ENG 111 Homework 5 Solutions

Spring 2021

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1. (20 points) Dinvi Inc. is currently selling two products, A, and B, 200 units and 100 units per year respectively at a price of $50/unit.

Dinvi is considering introducing a new product, C, to the market. Company is projecting that:

A's sales will go down, one time, by 25% while B's sales go up, one time, by 20% and stay there as long as C is available in the market. Per unit price of C is $40 and variable costs are $12.

20% of the existing office space will accommodate the sales/managerial activities of the new product line without disrupting the existing operations. The entire office space has rental/utility fixed costs amounting to $1,000 per year. (Hint: is this an allocated cost or opportunity cost?)

A warehouse, that is owned by the company (and currently rented out for $400/year) will be dedicated to C's storage. (Hint: is this an allocated cost or opportunity cost?)

Tax rate is 20%.

An asset purchase is required at a cost of $2,000 today. Asset is expected to depreciate straight-line to zero in five years with an expected market value of $300 in five years.

Sales will start next year and expected to be 200 units for the first three years and go up to 300 units for the last two years.

An immediate increase of $50 in NWC will be needed (with no other increases necessary in the subsequent years) that is expected to be recovered in five years.

a) (10 points) If the market rate for Dinvi is 5%, should C be introduced to the market?

Salvage Value = Market Value - 20% (market val - book val) = 300-.20(300-0)=240

Years	*0*	*1*	*2*	*3*	*4*	*5*	
Fixed Asset -depreciates straight-line 5 years	-2,000						
Erosion		-2,500	-2,500	-2,500	-2,500	-2,500	1 point
Synergy		1,000	1,000	1,000	1,000	1,000	1 point
Revenue		8,000	8,000	8,000	12,000	12,000	1 point
Var cost		-2,400	-2,400	-2,400	-3,600	-3,600	1 point
Rent loss		-400	-400	-400	-400	-400	1 point
Dep		-400	-400	-400	-400	-400	1 point
Pretax		3,300	3,300	3,300	6,100	6,100	
Tax		660	660	660	1,220	1,220	
NI		2,640	2,640	2,640	4,880	4,880	
OCF		3,040	3,040	3,040	5,280	5,280	4 points
Nwc	-50					50	
Salvage						240	4 points
Incremental Cash Flow	-2,050	3,040	3,040	3,040	5,280	5,570	4 points
NPV	14,937						4 points

b) (10 points) WITHOUT calculating the financial break-even point, can you assess whether the company is financially breaking even or not? Explain your reasoning with a few sentences.

The company is producing at a level higher than the financial break even point. We can deduce this because we know that at the current level of production NPV is positive. When all the costs and the benefits as well as the opportunity cost of financing is included, the company is more than covering its costs. Therefore, company is financially breaking-even and more!

2. (15 points) You are asked to choose between two mutually exclusive projects: A, B. The market rate of return is 14%. For both projects cash streams begin today (period zero) if you undertake them. For project A, the cash stream is (for years 0 through 3):
-$750, $310, $430,$330
For project B, cash stream is:

-$2100, $1200, $760, $850

a) (5 points) If these are independent projects and you do not have a budget constraint, which project(s) would you accept using Profitability Index criteria?

PI of A = (310/1.14+430/1.14²+330/1.14³) / 750 = 1.10
PI of B = (1200/1.14+760/1.14²+850/1.14³) / 2100 = 1.05
Both are valuable projects as their PI's are greater than 1. *(10 points)*

b) (5 points) If projects are mutually exclusive, which project would you pick if any, using the Profitability Index criteria?

Since the projects are mutually exclusive, we need to do calculate the PI of incremental cash flow:

PI of (Project 2 – Project 1) = (890/1.14+330/1.14²+520/1.14³) / 1350 = 1.03
Choose project 2.
(10 points)

c) (5 points) Now, assume that there is a third project: C. You do not know the cash flow of Project C . However, you know that the PI of the incremental cash flow of C over A is 0.76. If you had to choose between project A and C, which one would you choose? Also, can you tell, for sure, that Project C, by itself, better or worse than the market?

	Year 0	Year 1	Year 2	Year 3	PI
A	-750	310	430	330	-1.10
B	-2100	1200	760	850	-1.05
C	-1000	500	400	400	-1.02
C-A	-250	190	-30	70	-0.76
B-A	-1350	890	330	520	-1.03

3. (15 points) Digitel is a mobile devices company. Unit sale price if the mobile device is $84 and the unit variable cost is $24. The accounting break-even and the financial break-even points of Digitel are 240,000 units and 280,000 units respectively. If we hold everything else the same and only increase the annual fixed costs by $1,200,000, what would be the new accounting and financial break-even points?

