Homework #6

Due on Monday, May 9, at 6:00pm CT.

This homework uses Harvard Business Case, **Blaine Kitchenware, Inc.: Capital Structure**.

1 Assumptions and Data

- Use the facts from the case, along with the parameters assumed in Table 1.

Share price (2006)	16.25
Tax rate (2006)	0.40
Tax rate (2007 onward)	0.30
Market premium	0.06
Debt beta	0.20
Risk-free rate (%)	5.02
Interest earned on excess cash (%)	5.02
Terminal growth rate (%)	3.00
Loss Given Default (%)	15.00

Table 1: Assumed parameters

- We make a few assumptions that conflict with the info in the case:

Assumption	Reference	Case uses	Assume instead
2006 Market capitalization	Exhibit 3 value	959,596.35	959,595.00
2006 Cash counted as NWC	Exhibit 3, footnote (a)	0.00	66,557.00
2006 Selling General & Admin (SG&A)	Exhibit 1	28,512.00	18,598.00

Table 2: Assumptions that conflict with the case

- Exhibit 1 lists Selling, General, and Administrative (SG&A) costs **inclusive** of Depreciation. This is why the exhibit has to add back Depreciation to get to EBITDA—because it was already subtracted out with SG&A. We will refer to SG&A exclusive of depreciation, as illustrated in the bottom row of Table 2 and in Table 3.

- Exhibit 1 lists "Other Income" which comes from the realized return of the excess cash and marketable securities. The case does not include this in EBIT, but rather considers it as "negative" interest. We follow the case in excluding it from EBIT. See again the illustration Table 3.

	Year	2,004	2,005	2,006
	Revenue	291,940	307,964	342,251
	COGS	(-204,264)	(-220,234)	(-249,794)
	SG&A	(-18,306)	(-18,836)	(-18,598)
=	EBITDA	69,370	68,894	73,860
	Depreciation	(-6,987)	(-8,213)	(-9,914)
=	EBIT	62,382	60,682	63,946

Table 3: Explanation of Exhibit 1 EBIT

- Exhibit 3 lists "net debt" as debt minus excess cash, (see footnote b.) For Blaine in 2004-2006, that is a negative number. This means that your calculations will have $w_D < 0$ and $w_E > 1$. It means the historic asset beta will be larger than the historic equity beta.

- The corporate debt spreads are provided in Exhibit 4, and Table 4 gives an assumed threshold for the ratings, as well as their 4-year probability of default.

	Min ICR	Max ICR	Yield (%)	Prob of Default (%)
Aaa	13.00		5.88	0.60
Aa	10.00	13.00	6.04	0.92
A	7.00	10.00	6.35	1.90
Baa	5.00	7.00	6.72	6.63
Ba	3.00	5.00	7.88	24.04
B	2.00	3.00	8.94	44.75

Table 4: Debt ratings for various Interest Coverage Ratios (ICR), calculated as EBIT / interest. The probabilities of default are **4-year cumulative default probabilities.**

- The case does not provide forecasts of the balance sheet and income statement, but they are included as addendums to the Excel book of case exhibits. These forecast were built by assuming growth rates given in Table 5. No need to use these directly, as they were already used to build the forecasts for you. They are reported here only for clarity.

	2007	2008	2009	2010	Beyond
% rate	7.00	6.00	5.00	4.00	3.00

Table 5: Forecasted growth rates for selected balance sheet and income statement items.

2 Considering a Buyback

Suppose that Blaine plans to increase leverage by repurchasing shares at the end of the 2006 fiscal year. Blaine is considering two plans, a small buyback and a large buyback.

