Accounting for Intangible Assets, Firm Life Cycle and the Value Relevance of Intangible Assets

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Declaration of Originality

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Abstract

This study examines the relationship between accounting choice for intangible assets and their value relevance as well as the moderating effect of firm life cycle on this relationship, in the pre- and post-Australian Equivalents to International Financial Reporting Standards (AIFRS) periods. In the pre-AIFRS period, Australian firms enjoyed wide discretion in accounting for intangible assets. However, with the adoption of AIFRS in 2005, managerial discretion in accounting for the assets has become more restrictive. This allows the impacts of alternative accounting practices in these two periods to be investigated.

The sample used in this study consists of 900 and 1,225 firm-years for the pre- and post-AIFRS period, respectively. Sample firms are classified into three life cycle stages; Growth, Mature and Decline, based on Anthony and Ramesh's (1992) classification method. Four regression models based on the Ohlson (1995) valuation model are used in the tests of value relevance.

The findings indicate that during the pre-AIFRS period, capitalised identifiable intangible assets are regarded by the Australian market as value relevant. The results also suggest that although there is a significant difference in value relevance between Decline and Mature firms, the same effect is not present between Growth and Mature firms. Further, the results indicate that identifiable intangible assets for Growth and Mature firms are value relevant but not for Decline firms. Although the findings provide support to previous studies on the use of accounting choice as a signalling mechanism, there is also evidence to suggest that it is not employed homogeneously across firms.

A comparison between the pre- and post-AIFRS period suggests that the market attaches higher value relevance to identifiable intangible assets after the adoption of AIFRS. The findings also suggest that AIFRS implementation has led to an increase in the value relevance in all three firm life cycle stages and that there is

no significant difference between these stages. Nonetheless, the impact of AIFRS implementation is more substantial for Decline firms with evidence of value relevance found only in the post-AIFRS period.

This suggests that the concerns over a more restrictive accounting treatment for intangible assets following the adoption of AIFRS could lead to firms providing less value-relevant information might be overstated and unwarranted. The findings presented in this study should be useful to both researchers and accounting standard setters in the ongoing debate on allowing managerial discretion with regards to accounting for intangible assets, particularly following the adoption of AIFRS.

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Abbreviations

AIFRS	Australian Equivalents to International Financial Reporting Standards
AASB	Australian Accounting Standards Board
GAAP	Generally Accepted Accounting Principles
IASB	International Accounting Standards Board
RQ	Research questions
ASX	Australian Securities Exchange
AARF	Australian Accounting Research Foundation
R&D	Research and development
FASB	Financial Accounting Standards Board
AOJP	Australian Official Journal of Patents
SEC	Securities and Exchange Commission
IFRS	International Financial Reporting Standards
OLS	Ordinary least squares
ERC	Earnings response coefficients
CAP	Committee on Accounting Procedure
APB	Accounting Principles Board
FERC	Future earnings response coefficients
FW	Financial World
GICS	Global Industry Classification Standard
IOS	Investment opportunity sets
E&D	Exploration and development
CAR	Cumulative abnormal returns
IPO	Initial public offerings
PPE	Property, plant and equipment
PVED	Present value of future expected dividends
CSR	Clean surplus relation
RIV	Residual income valuation
LIM	Linear information dynamics
CAPM	Capital asset pricing model

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

Accounting for intangible assets is a long running, complex and controversial issue largely because of the difficulties in obtaining reliable estimates of value for these assets, despite their increasingly significant role in enhancing firm value. Due to the complexities in their underlying economics, most intangible investments fail to meet the asset recognition criteria outlined in traditional financial reporting systems (Lev, 2001; Wyatt, 2001; Kabir, 2008). The difficulties associated with the measurement and recognition of intangible investments lead to a significant portion of these investments being expensed as incurred in most accounting regulatory frameworks. Nonetheless, it is argued that such accounting practices might significantly understate the economic value of intangible assets, leading to reduced usefulness or relevance of accounting information (Cañibano, García-Ayuso and Sánchez, 2000; Lev, 2001; Upton, 2001; Wyatt, Matolcsy and Stokes, 2001).

The problem is exacerbated given the revolutionary changes in globalisation, information technology and innovation as well as increasing reliance on intangible investments to generate value. Consequently, an improvement in the financial reporting system, particularly in relation to intangible assets, is proposed to enhance the quality of the accounting numbers for efficient decision making (Amir and Lev, 1996; Lev and Sougiannis, 1996; Cañibano et al., 2000). This, in turn, has triggered numerous studies concerning the effect of accounting choice for intangible assets on the value relevance of accounting information, in general, and intangible assets, in particular.

Consistent with the Australian Accounting Standards Board's (AASB) commitment to its International Harmonisation Policy, Australian Equivalents of International Financial Reporting Standards (AIFRS) were adopted in 2005. The adoption of AIFRS resulted in a major change in Australian accounting practices for intangible assets. This is because in the pre-AIFRS period, Australian Generally Accepted Accounting Principles (GAAP) allowed greater managerial discretion than most other accounting jurisdictions, particularly the U.S., with respect to the accounting for intangible assets. However, with the adoption of AIFRS, this discretion has been largely restricted. Conflicting arguments have been presented concerning this substantial discretion and its impact on the value relevance of intangible assets (Abrahams and Sidhu, 1998; Fields, Lys and Vincent, 2001; Godfrey and Koh, 2001).

From one point of view, it can be argued that managers could use this discretion to convey accurately their private information to the market, thereby reducing the information asymmetry between managers and investors. Alternatively, the largely unregulated setting can be viewed as promoting managerial opportunistic behaviour that could lead to the manipulation of accounting numbers. Prior studies conducted in the pre-AIFRS setting have generally concluded that, given the discretion to capitalise, the recognised amounts of intangible assets are value relevant (Godfrey and Koh, 2001; Wyatt, 2005; Ritter and Wells, 2006; Dahmash, Durand and Watson, 2009).

Therefore, this has raised concerns over the impact of the more restrictive accounting practice for intangible assets in the post-AIFRS period on value relevance. As such, the debate on whether allowing greater flexibility to managers in accounting for intangible assets enhances or adversely affects the quality of accounting information in financial reporting is likely to continue.

1.2 Motivations for the Study

One of the motivations for conducting this study stems from the ongoing discussion concerning intangible assets. For example, the history of the standard setting development for intangible assets in Australia can be characterised as lengthy, complicated and highly controversial. In addressing this issue, Alfredson (2001) describes accounting for intangible assets as an unfinished standard setting task. This is largely because years of debate beginning from the 1980s have failed to result in an Australian consensus on the issue. Further, it continues to receive a lot of interest due to the international convergence among the major national standard setters and the International Accounting Standards Board (IASB) that led to the adoption of AASB 138 *Intangible Assets* in 2005. Therefore, it appears that the issue of intangible assets has always been, and continues to be, one of the important areas of interest for standard setters in Australia as well as at the international level. Nonetheless, these standard setting bodies are still struggling in establishing a consistent set of guidelines for the identification, measurement, reporting and management of intangible assets. Moreover, the increasing significance of the role of intangible assets in enhancing firm value in today's knowledge-based and technology-intensive economy puts more emphasis on the need for more research in this area. This provides a general motivation in conducting this study in an attempt to assist the relevant parties affected by this issue, particularly the policy makers.

