USING ACCOUNTING INFORMATION TO VALUE A BUSINESS – A CASE STUDY FOR THE MBA FINANCIAL ACCOUNTING COURSE

Timothy Kelley, University of San Diego
Loren Margheim, University of San Diego

TEACHING NOTES

CASE DESCRIPTION

The primary purpose of this case is to illustrate how financial accounting information can be used by potential purchasers of an existing business to develop a bid to purchase the business shown in the case. Secondary issues include the use of Excel for present value calculations such as calculating internal rate of return and differential use of operating cash flow and accrual accounting information for valuation purposes. The case has a difficulty level of five, appropriate for first year graduate students. The case has been designed to be used in a Financial Accounting course within an MBA program. Additionally, the case could be used in a junior or senior level finance or accounting class where students have the appropriate knowledge of financial statements and present value analysis. The case can be taught in 1-2 hours with no outside preparation by students as long as students have had exposure to present value concepts and financial accounting ratios.

CASE SYNOPSIS

In this case, students play the role of investors seeking to buy a fictitious company (USD Motors) that has prior financial statements available. Students forecast future income and operating cash flows for USD Motors and use this information to create a bid to buy the Company. Students learn how to use Excel to compute the present value of future net incomes and future operating cash flows as part of the process of putting together a bid. Students will discover how past accounting information can be used to make an important business decision. Students will compare their bid to benchmark data for Price to Earnings Ratio and Market to Book Value Ratio to make sure that their bid is reasonable. Students will prepare "sealed bids" that will be submitted to the course instructor toward the end of a class session. The highest bidding group will be the new "owner" of USD Motors.

RECOMMENDED QUESTIONS TO PROVIDE STUDENTS

1. Use Approach 1 (as described in the case) to estimate the average expected earnings (i.e., equal earnings for each year) over the next 20 years for USD Motors and compute the present value of an ordinary annuity using these estimated earnings. You are to use an interest rate for present value purposes that reflects the amount of risk that you think is associated with the purchase of USD Motors. The greater the perceived risk, the higher the interest rate (rate of return that is expected to be provided to the investors of USD Motors) that should be used by student groups for this case. Add this present value figure to the Company's current cash balance to determine your Bid #1.

2. Use Approach 2 (as described in the case) to estimate the expected earnings for each individual year over the next 20 years for USD Motors (reflecting some estimate about the expected growth in earnings) and compute the present value of these 20 future years of net incomes. Because each year will have a different expected net income, use Excel to determine the present value to save time. Without Excel, separate calculations would be needed (using a present value table) to take the present value of each individual net income figure and to add the resulting 20 calculated present value figures to determine the overall present value of the forecasted earnings (over the next 20 years) for USD Motors. Add your overall present value figure to the Company's current cash balance to determine your Bid #2.

3. Use Approach 3 (as described in the case) to estimate the expected operating cash flows over the next 20 years for USD Motors and to compute the present value of these estimated operating cash flows. For this calculation, forecast the expected earnings for each year for USD Motors for the next 20 years. Then add back depreciation expense for each year as an attempt to estimate the operating cash flows for each future year. For this case, all the Company's revenues are received as a cash flow at the end of the year that they are earned, and all expenses are cash outflows (at year end) in the year when they are incurred except for depreciation expense. Depreciation expense must be added back to net income (for each future year) to approximate operating cash flows because depreciation expense is an expense for accrual accounting purposes but is not a cash outflow (the cash outflow was previously incurred when the property, plant and equipment was purchased). Add your present value figure to the Company's current cash balance to determine your Bid #3.

4. Use the information from your answers to the first three case questions above to judgmentally decide which bid (of your three calculated bids) you would like to use for your "sealed" bid. Before submitting your group's bid to your instructor, make sure that your bid is reasonable considering what Price to Earnings Ratio and Market to Book Value Ratio for USD Motors is implied by the bid your group will be submitting.

These teaching notes are organized around the above four case questions. Additionally, the authors provide some concluding observations concerning:

(a) computing internal rate of return with the case materials and
(b) approaches the authors have used to employ the case materials in the classroom.

Case Question #1: Estimate the average expected earnings over the next 20 years for USD Motors and compute the present value of an ordinary annuity using that average expected earnings figure in your calculation.

