1.Introduction

The growth of research and development over the last two decades has elevated the importance of R&D in the performance of business enterprise (Aboody and Lev, 1998). A large number of studies have found a direct, positive association between a firm's R&D expenditures and its productivity improvements (Lev and Sougiannis, 1996). Further evidence shows that R&D plays a significant role in the creation of firm value.

Because of the importance of R&D, the proper accounting treatment for R&D expenditures has long been a controversial issue. The methods used for accounting for R&D might affect firms' willingness to engage in R&D. In turn, the large expenditures frequently made for R&D have the potential for markedly affecting a firm's reported income depending on the choice of method used for accounting for such expenditures.

One part of the debate is whether a single accounting method should be required or whether firms should be allowed to make a choice among competing methods to select an approach they feel is appropriate to their circumstances. If a choice is allowed, there is concern that firms may make the choice in a manner to manage reported earnings rather than in a manner to provide the best disclosure.

Under NZ GAAP, certain development costs may be either capitalised or expensed, with the choice left to the discretion of management. The current study seeks to determine whether NZ firms who capitalise these costs differ from firms that expense them. In particular the study looks at differences that are associated with different motivations for managing earnings. If differences are found across these characteristics, the motivation for making the particular choices may be inferred.

The results of the study will be of interest to both academics and practitioners. Academics have long been interested in the factors motivating choices among alternative methods. This study will provide additional evidence on the subject. Practitioners have been interested in more fully understanding reports and their potential manipulation. The study will provide additional evidence on whether accounting standards should allow alternative treatments for similar transactions.

The paper is organized as follows. Section 2 describes the development of R&D in the world and the R&D environment in New Zealand. Section 3 discusses the differences in accounting for R&D across countries. Section 4 reviews the prior literature on factors driving accounting choices for R&D. Section 5 describes the selected variables for study and explains the research design. Section 6 discusses the sample. Section 7 provides the results of tests. Sensitivity analysis is examined in Section 8 and conclusions are drawn in Section 9.

2. Development of R&D

A brief summary of R&D development in developed countries and in New Zealand is presented to provide a background for the study.

2.1. Development of R&D in developed countries

At the beginning of the 1970s, many large firms in developed countries began to make their R&D activities market-driven. They integrated their R&D activities with their strategies and policy-making. This led to decentralizing funding for R&D from the corporate level to lower levels (Belcher, 1996). Since then, the world economic structure has also changed from an emphasis on manufacturing to a service-based economy. As a result, the infrastructure of many businesses

can no longer be judged only by their physical assets. Instead, value is frequently associated with technology and intellectual property. Such components are of high importance for many businesses, especially for firms which are in high-tech and other technology-driven fields (Walther and Strickland, 2002).

Recent expenditures provide a perspective on the importance of R&D as a productive input. In the United States, growth in R&D spending has been outrunning overall economic growth since 1994. In 1997, total spending on R&D was US$210 billion, compared with US$215 billion invested by manufacturing firms in property, plant and equipment (Hansen, 1999). The increasing importance of R&D is also reflected by its faster growth rate compared with other major inputs. For instance, over the period from 1970 to 1997, the average annual growth rate of R&D was 8 percent, whereas the growth rate of capital investment (property, plant and equipment) was 6.8 percent (Hansen, 1999). Also in 1998, R&D spending accounted for 2.61 percent of GDP (Hansen, 1999).

Although spending on R&D has been accelerating in the United States, it is slipping behind that of Japan, Switzerland, Demark, Finland and Sweden in per capita R&D spending levels (Hansen, 1999). R&D spending has increased significantly in other OECD countries as well. For instance, in Canada, R&D expenditure jumped from Canadian $176 million in 1963 to Canadian $8.6 billion in 1997 (Statistics Canada 1997).

2.2 R&D environment in New Zealand

OECD countries that have closed the wealth gap with the USA have increased their R&D expenditures extensively by committing between 2 and 5.4% of GDP

to R&D. New Zealand however currently spends less on R&D than the average for OECD nations, with R&D representing not much more than 1% of its GDP.

Statistics for R&D spending in New Zealand for 2004 show that the proportion of R&D funding provided by the government in New Zealand is 45%, which is significantly higher than the OECD average of 30%. Conversely, New Zealand businesses funded just 38% of R&D in 2004, compared with the OECD average of 62%. Table 1 shows the source of R&D funding for the year 2004.

Of the funds spent by business on R&D, 18.7% went toward information, communication and technology software. Materials, construction, electronics and engineering account for another 16.7% of business R&D, and health care represents a further 12.9%. Table 2 shows business expenditure on R&D by socio-economic objective in 2004.

