

INTERNATIONAL FINANCE FINANCIAL MODEL

Lesson 4

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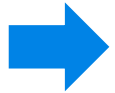
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Summary



Lesson 2 exercise and solution

DCF and some single-ratio traps

Lender ratios: D/E and the leverage effect, DSCR, LLCR

Example and new exercise

Exercise

Starting from the previous exercise, we can consider the possibility that the debt outstanding could change. The principal repayment is always as one third of the debt outstanding.

The bank perspective is to have a project generating enough cash to cover the debt service (DSCR).

Consider that the average of these annual ratio would be higher than 1.8x:

$$\text{AVERAGE} \left(\frac{\text{unlevered cash flow}}{\text{debt service (principal repayment + interests)}} \right) > 1.8$$

Please calculate the optimal leverage ratio (D/E) to maximize the leverage IRR, respecting the previous condition

Debt / Equity

Relative proportion of **shareholders'** equity between debt used to finance the company's assets.

Cash Flow	0	1	2	3
Net profit		29	31	40
D&A		100	100	100
Financial interests		9	6	3
Cash flow before debt	(300)	138	137	143
Debt drawdown	180			
Principal repayment		60	60	60
Financial interests		9	6	3
Cash flow after debt	(120)	69	71	80

Initial asset

Initial Debt

Initial equity contribution

$$D/E = 180/120 = 1.5$$

Or frequently named

$$D/E = 60/40$$

Unlevered cash flow / Debt service

Unlevered cash flow = Cash flow before debt

Debt service = total cash to cover the repayment of interest and principal on a debt for a particular period (principal repayment + financial interest)

Cash Flow	0	1	2	3
Cash flow before debt	(300)	138	137	143
Debt drawdown	180			
Principal repayment		60	60	60
Financial interests		9	6	3
Cash flow after debt	(120)	69	71	80
Debt Service		69	66	63

Which effects by changing D/E

1. Increase/reduction of the initial debt drawdown consequently the equity needs (capex – debt drawdown)
2. Increase/reduction of the principal repayment (1/3 of the initial outstanding debt)
3. Increase/reduction of the annual financial interests (5% of the outstanding debt at the beginning of that specific year)
4. Increase/reduction of taxes, as financial interests are tax deductible (tax as 30% of the Ebt)
5. Change in the cash flow after debt

Trials – Base case

Cash Flow		0	1	2	3
Cash flow before debt		(300)	138	137	143
Debt drawdown		180			
Principal repayment			60	60	60
Financial interests			9	6	3
Debt Service			69	66	63
Cash flow after debt		(120)	69	71	80
CF before debt / Debt service (DSCR)			2,00	2,07	2,27
Average DSCR			2,11		
Levered IRR			36,3%		

D/E = 60/40
(180/120) →

DSCR

Cash flow before debt / Debt service →

Average of annual DSCR >> 1.8x →

On the cash flow after debt →

Lender ratio

Sponsor ratio

Trials 1 – Increase the leverage

- From an initial D/E ratio of 60/40, since the Average DSCR (ADSCR) is above the target ($\gg 1.8x$) we could try to increase the leverage
- As first try, we increase the leverage up to 65/35

Debt = $300 \times 65\%$
 Repayment = $195/3$
 Interests = $195 \times 5\% \dots$

Cash Flow	0	1	2	3
Cash flow before debt	(300)	138	137	143
Debt drawdown	195			
Principal repayment		65	65	65
Financial interests		10	7	3
Debt Service		75	72	68
Cash flow after debt	(105)	63	65	75
CF a.d. / Debt service (DSCR)		1,85	1,92	2,09
Average DSCR		1,95		
Levered IRR		40,5%		

ADSCR still $> 1.8x$

Further leverage Benefit
 (levered IRR increase)

