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THE VALUE-RELEVANCE OF R&D EXPENDITURE: EXPERIENCE FROM MALAYSIA

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ABSTRACT

This paper examines the value relevance of R&D reporting among public listed companies in Malaysia for 2000 and 2001, subsequent to the introduction of FRS 109, Accounting for Research and Development (formerly known as MASB 4) which became effective in 1999. Beginning January 2006, FRS 138, Intangible Assets supersedes FRS 109. FRS 138 prescribes that a firm should expense its research costs and could capitalize the development cost as an intangible asset if the latter is expected to bring future benefits. Otherwise, the development expenditure is to be expensed. Test results based on Ohlson's (1995) valuation model shows that for capitalizers, the amount of R&D expenditure, either expensed or capitalized, influences the stock prices positively. As for the expensers, even though the amount expensed influences stock prices, this relationship is driven by outliers; when we dropped the outliers, the result was no longer significant. These results indicate that R&D activities of capitalizers are expected to bring future benefits and consequently, lead to higher prices while the R&D activities of expensers are more difficult to evaluate given a small sample size and the presence of outliers.

JEL classification: M41, O30

Key words: Research and development, Value-relevance, Capitalisation

1. INTRODUCTION

Modern corporations have to cope with rapid technological changes and the growth of science and knowledge-based industries. To compete in today's global market, a company must not only keep abreast of the current changes but more importantly, be the pioneer of technological breakthroughs. This necessitates a company to take on research and development (R&D) activities. The importance of R&D is given due recognition by the capital market regulator such as the Kuala Lumpur Stock Exchange (KLSE, now known as Bursa Malaysia). One of the merit criteria in the KLSE Corporate Awards, that recognise public listed companies which have demonstrated high standards of corporate governance, disclosure and transparency coupled with proactive investor relation efforts, is that the company must have a strong commitment towards R&D programmes and efforts to enhance technical excellence.

Generally, R&D activities require a company to invest a certain amount of capital in which the outcome of that investment is uncertain. Companies expect that the investment would yield a positive net present value, i.e., would create value to the companies. The evidence from the capital markets seem to support the argument that R&D is a positive net present value investment. Chan, Martin and Kensinger (1990) for instance look at the abnormal returns of 95 firms that announced that they would increase their R&D spending. They find that investors reacted positively to the announcement of R&D expenditures with the two-day announcement return of 1.38 percent. Furthermore, they find that the positive return is driven by firms in the high-technology sector. The two-day return for high-technology sector is 2.1 percent but the corresponding figure for the low-technology sector is –0.9 percent. Therefore, even though R&D could bring benefits to firms, these benefits accrue mainly to the high-technology industries.

As far as the accounting for R&D is concerned, traditionally there have been two approaches in treating the cost of R&D activities. The R&D cost could be recognized either as an expense or as an asset and then amortized over the period benefited. The debate over whether R&D spending should be expensed or capitalized has been ongoing for a long time. In the US, the accounting treatment of R&D is hotly debated since firms, except for those in the software industry, are required to

expense their R&D spending. Regulators in the US prefer to expense R&D since it is implicitly assumed that expensing rather than capitalizing R&D outlays increases the objectivity of financial statements. Given the outcome of many of these R&D outlays is uncertain and unreliably measured, objectivity has been the primary justification for the prescribed standards in the US. Kothari, Laguerre and Leone (2002) attempt to measure the relationship between variability of future earnings and R&D expenditures. In their models, they find that the coefficients of R&D expenditures are three-to-four times as large as those of the capital expenditures. Therefore, R&D outlays lead to higher earnings fluctuation and their findings lend a support to the argument that future outcomes of R&D outlays are difficult to predict. However, academic researchers (see, for examples, Lev, 1999; Chan, Lakanishok and Sougiannis, 2001) argue that the failure to recognize R&D as an asset will seriously distort common accounting measures such as price-earnings ratio, market to book ratio, and leverage ratio. Companies with high R&D spending would therefore appear to be highly leveraged and highly priced as compared to companies that do not have R&D spending. This will not only impair the credibility and relevance of financial reporting but also hinder firms' growth potential and value.