The New Zealand economy is dominated by primary industries, which generally spend less on R&D, choosing to invest in building scale rather than innovation. Thus on a global scale New Zealand is a tiny player in research and innovation. The R&D investment amounts to under 0.2% of the world's total. Compared with other OECD countries, R&D development is less active in New Zealand. Thus the accounting for R&D in New Zealand may not be as important an issue as in other countries. Thus the results related to R&D accounting in other countries may not generalise to New Zealand.

Table 1: R&D Funding in New Zealand for 2004 (By Source of Funds)

Source of funds	NZ dollar (million)	Percent
NZ business	612.90	38.5
NZ government	717.80	45.1
NZ universities	113.50	7.1
Overseas	108.70	6.8
Other funding source	40.2	2.5
Total	1593.10	100

Table 2: Business Expenditure on R&D

Socio-economic objective	NZ$ (million)	percent
Animal production	16.2	2.4
Dairy production	74.2	11.0
Horticultural, arable production	29.8	4.4
Forestry	12.1	1.8
Fishing	7.0	1.0
Agriculture, forestry and fishing	**139.3**	**20.6**
Meat and fish processing	15.6	2.3
Dairy processing	38.5	5.7
Fruit, crop and beverage processing	29.0	4.3
Fibre and skin	8.8	1.3
Wood and paper products	7.9	1.2
Materials, construction, electronics and engineering	112.9	16.7
Industrial development	**212.7**	**31.4**
Commercial and trade services	28.8	4.2
Urban and rural planning	6.3	0.9
Transport	9.2	1.4
Information, communication, and technology software	126.6	18.7
Development of infrastructure	**170.8**	**25.2**
Emery	15.8	2.3
Care of the environment	18.2	2.7
Health	87.6	12.9
Social development and services	9.1	1.3
Earth and atmosphere	0.5	0.1
Defence	2.7	0.4
Other	20.5	3.0
Other purposes	**154.3**	**22.8**
Total	**677.1**	**100**

3. Differences in Accounting Treatment for R&D

Accounting regulators have taken different approaches for the treatment of R&D expenditures in financial reports. This section reviews the accounting methods used in the US, UK, Canada, Australia, Japan and Europe and compares them with the accounting treatment for R&D in New Zealand.

3.1 Differences in accounting for internally generated development expenditures

The definition of R&D has been harmonized by the adoption of the OECD's "Frascati" definitions. Accounting standards in the developed countries have all distinguished between research costs and development expenditures. New Zealand Financial Reporting Standard (FRS) 13 defines research as "the original and planned investigation undertaken with the prospect of gaining new scientific or technical knowledge and understanding" (Paragraph 4.1). Development, on the other hand, is "the application of research findings or other knowledge to a plan or design for the production of new or substantially improved materials, devices, products, process, systems or services before the start of commercial production or use" (Paragraph 4.2).

Accounting standards in the US, the UK, Canada, Australia, New Zealand, Japan, and Europe as well as the International Accounting Standard Board (IASB) recognize outsourced R&D as an asset because the specific asset obtained is readily identified and easily valued by the market price. This is not the case for internally generated R&D. Most OECD countries (except applied research in Australia) require research costs to be expensed as incurred. But accounting standards for internally generated development costs vary significantly among countries. This paper focuses on the accounting choice for internally generated development expenditures.

Generally speaking, accounting standards for internally generated development expenditures take one of two approaches. The United States and Japan adopt an expense approach, which requires development expenditures to be expensed as incurred. In contrast, the UK, Australia, Canada, New Zealand, the EU countries and the IASB take a middle ground between the expense principle and the asset principle. If certain criteria are met, the development expenditures are to be capitalised and amortized as long as their recovery is reasonably assured. Table 3 provides a summary of some of the other differences in accounting for R&D in these jurisdictions.

Table 3: Accounting Policy for R&D in Selected OECD countries

Country	Accounting policy	Disclosure	Amortization	Annual impairment test
US	SFAS 2: Expense total amount as incurred	Disclose the amount of R&D expenses for each period	Not applicable	Not applicable
UK	SSAP 13: Expense both pure and applied research costs Capitalise and depreciate capital expenditure on fixed assets that provide facilities for research Capitalise and amortize development costs if they meet certain criteria.	Accounting policy Movements of deferred development costs and the amount brought forward at the beginning and carried forward at the end of each period	Usually less than 5 years	Yes
Australia	AASB 1011: Expense basic research costs as incurred Capitalise and amortize applied research and development costs if they meet certain criteria	The expenses during the financial year The amount of expensed R&D costs The amount of capitalised R&D costs at the end of financial year with accumulated amortization charges	Useful life	Yes
Canada	CICA 3450: Expense all research costs as incurred Capitalise development costs in certain defined circumstances	Amount of expensed R&D costs The amount of capitalised R&D costs	Useful life	Yes