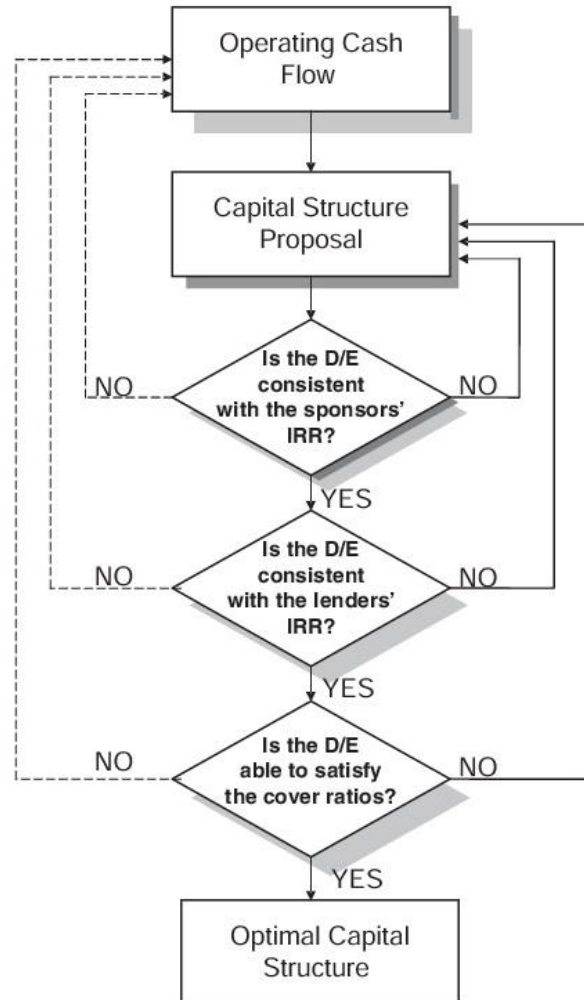
Leverage can be increased

Optimal results

- After several steps, it is possible to identify the optimal result, to get an average DSCR slightly higher than 1.8x, with the maximum levered IRR allowed
- The optimal leverage is around 70/30 (debt 70%)

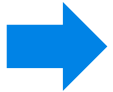
Cash Flow	0	1	2	3
Cash flow before debt	(300)	138	137	143
Debt drawdown	210			
Principal repayment		70	70	70
Financial interests		11	7	4
Debt Service		81	77	74
Cash flow after debt	(90)	58	60	70
CF a.d. / Debt service (DSCR)		1,72	1,78	1,95
Average DSCR		1,81		
Levered IRR		46,0%		

How to set the optimal D/E ratio?



Summary

Lesson 2 exercise and solution



Discounted cash flow

Lender ratios: D/E and the leverage effect, DSCR, LLCR

Exercise

Some evaluation methodologies

Discounted Cash Flow (DCF)	<ul style="list-style-type: none">• Forecast the free cash flow for many years ahead• Discount it back to today at an appropriate cost of capital (<i>dependent on the hurdle rate</i>)• Dividend discount if the analysis is done on the dividends itself• Crossing methodology: for corporate evaluation, but also for M&A in operating assets (<i>also in project finance</i>)
Market based (Multiples)	<ul style="list-style-type: none">• Multiples of some index, by sectorial multiples• i.e. Multiples on Cash Flow, After-tax profits, EBIT, EBITDA, etc.
(Net assets based)	<ul style="list-style-type: none">• Based on equity in the balance sheet.• May reflect revaluation of assets, or assets at replacement price, or liquidation values.

Discounted Cash Flow Method

Starting point:

1. Free Cash Flows

2. Discount rate

3. [Terminal value]

- Growth rate or expected operating flows
- Market changes
- Macro-economic changes
- Change in law
- Change in the financial structure
- Turnaround Cases

- Equivalent to liquidation/sale value
- Value of the cash flows after the forecast period
- Methods - Perpetual Growth & Multiple Approach

DCF – Two ways – same (similar) result

Unlevered based



- Starting from the unlevered cash flow (debt free)
- **WACC as discount rate**
- **Enterprise Value** as result = Market value of operating assets
- [With terminal value evaluation]



Enterprise Value = Equity Value
+ Net financial position
(*Outstanding debt-Cash*)

Levered Based

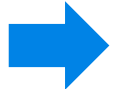


- Starting from levered cash flow
- **Ke as discount rate**
- **Equity Value** as result = Market Value of a firm's equity
- [With terminal value evaluation net of final outstanding debt]

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Exercise

Sponsor vs Lender perspectives

Different perspectives according to different roles, strategies and risk profiles

Sponsor

Risk based remuneration
Sensitivity analysis
Multiple Scenario



RatioS

(IRR, ROE, NPV, EPS)
DCF, Payback period

Lender

Lower remuneration
Lower risk
Stress test to avoid default



Covenant

(DSCR, LLCR, D/E)
Stress test

Lender's perspective

Will I get back my money?

Which is the impact on my ratios?



Loan repayment (total life and year-to-year) = cover ratio and equity / debt ratio. Covenant



Effects on the lender's asset and balance sheet (covered / uncovered ratio)



Interest rate and commissions (upfront fees, agency fees)

Example for discussion

An European Investor is considering a possible investment (>500 M\$) in a power generation (electricity) plant coal fired. The plant has to be built and it will be located in China.

How a bank could evaluate the possibility to finance the project and under which conditions?

Lender's ratios (covenant): D/E

Debt /
Equity

- Relative proportion of **shareholders'** equity and debt used to finance a company's assets. Closely related to leveraging, the ratio is also known as Risk, Gearing or Leverage. Over project's life and year-to-year
- Covenant: Debt / Equity \leq Max D/E

Lender's ratios (covenant): DSCR

DSCR Debt Service Cover Ratio

- Measure of the cash flow available to pay current debt obligations. The ratio states net operating income as a multiple of debt obligations due within one year, including interest, principal, sinking-fund and lease payments. **DSCR** is used to calculate debt servicing ability.
- $\text{DSCR} = \text{Cash Flow before debt} / \text{Debt Service}$
- Covenant: $\text{ADSCR (Average)} \geq \text{Target}$
 $\text{DSCR min} \geq \text{Target (over the project life)}$

Example: DSCR

DSCR
Debt Service
Cover Ratio

- $DSCR = \frac{\text{Cash Flow before debt}}{\text{Debt Service}}$
- Covenant: $ADSCR \text{ (Average)} \geq \text{Target}$
 $DSCR \text{ min} \geq \text{Target (over the project life)}$

