Applying DCF Model on Corporate Valuation: Influence of Leverage on Value - A Case Study of Netflix, Inc.

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ABSTRACT
Business valuation is indispensable to investment, with various ways to be used in their preferable scenarios respectively. Under the latest circumstances, great fluctuations have been seen in the majority of industries, which has brought up the complication of computing one's estimated value. In regard to Discounted Cash Flow (DCF) model, it is mostly used when a company's profits are expected to be unstable. Moreover, the level of liabilities is inevitable when it comes to valuation. Therefore, the paper takes a well-known and low-levered company yet with an indeterminate prospect, Netflix, as the sample of DCF valuation. Then, in comparison to its adjusted model and market capitalization value, the extent of the DCF model's practicality and effects of leverage on a low-levered company shall be seen. To sum up, each variable used in calculation can make big difference to the result, which means this valuation method is rather sensitive to not only revenue sand costs, but also especially target D/E ratio and discounted rate(WACC). More importantly, corporate valuation can demonstrate the effects of changes in fiscal structure. As a result, in this case, an increase in the level of leverage can raise the enterprise value of a low-levered company if organized well.

Keywords: *Valuation, FCF, D/E ratio, Leverage, Netflix*

1. INTRODUCTION

In contemporary era, though with the effects of pandemic since 2019, given that economic growth has been reintegrated among most countries, economic activities have been increasing (The economy grew 5.7% in 2021, the strongest since 1984 [1]), which aroused investment activities consequently. As business confidence has gradually gone back up and interest rates are at a low level, this is a good opportunity for low-levered companies to expand their liabilities. Nevertheless, a change in fiscal structure can have a tremendous influence on every corner of the corporation in the long term. Therefore, sufficient support should be provided using analytic tools before the ultimate decision, and DCF valuation is one of them. Thus, with the application of a typical example, the model can be demonstrated and its validity can be evaluated for investors to make more solid decisions.

2. DCF METHODOLOGIES

2.1. Different Methods

In a nutshell, regarding discounted cash flow model, there are four methods to value a corporation: 1) adjusted present value (APV), 2) capital cash flows (CCF), 3) cash flows to equity (CFE), and 4) free cash flows (FCF) to the firm [2]. Although approaches differ in detail, they share similar principles and, in theory, should give the same answer (value of equity). Nevertheless, what differs them from another includes algorithm of discount rate and cash flows that are discounted. Furthermore, the financing of debts correlated tax shields is valued discordantly, which brings about more data inconsistency and ultimately exponential discrepancy. Consequently, a substantial amount of controversy and debate are induced.

Particularly, assumptions of debt re-balancing layout on the organization, to wit, the adjustments are going to be made to the capital structure, contingent on future crisis management (e.g. enterprise value fluctuations).

Normally, there are two common assumptions, either maintaining the d/e ratio by modifying debts along with the value of the company, or making the amount of debts impervious to equity value shifts. Nevertheless, in this financial literature, another use of the means is demonstrated. Both scenarios will be calculated, adjusting debts to meet the target d/e ratio and also computing within a fixed debt. At last, by evaluating and comparing the outcomes, the two approaches can display the validity of obligation adjustment.

2.2. Free Cash Flow in Particular

The approach discussed in this paper is FCF to the firm. It is noted that, enterprise value is comprised of different types of capital, with the main ones being equity and debts (V = E + D), so that once V and D are estimated, the value of equity (price per share) can be found. The target of this approach is to computing free cash flow available to all investors, which can be used for finding the enterprise value using the DCF formula. Generally, what needs to be done is abstracted from precise computation of debt value, by either using a simple yield-to-maturity(YTM) computation or assuming that the book value and the market value coincide, and in this case, the former is chosen. Then, by starting with historical data, a detailed forecast can be developed for the nearest future and then coarser projections are used for those beyond forecasting period. Net present value (NPV) is computed by bring future FCF to the present (into discounted cash flows) using a discount rate, in this case, making use of weighted average cost of capital (WACC).

$$\mathrm{NPV} = \mathrm{CF}_0 + \frac{\mathrm{CF}_1}{1+\mathrm{r}_1} + \frac{\mathrm{CF}_2}{(1+\mathrm{r}_2)^2} + \frac{\mathrm{CF}_3}{(1+\mathrm{r}_3)^3} + \cdots = \sum_{\mathrm{t}=0}^{\infty} \frac{\mathrm{CF}_\mathrm{t}}{(1+\mathrm{r}_\mathrm{t})^\mathrm{t}} \quad (1)$$

t = year, CF = cash flow, r= discount rate

2.2.1. FCF calculation

The FCF calculation is based on four elements. NOPLAT, D&A, CAPEX and ΔWC.