Table 3: Accounting Policy for R&D in Selected OECD countries (Continued)

New Zealand	FRS 13: Expense research costs when incurred Capitalise development costs if all certain criteria are meet	The aggregate amount of R&D costs recognized as expense during the financial year	Useful life	Yes
Japan	Expense total R&D (except software)	Total amount of R&D costs	Not applicable	Not applicable
EU countries	Belgian, France: Capitalise R&D costs as intangible asset and amortize over useful years if certain criteria are meet EU proposes all listed companies to prepare their consolidated financial statements in accordance with IAS from 2005	Refer to IASB requirements	Useful life	Yes
IASB	Expense research costs as incurred Capitalise development costs in certain well-defined criteria	Useful life Amortization rate Amortization method Gross carrying amount Line items in the income statement in which amortization is included Explanation about any intangible amortized over longer than 20 years	Presumption of 20-year useful life	Yes

3.2. R&D capitalization

The controversy over the proper accounting treatment for R&D spending arises because R&D activities differ from other capital and financial inputs such as property, plant, equipment, inventory, or project financing. One important characteristic of R&D relates to information asymmetry (Aboody and Lev, 2000). First, there is no comparability of R&D across companies even within an industry. A majority of R&D projects are unique to the developing companies, so investors can derive little or no information about the productivity and value of a company's R&D from observing the R&D performance of other companies. In contrast, most capital investments such as commercial property share common characteristics across firms within an industry. Second, physical and financial assets can be traded in organized markets, where prices convey information about asset productivity and values. There are no such organized markets for R&D and as a result, no asset prices from which to derive information. Therefore, it is difficult to value R&D compared to other tangible assets. Thus, accounting measurement and reporting rules treat R&D in a different way from other investments. Accounting rules mandate the marking-to-market in quarterly and annual reports of most financial investments, and the periodic recognition of value impairment of physical assets. In this way, investors are provided with updated information about changes in assets values. In contrast, when R&D is required to be expensed immediately in financial statements, no information on value and productivity changes in R&D is reported to investors.

Although R&D may be difficult to value, two kinds of arguments have been advanced for why companies should be allowed to capitalise qualifying development expenditures. First, a study by Perry and Grinaker (1994) found that US companies, who are not allowed to capitalise their development costs, adjust their R&D spending to achieve budget targets. As R&D is an important

factor in the competitiveness of an industry, expensing R&D may well limit the innovative capacity of an economy. Second, due to the long-run benefits from R&D activities, R&D expensing distorts R&D information, while capitalisation provides a more fair view of the financial statements. The study by Lev and Sougiannis (1996) indicates that the correlation between R&D expenditures and earnings is statistically significant and economically meaningful.

3.3 R&D accounting in New Zealand

NZ GAAP requires the capitalization of development expenditures if the following criteria are met: (1) Completing the intangible asset is technically feasible so that it will be available for use or sale; (2) The firm intends to complete the intangible asset and use or sell it; (3) The firm has the ability to use or sell the intangible asset; (4) A market exists for the output from the intangible asset; (5) Adequate technical, financial and other resources are available to complete the development and to use or sell the intangible asset; (6) The firm is able to measure reliably the expenditure attributable to the intangible asset during its development (NZ IAS38). Although capitalisation of qualified development costs is required, the qualifying criteria are subjective and involve discretion and professional judgment. So in practice, New Zealand firms have a choice on how to account for R&D. This choice allows an opportunity for investigating the factors which affect management's choice of the accounting procedure to be used.

4. Prior literature on Factors Driving Choices for R&D

The accounting choices for R&D have been studied in other countries with much larger expenditures on R&D. This project analyses the factors examined in those countries to see if they have a similar effect in New Zealand. The

chosen factors are taken from studies by Daley and Vigeland (1983), Aboody and Lev (1998), Oswald (2000), Gaeremynck, Steurs and Veugelers (1998).

Several researchers have explored the motivation for the choice among alternative accounting principles (Hagerman and Zmijewski, 1979; Bowen, Daley and Huber, 1982; Dhaliwal, 1980). By using agency theory and other economic factors, models have been developed to explain why firms choose different accounting alternatives for similar events and transactions. The study by Daley and Vigeland (1983) extends that analysis to the choice of an accounting method for R&D expenditures. Their study focuses on two factors which might influence management's choice between capitalising or expensing R&D expenditures. They examine the potential for contracting costs in the form of bond covenant limitations on leverage, dividend payments, and interest coverage to motivate the choice. At the same time, they employ a variable to measure a political cost motivation. They analyse a sample of 313 UK firms (178 R&D expensing firms and 135 R&D capitalising firms) in 1972 and conclude that firms with higher leverage are more likely to capitalise R&D costs to increase reported income. However, larger firms are more likely to expense R&D costs to lower income as suggested by the political cost hypothesis.