In Malaysia, R&D activities among companies were very limited. Compared to companies in other countries such as the US, Japan and Germany, the amount spent on R&D by Malaysian companies was very much less (Alfan, 2003). According to Alfan (2003), a survey by the Malaysian Science and Technology Information Centre (MASTIC) indicates that lack of R&D strategy and shortage of expert R&D personnel were the major factors that contribute to the lack of R&D activities. In annual surveys carried out by the UK Department of Trade & Industry, none of Malaysian companies ranked in the top 500 international companies that undertook R&D investment in the year 2000 and 2001. Only Proton managed to place itself in the top 1000 and 1250 rankings in 2005 and 2006 respectively. This shows that companies in Malaysia do not spent as much on R&D as compared to other companies in developed countries.

As for the accounting treatment for R&D in Malaysia, it depends on the expectation about the future benefits of an investment in R&D. If the investment is not expected to lead to future benefits, then the company has to treat the investment as an expense. However, if the

investment is predicted to bring future benefits, then the investment cost is allowed to be capitalized. Based on the current accounting standards, in Malaysia as well as overseas (for example, Australia, Singapore, Korea and the UK), only eligible development costs can be capitalized and amortized whereas all costs related to research activities are expensed immediately. Alfan (2003) reports that companies in the MASTIC survey did not give any indication that the accounting treatment was responsible for the low spending on R&D activities. Shamsul Nahar and Mohamad Naimi (2005) find that only about 8 percent of Malaysian companies reported R&D cost, and out of that 42 percent did not separate the R&D costs into research and development, which is not consistent with the accounting standard for R&D in Malaysia. Furthermore, they find that 85 percent of the companies capitalized the R&D costs while another 14 percent expensed their R&D costs.

The capital market based accounting research on R&D to date, particularly using data from US, UK, Australia, Japan, Korea and other Western European countries, have largely focused on the stock price reaction to announcements concerning R&D activities, whether stock price reflects the information pertaining to R&D, and stock return volatility and earnings variability of R&D intensive versus R&D non-intensive firms. In Malaysia, to the best of our knowledge, accounting or finance related research on R&D is limited to descriptive studies on the disclosure of R&D activities in the annual reports of listed companies.

The objective of this study is to determine whether companies' disclosure of R & D spending is value relevant. This study adds to the existing body of knowledge by providing empirical evidence on whether the Malaysian stock market appropriately incorporates the value of long-term benefits of R&D spending. The findings can provide guidance to the accounting regulators on whether equity investors consider R&D expenditures undertaken by Malaysian firms to be value increasing investment i.e. they are expected to increase the firm's future cash flows. This study also aims to test whether capitalization of R&D cost is as value relevant as the expensing of R&D cost. In Malaysia, a company could choose to capitalise R&D costs if certain criteria are met as per Financial Reporting Standard 138 - Intangible Assets (FRS 138).[1] A related study which is closest to ours is Han and Manry (2004) who document that, in Korea, the positive association between R&D

expenditure and stock price is stronger for firms that capitalized, rather than expensed, the development costs indicating that capitalized expenditure represents greater future economic benefits.

The paper is organized as follows. Section 2 discusses the accounting standard of R&D in Malaysia and reviews previous studies on value relevance of R&D spending. Section 3 explains research methods, in which data collection and relevant valuation models are discussed. Section 4 covers results and discussions while Section 5 concludes.

2. LITERATURE REVIEW

2.1 ACCOUNTING STANDARD FOR R&D IN MALAYSIA

The councils of The Malaysian Association of Certified Public Accountants (MACPA) and the Malaysian Institute of Accountants (MIA) approved the application of International Accounting Standard 9 (IAS 9), Accounting for Research and Development Activities, to the published annual accounts of business enterprises in Malaysia effective January 1987. Beginning 1999, Malaysian Accounting Standard Board 4 (MASB 4, Research and Development Costs) governed the appropriate treatment of R&D expenditures in Malaysia. MASB 4 was renamed as FRS 109 and defines research as an original and planned investigation undertaken with the prospect of gaining new scientific or technical knowledge and understanding. While development is the application of research findings or other knowledge to a plan or design for production of new or substantially improved materials, devices, products, processes systems, or services prior to the commencement of commercial production or use.

FRS 109 prescribes that all research costs be expensed in the period incurred (paragraph 15) and development cost of a project be recognized as an asset and be amortized over a period not exceeding five years (paragraph 23) if a project meets all of these criteria:

a. The product or process is clearly defined and the costs attributable to the product or process can be separately identified and measured reliably.
b. The technical feasibility of the product or process can be demonstrated.

c. The enterprise intends to produce and market, or use, the product or process.
d. The existence of market for the product or process or, if it is to be used internally rather than sold, its usefulness to the enterprise, can be demonstrated.
e. Adequate resources exist, or their availability can be demonstrated to complete the project and market or use the product or process.