$$\begin{gathered}\mathrm{NOPLAT} \\ + \mathrm{D\ \&\ A} \\ - \mathrm{CAPEX} \\ \underline{\mp \Delta \mathrm{WC}} \\ \mathrm{FCF}\end{gathered} \quad (2)$$

By looking into the income statement of the company, NOPLAT (Net Operating Profit Less Adjusted Taxes) and tax rate (t) can be calculated as follows.

$$\mathrm{t} = \frac{\mathrm{Tax}}{\mathrm{Pre-Tax\ Income}}$$

$$\mathrm{NOPLAT} = \mathrm{Operating\ Income} \times (1-\mathrm{t}) \quad (3)$$

Depreciation & Amortization (D&A) represents a firm's fixed and intangible assets decrease in value over time, which lowers the firm's profit. However, this is not a cash expense since they were purchased before already, so it should be added back.

CAPEX or CapEx (capital expenditure) represents investments in fixed assets. They are paid in cash, but the expense will show in later periods as assets depreciate. Thus, CAPEX should be subtracted.

Change in working capital (ΔWC) needs to be corrected, since sometimes the firm sells products, but gets the payment later; and sometimes it purchases goods, but doesn't have to pay for some period of time. This appears as a revenue or expense in the firm's accounts, but actual cash arrives in a different period. When WC goes up, it means that the firm sold something, but has not got the cash yet, so it should be subtracted, vice versa.

2.2.2. WACC calculation

WACC is the weighted average cost of all sources of capital:

$$\mathrm{WACC} = \frac{\mathrm{D}}{\mathrm{V}}(1-\mathrm{t})\mathrm{r}_\mathrm{D} + \frac{\mathrm{E}}{\mathrm{V}}\mathrm{r}_\mathrm{E} \quad (4)$$

where D is debt; E is equity; V=D+E; t is the marginal tax rate of the firm; r_D is cost of debts; and r_E is cost of equity. Debt includes a multiplier, $(1-\mathrm{t})$, because the interest payment creates a tax shield, as they lower taxable profit and save tax paid. Also, note that there are risks that should be taken into account; therefore usually a target capital structure is used. And sometimes,when a firm's capital structure is way off the target, WACC needs to be computed dynamically.

The cost of debt can be computed in 3 ways:

1). Using the firm's credit rating: each rating band is priced with some risk premium (the investment return an asset is expected to yield in excess of the risk-free rate of return [3])

2). By computing yield-to-maturity (YTM) (the percentage rate of return for a bond assuming that the investor holds the asset until its maturity date [4]) on existing bonds and actual prices

3). Calculating yield-to-maturity using your own risk projections [5], then computing into the tax-adjusted by estimated marginal tax rate.

Cost of equity is estimated by estimated Capital Asset Pricing Model, which used to calculate expected return on capital investments, whose formula is as shown:

$$\mathrm{E}(\mathrm{r}_\mathrm{i}) = \mathrm{r}_\mathrm{f} + \beta_\mathrm{i}[\mathrm{E}(\mathrm{r}_\mathrm{m}) - \mathrm{r}_\mathrm{f} \quad (5)$$

where $\mathrm{E}(\mathrm{r}_\mathrm{i})$ represents expected return on security i, $\mathrm{E}(\mathrm{r}_\mathrm{m})$ is expected market return, r_f is risk-free return and β_i is security beta, which is a regression coefficient that shows how security reacts to market shocks.