In 1998, Aboody and Lev examined the determinants of US firms' choices of the amount of software development expenditures to expense or capitalise. By using data from 163 software companies over 1987-1995, they identify four variables (profitability, leverage, R&D intensity and firm size) that are significantly associated with the amount of software development costs that have been capitalised. According to their study, firm size and profitability are negatively associated with the annual amount of capitalised development costs. In contrast, software development intensity and leverage are positively related to the capitalised amount.

Oswald (2000) expanded Aboody and Lev's study by examining a broader set of industries and technologies, a different accounting rule and a different accounting jurisdiction. Oswald's study employed a sample of 1,780 UK firm-year observations over 1993-1997 and used a logit regression to model the decision to expense qualifying development expenditures based on industry indicator variables, profitability, leverage, systematic risk, firm size, R&D intensity and R&D steady-state. He found that the decision to expense versus capitalise is influenced by firm size and the intensity of the firm's R&D programs. The results indicate that larger firms, firms in steady-state and firms with lower R&D intensity are more likely to expense the qualifying development expenditures. Unlike Daley and Vigeland (1983), he didn't predict a directional relation between leverage and the expense versus capitalise decision. He believes that the effects of intangible assets on debt covenants are uncertain.

Gaeremynck, Steurs and Veugelers (1998) used 321 innovative French firms to examine the choice of accounting treatment for R&D expense. In their study, they distinguish between accounting variables and R&D variables. They find that the choice is linked with the size of the firm, its financial health and its R&D intensity. They suggest that firms which are in financial distress try to convince investors and debt holders that they will have future success arising from their research and development by showing these costs as an intangible asset in the balance sheet. They found that firms with lower R&D intensity are more likely to expense R&D costs, which is consistent with the finding of Oswald (2000). But their study contradicts other studies by finding that larger firms have a higher probability of capitalising their R&D expenditures.

5. Variables and Research Design

Based upon the preceding studies, the current study examines five variables to see if they distinguish between firms that capitalise versus firms that expense R&D. A firm is defined to be a capitaliser in year t if in that year the firm reported intangible development assets; otherwise it is classified as an expenser. A brief discussion of how each of the five variables is expected to affect the choice of accounting treatment follows.

5.1. Selected Variables

(1) Firm Size

Using a political visibility argument, firms may prefer to report lower income in order to avoid regulatory actions from the government. On average, capitalisation of R&D is likely to make reported income higher. Given growing R&D expenditures, capitalisation produces larger income and larger book value of equity than does a policy of expensing (Oswald, 2000). Therefore it may be that the expected costs of government scrutiny are increased by this choice (Watts and Zimmerman, 1978). Presumably, if firms report higher incomes, it is more likely for regulators to place tighter constraints on such firms' operation. If regulators tend to focus on large well-known firms to obtain the greatest political benefits, there may be less risk for small firms (Daley and Vigeland, 1983). Thus firm size is chosen to reflect vulnerability to political cost. Firm size is measured by both total assets and sales in this project.

H1: Smaller firms are more likely to capitalise R&D costs.

(2) Leverage

A highly geared firm represents a higher risk for equity holders and creditors as there is a greater chance of bankruptcy. The use of restrictive covenants in

debt agreements to reduce management's ability to transfer wealth between debt and equity holders has been recognized for some time (Smith and Warner, 1979). To limit this risk in debt agreements, maximum limits for leverage are generally set, especially limits on liabilities/total assets. Since generally accepted accounting principles are used to measure the financial variable, firms have a motivation to choose income increasing accounting methods, such as linear depreciation, FIFO and R&D capitalisation to relax the debt constraints by increasing reported earnings, retained earnings, and total assets (Daley and Vigeland, 1983). Leverage is selected as a measure of the extent of motivation to relax pressure on debt covenants by reporting higher income. Leverage is calculated as liabilities divided by total assets.

H2: Highly levered firms are more likely to capitalise R&D costs.

(3) Profitability

This hypothesis is related to income smoothing theory. In countries such as the US, the capitalisation of R&D is not allowed; thus firms can smooth their income by adjusting the amount of their R&D expenditures (Perry and Grinaker, 1994). Firms with low profits may cut their R&D costs to reach the market's expected level of earnings. But it is not necessary for profitable firms to do so. With a choice of accounting methods available, firms need not adjust R&D spending but rather can use different accounting treatment for R&D as a smoothing instrument. As capitalisation produces larger income and larger book value of equity than does a policy of expensing, management of less profitable firms may choose to capitalise R&D expenditures to increase profit. The variable of profitability is measured by net income divided by total assets less R&D capitalised.

