

**INTERNATIONAL FINANCE  
FINANCIAL MODEL  
Lesson 6  
Addendum – Debt repayment**

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# Summary

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Three main structures for debt repayment:

- **Fixed capital repayment** (*sometimes called Italian mortgage*)

Capital repayment is fixed every year. Since interests decrease over the time, debt service decreases over the time

- **Fixed debt service** (*sometimes called Italian mortgage*)

Debt service is fixed every year. Since interests decrease over the time, capital repayment has to increase over the time to keep a fixed debt service.

Debt service can be calculated with «PMT» or «RATA» excel formula, with financial interests, debt duration and debt outstanding as variable

- **DSCR profiled**

Specifically for project finance deals, where leverage is used to be high (>70%), and cash flow should be predictable, debt service can be profiled according to the project cash flow (before debt service).

The calculation of the debt service can be more complex as it requires iterations or excel macros

# (A) Fixed capital repayment

Debt outstanding	100	Yearly capital repayment	30
Duration (tenor)	15years	Yearly debt service	30 + financial interests
Financial interests	6%		

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOT
Debt outstanding - initial		100,0	93,3	86,7	80,0	73,3	66,7	60,0	53,3	46,7	40,0	33,3	26,7	20,0	13,3	6,7	
Financial interest		6,0	5,6	5,2	4,8	4,4	4,0	3,6	3,2	2,8	2,4	2,0	1,6	1,2	0,8	0,4	48,0
Capital repayment		6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	100,0
Debt service		12,7	12,3	11,9	11,5	11,1	10,7	10,3	9,9	9,5	9,1	8,7	8,3	7,9	7,5	7,1	148,0
Debt outstanding - final	100	93,3	86,7	80,0	73,3	66,7	60,0	53,3	46,7	40,0	33,3	26,7	20,0	13,3	6,7	0,0	

Debt service starts from 12.7 down to 7.1

Total financial interests are 48 over the time

If the project cash flow is 14 every year, at the beginning the debt service is too high (DSCR of 1.1x at year 1)

# (B) Fixed debt service

Debt outstanding	100	Yearly debt service	10.3
Duration (tenor)	15years	Using the formula	PMT (6%,15ys,100)
Financial interest rate	6%	Yearly capital repayment	10.3 - financial interests

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOT
Debt outstanding - initial	100,0	95,7	91,1	86,3	81,2	75,8	70,0	63,9	57,5	50,6	43,4	35,7	27,5	18,9	9,7		
Debt service		10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	154,4
Financial interest		6,0	5,7	5,5	5,2	4,9	4,5	4,2	3,8	3,4	3,0	2,6	2,1	1,7	1,1	0,6	54,4
Capital repayment		4,3	4,6	4,8	5,1	5,4	5,7	6,1	6,5	6,8	7,3	7,7	8,2	8,6	9,2	9,7	100,0
Debt outstanding - final	100	95,7	91,1	86,3	81,2	75,8	70,0	63,9	57,5	50,6	43,4	35,7	27,5	18,9	9,7	0,0	

Debt service is always 10.3

Total financial interests are 54.4 over the time, but you pay less at the beginning

If the project cash flow is 14 every year, at the beginning the debt service can match the lender's covenant (DSCR always 1.36x)

Is it better a fixed capital repayment or a fixed debt service? Usually a fixed debt service, because you pay less at the beginning, but it depends on financial interests and project IRR.

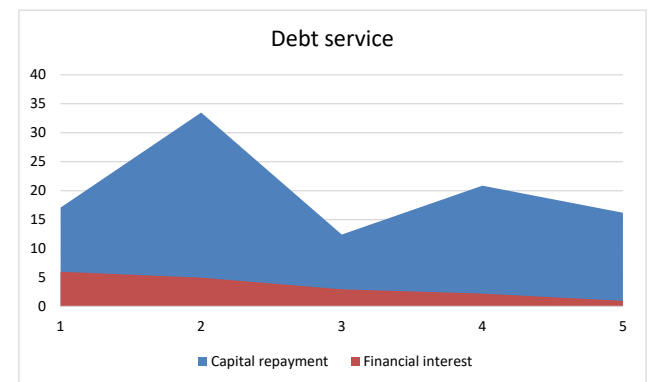
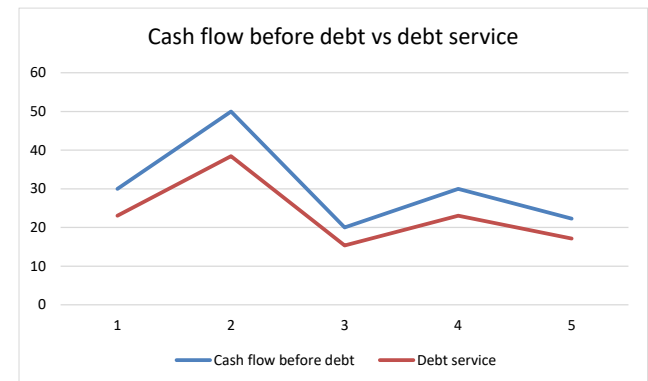
*You might try to simulate a different structure, for instance applying a fixed debt service and a fixed capital repayment in the exercise A of 15oct, and changing the financial interest rate*

# (C) DSCR Profiled

And if the cash flow would change over the years? In this case, debt service should be calculated considering the cash flow before debt service

Debt outstanding 100      Yearly debt service      DSCR profiled considering a DSCR = 1.3x every year  
 Duration (tenor) 5years  
 Financial interest rate 6%

Year	0	1	2	3	4	5	TOT
Cash flow before debt		30,00	50,00	20,00	30,00	22,30	
Debt outstanding - initial	100,0	82,9	49,4	37,0	16,2		
Debt service		23,1	38,5	15,4	23,1	17,2	117,2
Financial interest		6,0	5,0	3,0	2,2	1,0	17,1
Capital repayment		17,1	33,5	12,4	20,9	16,2	100,0
Debt outstanding - final	100,0	82,9	49,4	37,0	16,2	0,0	
DSCR		1,3	1,3	1,3	1,3	1,3	



By using a DSCR profiled debt service, it is possible to keep stable the yearly DSCR.

DSCR profiled debt service is frequently used in project finance deals, where leverage is relevant and cash flow are predictable