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USING EARNINGS AND RESIDUAL INCOME IN THE VALUATION OF NEWLY LISTED FIRMS

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Abstract

The present paper uses a set of valuation models which are based on Feltham and Ohlson's (1995) model, and examines the relationship between Market values (MV), Book values (BV) Net Income (NI), Residual Income (RI), and Research and Development (RD) expenses over a sample of newly listed US firms for the period 2000-2004. The purpose is to assess the extent to which traditional valuation methods remain valid in the new economic settings after the collapse of international markets in March 2000. Moreover, it is tested if the replacement of RI with NI in valuation models for newly listed firms potentially reduces information content and significance. The results indicate that variants of the Feltham and Ohlson's (1995) model, are able to explain the variation in MV of newly listed firms. Additionally, RI displays no stronger association than NI with MV of newly listed firms. Last, the results indicate that RD expenditures and BV enhance the explanatory power of both NI and RI for MV and their inclusion in valuation models is supported by the present study. JEL Classifications: G30, M40

Keywords: Newly listed firms; Residual Income; Earnings; Market Value; RD

1. Introduction

Examining the valuation of newly listed firms (hereafter, NLF) can be a fruitful task for researchers and practitioners of capital markets. This is due to the significance of the market of NLF which serves as a leading indicator of the public equity market. However, while there have been numerous papers that have investigated the value relevance of accounting information for older publicly traded stocks, there have been very few papers that have conducted a detailed study of the relevance of accounting information for NLF. Assessing thus their valuation attributes can provide vital information about when they become viable candidates for public equity financing. Additionally, the new economic settings after the collapse of international markets in March 2000 caused several commentators to raise questions about whether traditional val-

uation methods remain valid in the new economic setting (McCarthy, 1999). Such claims are more common in the context of the NLF, which are harder to value than older public traded stocks, because of their shorter financial history.

Since Williams (1938, see also Preinreich, 1938), the attempts to derive variants of a model that makes use of accounting data resulted into the first accounting-based valuation models. As a result of the analytical work of Ohlson (1990, 1991, and 1995) and Feltham and Ohlson (1994, 1995, and 1996) this approach has gained increased acceptance by both academics and practitioners and is now playing a significant role in capital markets-based financial accounting research.

Valuation of NLF is an active topic in accounting and finance research because of their changing nature over the years. This study examines whether traditional valuation models such as the Feltham and Ohlson (1995) model are also valid in the new economic settings after March, 2000. Second it assesses the relevance of accounting information for NLF. Furthermore, it provides further empirical evidence on the information content of Residual Income (RI) and Net Income after extraordinary items (NI) by testing valuation models for NLF firms that use earnings and residual income as explanatory variables whilst controlling for the impact of closing book value and research and development expenditures. The latter two variables have been proved to have a statistically significant information content for market values (e.g., Green, Stark and Thomas, 1996; Stark and Thomas, 1998; Akbar and Stark, 2003). Opening book value is used as the common deflator for all variables in the estimation of the models.

The findings indicate that replacing RI with NI in accounting-based valuation model does not reduce information content and significance. This is contrary to findings of RI superiority over NI in the literature. The results also indicate that future RD in conjunction with BV help RI and NI to display better explanatory power for market values.

The paper is organised as follows: Section 2 describes the Residual Income valuation model and the tests of relative and incremental information content. Section 3 provides the sources of the data and describes the methodology. Section 4 provides the empirical results of the paper and finally section 5 concludes the paper.

2. Research Design

2.1 The model

Ohlson's (1995) work is often cited as the theoretical foundation for many recent studies of the relation between Market values, Book values and Earnings. His methodology is employed by using a specification that can capture the effect of RD expenditures on market values (Green et al, 1996 and Stark and Thomas, 1998)[1]. They suggest that partitioning earnings into RD expenditures and earnings plus RD expenditures, could improve the ability of earnings to explain market values. By denoting MV_u the market values, NI_u the net income after extraordinary items of company *i*, BV_u the book values and RD_u research and development expenditures of company i we initially investigate the following accounting-based valuation model

$$MV_{it} = b_0 + b_1 NI_{it} + error_{it} \quad (1)$$

where $error_{it}$ is a mean zero error term.