H3: Firms with lower profitability are more likely to capitalise R&D costs.

(4) Financial Health

Firms which are healthy financially have the ability to repay their debt. Therefore they have less need to justify their performance to creditors. However, if a company is having trouble repaying its debt, the firm may be motivated to capitalise their R&D expenditures. The Firm can use the reporting choice as a signal to convince investors and debt holders that there will be future success from the research and development by showing these expenditures as intangible assets in their balance sheet.

Financial health is measured by a variable which takes on the value of 1 if operating cash flow is larger than short term debt. If this is the case, the firm is considered to be healthy financially. If operating cash flow is smaller than short term debt, the firm may have difficulty in paying its short term debts. In this case, the firm is considered to be in financial distress and the variable is coded zero.

H4: Firms which are in financial distress are more likely to capitalise R&D costs.

(5) R&D Intensity

R&D intensity is included in this project to determine whether the magnitude of R&D expenditures influences the decision to capitalise versus expense. Management of firms which invest heavily in R&D may wish to capitalise their successful development projects to communicate the success of those programs to market participants. Firms with intense R&D programs are engaged in many R&D projects and management may wish to signal its confidence in the return from these investments by treating them as an asset (Gaeremynck et al, 1998). It is also assumed that firms with few R&D projects may choose to communicate

R&D information through other means. R&D intensity is measured by the amount spent on R&D divided by total sales.

H5: Higher R&D intensity firms are more likely to capitalise R&D costs.

5.2 Research Design

The project aims to determine whether the preceding factors affect New Zealand firms' decisions on whether or not to capitalise R&D costs. A logit regression is used to measure the relation between the accounting method used for R&D and the selected characteristics of firms. A logit model is a multivariate binary model which is particularly appropriate for models of choice behaviour. It models which choice is made dependent on the characteristics of the firms making the choices.

In summary, I predict that the choice to expense versus to capitalise qualifying development expenditures is associated with a firm's size, leverage, profitability, financial health and R&D intensity. These predictions are first examined by using univariate comparisons and then the following logit regression:

$$EXP_{it} = ß_1 + ß_2 LEV_{it} + ß_3 SIZE_{it} + ß_4 PROFIT_{it} + ß_5 FINHEALTH_{it} + ß_6 INT_{it}$$

Where: EXP_{it} = variable equal to 1 if firm i expenses development costs in year t; 0 otherwise.

LEV_{it} = liabilities divided by total assets;

$SIZE_{it}$ = log of total sales for firm i, or log of total assets for firm i.

$PROFIT_{it}$ = the sum of net income and the amount of R&D capitalised divided by total assets less R&D capitalised for firm i in year t,

$FINHEALTH_{it}$ = variable equal to 1 if the operating cash flow is larger than short term debt for firm i in year t; 0 otherwise,

INT_{it} = amount expensed on R&D divided by total sales for firm i in year t.

6. Data and Sample Selection

As discussed in section 2.2, NZ firms are relatively low investors in R&D. This limits the availability of data. In order to mitigate the data limitation, data are collected from two sources for this project. The first source includes all NZ listed firms on Datex that disclosed their R&D expenses in years 2000-2005. This period is selected because it is recent and the R&D programs for NZ companies were much more active than for other periods according to NZ Statistic 2004. This search yields 60 firms. Due to the limited amount of data available from listed firms, the second source is the set of annual reports which are available on Unitec's Library shelves. The latter source yields an additional 48 firms. Firms in oil and gas exploration and firms in mining and aerospace are excluded (16 firms) because their intangible assets are more likely related to exploration and development not to R&D. Firms whose development expenditures were devoted to infrastructure development are excluded as well (12 firms). Data on net income, sales, debt, total assets, total liabilities, operating cash flow, and the amount spent on R&D are also required for each firm. For every company the notes to the financial statements were checked to verify, first, whether or not these companies disclose their R&D expenditures, and, second, whether or not they capitalize these costs. Missing data on these items reduced the final sample to 70 firms as seen in Table 4. A total of 315 firm-year observations meet the criteria and are included in the project. Among these 70 firms (315 firm-year observations), 28 firms (123 firm-years) are defined as capitalisers and 42 firms (192 firm-years) as expensers. Table 5 gives a sample breakdown by year.