In addition, most empirical studies in Australia have examined the effect of accounting choice for intangible assets on the value relevance of these assets in the period before the adoption of AIFRS (Abrahams and Sidhu, 1998; Godfrey and Koh, 2001; Wyatt, 2005; Dahmash et al., 2009). These studies, however, examine only limited aspects of accounting choice and focus only on a simple and narrow relationship between accounting choice and firm value as prescribed in most valuation models. This leads them to form almost consistent conclusions with regards to the use of accounting choice for intangible assets as a credible signalling mechanism by firms, despite the substantial managerial discretion enjoyed by

Australian firms during the pre-AIFRS period. However, other factors such as firms' underlying economic attributes may also affect accounting choice and value relevance.

A review of the literature suggests that the underlying economic attributes of the firm, as represented by firm life cycle stages, are likely to have an impact on their accounting choice for intangible assets and, consequently, on the value relevance of such information in the financial reports (Anthony and Ramesh, 1992; Skinner, 1993; Dhaliwal, Heninger and Hughes, 1999). This factor or variable, however, is not incorporated in most of the previous studies. Therefore, this study attempts to address this research gap by taking into account the effect of firm life cycle in examining the relationship between accounting choice for intangible assets and value relevance. This should provide a better understanding of the interactions between accounting choice and value relevance given the discretion in accounting for intangible assets and, thus, should be of great interest to standard setters.

Finally, the change in accounting choice following AIFRS implementation has generated much discussion with regards to its economic impacts. As the flexible pre-AIFRS practices have become well established, any proposed restrictions to those practices are inevitably going to give rise to controversy (Alfredson, 2001). Despite the concerns, very limited studies have empirically examined this issue and this highlights another research gap in this area. Therefore, the adoption of AIFRS provides a motivation as well as an opportunity to examine further this controversial issue in accounting for intangible assets. In general, this study aims to provide more empirical evidence on the effect of accounting choice for intangible assets on value relevance, given the differences in firms' economic attributes and differences in the discretionary choices of accounting for the assets following the implementation of AIFRS. In order to do so, this study focuses on identifiable intangible assets, for which management has had greater accounting discretion during the pre-AIFRS period. Moreover, the focus on identifiable intangible assets is also consistent with the definition of intangible assets outlined in AASB 138.

1.3 Objectives of the Study and Research Questions

The general objective of this study is to examine empirically the relationships among firm life cycle, accounting choice for intangible assets and the value relevance of these assets in the period before and after the adoption of AIFRS. More specifically, in the context of intangible assets, this study seeks to understand and examine the effect of accounting choice on their value relevance and also the role of firm life cycle in the relationship between accounting choice and value relevance during the pre-AIFRS period. Further, this study aims to investigate the impact of the change in regulatory accounting practices on the relationship between first, accounting choice and value relevance and second, firm life cycle, accounting choice and value relevance.

Consequently, the following research questions (RQs) are investigated in this study.

RQ1: Are the amounts reported for intangible assets during the pre-AIFRS period value-relevant?

RQ2: During the pre-AIFRS period, does firm life-cycle moderate the relationship between accounting choice for intangible assets and the value-relevance of these assets?

RQ3: What is the effect of AIFRS adoption on the value-relevance of intangible assets?

RQ4: Does the effect of AIFRS adoption on the relationship between accounting choice for intangible assets and the value-relevance of these assets vary significantly across firm life-cycle stages?

1.4 Justifications for the Study

This study aims to contribute to the body of knowledge in research areas concerning the implications of accounting choice for intangible assets and the value relevance of intangible assets. This is particularly important considering the increasing role played by intangible assets in today's economy as reflected in the ongoing discussions and debates on the reporting of these assets. First, in attending to RQs 1 and 2, this study intends to enhance the current understanding of the economic implications of accounting choice for intangible assets in an accounting setting characterised by greater flexibility. Such flexibility basically enables accounting choice to be investigated further in the light of managerial motives by incorporating the potential effect of a key market imperfection, namely, information asymmetry. In this study, the effect of accounting choice for intangible assets on value relevance is considered alongside firm life cycle. Specifically, it examines the moderating effect of the differences in firms' economic characteristics, as represented by firm life cycle stages, on the value relevance of managerial accounting choice in accounting for intangible assets. This will provide a deeper insight into the signalling mechanisms used by managers and, therefore, will allow a more meaningful contribution to both accounting choice and value relevance literature.

Second, in answering RQs 3 and 4, this study contributes to the literature on accounting choice and the value relevance of intangible assets capitalisation by providing empirical evidence on the issue concerning AIFRS adoption. Following the introduction of AIFRS, in general, and AASB 138, in particular, there have been concerns about the effect of the new accounting regime and standard on the quality or value relevance of accounting information. The more restrictive accounting treatments for intangible assets are argued to limit managerial ability to communicate the value of such assets to the investors, hence reducing their information set and consequently the value relevance of the assets. Thus, this study aims to provide more understanding on the relationship between accounting choice and value relevance of intangible assets as well as the relationships among firm life

cycle, accounting choice and the value relevance of intangible assets, following AIFRS implementation.

Furthermore, a methodological contribution of this study is made, firstly, in the operationalisation of abnormal earnings in accordance with the Ohlson (1995) valuation model for conducting the tests of value relevance. This is because, despite the importance of abnormal earnings as one of the components in the Ohlson (1995) model, previous studies using the model generally utilise other historical income measures due to the difficulties in operationalising the abnormal earnings measure. Recognising this limitation, this study attempts to incorporate abnormal earnings when employing the Ohlson (1995) model by estimating firm-specific discount rates. The rigorous methodology used in the operationalisaton of abnormal earnings, therefore, should emphasise one of the strengths of this study.

The second methodological contribution is in the operationalisation of the firm life cycle concept in the Australian capital market. In the context of firm life cycle, the attempt in this study to classify Australian publicly-listed firms into their respective life cycle stages is based largely on firm-specific economic attributes relating to their investments in intangible assets. This, therefore, should assist in more meaningful inferences in future studies related not only to accounting choice and value relevance but also to other research areas concerning intangible assets.

The findings in this study should provide useful inputs to accounting standard setters in formulating and determining the rules under which firms report financial results, especially in terms of intangible assets to investors. Additionally, because standard setters are responsible for the development of the accounting standards to meet the needs of the issuers and various users of financial statements, research motivated by standard setting issues, such as intangible assets, offers additional insights into the financial reporting needs of these parties. This suggests that management, investors, accounting firms and other parties interested in and affected by financial reporting can also benefit from research relevant to standard setting.

In summary, the justification for this study is defined in terms of its contribution to: (1) the understanding of the economic implications of accounting choice particularly in relation to the market imperfections driving the choice; and (2) improving the knowledge of intangible assets information quality especially given the differences in accounting practices for these assets.

