# 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 the years 2000 and 2001, subsequent to the introduction of *FRS 109, Accounting for Research and Development* (formerly known as *MASB 4*). FRS 109 states that a firm should expense its research costs and could capitalize the development cost 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 is 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.

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# I. INTRODUCTION

Rapid technological changes and the growth of science and knowledge-based industries have become the norm of modern corporations. 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 breakthrough. This necessitates a company to take on research and development (R&D) activities.

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 seems 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%, which is statistically significant. Furthermore, they find that the positive return is driven by firms in the high-technology industries. The two-day return of 2.1% of firms in the high-technology sector is significant while the corresponding figure for the low-technology sector of –0.9% is also significant. 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 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 internationally. On the other hand, researchers (see for e.g. 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, the accounting treatment for R&D 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.

A review of literature shows that numerous studies have been conducted in the US and some other jurisdictions (Australia, Japan and Korea for example) to examine the effect of R&D spending on firms' value. However, no such studies have been undertaken in Malaysia, and to fill the missing gap it is felt necessary that this study be conducted. As the Malaysian accounting standard, unlike that of the US, allows expensing and capitalization of R&D expenditure (subject to certain criteria) this study makes an interesting and significant contribution to the accounting body of knowledge.

Generally, the objective of this study is to investigate the impact of R&D spending on firms' market value. In addition, it attempts to demonstrate whether the stock market appropriately incorporate the value of long-term benefits of R&D spending. The findings can alert standard setters of the implication of *FRS 109*[1], *Research and Development Costs*, which to some extent limits management discretion as to when R&D spending can be capitalized. Finally it is hoped that the evidence on the value relevance of R&D spending can promote companies to undertake R&D activities as their future economic benefits will be shared by consumers, the firm, and the nation as a whole.

The rest of this paper is organized as follows. The next section discusses the accounting standard of R&D in Malaysia and reviews previous studies on value relevance of R&D spending. Following that, there is a section on research methods, in which data collection and relevant valuation models are discussed. Results and discussions are presented next, following which this paper concludes the study.

## II. LITERATURE REVIEW

### Accounting Standard for R&D in Malaysia

The accounting standard for R&D in Malaysia is prescribed by *FRS 109*. The standard 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 developments 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:

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[1] Known as *MASB 4* prior to 1 January 2005.

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; and
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.

**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 behavior 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 a 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% and 22.2%, 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 et al. (2001) studied 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.

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.

As a summary, the international evidence points toward the relevance of R&D capitalization in the financial reports. Capitalization of R&D expenditure might provide additional information that users of financial statements could use in evaluating a firm.

## III. RESEARCH METHODS

### Data

*FRS 109* specifically defines development expenditures as the application of research findings in which this research should be original and planned investigation to gain new scientific or technical knowledge and understanding. Based on casual inspection of annual reports of companies listed on Bursa Malaysia[2], "development expenditure" also applies, among others, to plantation development, forestry development, property development, and courses and syllabi development expenditures. Therefore, 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*.

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.

Our final 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

[2] Formerly known as the Kuala Lumpur Stock Exchange (KLSE).

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.

**Regression Models**

Ohlson (1995) shows the relationship between book value of equity and earnings to share price. He posits that prices could be explained by book value of equity, earnings, and other information. Based on Ohlson (1995), the relationship is estimated using the following model:

$$P_{it} = \alpha_0 \alpha_1 Year_{it} + \alpha_2 EPS_{it} + \alpha_3 BV_{it} + e_{it} \quad \text{(Model 1)}$$

where:

$P_{it}$ = stock price for firm i at the end of year t.
$Year_{it}$ = year dummy for firm i (one for year 2001 and zero for year 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:

$$P_{it} = \alpha_0 \alpha_1 Year_{it} + \alpha_2 EPS_{it} + \alpha_3 BV_{it} + \alpha_4 R\&Dpershare_{it} + e_{it} \quad \text{(Model 2)}$$

where $R\&Dpershare_{it}$ = Total R&D expenditure per share for firm i in year t, and other variables as previously defined.

The EPS and BV in Model 2 are further broken down as follows. EPS is broken into two components: EPS 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 BV 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 per share 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:

$$P_{it} = \alpha_0\alpha_1 Year_{it} + \alpha_2 EPSbef_{it} + \alpha_3 ExpFull_{it} + \alpha_4 ExpCap_{it} + \alpha_5 BVbef_{it} + \alpha_6 CapAmt_{it} + e_{it,} \quad \text{(Model 3)}$$

where the variables are as defined previously[3].

