

## Dupont Identity and Growth Rates<sup>1</sup> In-Class Problem<sup>2</sup>

*The subject firm in this problem set is National Media Management, a Utah based LLC from 1994 through 1999. The Income Statement, Balance Sheet, and Other Financial Information used herein are also used in other In-Class Problems in support of building a body of Corporate Finance In-Class Problems.*

Suppose that you're the CFO of a small media management firm, National Media Management (NMM)<sup>3</sup>, with the attached balance sheet, income statement, and other financial data. You know that your CEO has been in talks with a major competitor regarding purchasing your firm and you've been asked to provide some important cash flow figures. The firm considering acquiring NMM will be backed by a private equity firm and you need to be as clear as possible with respect to what values should be reported based on traditional finance practices.

The private equity managers are sticklers when it comes to understanding return on assets (ROA), return on equity (ROE), potential growth rates and various liquidity measures, so much so that they insist on not only seeing calculations for these measures, but also for validating them with alternative measures, and deconstructing these measures to isolate potential problems or opportunities. You know that some ways of doing this can be accomplished through the Dupont Identity, the Internal Growth Rate and the Sustainable Growth Rate.

a. Use the Dupont Identity to calculate the Return on Equity for this firm.

$$ROE = PM * TAT * EM$$

$$PM = \text{Profit margin} = \text{Net Income} / \text{Sales}$$

$$= \frac{352,875}{9,687,246} = 0.0364 \text{ or } 3.64\%$$

$$TAT = \text{Total asset turnover} = \text{Sales} / \text{Total Assets}$$

$$= \frac{9,687,246}{3,271,807} = 2.96$$

$$EM = \text{Equity multiplier} = \text{Total Assets} / \text{Total Equity} = 1 + D/E \text{ ratio}$$

$$= \frac{3,271,801}{1,959,504} = 1.67$$

$$ROE = .0364 \times 2.96 \times 1.67 = .1799 \text{ or } 17.99\%$$

Which seems high, so let's see if we can't validate it through the basic formula for ROE

$$ROE = \text{Net Income} / \text{Total Equity} = NI/TE = \text{Basic Formula}$$

$$= \frac{352,875}{1,959,504} = .1801 = 18.01\%$$

And this is virtually the same value excepting for some minor rounding differences.

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<sup>1</sup> This problem and solution set is intended to present an abbreviated discussion of the included finance concepts and is not intended to be a full or complete representation of them or the underlying foundations from which they are built.

<sup>2</sup> This problem set was developed by Richard Haskell, PhD (rhaskell@westminstercollege.edu), Gore School of Business, Westminster College, Salt Lake City, Utah (2015).

<sup>3</sup> While National Media Management is the name of an actual firm incorporated in the State of Utah from 1994-1999, the values presented are not representative of actual firm values.

**b. What is the return on asset (ROA) rate for this firm using a Dupont style disaggregation?**

$$\begin{aligned} \text{ROA} &= \frac{\text{Net Income}}{\text{Total Revenue}} \times \frac{\text{Total Revenue}}{\text{Total Assets}} \\ &= \text{PM} \times \text{TAT} \\ &= \frac{352,875}{9,687,246} \times \frac{9,687,246}{3,271,807} = 0.0364 \times 2.96 = .1077 = 10.77\% \end{aligned}$$

**c. What is the functional difference between ROE and ROA?**

ROE measures the efficiency of a firm's operation as a function of its total equity, while ROA measures the firm's efficiency as a function of its assets. While we might argue that the firm's assets are there as a direct result of its equity shareholder's investment, we must also recognize that assets come about through debt capital and equity is at least partially a function of retained earnings, which is more a management result than an investor result.

**d. Why might an analyst want to use the Dupont Identity to derive ROE or ROA rather than the basic ROE and ROA formulae?**

While a firm's ROE is important to would be investors and current shareholders alike, decomposing ROE into its component parts might often help us see problem areas on which the firm's management might make improvements, or opportunities through which the firm might profit.

**e. What is this firm's Internal Growth rate (IGR)?**

To measure a firm's IGR we must establish its retention ratio or "b". The retention ratio can be expressed as  $\frac{\text{Net Income} - \text{Dividends Paid}}{\text{Net Income}}$  and is simply a ratio of the retained earnings (Net Income – Dividends Paid) to Net Income.

$$b = \frac{352,875 - (25,317 + 20,000)}{352,875} = 0.8716 \text{ or } 87.16\% - \text{meaning the firm retains 87\% of its earnings for internal investment and growth}$$

$$\begin{aligned} \text{IGR} &= \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \\ &= \frac{.1079 \times .8716}{1 - .1079 \times .8716} = .09405906 = 0.1038 \text{ or } 10.38\% \end{aligned}$$

**f. What is the firm's Sustainable Growth Rate (SGR)?**

$$\begin{aligned} \text{SGR} &= \frac{\text{ROE} \times b}{1 - \text{ROE} \times b} \\ &= \frac{.1801 \times .8716}{1 - .1801 \times .8716} = \frac{.1569}{.8431} = .1861 = \text{or } 18.61\% \end{aligned}$$

**g. What is the firm's Dividend Payout Ratio, what does it represent, and how does it relate to the firm's Retention Ratio?**

$$\begin{aligned} \text{The Dividend Payout Ratio} &= \frac{\text{Dividends Paid}}{\text{Net Income}} = \frac{45,317}{352,875} = 0.1284 \text{ or } 12.84\% \\ &= 1 - b = 1 - 0.8716 = 0.1284 \text{ or } 12.84\% \end{aligned}$$

The dividend payout ratio is the corollary of the firm's "plow back ratio" (retention ratio). It represents the firm's dividend distribution to investors as a function of its net income, while the retention ratio represents the net income the firm plows back into itself for growth and investment purposes.