1.5 Overview of Research Methods

In order to obtain the sample used in this study, first, all Australian Securities Exchange (ASX) listed firms excluding firms in the Financials industry for the period of 2003 to 2004 for the pre-AIFRS period and 2007 and 2008 for the post-AIFRS period were selected. This initial sample is then utilised to perform the firm life cycle stages classification procedure which is based on Anthony and Ramesh (1992) with some modifications. Using multiple life cycle stage proxies, firms are classified into three major life cycle stages which are Growth, Mature and Decline. The sample selection process used in this study derives a final sample of 2,125 firm years which consists of 900 firm-years in the pre-AIFRS period and 1,225 firm-years in the post-AIFRS period.

Four regression models based on the Ohlson (1995) valuation model are used to analyse the hypothesised associations among firm life cycle, accounting choice for intangible assets and the value relevance of the assets in both the pre-AIFRS and post-AIFRS periods. The model used in this study to analyse value relevance is grounded in a theory that examines the determinants of firm value, which also has been used in numerous studies. Thus, the utilisation of the Ohlson (1995) framework in this study will avoid potential specification bias in the analyses. Further, the empirical analyses also account for departures from normality and linearity, heteroscedasticity, multicollinearity and autocorrelation, where appropriate.

1.6 Key Findings

The findings in this study indicate that given the discretion in accounting for intangible assets during the pre-AIFRS period, capitalised intangible assets of Australian firms are generally regarded by the market as value relevant. The findings also provide support for the claim that firm life cycle moderates the effect of accounting choice on the value relevance of intangible assets, with significant differential value relevance between firms in the Mature and Decline stages. The results also indicate that, given managerial discretion during the pre-AIFRS period, capitalised intangible assets of Growth and Mature firms are value relevant, but not Decline firms. This highlights that accounting choice for intangible assets might not be used homogeneously across firms to signal their future economic value. In contrast to Growth and Mature firms, the lack of value relevance for intangible assets reported by Decline firms suggests that there is a tendency for these firms to abuse the discretion.

The results also show that the adoption of AIFRS is associated with improved value relevance of intangible assets, in general, and across all firm life cycle stages, indicating improved investors' confidence in the capitalised amounts. Finally, while no significant difference is found between firm life cycle stages in relation to the change in value relevance following AIFRS adoption, the findings also indicate that the most noticeable difference is for Decline firms. This is mainly because evidence of value relevance for these firms is only found in the post-AIFRS period. Intangible assets reported by Growth and Mature firms, on the other hand, are considered as value relevant by the market in both the pre- and post-AIFRS periods. These findings suggest that the restrictions imposed by AIFRS in accounting for intangible assets not only improve the credibility of the signalling mechanism used by firms but also limit the potential occurrence of managerial opportunism. Overall, the findings provide more insights into the issues of interest regarding the implications of the differences in accounting practice for intangible assets.

1.7 Outline of the Thesis

The remaining chapters are structured as follows. Chapter 2 presents a literature review discussing various relevant issues concerning intangible assets. The main purpose of this chapter is to provide a framework for understanding issues associated with intangible assets that include their increasing importance in enhancing firm value, definitions, classifications, arguments for and against the recognition of the assets as well as the historical development of accounting for these assets in the Australian setting.

Chapters 3 and 4 provide a review of the research into value relevance and firm life cycle. The purpose of these two chapters is to provide a framework for establishing the relationships among firm life cycle, accounting choice for intangible assets and the value relevance of these assets. In Chapter 5, a synthesis of Chapters 2, 3 and 4 is provided, leading to the development of the hypotheses to explore the research questions identified in Section 1.2.

Chapter 6 describes the methodology used in the firm life cycle classification procedure, the models employed for the tests of the hypotheses, variable measurements and the data sources. The sample selection process, model specification tests, descriptive statistics and the results for the value relevance tests are reported and discussed in Chapter 7.

The final chapter concludes the thesis with a discussion on the key findings, the contributions of the research to the body of knowledge, its implications and limitations and presents suggestions for future research areas.

CHAPTER 2

ACCOUNTING FOR INTANGIBLE ASSETS: ISSUES AND PROBLEMS

2.1 Introduction

One of the main objectives of financial reporting is to provide users of financial statements with information useful for various decisions such as efficient resource allocation, fiduciary purposes, contract monitoring and so on. The Statement of Accounting Concepts SAC 2: *Objective of General Purpose Financial Reporting* (Australian Accounting Research Foundation (AARF), 1990) highlights the role of financial reporting as a means of communicating relevant and reliable information about a reporting entity to users. Specifically, the objective of financial reporting as indicated in SAC 2 is to "[p]rovide information to users that is useful for making and evaluating decisions about the allocation of scarce resources" (para. 26). The Statement also notes that "[e]fficient allocation of scarce resources will be enhanced if those who make resource allocation decisions…..have the appropriate financial information on which to base their decisions" (para. 13).

High quality accounting information is a pre-requisite for well functioning capital markets and economies as a whole and as such should be of importance to investors, companies and accounting standard setters. Among the four principal qualitative characteristics that accounting information should have in order to be useful to users are relevance and reliability. The importance of these qualitative characteristics is emphasised in the Framework for the Preparation and Presentation of Financial Statements (AASB, 2004). Finding a balance or trade-off between these characteristics is often necessary and the Framework notes that the overriding

consideration in achieving a balance between relevance and reliability is "[h]ow best to satisfy the economic decision-making needs of users" (para. 43).

Nevertheless, finding the right 'relevance-reliability balance' of accounting information has been proven to be a difficult task especially in the case of intangible assets. Accounting standard setters, academics and other major stakeholders are constantly struggling with the trade-offs between providing the most relevant external financial reports while maintaining the reliability and verifiability of the information provided. Accounting for intangible assets has long been a controversial issue primarily because obtaining reliable estimates of value for these assets can be problematic and the increasing importance of intangible assets in today's economy has exacerbated the problem in accounting for these assets. During the last two decades the economy has progressively moved into a more knowledge-based, fast-changing and technology-intensive one in which investments in intangible assets such as human resources, information technology, research and development (R&D), customer acquisition and so on have become essential in order to maintain a firm's competitive position and ensure its future viability (Cañibano et al., 2000).

Standard setters to date tend to maintain a conservative approach to the measurement and reporting of intangible assets. Specifically, they have prescribed asymmetric asset recognition rules for acquired and internally generated intangible assets. Acquired intangible assets can usually be recognised because there is a verifiable measure from the exchange transaction. On the contrary, internally generated intangible assets are normally kept off the balance sheet due to the lack of a verifiable measure from an exchange transaction although there is not necessarily a lack of control over the asset or expected future benefits.

It has been suggested that given the significance and importance of intangible assets and the constraints placed on their recognition, current financial reporting systems might significantly understate the economic value of intangible assets, hence, reducing their value relevance (Lev, 2001). The pressure to improve accounting

treatment for intangible assets particularly in relation to the measurement and reporting of these assets continues to present more challenges to accounting standard setters. The concern over the relevance of current reporting practices has also generated a considerable amount of research investigating issues related to intangible assets. Intangible assets so far have been extensively analysed in the economics, management, finance and accounting literature, both conceptually and empirically. Unfortunately, there seems to be no agreement on issues concerning the definition and classification of the intangible assets, the criteria that should be adopted for their measurement and reporting or their effects on the value relevance of financial statements (Cañibano et al., 2000).