We expect that $\alpha_2$ is greater than one since the prices should capitalize the information inherent in EPS. As for $\alpha_3$, 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 zero. 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 one. The sign of $\alpha_4$ is not clear. The argument is similar to $\alpha_3$. As for $\alpha_5$, the coefficient should be greater than zero. Finally, if R&D is important and contribute to the future survival of the firm, we expect that $\alpha_6$ should be greater than one.

## IV. 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, we find that the 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% level respectively. However, the share prices of the expensers are not statistically different from the share price of the capitalizers. 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. When these eight observations are dropped, the differences are no longer significant. Finally, expensers are larger than both capitalizers and firms with no R&D while the size of capitalizers are not statistically different form the size of firms with no R&D investments.

(INSERT TABLE 1 HERE)

Table 2 reports the correlations between the variables of interest. As expected, the correlation between EPS and EPSbef of 0.9926 and BV and BVbef of 0.9999 are high[4]. The correlation between EPSbef and BVbef is 0.605. Even though this figure is high, it is

[3] We do not include the results of $AmortCap_{it}$ and $Writeoff_{it}$ since we are not interested in these coefficients.

[4] However, this is not a cause for concern as the variables are not going to be used simultaneously.

not a cause of concern. We check for the existence of multicollinearity in our model by looking at variance inflation factors and none of the models suffers from the existence of multicollinearity problems.

(INSERT TABLE 2 HERE)

Table 3 shows the results of the regression model. The first model, on the second column, shows that only EPS affects the value of a firm. The coefficient for EPS is a statistically significant 2.564, which means that a one cent change in EPS leads to a price change of 2.564 cents. The coefficient on BV of 0.139 is not statistically significant even though the value is between zero and one. The adjusted $R^2$ of 0.201 is low but it is consistent with the findings of Graham and King (2000). Graham and King (2000) find that the adjusted $R^2$ of the Ohlson's model in Malaysia is 0.277, which is the second lowest among the six Asian countries that they survey in their paper. However, they find that the coefficient on BV is statistically significant. The different in results between this paper and theirs might be due to the different sample period. Their sample period from 1987 to 1996 reflects the economy expansion period while this paper uses 2000 and 2001, a period of lower economic expectations in Malaysia.

(INSERT TABLE 3 HERE)

The third column of Table 3 presents the findings of the second model, that is, when the variable R&Dpershare is added to the first model. The coefficient of R&Dpershare is a statistically significant 15.309. This coefficient is also economically significant as a one standard deviation change in R&Dpershare would lead to a 79 cents change in price. The coefficients of EPS and BV are statistically significant even though not significant as in the first model. The adjusted $R^2$ increases from 0.201 to 0.319.

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 one. A one standard deviation change in this coefficient leads to a 46 cents 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 benefits 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 expensed 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 cents 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 observations. When we throw out these observations, the results of other coefficients do not change in sign or significance.

Finally, the coefficient for CapAmt is a statistically significant 22.974. CapAmt is also economically significant as a one standard deviation change in this variable leads to a 56 cents change in price. The significant and positive effects of CapAmt on prices show that the capitalization of the R&D activity leads to future economic benefits and these benefits 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 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.

(INSERT TABLE 4 HERE)

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 significant 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.

In summary, our results show that for both expensers and capitalizers, the amount of R&D expenditure lead to future economic benefits and these benefits are reflected in the stock prices. These results are consistent with the findings of Aboody and Lev (1998) and Han and Manry (2004). However, for expensers, the result is influenced by the existence of outliers.

## IV. CONCLUSION

This study investigates whether accounting method for R&D affects the stock prices. Firms are allowed to capitalize their R&D spending if certain criteria are met. We find that for capitalizers, the amount of R&D either expensed or capitalized influence the

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

stock prices positively. As for the expensers, even though the amount expensed influence the stock prices but this relationship is driven by outliers; when we dropped the outliers, the result is no more 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.

## REFERENCES


Aboody, J. and Lev, B. 1998. The value relevance of intangibles: The case of software capitalization, *Journal of Accounting* Research 36, 161-191.

Abrahams, T. and Sidhu, K.B. 1998. The role of R&D capitalizations and firm valuation and performance measurement, *Australian Journal of Management* 23(2), 169 -183.

Chan, K.C.L., Lakanishok, J. and Sougiannis, T. 2001. The stock market valuation of research and development expenditures, *Journal of Finance* 56(6), 2431-2454.

