ 5,578.00	$ 504.00	11.07x
Starwood Hotels	Host Marriott					$ 4,096.00	$ 315.08	13.00x
La-Quinta Corp	Blackstone Group	$ 12.22	203	$ 2,474.00	$ 925.71	$ 3,400.00	$ 229.70	14.80x
Wynham Int'l	Blackstone Group	$ 1.15	172,053,000	$ 197.86	$ 2,681.96	$ 2,879.82	$ 275.18	10.47x
John Q. Hammons Hotels	JQH Acquisition LLC	$ 24.00	19,583	$ 470.00	$ 765.20	$ 1,235.00	$ 123.07	10.00x
Societe du Louvre	Starwood Capital					$ 1,028.90	$ 91.05	11.30x
Intercontinental Hotels	LRG					$ 981.00	$ 106.63	9.20x
Boca Resorts	Blackstone Group	$ 24.00	40,284,000	$ 966.82	$ 217.29	$ 1,184.11	$ 90.07	13.15x
Prime Hospitality	Blackstone Group	$ 12.25	44,808,000	$ 548.90	$ 243.60	$ 792.50	$ 55.12	14.38x
Extended Stay	Blackstone Group	$ 19.93	95,077,000	$ 1,894.88	$ 1,231.50	$ 3,126.38	$ 224.85	13.90x
							Average	**14.32x**
				585,000	13.19x		Adjust. Out	**13.19x**

Haytt's Enteprise Value	**7,714,862**
Less Debt	(1,612,000)
Plus Cash	961,000
Equity Value	7,063,862
Shares Outstanding	102,060
Value per Share	**69.21**

Methods 1-6: Valuation of Public Traded Companies

- Method 6: Using the Discount Cash Flow Method (DCF)
  - To value the company using the DCF method the analyst needs to derive the following four items:
    - Setting up a stream of cash flows
    - Identifying an exit year
    - Calculating the value at exit year (terminal value)
    - Using the appropriate discount rate to value the present value of the firm

Methods 1-6: Valuation of Public Traded Companies

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METHOD #6 - Discount Cash Flow Valuation Analysis

Discout Cash Flow Valuation Analysis	Historical Assumptions	Projected Assumptions	Input Actual 12/31/2019	year = 1 12/31/2020	2 12/31/2021	3 12/31/2022	4 12/31/2023	EXIT YEAR 5 12/31/2024	6 12/31/2025
Revenues			4,763,000	4,905,890	5,249,302	5,616,753	6,009,926	6,430,621	6,880,765
Revenue Growth				3.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Cost of Revenues (CoGS)	82.0%	80.0%	(3,905,660)	(3,924,712)	(4,199,442)	(4,493,403)	(4,807,941)	(5,144,497)	(5,504,612)
Operating Expenses (Excl. Non-rec.)	13.4%	13.0%	(636,340)	(637,766)	(682,409)	(730,178)	(781,290)	(835,981)	(894,499)
EBIT			221,000	343,412	367,451	393,173	420,695	450,143	481,654
Less Taxes (tax rate x of EBIT)		22.0%	-	(75,551)	(80,839)	(86,498)	(92,553)	(99,032)	(105,964)
Plus Depreciation	7.6%	7.5%	364,000	367,942	393,698	421,257	450,744	482,297	516,057
Less Working Capital	0.0%	0.0%		-	-	-	-	-	-
Less Capex	7.8%	7.5%	(369,999)	(367,942)	(393,698)	(421,257)	(450,744)	(482,297)	(516,057)
Cash Flow			**215,001**	**267,862**	**286,612**	**306,675**	**328,142**	**351,112**	**375,690**
EBITDA			**585,000**	**711,354**	**761,149**	**814,429**	**871,439**	**932,440**	**997,711**
Debt (assuming 5% reduction of intial principal per year)			**1,612,000**	**1,531,400**	**1,450,800**	**1,370,200**	**1,289,600**	**1,209,000**	**1,128,400**

