Case Study Series

An Application of the Residual Earnings Model in Valuation

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Abstract

From February to November 2014, PepsiCo's shares rose an incredible 28% (around 40% in annualized terms) while its main rival Coke was almost flat (only 7% increase) and the S&P500 was also almost flat (only 10% increase). This case focuses on this sudden increase in the company's share price and encourages an examination of the company's stock value using the residual earnings model of valuation. The students will learn how to use earnings to value a target company's common shares. They will learn about this method's advantages and disadvantages when valuing a company. In their calculations, they will use different assumptions regarding the company's future growth rate. Based on their calculations, they will make an investment decision: "Buy", "Hold", or "Sell". It is a hands-on application for investment, financial statement analysis, and financial management undergraduate and graduate students who want to learn how to value a company.
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Introduction

John and Mary Ann were both interns at an investment firm. Their first task was estimating the value (i.e. "intrinsic value") of PepsiCo shares. After estimating the value of the company's shares, they would compare this to the market value of the shares, and then, based on that comparison, they would issue an investment recommendation for the stock.

John had already started working on this task. In order to compare the market price with the intrinsic value, John had to find the current stock price. He found out that PepsiCo, Inc.'s stock price as of 12/31/2013 was $82.94 (nasdaq.com/symbol/pep/historical).

Mary Ann suggested using the residual earnings model to come up with the investment decision. "All firms have earnings posted with the Securities and Exchange Commission, so no problem in finding the earnings". Therefore, the next step was to work on the earnings and incorporating them into the residual earnings model.

Dividend Information

John knew that they needed some information about the dividends. From Pepsi's income statement from 2008 to 2013 (Exhibit 1), John was able to collect dividends per share data from 2008 to 2013 (www.nasdaq.com/symbol/pep/dividend-history).

2008	2009	2010	2011	2012	2013
$1.65	$1.78	$1.89	$2.03	$2.13	$2.24

"Before starting to use the residual earnings model, in addition to dividends, what else do we need?" John asked.

"First, we will need to know the growth rate in the dividends. Let's try to use the annual growth rate of dividends in 2008-2013 to predict the growth for the next four years (2013-2017). John, can you verify for me to see if the annual growth rate was 6.31% for the 2008-2013 period?" Mary Ann added.

"Yes, 6.31% recent annual growth in dividends is correct. So, we can use this growth rate to estimate the future dividends" John replied.

Mary Ann added: "We also need an estimate of the discount rate to discount the residual earnings. Using the $(D_1/P) + g$ formula, I am finding a 9.18% cost of common stock".

Residual Earnings Model
John was not familiar with the model, so he asked Mary Ann to explain to him how it worked.

Mary Ann clarified, "Basically, in the model, the intrinsic value is based on the book value of equity plus the present value of the residual earnings over the years.

$$P = B_0 + RE_1/(1+r) + RE_2/(1+r)^2 + \ldots$$

Where B_i= Book value of Equity of year i
RE_i= Residual earnings of year i

Residual earnings are excess earnings above the required earnings by the shareholders.

In other words, RE_i (\$) =$EPS_i-(r*B_{i-1})$

Where r = the required return by common equity;
B_{i-1}= Book value of Equity of year i-1
RE_i = Residual earnings of year i

So in order to calculate residual earnings, we will need to find the EPS, EPS growth rate, book value of equity as well as the required return by common stock. John was amazed how much Mary Ann knew about this valuation model.

John was a fast learner. He acted fast by trying to gather the total common equity for PepsiCo in 2013. It was \$24,389 million. He understood that that would be the B_0. The per-share value of equity was \$15.81.

In order to estimate the book values of equity in the future years, they needed to use the following formulas that require EPS and DPS. The annual dividend growth rate was 6.31%.

Therefore, they had the followings:

$$B_1=B_0+EPS_1-DPS_1$$

John tried to gather 2010-2013 EPS from the internet. However, he found out from 2011 – 12, the company earnings per share growth was negative from the prior year. The growth rate was a negative 3%. Browsing earlier years, he found from 2007 – 08, the company had a negative growth rate of 6%.

Below was PepsiCo, Inc.'s EPS from 2004-2013 that John found from the internet (nasdaq.com/symbol/pep/revenue-eps).

Year	2004	2005	2006	2007	2008
EPS ($)	$2.44	$2.39	$3.34	$3.41	$3.26
Year	2009	2010	2011	2012	2013
EPS ($)	$3.81	$3.97	$4.08	$3.96	$4.37

To get a better average growth number, or to smooth out the effect of the 2 periods where EPS was negative, John went back to the year 2004 - 05 up to 2012-13 (9 periods) to calculate an average growth rate in Pepsi's EPS. During the 2004-2013 period, the average annual growth rate in earnings for PepsiCo was 7%.

Then John asked, "What do we need to do next?" Mary Ann explained in details, "We will need EPS forecasts from 2014-2017 based on the 7% growth rate. Using both the EPS and DPS forecast of 2014-2017, we will be able to calculate book value of equity from 2014-2017. After that, we are ready to calculate residual earnings: RE_i ($) $=EPS_i-(r*B_{i-1})$ for 2014-2017."

Similar to the dividend discount model, the residual earnings model could also accommodate different growth assumptions as follows:

1. *Zero-growth* : $P = B_0 + RE/r$
    Where P is the value estimate, B_0 is the current book value of equity, RE is the current residual earnings, and r is the cost of common stock (or the required return by the shareholders).