In each group's initial attempt at coming up with a reasonable bid, students are asked to develop a bid based on the present value of an ordinary annuity after estimating an average annual net income for USD Motors over the next 20 years. Here the students are using a simplified assumption that all future years will have the same annual increase in earnings beyond Year 4 and that you can just present value the "average" of future years' income (in this initial step toward coming up with a reasonable bid).

One approach to estimating an average net income for the next 20 years would be to create a forecast assuming that the $5,000,000 net income per year annual increase over the last 4 years will continue over the next 20 years. For example, with this assumption, net income would be estimated to be $36,500,000 in Year 5. This $36,500,000 figure is computed by adding the actual net income in Year 4 of $31,500,000 to the $5,000,000 expected annual increase in net income. Adding $5,000,000 in net income per year would result in a net income of $131,500,000 in Year 24. One approach to computing the average net income over the next 20 years would be to find a simple average of the forecasted net incomes for Year 5 and Year 24. This estimated average annual net income would be $84,000,000 [($36,500,000 + 131,500,000)/2].

Using Excel, we can compute the present value of the expected net incomes for USD Motors over the next 20 years. Since we have already estimated an average annuity of $84,000,000 over the next 20 years based on forecasted future net incomes, we must now determine what interest rate to use. In Table 1 of the Teaching Notes (shown below) we have used 16% as our illustration interest rate. Student groups that perceive less risk could well justify a lower rate which will result in a higher present value and a higher bid. Table 1 of the Teaching Notes shown below indicates that the present value of an ordinary annuity of $84,000,000 over 20 years at i = 16% is $498,022,636.

To determine a bid for USD Motors students' groups would need to add the value of any liquid assets like cash and subtract any liabilities from the computed present value. In this case, USD Motors does not have any liabilities, so to determine the bid we would add the $498,022,636 present value of forecasted average earnings to the current cash balance of $110,000,000 to compute a potential bid of $608,022,636 for USD Motors.

It should be noted that the above calculation could also be made by looking up the present value factor for an ordinary annuity without using Excel. The present value factor (with an ordinary annuity) for n = 20 years and i = 16% is 5.929. A present value of an ordinary annuity of $498,036,000 would be determined by multiplying the $84,000,000 annuity by the

present value factor of 5.929. The $14,000 difference between this $498,036,000 value computed using a present value factor and the $498,022,636 calculated in the previous paragraph using Excel is due to rounding.

Students will hopefully realize that the first attempt at coming up with a bid (USD Motors Bid #1--$608,022,636) may be on the high side. Assuming for Bid #1 that the forecasted earnings will be an annuity, the resulting calculations to determine this bid will likely overstate the present value of earnings from the earlier years because the annuity of $84,000,000 would likely overstate forecasted earnings in the early years when the present value factors are greater. On the other hand, Bid #1 would likely tend to understate the present value of earnings from the later years (when the present value factors are lower) as long as earnings are increasing over time. The overstated present value of earnings from the earlier years will likely be greater than the understated present value of earnings from the later years, yielding a net overstatement when calculating the present value of expected earnings. Thus, Bid #1 is likely to be overstated.

Case Question #2: Estimate the expected earnings for each individual year over the next 20 years for USD Motors (reflecting some estimate about the expected growth in earnings) and compute the present value of these 20 future years of net incomes.

The way to remedy the overstatement created by the overly simple first attempt at developing a reasonable bid for USD Motors is to estimate the forecasted earnings for each year individually and to calculate the present value of these earnings using Excel. In Table 2 of the Teaching Notes, we increase the forecasted net income by $5,000,000 each year like what was done when computing Bid #1. Using Excel to do the present valuing of each individual year's estimated net income, we would find that the present value of the forecasted net incomes for the next 20 years is $369,563,061 when using 16% as the interest rate for present value calculations. After adding the current cash balance of $110,000,000 to this $369,563,061 present value figure, we determine that our Bid #2 is $479,563,061.

As expected, Bid #2 is lower than Bid #1 because Bid #2 has lower net incomes in the earlier years compared with using the average annuity assumed for Bid #1. Since Bid #2 has lower incomes in the earlier years and because these earlier years have higher present value factors (compared with the much lower present value factors associated with the later years), Bid #2 at $479,563,061 is lower than Bid #1 at $608,022,636.