Terminal Value	Assumptions	Growth		
EBITDA Multiple Method	14.69x		(EBITDA x EBITDA Multiple)	13,697,547
Perpetuity Method	9.22%	7.00%	Next Year's Cash Flow / (Discount Rate - Growth)	16,948,848
Average				15,323,198
Less Debt Outstanding (at Exit)				(1,209,000)
Plus Cash (at Exit)				-
Equity Value at Terminal				14,114,198

		PV (for $1)						
Equity Cash Flows	**11.5%**			**267,862**	**286,612**	**306,675**	**328,142**	**14,465,309**
	PV (1) =	**0.8969414**	**$240,256**					
	PV (2) =	**0.8045039**	**$230,580**					
	PV (3) =	**0.7215929**	**$221,294**					
	PV (4) =	**0.6472266**	**$212,382**					
	PV (5) =	**0.5805243**	**$8,397,464**					
	PV=		**$9,301,977**					

Enterprise Value =	**PV of Equity + PV of Debt**
PV of Equity =	**$9,301,977**
+ PV of Debt =	**1,612,000**
+ PV of Cash =	**(961,000)**
Hyatt's Enterprise Value	**9,952,977**
Less Debt	(1,612,000)
Plus Cash	961,000
Equity Value	9,301,977
Shares Outstanding	102,060
Value per Share	**91.14**

Cost of Equity Calc	
Risk Free Rate (5 year)	**1.50%**
Premium based on MC =	**9.00%**
Hyatt Beta =	**1.11x**
Expected Equity Return =	**11.5%**

Interest 12/19 ($ 000s)
75,000
4.65% Rate

WACC Calc:	**12/31/2019**	**% Cap**	**AT RoR**	**WACC**
Debt	**1,612,000**	**28.9%**	**3.629%**	**1.050%**
BV Equity	**3,962,000**	**71.1%**	**11.490%**	**8.167%**
	5,574,000	**100.0%**		**9.217%**

Method 7: Using the Leveraged Buyout Model (LBO) Method

- While the DCF analysis is used for determining today's value of the company based on future cash flows, **the value of the company using this LBO method is determined based on investor expectation, which means return determines the acquisition price of the firm**.
  - **Building the Transactions Sources and Uses**
  - **Setting up the Debt Schedules**
  - **Calculating the Expected Equity Return**
  - **Running Projections**
  - **Determining the Terminal Value**
  - **Determining the Value of the Firm**

Method 7: Using the Leveraged Buyout Model (LBO) Method

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METHOD #7 - Leveraged Buyout (LBO) Analysis

Transactions Uses		Current Stock Price	Premium	Purchase Stock Price	Shares Outstanding (millions)	Total Amount ($ 000's)	% Total Uses	EBITDA Multiple
Purchase of 100% Shares		$ 76.23	0%	$ 76.23	102,060	**7,780,000**	80.04%	13.30x
Refinance Short-Term & Long Term Debt						**1,612,000**	16.58%	2.76x
Transaxtion Fees & Expenses		3.50%				**328,720**	3.38%	0.56x
Total Cost of Transaction (Uses)						**9,720,720**	100.00%	16.62x
	Buyout Price	84.80	11.24%					

Transactions Sources	EBITDA Multiple (Capacity)	Interest Rate / Expected Return	After Tax Interest Rate Adjustments	WACC Calc	Total Amount ($ 000's)	% Capital
Bank Loan	3.50x	5.0%	3.90%	0.821%	**2,047,500**	21.06%
Corporate Bonds	2.50x	8.0%	6.24%	0.939%	**1,462,500**	15.05%
Total Debt	6.00x				**3,510,000**	36.11%
Equity	10.62x	11.5%	11.5%	7.341%	**6,210,720**	63.89%
Total Sources	16.62x			9.101%	**9,720,720**	100.00%

Cost of Equity Calc	
Risk Free Rate (5 year)	**1.50%**
Premium based on MC =	**9.00%**
Hyatt Beta =	**1.11x**
Expected Equity Return =	**11.5%**