Chan, S.H., Martin, J. and. Kensinger, J. 1990. Corporate research and development expenditures and share value, *Journal of Financial Economics* 26, 255-276.

Graham, R. and King, R. 2000, Accounting practices and the market valuation of accounting numbers: Evidence from Indonesia, Korea, Malaysia, the Philippines, Taiwan, and Thailand, *The International Journal of Accounting* 35(4), 445-470.

Han, B.H. and Manry, D. 2004. The value-relevance of R&D and advertising expenditures: Evidence from Korea, *The International Journal of Accounting* 39, 155-173.

Lev, B. 1999. R&D and capital markets, *Journal of Applied Corporate Finance* 11(4), 21-35.

Lev, B. and Sougiannis, T. 1996. The capitalization, amortization, and value-relevance of R&D, *Journal of Accounting and Economics* 21, 107-138.

Ohlson, J. 1995. Earnings, book values, and dividends in equity valuation, *Contemporary Accounting Research* 11(2), 661-687.

Xu, M. and Zhang, C. 2004. The explanatory power of R&D for the cross-section of stock returns: Japan 1985-2000, *Pacific-Basin Finance Journal* 12, 245-269.

Zhao, R 2002. Relative value relevance of R&D reporting: An international comparison. *Journal of International Financial Management and Accounting*, 13(2), 153-174.

**Table 1: Descriptive statistics (all figures in RM except for R&DperSales): Mean (standard deviation) of variables**

| Variable | Expensers (n=23) | Capitalizers (n=76) | No-R&D (n=147) | All (n=246) |
|---|---|---|---|---|
| Price | 4.182 (4.248)[ns1,f] | 3.312 (3.323)[h] | 2.413 (2.278) | 2.856 (2.905) |
| Sales | 1,734,679,830 [b,e] (2,526,560,777) | 487,941,790 [ns2] (1,075,452,681) | 316,970,530 (629,139,467) | 502,340,976 (1,151,693,440) |
| EPS | 0.4543 (0.5105)[b,d] | 0.0317 (0.3854)[h] | 0.1464 (0.2854) | 0.1398 (0.3611) |
| BV | 3.4747 (3.4208)[b,f] | 1.7477 (1.0730)[h] | 2.1035 (1.1930) | 2.122 (1.571) |
| EPSbef | 0.5518 (0.5907)[a,d] | 0.0466 (0.3818)[h] | 0.1464 (0.2854) | 0.1535 (0.3781) |
| ExpR&D | 23,389,262 (46,969,776)[b,e] | 49,198.09 (207,981.39)[h] | 0 | 2186801 (15641578) |
| ExpR&Dper share | 0.10 (0.124)[a,d] | 0.0008 (0.0039)[i] | 0 | 0.0094 (0.0467) |
| BVbef | 3.4747 (3.4208)[b,f] | 1.7727 (1.0639)[h] | 2.1035 (1.1930) | 2.114 (1.575) |
| CapAmt | 0[a,irr2] | 2,817,205 (7,716,368)[g] | 0 | 870356 (4464148) |
| CapAmtpershare | 0[a,irr2] | 0.0250 (0.0390)[g] | 0 | 0.0077 (0.02448) |
| R&D Expenditures | 23,389,262 (46,969,776)[b,e] | 2,866,403 (7,702,410)[g] | 0 | 3072356 (16145983) |
| R&DperSales | 0.00967 (0.011656)[ns1,d] | 0.01394 (0.0207)[g] | 0 | 0.0052 (0.0136) |
| R&Dpershare | 0.09738 (0.1238)[b,d] | 0.02583 (0.0387)[g] | 0 | 0.0171 (0.0514) |

a, b, c, and ns1 refer to the difference between expensers and capitalizers for a variable of interest being significant at 1%, 5%, 10%, and not significant respectively.

d, e, f, and irr2 refer to the difference between expensers and no-R&D for a variable of interest being significant at 1%, 5%, 10%, and irrelevant respectively.

g, h, i, and ns3 refer to the difference between capitalizers and no-R&D for a variable of interest being significant at 1%, 5%, 10% and not significant respectively.

