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# MANAGEMENT & ACCOUNTING REVIEW

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# R&D Information and Market Valuation: Empirical Evidence from Malaysian Listed Firms

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## ABSTRACT

*Research and Development (hereafter R&D) is an expensive activity as it requires an investment of a certain amount of capital with the belief that they would result in some increased benefits in the future. Traditionally, firms have supported R&D due to technological improvements that are made possible by innovation which allows for better productivity, greater markets success and compliance to regulatory demands. Companies expect that the investment would create some values to them. In relation to this, the major aim of this study is to understand and acknowledge the value relevance of R&D in market valuation. The study only focuses on listed companies in Malaysia for the year 2000 until 2012. This study empirically investigated the association between R&D information in determining and explaining the market value. The study identifies the relationship between R&D and all other assets. Furthermore, the study examined the relationship between R&D and the sign of earnings items. An equity valuation model based on the modified balance sheet identity was used to permit R&D and other assets to have separate empirical coefficient values. This study found weak empirical support at best for the value relevance of R&D at the firm level. However, the market has taken into consideration the Book Value of Net Asset (BVNA) in determining the firm's equity value as compared to R&D. The results also indicated that the market's valuation of R&D is expected to be priced differently from other assets during the period of study. In addition, our results provided evidence that there is no significant relationship between R&D information and the sign of earnings items.*

**Keywords:** *Book Value of Net Asset, R&D Information, Market Value, Value Relevance*

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## INTRODUCTION

Research and Development (hereafter R&D) has been a challenging issue and the term is usually applied to distinguish the actions undertaken by firms and other entities in order to create new or improved products and procedures. In relation to this, R&D is perceived as part of the innovation process which affects the transformation of knowledge into tangible output. R&D activities require a company to invest a certain amount of capital in which the outcome of that investment is uncertain (Taufil Mohd et al., 2006). Many businesses in the commercial world spend vast amount of money on an annual basis on the R&D of products and services. Even though R&D is considered as an expensive activity, most modern businesses make strategic choices about investment in R&D in the hope of enjoying competitive advantage in the future. The evidence from previous study seems to indicate that R&D activities generally benefit the companies from the high-technology industries.

Most current studies indicate that the accounting number of R&D has value-relevance or in other words, it has future economic benefits. Many researchers have conjectured that benefits from R&D are plausible. According to Nobelius (2004), R&D has been studied for a long time from different contexts, economies and environmental demands throughout the years. Nevertheless, whether or not the information about intangible assets reported under current financial reporting requirements conveys information that is value relevant to the market participants' valuation of firms' equity has long been a question of interest to accounting policymakers and researchers. Basically, the primary purpose for conducting the tests of value relevance is to extend our knowledge regarding the relevance and reliability of accounting numbers as reflected in equity values. The value relevance research assesses how well accounting numbers reflect information used by equity investors. Besides, the findings of this research should be important for those involved in the setting and monitoring of standards, as relevance and reliability are the two primary criteria in the accounting conceptual framework.

However, one could pose the question as to whether the controversy surrounding R&D is really important or it is just making 'noise' in the security market. Apart from that, one of the possibilities is to examine

whether the market perceives the amount of R&D as an important variable in the determination of the value of a company. In relation to this, the study will add to the existing body of knowledge by providing empirical evidence on the market valuation of R&D. Therefore, the empirical aims of this study are to investigate the relationship between the accounting information and market valuation of R&D and the relationship between R&D and other assets. Apart from that, this paper uses an equity market value as the valuation benchmark for a sample Malaysian firms for the year 2000 to 2012. Further, we examined the relationship between R&D and the sign of earnings items. Earnings items are used as a proxy throughout the study period.

The paper is organized as follows. Section 2.1 discusses the previous studies on value relevance of intangibles. Section 3.1 explains research methods, in which data collection and relevant valuation models are discussed. Section 4.1 covers discussion and analysis while Section 5.1 outlines the conclusion and recommendation resulting from this study.