Debt Schedule	Years	Rate	12/31/2019	LTM 12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025	1/1/2027	1/1/2028
Bank Loan	7	5.0%									
Outstanding			2,047,500	2,047,500	1,947,500	1,822,500	1,672,500	1,472,500	1,222,500	872,500	-
Scheduled Principal Payments (P)				-	100,000	125,000	150,000	200,000	250,000	350,000	872,500
Interest Payments (I)				102,375	102,375	97,375	91,125	83,625	73,625	61,125	43,625
Total Payments (P+I)				102,375	202,375	222,375	241,125	283,625	323,625	411,125	916,125
Corporate Bonds	10	8.0%									
Outstanding			1,462,500	1,462,500	1,462,500	1,462,500	1,462,500	1,462,500	1,462,500	1,462,500	1,462,500
Scheduled Principal Payments (P)				-	-	-	-	-	-	-	-
Interest Payments (I)				117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000
Total Payments (P+I)				117,000	117,000	117,000	117,000	117,000	117,000	117,000	117,000
Total Debt Payments				219,375	319,375	339,375	358,125	400,625	440,625	528,125	1,033,125
Total Debt Outstanding				3,510,000	3,410,000	3,285,000	3,135,000	2,935,000	2,685,000	2,335,000	1,462,500

Method 7: Using the Leveraged Buyout Model (LBO) Method

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METHOD #7 - Leveraged Buyout (LBO) Analysis

			year =	1	2	3	4	5	6	
Discout Cash Flow Valuation Analysis	Historical Assumptions	Projected Assumptions	Input Actual	LTM				EXIT YEAR		
			12/31/2019	12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025	
Revenues			4,763,000	4,905,890	5,249,302	5,616,753	6,009,926	6,430,621	6,880,765	
Revenue Growth				3.0%	7.0%	7.0%	7.0%	7.0%	7.0%	80% of WACC
Cost of Revenues (CoGS)	82.0%	80.0%	(3,905,660)	(3,924,712)	(4,199,442)	(4,493,403)	(4,807,941)	(5,144,497)	(5,504,612)	
Operating Expenses (Excl. Non-rec.)	13.4%	12.0%	(636,340)	(588,707)	(629,916)	(674,010)	(721,191)	(771,675)	(825,692)	
EBIT			221,000	392,471	419,944	449,340	480,794	514,450	550,461	
Less Interest				(219,375)	(219,375)	(214,375)	(208,125)	(200,625)	(190,625)	
EBT			221,000	173,096	200,569	234,965	272,669	313,825	359,836	
Less Taxes (tax rate x of EBIT)		22.0%	-	(38,081)	(44,125)	(51,692)	(59,987)	(69,041)	(79,164)	
Net Income			221,000	135,015	156,444	183,273	212,682	244,783	280,672	
Plus Depreciation	7.6%	7.5%	364,000	367,942	393,698	421,257	450,744	482,297	516,057	
Plus Amortization		7 Years		46,960	46,960	46,960	46,960	140,880		
Less Working Capital	0.0%	0.0%		-	-	-	-	-	-	
Less Capex	7.8%	6.0%	(369,999)	(294,353)	(314,958)	(337,005)	(360,596)	(385,837)	(412,846)	
Cash Flow Before Principal Payment			**215,001**	**255,563**	**282,144**	**314,484**	**349,791**	**482,123**	**383,884**	
Debt Principal Payment				-	(100,000)	(125,000)	(150,000)	(200,000)	(250,000)	
Equity Cash Flows			215,001	255,563	182,144	189,484	199,791	282,123	133,884	
EBITDA			**585,000**	**760,413**	**813,642**	**870,597**	**931,539**	**996,746**	**1,066,518**	
Debt			**1,612,000**	**3,510,000**	**3,410,000**	**3,285,000**	**3,135,000**	**2,935,000**	**2,685,000**	