When company's capital structure is quite different from industry average, beta needs to adjusted along. We assume that demanded debts returns does not respond to market shocks, so that beta of debts equals to nil. Then industry average beta is:

$$\hat{\beta}_A = \hat{\beta}_D \frac{D_I}{V_I} + \hat{\beta}_E \left(1 - \frac{D_I}{V_I}\right) \approx \hat{\beta}_E \left(1 - \frac{D_I}{V_I}\right) \quad (6)$$

where β_E is industry beta inferred from the market beta, and D_I/V_I is the industry debt-to-value ratio. Accordingly, using industry beta of assets, company beta can be computed back, as the capital structure used in later calculations :

$$\beta_E \left(1 - \frac{D}{V}\right) = \hat{\beta}_A \Rightarrow \beta_E = \frac{V}{E} \hat{\beta}_A \quad (7)$$

As for the continuation value, suppose that the estimated FCF at the end of the forecasting period is FCF_T, which grows every period at the rate g, and discounted at the rate r (r>g). Hence, continuation value is:

$$V_t = FCF_T \left[\frac{1+g}{1+r} + \left(\frac{1+g}{1+r}\right)^2 + \left(\frac{1+g}{1+r}\right)^3 + \dots\right]$$
$$= FCF_T \frac{1+g}{1+r} \cdot \frac{1}{1-\frac{1+g}{1+r}} = FCF_T \frac{1+g}{1+r} = \frac{FCF_{T+1}}{r-g} \quad (8)$$

in which g is computed as:

$$g = ROIC \times IR \quad (9)$$

where ROIC represents the return on invested capital, IR is short for investment rate [5].

3. COMPANY PROFILE

3.1. Position within the industry

As an American subscription streaming service and production company, Netflix's performance has been stunning on the market and its market capitalization today of $151.51 Billion and a market share at the first place (30%) reflects that success [6]. Although global governments have been trying to set boundaries for streaming giants, entertainment and mass media still counts as one of the most profitable industries of all [7].

3.2. Business Strategy

Its business scope covers a subscription service streaming movies and television episodes over the Internet and sending DVDs by mail. (Domestic Streaming, International Streaming, and Domestic DVD). As technology has made streaming both viable and convenient, Netflix has become one of the primary distribution mechanisms for movies and TV shows to get to consumers. Its basic business model is captured below [8]:

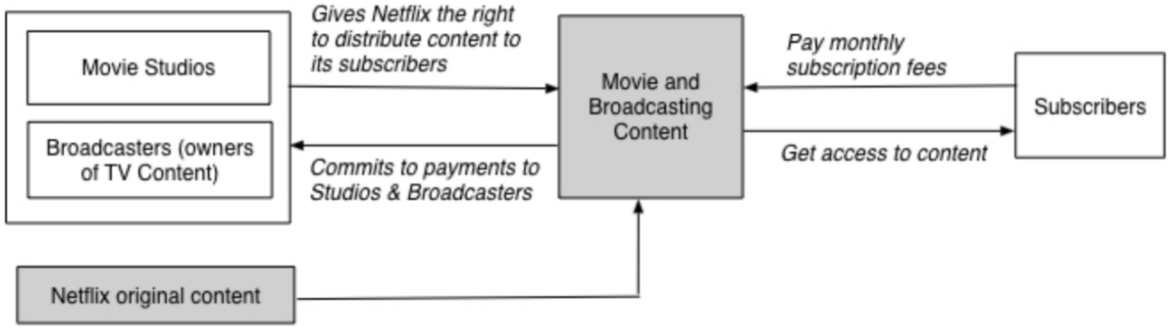

Figure 1. Business Model of Netflix

The model initially rested entirely on acquiring the content from movie studios and TV show producers, with long term contractual commitments associated with these agreements. In recent years, though, Netflix has started producing its own content, partly to get some freedom from having to enter into expensive commitments, and partly to get subscribers to be get attached to the content (and keep paying monthly fees). While much of the content is delivered in streaming form now, a portion of the subscription base still gets DVDs mailed to them with their content.

4. ASSUMPTIONS

Due to the pandemic effects, the needs for streaming services has been growing, therefore a dramatic rise should have been seen on Netflix's growth of revenue. Unfortunately, Netflix's stock conversely fell as much as 20% in after hours trading due to a bad outlook for its future growth. There are two possible reasons for its surprising loss of market share and growth rate, challenge from streaming rivals and market saturation. Additionally, global governments try to set boundaries for streaming giants, which, in tern, further attacks its success. Therefore it is assumed that there will be continues growing revenue, yet losing market share and seeing slowed down growth of new subscribers.

4.1. Operations

To predict the trend of revenue growth more accurately, revenues are separated into 4 districts -- United States and Canada, Europe, Middle East and Africa, Latin America, Asia-Pacific (UCAN, EMEA, LATAM and APAC) and two products (Streaming services and DVD delivery).

