The melding of financial and valuation analysis: an application

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Abstract

The purpose of this paper is to explicitly show how changes in cash flows from operating and financing decisions made as a result of financial ratio analysis can impact the value of the firm. The paper by applying firm-valuation analysis to the resulting cash flows illustrates the impact on firm value of specific management strategies through the melding of financial and valuation analysis.
Keywords: Financial analysis, valuation analysis, adjusted present value

Introduction

While managers frequently perform or are presented with financial ratio analysis that compares their firm's results to industry averages or other suitable benchmarks, many managers fail to grasp the significance of carrying out such an analysis and the potential benefits that may accrue from such an endeavor. The purpose of this paper is to illustrate the value of performing financial ratio analysis by melding standard financial ratio analysis with firm-valuation analysis. In this manner, not only does the significance of performing financial ratio analysis become abundantly clear, but the potential benefits accruing from various management actions can be explicitly illustrated.

As important as financial-analysis skills are to investors and creditors, these skills are even more important to general managers who in the aggregate decide how society's limited resources are allocated within the economy. The former perform their analyses from the outside looking in and are passive observers with respect to a firm's operations. The latter, on the other hand, are active participants in the firm's operations. It is their choice of actions and their effectiveness in carrying out those decisions that determine not only the value of the firm to the shareholders, but also the efficiency with which the nation's limited capital resources are employed. Thus, regardless of the general manager's functional specialty or the size of the general manager's company, general managers need to possess financial-analysis skills so as to be able to diagnose their firm's ills, prescribe useful remedies, and anticipate fully the financial consequences and benefits of their actions.

Unfortunately, many general managers do not fully understand accounting and finance and, thus, are working under a handicap. "You can't manage what you can't measure." And, you cannot evaluate alternative courses of action if you are unable to assess fully the consequences and benefits of these actions. Financial ratio analysis is more than simply a printout of a listing of financial ratios. Financial ratio analysis need to go further by indicating the potential changes in a firm's cash flows from undertaking policies to remedy unfavorable financial ratios. To any other than the finance professional, the total significance of this action and the resulting change in cash flows is often missed or misunderstood.

Sadly, many general managers fail to grasp the significance of doing such an analysis and the potential benefits that may accrue from undertaking such an endeavor. Seldom do they look beyond the immediate numbers to see the potential resulting impact on the firm's cash flows by instituting differing operating and financing strategies. Yet, by tracing financial ratio analysis from company performance evaluation, through potential corrective actions to cash-flow impacts, and ultimately firm value, general managers will be better able to appreciate the significance of financial analysis and how their managerial actions and decisions can impact the value of the firm. Thus, by melding standard financial ratio analysis with firm-valuation analysis, the general manager can better understand and determine how much of the firm's value depends on his or her actions, and how much impact on firm value will result from instituting differing managerial alternatives. It is important that the executives responsible for operations realize how much impact they have on the firm's value and more specifically on what that value depends. The purpose of this paper is to explicitly show how changes in cash flows from operating and financing decisions made as a result of financial ratio analysis can impact the value of the firm by applying firm-valuation analysis to the resulting cash flows.

Adjusted Present Value

The valuation technique employed in this paper is adjusted present value (APV) (Myers 1974, Ruback 1986, Shapiro 1978 & 1983). APV's signature characteristic is that no discount rate contains anything other than time value (the risk-free rate of interest) and a risk premium (according to the riskiness of the cash flows being discounted). This allows the impact of individual decisions to be determined by unbundling the base-case cash-flow projections into separate cash flows associated with each value-creating decision. Baseline cash flows are derived from recent operating results and represent the business in its current underperforming configuration. Then, the values of the incremental cash flows for each of the proposed operating initiatives, for example, margin improvements, networking-capital improvements, asset liquidations, and higher steady-state growth are separately determined. Any value created by financial maneuvers -- tax savings, risk management, subsidized debt, credit-enhanced debt -- has its own cash-flow consequences. You can treat each of those consequences by laying out the cash flows in a spreadsheet and discounting them at a rate that reflects time value and their riskiness, but nothing else. In other words, APV is exceptionally transparent; you get to see all the components of value in the analysis; none are buried in adjustments to the discount rate as in the more traditional-valuation analysis.

