Reading: Odomirok - Chapter 22/23 (goodwill - 2016.Fall Q18) a-Question
Model: 2016.Fall #18
Problem Type: GAAP goodwill using cost-of-capital approach

Given

Amounts at time of acquisition at CY	
FV(assets)	280
U.S. GAAP assets	275
FV(liabilities) *other than loss & LAE*	70
purchase price	11

nominal future cash flows of liabilities		
CY	*paid during year*	100
CY + 1	*paid during year*	60
CY + 2	*paid during year*	40
> CY + 2	*paid during year*	0

some more junk you'll need	
pre-tax cost-of-capital	9%
risk-free rate	2%
illiquidity premium	1%

still more junk you'll need:

loss & LAE payments are made mid-year <== use 0.5, 1.5, 2.5,... to discount
return on capital is paid to investores at year-end <== use 1, 2, 3,... to discount

required capital @ year-end = **unpaid x** 50%

(stated slightly differently from exam problem - this is done so that my solution fits the risk-adjustment formula from Odomirok)

Find value of purchaser's GAAP **goodwill** using the cost-of-capital approach

The first section of the solution calculates FV(loss & LAE) according to the 3 components.

Component #1: calculate nominal future cash flows of liabilities

For this problem, we are given the cash flows, otherwise we'd have to calculate them from the LDFs or the payment pattern.

Component #2: discount the nominal cash flows & add a load for illiquidity

discount rate	=	risk-free rate	+	illiquidity premium
	=	2%	+	1%
	=	3%		

Actually, all we did here was calculate the discount rate, i. The actual discounting is done further down after the risk margin calculation.

Component #3: risk margin calculation

First, we need the cumulative unpaid values at the start of each year. See table at right =>

CY	200
CY + 1	100
CY + 2	40
> CY + 2	0

Then the capital required to support these liabilities = 50% x unpaid:

C_0	=	50%	x	200	=	100
C_1	=	50%	x	100	=	50
C_2	=	50%	x	40	=	20
C_3	=	50%	x	0	=	0

Now we can apply the **risk adjustment** formula using the discount rate from above:
Note that we use integer exponents because investors are paid at year-end.

avg(C_0, C_1)	/	(1.03) ^ 1	=	72.8	
avg(C_1, C_2)	/	(1.03) ^ 2	=	33.0	
avg(C_2, C_3)	/	(1.03) ^ 3	=	9.2	
avg(C_3, C_4)	/	(1.03) ^ 4	=	0.0	
				115.0	
			x	6%	= (R - i)
		risk margin component of FV(liabilities) ==>		6.9	

solution continued on next page…

Now we have to calculate the discounted **unpaid values** using the same discount rate
Use the given **incremental** unpaid values.
Note that we use fractional exponents 0.5, 1.5, 2.5,... because payments are made mid-year .

100	/	(1.03) ^ 0.5	=	98.5
60	/	(1.03) ^ 1.5	=	57.4
40	/	(1.03) ^ 2.5	=	37.2
				193.1

Now we have all the pieces of FV(liabilities)

risk margin	6.9	
unpaid loss & LAE:	193.1	
other than loss & LAE:	70.0	*<== given in the statement of the problem*
FV(liabilities) =	**270.0**	

We also know:	**FV(assets) =**	**280.0**	*<== given in the statement of the problem*
	P =	**11.0**	*<== given in the statement of the problem*
Then:			*(purchase price)*

goodwill	=	P	-	[	FV(assets)	-	FV(liabs)	]
	=	11.0	-	[	280.0	-	270.0	]
	=	1.0	*<== final answer*					