Original Accounting Break-Even =(Fixed Costs+Depr.)/(SalesPrice-Variable Cost) = 240,000

New Accounting Break-Even =(Fixed Costs+$1,200,000+Depr.)/(SalesPrice-Variable Cost)

=(Fixed Costs+Depr.)/(SalesPrice-Variable Cost)+$1,200,000/($84-$24)
=240,000+20,000=260,000 units.

= (EAC+Fixed Costs(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t)

Original Financial Break-Even = (EAC+Fixed Costs(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t)
=280,000

New Financial Break-Even = (EAC+(Fixed Costs+$1,200,000)(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t)

=[(EAC+Fixed Costs(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t)]
+[$1,200,000(1-t) /(84-24)(1-t)]*

=280,000+20,000=300,000 units

4. (15 points) SEE THE EXCEL FILE

Uber provides an app-based transportation service and it is one of the fastest growing companies with a strong investor backing. In this homework, you are going to be simulating a simplified version of Uber's future cash flow in US for the coming 5 years, 2022 through 2026:

Here is the information on the current numbers and future estimates for the US market:

The revenue: Average Daily Rides and Average Price Per Ride, which are currently 1 million and $4, respectively.

Growth Projections: Uber's average daily ride number is estimated to go up by 8% with 0.3 probability, 12% with 0.6 probability and 18% with 0.1 probability each year independent of its realization in the previous year.

Average Price Per Ride is expected to go up 3% per year.

Using the above information, answer the following:

Due to various claims on safety and regulation issues, company is expected to spend a considerable amount on legal settlements. Uber aims to be able to cover its settlement costs with the revenue it obtains from operations for the coming 5 years 90% of the time, on average.
The settlement expense for 2022 through 2026 is expected to be a total of $X in today's dollars. If the discount rate is 5%, estimate X by running a Monte Carlo Simulation at least 1,000 times.

Excel Help: You need to generate random variables. Enter "=RAND()" in, say, cell A1, and Excel will return a random variable between 0 and 1. Each time you press enter on cell A1, this number will change. Entering "=IF(A1<.25,100,IF(A3<.5,200,IF(A3<.75,300,400)))" will return one of the following numbers with equal probability: 100 or 200 or 300 or 400.

5. (20 points) You bought a 4-year bond with 10% coupon rate and $1,000 face value that is offering a 9% current yield today, exactly two years after its issue date (after its second coupon payment).

a) (10 points) What is the yield on this bond today?

Current Yield = Coupon Payment / Current Price of the Bond
9% = 100 / Current Price of the Bond
Current Price of the Bond = $1,111.11

The yield that corresponds to this bond is

$1{,}111.11 = 100/(1+r) + 1100/(1+r)^2$
$r = 4.1\%$

b) (10 points) What would be the capital gains rate from this year to next year?

Solution Alternative 1:

Price next year is 1100/1.041 = 1,056.67

Capital Gains is (1,056.67-1,111.11) /1,111.11 = - 4.9%

Solution Alternative 2:

Yield = Current Yield + Capital Gains Rate
Capital Gains Rate = 9%-4.1% = -4.9%

6. (15 points) Three years ago, PurpX issued 10,000 bonds with the following specifications:

10-year bond with 10% coupon rate and $1000 face value.

PurpX made its third coupon payment today with 7 more coupon payments as well as the face value left to be paid.

The current market rate is 6%.

One board member suggests to take advantage of the low rates and purchase back all the bonds to reissue them at 6% coupon rate.

a) (5 points) How much does PurpX need today to purchase back all of its bonds?

BV = (100/0.06)(1-1/1.06^7)+1000/1.06^7 = 1,223
*10,000*1,223 = $12,230,000*

b) (5 points) How many new 7-year, 6%-coupon, $1,000-face-value bond does PurpX need to issue to finance this purchase?

6% coupon rate bonds will sell at face value today. Therefore from the sale of each bond, PurpX can get $1,000.
*12,230,000/1,000 = 12,230 bonds need to be issue*d.

c) (5 points) Would you be supporting the board member who makes this suggestion? Why or why not?

The present value of the existing payments left on the current bonds is exactly equal to the the present value of the total payments of the required amount of new bonds. Therefore, there will be no change in the financial obligations of the company.

Indifferent.