The adjusted present value is based on the concept of *value additivity.* This concept holds that in well-functioning capital markets the market value of a firm is the sum of the present value of all the assets held by the firm. Here, all assets mean intangible as well as tangible assets. Thus, while the present value of all the firm's tangible assets may very well fall short of the firm's market value, the difference is explained by the present value of intangible assets, such as going-concern value, experienced-management team value, value of potential-growth opportunities, and stable- and dependable-workforce value. It is this value additivity concept that permits the adjusted present value to be broken down into its component parts, thus, providing more managerially relevant information than traditional-valuation analysis. This unbundling of component values can help managers analyze not only how much a decision alternative is worth in terms of value it adds to the firm but also what is causing that value increment.

To portray the value of financial analysis, the case example of D/A Instruments, Inc. will be used to trace financial ratio analysis from the analysis of the firm's current situation through decision making to the impact of differing alternative decisions on a firm's cash flows, and then through the use of adjusted present value analysis to changes in the value of the firm. This is accomplished by first performing financial ratio analysis on the case situation to evaluate the past performance of the company and suggest alternative courses of actions. The impact of these alternative courses is then traced to their effects on cash flows and then ultimately to their impact on the value of the firm to its shareholders. Hence, in this manner the general manager learns to appreciate financial ratio analysis.

D/A Instrument, Inc.

Roger Diamond had just been named the new president of D/A Instruments, Inc. He took over from his father who was forced to retire due to health problems. As a teenager Roger worked on the company's production line, and he continued to work in the production area during the summers while he attended the University of Maryland. After graduating with a degree in electrical engineering, Roger worked full-time in the company's production department while he

pursued his MBA degree at night. For the last five years to increase his knowledge and his experience with differing aspects of the company, Roger has been based in California as sales manager for West Coast sales.

D/A Instruments, headquartered in Cambridge, Maryland, was a relatively small manufacturer of electromedical and electrotherapeutic instruments for hospitals. While it made a number of devices, its primary products were cardiographs, respiratory analysis equipment, and ultrasonic equipment. It sold the equipment through a direct sales force on the east and west coasts and covered the rest of the country through manufacturers' representatives. James Diamond, Roger's father, and a partner William Anderson had founded the company thirty years ago. Bill Anderson had been bought out approximately fifteen years ago. While the company's stock was traded over-the-counter, the Diamond family held a controlling interest in the company. The company's stock was followed by the regional investment management firm of Alexander & Sons.

Recently, Roger received a copy of an investment report prepared by a financial analyst at Alexander & Sons which showed an intrinsic value for D/A Instruments of $16.25 million which accorded the stock a price-to-earnings ratio of only about five times earnings (See Table 3.). Therefore, one of the first things Roger did was to undertake a complete financial analysis of the firm with the help of Jennifer Meyer, a CPA and financial consultant. The firm's most recent financial statements appear in Table 1. Financial ratios were computed and compared with industry average ratios and appear in Table 2.

Financial Analysis

An analysis of D/A's financial statements revealed a number of significant concerns. A majority of these concerns were the direct result of James Diamond's health. On the advice of his doctor, the senior Diamond had cut back on the amount of time spent at the office and took other steps to lower stress. This resulted in decreased efficiency in working capital, a reduction in the firm's debt ratio, and a slowing of sales. In addition, costs were not monitored as carefully as in the past and profitability declined.

While the D/A's liquidity ratios were below the industry average, Jennifer also noted that the these ratios overstated the firm's liquidity as D/A Instruments' accounts receivable and inventory were somewhat less liquid than the other firms in the industry. Jennifer pointed out that by bringing D/A Instrument's average collection period and inventory turnover ratios in line with the industry averages the firm would be able to free cash from these accounts of $681,670 and $389,570, respectively. That is, $A/R_{08} - Sales_{08}/(360/Ind.Avg.\ Collection\ Period) = Funds\ Available\ from\ A/R$ or [$7,134 - ($72,600/11.25) = $680.67] and $I_{08} - (Sales_{08}/Ind.Avg.\ Inventory\ Turnover) = Funds\ Available\ from\ Inventory$ or [$10,761 - ($72,600/7) = $389.57].

The firm's fixed asset turnover ratio had declined in its efficiency primarily due to the slower than expected growth in sales. The firm's debt-to-total-assets ratio had declined steadily over the last several years as Roger's father sought to lessen the risk inherent in the firm due to his declining health. As a result D/A's debt load was considerably lower than the industry average. This in turn had the impact of lowering the firm's return on equity. However, the unused debt capacity was available to finance the retirement of James Diamond as per the firm's succession plan which required a partial equity buyback of $4.5 million.