It can be asserted that the more conservative (lower) Bid #2 is more realistic than Bid #1 since it is unlikely that USD Motors' earnings would suddenly increase to the $84,000,000 average earnings shown under the discussion of the Case Question #1 solution. Bid #2 is built upon the more realistic assumption (for forecasting purposes) that USD Motors will see a gradual $5,000,000 increase in net income each year over the next 20 years consistent with what was experienced in the first four years of the Company's operations.

For this question, student groups will likely try to use other data to estimate yearly earnings other than the simple assumption that earnings will increase $5,000,000 per year and other data to justify a different interest rate to use in the present valuing process. Instructors

should specifically ask groups to justify how the estimated yearly earnings were estimated and to also justify the interest rate they used to perform the present valuing process.

Case Question #3: Estimate the expected operating cash flows (over the next 20 years) for USD Motors and compute the present value of these estimated operating cash flows.

While Bid #2 (with increasing forecasted income each year) is shown to be more realistic than Bid #1 (which assumes that forecasted income forms an annuity), it could be argued that Bid #2 is flawed in that it is based on forecasted future incomes rather than forecasted future operating cash flows. In an investment decision, investors may be more interested in making a bid based on expected operating cash flows (instead of using expected accrual accounting net income figures). One way to approximate operating cash flows is to add back depreciation expense to net income. This add back is needed as depreciation expense is an accrual accounting expense that is not a cash flow in the current period, as the cash flow took place when the property, plant and equipment was previously purchased. In Table 3 of these Teaching Notes, we add back the $3,500,000 annual depreciation expense (see Table 2 in the case for USD Motors' income statements showing this depreciation figure) to the forecasted net income figures for USD Motors for the next 20 years (from Table 2 -- Teaching Notes) in order to forecast the operating cash flows for each year. The present value of the forecasted operating cash flows for USD Motors is found to be $390,314,004 (see Table 3 -- Teaching Notes). This present value figure is added to the $110,000,000 current cash balance of USD Motors and the resultant figure of $500,314,004 is Bid #3.

This Bid #3 of $500,314,004 is found to be larger than Bid #2 at $479,563,061 which reflects (in this case) that operating cash flows (Bid #3) are greater than accrual-based income (Bid #2) since the add back of depreciation expense to net income is assumed in this case to be the only adjustment between net income and operating cash flows. We believe that most investors would be more interested in using forecasted operating cash flows when making an investing decision (instead of using forecasted net income figures) and that therefore Bid #3 is more realistic than Bid #2.

Case Question #4: Before submitting your group's bid to your instructor, make sure that your bid is reasonable in light of the Price to Earnings Ratio and Market to Book Value Ratio for USD Motors that would be implied by the bid your group will be submitting.

For discussion purposes, let's say that the highest group bid for a particular class session is $500,314,004 (from Bid #3 above). To get an idea if this bid is reasonable, let's compute the Price to Earnings Ratio and the Market to Book Value Ratio for USD Motors and compare these ratios to some useful benchmarks. To compute the Price to Earnings Ratio for USD Motors we would divide the $500,314,004 purchase price by the Year 4 earnings for USD Motors of $31,500,000 resulting in a Price to Earnings Ratio of 15.88. (Note: The purchase price and net income figures could both be divided by the 140,000,000 outstanding common shares, yielding a purchase price per share of $3.57 and an earnings per share of $.23. Dividing the purchase price

per share by the earnings per share would give us a Price to Earnings Ratio of 15.52, with the slight difference between 15.88 and 15.52 being due to rounding).

In our class discussion, we would look at the Price to Earnings Ratios of growth stock companies (with higher price to earnings ratios and earnings growth rates) and the Price to Earnings Ratios of so-called value stock companies (with lower Price to Earnings Ratios and earnings growth rates) to determine if students believe that USD Motors is more of a growth stock or a value stock and if the "winning" (highest) bid for the class is reasonable. In most class discussions, students will see USD Motors as a value stock and that the winning bid for the class is reasonable. For example, on March 9, 2023, the average Price to Earnings Ratio (based on trailing twelve month "as reported" earnings) for the S & P 500 was 20.94 (https://www.multpl.com/s-p-500-pe-ratio). Since USD Motors' Price to Earnings Ratio is lower than the S & P 500 average for this ratio, there is evidence that USD Motors is being considered a value stock with lower expected growth in future earnings (compared with the average U.S company).