FRS 109, in tandem with International Accounting Standards No. 9 (revised), requires the exercises of prudence judgment in determining the economic viability and certainty of development costs to be recognized as an asset.

2.2 PRIOR STUDIES

Most of the studies on R&D have been carried out in the US. Compared to FRS 109, the US Statement on Financial Accounting Standards No. 2 (1974) prescribes a more stringent rule for costs associated with R&D. The latter states that direct relationship between R&D costs and specific future benefits as measured by subsequent sales, earnings, or market share of industries does not exist. Therefore, all research costs should be expensed when incurred. Managers burdened to achieve short-term profit target will find R&D spending as possible target of cuts. In 1985, the US Financial Accounting Standards Board (FASB) made an exception to full expensing requirement for some software development costs. This is because the investment on software development has demonstrated to produce future economic benefits.

Since the benefits of R&D are difficult to assess, regulators in the US try to prevent the opportunistic behaviour of managers by requiring firms to expense their R&D expenditure. Given the pros and cons of both expensing and capitalizing R&D activities, standard setters around the world have to make a choice between the two opposing forces. One is the potential abuse that could arise if a firm is allowed to choose between expensing and capitalizing and the other is the distortion in the financial statements if a firm has to expense its R&D expenditure.

Lev (1999) has been critical of the way that R&D is accounted for in the US. He argues that full expensing of R&D spending is distorting

the true financial picture of a firm. Lev and Sougiannis (1996) look at the effects of R&D on stock returns and prices. In testing the relevance of R&D expenditures, they measure the benefits of the expenditures on current and future earnings. They find that the effects of R&D on earnings range from five years (for firms in the scientific instruments industry) to nine years (for firms in the chemicals and pharmaceutical industry). Furthermore, they find that the understatements of earnings and equity are 20.55 percent and 22.2 percent, respectively. The effect of R&D on return on equity (ROE) is ambiguous; ROE is understated for firms that experienced high growth rates of R&D and overstated for firms with low growth rates. Finally, they find that the difference between restated earnings (assuming capitalization), and reported earnings is positively related to both price and stock returns, and the difference between restated book value of equity and reported book value of equity is positively related to price. Therefore, they conclude "R&D capitalization yields statistically and significantly reliable and economically relevant information" (p. 134).

Aboody and Lev (1998) examine firms in the software industry where capitalization of R&D costs is allowed. They find that the stock price is positively related to the book value of capitalized software asset, changes in earnings one-year and two-year ahead are positively related to changes in the capitalized amount of software development, and changes in the capitalized amount of software development could explain contemporaneous stock returns. Therefore, capitalization of R&D costs provides useful information to investors. As for the firms that fully expensed their R&D costs, they find that even though the amount expensed could not explain contemporaneous stock returns, the amount expensed could explain returns one-year or two-year ahead.

Chan, Lakanishok and Sougiannis (2001) study the impact of R&D intensity, i.e., R&D expenditures scaled either by sales or by market value of equity, on returns. They find that returns of firms that carried out R&D activities do not differ from those of firms that do not carry out the activities irrespective of the level of R&D intensity when the intensity is measured relative to sales. However, when R&D intensity is measured relative to the market value, they find that firms with the highest R&D intensity outperform their controls. Further investigation suggests that R&D intensity is strongly related to stock volatility. They suggest that the lack of accounting disclosure might help explain this

volatility. However, Aboody and Lev (1998), in investigating the reason behind financial analysts' calls to abolish Statement on Financial Accounting Standards No. 86, find that analysts have trouble in forecasting earnings of firms in the software industry. They find that the higher the annual R&D costs relative to market value, the greater the forecast error is. This finding is in line with the finding of Kothari et al. (2002) where they find that R&D outlays positively influence the variability of future earnings.

Lev (1999), Lev and Sougiannis (1996), Aboody and Lev (1998), Chan, Lokanishok, and Sougiannis (2001) and Kothari, Laguerre and Leone (2002) examine the relevance of R&D in the US per se. Collectively, they find that both R&D outlays and R&D accounting choice could explain performance, either measured by price or return. The findings in other countries are similar to the findings in the US.