Following Green et al. (1996) earnings are disaggregated into an Earnings plus RD expenditures component and into an RD expenditures component. This disagregation leads to the second valuation model

$$MV_{it} = b_0 + b_1(NI_{it} + RD_{it}) + b_2 RD_{it} + error_{it} \quad (2)$$

If in empirical settings the condition that $b_1=-b_2$ applies it is a clear implication that the market, in the context of a straightforward earnings model, does not capitalize RD expenditures.

A third valuation model prevails by enhancing equation 2 with Book Values. This implies that cross-sectional variation of market values can be explained by both book values and earnings. Thus the third model is as follows

$$MV_{it} = b_0 + b_1(NI_{it} + RD_{it}) + b_2 RD_{it} + b_3 BV_{it} + error_{it} \quad (3)$$

The extant literature on estimating equations similar to the above showed that both equity book value and net income are able to explain variations in the

market values. Thus omitting one or the other potentially leads to model misspecification (Easton and Harris, 1991; Easton, 1999; Penman, 1998).

Residual income is broadly defined as the accounting earnings of the period less a charge[2] for the use of invested capital and has prevailed as a correct valuation attribute. Unlike simple earnings it recognizes that we should account for the capital employed by a company which bears a cost.. In formal terms, $RI_t = NI_t - k_e BV_{t-1}$. In empirical settings this model examines the cross-sectional relation between current Market Values, Book Values and Residual Income. If it is found that simple RI measures have more explanatory power for market values relative to NI then it provides some support for those who advocate the use of RI as the basis of planning and control (Stark and Thomas, 1998). The fourth model appears as follows

$$MV_{it} = b_0 + b_1[(NI_{it} + RD_{it}) - kBV_{t-1}] + b_2 RD_{it} + b_3 BV_{it} + error_{it} \quad (4)$$

or equivalently

$$MV_{it} = b_0 + b_1(RI_{it} + RD_{it}) + b_2 RD_{it} + b_3 BV_{it} + error_{it} \quad (5)$$

One problem that emerges in employing the RIM with actual data is the estimation of the cost of capital. While, early studies, usually assume a constant value for the cost of capital (see Lee, 1999 for a review), Gebhardt et al. (1999), and Brief (1999), use RIM framework to estimate the implied rate of return, which can be thought of as the ex-ante cost of equity capital. However, Beaver (1999) argues that this practice actually translates into a residual income figure, which is nothing else but ROE minus a constant[3]. Stark and Thomas (1998) on the other hand, show that it is the BV at time *t-1* and not the cost of capital that has information content and that a constant k may play the role of the regression slope if RI is decomposed into its individual components.

2.2 Tests of information content

Following Biddle et al. (1995), a distinction is drawn between incremental and relative information content. Incremental information content comparisons evaluate the value relevance of one measure against another when both

can be used to assess the information content of a set of variables (Bowen et al., 1987). Following Bowen et al. (1987) incremental information content is assessed by examining the statistical significance of OLS slope coefficients. In contrast relative information content comparisons are used when interest lies in ranking some performance measures according to their information content when only one measure can be used i.e. when making mutually exclusive choices. Dechow et al. (1996) makes a distinction between nested and non-nested models[4]. They argue that simply comparing R^2's does not provide statistically reliable evidence for comparing non-nested equations such equations (l)-(4). In order to formally discriminate between the four competing specifications, they should be evaluated as competing non-nested models and thus Akaike and Schwarz Information Criteria are used along with adjusted R^2.