Table 1. Netflix's numbers of paid memberships and percentage change from 2019 to 2021 as of each year ended

As of / year ended	2019	2020	2021	Regional Population	Proportion (Sales to all)	Predicted growth rate
Paid memberships at end of period (UCAN)	67,662	73,936	75,215	357,000	21.07%	
% change as compared to prior-year period (UCAN)	13	6	9			8-12%
Paid memberships at end of period (EMEA)	51,778	66,698	74,036	995,604	7.44%	
% change as compared to prior-year period (EMEA)	-1	4	8			7-13%
Paid memberships at end of period (LATAM)	31,417	37,537	39,961	663,591	6.02%	
% change as compared to prior-year period (LATAM)	0	-9	4			2-5%
Paid memberships at end of period (APAC)	16,233	25,492	32,632	2,679,290	1.22%	
% change as compared to prior-year period (APAC)	-1	-1	5			3-8%

As shown in Table 1, extracted from the financial statements from Netflix's official website [9], by looking at number of paid memberships and percentage changes as compared to the prior year period, UCAN has been shown an average 10% of steady annual growth. As for that of EMEA, it went negative in 2019, however increased promptly in 2020 by 5%, and ended as 8% by 2021, similarly for APAC however in a lower pace, which is possibly due to the pandemic effects. Conversely, in LATAM, it first went down by 9% from 2019 to 2020, then increased drastically by 13% by 2021, which shows the large potential market.

Furthermore, by latest data [10], proportion of the users to the whole local population are calculated as shown in Table 1. Regions with high growth rate and low proportion of users are expected to have more rapid growth in the following years, therefore the predicted growth rate is listed in the last column. Consequently, revenues in operations can be predicted more accurate by doing so.

In terms of sales of DVD, a downward trend is seen throughout the past decade, due to less needs and increased delivery fees during pandemic. Hence, the growth rate is used from 2020 - 2021 to calculate the predicted future revenues of DVD sales.

As for modeling cost and expenses, usually costs are divided into two types, variable costs that change with quantity sold (typically COGS), and fixed costs, those that do not depend on quantities sold, typically Operating Expenses. In this case, costs are separated into four elements, cost of revenues, marketing, Technology and development, general and administrative, for which variable costs are based on sales growth that are assumed growing by last year's growth rate and fixed operating costs that shows a regular growth, so we decided to use a quantitative approach for accuracy.

Table 2. Last 3 years' quarterly data of costs and membership in districts as linear regression inputs

	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	y11	y12
22Dec	5323277	672682	684893	412002	79681	87061	45928	39007	15.9006	12.3985	7.33030	9.62174

23Dec	5983982	695356	775071	468196	83401	99202	50914	46535	16.9195	13.0361	7.13393	9.75195
24Dec	6644688	718031	865249	524391	87121	111343	55900	54064	17.9384	13.6737	6.93757	9.88216
25Dec	7305393	740704	955427	580585	90840	123485	60886	61592	18.9573	14.3113	6.74121	10.0123
26Dec	7966099	763378	1045605	636779	94560	135626	65872	69120	19.9762	14.9490	6.54484	10.1425
27Dec	8626804	786053	1135783	692974	98280	147768	70858	76649	20.9950	15.5866	6.34848	10.2727

Table 3. Annotation for from y1 to y12

y1	Cost of revenues
y2	Marketing
y3	Technology and development
y4	General and administrative
	United States and Canada (UCAN)
y5	Average paying memberships
y6	Average revenue per membership
	Europe, Middle East and Africa (EMEA)
y7	Average paying memberships
y8	Average revenue per membership
	Latin America (LATAM)
y9	Average paying memberships
y10	Average revenue per membership
	Asia-Pacific (APAC)
y11	Average paying memberships
y12	Average revenue per membership

To do so, python contributed to modeling a linear regression for 12 of the time dependent inputs, including cost and expenses and revenue inputs. As shown in Table 2, 'x' is the dependent variable (quarters of years) and 'y's are the independent variables (inputsTD). Using the model out of three years' data (2019-2021), the next year's data was predicted (, since linear regression are used for sufficient prior data and relatively short term prediction). Then with statistics from 19 to 21, combining the market predictions, data for rest of the years can therefore be predicted.

4.2. Investment/CAPEX

CapEx prediction is better based on scenario analysis, which in this case is just about to get out of aftershock of pandemic. Using the capital expenditure rate of revenue as a time independent input, CapEx can be computed easily, as well as PP&E and depreciation, which will later be referred as inputs in income statements.