Zhao (2002) compares the accounting standards on R&D among four countries: the US, the UK, France, and Germany. Germany and the US require full expensing of R&D expenditures while France and the UK allow firms to capitalize the expenditures. They find that for the sub-sample of capitalizing firms, both the periodic expenditures and the book value of capitalized R&D costs could explain the stock prices. Therefore, capitalization provides meaningful information to investors.

Abrahams and Sidhu (1998) look at the effects of R&D on firm value in Australia. In Australia, a firm is allowed to capitalize its R&D spending if certain requirements are met. They find that the stock prices are positively related to the capitalized R&D costs. Furthermore, reported earnings, net of expenses and amortizations associated with R&D, are better able to explain share price than earnings before taking into account the expenses and amortizations. Therefore, in Australia the benefits of sharing the information through capitalization outweigh the potential abuse of spicing up the financial statements.

Xu and Zhang (2004) look at the role of R&D in explaining returns in Japan and they find that R&D is useful in explaining returns in the post-bubble period, i.e., from 1993 to 2000. Furthermore, they find that R&D leads to higher volatility in the post-bubble period but not for the whole sample period. Han and Manry (2004) investigate whether R&D influences stock prices in Korea, in which capitalization of R&D expenditures is allowed. They find that for firms that choose to capitalize, the book value of the capitalized asset is strongly associated with stock prices and for firms that choose to expense, the expensed amount is

positively related to the prices.

These studies show that both R&D outlays and R&D accounting choice could explain performance. Capitalization of R&D expenditure might provide additional information that users of financial statements could use in evaluating a firm. Therefore, this study adds to the international evidence by looking at R&D expenditures and its accounting treatment in Malaysia.

3. RESEARCH METHODS

3.1 DATA

Our sample consists of 126 Bursa Malaysia Main Board companies in three major industries, i.e., industrial products, consumer products and technology. Annual reports for the years 2000 and 2001 are examined. Due to unavailability of six annual reports, our final sample consists of 246 firm-years. Out of these, 76 firm years are capitalizers, 23 are expensers, and 147 do not carry out any R&D activities. In addition, companies' annual reports for the years 2000 and 2001 are observed for other relevant information. We also use Datastream database to extract data related to stock prices.

This study excludes companies involved in plantation, property and real estate, construction, and education, as their development expenditures are not R&D per se as defined under FRS 109.

FRS 109 specifically defines development expenditures as the application of research findings in which this research should be an original and planned investigation to gain new scientific or technical knowledge and understanding. Based on inspection of annual reports of companies listed on Bursa Malaysia, "development expenditure" also applies, among others, to plantation development, forestry development, property development, and courses and syllabi development expenditures.

Furthermore, diversified companies usually lumped together the amount spent on development expenditures, making it difficult to disaggregate the spending directly related to R&D as defined in FRS 109. As most firms in the trading and services industry are highly diversified, they are also excluded in this study. Firms in the financial industry are also excluded because of their unique regulatory environment.

3.2 REGRESSION MODELS

In order to investigate the objective, we follow the method proposed by Ohlson (1995). He posits that prices can be explained by book value of equity, earnings, and other information. Based on his model, the following relationship is estimated:

$$(1) \qquad P_{it} = \beta_0 + \beta_1 Year_{it} + \beta_2 EPS_{it} + \beta_3 BV_{it} + e_{it}$$

where:

P_{it} = stock price for firm *i* at the end of year *t*.
$Year_{it}$ = year dummy for firm *i* (one for 2001 and zero for 2000).
EPS_{it} = earnings per share for firm *i* in year *t*.
BV_{it} = book value of equity per share for firm *i* in year *t*.

To test the relationship between R&D and share prices, the above model is expanded by including the R&D variable as follows:

$$(2) \qquad P_{it} = \beta_0 + \beta_1 Year_{it} + \beta_2 EPS_{it} + \beta_3 BV_{it} + \beta_4 (R\&Dpershare)_{it} + e_{it}$$

where $(R\&D\ pershare)_{it}$ is total R&D expenditure per share for firm *i* in year *t*.

EPS is broken into two components: Earning per share before taking into account the expensed R&D, and the expensed R&D per share. Furthermore, since some of the capitalizers expensed some portion of their R&D expenditures, the expensed R&D per share is further broken down into two components. One is the expense by the expensers and the other is the expense by the capitalizers.

Therefore,

$$EPS_{it} = EPSbef_{it} - (EXPFull_{it} + ExpCap_{it} + AmortCap_{it} + Writeoff_{it})$$

where

$EPSbef_{it}$ = EPS before taking into account the expensed R&D.