## **LITERATURE REVIEW**

### **Value Relevance of Intangibles: Research and Development**

There is an extensive body of literature review providing empirical evidence on the relevance of intangibles for equity valuation and, therefore, pointing out the need to take intangibles into account in investment, credit and management decision-making. McCarthy & Schneider (1995) analysed the market perception of goodwill as an asset in the determination of a firm valuation in the United States market. They also examined how the market perceives goodwill in relation to all other assets. Their findings showed that investors perceive goodwill as an asset when valuing a firm and suggested that the market includes goodwill when valuing a company. In other studies, the fair value of accounting value relevance literature also addressed questions relating to the cost of non-financial intangible assets related to goodwill (Barth et al., 2001). The findings showed that available estimates of intangible asset values reliably reflect the values of the assets as assessed by investors. Besides, the estimates have a significantly positive relation with share price. In fact, there is a review of the literature that indicated



the diverse paradigms that have encompassed R&D. The transition from early days' booming markets and economic growth in the 1950s to today's highly competitive and global marketplace is reflected in the way R&D has been managed (Nobelius, 2004).

Accounting for R&D is an important area in which significant doubt exists concerning the appropriateness of the present level of mandated disclosure on accounting financial statements (Hirschey et al., 2001). R&D constitutes a fundamental factor for the successful introduction of new, more efficient and clean supply and end-use technologies and the achievement of economic, safety, environmental and other goals (Barreto & Kypreos, 2004). Hence, questions are posed on whether or not investors really look at the R&D information in determining a company's market value or value of companies. These questions raise another issue taken up by this study which is to examine whether the commotion surrounding the subject of R&D is really important to investors due to corporate growth, or is just to create 'noise' in the security market. Thus, the study will try to uncover if R&D information reported in the financial statement is being taken into consideration by investors when valuing a company. Therefore, prior research had been conducted to examine the value relevance of R&D. Other than that, numerous articles that consist of various models and framework also had been developed.

Furthermore, Zainol et al. (2008) concluded that R&D activities initiated by a firm is an important signal for a firm's potential future value-creation. According to this study which was conducted based on 230 public-listed companies from the main board of Bursa Malaysia, companies in the consumer sector have a higher probability of reporting R&D as intangible assets than the companies in the industrial sector. By treating R&D as intangible assets, the companies in the consumer sector manage to increase the possible inflow of foreign direct investment and enhance the market value of the firm. The study also found that companies with high total assets tend to have a greater probability of reporting R&D cost as intangible assets. The study revealed companies which report the R&D as intangible assets are eligible for the tax credit, a tax deduction and special depreciation allowance including tax exemption under the Malaysian Income Tax Act 1967.

Overall, research suggests that investors use disclosures on intangible expenditures and those intangible expenditures have future benefits, but these benefits are more uncertain than those associated with conventionally recognised assets (Maines et al., 2003). In addition, a study by Laincz (2005) presented the partial equilibrium for a single industry, which demonstrates how growth-promoting R&D subsidies alter the endogenously determined market structure. The results indicated optimal R&D policies in existing endogenous growth models rely on strong assumptions regarding market structure.

## METHODOLOGY

### Development of the Theoretical Framework

The accounting identity model, also called the balance sheet model, is based on the theory that the market value of the firm's equity is the market value of its assets minus the market value of its liabilities, whereby investors assign values to the firm by taking the difference between the market value of total assets and the market value of total liabilities. Accordingly, the balance sheet model has been widely used by many researchers in their study which includes only the balance sheet variables in the regression equation, as in the study published by Landsman (1986). The model was actually based on the basis accounting equation which holds that shareholders' equity is the residual of corporate assets less corporate liabilities. Therefore, the shareholders' equity can be written as:

$$\text{Shareholders' equity (Net assets)} = \text{Total assets} - \text{Total liabilities}$$

The use of this equation enables Landsman to compare coefficient values of assets and liabilities to their counterparts. By removing earnings, which is one of the explanatory variables, the weighted average of the income variable and the balance sheet variable is no longer available. The model is as follows:

$$MVE_{jt} = a_0 + a_1 BVNA_{jt} + a_2 R/D_{jt} + e_{jt} \dots (\text{Model 3.1.1})$$