2. *The constant-growth:* $P = B_0 + RE_1/(r-g)$
    Where r is the required return by the shareholders, and g is the estimated constant growth rate.

3. *Supernormal growth model:* $P = B_0 + RE_1/(1+r) + RE_2/(1+r)^2 + CV/(1+r)^2$
    Where $RE_2 = RE_1*(1+g_1)$, and
    $CV = $ Continuing Value $= RE_3/(r-g_2) = (RE_2*(1+g_2))/(r-g_2)$
    Here, g_1 is the initial growth rate, and g_2 is the second-phase growth rate.

Mary Ann continued, "For the Supernormal-growth model for earnings, we expect 7% growth per year in earnings for the first four years (2014-2017). After 2017, we expect 5% growth per year in residual earnings."

The two colleagues went to their offices for a while and agreed to meet at 4 p.m. in that afternoon. At 4 p.m., Mary Ann visited John in his office. She placed some printouts on the table and said with a smiling face "I think, in order to value the company's shares, we will need to answer the following questions:

1. First, let's start with what is meant by residual earnings. What is "residual earnings"?
2. What is the logic of the residual earnings model? How will we use "residual earnings" in our calculations?
3. Does the model estimate firm value or does it estimate the value of equity?
4. Does the model use the weighted-average cost of capital (i.e. WACC) or does it use the cost of common stock? Why?
5. What are the advantages and the disadvantages of the method?

6. What are the zero-growth, the constant-growth, and the supernormal growth models under the residual earnings model?
7. Estimate the book value of equity, the return on common equity, and the residual earnings for the firm in each year.
8. Estimate the value of PepsiCo shares using the supernormal growth model. We can assume 5% growth per year in residual earnings after 2017.
9. What would be our investment advice for potential investors in PepsiCo shares?
10. What would be our final decision? Is the stock a good buy?

John was excited: "Wow, I am impressed! This question list will definitely help us in this task. Let's start working on this then!"

John asked a final question: "So, to come up with the residual earnings, we will use 6.31% annual growth for the dividends between 2013 and 2017, and 7% annual growth in earnings between 2013 and 2017. After 2017, we will assume a 5% annual growth in residual earnings, is this correct?"

"Yes, that is right; and don't forget, our discount rate is 9.18%" replied Mary Ann.

Exhibit 1- Pepsico's Annual Income Statements

Consolidated St. of Income (USD $) In Millions, except Per Share data, unless otherwise specified	12 Months Ended		
	Dec. 28, 2013	Dec. 29, 2012	Dec. 31, 2011
Income Statement [Abstract]			
Net Revenue	$ 66,415	$ 65,492	$ 66,504
Cost of sales	31,243	31,291	31,593
Selling, general and administrative expenses	25,357	24,970	25,145
Amortization of intangible assets	110	119	133
Operating Profit	9,705 [1]	9,112 [1]	9,633 [1]
Interest expense	(911)	(899)	(856)
Interest income and other	97	91	57
Income before income taxes	8,891	8,304	8,834
Provision for income taxes	2,104	2,090	2,372
Net income	6,787	6,214	6,462
Less: Net income attributable to non-controlling interests	47	36	19
Net Income Attributable to PepsiCo	$ 6,740	$ 6,178	$ 6,443
Net Income Attributable to PepsiCo per Common Share			
Basic	$ 4.37	$ 3.96	$ 4.08
Diluted	$ 4.32	$ 3.92	$ 4.03
Weighted-average common shares outstanding			
Basic	1,541 [2]	1,557 [2]	1,576 [2]
Diluted	1,560 [2]	1,575 [2]	1,597 [2]
Cash dividends declared per common share	$ 2.24	$ 2.1275	$ 2.025

[1] For information on the impact of restructuring, impairment and integration charges on our divisions, see Note 3 to our consolidated financial statements. See also Note 15 to our consolidated financial statements for more information on our transaction with Tingyi and refranchising of our beverage business in Vietnam in our AMEA segment.

[2] Weighted-average common shares outstanding (in millions).

Exhibit 1 (continued)

Consolidated Statement of Income (USD $) In Millions, except Per Share data	12 Months Ended		
	Dec. 25, 2010	Dec. 26, 2009	Dec. 27, 2008
Net Revenue	$ 57,838 [1]	$ 43,232 [1]	$ 43,251 [1]
Cost of sales	26,575	20,099	20,351
Selling, general and administrative expenses	22,814	15,026	15,877
Amortization of intangible assets	117	63	64
Operating Profit	8,332 [2]	8,044 [2]	6,959 [2]
Bottling equity income	735	365	374
Interest expense	(903)	(397)	(329)
Interest income	68	67	41
Income before income taxes	8,232	8,079	7,045
Provision for income taxes	1,894	2,100	1,879
Net income	6,338	5,979	5,166
Less: Net income attributable to noncontrolling interests	18	33	24
Net Income Attributable to PepsiCo	$ 6,320	$ 5,946	$ 5,142
Net Income Attributable to PepsiCo per Common Share			
Basic	$ 3.97	$ 3.81	$ 3.26
Diluted	$ 3.91	$ 3.77	$ 3.21
Cash dividends declared per common share	$ 1.89	$ 1.775	$ 1.65

[1] Represents net revenue from businesses operating in these countries.

[2] For information on the impact of restructuring, impairment and integration charges on our divisions, see Note 3.

Source: nasdaq.com/symbol/pep/sec-filings

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