$ExpFull_{it}$ = expensed R&D per share by the expensers.

$ExpCap_{it}$ = expensed R&D per share by the capitalizers.

$AmortCap_{it}$ = amount of amortization per share by the capitalizers.

$Writeoff_{it}$ = amount of write-off per share by the capitalizers.

Similarly, *BV* is broken down into two components, i.e., the book value before taking into account the capitalized amount, and the capitalized amount of R&D per share. Therefore,

$$BV_{it} = BVbef_{it} + CapAmt_{it}$$

where

$BVbef_{it}$ = *BV* before taking into account the capitalized amount of R&D.

$CapAmt_{it}$ = capitalized amount of R&D per share.

Thus, the final model that we estimated takes the following form:[2]

$$(3) \qquad P_{it} = \beta_0 + \beta_1 Year_{it} + \beta_2 EPSbef_{it} + \beta_3 EXPFull_{it} \\ \beta_4 EXPCap_{it} + \beta_5 BVbef_{it} + \beta_6 CapAmt_{it} + e_{it}$$

We expect that β_2 is greater than one since the prices should capitalize the information inherent in *EPS*. As for β_3, the sign is not clear. If investors believe that the expenses are not going to affect profitability, then the coefficient should not be different from 0. However, the opponents of the expensed method argue that R&D is going to affect a firm's profitability and thus, we should expect the coefficient to be greater than 1. The sign of β_4 is not clear. The argument is similar to β_3. As for β_5, the coefficient should be greater than 0. In comparing two companies that is similar in all aspects except profitability, we would find that the book value of equity for the more profitable company should be greater than the other company. Since price is driven by

profitability, we expect that the share price of the more profitable company should be greater than the share price of a less profitable firm. Finally, if R&D is important and contributes to the future survival of the firm, we expect that β_6 should be greater than 1.

4. RESULTS AND ANALYSIS

Table 1 provides the descriptive statistics. There are 23 expensers, 76 capitalizers, and 147 observations that do not spend any money on R&D, subsequently referred to as non-R&D. Comparing the three groups, the mean share prices of expensers and capitalizers are higher than those of the non-R&D and these differences are significant at the 10 and 5 percent levels, respectively using *t*-test to measure the difference of two means. However, the mean share prices of the expensers are not statistically different from the mean share price of the capitalizers. Mean *EPS*, *BV*, *EPSbef*, and *BVbef* of the expensers are significantly greater than those of the non-R&D and the capitalizers while the averages for the non-R&D are greater than those of the capitalizers. R&D expenditure, which is equal to the amount expensed plus the amount capitalized, and R&D expenditure per share are also statistically different between capitalizers and expensers. However, these differences are driven by four firms, with eight firm-years data. The amount of R&D expensed for these firms is more than two standard deviations away from the mean. When these eight observations are dropped, the differences are no longer significant. Finally, expensers are larger in size, as measured by sales, than both capitalizers and non-R&D while the size of capitalizers is comparable to the size of non-R&D firms.

Table 2 reports the correlation between the variables of interest. As expected, the correlation coefficients between *EPS* and *EPSbef* of 0.9926 and *BV* and *BVbef* of 0.9999 are high.[3] The correlation between *EPSbef* and *BVbef* is 0.605. Even though this figure is high, it is not a cause of concern. We check for the existence of multicollinearity in our models by looking at variance inflation factors and none of the models suffers from the existence of multicollinearity problems.

Table 3 shows the results of the regression model. Model 1 shows that only *EPS* affects the value of a firm. The coefficient for *EPS* is 2.564 and statistically significant, which means that a one sen change

TABLE 1
Descriptive statistics: Mean and Standard Deviation

Variable	Expensers (n=23)	Capitalizers (n=76)	Non-R&D (n=147)	All (n=246)
Price	4.182	3.312	2.413	2.856
	(4.248)[ns1,f]	(3.323)[h]	(2.278)	(2.905)
Sales	1,734,679,830 [b,e]	487,941,790 [ns2]	316,970,530	502,340,976
	(2,526,560,777)	(1,075,452,681)	(629,139,467)	(1,151,693,440)
EPS	0.4543	0.0317	0.1464	0.1398
	(0.5105)[b,d]	(0.3854)[h]	(0.2854)	(0.3611)
BV	3.4747	1.7477	2.1035	2.122
	(3.4208)[b,f]	(1.0730)[h]	(1.1930)	(1.571)
EPSbef	0.5518	0.0466	0.1464	0.1535
	(0.5907)[a,d]	(0.3818)[h]	(0.2854)	(0.3781)
ExpR&D	23,389,262	49,198	0	2,186,801
	(46,969,776)[b,e]	(207,981)[h]		(15,641,578)
ExpR&Dper share	0.10	0.0008	0	0.0094
	(0.124)[a,d]	(0.0039)[i]		(0.0467)
BVbef	3.4747	1.7727	2.1035	2.114
	(3.4208)[b,f]	(1.0639)[h]	(1.1930)	(1.575)
CapAmt	0[a,inr2]	2,817,205	0	870,356
		(7,716,368)[g]		(4,464,148)
CapAmtpershare	0[a,inr2]	0.0250	0	0.0077
		(0.0390)[g]		(0.02448)