In order to compute the Market to Book Value Ratio for USD Motors, the Company's fair market value of $500,314,004 (using Bid #3) would be divided by the $236,000,000 book value of its stockholders' equity at the end of Year 4 (the date of acquisition) to yield a Market to Book Value Ratio of 2.12. In our class discussion, we would look at this 2.12 Market to Book Value Ratio and compare it to growth stocks (with higher Market to Book Value Ratios) and to value stocks (with lower Market to Book Value Ratios) and generally most classes will find that the winning bid is reasonable for a company that seems to be a value stock. USD Motors can be seen as a value stock since its Market to Book Value Ratio of 2.12 is lower than the Market to Book Value Ratio of the average U.S. Company. (Note: On March 9, 2023, the average Market to Book Value Ratio for the S & P 500 was 3.93 (https://www.multpl.com/s-p-500-price-to-book).

CONCLUDING OBSERVATIONS

(a) Internal Rate of Return Considerations:

If there is time at the end of the class, we like to show students how to compute the Internal Rate of Return associated with the purchase of USD Motors. To illustrate the concept of internal rate of return, we extend the information from Bid #3. Let's say that instead of the computed Bid #3 of $500,314,004, a student group decides to bid $600,000,000 in its attempt to purchase USD Motors. Of course, the investors' implied rate of return with Bid #3 is 16% which is the interest rate that was used for present value purposes to develop Bid #3. If, on the other hand, the investors bid $600,000,000 (Bid #4) for USD Motors, the question remains: what would be the investors' rate of return implied by this purchase price (assuming that we are using the same forecasted operating cash flows that was used for Bid #3). The computed internal rate of return would be the interest rate that would cause the present value of future net operating cash flows to equal the net cost of the investment to purchase USD Motors.

In order to compute the internal rate of return, students would first need to determine the net cost of purchasing USD Motors. In this case, if the cost to acquire USD Motors is $600,000,000 (Bid #4) and USD Motors has a cash balance of $110,000,000, then the net cost to acquire USD Motors is $490,000,000 (see Table 4 of the Teaching Notes). Students can then use Excel to find out what interest rate is needed that will cause the present value of 20 years of forecasted operating cash flows to equal the net cost to acquire USD Motors. Near the bottom of Table 4 of the Teaching Notes, we can see that the internal rate of return related to this $600,000,000 bid is 12.85%. The formula for computing this internal rate of return is =IRR(D32:D52). The judgement call for the (hypothetical) winning student group with Bid #4 was deciding that the group felt comfortable with a forecasted 12.85% rate of return considering the group's perception of the risk/rate-of-return trade-offs associated with investing in USD Motors.

(b) How the Authors have used the Case Materials in the Classroom:

This case has been used by the authors in MBA financial accounting classes and in honors sections of Principles of Financial Accounting classes (in which we use an MBA level financial accounting textbook). In these classes, the case is done after the class has covered present value calculations and financial statement analysis. The case normally takes up an entire 80-minute class but is well worth the time as students discover experientially how accounting information can be used to make a business decision. We have not used this case in our regular (nonhonors) Principles of Financial Accounting classes because textbooks used in these classes do not generally cover present value calculations.

We have found it most effective (while student groups are working on the case) to have the professor acting as a consultant to groups that get stuck with the process. Students oftentimes divide up tasks within the group with some group members focusing on the forecasting issues, while others in the group try to work out the present value calculations using Excel. We find that students have fun with this case and get emotionally involved debating within the group how much to bid for USD Motors. Groups become competitive hoping to win the bid (without paying too much). We have found that students become very animated when the "sealed" bids are brought up to the front of the classroom and the professor writes each group's bid on the board. We like to make sure that there is enough time at the end of the class to compute the Price to Earnings Ratio and Market to Book Value Ratio implied by the winning bid for USD Motors. In our experience, most winning bids have been deemed to be reasonable by the class.

Years ago, in the "early days" of conducting this case, some winning bids were way out of line (due to calculation or conceptual errors). We have had more success with student groups coming up with reasonable bids after we asked students to calculate the Price to Earnings Ratio and Market to Book Value Ratio implied by their bid for USD Motors and to compare their ratios to the S&P 500 averages for these ratios.