Terminal Value	**Assumptions**		**Growth**		
EBITDA Multiple Method	14.69x			(EBITDA x EBITDA Multiple)	14,642,205
Perpetuity Method	9.10%		7.00%	Next Year's Cash Flow / (Discount Rate - Growth)	18,267,762
Average			(80% of WACC)		16,454,984
Less Debt Outstanding (at Exit)					(2,935,000)
Plus Cash (at Exit)					-
Equity Value at Terminal					13,519,984

		PV (for $1)						
Equity Cash Flows	**11.5%**			**255,563**	**182,144**	**189,484**	**199,791**	**13,802,106**
	PV (1) =	**0.8969414**	**$229,225**					
	PV (2) =	**0.8045039**	**$146,535**					
	PV (3) =	**0.7215929**	**$136,730**					
	PV (4) =	**0.6472266**	**$129,310**					
	PV (5) =	**0.5805243**	**$8,012,458**					
	PV=		**$8,654,259**					

Enterprise Value =	**PV of Equity + PV of Debt**
PV of Equity =	**$8,654,259**
+ PV of Debt =	**1,612,000**
+ PV of Cash =	**(961,000)**
Hyatt's Enterprise Value	**9,305,259**
Less Debt	(1,612,000)
Plus Cash	961,000
Equity Value	8,654,259
Shares Outstanding	102,060
Value per Share	**84.80**

Methods 1-7 - Summary:

Putting All the Values Together

ENTERPRISE VALUATION ANALYSIS	EV	Debt	Cash	Eq Value	Shares Outs	Stock Price	H/L %	
Book Value Equity	4,613,000	1,612,000	961,000	3,962,000	102,060	$ 38.82		
METHOD #1 - Market Value / Using the Stock Price	**8,431,000**	**1,612,000**	**961,000**	**7,780,000**	**102,060**	**$ 76.23**		
METHOD #2- Intrinsic Value	8,959,302	1,612,000	961,000	8,308,302	102,060	$ 81.41	6.8%	H
METHOD #3- Dividend Discount Model (DDM)	8,099,763	1,612,000	961,000	7,448,763	102,060	$ 72.98	-4.3%	S
METHOD #4 -Average EBITDA Industry Trading Multiples	8,593,652	1,612,000	961,000	7,942,652	102,060	$ 77.82	2.1%	H
METHOD #5 - Using Averge EBITDA Transaction Multiples	7,714,862	1,612,000	961,000	7,063,862	102,060	$ 69.21	-9.2%	S
METHOD #6 - Discount Cash Flow Valuation Analysis	9,952,977	1,612,000	961,000	9,301,977	102,060	$ 91.14	19.6%	B
METHOD #7 - LBO Analysis	9,305,259	1,612,000	961,000	8,654,259	102,060	$ 84.80	11.2%	B
Average of other methods	**8,770,969**	**1,612,000**	**961,000**	**8,119,969**	**102,060**	**$ 79.56**	4.4%	H

Method 6: Discount Cash Flow Method (DCF)

- One of the most effective ways to value a private company is to dive into the company's projections and change the assumptions based on the investor's view of how the revenue will grow and at what cost.
- Since there is no stock price that trades, which gives the investor a direct indication of what the company is worth (market value), an important method used by professionals is the discount cash flow (DCF) method, which measures the company's intrinsic value.
- The conduction of this method is to calculate the first the equity cash flows, identify the exit year, estimate the terminal value in the exit year, and use the expected equity return as the discount rate.