TABLE 1 (continued)

Variable	Expensers (n=23)	Capitalizers (n=76)	Non-R&D (n=147)	All (n=246)
R&D Expenditures	23,389,262	2,866,403	0	3,072,356
	(46,969,776)[b,e]	(7,702,410)[g]		(16,145,983)
R&DperSales	0.00967	0.01394	0	0.0052
	(0.011656)[ns1,d]	(0.0207)[g]		(0.0136)
R&Dpershare	0.09738	0.02583	0	0.0171
	(0.1238)[b,d]	(0.0387)[g]		(0.0514)

Notes: a, b and c refer to the difference between expensers and capitalizers for a variable of interest being significant at the 1%, 5% and 10% levels, respectively, and ns1 being not significant (*t*-test of difference-in-means is used).
d, e and f refer to the difference between expensers and non-R&D for a variable of interest being significant at the 1%, 5% and 10% levels, respectively, and irr2 being not significant (*t*-test of difference-in-means is used).
g, h and i refer to the difference between capitalizers and no-R&D for a variable of interest being significant at the 1%, 5% and 10% levels, respectively, and ns2 being not significant (*t*-test of difference-in-means is used).

Price : Adjusted price at financial year end (in RM)
Sales : Sales (in RM)
EPS : Earnings per share (in RM)
BV : Book value per share (in RM)
EPSbef : EPS before taking into account the expensed R&D (in RM)
ExpR&D : The amount of R&D being expensed (in RM)
ExpR&Dpershare : The amount of R&D being expensed divided by total shares outstanding (in RM)
BVbef : Book value per share before taking into account the capitalized amount per share (in RM)
CapAmt : Amount of R&D being capitalized (in RM)
CapAmtpershare : Amount of R&D being capitalized divided by total shares outstanding (in RM)
R&D Expenditures : Total R&D expenditures each year (in RM)
R&DperSales : The ratio of total R&D expenditures to the total sales
R&Dpershare : Total R&D expenditures each year divided by total shares outstanding (in RM)

TABLE 2
Correlations Coefficients

	EPS	*BV*	*EPSbef*	*BVbef*	*ExpFull*	*CapAmt*	*ExpCap*	*R&Dpershare*
EPS	1.000	0.587***	0.993***	0.589***	0.365***	-0.192***	-0.090	0.237***
BV		1.000	0.606***	0.9999***	0.393***	-0.158**	-0.031	0.281***
EPSbef			1.000	0.608***	0.470***	-0.182***	-0.076	0.337***
Bvbef				1.000	0.393***	-0.174***	-0.030	0.274***
ExpFull					1.000	-0.062	-0.023	0.879***
CapAmt						1.000	-0.023	0.419***
ExpCap							1.000	0.010
R&Dpershare								1.000

Notes: ***, **, and * significant at the 1%, 5%, and 10% levels, respectively.
See notes of Table 1 for definition of variables.

in *EPS* leads to a price change of 2.564 sen. The significance of *EPS* in explaining price is expected since higher *EPS* could lead to higher dividends and price is equal to the present value of all dividends expected to be received by the shareholders. The importance of *EPS* in valuing a share is evident when analysts use price-to-earnings ratio in calculating the price of a share. The coefficient for *BV* is 0.139 but it is not statistically significant even though the value is between 0 and 1. Graham and King (2000) find that the coefficient on *BV* is statistically significant. The differences in results might be due to the different sample period. Their sample period from 1987 to 1996 reflects the period of economic expansion while this paper uses 2000 and 2001, a period of lower economic expectations in Malaysia. However, the insignificance of book value per share in explaining price in Malaysia is not an isolated case as Zhao (2002), using 4,625 firm-year observations from 1990-1999, reports similar findings in the UK.