**h. What is the functional difference between a firm's IGR and SGR?**

The IGR informs us of the rate of growth a firm can attain via internal resources (accumulated retained earnings and existing productive capital assets), while the SGR lets us know what type of growth the firm might be able to sustain over time with given its equity capital structure and ability to attract debt financing, while keeping its debt ratio constant.

**i. What is the firm's Current Ratio for 2014?**

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{1,814,464}{192,480} = 9.43$$

**j. What is the firm's Quick Ratio for 2014?**

$$\text{Quick Ratio} = \frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}} = \frac{1,814,464 - 712,296}{192,480} = \frac{1,102,168}{192,480} = 5.73$$

Note that this can also be thought of as follows:

$$= \frac{\text{Cash} + \text{Accounts Receivable}}{\text{Current Liabilities}} = \frac{243,850 + 858,318}{192,480} = \frac{1,102,168}{192,480} = 5.73$$

**k. What is the functional difference between the firm's Current Ratio and Quick Ratio?**

The Current Ratio gives us a sense of the short-term resources the firm *should have* at its disposal to satisfy short-term obligations, but it supposes the firm is in a position to continue to sell from its existing inventory. As this number approaches one (1) it suggests the firm may have difficulty meeting its obligations.

The Quick Ratio is only slightly different in that it represents the short-term resources the firm should have at its disposal to meet short-term obligations without the need to sell any existing inventory. In both cases there is a supposition that the firm's accounts receivable will pay in a timely manner.

**l. What is the firm's Times Interest Earned Ratio (TIE) and what does it functionally represent?**

$$\text{Times Interest Earned} = \frac{EBITDA}{\text{Interest Expense}} = \frac{EBIT + DA}{\text{Interest Expense}} = \frac{633,876 + 145,734}{90,992} = \frac{779,611}{90,992} = 8.57$$

When this number approaches one (1) it suggests the firm's operating cash flow may simply be able to cover its interest expense and may not be able to cover required principle payments, preferred dividends or profit expectations of common equity stakeholders.

National Media Management Balance Sheet as of December 31					National Media Management Income Statement January 1 - December 31, 2014	
	2018	2019		2018	2019	
<b>Current Assets</b>			<b>Current Liabilities</b>			<b>Sales</b>
Cash	213,960	243,850	Accounts Payable	214,414	192,480	Products
Accounts Receivable	651,552	858,318	Total	214,414	192,480	Services
Inventory	621,807	712,296				Total Sales
Total	1,487,319	1,814,464	<b>Long Term Debt</b>			
<b>Net Fixed Assets</b>			Mortgages (interest only)	271,700	285,300	<b>COGS</b>
Buildings	900,000	900,000	Credit Line	99,022	134,508	Production
Equipment	550,000	750,000	Bonds	628,522	700,015	Materials
Technology	250,000	301,693	Total	999,244	1,119,823	Total COGS
Gross Assets	1,700,000	1,951,693	<b>Owner's Equity</b>			<b>Gross Profit</b>
Accumulated D&A	348,616	494,350	Common Stock	292,564	319,465	
Total Net Fixed Assets	1,351,384	1,457,343	Preferred Stock	200,000	200,000	<b>Operating Expenses</b>
			Accumulated Retained Earnings	1,132,481	1,440,039	Admin and Mgt
			Total	1,625,045	1,959,504	Depreciation & Amortization
<b>Total Assets</b>	2,838,703	3,271,807	<b>Total Liabilities and Owner's Equity</b>	2,838,703	3,271,807	Total Operating Expenses
						<b>Operating Income</b>
<b>Additional Financial Information</b>	<b>Cash Flow Statement</b>					<b>Non-Operating Expense</b>
<b>Common Stock</b>	<b>Cash Flow From Operations</b>					Credit Line Interest Expense
Shares Outstanding		319,465	Net Income		352,875	Mortgage Interest Expense
12/31 Price per Share		13.75	Depreciation & Amortization		145,734	Bond Interest Expense
Market Value (Market Cap)		4,392,644	Increase (decrease) in Accts. Payable		(21,934)	Total Non-Operating Expense
Beta		1.30	Decrease (increase) in Receivables		(206,766)	
R <sub>M</sub>		12.00%	Decrease (increase) in Inventories		(90,489)	<b>Pre-Tax Income</b>
R <sub>F</sub>		2.00%	Total Cash Flow from Operations		179,420	Tax
						Net Income
<b>Preferred Stock</b>	<b>Cash Flow from Investing</b>					
Shares Outstanding		200,000	Purchase of Fixed Assets		(251,693)	<b>Distribution of Earnings</b>
12/31 Price per Share		1.65	Total Cash Flow from Investing		(251,693)	Dividends (Common)
Market Value (Market Cap)		330,000				Dividends (preferred)
			<b>Cash Flow from Financing</b>			Retained Earnings
<b>Bond Information</b>			Additions (reductions) to LTD		120,579	
Coupon Rate		5.57%	Additions (reductions) to Equity		26,901	
YTM		7.00%	Dividends Paid (-)		(45,317)	
Years Remaining		20	Total Cash from Financing		102,163	
Face Value		1000				
P/YR		2	<b>Net Cash Flow</b>		29,890	
			<b>Beginning Cash Balance</b>		213,960	
			<b>Ending Cash Balance</b>		243,850	