Table 4: Sample Selection Summary (By Company)

Sample	No. of companies
Initial sample for listed companies	60
Initial sample for unlisted companies	48
Total initial sample	108
Less companies that engage in oil, gas exploration and mining exploration	16
Less companies whose development is related to infrastructure development	12
Less missing data	10
Final sample	70

Table 5: Sample selection Summary (By Year)

Year	No. of Companies
2000	38
2001	42
2002	50
2003	56
2004	64
2005	65
Final sample for firm-years	315

7. Empirical Results

7.1. Non-Parametric and Univariate tests

7.1.1 Descriptive statistics

In this section, the selected firm characteristics are compared for firms which expense versus capitalise R&D expenditures. Table 6 reports descriptive statistics on the full sample across accounting treatment for qualifying development expenditures.

Table 6: Descriptive Statistics for Variables

Variables	Expensers					Capitalisers				
	Mean	Median	Std Dev	Min	Max	Mean	Median	Std Dev	Min	Max
Firm size (by assets)	1,645,508	64,924	6,302,924	235	38,219,000	328,996	26,436	782,202	291	4,384,901
Firm size (by sales)	975,897	59,106	3,840,663	1	23,086,000	200,973	57,384	489,072	5	4,600,000
Leverage	0.427	0.434	0.226	0.013	0.919	0.455	0.468	0.233	0.011	0.978
Profitability	0.021	0.046	0.244	-1.007	0.545	-0.272	0.026	0.945	-5.897	0.304
Financial Health	0.784	1	0.437	0	1	0.334	1	0.489	0	1
Intensity	0.027	0.004	0.089	0.0001	0.521	0.163	0.013	0.168	0.0002	0.958

The average assets size for expensers is NZ$1,645,508 versus NZ$328,996 for capitalisers. The median value for expensers is NZ$64,924 versus NZ$26,436 for capitalisers. The difference between both mean values and median values is significant, which suggests that expensers tend to be larger than capitalisers.

Average total sales for expensers is NZ$975,897 versus NZ$200,973 for capitalisers. The difference is significant. The median value for total sales is also larger for expensers than capitalisers but the difference is not significant.

Expensers' average leverage of 42.7% is less than the 45.5% for capitalisers. Similarly the median value is 43.44% for expensers versus 46.81% for capitalisers. The difference is not significant for either the mean or median. Thus there is little difference between expensers and capitalisers in respect to firms' leverage.

Expensers have a profitability ratio of 0.02% versus minus 27.21% for capitalisers. But the median value is reversed with an average for expensers of 4.68% versus 2.64% for capitalisers. The difference in the mean values is significant but not for the median value. Thus the results for profitability are mixed.

The explanatory variable for financial health takes on a value of zero or one for each firm depending on whether the firm's operating cash flow is bigger than short term debt. A value of zero indicates that a firm may have problems paying its short term debt. The median value for the financial health variable is one for both expensers and capitalisers. The mean value is 0.78 for expensers versus 0.33 for capitalisers. The difference for the mean value is significant, which suggests that expensers are healthier financially than capitalisers.

Expensers spend an average of 2.75% of total sales on R&D versus 16.32% for capitalisers. The median value of R&D expenditures is 0.45% for expensers versus 1.33% for capitalisers. The differences for both the means and medians are significant, which indicates that capitalisers have higher R&D intensity than expensers.

7.1.2 Results of t-tests

Table 7 reports the results of t-tests for the mean values for each of the variables selected for study. The results from the t-tests indicate that the size of the firm, measured in terms of total assets and sales, is a significant ($p<.05$) variable to distinguish between firms which expense their R&D and those which capitalise R&D. The leverage variable does not significantly distinguish between expensers and capitalisers. Thus the decision to expense or capitalise qualifying development expenditures does not seem to be influenced by a firm's leverage. The performance of the firms, measured by either profitability or financial health distinguishes significantly ($p<.001$) between expensers and capitalisers. The intensity of R&D programs is also a highly significant ($p<.001$) variable for distinguishing between expensers and capitalisers.

Table 7: Results of T-Test

Independent variables	t-test for Equality of Means	
	t	Sig. (2-tailed)
Firm size (assets)	-2.302	.022
Firm size (sales)	-2.237	.026
Leverage	.988	.324
Profitability	-4.161	.000
Financial Health	-8.889	.000
R&D intensity	11.114	.000

7.1.3 Results of correlation test

Table 8 reports Pearson correlations between the variables examined in the study. Asterisks highlight the significant correlations. As was expected, firm size measured by either assets or sales, profitability, financial health and R&D intensity are highly correlated with firms' accounting choice for qualifying

development expenditures. However, leverage is not correlated with firms' accounting choice for R&D costs. The results are consistent with the t-tests.