Where

- $MVE_{jt}$  = Market value of shareholders' equity of firm j in year t  
 $BVNA_{jt}$  = Book value of the net assets minus R&D of firm j in year t  
 $R/D_{jt}$  = Research and development of firm j in year t  
 $e_{jt}$  = Error term

Numerous papers utilised equity market value as the valuation benchmark to assess how well particular accounting numbers reflect information used by investors. Besides, the tests often focus on the coefficient of the accounting numbers in the estimation equation. Similar to Barth et al. (2001), we examined whether the estimated coefficient on the accounting numbers is significantly different from zero with the predicted sign. Rejecting the null of no significance or unpredicted sign is interpreted as evidence that the accounting amount is relevant and not totally unreliable. This study also examines how the market perceives the accounting numbers in relation to all other amounts recognised in financial statements. Thus, rejecting the null that the coefficients are the same is interpreted as evidence that the accounting numbers being studied have relevance and reliability that differ from recognised amounts. Therefore, the multiple regression analysis is used to test the model and the relationship is analysed. The market valuation model is estimated for each of the years from 2000 to 2012. Thus, the model tested in this study is as follows: -

$$MVE_{jt} = a_0 + a_1BVNA_{jt} + a_2EARN_{jt} + a_3R/D_{jt} + e_{jt} \dots (\text{Model 3.1.2})$$

Where

- $MVE_{jt}$  = Market value of shareholders' equity of firm j in year t  
 $BVNA_{jt}$  = Book value of the net assets minus R&D of firm j in year t  
 $EARN_{jt}$  = Net profit of firm j in year t  
 $R/D_{jt}$  = Research and development of firm j in year t  
 $e_{jt}$  = Error term

We estimated yearly cross-sectional regressions over a thirteen-year period from 2000 to 2012 and used r-squared as one of the methods to measure value-relevance. Apart from that, there is another extension model that can be tested empirically to discover the relationship between R&D information and the sign of earnings items throughout the study period.

Besides, a new variable was added to the original model used in this study. The basic model had been extended to include a dummy variable. This dummy variable stands for the direction of earnings items, which were divided into positive (profit) and negative (loss). If the reported earnings items were positive, the value for this dummy variable was 1. On the other hand, if the reported earnings items were negative, the value for this dummy variable was 0. The new extended model is established as follows: -

$$R/D_{jt} = a_0 + a_1 MVE_{jt} + a_2 BVNA_{jt} + a_3 EARN_{jt} + a_4 DEARN_{jt} + e_{jt} \dots \text{(Model 3.1.3)}$$

Where

$R/D_{jt}$	= Research and development of firm j in year t
$MVE_{jt}$	= Market value of shareholders' equity of firm j in year t
$BVNA_{jt}$	= Book value of the net assets minus R&D of firm j in year t
$EARN_{jt}$	= Net profit of firm j in year t
$DEARN_{jt}$	= Dummy variable taking the value of 1 for positive earnings and 0 otherwise
$e_{jt}$	= Error term

The above models are normally distributed with mean 0 and a constant variance,  $\sigma^2$  and the error terms are independent.

## Research Hypotheses

Three hypotheses have been developed and will be tested in this study. In fact, the analysis that is going to be performed will be based on these three hypotheses. The first hypothesis to be addressed in this study is whether R&D should be considered as an important element when determining a firm's market value. In order to achieve this objective,  $a_3$  is the coefficient of main interest (as in Model 3.1.2). If the market places value on R&D of a firm, then R&D should be significantly and positively correlated with the firm's market value. In order to check for this relationship, the following null hypothesis is tested based on the Model 3.1.2:

$$H_1: a_3 = 0$$

If the R&D information is a significant variable, then further examination should test how the market perceives R&D in relation to all other assets. In other words, this research attempts to assess whether R&D is being priced differently from other assets. In order to check for this relationship, the following null hypothesis is established based on the Model 3.1.2:

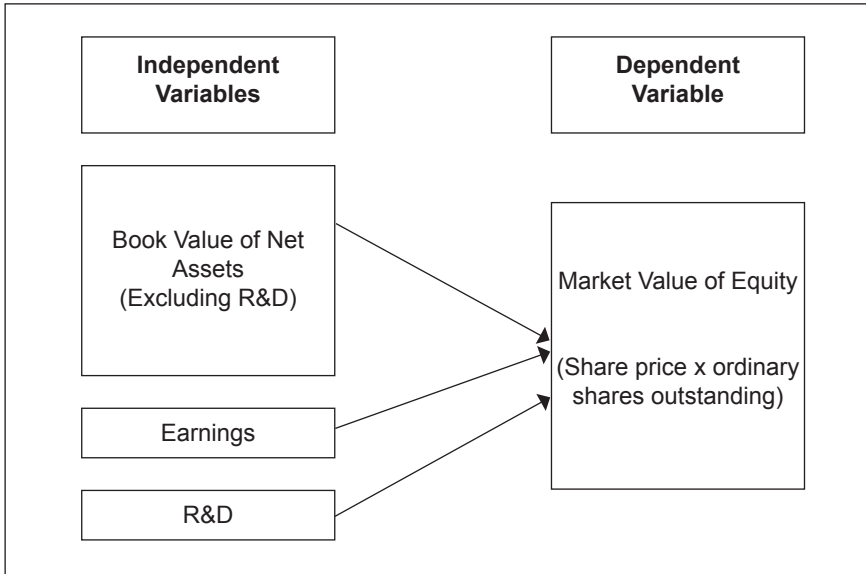
$$H_2: a_1 = a_3$$

Meanwhile, the third hypothesis examines whether there is any relationship between R&D and the sign of earnings items throughout the study period. In order to check for this relationship, the following null hypothesis is tested based on the Model 3.1.3:

$H_3$ : There is no relationship between R&D information and the sign of earnings items.

### **Theoretical Model**

As stated earlier, the main objectives of the study are to investigate empirically the association between R&D information in determining and explaining the firms' market value and to establish a relationship between R&D information with all other assets specifically over the period of 2000 until 2012 based on Malaysian listed firms. Literally, assets are rights accruing to an entity, while equities represent sources of the assets and consists of liabilities and the stockholders equity. Thus, income earned is the property of the entity until it is distributed as dividends to the shareholders. Hence, the firm's book value of net assets (excluding R&D), earning and R&D will be the independent variables in the framework. Consequently, the conceptual model is presented in Figure 1.



**Figure 1: Conceptual Model of the Study**

## Sample Selection

The study sample consists of Malaysian listed firms. The coverage of the study is thirteen years starting from the year 2000 until the fiscal year of 2012, in which data is obtained from DataStream. A firm-year is included as observation if all such variables (market value of shareholders' equity, book value of net assets, earnings and R&D) are presented for a given fiscal year. Likewise, any missing variables are omitted. As a result, the final sample consists of various sample sizes during the period of study. Table 1 summarises the sample selection and size used for the study. After excluding the missing observations of variables market value of equity, book value of net assets, earning and R&D, the final sample for this study has 665 firm-year observations.

**Table 1: Sample Selection and Size**

Sample Selection	Firm-years
DataStream (Thompson One Banker) for the year 2000-2012	12,259
Missing observations of market value of equity (MVE), book value of net assets (BVNA), earnings (EARN) and capitalized R&D (R/D)	11,594
Sample Size	665

**Variables Definition**

The accounting variables included in the regression model are market value of equity, book value of net assets, earnings and research and development. A summary of the variables of interest is presented in Table 2. The market value of shareholders’ equity (MVE) is defined as the share price multiplied by the number of shares outstanding at the end of the accounting year. The book value of total assets, research and development (R&D), total liabilities and the earning figure (EARN) are also taken directly from the DataStream without any modification, except in some cases whereby variables are combined as shown. However, the book value of net assets (BVNA) is derived by deducting the total assets (excluding R&D) with total liabilities.