In order to provide a framework for understanding issues associated with intangible assets, this chapter reviews relevant literature on intangible assets, particularly in relation to their identification and reporting. First, it highlights the increasing importance of intangible assets in today's economy and reviews the factors that give rise to such growth in intangible assets. Second, the various definitions and classifications used to describe intangible assets are explored. Third, it examines the issues associated with the recognition of intangible assets and, finally, the development of accounting for intangible assets in Australia is discussed.

2.2 The Growth of Intangible Assets

The source of value, wealth and growth of today's economy is driven primarily by the creation and manipulation of intangible assets (Lev, 2001). Recognising the increasingly important role of intangible assets in the modern economy, Lev (2001, p.1) argues that "[a]bnormal profits, dominant competitive positions and sometimes even temporary monopolies are achieved by the sound deployment of intangibles, along with other types of assets". Raoul Pinnel, Chairman of Shell Brands International shares a similar view on the value-creation role of intangible assets by stating that:

> [i]ntangible value is the issue of the decade. Shareholders will place increasing emphasis on management's ability to manage intangible assets, rather than tangible assets, in the understanding that a growing proportion of companies' value will derive from intangibles (Institute of Practitioners in Advertising, 2006, p. 5)

Surveys conducted by various organisations highlight the growth of intangible assets. For example, *The Global Intangible Study 2006* (GIST^{TM}) by Brand Finance shows that 62 percent of value of the largest 25 stock markets in the world is represented by intangible assets while *Market Capitalization of the S&P 500* by Millward Brown Optimor reports that the value of intangibles of the S&P 500 has trebled over the last 30 years (Institute of Practitioners in Advertising, 2006).

Despite this dramatic increase, it is important to recognise that intangible assets are definitely not a new phenomenon unique to modern economies as they have existed since the dawn of civilisation and are created whenever ideas are put to use (Lev, 2001). Similarly, Basu and Waymire (2008) argue that because the overall trend in many civilisations has been towards improving the standard of living, human progress has always reflected accumulated human ingenuity. Intangible assets are thus ubiquitous to human economic interaction because people have always produced and implemented ideas to increase their productivity (Basu and Waymire, 2008). However, many changes have taken place especially over the last fifty years and today's economy is fundamentally different from the economy of the 1950s and earlier (Upton, 2001). The revolutionary changes, particularly in globalisation, information technology and technological and financial innovation, spawned what is known as the new-economy in the mid 1990s (MERITUM, 2001). This consequently places more emphasis on the relevance of intangible assets.

2.2.1 The New-Economy

The revolutionary changes in information technology combined with intensified business competition due to trade globalisation, deregulation in key economic

sectors and financial innovations have transformed the resource-based manufacturing economy or the so-called old economy into a new-economy. Despite the extensive literature on this topic, there is no clear and exact definition of the new-economy as the descriptions vary from one writer to the next (MERITUM, 2001; Upton, 2001). However, the various key words used to describe the new-economy include the post-industrial economy, knowledge-based economy, service economy, knowledge society, knowledge-intensive economy, knowledge economy, new industrial age, information age and information era (Steenkamp, 2007).

In a special report *Business and Financial Reporting – Challenges from the New-economy,* Upton (2001) states that the distinguishing features of a new-economy are: (1) knowledge, knowledge capital, know-how and intellectual capital; (2) the Internet; (3) technology; (4) information; (5) intangible assets; (6) knowledge sharing and new forms of organisation; (7) network effects; and (8) globalisation. The descriptions and characteristics used to describe the new-economy usually depict a knowledge and information-based economy in which job creation and higher standards of living are the results of innovative ideas and technology embedded in both services and manufactured products. This also highlights the fundamental difference between the new-economy and the old economy in which land, labour and capital are considered the primary factors of production (Drucker, 1993).

Drucker (1993) argues that although the traditional factors of production, namely, land, labour and capital, have not disappeared entirely they have become somewhat secondary and are increasingly being replaced by knowledge as a more meaningful resource. Instead of relying on the traditional factors of production, value is now created by productivity and innovation which involve applications of knowledge to work. In short, the shift towards a new-economy is transforming the dynamics of the business environment (Boedker, Guthrie and Cuganesan, 2004). One of the most prominent examples is Ford Motor Co. which was an asset-intensive manufacturing company for decades. However, fundamental changes are taking place or are

planned by Ford to focus on brand building and consumer relationships. This is done by outsourcing and spinning off the manufacturing of automotive parts, shedding physical assets and investing heavily in intangible assets (Slater, 1999; Lev, 2001). This involves aggressive deployment of new technologies such as the Ford Intranet to manage and share information effectively among its employees and Auto-xchange to connect its world-wide suppliers. As a result of this dynamic business environment, companies now have to rely more and more on continuous innovation for survival and growth (Lev, 2001). Innovation, in turn, is primarily achieved by investment in intangible assets, resulting in the increasing importance and significance of these assets in the production functions of businesses.

2.2.2 Linking Innovation to Intangible Assets

Similar to the new-economy there are various definitions for innovation that appear in the existing literature. Although the exact definition may vary, the term innovation in its widest sense refers to something new that adds value to a business (Knight, 1967; Abernathy and Utterback, 1978; Feeny and Rogers, 2003). Innovation has always been an important activity of individuals and business enterprises. Significant scientific and industrial innovations of the nineteenth and twentieth centuries such as chemical and pharmaceutical discoveries, electricity, transportation, communication, and information technologies are proof that there has always been strong incentive to innovate (Lev, 2001; Fagerber, Mowery and Nelson, 2005). For example, the IBM-Melbourne Institute *Innovation Index of Australian Industry* report reveals that the rate of innovative activity in Australia has increased by 25.8 percent during the period 1990 to 2005, with particularly strong growth experienced since 1996 (Melbourne Institute of Applied Economic and Social Research, 2007).

The discussion on innovation often starts by distinguishing invention from innovation. An invention is described as a new idea, sketch or model for a new or improved device, product, process or system while innovation is the first attempt to carry it out in practice (Fagerber et al., 2005). In order to be able to turn an invention into an innovation, a firm normally needs to combine a number of different types of

knowledge, capabilities, skills and resources. For example, the firm may require production knowledge, skills and facilities, market knowledge, a well functioning distribution system and sufficient financial resources. Dosi (1988) argues that innovation involves the search for and the discovery, experimentation, development, imitation, diffusion and adoption of new products, production processes and organisational set-ups. Similarly, Nelson and Winter (1982) suggest that innovation processes generate new products and new routines for an innovating firm. According to the economic literature, an idea, a change or an improvement is only regarded as an innovation if it has been put to use, implemented or commercialised in some way. The creation of abstract knowledge or the invention of new products or processes is not usually considered an innovation until it has been productively embedded into a firm's practices (Knight, 1967; Stoneman, 1983; Feeny and Rogers, 2003).