Price: Adjusted price at financial year end

Sales: Sales

EPS: Earnings per share

BV: Book value per share

EPSbef: EPS before taking into account the expensed R&D

ExpR&D (in RM): The amount of R&D being expensed
ExpR&Dper share: The amount of R&D being expensed divided by total shares outstanding
BVbef : Book value per share before taking into account the capitalized amount per share
CapAmt (in RM): Amount of R&D being capitalized
CapAmtpershare: Amount of R&D being capitalized divided by total shares outstanding
R&D Expenditures: Total R&D expenditures each year
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

**Table 2: Correlations among variables**

| | Price | EPS | BV | EPSbef | BVbef | ExpFull | CapAmt | ExpCap |
|---|---|---|---|---|---|---|---|---|
| Price | 1.000 | 0.362*** | 0.257*** | 0.387*** | 0.255*** | 0.316*** | 0.131** | 0.073 |
| EPS | | 1.000 | 0.587*** | 0.993*** | 0.589*** | 0.365*** | -0.192*** | -0.090 |
| BV | | | 1.000 | 0.606*** | 0.9999*** | 0.393*** | -0.158** | -0.031 |
| EPSbef | | | | 1.000 | 0.608*** | 0.470*** | -0.182*** | -0.076 |
| BVbef | | | | | 1.000 | 0.393*** | -0.174*** | -0.030 |
| ExpFull | | | | | | 1.000 | -0.062 | -0.023 |
| CapAmt | | | | | | | 1.000 | -0.023 |
| ExpCap | | | | | | | | 1.000 |
| R&Dpershare | | | | | | | | |
| Sales | | | | | | | | |

***, **, and * signify that the correlations are significant at 1%, 5%, and 10%, respectively

Price: Adjusted price at financial year end
EPS: Earnings per share
BV: Book value per share
EPSbef : Earnings per share before taking into account the expenses amount per share
BVbef : Book value per share before taking into account the capitalized amount per share
ExpFull: The amount of R&D per share being expensed by the expensers
CapAmt: Amount of R&D being capitalized divided by total shares outstanding
ExpCap: The amount of R&D per share being expensed by the capitalizers
R&Dpershare: Total R&D expenditures each year divided by total shares outstanding
Sales: Sales

**Table 3: Results of the models for the full sample**

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Constant | 3.263 (p=0.000) | 3.243 (p=0.000) | 3.075 (p=0.000) |
| EPS | 2.564 (p=0.009) | 2.326 (p=0.013) | |
| BV | 0.139 (p=0.329) | 0.030 (p=0.817) | |
| EPSbef | | | 2.616(p=0.009) |
| ExpFull | | | 9.837 (p=0.035) |
| ExpCap | | | 141.643 (p=0.000) |
| BVbef | | | 0.050 (p=0.687) |
| CapAmt | | | 22.974(p=0.000) |
| R&Dpershare | | 15.309 (p=0.000) | |
| Year dummy | Included | Included | Included |
| Adjusted $R^2$ | 0.201 | 0.319 | 0.330 |

EPS: Earnings per share
BV: Book value per share
EPSbef : Earnings per share before taking into account the expenses amount per share
ExpFull: The amount of R&D per share being expensed by the expensers
ExpCap: The amount of R&D per share being expensed by the capitalizers
BVbef : Book value per share before taking into account the capitalized amount per share
CapAmt: Amount of R&D being capitalized divided by total shares outstanding
R&Dpershare: Total R&D expenditures each year divided by total shares outstanding

**Table 4: Results of the models when eight firm-years are taken out**

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Constant | 3.585 (p=0.000) | 3.187 (p=0.000) | 3.162 (p=0.000) |
| EPS | 2.156 (p=0.027) | 2.320 (p=0.018) | |
| BV | -0.036 (p=0.820) | 0.026 (p=0.862) | |
| EPSbef | | | 2.464 (p=0.015) |
| ExpFull | | | 15.751 (p=0.557) |
| ExpCap | | | 138.892 (p=0.000) |
| BVbef | | | 0.015 (p=0.919) |
| CapAmt | | | 22.221(p=0.000) |
| R&Dpershare | | 22.696 (p=0.000) | |
| Year dummy | Included | Included | Included |
| Adjusted $R^2$ | 0.201 | 0.242 | 0.247 |

EPS: Earnings per share
BV: Book value per share
EPSbef : Earnings per share before taking into account the expenses amount per share
ExpFull: The amount of R&D per share being expensed by the expensers
ExpCap: The amount of R&D per share being expensed by the capitalizers
BVbef : Book value per share before taking into account the capitalized amount per share
CapAmt: Amount of R&D being capitalized divided by total shares outstanding
R&Dpershare: Total R&D expenditures each year divided by total shares outstanding