**Table 2: Variables Required for Regression from Data Stream**

Name of variables required for regression	Variables	Symbol
Market value of equity	Ordinary share outstanding x share price	MVE
Book value of total assets	Total assets	
Book value of total liabilities	Total liabilities	
Total sales	Turnover	
Earnings	Profit attributable to Shareholders	EARN
Net assets	Book value of total assets - Book value of total liabilities - Research and development	BVNA
Research and Development	R&D to sales	R&D

## DISCUSSION AND ANALYSIS

### The Relationship Between R&D and Firm's Market Value After Taking Into Consideration Heteroscedasticity Problem

Table 3 demonstrates the summary statistics from the basic regression models that are based on White's heteroscedasticity adjusted standards errors by Malaysian listed firms during 2000-2012. Specifically, the values of  $a_0$  are non-zero and higher than one for overall result except (as reported in Table 3) for the Year 2001 ( $a_0 = -0.118$ , White's  $t = -0.316$ ). Other than that, the intercept term  $a_0$  significant at 5% level except (as reported in Table 3) for the Year 2000 ( $a_0 = 0.414$ , White's  $t = 1.827$ ,  $p = 0.088$ ), Year 2001 ( $a_0 = -0.118$ , White's  $t = -0.316$ ,  $p = 0.754$ ); Year 2002 ( $a_0 = 0.399$ , White's  $t = 1.662$ ,  $p = 0.107$ ); Year 2004 ( $a_0 = 0.652$ , White's  $t = 1.850$ ,  $p = 0.070$ ); Year 2007 ( $a_0 = 0.431$ , White's  $t = 1.415$ ,  $p = 0.162$ ); Year 2008 ( $a_0 = 0.098$ , White's  $t = 1.073$ ,  $p = 0.287$ ); Year 2010 ( $a_0 = 0.287$ , White's  $t = 1.347$ ,  $p = 0.183$ ); Year 2011 ( $a_0 = 0.248$ , White's  $t = 1.514$ ,  $p = 0.136$ ); and Year 2012 ( $a_0 = 0.801$ , White's  $t = 1.911$ ,  $p = 0.067$ ). Based on these findings, it appears that the market takes into consideration the amount of R&D (for the year 2001, 2002, 2008, and 2009) and BVNA in its determination of a firm's valuation. In other words, investors perceived BVNA rather than R&D as an important element when determining a firm's market value.

**Table 3: Market Value Predictions for Malaysian Firms  
(White's Heteroscedasticity Adjusted Standard Error)**

Predicted Sign	$a_0$	$a_1$	$a_2$	$a_3$	$R^2$	N
	?	+	+	+		
2000						
coefficient	0.414	0.878	1.880	0.293	0.648	19
white-t	1.827	5.821	2.305	1.840		
p-value	0.088	0.000*	0.036*	0.086		
2001						
coefficient	-0.118	0.938	0.116	0.451	0.585	31
white-t	-0.316	2.872	0.383	2.499		
p-value	0.754	0.008*	0.705	0.019*		
2002						
coefficient	0.399	0.549	1.548	0.413	0.512	35
white-t	1.662	2.523	3.089	2.020		
p-value	0.107	0.017*	0.004*	0.052*		