DSCR		0	1	2	3	4	5	6	7	8	9
L	Cash Flow Available for Debt Service (C-H-J±K)	(300)	(400)	137	164	143	141	142	106	100	102
P	Debt Service (O+F)	0	0	97	93	89	85	81	77	74	70
Debt Service Cover Ratio - DSCR (L/P)		n.a.	n.a.	1,41	1,76	1,60	1,66	1,75	1,37	1,36	1,47

	Model		Covenant
Min DSCR	1,36	≥?	1,30
ADSCR	1,55	≥?	1,35



Lender's ratios (covenant): LLCR

LLCR Loan Life Cover Ratio

- Financial ratio used to estimate the ability of the borrowing company to repay an outstanding loan
- LLCR provides the lenders with a measure of the number of times the project cash flow over the scheduled life of the loan can repay the outstanding debt balance
- $LLCR = (\text{NPV of CFADS over Loan Life [+DSRA]}) / \text{Debt Balance}$
- Covenant: ALLCR (Average) \geq Target

$LLCR \text{ min} \geq \text{Target (over the project life)}$

Example: LLCR

LLCR
Loan Life
Cover Ratio

- LLCR measures of the number of times the project cash flow over the scheduled life of the loan can repay the outstanding debt balance
- $LLCR = \frac{\text{NPV of CFADS over Loan Life [+DSRA]}}{\text{Debt Balance}}$
- Covenant: ALLCR (Average) \geq Target

LLCR min \geq Target (over the project life)

LLCR		0	1	2	3	4	5	6	7	8	9
L	Cash Flow Available for Debt Service (C-H-J±K)	(300)	(400)	138	164	143	142	143	106	100	102
S	NPV of CFADS over loan life	396	820	732	612	505	394	275	185	97	
P	Debt Service (O+F)	0	0	100	96	92	88	84	80	76	72
Q	Debt balance, principal final (M+N-O)	216	504	473	405	338	270	203	135	68	0
T	Life Loan Cover Ratio - LLCR (S/Q)	n.a.	n.a.	1,55	1,51	1,50	1,46	1,36	1,37	1,43	n.a.

Min LLCR
ALLCR

	Model		Covenant
Min LLCR	1,36	$\geq?$	1,35
ALLCR	1,45	$\geq?$	1,45



Take away

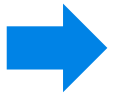
- Lender perspective on projects
- Lender ratio (covenant): D/E
- Lender ratio (covenant): DSCR
- Lender ratio (covenant): LLCR
- How to match sponsor e lender's goals: maximize IRR and respect covenants

Summary

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DCF and some single-ratio traps

Lender ratios: D/E and the leverage effect, DSCR, LLCR



Exercise

Exercise

P&L	0	1	2	3
Revenues		200	300	250
Costs		50	150	90
Ebitda		150	150	160
D&A		100	100	100
Ebit		50	50	60
Financial interests		9	6	3
Ebt		41	44	57
Tax		12	13	17
Net profit		29	31	40

Cash Flow	0	1	2	3
Net profit		29	31	40
D&A		100	100	100
Financial interests		9	6	3
Capex variation (-)	300			
Cash flow before debt	(300)	138	137	143
Debt drawdown	180			
Principal repayment		60	60	60
Financial interests		9	6	3
Cash flow after debt	(120)	69	71	80

Starting from the previous exercise, with initial capex 300, debt drawdown 180, calculate:

- DSCR (annual and average)
- LLCR (annual and average)
- D/E (annual and average)

For the D/E calculation, consider that:

- *the initial net cash out (120) would be an equity contribution*
- *the company will distribute all the cash flow after debt (as net profit + equity reduction)*

Annex

Some traps of IRR

Traps of IRR only – some examples

- **Economies of Scale Ignored:**

it ignores the actual dollar value of benefits. A project value of \$1M with 18% IRR should always be preferred over a project value of \$100k with 50% IRR.

Year 1	-1.000.000	-100.000
Year 2	500.000	50.000
Year 3	500.000	100.000
Year 4	358.000	75.000

IRR	18,0%	50,0%
TOTAL GAIN	358.000	125.000

- **Impractical Implicit Assumption of Reinvestment Rate:**

While analyzing a project with IRR method, it implicitly assumes that the positive future cash flows are reinvested at IRR. Maybe annual cash are not enough to be reinvested

What to do with the money I get ?

Traps of IRR only – some examples

- **Different Terms of Projects:**

Consider two projects with different project duration. One ends after 3 years and the other ends after 5 years. This point is not considered by IRR method.

Year 1	-100.000	-100.000
Year 2	100.000	40.000
Year 3	30.000	40.000
Year 3		40.000
Year 4		40.000

IRR	24,2%	21,9%
TOTAL GAIN	30.000	60.000

- **A mix of Positive and Negative Future Cash Flows:**

When a project has some negative cash flow in between other positive cash flow, the equation of IRR is satisfied with more than one rate of return i.e. it reaches the trap of Multiple IRR.