Solvay Brussels School Economics & Management

ULB

Université Libre de Bruxelles
Programme 2010-2011

CORPORATE VALUATION AND FINANCING
GEST-D-408 & GEST-D-410
Prof. H. Pirotte

LASTNAME :

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Final Exam
Form A

Wednesday 12 January 2011

Indications

Please follow these indications:

1. The exam lasts 3 hours.
2. Please verify that your document contains exactly 6 pages.
3. Each question is worth one point unless otherwise stated, i.e. there are 26 points in total, including two "bonus" (or facultative) questions of 3 points each.
4. Please write your first name and last name on the first page.
5. Good work!!!

Problems

P1 Company valuation

We are on the 31st December 2010. You just finished your studies at the SBS and decide to start your own business in the business of 3D TVs. The initial investment will be € 40 million (amount to be paid on the 31st December 2010) and the company you would like to launch will have the following summarized income statement for the next 3 years (end of the year – mio. €):

	2011	2012	2013
EBIAT	2,8	4,2	6,3
Depreciation	2	2	2

You also know that:

- the debt of your company will always be equal to 40% of the total value of the company (amount adjusted continuously),
- after 2013 (only), EBIAT growth rate is expected to be 2% every year,

- investment cash-flows will be equal to depreciation from 2014 onwards, and to 0 from 2011 to 2013.
- the tax rate is 30%,
- the cost of debt of your new company is expected to be 8.3%,
- the WCR of the firm should not change,

You want to determine if your company is valuable, but, unfortunately, you didn't manage (as it is relatively new business) to obtain an estimate of the cost of assets. A friend of yours suggests that you can use information relative to a quoted company named 3D&Co (which is exactly in the same business as your company) to obtain your ka. That information is summarized in the following table:

3D&Co	
D/V	20%
ke	11%
kd	6%
tc	30%

Q1 Compute the ka of the 3D&Co (the debt of 3D&Co is adjusted continuously to maintain D/V constant).

Q2 Compute the WACC of your company and justify the formula you use *(if you did not manage to find an answer to the previous question use a ka of 10%).*

Q3 Compute the terminal value of the company (FCF going from 2014 until infinity) at the end of 2013 *(if you did not manage to find an answer to the previous question use a WACC of 9%).*

Q4 Compute the amounts for the total company value for each year-end of the period 2010-2013.

Q5 Compute the amounts for the value of debt for each year-end of the period 2010-2013. *(if you did not manage to find an answer to question Q3 use a terminal value of € 90 mio.)*

You want to be sure of your computation of the value of the company and decide to use another method where tax shields are **explicitly** modelled, the Capital Cash Flows method (applies to questions 6,7 and 8).

Q6 Is this method coherent with what you did before or not and why?

Q7 Compute the terminal value of the levered company in 2013 using the new method.

Q8 Compute the total value of the levered company in 2010 using the new method *(if you did not manage to find an answer to the previous question use a terminal value of € 90 mio.)*

You want to check your results once again using the FTE method (still be coherent with what you did before):

Q9 Compute the annual free cash flows to equity (FTEs) for the years 2010 to 2013.

Q10 Compute the terminal value of equity in 2013 using the FTE method. *(if you did not manage to find an answer to the previous question use a terminal value of € 55 mio. for equity).*

Q11 Compute the total value of equity in 2010 using the FTE method.

P2 Risky debt

You were recently hired by the department responsible of the credit risk pooling of the bank. In other words, you are responsible for the ultimate valuation and management of the credit risk positions of the bank. The bank possesses 250 mortgage loans where **each** loan has an average maturity of **3 years** and is "covered" by real estate value on average of **600'000 EUR** (today's value). Real estate is quite volatile nowadays and your statistical department evaluates real estate volatility around **32.25%**, annual. The annual riskfree rate is currently at **2%**. The average loan face value is **450'000 EUR**. There is no rent or any cash flow paid by the borrower before maturity. Only the reimbursement of the loan matters and we assume that the loan would be in default if not covered by the real estate underlying (a straight and simple loan where 450'000 EUR is the maximum amount paid back in fine).

Your manager is just going to a meeting where the value of this portfolio will be discussed and therefore you just have the time to imagine a **three-period binomial tree**, i.e. where 1 period would count for 1 year.

Q12 How much is today's value of the average mortgage loan? **(2 points)**

Q13 How much is the expected yield of each loan? (*If you did not manage to find any value before, use a value of 500'000).*

Q14 How much do you expect the loss-given-default (LGD) to be for the average loan? **(2 points)**

Q15 [BONUS QUESTION]
The bank would like to find another option for its customers, in order to propose another set of conditions. In particular, the bank would like to be able to renegotiate some of these mortgages and propose loans where the bank holds a fraction of the real estate (becoming an owner) instead of being repaid in the case the real estate appreciates a lot at the end of the 3 years (the bank would be able to still choose to be repaid or to keep the fraction of the real estate). Imagine that this fraction would be 50%, please compute the new final payoffs of this special "convertible loan", price it and provide the new expected yield (based on the same face value of 450'000 EUR of course) **(3 points)**

Your favourite Belgian financial newspaper, l'Echo, publishes a comment about the Belgian Treasury financing situation. It states: ' Last year the average return on Belgian linear bonds (OLOs) with maturities between 2 and 10 years was 2.4%, against 3% last week. Belgian public debt now pays 1.04% more over 10 years than Germany'.