Predicted Sign	a <sub>0</sub>	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	R <sup>2</sup>	N
	?	+	+	+		
2003						
coefficient	0.958	0.440	1.374	0.042	0.200	46
white-t	2.724	1.395	1.484	0.753		
p-value	0.009*	0.170	0.145	0.456		
2004						
coefficient	0.652	1.066	0.053	-0.050	0.136	53
white-t	1.850	1.805	0.107	-1.370		
p-value	0.070	0.077	0.915	0.177		
2005						
coefficient	1.053	0.077	4.167	0.015	0.345	63
white-t	4.030	0.394	3.048	0.443		
p-value	0.000*	0.695	0.003*	0.659		
2006						
coefficient	1.081	0.685	2.759	0.002	0.381	69
white-t	2.291	1.357	1.517	0.080		
p-value	0.025*	0.179	0.134	0.936		
2007						
coefficient	0.431	1.025	0.641	0.013	0.423	71
white-t	1.415	2.779	1.929	0.410		
p-value	0.162	0.007*	0.058	0.683		
2008						
coefficient	0.098	0.450	2.497	0.169	0.903	67
white-t	1.073	6.907	8.417	11.887		
p-value	0.287	0.000*	0.000*	0.000*		
2009						
coefficient	0.509	0.257	2.256	0.061	0.528	61
white-t	3.900	2.351	1.759	3.011		
p-value	0.000*	0.022*	0.084	0.004*		
2010						
coefficient	0.287	0.483	4.792	0.003	0.477	61
white-t	1.347	2.266	2.628	0.134		
p-value	0.183	0.027*	0.011*	0.893		
2011						
coefficient	0.248	0.457	6.063	0.004	0.686	59
white-t	1.514	3.034	4.252	0.484		
p-value	0.136	0.004*	0.000*	0.630		
2012						
coefficient	0.801	0.552	2.390	-0.002	0.375	30
white-t	1.911	1.572	1.358	-0.070		
p-value	0.067	0.128	0.186	0.944		

Note: The table indicates significance at 5% (\*)

Model (Basic):  $MVE_{jt} = a_0 + a_1 BVNA_{jt} + a_2 EARN_{jt} + a_3 R/D_{jt} + e_{jt} \dots$  (Model 3.1.2)

## Market Valuation of Research and Development versus Other Assets

Given that R&D appears to be a significant factor in valuing a company, the second hypothesis examines how the market perceives R&D in relation to all other assets. In other words, this research attempts to find out if R&D is priced differently from other assets. This hypothesis ( $H_2$ ) is tested by comparing the coefficients of R&D and BVNA. If the two coefficients are not significantly different, this would suggest that the market treats R&D like any other assets. However, if the coefficients are significantly different, then the market perceives reported R&D differently from the other assets. By answering this question, it would provide insight into the relative importance of reported R&D in valuing a firm compared to other assets. Such results would provide additional evidence for the recognition of R&D in the balance sheet. After comparing the coefficients of R&D and BVNA, the Wald Test is computed in order to check on how the market perceives the amount of R&D in relation to all other assets.

The absolute value of BVNA and R&D coefficients from the basic model presented in Table 4 is discussed. The results (as reported in Table 4) are as follows: Year 2000  $a_1 = 0.878 > a_3 = 0.293$ ; Year 2001  $a_1 = 0.938 > a_3 = 0.451$ ; Year 2002  $a_1 = 0.549 > a_3 = 0.413$ ; Year 2003  $a_1 = 0.440 > a_3 = 0.042$ ; Year 2004  $a_1 = 1.066 > a_3 = -0.050$ ; Year 2005  $a_1 = 0.077 > a_3 = 0.015$ ; Year 2006  $a_1 = 0.685 > a_3 = 0.002$ ; Year 2007  $a_1 = 1.025 > a_3 = 0.013$ ; Year 2008  $a_1 = 0.450 > a_3 = 0.169$ ; Year 2009  $a_1 = 0.257 > a_3 = 0.061$ ; Year 2010  $a_1 = 0.483 > a_3 = 0.003$ ; Year 2011  $a_1 = 0.457 > a_3 = 0.004$ ; and Year 2012  $a_1 = 0.552 > a_3 = -0.002$ . It is obvious that the absolute values of BVNA coefficients are slightly higher than R&D for all cases. It indicates that investors value BVNA higher than R&D. After considering the absolute values of both coefficients, the magnitude of the market perception of R&D in relation to other assets is tested and examined. The result of this test is presented in Table 4. The results show that the null hypothesis of equal coefficients is rejected at a 5% significance level for Malaysian listed companies only during the years of 2008, 2010, 2011 and 2012. Thus, it can be concluded that the capitalised R&D is priced differently from other assets only for a few years, with lower occurrences.