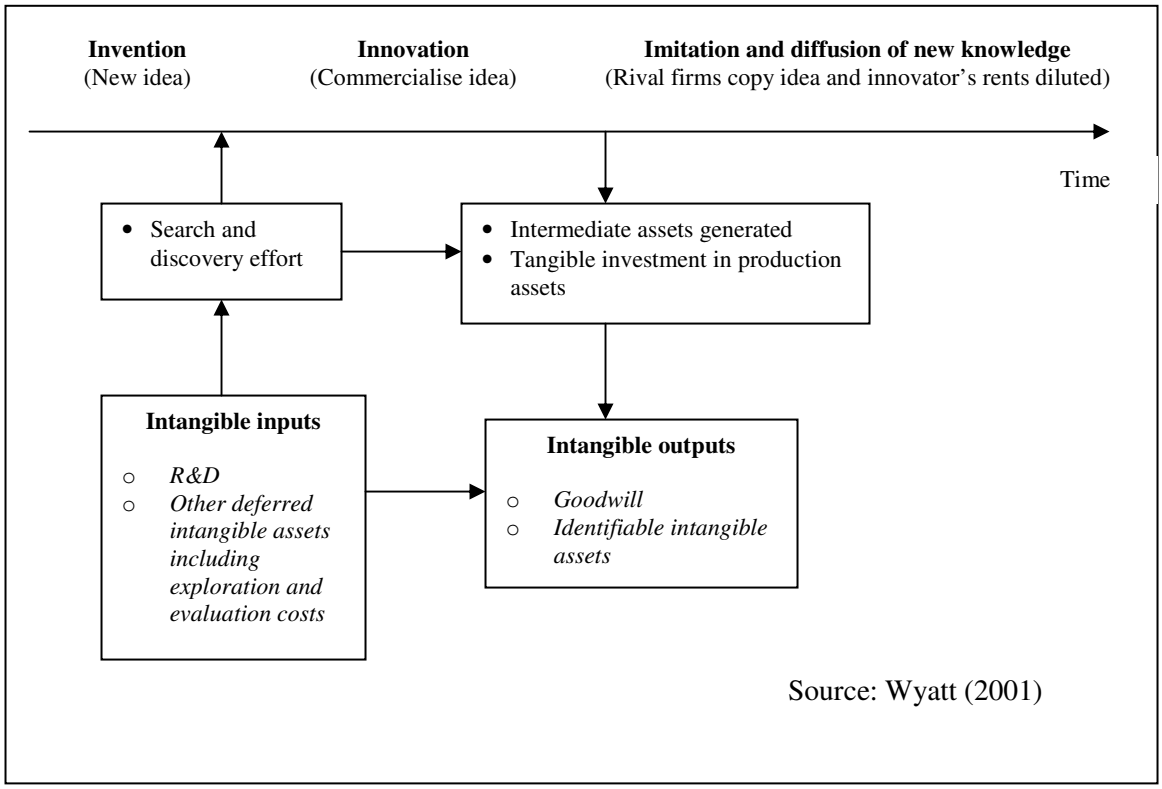
The close link between innovation and intangible assets is established by the fact that innovation activities are driven by intangible assets, in general and information and knowledge, in particular (Wyatt, 2001; Fischer, 2006). As emphasised by Lev (2001, p.16):

> [i]nnovations are created primarily by investments in intangibles. The new products, services and processes generated by the innovation process……are the outcomes of investment in such areas as R&D, acquired technology, employee training and customer acquisition costs.

Hence, it can be seen that intangible assets play an important role throughout the innovation activities of a firm, either as inputs to or outputs of the process. Recognising these roles of intangible assets, studies have used intangible asset figures or values to proxy for innovation, both as inputs to innovation activity and as outputs of innovation activity (Rogers, 1998). The relationship between intangible assets and innovation is illustrated in Figure 2.1.

Figure 2.1

Investment Phases in Innovation Activities



From Figure 2.1, it can be seen that the search and discovery effort undertaken by the firm during the innovation activities requires intangible inputs. Intangible inputs refer to expenditures on activities such as work-force training, R&D, exploration and evaluation, market and technical knowledge, as well as the investment cost of externally acquired intangible assets, for example, goodwill. These expenditures will occur very early in the project life cycle, normally in the invention phase. Expenditures on these intangible inputs generates intermediate intangible outputs that represent the internally generated separable intangible assets such as rights to operate tangible assets and benefits provided by patents, trademarks, licences and copyrights and internal goodwill items such as brands, designs, internal value-creating routines, customer and supplier lists, skilled work-force, market share and organisational structure. Some, for example, trademarks and patents, can be

recognised in the balance sheet as identifiable intangible assets, along with purchased goodwill, while some may not meet the recognition requirements imposed by most accounting standard setters.

The above discussion establishes the increasing importance of intangible assets in the modern economy. First, it reveals how the emergence of new-economy firms is changing the role of intangible assets in today's economy. Then, it shows the close link between intangible assets and innovation and how firms' needs for innovation in their value-creation activities, growth and survival give rise to greater investment in intangible assets. In the next section, in order to develop a framework upon which the discussion on intangible assets in this study will be centred, various definitions and classifications of intangible assets are reviewed.

2.3 Definition and Classification of Intangible Assets

Notwithstanding the increasing importance and significance of intangible assets, there are unresolved problems concerning the definition and classification as well as the recognition and measurement of intangible assets. This section discusses issues relating to definition and classification of intangible assets while issues concerning both recognition and measurement are discussed in Section 2.4.

A review of extant scholarly literature in this area suggests that most discussion on intangible assets falls into two categories. The first category conceptualises intangible assets from a broad point of view and includes virtually any resource that is both intangible (lacking in physical substance) and of economic value to the firm. This includes all types of intellectual capital, for example, those items associated with the firm's human capital (such as employee training, morale, loyalty and knowledge), process-related capital (such as information technology, designs, networks, administrative structure and processes and production processes), and external relations (such as customer satisfaction, loyalty, supplier relationships and brand names). Intangible assets according to Lev (2001, p.5) are:

> [c]laims to future benefits that do not have a physical or financial (such as a stock or a bond) embodiment that are generated by innovation or discovery, unique organizational designs, or human resources practices.

The MERITUM Guidelines define intangibles as non-monetary sources of probable future economic benefits that lack physical substance, are controlled as a result of past transactions and events and may or may not be separable (MERITUM, 2001). Similarly, Basu and Waymire (2008) adopt a wide view and define intangibles as ideas or knowledge about the natural and socio-cultural worlds that enable people better to accomplish their goals. Clearly, there is no common, all-embracing definition of intangible assets on an international level. Additionally, several terms are often used as synonyms to describe intangible assets without being clearly differentiated. These include such terms as intangibles, intellectual assets, intellectual property, intellectual capital, knowledge-based assets and knowledge capital.

The second category, on the other hand, is mostly adopted by accounting standard setters that are aware of practical difficulties associated with the wide-reaching definitions of intangible assets. Hence, this category accounts for a narrower set of items by focusing on intangible assets that are identifiable or more specifically, items that have value on a stand-alone basis and meet conventional definitions of assets (Skinner, 2008). According to Cañibano et al. (2000), the definitions presented by the major standard setters are rather similar, with intangible assets being characterised as non-physical and non-monetary sources of probable future economic benefits accruing to the firm as a result of past events or transactions.