The third column of Table 3 presents the findings from the second model, that is, when the variable *R&Dpershare* is added to the first model. As for the coefficients of *EPS* and *BV*, they are smaller in magnitude compared to the first model but the significance of the coefficients are comparable to the first model. The adjusted R^2 increases from 0.254 in the first model to 0.319 in the second model. This shows that *R&Dpershare* has an explanatory power over price. The coefficient of *R&Dpershare* is 15.309 and statistically significant. This coefficient is also economically significant as a one standard deviation change in *R&Dpershare* would lead to a 79 cents change in price.[4] This result shows that R&D outlays affect share prices, i.e., they are value-relevant. R&D is expected to bring future economic benefits, however risky or uncertain they are, and these benefits are reflected in share prices. If R&D per se is value-relevant, then the next logical progression, given the current discussions on R&D accounting choice, is whether different accounting method affects share prices differently. This question is answered by the final model.

The fourth column summarizes the results associated with the final model. Using this model, we find that the statistical significance of *EPSbef* and *BVbef* are similar to the previous models, i.e., *EPSbef* is significant while *BVbef* is not. The coefficient for *ExpFull*, which represents firms that fully expensed their R&D expenditures, is significant and the sign is as predicted, i.e., positive and greater than 1.

TABLE 3
Regression Results for the Full Sample (246 Firm-Years)

Variables	Model 1	Model 2	Model 3
Constant	3.263 (8.824)	3.243 (9.308)	3.075 (9.259)
EPS	2.564 (2.602)	2.326 (2.477)	
BV	0.139 (0.970)	0.030 (0.229)	
EPSbef			2.616 (2.599)
ExpFull			9.837 (2.086)
ExpCap			141.643 (5.029)
BVbef			0.050 (0.398)
CapAmt			22.974 (3.875)
R&Dpershare		15.309 (4.595)	
Year dummy	Included	Included	Included
Adjusted R^2	0.254	0.319	0.330

Notes: (.) *t*-statistic.
See notes of Table 1 for definition of variables.

A one standard deviation change in this coefficient leads to a 46 sen change in price. Firms are not going to spend on R&D if they believe that their spending would not lead to future benefits. Therefore, even though the expensers fully expensed their R&D costs, investors expect that the investment in R&D by these firms would lead to future benefits and thus, they impounded these expectations into current stock prices. This finding differs from the finding of Aboody and Lev (1998). Aboody and Lev (1998) find that for the software companies that choose to fully expense their R&D spending, the expenses do not affect current period returns but future returns. Han and Manry (2004) find that fully-expensed firms have higher prices, which is consistent with our results.

The coefficient of *ExpCap* is 141.643 and is statistically significant. Since a one standard deviation change in *ExpCap* leads to a 31 sen

TABLE 4
Regression Results for Partial Sample (238 Firm-Years)

Variables	Model 1	Model 2	Model 3
Constant	3.585 (8.976)	3.187 (8.420)	3.162 (8.313)
EPS	2.156 (2.231)	2.320 (2.379)	
BV	-0.036 (-0.228)	0.026 (0.174)	
EPSbef			2.464 (2.440)
ExpFull			15.751 (0.587)
ExpCap			138.892 (4.946)
BVbef			0.015 (0.102)
CapAmt			22.221 (3.953)
R&Dpershare		22.696 (3.937)	
Year dummy	Included	Included	Included
Adjusted R^2	0.201	0.242	0.247

Notes: (.) *t*-statistics.
See notes of Table 1 for definition of variables.

change in prices, this coefficient is also economically significant. An explanation of this result is that, even though the capitalizers expensed some of their R&D spending, the effects of the spending would still be felt in the future. Therefore, the prices reflect this information. However, the result of this variable should be interpreted cautiously since we only have six capitalizers who expensed a part of their R&D costs, i.e., we have only six observations with non-zero values.

Finally, the coefficient for *CapAmt* is statistically and also economically significant as a one standard deviation change in this variable leads to a 56 sen change in price. The significant and positive effects of *CapAmt* on prices show that the capitalization of the R&D activity indicates future economic benefits and these expectations are impounded into the prices. The result of this coefficient is consistent with the results of Aboody and Lev (1998) and Man and Hanry (2004).