Table 1 of the Teaching Notes
Present Value of a Simple Average Earnings Over 20 Years at 16%

Year #	Expected Earnings	Present Value of Earnings	Cash Balance	**Total Bid #1**
0	0	$498,022,636	110 mil	608,022,636
1	84,000,000			
2	84,000,000			
3	84,000,000			
4	84,000,000			
5	84,000,000			
6	84,000,000			
7	84,000,000			
8	84,000,000			
9	84,000,000			
10	84,000,000			
11	84,000,000			
12	84,000,000			
13	84,000,000			
14	84,000,000			
15	84,000,000			
16	84,000,000			
17	84,000,000			
18	84,000,000			
19	84,000,000			
20	84,000,000			

Note: The formula used in cell C3 is =NPV(16%,B4:B23)

NPV means Net Present Value

16% is the interest rate used.

B4:B23 gives the cells that has the $84,000,000 annuity.

Table 2 of the Teaching Notes
Present Value of Individual Years' Estimated Earnings Over 20 Years at 16%

Year #	Expected Earnings	Present Value	Cash Balance	**Total Bid #2**
0	0	$369,563,061	110 mil	479,563,061
1	36,500,000			
2	41,500,000			
3	46,500,000			
4	51,500,000			
5	56,500,000			
6	61,500,000			
7	66,500,000			
8	71,500,000			
9	76,500,000			
10	81,500,000			
11	86,500,000			

Note: The formula used in cell C3 is =NPV(16%,B4:B23)

12	91,500,000
13	96,500,000
14	101,500,000
15	106,500,000
16	111,500,000
17	116,500,000
18	121,500,000
19	126,500,000
20	131,500,000

Table 3 of the Teaching Notes
Present Value of Individual Years' Operating Cash Flow Over 20 Years at 16%

USD Motors--Bid #3						
Time	Expected	Add:	Operating	Present	Cash	**Total**
Period	Earnings	Depr.	Cash Flow	Value	Balance	**Bid #3**
0	0			$390,314,004	110,000,000	$500,314,004
1	36,500,000	3,500,000	40,000,000			
2	41,500,000	3,500,000	45,000,000	Note: The formula used in cell E7 is		
3	46,500,000	3,500,000	50,000,000	=NPV(16%,D8:D27)		
4	51,500,000	3,500,000	55,000,000			
5	56,500,000	3,500,000	60,000,000		**Note:**	
6	61,500,000	3,500,000	65,000,000		Any liabilities would be	
7	66,500,000	3,500,000	70,000,000		subtracted before making bid.	
8	71,500,000	3,500,000	75,000,000			
9	76,500,000	3,500,000	80,000,000		Interest rate	
10	81,500,000	3,500,000	85,000,000		0.16	
11	86,500,000	3,500,000	90,000,000			
12	91,500,000	3,500,000	95,000,000			
13	96,500,000	3,500,000	100,000,000			
14	101,500,000	3,500,000	105,000,000			
15	106,500,000	3,500,000	110,000,000			
16	111,500,000	3,500,000	115,000,000			
17	116,500,000	3,500,000	120,000,000			
18	121,500,000	3,500,000	125,000,000			
19	126,500,000	3,500,000	130,000,000			
20	131,500,000	3,500,000	135,000,000			

Table 4 of the Teaching Notes
Internal Rate of Return

Year #	Expected Earnings	Depr. Expense	**Net Cash Flows**	
0			($490,000,000)	Note: This $490 mil = $600 mil bid minus
1	36,500,000	3,500,000	40,000,000	$110 mil cash balance
2	41,500,000	3,500,000	45,000,000	
3	46,500,000	3,500,000	50,000,000	
4	51,500,000	3,500,000	55,000,000	
5	56,500,000	3,500,000	60,000,000	
6	61,500,000	3,500,000	65,000,000	
7	66,500,000	3,500,000	70,000,000	
8	71,500,000	3,500,000	75,000,000	
9	76,500,000	3,500,000	80,000,000	
10	81,500,000	3,500,000	85,000,000	
11	86,500,000	3,500,000	90,000,000	
12	91,500,000	3,500,000	95,000,000	
13	96,500,000	3,500,000	100,000,000	
14	101,500,000	3,500,000	105,000,000	
15	106,500,000	3,500,000	110,000,000	
16	111,500,000	3,500,000	115,000,000	
17	116,500,000	3,500,000	120,000,000	
18	121,500,000	3,500,000	125,000,000	
19	126,500,000	3,500,000	130,000,000	
20	131,500,000	3,500,000	135,000,000	

IRR = 12.85%

Cell B26 is: =IRR(D4:D24)