4.3. Financing

The financing sheet includes specifics for debts, which are Debt at end of year, interest and debt change.

Model one: According to our scenario, the target d/e ratio is way higher than the current one. Therefore, more debts were added up systematically to meet the ideal proportion in a high rate of rise. Later by integrating assets and liabilities, the balance sheet can be completed.

Model two: To infer the effect of leverage and d/e ratio on a company's value, the control variable is the change of debt over the forecasting period, which is specified into this sheet. Therefore in this scenario, debts are adjusted to meet the current d/e ratio instead of the

targeted one, shown by relatively smaller amount of debt change over a same time period.

4.4. Valuation

Value of the enterprise is computed as the net present value(NPV), as shown in diagram 3. To do so, free cash flow(FCF) were firstly computed out of operating profit, NOPLAT, D&A, CAPEX and change in working capital. Then as referred to the time independent inputs to calculate weighted average cost of capital(WACC) as the discount rate, which includes cost of equity (Using CAPM method), cost of debt (interest rate) and company beta. Ultimately, by the discounted cash flow, NPV in forecast period (2021-2027) and continuation period(2027-) can be calculated and added up to acquire the enterprise value.

5. VALUATION

Model one and model two are simultaneously-conducted experiments with the control variable being a current and a target d/e ratio. The contrast between the two computed enterprise values will reveal whether remaining at the current d/e ratio or adjusting towards a target d/e ratio is better under the company's scenario. Namely, it reflects how the extent of leverage (liability level or debt to equity ratio) affects valuation and value of the company.

5.1. Model one

5.1.1. Computation

Table 4. WACC calculation inputs

US risk-free	1.9%	Growth Rate	3.9%
Market Premium	4.7%	Inflation in the base year	4.7%
Country Premium	5.5%	Tax Rate	1.1%
Company D/E	0.96	Target D/E	0.96

Table 5. Ultimate valuation sheet of model one including FCF and WACC

EFCF ($)	2021	2022	2023	2024	2025	2026	2027
Operating Profit	6,194,509,000	6,437,352,842	6,043,459,330	5,338,133,779	4,695,674,627	4,392,533,136	4,547,335,317
NOPLAT	6,126,369,401	6,366,541,950	5,976,981,277	5,279,414,307	4,644,022,206	4,344,215,271	4,497,314,629
D&A	10,554,578,928	11,594,402,169	12,634,937,208	13,517,882,975	14,171,252,834	14,623,606,634	14,973,380,086
CAPEX	13,829,346,928	14,871,411,869	15,415,643,035	15,575,573,762	15,595,873,569	15,725,165,883	16,141,749,776
Change in WC	-	- 36,877,710	581,503	- 17,204,944	- 8,988,521	17,523,951	51,677,756
FCF	2,851,601,401	3,126,409,971	3,195,693,947	3,238,928,465	3,228,389,991	3,225,132,072	3,277,267,183
WACC							
Inflation (%)	0.0	2.3	2.1	3.2	3.5	2.7	3.4
Company beta	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Cost of Equity (%)	11.96	9.56	9.36	10.46	10.76	9.96	10.66
Cost of Deb (%)	1.75	1.75	1.75	1.75	1.75	1.75	1.75
WACC (%)	6.93	5.69	5.59	6.16	6.31	5.90	6.26

Discount factor	1	0.97	0.92	0.87	0.82	0.77	0.73
Discounted CF	2,851,601,401	3,041,068,197	2,943,959,951	2,810,713,639	2,635,204,467	2,485,910,595	2,377,248,836

NPV forecast period: $16,294,105,684

NPV continuation period: $104,600,876,849

Value of debt: $58,255,095,210

Equity: $62,639,887,323

D/E ratio : 0.93

Enterprise Value: $120,894,982,533

5.1.2. Analysis and Evaluation on the outcome

As illustrated, this is the one using a current d/e ratio of 0.96. To retain this proportion, value of debt has to equate 48 percent of the enterprise value. Elements affected by distinctness of change in debt are cost of debt, and value of debt, consequently WACC(discount rate), NPV and the ultimate enterprise value.

Compared to the market price of $151,51 billion, the estimated value is around $30 billion lower. Analytically, the discrepancy has four possible causes.