Valuation Analysis – Celerity Technology Inc

Celerity Technogy Inc. ("CTI")
Discount Cash Flow Valuation Method (000's)

			PROJECTED				
						EXIT YEAR	
	Year -1	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Revenues	960,000	1,110,000	1,228,140	1,344,200	1,442,919	1,529,268	1,605,161
Cost of Revenues	(345,000)	(420,000)	(463,078)	(506,823)	(544,053)	(576,709)	(605,474)
Operating Expenses	(230,000)	(257,000)	(271,501)	(289,448)	(306,442)	(322,900)	(338,999)
EBITDA	**385,000**	**433,000**	**493,561**	**547,928**	**592,424**	**629,659**	**660,688**
Less Depreciation & Amortization	(60,000)	(65,000)	(73,688)	(80,652)	(86,575)	(91,756)	(96,310)
EBIT	325,000	368,000	**419,872**	**467,276**	**505,849**	**537,902**	**564,378**
Less Taxes			(129,769)	(147,070)	(156,960)	(158,461)	(162,851)
EAT			**290,103**	**320,206**	**348,889**	**379,441**	**401,527**
Plus Depreciation & Amortization			73,688	80,652	86,575	91,756	96,310
Less Working Capital			2,870	(4,548)	(3,869)	(3,384)	(2,974)
Less Capital Expenditures and Investments			(193,626)	(211,923)	(227,487)	(241,101)	(253,066)
Cash Before Financing Payments			**173,036**	**184,386**	**204,109**	**226,713**	**241,796**
Less Debt Service (Principal + Interest)			(125,450)	(129,600)	(153,450)	(201,750)	(237,250)
Free Cash Flow			**47,586**	**54,786**	**50,659**	**24,963**	**4,546**
TERMINAL VALUE (TV)		**TV Assumptions**					
Terminal Value using EBITDA Multiple Method		EBITDA Multiple = **7.5x**				4,722,439	
Terminal Value using Perpetuity Method		Discount Rate = **10%**				4,835,926	
Average Terminal Value		Growth = **5%**				4,779,182	
Less Debt						(1,030,000)	
Equity Value at Exit Year						3,749,182	
Equity Cash Flows		Equity Expected Return = **20%**	47,586	54,786	50,659	3,774,145	
Present Value of Equity		1,927,111	39,655	38,046	29,316	1,820,093	
Plus Debt		1,190,000					
Less Cash		(65,800)					
Firm Enterprise value		**3,051,311**					
Enteprise Value / EBITDA		7.0x					

Figure 17.10

Method 7: Leveraged Buyout (LBO) Method for Private Companies

Celerity Technogy Inc. ("CTI")
LBO Method (000's)

TRANSACTION SOURCES & USES

Sources	Capacity EBITDA x	Amount	% Capital	Inter. / Exp. Ret.	WACC	Uses		Purchase EBITDA Multiple	Amount
Bank Loan	3.5x	1,515,500	33.8%	5.0%	1.1%	Purchase Enteprise Value		10.0x	4,330,000
Corporate Bonds	2.5x	1,082,500	24.2%	8.0%	1.2%	Fees (% EV)	3.50%		151,550
Total Debt	6.0x	2,598,000	58.0%		0.0%				
Equity		1,883,550	42.0%	25.0%	10.5%				
Total Sources		4,481,550	100.0%		**10.5%**				4,481,550

Tax Rate = 36%

DEBT SCHEDULES

	Years	Interest	Year 0	Year 1	Year 2	Year 3	EXIT YEAR Year 4	Year 5
Bank Loal - Outstanding	5	5.0%	1,515,500	1,363,950	1,212,400	1,060,850	909,300	-
Bank Loan - Principal Incr./Decr.				151,550	151,550	151,550	151,550	909,300
Bank Loan - Interst Payment				75,775	68,198	60,620	53,043	45,465
Bonds - Outstanding	10	8.0%	1,082,500	1,082,500	1,082,500	1,082,500	1,082,500	1,082,500
Bonds - Principal Incr./Decr.				-	-	-	-	-
Bonds - Interst Payment				86,600	86,600	86,600	86,600	86,600

