Intrinsic Value for Firm Valuation: A Case Study

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Abstract: To value a rm, there are usually two di erent methods, namely direct val-uation and relative valuation. When referring to direct valuation, we calculate the intrinsic value using the idea of time value of money (TVM) to convert fu-ture cash ow into its present value under a proper discount rate. This method could give us a clear image of how much we value a rm or equity. As for relative valuation, it is a method that usually gives investors an overall idea of comparison among similar companies. We use multiples, or indices, in relative valuation such as P/E, P/B and many other ratios which all function di er-ently as indicators of pro tability of a rm. In this paper, we will utilize the rst method, direct valuation, to value rms.

1. Introduction

Researchers have studied many aspects of a valuation process. Some papers focused on the role of accounting and discussed the valuation model based on \what we know" to avoid speculations as much as possible (Penman, 2006). Moreover, the terminal value calculation is worth arguing among analysts as well. Some papers discussed an alternative to the unrealistic assumption about terminal value calculation by introducing an adjustable fade rate called f (Hol-land, 2018). For practicing purpose, some papers aimed to assist the discounted cash ow (DCF) users by examining the relationship between free cash ow (FCF) and economic value added (EVA) as well as the equivalence to net present value (NPV) in a more general way which links to practical problems (Shrieves and Wachowicz, 2001).

2. Valuation Formula

Lots of studies on valuation has been conducted and there are many insight-ful papers each having its own perspective. Some relevant papers are reviewed as follows.

Also, there are papers summarizing ten dif-ferent DCF methods including free cash ow, equity cash ow and so on in answering whether they provide the same value (Fernandez and Magni, 2007). These topics are vital in yielding a more accurate output. These papers provided a critique of the direct valuation model in identifying what is being captured and what is not (Penman, 2016). As a result, researchers are trying to develop a more robust valuation by stressing three critical points that include the role of accounting, being practical and the accordance with nancial theory.

1.1 Cash Flow

Free cash ow is preferable in our valuation model. For rm valuation, we use free cash ow to rm (FCFF) and for equity valuation; we use free cash ow to equity (FCFE).

FCFF = After-tax operating income - net capital expenditure - change in work-ing capital

FCFE = Net income - net capital expenditure - change in working capital

1.2 Discount Rate

The rate needed to discount cash ow. For equity valuation, we use cost of eq-uity and for rm valuation, we use cost of capital which is the weighted average of cost of debt and cost of equity.

3. Example

In this paper, two major american airline companies, Delta Airlines(DAL) and United Airlines(UAL), are valued using the intrinsic valuation model.

2.1 Cash Flow

Table 1. intrinsic valuation model

	DAL	UAL
operating income	5,264,000	3,779,000
income tax	1,216,000	529,000
net income	3,935,000	2,129,000
working capital 2018	-12,238,000	-5,999,000
working capital 2017	-10,729,000	-5,563,000
working capital	-1,509,000	-436,000
depreciation	2,329,000	2,240,000
capital expenditure	5,168,000	4,177,000
FCFF	2,718,000	1,749,000
FCFE	2,605,000	628,000

(All numbers in thousands from Yr2018)

2.2 Discount Rate

Table 2. Discount Rate

	DAL	UAL
Risk-free rate[1]	2.75%	2.75%
	1.30	1.22
market return[2]	6.99%	6.99%
ERP	5.51%	5.17%
cost of equity	9.91%	9.06%
market value of equity[3]	36.42B	22.59B
marginal tax rate[4]	25.30%	25.30%
default spread[5]	2.00%	3.00%
cost of debt	3.55%	4.30%
book value of debt	17.44B	20.18B
cost of capital	7.85%	6.81%

a).the arithmetic mean of U.S. 10-yr bond rates from 2018.6 to 2019.6
b).from S&P Dow Jones Indices for U.S. stock market 1yr annualized return
c).number of shares outstanding multiplied by the 200-day average of stock price
d).arithmetic mean from the lowest 21.00% to as high as 29.60% due to local tax rate
e).according to the rating from SP and converting chart from NYU stern

2.3 Growth Rate

Table 3. Growth Rate

	DAL	UAL
invested capital	25,356,000	23,795,000
ROC	15.96%	13.66%
reinvestment	1,330,000	1,501,000
reinvestment rate	32.86%	46.18%
g(rm)	5.24%	6.31%
payout ratio	20.93%	0.00%
retention rate	79.07%	100.00%
ROE	33.67%	27.90%
g(equity)	26.62%	27.90%

2.4 Cash Flow Chart in 5 Years

Based on the cas how and growth rate, the following charts could be calculated:

Table 4. Cash Flow Chart in 5 Years

DAL		Y1	Y2	Y3	Y4	Y5
Year	2018	2019	2020	2021	2022	2023
FCFF	2,718,000	2,860,423	3,010,309	3,168,050	3,334,055	3,508,760
FCFE	2,605,000	3,298,451	4,176,499	5,288,283	6,696,023	8,478,505

Table 5. Cash Flow Chart in 5 Years

UAL		Y1	Y2	Y3	Y4	Y5
Year	2018	2019	2020	2021	2022	2023
FCFF	1,749,000	1,859,362	1,976,688	2,101,417	2,234,016	2,374,982
FCFE	628,000	803,212	1,027,308	1,313,927	1,680,513	2,149,376

2.5 Terminal Value

Table 6. Terminal Value

	DAL	UAL
g^0(set around Risk-free rate)	2.00%	2.00%
r^0	6.73%	6.21%
new reinvestment rate	12.53%	14.64%
terminal value	66,183,819	49,117,110

4. Sensitive Analysis and Conclusion

In utilizing direct valuation, there can still be subtle di erence among an-alysts. First, di erent analysts could have used di erent numbers as inputs. Second, many factors depend on analysts' own expectation to the rm or in-dustry such as the growth rate. In other words, these uncertain data or inputs are variables in the intrinsic valuation model. This is the stage where sensitive analysis is introduced which allows analysts to study the results better.