3. Data sources and Sample selection

The historical accounting data used in this study are obtained from the COMPUSTAT database over a five-year period from 2000-2004 for a large sample of newly listed US firms. When the annual subsamples are pooled together results in 3780 firm year observations for analysis. The variables' used are: MV = market value of company i calculated 6 months after the balance sheet publication date and according to Stark and Thomas (1998) this is necessary to ensure that the information in the financial statement is reflected in the Market value. NI = Net Income before extraordinary items[5]; BV = book value of company i calculated on an issue basis, using that portion of share capital and reserves (excluding preference capital) minus intangibles attributable to the issue; k = cost of equity capital calculated as the geometric mean of the closing values of the one year U.S. Government T-Bill and RI = calculated as Net Income for that year minus the Book Value of the previous year multiplied by the cost of equity capital (NI_t - (k BV_t)). Moreover, RD measures the Research and Development expenses appearing in the balance sheet statement. Finally following Stark and Thomas (1998) each equation is estimated in a deflated form, using opening book values as the deflator due to overcoming any size-related heteroscedasticity that can be expected in equations (1)-(5). Moreover, the data are used in panel form and for a firm to enter the panel it must satisfy for that year the following conditions

1. All the required data must be available from Compustat;

2. The ratio of MV to BV must not exceed 10. The second criterion is employed to "trim" extreme observations. The sample selection criteria results

in a panel of 1739 observations. Table 1 shows descriptive statistics on selected variables of the sample.

TABLE 1

Descriptive statistics of selected variables

	MV	NI	NI+RD	RI+RD	RD	BV
Mean	5.96	-0.05	0.07	0.00	0.12	1.50
Median	2.19	-0.05	0.06	-0.02	0.04	1.00
Std. Dev.	132.27	9.35	8.98	8.98	1.72	15.45
Skewness	19.98	8.77	10.03	10.03	-19.66	5.74
Kurtosis	545.90	268.65	295.56	295.56	527.40	314.85

Notes: The sample consists of 3780 observations of earnings, market capitalisation, book values and residual income observations in levels.
MV = the market value at the end of year t, BV = the book value at the end of year t, NI = earnings before extraordinary items at year t, RD = Research and Development expenditures at year t.

4. Results

4.1 Principal findings

The outcomes of estimating panel regressions (1)-(4) are presented in this section. Table 2 provides details of the estimates of the 4 pool regressions[6] for the years 2000-2004. The results suggest a number of points. First, the value of the intercept is negative and insignificant in all the four regressions which is consistent with Ohlson (1995). Second, the RD measure exhibits significant ability in explaining market values. This means that the market capitalizes RD in a straightforward fashion. Additionally the RD's coefficients are larger and more significant in comparison with older public traded firms as it can be seen from table 2, which implies that the market considers them as an indicator of firm's growth prospects. Third, it appears that the explanatory power of the NI is reduced in the limit when RD and/or BV are used to explain the MV. Fourth the addition of RD helps RI and NI in explaining market values. Furthermore the adjusted R^2 is greater for the regression models (3-4). However, BV has low explanatory power for market values and that is in contrast with studies of value relevance of accounting variables for older public traded companies (Guenther and Sun, 2004). This may be a shortcoming of their shorter financial history. Fifth as it can be seen the Breusch-Godfrey test for serial correlation shows that only regression model (1) suffers from considerable serial correlation in the

residuals. This is probably due to the omitted variables problem (Easton, 1999). Indeed when the model is expanded the correlation test statistic becomes insignificant. Overall, by using the adjusted R^2 as measure of the goodness of fit, regression models (3-4) provide the best fit with a value of 97%. Beatty, Riffe, and Thompson (2000), find that when all the variables in their model are deflated by book value of equity or sales or when all variables are log-transformed, the adjusted R^2 is also near 90%. Following the constructive comments of Dechow et al. (1996), the Akaike and Schwarz Bayesian Information Criteria are used in a non-nested model selection framework. For non-nested alternatives-smaller values of the AIC are preferred. The values of the AIC and SBIC are shown in the last columns of Table 2 and as can be seen models (3) and (4).

TABLE 2

Results of pool regressions of Market Value on Book Value
Net Income and RD for newly listed US firms

Equation 1 $MV_{it} = b_0 + b_1 NI_{it} + error_{it}$.