CASH FLOW PROJECTIONS

	Year -1	Year 0	Year 1	Year 2	Year 3	EXIT YEAR Year 4	Year 5
Revenues	960,000	1,110,000	1,228,140	1,344,200	1,442,919	1,529,268	1,605,161
Cost of Revenues	(345,000)	(420,000)	(463,078)	(506,823)	(544,053)	(576,709)	(605,474)
Operating Expenses	(230,000)	(257,000)	(271,501)	(289,448)	(306,442)	(322,900)	(338,999)
EBITDA	**385,000**	**433,000**	**493,561**	**547,928**	**592,424**	**629,659**	**660,688**
Less Depreciation	(60,000)	(65,000)	(73,688)	(80,652)	(86,575)	(91,756)	(96,310)
Less Amortization			(30,310)	(30,310)	(30,310)	(30,310)	(30,310)
EBIT	325,000	368,000	**389,562**	**436,966**	**475,539**	**507,592**	**534,068**
Less Taxes			(140,242)	(157,308)	(171,194)	(182,733)	(192,265)
EAT			**249,320**	**279,658**	**304,345**	**324,859**	**341,804**
Plus Depreciation & Amortization			103,998	110,962	116,885	122,066	126,620
Less Working Capital			2,870	(4,548)	(3,869)	(3,384)	(2,974)
Less Capital Expenditures and Investments			(193,626)	(211,923)	(227,487)	(241,101)	(253,066)
Cash Before Financing Payments			**162,563**	**174,149**	**189,874**	**202,441**	**212,383**
Less Debt Service (Principal + Interest)			(125,450)	(129,600)	(153,450)	(201,750)	(237,250)
Free Cash Flow			**37,113**	**44,549**	**36,424**	**691**	**(24,867)**

TERMINAL VALUE (TV)	**TV Assumptions**					
Terminal Value using EBITDA Multiple Method	EBITDA Multiple =	**10.0x**				6,296,585
Terminal Value using Perpetuity Method	Discount Rate =	**10.5%**				3,856,429
Average Terminal Value	Growth =	**5.0%**				5,076,507
Less Debt						(1,030,000)
Equity Value at Exit Year						4,046,507
Equity Cash Flows	Equity Expected Return =	**25%**	37,113	44,549	36,424	4,047,197
Present Value of Equity	1,734,583		29,690	28,511	18,649	1,657,732
Plus Debt	2,598,000					
Less Cash	-					
Firm Enterprise value	**4,332,583**					
Enteprise Value / EBITDA	10.0x					

Figure 17.11

Method 8: Valuation of Distress Firms

- **Option Pricing Model Framework**
  - In option pricing and specifically in call options the payoff formula or intrinsic value of the option is

    Option payoff = Max (o, S – X)

    where S is the stock price and X is the exercise price.
  - To calculate the enterprise value

    EV = E + D – C or EV = E + net D

    where EV is the enterprise value of the firm, E is the equity value, D is the debt and C is cash. The net D is referred to as debt minus cash implied that the current debt could be paid with cash on hand.
  - Solving for equity:

    E = EV – net D

    where E is the equity, EV is the enterprise value and net D is the net debt.

Method 8: Valuation of Distress Firms

- **Option Pricing Model Framework**

The Black-Scholes formula is

$$\text{C option payoff} = \text{Se}^{-\delta.t} \,.\, \text{N (d1)} - \text{Xe}^{-i.t} . \text{N (d2)}$$

where S is the stock price, δ is the dividend yield, t is time until expiration, X is the option exercise price, i is the risk-free interest rate, and N is the normal distribution.

$$\mathbf{d1} = \frac{\left[\ln\left(\frac{\mathbf{S}}{\mathbf{X}}\right) + \left(\mathbf{i} - \boldsymbol{\delta} + \frac{\boldsymbol{\sigma}^{\mathbf{2}}}{\mathbf{2}}\right).\mathbf{t}\right]}{\boldsymbol{\sigma}\sqrt{\mathbf{t}}} \textit{ and } \mathbf{d2} = \mathbf{d1} - \boldsymbol{\sigma}\sqrt{\mathbf{t}}$$

where S is the current stock price, X is the contractual exercise price, i is the risk-free interest rate, δ is the dividend yield, σ is the standard deviation, and t is time to expiration.