Before doing sensitive analysis, it is useful to do a comparison on the results stated above.

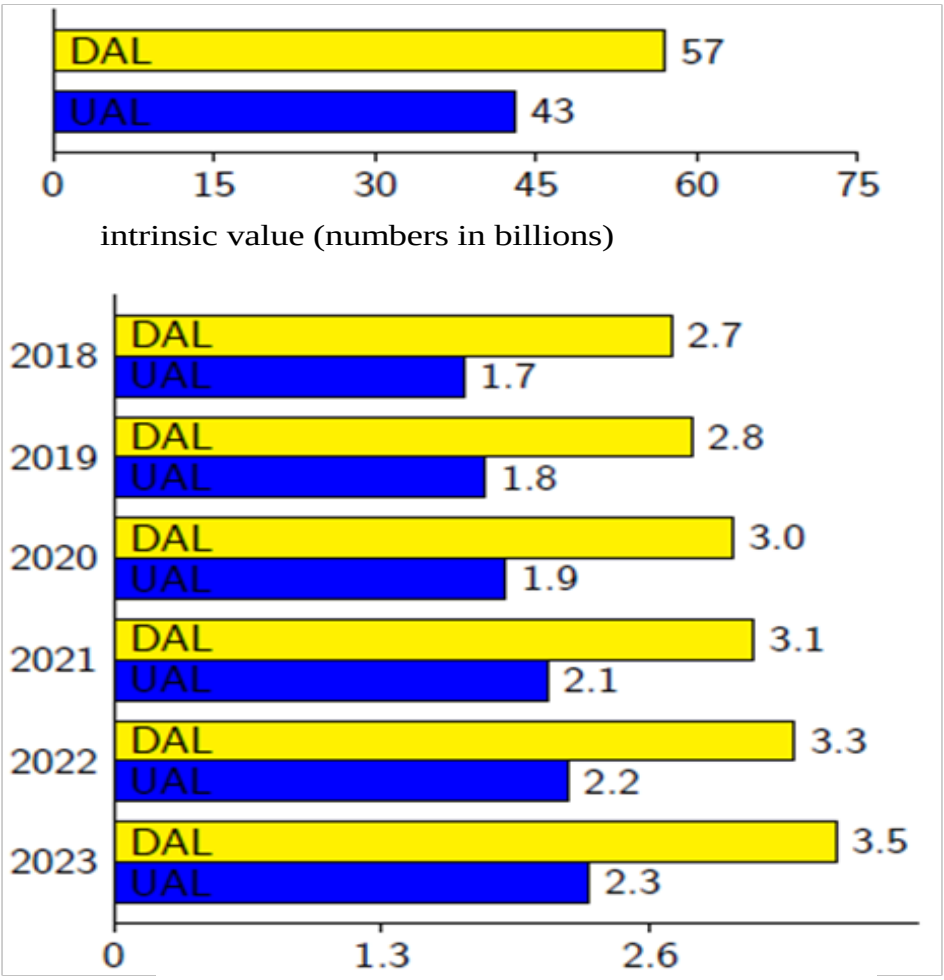

Figure 1. Sensitive Analysis

As shown above, the major input that contributes to the di erence of intrinsic value is FCFF. Although the cost of capital for delta airline is larger than that of united airline, delta still has a greater value. One way to do the sensitive analysis is to change the inputs of one Airline Company so that the output could be almost the same as the other. However, the di erence caused by cash ow has a major e ect which is hard to o set by merely changing other factors such as lowering cost of capital or having a higher growth rate. Though, for example, it is still useful to uctuate the cost of capital within 5% and see the scope of changing of the output.

5. Conclusion

For rm valuation, intrinsic value plays an important role as it conveys a clear image of how much a rm is worth by converting the future cash ows into a present value. Though the amount of and the variety of data are considerable, the output of intrinsic valuation method is of great value itself.

There are four main parts in this case study. First, we presented the main idea behind the study, including the intrinsic valuation and the relative valua-tion, and introduced the existing studies by other scholars. Second, we gener-alized the valuation model by analyzing four vital inputs, cash ow, discount rate, growth rate and terminal value and stated some useful formulas. Then, we further illustrated not only the valuation model but also the calculation pro-cess by valuing two di erent airlines, DAL and UAL, and presented the result. Finally, we conducted a sensitive analysis which is useful in pointing out the impact of variables on rm valuation.

This study is only a small part of rm valuation but it does underlie the fu-ture analysis and even conduct the nal decision making. A steady foundation is always sought by analysts and therefore, future re nements of the calculation details are always needed.

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