Ms. Meyer's investigations found that the company's below average profitability could be traced to two factors: slowing sales growth and increasing costs and expenses relative to sales.

Working closely with production and marketing personnel, Roger and Jennifer implemented a new cost control system and designed a marketing plan to increase sales. Based on the achievement of these plans, the firm's operating profit margin was forecasted to increase by three percent from the current 7.06% to 10.06%. In addition, projected sales and EBIT growth were expected to increase from the current forecast of three percent per year to eight percent.

Valuation Analysis

Base-Case Cash Flows

Table 3 contains the partial investment report on D/A Instruments, Inc. prepared by Alexander and Sons which employed the adjusted present value (APV) valuation technique. This valuation serves as our base-case value or the existing value of D/A Instruments at the time Roger took over as president. It is based on a projected growth rate of 3% for earnings before interest and taxes (EBIT). As the firm is currently operating below capacity, it is anticipated that the firm's capital expenditures will just equal depreciation. Thus, there is no expected increase in net fixed assets for the next several years. Changes in working capital are expected to increase at the same rate as EBIT. Long-term debt is held steady at $1.4 million, and the current level of short-term debt is expected to increase at 3 percent per year. Both carry an interest rate of 12 percent per year.

The APV valuation method is executed in the same way any discounted cash-flow valuation would be performed. Free cash flows are determined based on the financial projections of the firm. These projections consist of expected after-tax operating cash flows and incremental investment cash flows. The discount rate used to find the present value of the cash flows should be based on the riskiness of the cash flows and the opportunities available to investors to earn a return on investments of similar risk. The current opportunity cost of equity for firms in D/A Instruments risk class is 24 percent. Hence, this discount rate would be employed to value the firm's free cash flows. The terminal value of the cash flow stream is based on an estimate of the assets' value at the end of 2013 which takes into account everything after the terminal horizon. Here, the assets' value after five years is based on expecting free cash flows to grow at 3% per year in perpetuity. Thus, employing the Gordon dividend valuation model construct, the terminal value for D/A Instruments is $17.34 million or [$3.54 (1 + .03)/(.24-.03)]. Discounting the free cash flows and the terminal value at 24% yields a present value of $14.96 million.

The foregoing value of the assets would be the value of the firm if management chose to finance the firm entirely with equity. Since the firm is not financed entirely by equity, the incremental value associated with the firm's financing strategy is added to the value of the assets to obtain the overall value of the firm. Financing with some debt in the capital structure provides the benefit of the tax deductibility of interest payments. That is, taxable income is reduced by the amount of interest payment and provides a tax-savings cash flow or interest tax shield equal to the product of the interest payment times the firm's tax rate (34% for D/A Instruments). The present value of these cash flows is discounted at a rate reflecting their lower risk. Given the relative certainty of these cash flows, the after-tax cost of debt capital is used as the discount rate. For D/A Instruments the after-tax cost of debt capital is approximately 8.0% or [12.0% x (1 - .34) = 7.92%]. The terminal value of the financing effects is conservatively estimated as a perpetuity capitalized at the after-tax cost of debt capital. Thus, the present value of the financing side effects is $1.29 million. Combining the present value of the financing effects with the

present value of the assets results in an APV for D/A Instruments of $16.25 million [$14.96 + $1.29].

Increments in Value from Financial Analysis

Through the use of financial analysis, Roger was able to generate cash flows from the reduction of accounts receivable and inventory. In addition, financial analysis highlighted the need for controlling costs and increasing sales growth as well as identifying unused debt capacity. How will the anticipated action resulting from financial analysis impact D/A Instruments intrinsic value? Table 4 presents the valuation of D/A Instruments taking into account the expected changes.

The $1,071 million in funds removed from accounts receivable and inventory are reflected in the estimate of the firm's need for working capital and the increases in working capital. The 2009 change in working capital is a negative $320,000 which reflects the $1.071 million savings in working capital and an expected 8% growth rate in working capital needs equal to the expected growth rate in EBIT.

EBIT is affected not only by the implementation of the of the new cost control system which is expected to raise the operating profit margin from 7.06% to 10.06% , but also by the marketing plan which is expected to increase sales and EBIT growth from 3% to 8%. Thus, the expected EBIT levels in Table 4 reflect both these changes. As before capital expenditures are expected to equal depreciation. Interest payments increase due to the rise in long-term debt by $4.5 million to finance the equity buyback. The expected future free cash flows and the terminal value of the free cash flows are again discounted back at 24%. Again, the terminal value is valued as a growing perpetuity with a perpetual growth rate now expected to be 8%. This yields a terminal value of $40.26 million and a total present value of $28.32 million, Adding the present value of the increased financing side effects resulting from the greater use of debt financing ($3.67 million), the new APV for D/A Instruments is $31.99 million. As before a conservative approach is taken in valuing the financing side effects by valuing the terminal value of the interest tax shield as a perpetuity capitalized at the after-tax cost of debt capital.