	Small Buyback	Large Buyback
Repurchased Shares	12,000.00	22,000.00
Share Price	16.25	16.25
Cash Used	164,309.00	164,309.00
Debt Issued	30,691.00	193,191.00

Table 6: Two plans under consideration

2006	No Repo	Small Repo	Large Repo
Shares Repurchased	0	12,000	22,000
Shares Outstanding	59,052	47,052	37,052
Net Working Capital	98,788	98,788	98,788
Net Other	50,945	50,945	50,945
PPE	174,321	174,321	174,321
Net Assets	324,054	324,054	324,054
Net Debt	(-164,309)	30,691	193,191
Book Equity	488,363	293,363	130,863
Market Equity	959,595	764,595	602,095

Table 7: 2006 Balance Sheets under three scenarios

1. Calculate the impacts on the 2007 income-statement. Specifically, fill out Table 1 under all three scenarios.

   See Solution Table 1.

2. Discuss Blaine's gross and net profit margins, asset turnover, and leverage under these three scenarios.

   See Solution Table 2 for a comparison of these ratios.[1] Note that this is just a refinancing—it does not change EBIT or sales. Thus, several of the metrics stay the same.

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[1]To try to reduce the required calculations, the next question recommends mixing the 2007 income data with the 2006 balance-sheet data. For this question it is fine if you used 2006 or 2007 balance-sheet data—it makes no difference given the metrics we are calculating and the assumed stability of the balance-sheet.

The Large Repo sees book and market leverage get to over 80% and 30% respectively, while it stays very low for the Small Repo. The other notable difference is net margin, which goes from nearly 13% to less than 8%.

3. Under the baseline and buyback scenarios, discuss how Blaine's leverage, return-on-book-equity, and trading multiples compare to the comps in Exhibit 3. (For the comparison, go ahead and use the 2007 data in Table 1 with the 2006 balance sheet data in Table 7.)

See Solution Table 3 for a comparison of the mean of the firms listed in Exhibit 3, with Blaine under the historic 2006 data as well as the projected 2007 income statement under the three buyback scenarios.[2]

Based on this comparison, it is clear that the Small Repo will put Blaine in a similar position to the average of the comps, whereas the Large Repo will give it much higher Book Leverage and ROE, (though still a smaller Market-to-Book value.)

BS: 2006, IS: 2007	No Repo	Small Repo	Large Repo
EBIT			
Debt Rating			
Debt Yield			
Interest income			
Interest charged			
Net interest			
EBT			
Gross Tax			
Tax Shield			
Net Tax			
Earnings			
EPS			
Book ROE (%)			

Table 8: 2007 Income Statements under three scenarios

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[2]Once again, using the mismatch of 2007 metrics with 2006 balance sheet is just meant to ease the amount of work for the question. Using the 2007 balance sheet to match the 2007 income statement makes little difference to the metrics, only impacting the book ROE.

BS: 2006, IS: 2007	No Repo	Small Repo	Large Repo
EBIT	68,421.95	68,421.95	68,421.95
Debt Rating	Aaa	Aaa	Baa
Debt Yield	5.88	5.88	6.72
Interest income	8,248.31	0.00	0.00
Interest charged	0.00	1,804.63	12,982.44
Net interest	(-8,248.31)	1,804.63	12,982.44
EBT	76,670.26	66,617.32	55,439.52
Gross Tax	20,526.59	20,526.59	20,526.59
Tax Shield	2,474.49	(-541.39)	(-3,894.73)
Net Tax	23,001.08	19,985.20	16,631.86
Earnings	53,669.19	46,632.13	38,807.66
EPS	0.91	0.99	1.05
Book ROE (%)	10.99	15.90	29.66

Solution Table 1: 2007 Income Statements under three scenarios

BS: 2006, IS: 2007	No Repo	Small Repo	Large Repo
Gross margin	0.1868	0.1868	0.1868
Net margin	0.1466	0.1273	0.1060
Asset (incl. excess cash) turnover	0.5983	0.8179	0.8179
Asset (excl. excess cash) turnover	1.0818	1.0818	1.0818
Debt-to-book-assets	(-0.5070)	0.0947	0.5962
Debt-to-market-assets	(-0.2066)	0.0386	0.2429
Interest-coverage	(-8.2953)	37.9147	5.2703