**Table 4: Wald Test Restriction Imposed on Parameter of Market Value Predictions for Malaysian Firms**

Year	Coefficient		Chi-Square	p-Value
	a1	a3		
2000	0.878	0.293	1.616	0.204
2001	0.938	0.451	0.189	0.664
2002	0.549	0.413	2.622	0.105
2003	0.440	0.042	0.288	0.591
2004	1.066	-0.050	0.913	0.339
2005	0.077	0.015	11.120	0.001
2006	0.685	0.002	3.213	0.073
2007	1.025	0.013	0.304	0.581
2008	0.450	0.169	14.226	0.000*
2009	0.257	0.061	2.782	0.095
2010	0.483	0.003	10.894	0.001*
2011	0.457	0.004	23.405	0.000*
2012	0.552	-0.002	6.795	0.009*

Model (Basic):  $MVE_{jt} = a_0 + a_1 BVNA_{jt} + a_2 EARN_{jt} + a_3 R/D_{jt} + e_{jt} \dots$  (Model 3.1.2)  
 Restriction:  $a_1 - a_3 = 0$

### The Relationship between R&D and Earnings Sign

Table 5 reports that the coefficient  $a_3$  is not significant at the 5% significance level during the period 2000 to 2012. Nevertheless, it is significant at the 5% significance level for the Year 2007 ( $a_3 = -7.612$ , White's  $t = -2.247$ ,  $p = 0.028$ ); Year 2008 ( $a_3 = -16.319$ , White's  $t = -30.262$ ,  $p = 0.000$ ); and Year 2009 ( $a_3 = -29.281$ , White's  $t = -6.395$ ,  $p = 0.000$ ) but with incorrect sign. Therefore, we have enough statistical evidence not to reject the null hypothesis. As a result, we can conclude that the relationship

between the amount of R&D and earnings items is not significant. The coefficients also shows that the value of R&D has negative relation with earnings items (as reported in Table 5) except for the Year 2000 ( $a_3 = 6.452$ ) and Year 2002 ( $a_3 = 0.937$ ).

**Table 4.1.3: Market Value Predictions for Malaysian Firms - Dummy Variable Included (White's Heteroscedasticity Adjusted Standard Error)**

Predicted Sign	$a_0$	$a_1$	$a_2$	$a_3$	$a_4$	R <sup>2</sup>	N
	?	+	+	+	?		
2000							
coefficient	4.549	0.397	-0.045	6.452	-4.896	0.466	19
white-t	2.049	1.583	-0.101	1.242	-1.735		
p-value	0.060	0.136	0.921	0.234	0.105		
2001							
coefficient	0.862	0.532	-0.463	-0.221	-0.343	0.285	31
white-t	1.389	2.399	-2.061	-1.024	-0.652		
p-value	0.177	0.024*	0.049*	0.315	0.520		
2002							
coefficient	0.555	0.405	0.035	0.937	-0.531	0.316	35
white-t	1.271	2.023	0.121	0.935	-1.285		
p-value	0.213	0.052*	0.904	0.357	0.208		
2003							
coefficient	-0.556	0.280	1.849	-1.720	-0.659	0.198	46
white-t	-0.519	0.979	1.804	-1.410	-0.450		
p-value	0.606	0.333	0.079	0.166	0.655		
2004							
coefficient	-3.728	-0.531	7.002	-3.854	-0.448	0.407	53
white-t	-0.811	-0.973	1.563	-1.479	-0.139		
p-value	0.421	0.335	0.125	0.145	0.890		
2005							
coefficient	-1.963	0.455	2.770	-7.271	1.377	0.108	63
white-t	-0.621	0.999	0.830	-1.006	0.656		
p-value	0.537	0.322	0.410	0.318	0.514		
2006							
coefficient	0.538	0.076	1.267	-0.430	0.666	0.037	69
white-t	0.506	0.117	0.747	-0.362	0.574		
p-value	0.614	0.907	0.457	0.718	0.568		