Q16 What does this last figure (1.04%) represent? What do you think drives it? Mention/discuss at least two factors (in Belgium and/or elsewhere).

P3 Risk-neutral asset pricing

You live in a world where there exists only one asset: a share of a company named PNC (share's expected CF and market price are stated below). This world is quite myopic since investors limit their time horizon to one year, the economy being then in one of the following two states: "bad" or "good".

Q17 Your boss asks you to find the value of Project A (the expected CF are stated below), a friend of yours tells you that this is impossible as there is only one asset in the economy. Could you still find the value of this project?

	Market Value (t=0)	Expected Value (t=1)	
		Good State	*Bad State*
Real Probability		0.3	0.7
PNC's share	0.80	1.5	0.75
Project A	?	2	1

A new asset just pops up in the economy, its market price is 1.03 for an expected CF of 1 in the bad state and 1.75 in the good state.

Q18 Seen how successful you have been in solving his first question, your boss asks you to find the value of Project B which CF will be 2 with certainty in period t=1.

Q19 Your boss is impressed, you managed to answer his first two questions, he asks you to find the value of a last project which CF are 3 in the good state and 1 in the bad state.

P4 Capital structure and leverage

Collin-Dufresne, Goldstein & Martin (2001) analyze credit spreads against the following factors:

Variable	Description
Δlev_t^i	Change in firm leverage ratio
Δr_t^{10}	Change in yield on 10-year Treasury
$\Delta slope_t$	Change in 10-year minus 2-year Treasury yields
ΔVIX_t	Change in implied volatility of S&P 500
$S\&P_t$	Return on S&P 500
$\Delta jump$	Change in slope of Volatility Smirk

The results of their analysis are presented here below in a next table.

Q20 [BONUS QUESTION]
Please comment this analysis, focusing on **one** of the factors presented her above only, i.e. the most relevant one following your comprehension of this table. **(3 points)**

Table III

Structural Model Determinants of Credit Spread Changes by Rating Group

For each industrial bond i having at least 25 monthly quotes CS_t^i over the period July 1988 to December 1997, we estimate the following regression: $\Delta CS_t^i = \alpha + \beta_1^i\, ret_t^i + \beta_2^i\, \Delta r_t^{10} + \beta_3^i\, (\Delta r_t^{10})^2 + \beta_4^i\, \Delta slope_t + \beta_5^i\, \Delta VIX_t + \beta_6^i\, S\&P_t + \beta_7^i\, \Delta jump_t + \epsilon_t^i$. Quotes are discarded whenever a bond has less than 4 years to maturity. Average OLS parameter estimates are reported in Panel A. Panel B shows averages for a short maturity subsample where quotes are discarded whenever a bond has more than 9 years to maturity. Panel C shows averages for a long maturity subsample where quotes are discarded whenever a bond has less than 12 years to maturity. Associated t-statistics for each average appear immediately beneath.

	Rating Groups					
	AAA	AA	A	BBB	BB	B
	Panel A: All Maturities					
Intercept	0.021	0.016	0.011	0.018	0.009	−0.033
t	2.89	8.17	10.78	9.44	1.82	−0.67
ret_t^i	0.002	0.000	−0.001	−0.002	−0.003	−0.018
	2.11	0.15	−2.67	−4.15	−4.58	−2.75
Δr_t^{10}	−0.109	−0.150	−0.151	−0.159	−0.296	−0.862
	−7.15	−17.99	−27.73	−26.03	−14.74	−4.36
$(\Delta r_t^{10})^2$	−0.039	−0.012	0.037	−0.014	0.095	0.568
	−0.52	−0.76	3.94	−1.02	2.15	1.19
$\Delta slope_t$	0.042	0.009	−0.017	0.027	−0.060	0.048
	0.55	0.70	−1.90	2.83	−1.92	0.36
ΔVIX_t	0.002	0.004	0.002	0.002	0.000	−0.029
	0.62	2.92	4.44	2.88	−0.11	−0.79
$S\&P_t$	−0.016	−0.015	−0.014	−0.014	−0.023	−0.043
	−14.36	−18.50	−37.00	−21.22	−9.82	−3.65
$\Delta jump_t$	0.003	0.004	0.003	0.003	0.004	0.005
	2.83	10.24	13.57	12.98	6.62	0.98
Adjusted R^2	0.222	0.293	0.234	0.194	0.197	0.275
N	4	56	275	245	90	18