Firstly, since it is assumed that the growth of Netflix will continue to slow down, the growth rate is 3.9%(= ROIC*IR = 18.52% * 21.15%), which brings the revenue down to a great extent and later reduces the value as well in the long term. Secondly, since a small change in the discount factor can make drastically different outcomes, a bit higher discount factor can make exponentially lower NPV. Thirdly, factors that are typed in manually can be inaccurate, which leads to bigger discrepancies in later calculations. Those include: inflation, expense coefficients (inputs-TI). Eventually, linear regression was partially used to estimate future revenue, cost and expenses. It seems to be reasonable, but there is insufficient prior data to make the model. More the data, more accurate it would be. Therefore, in this case, unfavorable inaccuracy is inevitable. Moreover, frequent fluctuations made neither quadratic nor linear equations suitable for modeling, which means the shape was out of bounds. Consequently, this limitation further added to the inaccuracy.

5.2. Model two

5.2.1. Computation

Table 6. Ultimate valuation sheet of model two including FCF and WACC

US risk-free	1.9%	Growth Rate	3.9%
Market Premium	4.7%	Inflation in the base year	4.7%
Country Premium	5.5%	Tax Rate	1.1%
Company D/E	0.96	Target D/E	1.10

Table 7. Ultimate valuation sheet of model two including FCF and WACC

EFCF ($)	2021	2022	2023	2024	2025	2026	2027
Operating Profit	6,194,509,000	6,437,352,842	6,043,459,330	5,338,133,779	4,695,674,627	4,392,533,136	4,547,335,317
NOPLAT	6,126,369,401	6,366,541,950	5,976,981,277	5,279,414,307	4,644,022,206	4,344,215,271	4,497,314,629
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CAPEX	13,829,346,928	14,871,411,869	15,415,643,035	15,575,573,762	15,595,873,569	15,725,165,883	16,141,749,776
Change in WC	-	- 36,877,710	581,503	- 17,204,944	- 8,988,521	17,523,951	51,677,756
FCF	2,851,601,401	3,126,409,971	3,195,693,947	3,238,928,465	3,228,389,991	3,225,132,072	3,277,267,183

WACC							
Inflation (%)	0.0	2.3	2.1	3.2	3.5	2.7	3.4
Company beta	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Cost of Equity (%)	11.96	9.56	9.36	10.46	10.76	9.96	10.66
Cost of Deb (%)	1.75	1.75	1.75	1.75	1.75	1.75	1.75
WACC (%)	6.93	5.36	5.27	5.79	5.94	5.55	5.89
Discount factor	1	0.97	0.93	0.87	0.83	0.78	0.74
Discounted CF	2,851,601,401	3,045,790,339	2,943,959,951	2,810,713,639	2,635,204,467	2,485,910,595	2,377,248,836

NPV forecast period: $16,446,689,265

NPV continuation period: $126,480,264,198

Value of debt: $74,866,499,433

Equity: $68,060,454,030

D/E ratio : 1.10

Enterprise Value: $142,926,953,463

5.2.2. Analysis and Evaluation on the outcome

In terms of model two, all elements remain the same, except for an alternative d/e ratio of 1.10, calculated by analyzing the company's current situation and the industry's average. In contrast to model one, with a higher d/e ratio, the value of debt is relatively higher, so that more interest rate needs to be paid. However, in the meantime, WACC is also lower, which results in a lower discount factor that brings the enterprise value up by over 22 billion dollars.

6. CONCLUSIONS

To sum up, the paper took Netflix as an example to demonstrate how leverage affects a low-levered company's value, as well as the effects and importance of adjusting the target d/e ratio. The comparative models exhibit that Netflix's enterprise value will increase if adjusted to a higher d/e ratio, since a higher interest rate is needed, but is counteracted by higher NPV caused by a lower discount factor.

Corporation valuation doesn't only reflect a business 'performance and status, but also gives reference to the financing of a company, and helps back up decision-making such as control of fiscal adjustments over the proportion of debts, and trade-off between returns and risks. As justified, Netflix gives a good example of the case, that systematic gradual increase in debt can increase the value of a low-levered corporation.

Nevertheless, there are always aspects to improve. For instance, a more comprehensive conclusion could have been drawn if there were exhibitions on organizations at other liability levels. Furthermore, studies on other valuation methods may also lead to a different outcome, as a debatable point of view to be unfolded in my next paper.

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