The analysis of the individual descriptive variables in this section suggests that firms which expense qualifying development expenditures are bigger, more profitable, and healthier financially than capitalisers. Firms with higher R&D intensity are more likely to capitalize their qualifying development costs. Leverage does not seem to be related to the accounting choice for R&D expenditures.

Table 8: Correlation Matrix (n=351)

	Asset Size	Sales Size	Leverage	Profitability	Financial Health	R&D Intensity	R&D accounting
Asset Size							
Pearson Correlation	1						
Sig. (2-tailed)							
Sales Size							
Pearson Correlation	.981**	1					
Sig. (2-tailed)	.000						
Leverage							
Pearson Correlation	.033	.043	1				
Sig. (2-tailed)	.555	.449					
Profitability							
Pearson Correlation	.061	.068	.169**	1			
Sig. (2-tailed)	.277	.226	.003				
Financial Health							
Pearson Correlation	.138*	.149**	.042	.273**	1		
Sig. (2-tailed)	.014	.008	.454	.000			
R&D intensity							
Pearson Correlation	-.114*	-.107	-.181**	-.437**	-.440	1	
Sig. (2-tailed)	.043	.058	.001	.000	.000		
Accounting choice for R&D							
Pearson Correlation	.129*	.125*	-.056	.229**	-.532**	.449**	1
Sig. (2-tailed)	.022	.026	.324	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

7.2. Logit Regression Results

Asset size and sales size are highly correlated, so they should not both be used in the same logit model. Therefore, the logit model was fit twice, once using asset size with the other variables and the second using sales size and the other variables.

Table 9 and Table10 present the results of the two logit regressions. In both, firm size measured by assets or sales, leverage, profitability, financial health and R&D intensity were log transformed to normalise the data.

The results in Table 9 and Table 10 are very similar. Firm size measured by total assets is weakly significant and positively related to the expense versus capitalise choice, indicating that larger firms are more likely to expense their qualifying development expenditures. However, when firm size is measured by sales, firm size is no longer a significant variable for predicting the accounting choice for qualifying development expenditures. Firm leverage is not significant in explaining the expense versus capitalise choice in either version of the model.

Firm profitability is positively related to the expensing option in both models, suggesting that profitable firms prefer to choose to expense their qualifying development expenditures. But unprofitable companies prefer to capitalise their qualifying development expenditures. The financial health variable is significant (< .001) positively related to the expensing option in both models, which suggests that financially healthy firms expense the development expenditures and firms which are in financial distress choose to capitalise their qualifying development expenditures. R&D intensity is significant (< .001) negatively related to the expense option in both models, indicating that firms with lower R&D intensity are more likely to expense qualifying development expenditures

and higher R&D intensity firms are more likely to capitalise the qualifying development expenditures.

Most of these findings from the logit regression are consistent with prior studies. The significance of firm size in Oswald's study (<.001) is much more significant than in this project. The results for firm size are inconsistent with Gaeremynck, et al (1998), who conclude that smaller firms are more likely to expense qualifying development expenditures. The leverage variable is inconsistent with the finding by Daley, et al (1983), who indicate that leverage is a significant factor that influences the accounting choice for R&D expenditures. But it is consistent with the study by Oswald (2000). The findings for firm profitability and R&D intensity are consistent with the study by Oswald (2000) and Gaeremynck, et al (1998). And the result for financial health is consistent with the finding by Gaeremynck, et al (1998).

Table 9: Logit Regression Results (Asset Size)

Independent Variables	Coefficient	Significance
Intercept	0.589	0.00
Asset Size	0.00	0.05
Leverage	0.064	0.43
Profitability	0.103	0.02
Financial Health	0.286	0.00
R&D Intensity	-0.551	0.01
Pseudo (Nagelkerke R^2)	49.5%	
-2 Log likelihood	278.502	
% Predicted correct	83.5%	

Table 10: Logit Regression Results (Sales Size)

Independent Variables	Coefficient	Significance
Intercept	0.591	0.00
Sales Size	0.22	0.06
Leverage	0.058	0.46
Profitability	0.108	0.00
Financial Health	0.275	0.00
R&D Intensity	-0.554	0.01
Pseudo (Nagelkerke R^2)	49.5%	
-2 Log likelihood	278.34	
% Predicted correct	83.5%	

8. Sensitivity Analysis

The results in Table 9 and Table 10 are based on a pooled cross-sectional and longitudinal estimation. Because the same companies appear multiple times in the pooled sample and as their accounting choice for the qualifying development costs do not change over time, the pooled sample significance levels are overstated due to dependence among observations. In order to mitigate that concern, a sensitivity analysis is performed. The logit regression was run six times using firm size measured by total assets with the other variables on a yearly basis. The results (as shown in Table 11) indicate that firm size is not a significant variable for explaining the accounting choice for qualifying development expenditures, thus casting doubt on the result in Table 9. But results for the other variables are unaffected. Firm leverage is not related to the R&D accounting choice for qualifying development expenditures. Profitability and financial health are positively associated with the expense choice, and R&D intensity is positively related to capitalisation.