Binomial Distribution
(non cumulative)

number of possible trials	times goal reached	probability of goal (1 time)																			
n	x	0.01	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95
2	0	0.9801	0.9025	0.8100	0.7225	0.6400	0.5625	0.4900	0.4225	0.3600	0.3025	0.2500	0.2025	0.1600	0.1225	0.0900	0.0625	0.0400	0.0225	0.0100	0.0025
	1	0.0198	0.0950	0.1800	0.2550	0.3200	0.3750	0.4200	0.4550	0.4800	0.4950	0.5000	0.4950	0.4800	0.4550	0.4200	0.3750	0.3200	0.2550	0.1800	0.0950
	2	0.0001	0.0025	0.0100	0.0225	0.0400	0.0625	0.0900	0.1225	0.1600	0.2025	0.2500	0.3025	0.3600	0.4225	0.4900	0.5625	0.6400	0.7225	0.8100	0.9025
3	0	0.9703	0.8574	0.7290	0.6141	0.5120	0.4219	0.3430	0.2746	0.2160	0.1664	0.1250	0.0911	0.0640	0.0429	0.0270	0.0156	0.0080	0.0034	0.0010	0.0001
	1	0.0294	0.1354	0.2430	0.3251	0.3840	0.4219	0.4410	0.4436	0.4320	0.4084	0.3750	0.3341	0.2880	0.2389	0.1890	0.1406	0.0960	0.0574	0.0270	0.0071
	2	0.0003	0.0071	0.0270	0.0574	0.0960	0.1406	0.1890	0.2389	0.2880	0.3341	0.3750	0.4084	0.4320	0.4436	0.4410	0.4219	0.3840	0.3251	0.2430	0.1354
	3	0.0000	0.0001	0.0010	0.0034	0.0080	0.0156	0.0270	0.0429	0.0640	0.0911	0.1250	0.1664	0.2160	0.2746	0.3430	0.4219	0.5120	0.6141	0.7290	0.8574
4	0	0.9606	0.8145	0.6561	0.5220	0.4096	0.3164	0.2401	0.1785	0.1296	0.0915	0.0625	0.0410	0.0256	0.0150	0.0081	0.0039	0.0016	0.0005	0.0001	0.0000
	1	0.0388	0.1715	0.2916	0.3685	0.4096	0.4219	0.4116	0.3845	0.3456	0.2995	0.2500	0.2005	0.1536	0.1115	0.0756	0.0469	0.0256	0.0115	0.0036	0.0005
	2	0.0006	0.0135	0.0486	0.0975	0.1536	0.2109	0.2646	0.3105	0.3456	0.3675	0.3750	0.3675	0.3456	0.3105	0.2646	0.2109	0.1536	0.0975	0.0486	0.0135
	3	0.0000	0.0005	0.0036	0.0115	0.0256	0.0469	0.0756	0.1115	0.1536	0.2005	0.2500	0.2995	0.3456	0.3845	0.4116	0.4219	0.4096	0.3685	0.2916	0.1715
	4	0.0000	0.0000	0.0001	0.0005	0.0016	0.0039	0.0081	0.0150	0.0256	0.0410	0.0625	0.0915	0.1296	0.1785	0.2401	0.3164	0.4096	0.5220	0.6561	0.8145
5	0	0.9510	0.7738	0.5905	0.4437	0.3277	0.2373	0.1681	0.1160	0.0778	0.0503	0.0313	0.0185	0.0102	0.0053	0.0024	0.0010	0.0003	0.0001	0.0000	0.0000
	1	0.0480	0.2036	0.3281	0.3915	0.4096	0.3955	0.3602	0.3124	0.2592	0.2059	0.1563	0.1128	0.0768	0.0488	0.0284	0.0146	0.0064	0.0022	0.0005	0.0000
	2	0.0010	0.0214	0.0729	0.1382	0.2048	0.2637	0.3087	0.3364	0.3456	0.3369	0.3125	0.2757	0.2304	0.1811	0.1323	0.0879	0.0512	0.0244	0.0081	0.0011
	3	0.0000	0.0011	0.0081	0.0244	0.0512	0.0879	0.1323	0.1811	0.2304	0.2757	0.3125	0.3369	0.3456	0.3364	0.3087	0.2637	0.2048	0.1382	0.0729	0.0214
	4	0.0000	0.0000	0.0005	0.0022	0.0064	0.0146	0.0284	0.0488	0.0768	0.1128	0.1563	0.2059	0.2592	0.3124	0.3602	0.3955	0.4096	0.3915	0.3281	0.2036
	5	0.0000	0.0000	0.0000	0.0001	0.0003	0.0010	0.0024	0.0053	0.0102	0.0185	0.0313	0.0503	0.0778	0.1160	0.1681	0.2373	0.3277	0.4437	0.5905	0.7738