The Financial Accounting Standards Board (FASB) in its Statement of Financial Accounting Standards No. 142 *Goodwill and Other Intangible Assets* states that "the characteristics that distinguish intangible assets from other assets are that they are (a) without physical substance, (b) not financial instruments, and (c) not current assets" (FASB, 2001, p. B27). Similar to the IASB, the AASB in AASB 138 *Intangible Assets* (para. 8) defines intangible assets as "an identifiable non-monetary asset

without physical substance" (AASB, 2007). The definition of an intangible asset under AASB 138 requires the asset to be identifiable in order to distinguish it from goodwill. An asset satisfies the identifiability criterion if it: (1) is separable, i.e., capable of being separated or divided from the entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, asset or liability; or (2) arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights and obligations. It appears that the definitions adopted by these standard setters are more restrictive because some intangible investments such as intellectual capital will be unlikely to satisfy the identifiability criterion and, hence, are excluded from the concept of intangible assets.

Another equally important issue concerning intangible assets that is still debatable is the classification of these assets. However, Cañibano et al. (2000) argue that the classification of intangible assets has not been much of a focus and received less attention from academic researchers until relatively recently. Many attempts have been made to develop theoretically consistent classifications of intangible assets. This reflects the belief that an agreed classification system with shared meanings is an essential component in providing proper guidelines for recognition, measurement and disclosure of these assets (Abernethy et al., 2003). However, formulating a classification for intangible assets has not been an easy task since it varies depending on whether a broader or narrower definition is adopted. For instance, those who define intangible assets from the broader point of view, for example, European firms, have focused on "intellectual capital accounts" designed to meet internal management and external reporting objectives (Abernethy et al., 2003, p.19). Hence, they are most likely to classify intangible assets into components such as human capital, structural capital, relational capital, organisational capital, intellectual property and so on.

Despite the considerable efforts being put forward in developing these intellectual capital accounts, no empirical evidence to date suggests that this approach improves

firms' information environment or internal management of intangible assets (Abernethy et al., 2003). Additionally, the abstract nature of the constructs forming the building blocks defining this expansive approach is usually inconsistent with the evidence on the types of information employed by managers and investors for evaluating firm economic performance (see, for example, Amir and Lev, 1996; Aboody and Lev, 1998; Oswald, 2008).

Although there is no existing classification system for intangible assets, specific accounting regulations proposed by standard setting organisations tend to concentrate on four broad classifications of intangible assets; acquired intangible assets, internally generated intangible assets, R&D and intellectual property. The descriptions for each of these categories of intangible assets are as follows (Wyatt and Abernethy, 2003).

1. *Acquired intangible assets* - include acquired identifiable intangible assets (for example, trademarks and patents, licences) and unidentifiable[1] intangible assets (generally referred to as purchased goodwill).
2. *Internally generated intangible assets* – include identifiable intangible assets developed or produced by the firm and internal goodwill that is not easily attributable as to its source of value. Identifiable intangible assets and internal goodwill relate to such things as the firm's information systems, administrative structures and processes, market and technology knowledge, and customer and supplier networks.
3. *R&D costs* – include expenditures associated with R&D activities performed within the firm. Expenditures for exploration, evaluation and development costs in mining and other resource-based firms are usually accounted for separately because of the specific risk profile of these expenditures.

[1] An unidentifiable intangible asset refers to an asset that is not separable nor does it arise from contractual or other legal rights (AASB 138, para. 49).

4. *Intellectual property* – a sub-set of acquired and internally generated intangible asset classifications that have legal or contractual rights such as patents, trademarks, designs, licences and copyrights.

Based on the above discussion it appears that there is no consistent approach in defining and classifying intangible assets, which, consequently, complicates accounting for these assets. This is emphasised by Canibaño et al. (2000, p. 108) who state that:

> [a]cademics and standard setting bodies are currently faced with the challenge of undertaking joint efforts towards developing an appropriate definition of intangibles and a coherent classification, which are the necessary starting point for the development of a set of valuation criteria and guidelines for financial reporting that will result in an improvement of the ability of financial statements to provide relevant information on the intangibles determinants of the value of companies.

2.4 Issues Concerning the Recognition of Intangible Assets

This section will provide a synthesis on the important issues put forward by those who oppose and those who support intangible asset recognition in the financial statements. First, it will discuss how the conflict between the economic characteristics of intangible assets and asset definition and recognition criteria outlined in the current financial reporting systems leads to the accounting treatment of immediate expensing for most intangible expenditures. Next, the issues raised in relation to the failure to recognise intangible assets in the balance sheet are described.

2.4.1 Problems in Recognising Intangible Assets

Existing accounting frameworks such as that of the AASB only allow intangible expenditures to be recorded in the accounting system as assets if the items meet both the asset definition and the recognition criteria (AASB 138, para. 18). The asset

definition criteria for intangible assets comprise three primary attributes which are identifiability, control and future economic benefits. These attributes are defined in AASB 138 (para. 10) as follows (AASB, 2007).

1. Identifiability – it (a) is separable, that is capable of being separated or divided from the entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, asset or liability; or (b) arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights or obligations.
2. Control – if the entity has the power to obtain the future economic benefits flowing from the underlying resource and to restrict the access of others to the benefits.
3. Future economic benefits – the benefits flowing from intangible assets may include revenue from the sale of products or services, cost savings or other benefits resulting from the use of the asset by the entity.

Meanwhile the asset recognition criteria for intangible assets as outlined in AASB 138 (para. 21) comprise two attributes (AASB, 2007).

(a) it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity; and
(b) the cost of the asset can be measured reliably.

However, many intangible assets tend to have different economic characteristics to those defined and recognised under the current financial accounting framework. Hence, they often fail to be included in the balance sheet. There are three distinguishing economic characteristics of intangible assets: inherent uncertainty, partial excludability and non-separability, which render these assets, in many cases outside the definition and recognition criteria.

2.4.1.1 Inherent Uncertainty

Although expected future economic benefits are emphasised both in the definition of an asset and in its recognition criteria, intangible investments are often described as having highly uncertain and ambiguous future benefits (Lev, 2001; Abernethy et al., 2003; Hunter, Webster and Wyatt, 2005; Skinner, 2008). There is a certain degree of risk associated with any type of investment and assets in any uncertain business environment. However, the degree of risk for intangible assets is significantly greater than that of other tangible or even financial assets (Lev, 2001). The substantially higher levels of risk associated with intangible assets is closely related to the link between these assets and the nature of innovation activities (Wyatt, 2001).

As discussed earlier, innovation activities are driven mostly by investment in intangible assets. Innovation activities, in turn, involve the solution of problems and, normally, the problems are ill structured (Dosi, 1988), which means that available information does not automatically generate a solution to the problem. This is because what is searched for is basically unknown before the search, discovery and creation activities take place. As a result, it is most likely that there will be significant time lags between the expenditures and efforts undertaken by the firm to begin the innovation activity and the time for the arrival of a commercially viable innovation. Take, for example, the patent on the drug Fluoxetine (commercially known as Prozac). The expenditures made to develop the drug took place over many years during which period the possible therapeutic and commercial success of the drug were virtually unknown. Thus, the ill structured nature of innovation activities leads to the uncertain nature of the discovery process and the inability to predict the arrival of innovation. Consequently, the investment outcomes of innovation efforts can hardly be known with certainty *ex ante* (Dosi, 1988). Therefore, because of the ambiguity in determining the future economic benefits, many investments incurred to generate intangible assets are not recognised in the financial statements.