Equation 2 $MV_{it} = b_0 + b_1(NI_{it} + RD_{it}) + b_2 RD_{it} + error_{it}$.

Equation 3 $MV_{it} = b_0 + b_1(NI_{it} + RD_{it}) + b_2 RD_{it} + b_3 BV_{it} + error_{it}$.

Equation 4 $MV_{it} = b_0 + b_1(RI_{it} + RD_{it}) + b_2 RD_{it} + b_3 BV_{it} + error_{it}$.

Model	b_0	t-stat	b_1	t-stat	b_2	t-stat	b_3	t-stat	Ad. R^2	Breusch-Godfrey Serial Correlation test	AIC	SBIC
1	-34.23	-1.54	13.88	3.11***					0.74	7.55***	16.68	16.68
2	-11.38	-1.06	17.72	32.02***	45.27	12.07***			0.96	0.00	15.05	15.06
3	-16.16	-1.62	13.79	6.50***	37.04	7.13***	1.79	1.97**	0.97	0.00	14.80	14.81
4	-15.14	-1.51	13.79	6.50***	37.04	7.13***	1.79	1.97**	0.97	0.00	14.80	14.81

Notes: The sample consists of 3780 observations of earnings, market capitalisation, book values and residual income observations in levels. ***, ** and * indicates 1%, 5% and 10% significance level. The Breusch-Godfrey Serial Correlation test has an asymptotic F distribution under the null hypothesis.
MV= the market value at the end of year t, BV= the book value at the end of year t, NI=earnings before extraordinary items at year t, RD= Research and Development expenditures at year t.

5. Summary and implications

The present paper assesses the extent to which traditional valuation methods remain valid in the new economic settings after 2000 by using panel data for a large sample of U.S. newly listed firms. Moreover it examines whether earnings outperform residual income in equity valuation of NLF. Book values (BV), residual income (RI), earnings (NI), and Research and Development expenditures (RD) are used to examine four different variants of the Feltham-Ohlson model that have been used in various research settings. The ability of each model is assessed using measures of relative information content for nested and non-nested models.

As it is shown on average residual income is unable to outperform earnings as valuation attribute. Moreover, it is shown that RD and BV help RI and NI in accurately capturing the future prospects of a firm.

Nevertheless, RD appears to maintain sound information content in all cases. Moreover, the explanatory power of BV is not significant as in other studies of the kind[7] at the 1% level even-though BV captures future firm prospects omitted by other measures of profitability (Beaver, 1989). However, if we think of market values as book values plus goodwill (Monahan, 1999), the results imply that for newly listed firms investors place more significance on variables that potentially proxy for goodwill. In this context we could argue that RI, NI and RD expenses account for goodwill. However, this is an issue that expands beyond the scope of the present paper and requires further analysis.

Endnotes

1. The paper does not try to answer the question as to whether the RD effect refers to omitted risk factors or market mispricing. Studies of this kind are Lev et al., 2005.

2. The charge is obtained by multiplying the cost of equity capital (k_c) with the book value of equity at the beginning of period t.

3. In terms of ROE, RI is given as RI,=(ROE_t-k)BV,-i. On the other hand, NI,=ROE_txBV,-i. Thus, if the cost of capital is constant, RI differs from NI by a constant proportion of the BV of the previous period.

4. According to Pesaran and Weeks (1999) two models are non-nested or they belong to "separate families" when none of the individual models may be obtained from the remaining either by imposition of parameter restriction or through a limiting process.

5. According to Barth et al. (1999), defining NI in this way violates the clean surplus

assumption of Ohlson (1995). However, it eliminates potentially confounding effects of large one-time items and is consistent with prior research (Dechow et al, 1999).

6. Regression standard errors are corrected for heteroskedasticity using White's consistent covariance matrix. Moreover, in all years and for all models the values of Breusch-Godfrey test-statistic show no evidence of autocorrelation.

7. Guenther and Sun (2004) find that Book value alone and book value along with residual income and other informational variables are significant in several cross-country settings.

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