Solution Table 2: Financial metrics for 2007

| | Exhibit 3 | | BLAINE - BS: 2006, IS: 2007 | | |
	Comp Mean	Blaine 2006	No Repo	Small Repo	Large Repo
ROE (book)	0.26	0.11	0.11	0.16	0.30
Leverage (book)	0.12	(-0.32)	(-0.51)	0.09	0.60
Market-to-Book	3.55	1.96	1.96	2.61	4.60

Solution Table 3: Comparable firms

3 Valuing Blaine

Assume

- Blaine executes the Large Buyback described in Table 6.

- Consider the valuation just afterward, at the end of 2006, thus valuing the 2007-beyond projected cashflows.

- Assume the debt used to repurchase shares is "interest-only" in perpetuity. (No principal repayment.)

1. Report the various betas, filling out Table 4.

   See Solution Table 4 for the solution.

   To solve this, you must start by converting the Blaine historic equity beta (Exhibit 3) into a historic asset beta based on the historic leverage.[3] After calculating this historic asset beta, (shown in the solution table,) convert this to a forward-looking equity beta by applying Blaine's post-repurchase leverage.

2. Report the 2007-2010 free-cash-flow-to-asset used in LOOP valuation.

   See Solution Table 5 for the FCF-to-assets used for APV (and WACC.) Note that these FCF use the LOOP taxes which ignore the interest tax shield. (That tax-shield value is added separately for APV, and it is accounted for via the discount rate for WACC.)

3. Calculate the (LOOP) asset value of Blaine. How much of this comes from the terminal value?

   See Solution Table 6.

   The majority (over 80%) of the LOOP value comes from the terminal value.

4. Calculate the value of the tax-shields to Blaine. Calculate it using the debt discount rate, $(\overline{R}_D)$, and also the asset discount rate, $(\overline{R}_A)$. Explain which rate is more appropriate for Blaine's tax shield?

   See Solution Table 6.

   The value of the tax shields is much higher if they are discounted by $\overline{R}_D$, (not surprisingly.) The appropriate rate depends on how risky the tax shields are. Given Blaine's strong profitability, the firm is almost certainly able to monetize them for the small recap, which implies they have the same riskiness as the debt, and we should use $\overline{R}_D$. However, the large recap puts significant pressure on Blaine's cashflows as seen in the small ICR. Thus, it is more reasonable to see the riskiness of these tax shields as equalling the riskiness of Blaine's overall cashflows and assets, suggesting that we use $\overline{R}_A$.

   Note that here we assume there is no terminal growth rate for the tax shields.

5. Report and compare the APV and WACC values for Blaine.

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[3]Alternatively, you may have used the comparable firms and calculated each of their historic asset betas.

6. Which is better suited for this analysis, the APV or the WACC model? Why would they differ here?

The APV is more appropriate for this valuation, even if we only consider Tax violations of LOOP. The WACC assumes constant leverage going forward, which is not our assumption here. We assume the debt level is constant, but with the projections we see rising equity value, making the market leverage shrink over time.

	Asset	Debt	Equity
Weight	—		
Beta			
Discount Rate			
WACC		—	—

Table 9

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	Asset	Debt	Equity
Weight	—	0.2429	0.7571
Beta	0.6344	0.2000	0.7738
Discount Rate	0.0883	0.0622	0.0966
WACC	0.0837	—	—

Solution Table 4

	2007	2008	2009	2010	TV (2010)
EBIT	68,422	72,527	76,154	79,200	
Tax (Gross/LOOP)	(-20,527)	(-21,758)	(-22,846)	(-23,760)	
Depr.	10,608	11,244	11,807	12,279	
Capex	(-12,203)	(-11,191)	(-9,886)	(-8,304)	
Δ NWC	(-2,256)	(-2,069)	(-1,828)	(-1,535)	
FCF-to-asset	44,045	48,753	53,401	57,879	1,023,225
Tax shields	3,895	3,895	3,895	3,895	44,127

Solution Table 5

Terminal (LOOP)	729,518
Total (LOOP)	893,855
Tax Shield @ $\overline{R}_A$	44,127
Tax Shield @ $\overline{R}_D$	62,616

Solution Table 6

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4 Optimal Leverage

Blaine has been making acquisitions recently, and there may be opportunities for future acquisitions. Suppose that...