In addition, intangible expenditures such as R&D, market research and work-force training are concentrated at the early, higher risk phase of the innovation activity. In contrast, much of the investments at the later, lower risk phase of the activity are in the form of tangible assets. Thus, Lev (2001) argues that the decreasing level of risk along the phase of innovation activities leads to the inherent uncertainty associated with intangible assets. By referring to Figure 2.1, it can be seen that an innovation activity usually starts with the search and discovery process and ends with the commercialisation of final outputs of products or services. For example, basic research, which often takes place at the very beginning of the innovation process (the invention phase), has the highest level of risk in relation to technological and commercial success. This type of research concerns the original investigation without a specific aim or application in which a relationship between costs and future benefits is not evident (Wyatt et al., 2001). According to Berk, Green and Naik (1999), research at this phase is subject to four types of risk: (1) technical risks pertaining to the successful completion of the invention; (2) the risk associated with the likelihood of technological obsolescence once the invention is complete due to competitive threat; (3) uncertainty associated with the potential cash flows the invention will generate once completed; and (4) uncertainty associated with the duration and costs of the invention process itself. In contrast, the production of tangible assets in the innovation activity is exposed to a lower level of risk mainly because the technological uncertainties embodied in the earlier innovation phase have been largely resolved.

Therefore, in comparison to tangible assets, investments in intangible assets are subject to higher degrees of risk, resulting in greater uncertainty of future economic benefits. In fact, this uncertainty has been provided as a major justification by accounting standard setters in their decision to expense most intangible investments (Kabir, 2008). This is mostly because including uncertain investment estimates potentially increases the errors in current and forecasted measures of future performance. The uncertain estimates of future benefits also complicate the process of formulating a reliable measurement in valuing these assets. Consequently, this

particular economic characteristic prevents a significant portion of intangible expenditures from being recognised under current accounting model due to failure to comply with asset definition and recognition criteria.

2.4.1.2 Partial Excludability

Another equally important asset definition criterion is the firm's complete control over the asset and its ability to restrict the access of others to the benefits. Property rights provide a firm with information about the availability of control rights and the probability that the firm can effectively secure or appropriate the expected investment benefits of the asset. Tangible and financial assets have well defined property rights in which the ownership and benefits of these assets can be legally appropriated by their owners. For example, the owner of a particular piece of land or property can enjoy the full benefits (or bear losses) of the investment while non-owners will have no share or rights over such investment. However, unlike tangible and financial assets, intangible assets are often characterised by partial excludability or fuzzy property rights. This refers to the inability of owners of these assets fully to exclude non-owners from enjoying some of the benefits of the investment (Wyatt, 2001; Skinner, 2008), a phenomenon known as spillovers (Arrow, 1962; Jaffe, 1986; Geroski, 1995; Takalo, 1998). For instance, a firm's investment in developing skilled and experienced employees does not necessarily preclude others from the benefits of those investments. The investment benefits will eventually flow through to other non-owners such as other firms and society at large when the employees leave the firm either to work with other firms or to start their own. This is largely due to intangible investments' dominance by people compared with machinery and the ease of copying non-embodied forms of intellectual capital (Hunter et al., 2005).

As a result, the firm cannot be certain of effectively appropriating the investment benefits because property rights remain with the individual employee. Firms have responded to the problems of defending property rights through both formal systems and informal systems. Formal systems for obtaining property rights over intangible

assets include the legal system, contract law and registration systems for patent, trademark and design rights. Informal systems include complex knowledge structures and factors affecting the firm's information environment and stock of intangible assets such as trade secrecy, superior internal competencies and employees, alliances, brand name and market share (Wyatt, 2005).

Nonetheless, even in the case where property rights are legally well defined such as patented inventions, there will still be significant spillovers. This is because, first, the invention can be used freely by non-owners after expiry of the patent. For example, generic drugs can be legally produced once the patent protections afforded to the original pharmaceutical company that developed the drugs have expired, which is up to 25 years from application in Australia. Further, generic drug firms may benefit from the previous marketing efforts of the brand-name drug. Second, even before expiration of the patent there are often enormous spillovers through imitation by rival firms (Takalo, 1998; Lev, 2001). Some of the most innovative industries such as software, computers and semi-conductors have historically weak patent protection and experienced rapid imitation of their products (Bessen and Maskin, 2000).

However, the risk of imitation is inherent in the patent system itself. This is because under the system, patent-holders are required to disclose their protected inventions to the public in exchange for exclusive rights over inventions for the purpose of increasing the diffusion of technological knowledge and reducing wasteful duplication of innovative efforts (Magazzini, Pammolli, Riccaboni and Rossi, 2009). For example, in Australia, IP Australia publishes the contents of an innovation patent once granted and again at certification and the contents of a standard patent application 18 months after its priority date and again after acceptance. This information is disclosed in the *Australian Official Journal of Patents* (AOJP) which is made available to the public through its website. Such publication means that the contents of the patent are no longer confidential so that the invention becomes part of public knowledge.

IP Australia outlines two reasons for such disclosure: to assist in advancing industry and technology and to enable patent-holders to take legal action for any future infringements. Thus, acquiring legal protection such as a patent does not necessarily prevent imitation because the imitator always has an opportunity to try to invent around the patent by producing a non-infringing substitute (Takalo, 1998). Finally, it is also possible for spillovers to occur at the international level due to various reasons including ineffective enforcement of property rights protection for intangible assets such as patents and copyrights in many countries. This results in the copying and imitation of various R&D products, most noticeably software and other intellectual works such as music, movies and literature. Moreover, spillovers can also be brought about by intangible assets embedded in the activities of multi-national corporations to local firms in host countries which can be in various forms of technologies and skills that the host countries do not possess (Blomström and Kokko, 2001).

The inference from the above discussion is that securing and defending property rights is a common problem for intangible investments. This is because the value may be tied up in people who cannot be owned or else attributable to rents that are easily copied and dissipated by rival firms (Webster, 1999). As a result, this particular characteristic of partial excludability or fuzzy property rights exposes intangible assets to spillovers and imitation risks that enable others to share the firm's investment benefits over the assets. This means that unlike tangible or financial assets, the firm does not have absolute control over intangible assets and such absence of control creates significant challenges in the managing and reporting of intangible assets under current financial reporting systems. In addition, the lack of control also affects the firm's ability to capture the expected investment benefits (Dosi, 1988; Geroski, 1995; Wyatt, 2005; Kabir, 2008). This, in turn, leads to another problem related to the recognition of asset, that is to formulate a reliable estimate in measuring intangible assets, supporting the arguments against the recognition of these assets in the balance sheet.