Predicted Sign	a <sub>0</sub>	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	a <sub>4</sub>	R <sup>2</sup>	N
	?	+	+	+	?		
2007							
coefficient	-1.864	0.537	4.757	-7.612	-0.746	0.322	71
white-t	-1.112	0.497	1.644	-2.247	-0.435		
p-value	0.270	0.621	0.105	0.028*	0.665		
2008							
coefficient	-0.481	3.977	-1.263	-16.319	0.555		67
white-t	-0.486	11.305	-3.152	-30.262	0.525	0.983	
p-value	0.628	0.000*	0.002*	0.000*	0.601		
2009							
coefficient	-4.547	4.089	2.502	-29.281	1.843		61
white-t	-2.490	4.341	2.798	-6.395	0.917	0.627	
p-value	0.016*	0.000*	0.007*	0.000*	0.363		
2010							
coefficient	-3.074	0.407	3.446	-8.596	2.064		61
white-t	-1.097	0.394	3.402	-0.692	0.610	0.243	
p-value	0.277	0.695	0.001*	0.491	0.544		
2011							
coefficient	-2.478	1.372	2.316	-33.322	4.116		59
white-t	-0.752	0.771	1.796	-1.667	0.970	0.336	
p-value	0.455	0.444	0.078	0.101	0.336		
2012							
coefficient	-7.158	-0.130	5.764	-16.391	5.626		30
white-t	-0.803	-0.078	3.248	-0.996	0.594	0.404	
p-value	0.429	0.938	0.003*	0.328	0.558		

Note: The table indicates significance at 5% level

## CONCLUSION AND RECOMMENDATION

The major concern in this study is to understand and recognise the value relevance of R&D in market valuation. Research on value relevance shows that the market is capable of valuing intangible assets, predominantly on R&D. This study has examined whether the market perceives the amount of R&D as an important variable in determining the value of the company. Specifically, the study empirically investigates the association between capitalised R&D in determining and explaining the market value of Malaysian listed companies during the period 2000-2012. In addition, the study also looks at whether the market valuation of R&D differs from

its valuation of other assets. Further, we examine the relationship between capitalised R&D and the sign of earnings items throughout the study period.

This study finds weak empirical support at best for the value relevance of R&D at the firm level even though there is a relationship between the market value of shareholder's equity and R&D in the years 2001, 2002, 2008, and 2009. Apart from that, it is found that the market takes more consideration of BVNA in determining the firm's equity as compared to R&D. Besides, after taking into consideration heteroscedasticity problems in the models, it can still be concluded that the amount of BVNA is more value relevant to the investors as compared to R&D. This analysis also confirms that R&D is priced differently from the other assets only for a few years. Moreover, there is no significant relationship exists between the amount of R&D and the sign of earnings items throughout the study period. It shows that regardless of the signs of the earnings items (i.e. negative or positive), they do not affect the continuous R&D activity throughout the study period. The findings are consistent with the notion that the market incorporates the accounting information from the balance sheet in the valuation of firms, and contribute further evidence (in this case from Malaysia) to existing findings about the investor decision-usefulness of reported balance sheet numbers.

Previous studies have concluded that higher value relevance is achieved by capitalising R&D costs provided they meet certain successfulness criteria, instead than just expensing those (Cazavan-Jeny & Jeanjean, 2006). As stated by Barth et al. (2001, p.78), the "value relevance studies are designed to assess whether particular accounting amounts reflect information that is used by investors in valuing firm's equity". In this study, the findings are consistent with (Tsoligkas & Tsalavoutas, 2011; Landry & Callimaci, 2004; and Shevlin, 1991). Recent literature raises concerns about the value relevance of R&D assets and expenses. Tsoligkas & Tsalavoutas (2011) reported that a capitalised portion of R&D is significantly and positively related to market values, suggesting that the market perceives these items as successful projects with future economic benefits. Besides, Zhao (2002) found that the level of R&D reporting has a significant effect on the association of equity price to accounting earnings and book value.

Overall, findings from the study provide useful information for investors. Investors use accounting information of R&D and BVNA that

represents important measures of financial statement in making economic decisions. Besides, the findings also provide guidance to the accounting regulators on whether equity investors consider R&D undertaken by Malaysian companies to be value-added investment. Thus, this study adds to the existing literature by providing empirical evidence on the market valuation of R&D.

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