The final model shows that the use of either accounting method, expensing or capitalizing, is relevant in explaining prices. Next, we want to test whether the coefficients associated with expensing, as signified by *ExpFull*, and capitalizing, as signified by *CapAmt*, is statistically different from each other. For this purpose, we use the Wald test and we find that we cannot reject the hypothesis that *ExpFull* is equal to *CapAmt* at the 10 percent significance level. This result indicates that one accounting method does not have a bigger impact on share prices compared to the other method. This makes economic sense as it is the decision to carry out R&D that affects share prices and not the accounting choice.

The results in Table 3 are not clean of outliers. Among the expensers, we find that there are eight observations with R&D spending of at least RM46 million.[5] When we exclude these eight observations from the sample, the average R&D expensed for the remaining 15 observations dropped from RM23.4 million (when 23 firm-years were observed) to RM1.5 million. Table 4 shows the results when we exclude the outliers from our sample.

The models in Table 4 have lower adjusted R^2 compared to the models in Table 3 when all firms are used. Furthermore, when we exclude the outliers, we find that the coefficient of firms that fully expensed their R&D expenditures is not significant anymore while the rest of the coefficients maintain their significance level. Therefore, the presence of outliers influences our earlier results for *ExpFull*. However, we have to be cautious in interpreting this result since the sample size is very small.[6]

In summary, our results show that R&D outlays are priced positively by the market participants and that for both expensers and capitalizers, the amount of R&D expenditure indicates future economic benefits and these expectations are reflected in the stock prices. These results are consistent with the findings of Aboody and Lev (1998) and Han and Manry (2004). Furthermore, the Wald test indicates that both accounting methods have the same effect on price. Therefore, it really does not matter how a firm treats its R&D expenditures. Finally, the result of the expensers should be interpreted cautiously as the result is influenced by the existence of outliers.

5. CONCLUSION, IMPLICATION AND FUTURE RESEARCH

This study investigated whether R&D and its accounting method affected stock prices. Firms are allowed to capitalize their R&D spending if certain criteria are met. We found that for capitalizers, the amount of R&D either expensed or capitalized influenced the stock prices positively. As for the expensers, even though the amount expensed influenced the stock prices but this relationship was driven by outliers; when we dropped the outliers, the result was no longer significant. These results indicate that R&D activities of capitalizers are expected to bring future benefits and consequently lead to higher prices while the R&D activities of expensers are more difficult to evaluate given a small sample size and the presence of outliers. We find no evidence to suggest that capitalized R&D expenditures are priced more than fully expensed R&D expenditures by the equity investors. Our main finding that the capitalized amount of R&D expenditure is value relevant implies that equity investors in Malaysia are in agreement with the accounting standard setters and management who support the recognition of development expenditure that are expected to generate future economic benefits as internally generated intangible assets. Going forward, further insights can be gained by investigating whether the strength of the association between R&D expenditure and market value varies according to the firm's R&D characteristics such as its intensity, productivity and whether the firm is a leader or follower in R&D. Another avenue for future research is to examine the economic consequences of R&D expenditure on the long-run abnormal returns, in addition to contemporaneous stock price.

ENDNOTES

1. Accounting treatment for R&D expenditures in Malaysia was formerly prescribed in MASB 4 (adopted from IAS 9), effective from 1999. MASB 4 was superseded by FRS 109 and later was withdrawn in 2004. Beginning January 2006, R&D expenditures become part of FRS 138 that prescribes accounting treatment for intangibles. This study documents early adoption of MASB 4 (later named as FRS 109) among Malaysian industrial firms in 2000-2001. Therefore, FRS 109 instead of FRS 138 would be a better standard of reference. In all subsequent discussions, we refer to FRS 109 instead of FRS 138.

2. We do not include the results of $AmortCap_{it}$ and $Writeoff_{it}$ as they are not statistically significant.

3. However, this is not a cause of concern as the variables are not going to be used simultaneously.

4. Change in price = Coefficient of R&D x Standard deviation of R&D per share = 15.309 x 0.0514 = 0.79

5. RM being Ringgit Malaysia, which is the Malaysian currency.

6. We also identify outliers by looking at firms with R&D per share, among firms with R&D expenditures, greater than either two or three standard deviations away from the average R&D per share, among firms with R&D expenditures. The results remain similar to the results in Table 4. Finally, we find that the significant of *ExpFull* of model 3 in Table 3 is driven by one firm, OYL, with two years of data. When we dropped this firm, the coefficient of *ExpFull* is 3.449 with a *t*-statistic of 0.734 and the corresponding *p*-value of 0.464.

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