- It is the end of 2006, and Blaine has done the Large Buyback.

- In 4 years, at the end of 2010, Blaine will have the option to pay **$200,000** for acquisitions that increase capacity and permanently boost Blaine's subsequent FCF-to-assets by **20%**.[4]

- You have calculated the terminal value of assets, which is based on the mean forecasted outcome. Suppose that there is substantial variation in the forecasts: there is a **50%** chance that the terminal value is **double** what you calculated, and there is a **50%** chance the (LOOP) terminal value is **0**.

1. What is the value of this real option? For simplicity, discount both the strike and the option payoff by $\overline{R}_A$.

   See Solution Table 7. Note that in the "Good" scenario, the option is far in the money, while in the "Bad" scenario it is far out of the money. Taking the average of both payoffs (net of the strike) shows the option has substantial value—on the same order of magnitude as the value to the tax shields discounted at $\overline{R}_A$.

2. Suppose that if Blaine defaults on its debt, it loses (in 2006 dollars) the previously calculated real option value, the tax shield (valued with $\overline{R}_A$ in perpetuity,) as well as a percentage (known as the Loss Given Default) of Blaine's 2006 LOOP asset value. See Table 1 for the LGD parameter.

   Using the probability of default estimates in Table 4, calculate the expected cost of financial distress over this 4-year period. (For simplicity, we are considering default over the 4 years as a single outcome, not the function of a sequence of 1-year default probabilities.)

   See Solution Table 8 for the components of the COFD and the estimated ECOFD.

3. In total, do you estimate that the Buyback increased or reduced Blaine's value?

   See the calculations in Solution Table 8, and note that the net impact is sensitive to some assumptions.[5]

4. Suppose Blaine cannot fund the (optional) real option strike for acquisitions with new debt, nor is there sufficient internal cash; rather, it must be funded with new equity.[6] At the end of the four years, how far must the real option be in the money in order for equity holders to exercise it? Consider the Merton Model of Debt and Equity and its implied hurdle-rate for new equity.

   From the Merton Model, we know that to incentive equity holders, the project must return

   $$\text{NPV-per-dollar-invested} > \frac{w_D \beta_E}{w_E \beta_E}$$

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[4]That is, the acquisitions increase only the LOOP FCF, not the tax shields. Furthermore, given these are the FCF subsequent to 2010, they are estimated by the terminal value.

[5]For instance, did you assume the tax shield had a perpetual growth rate? What was the Large Repo rated, which depends on whether you used the forecasted ICR or imputed ICR. Also, we have discounted the tax shields at the asset rate, which we argued above seems reasonable. If the tax shields were discounted at the debt rate, then the Large Buyback increases in value.

[6]Perhaps the value of the acquisitions can only be seen by management (equity) with inside information and deep knowledge about the assets.

Given the data in Solution Table 4, this implies the hurdle in Table 7.

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strike	200,000
underlying (good)	409,290
underlying (bad)	0
expected payoff	104,645
value	74,608
underlying hurdle to exercise	216,587

Solution Table 7

LOOP Value	893,854.81
Loss on default (%)	15.00
LOOP Value lost given default ($)	134,078.22
Tax Shield	44,126.60
Real Option	74,607.66
COFD	252,812.49
Prob. default (%)	6.63
$\mathbb{E}\left[\text{COFD}\right]$	16,761.47
LOOP Value	893,854.81
Value of Leverage	101,972.80
Total Net Value	995,827.61

Solution Table 8