Overall the steps taken by Roger Diamond have the potential to boost the value of the firm by $15.74 million. An added benefit of adjusted present value is that it is transparent and permits you to properly allocate the $15.74 million increase in value to the various strategies undertaken by management. Table 5 provides the breakdown of the $15.74 million into those strategies. It shows that through the increased use of the firm's debt capacity, D/A management was able to increase the value of the firm by $2.38 million. The increased use of debt financing incrementally increased the interest tax shield. Discounting these incremental cash flows at the after-tax cost of debt capital provides for an increase in the value of D/A Instruments of $2.38 million.

The increase in value from increasing the firm's growth rate in sales and EBIT is equal to $3.66 million, Management took steps to increase the firm's growth rate from 3% to 8%. This impact on free cash flows is reflected in the incremental increase in EBIT from increasing the growth rate to 8% and holding the operating profit rate at the original 7.06%. This increase is offset somewhat by the correspondingly greater required investment in working capital. Hence, the incremental required working capital needs reduce the free cash flows. Due to the differences in perpetual growth rate assumptions implicit in the terminal value estimations between the base-case and the projected-case situations, the terminal values for the asset free cash flows in Table 5 should sum to the incremental terminal value for the asset free cash flows. The incremental ter-

minal value for the asset free cash flows is $22.92 million or [40.26 - 17.34]. As the terminal value for the free cash flows from decreasing cost is calculated at $14.26 million, the resulting terminal value for free cash flows from increasing growth is $8.66 million or (22.92 - 14.26]. This results in a value increment of $3.66 million from increasing the firm's growth rate in sales and EBIT.

The value of D/A Instruments was increased by $9.70 million by implementing the new cost control system. This value increment was determined by computing the incremental EBIT resulting from having the higher operating profit margin of 10.06% as opposed to the previous 7.06%. The growth rate of sales was controlled by holding growth constant at 8%. Using a terminal value based on the valuation of a growing perpetuity with a growth rate of 8% and a discount rate of 24% results in $14.26 million. Thus, the total present value of cash flows resulting from this strategy is $9.70 million.

In summary, APV breaks down the increase in value of D/A Instruments into the various strategies undertaken by management. The breakdown is as follows:

Strategy	Value Increment
Increased use of debt capacity	$ 2.38 million
Marketing plan to increase growth rate	$ 3.66 million
Implementation of new cost control system	$ 9.70 million
	$15.74 million

Conclusion

Adjusted present value (APV) has the characteristic that the discount rate used to discount cash flows only contains elements for the time value and a risk premium for the cash flows being discounted. Therefore, any value created by management strategies can be valued individually based on the cash flows it generates. The impact of financial strategies, such as increasing debt, is treated separately and does not impact the discount rate employed in discounting other cash flow streams. The result is APV as a valuation technique is transparent and permits you to see all the components of value in an analysis; none are buried in adjustments to the discount rate as in the more traditional-valuation analysis. Thus, APV has the distinct advantage of permitting the analyst to follow the impact of financial statement analysis through the changes in cash flows from operating and financial decisions made as a result of the financial analysis to the ultimate impact on firm valuation.

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TABLE 1
D/A INSTRUMENTS, INC. FINANCIAL STATEMENTS

BALANCE SHEET
December 31, 2008 (Amounts in $000's)

	2008
Cash	$ 1,614
Accounts receivable	7,134
Inventory	10,761
Current assets	19,509
Land, buildings and equipment	28,480
Accumulated depreciation	1,940
Net fixed assets	26,540
Total assets	$ 46,049
Short-term bank loans	$ 1,000
Accounts payable	5,122
Accruals	2,980
Current liabilities	9,102
Long-term bank loan	1,400
Total liabilities	10,502
Common stock (3.65 million shares)	9,125
Retained earnings	26,422
Stockholders' equity	35,547
Total liabilties & equity	$ 46,049

INCOME STATEMENT
For the year ended December 31, 2008 (Amounts in $000)