Method 8: Valuation of Distress Firms

Input:

- S = Value of the firm = $1 billion
- X = Exercise price = debt value = $1,200 million
- σ = Standard deviation of the asset = 20%
- t = Time = term of the bond = 5 years
- i = Risk-free rate = 3%
- δ = Dividends = cash flow paying the equity = $0
- C = Equity value = E =?

Formulas and output:

Using the formula to determine the deviations d1 and d2:

$$\boldsymbol{d1 = \frac{\left[ln\left(\frac{S}{X}\right)+\left(i-\delta+\frac{\sigma^2}{2}\right).t\right]}{\sigma\sqrt{t}}} \text{ and } \boldsymbol{d2 = d1 - \sigma\sqrt{t}}$$

$d1 = .7671 \text{ and } N(d1) = .7785$

$d2 = .5678 \text{ and } N(d2) = .7149$

Using the Black Sholes formula:

$$C = Se^{-\delta.t}.N(d1) - Xe^{-i.t}.N(d2)$$

$$C = \$152.0\ million$$

Valuation Analysis of Distress Company – AB Air Co.

CASE STUDY: AB Air Co.

File for Bankruptcy 1990

DEBT ASSUMPTIONS			VALUE ASSUMPTIONS (Pre-bankrupcy)	
Debt Outstanding =	600		Stock Montly Var. (1985 - 1990) =	3.15%
Weighted Average Duration=	5	years	Bonds Monthly Var. (1985 - 1990) =	2.16%
Weighted Average maturity=	8.7	years	Correlation between Stock/Bond	0.25
WACC=	10.0%		Debt proportion (1987 - 1991) =	88.30%
Tax Rate =	36.0%			

Discount Cash Flow Analysis ($ millions)		1991	1992	1993	1994	1995
Revenue		1,250.0	1,137.5	1,114.8	1,159.3	1,205.7
CoGS		(980.0)	(810.0)	(668.0)	(695.6)	(723.4)
Oper. Exp.		(720.0)	(210.0)	(205.8)	(214.0)	(222.6)
EBIT		**(450.0)**	**117.5**	**241.0**	**249.7**	**259.7**
EBIT (t)		**(162.0)**	**42.3**	**86.8**	**89.9**	**93.5**
EBIT (i-t)		**(288.0)**	**75.2**	**154.2**	**159.8**	**166.2**
Less Maintenance Capex (offset by Depreciation)		-	-	-	-	-
Less W/C (assumiung $0)		-	-	-	-	-
Cash Flow		(288.0)	75.2	154.2	159.8	166.2
Terminal Value assumption	5.0x EBIT					1,298.5
EV (PV) of the firm	**$934.8**	**(288.0)**	**75.2**	**154.2**	**159.8**	**1,464.7**

Step 1 - Find the annualized in stock and bond prices:

Annualized Variance in Stock Price σ^2 =	0.37812 (annual)	St. Dev.=	0.6149146
Annualized Variance in Bond Price σ^2 =	0.2592 (annual)	St. Dev.=	0.5091169

Step 2 - Find the annualized variance in firm value

$$(we^2 \times \sigma e^2) + (wb^2 \times \sigma b^2) + 2.(we \times wd \times ped \times \sigma e \times \sigma d).C$$

We=	11.70%	C=	0.25
Wd=	88.30%		

Annualized Variance in firm value 0.211314

The five-year bond rate (corresponding to the weighted average duration of 5.1 years) is 6.0%

Stet 3 - Find the value of call based upon the following parameters of equity as a call option

Value of the underlying asset = S = Value of the firm =	$934.8	
Exercise Price = X = Face Value of outstanding debt =	$600.0	
Life of the option = t = Weighted average duration of debt=	5	years
Variance in the value of the underlying asset = σ^2 =	0.2113143	
Riskless Rate = I = T-Bond for option life =	6.00%	

d1=	1.23721	N (d1) =	0.8919954
d2=	0.209313	N (d2) =	0.5828981

Value of the call (Equity) = 574.5364

Figure 17.12