Table11: Results of Sensitivity analysis

Independent variables	2000		2001		2002		2003		2004		2005	
	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig
Intercept	0.75	0.00	0.78	0.00	0.72	0.00	0.64	0.00	0.76	0.00	0.52	0.00
Asset Size	0.00	0.08	0.00	0.07	0.00	0.07	0.00	0.07	0.00	0.07	0.00	0.06
Leverage	0.0032	0.86	0.0042	0.78	0.0065	0.066	0.0074	0.54	0.00	0.89	0.0084	0.52
Profitability	0.084	0.05	0.098	0.04	0.100	0.03	0.099	0.04	0.100	0.03	0.101	0.01
Financial Health	0.32	0.01	0.36	0.02	0.38	0.02	0.46	0.03	0.37	0.02	0.30	0.01
R&D intensity	-0.48	0.02	-0.45	0.03	-0.50	0.001	-0.49	0.02	-0.52	0.00	-0.54	0.00
Pseudo (R^2)	44.2%		44.6%		47.7%		46.3%		55.6%		60.8%	
-2 Log Likelihood	42.6		43.9		42.8		41.2		51.8		57.3	
% Predicted Correct	76.9%		77.2%		77.6%		78.2%		81.0%		82.3%	

9. Conclusion

This study examined factors that might affect the accounting choice for development expenditures in New Zealand. Data from the years 2000 to 2005 yielded 315 NZ firm-year observations. Five firm-specific factors that prior studies have shown to influence the choice of accounting treatment for development expenditures in other countries were selected for study. These factors were firm size, leverage, profitability, financial health and R&D intensity. A logit regression model was used to test the significance of the selected variables. Firm size was found not to be a significant factor to distinguish from expensers and capitalisers. This finding is inconsistent with the results of studies by Daley and Vigeland, (1983), Aboody and Lev (1998) and Oswald (2000) which show that firm size is positively related to the decision to expense qualifying development expenditures. The rationale researchers have given for why size affects the accounting decision is that large firms seek to minimize political cost. But the current study uses only New Zealand firms.

Given that New Zealand firms are relatively small in comparison with other OECD countries, it may be that New Zealand firms are not as susceptible to political cost.

Firm leverage was also found not to be related to the accounting choice for qualifying development expenditures. This contrasts with the results of studies by Daley and Vigeland, (1983) and Aboody and Lev (1998), but is consistent with a study by Oswald (2000). The inconsistency may result from different definitions of leverage used in the studies. Daley and Vigeland (1983) define leverage as long term debt divided by total assets minus intangible assets while Aboody and Lev (1998) measure leverage as long term debt divided by the book value of equity. Because New Zealand firms do not report long term debt separately, the current project defined leverage as total liabilities divided by total assets. This latter definition may blur the distinction between firms which are subject to debt covenants from those which are not. Thus the variable may not capture the influence of long-term debt covenants on accounting choice.

Firm profitability and financial health were found to have a significant positive relationship to the expense choice. In contrast, R&D intensity had a significant positive association with the capitalisation choice. As a percent of sales capitalisers, on average, spend much more on R&D than expensers. These results are consistent with prior studies. The results of this project indicate that firms which are profitable with good financial health tend to expense qualifying development expenditures. This suggests that firms prefer to expense development expenditures but choose to capitalize them when they need to try to increase reported earnings. Similarly, if a firm's development expenditures are high in relation to profit they are motivated to capitalise the expenditures.

The findings provide some evidence that management in New Zealand uses accounting choice for qualifying development expenditures to manage the size

of reported income. The findings of this project show that NZ firms choose the method of accounting for R&D for some of the same strategic reasons as firms in bigger countries. Thus the debate on whether accounting standards should allow alternative treatments for similar transactions will continue in New Zealand.

However the results from the current project should be interpreted with caution. The study did not choose a representative sample of firms but only used readily available reports from firms. Thus the results may not generalize to all New Zealand firms. In addition, the measures of the variables used in this project differ from the measures used by other researchers, especially the measurement of leverage. Thus the results should not be interpreted as refuting prior work. Finally, the project only looked at a subset of the possible explanatory variables that affect accounting choices. Before making policy recommendations a replication should be undertaken using a more representative sample of New Zealand firms and a wider range of variables that might affect the choice among accounting alternatives.

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