	2008
Net sales	$ 72,600
Cost of goods sold	56,628
Gross profit	15,972
Administrative and selling expenses	8,712
Depreciation	1,500
Miscellaneous expenses	636
Total operating expenses	10,848
Earnings before interest and taxes	5,124
Interest: Short-term loan	120
Interest: Long-term loan	168
Earnings before taxes	4,836
Taxes (34%)	1,644
Net earnings after taxes	$ 3,192

TABLE 2
FINANCIAL RATIOS

	2008	Industry
Liquidity ratios:		
Current ratio	2.14	3.10
Quick ratio	0.96	1.80
Efficiency ratios:		
Average collection period (days)	35.38	32.00
Inventory turnover (selling)	6.75	7.00
Fixed assets turnover	2.74	3.30
Total assets turnover	1.58	2.29
Leverage ratios:		
Debt ratio	22.81%	34.0%
Times interest earned	17.79	17.00
Profitability ratios:		
Gross profit margin	22.00%	32.5%
Operating profit margin	7.06%	
Net profit margin	4.40%	8.0%
Return on total assets	6.93%	18.3%
Return on equity	8.98%	27.8%

TABLE 3
PARTIAL INVESTMENT REPORT - D/A INSTRUMENTS, INC.

Pro Forma Income Statements (millions):	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
EBIT	5.12	5.28	5.44	5.60	5.77	5.94
Interest	-0.29	-0.29	-0.30	-0.30	-0.30	-0.31
EBT	5.41	5.57	5.73	5.90	6.07	6.25
Taxes @ 34%	-1.84	-1.89	-1.95	-2.01	-2.06	-2.12
Net Income	7.25	7.46	7.68	7.90	8.13	8.37
Additional Information:						
Depreciation	1.50	1.50	1.50	1.50	1.50	1.50
Capital expenditures	1.50	1.50	1.50	1.50	1.50	1.50
Change in working capital	0.33	0.34	0.35	0.36	0.37	0.39
Pro Forma Balance Sheets (millions):						
Assets						
Net working capital	11.41	11.75	12.10	12.46	12.84	13.22
Net fixed assets	26.54	26.54	26.54	26.54	26.54	26.54
Total assets	37.95	38.29	38.64	39.00	39.38	39.76
Liabilities & Equity						
Bank loan @ 12%	1.00	1.03	1.06	1.09	1.13	1.16
Long-term debt @ 12%	1.40	1.40	1.40	1.40	1.40	1.40
Total debt	2.40	2.43	2.46	2.49	2.53	2.56
Equity	35.55	35.86	36.18	36.51	36.85	37.20
Total liabilities & equity	37.95	38.29	38.64	39.00	39.38	39.76
Additional Information:						
Interest paid	0.29	0.29	0.30	0.30	0.30	0.31
Pro Forma Cash Flows (millions):						
EBIT	5.12	5.28	5.44	5.60	5.77	5.94
Taxes @ 34%	(1.74)	(1.79)	(1.85)	(1.90)	(1.96)	(2.02)
EBIT (1-t)	3.38	3.48	3.59	3.70	3.81	3.92
Depreciation	1.50	1.50	1.50	1.50	1.50	1.50
Operating cash flow	4.88	4.98	5.09	5.20	5.31	5.42
Capital expenditures	(1.50)	(1.50)	(1.50)	(1.50)	(1.50)	(1.50)
Change in working capital	(0.33)	(0.34)	(0.35)	(0.36)	(0.37)	(0.39)
Free cash flows	3.05	3.14	3.24	3.33	3.43	3.54

TABLE 3 (Continued)
PARTIAL INVESTMENT REPORT - D/A INSTRUMENTS, INC.

Present Value of Pro Forma Cash Flows and Terminal Value:

	2008	2009	2010	2011	2012	2013
Free cash flows		3.14	3.24	3.33	3.43	3.54
Terminal value						17.34
Present value factor @ 24%	1.0000	0.8065	0.6504	0.5245	0.4230	0.3411
Present value		2.53	2.10	1.75	1.45	7.12
Total present value	14.96					

Present Value of Financing Side Effects:

	2008	2009	2010	2011	2012	2013
Interest tax shield		0.10	0.10	0.10	0.10	0.10
Terminal value of tax shields						1.31
Present value factor @ 10.5	1.0000	0.9259	0.8573	0.7938	0.7350	0.6806
Present value		0.09	0.09	0.08	0.08	0.96
Total present value	1.29					
Adjusted present value	16.25					