2.4.1.3 Non-separability

Upton (2001) states that although few would argue that information about intangible assets is not relevant, many would question whether these items are measurable. Those that argue against the recognition of intangible assets, particularly the internally generated ones, emphasise that the problem is, first, cost is not a reliable measure of the underlying value of the assets and second, measures other than cost including fair value lack sufficient reliability (Upton, 2001). The main reason for these problems relates to the tendency of intangible assets to be non-separable. The non-separability of intangible assets means that they are not capable of being separated and divided from the firm without any loss of value (Lev, 2001; Hunter et al., 2005; Skinner, 2008). This is essentially because the value of intangible assets such as brand names, employee skills and organisational capabilities is the result of many different and interrelated activities and expenditures. For example, the value of a brand may depend on the patent to a particular technology, aggressive advertising efforts and other reputation enhancing activities.

The creation of intangible assets involves ideas that build on other ideas to generate complementarities and synergies (Basu and Waymire, 2008), many of which, as discussed earlier, have different owners and are not owned by any given firm. These complementarities and synergies mean that the value of a specific intangible asset is intrinsically connected to the residual value of the firm within which it will be employed. This embodiment of intangible assets in the value of the firm renders the definition criterion of identifiability unlikely. Another accounting implication is that, without being able to identify separately the costs or value attributable to each of these intangible assets, it is not possible reliably to measure them as independent assets at either their cost or fair value (Upton, 2001; Kabir, 2008; Skinner, 2008), which is one of the important recognition criteria.

Thus, from the standpoint of current financial accounting frameworks, the mismatch between economic characteristics of intangible assets and accounting principles

results in the under-recognition of these assets in the balance sheet. The difficulties in measuring and reporting these assets are reflected in the decision of most accounting frameworks to write-off most intangible expenditures as operating expenses in the income statement.

2.4.2 Implications for the Usefulness of Financial Statements

As discussed earlier, current accounting standards (see, for example, FASB Statement No. 142 *Goodwill and Other Intangible Assets*) require most intangible expenditures to be expensed as incurred. This means that a significant portion of internally generated intangible assets is not recognised in the balance sheet of a firm. There are arguments that the failure to recognise these assets in the financial statements will lead to information deficiencies because managers, investors and policymakers are not receiving some of the most relevant information about the firm (Cañibano et al., 2000; Lev, 2001; Wyatt, 2001; Abernethy et al., 2003). The widening gap between firms' market values and book values of equity suggests that the current financial reporting frameworks present an incomplete account of their value (Lev, 2001; Steenkamp, 2007).

The impact of intangible asset recognition, or the lack thereof, on the value of information provided by firms is becoming an increasingly important issue particularly with the new-economy firms such as Google, Microsoft and Samsung playing increasingly vital roles in the world's economy. Further, more traditional firms are relying on intangible assets to generate value (Skinner, 2008). It has been argued that there is a disconnection between existing financial reporting frameworks and information needs of the new-economy firms, due to the omission of new-economy assets and value drivers from financial statements (MERITUM, 2001; Upton, 2001; Steenkamp, 2007).

It is frequently argued that new-economy firms depend more heavily on intangible assets, particularly human capital or other knowledge-based assets in their value-

creation process than on tangible and financial assets (Clikeman, 2002; Mouritsen, 2003). However, the mismatch between economic characteristics of intangible assets and accounting principles means the entire category of these assets is being omitted from the balance sheet. In addition, there are also concerns that due to the restrictions placed over the recognition of the assets, existing financial frameworks do not capture and may not be able to capture the value drivers that dominate modern firms (Bontis, 2001; Daum, 2001; Upton, 2001; Steenkamp, 2007). As emphasised by Hunter et al. (2005), the purpose of all commercial activity is to add value to inputs or resources used up in the course of business. The success of a firm in this value-creation process reflects its competitive advantage and its ability to survive and out-perform rival firms. Therefore, value drivers in this case refer to factors that enhance the value of a product or service as perceived by consumers that consequently create or drive firms' revenue, wealth, growth and success (Daum, 2001; Steenkamp, 2007; Ittner, 2008). Intangible assets such as human capital, brands, reputation, organisational capabilities and information technology are significant value drivers in today's economy and, hence, it has been suggested that the accounting profession should adequately account for these drivers (Guthrie, 2001; MERITUM, 2001; Reed, 2001).

The claim that financial statements are no longer reflecting the real value of a business also has adverse effects on the management of intangible assets and intangible investment decisions. This is because, first, managers typically make decisions about intangible asset expenditure with little information about the returns from past expenditures of this type or the likely future returns from that particular expenditure (Hunter et al., 2005). Management has traditionally designed its internal reporting systems to support the preparation of external financial reports (Daum, 2001). Most intangible investments are usually immediately expensed for external reporting purposes, resulting in a lack of differentiation between expenditure on current production and profitability and expenditure expected to generate future output and profits. Since expenditures relating to investments and operating expenses for the period are not separated, decisions about intangible investments are unlikely

to be optimal and will not have a clear and measurable impact on future economic performance and firm value (Hunter et al., 2005). This kind of problem is the basis of argument for traditional financial statements becoming less explanatory and informative because they provide reliable but not relevant information to understand how their resources, many of which are intangible assets, create value in the future (Canibaño et al., 2000; MERITUM, 2001).

Second, in the absence of relevant accounting data, managers have to rely on other non-financial information sources for asset management purposes (Wyatt, 2001). Ittner (2008) provides a review of statistical evidence on the links between internal measurement of intangible assets based on non-financial indicators and firm performance. The evidence indicates that although studies have shown that intangible asset measurement is associated with higher firm performance, technical and organisational barriers prevent many firms from identifying appropriate measures or assessing these economic benefits. Thus, so far, it can be concluded that the emphasis of intangible assets recognition appears to be on reliability, which could be detrimental to another important financial characteristic, that is, relevance.

2.4.3 Accounting for Intangible Assets and Information Asymmetry

Information asymmetry arises in situations where managers possess greater and/or better information (know as insiders' information) than investors (Akerlof, 1970; Aboody and Lev, 2000; Fields et al., 2001; Mohd, 2005). This creates an imbalance in access to information and enables some investors to become more informed than others by having greater private information, either through their superior ability in analysing public information or in acquiring insiders' information. Regardless of how the private information is obtained, a major consequence of information asymmetry is that informed investors can exploit this superior information to assess the future benefits of an investment, gaining at the expense of uninformed investors (Mohd, 2005). This information asymmetry risk that leads to long-term

informational disparities between informed and uninformed investors is a major concern of accounting regulators (Callahan, Lee and Yohn, 1997).

All corporate investments are associated with information asymmetries because, in contrast to outsiders that receive highly aggregated information on investment productivity at discrete points of time, managers can continually observe changes in investment productivity on an individual asset basis (Aboody and Lev, 2000; Lev, 2001). However, extant empirical studies provide consistent support that intangible assets are associated with greater information asymmetry (Barth and Kasznik, 1999; Aboody and Lev, 2000; Barth, Beaver and Landsman, 2001; Boone and Raman, 2001). Investment in intangible assets is associated with greater information asymmetry than investment in tangible or financial assets because, first, of its relative uniqueness or idiosyncrasy (Aboody and Lev, 2000; Lev, 2001). For example, a failure of a drug development program to pass the required phases of clinical trials in a particular firm is a unique event not shared by other pharmaceutical firms. Consequently, this leads to the difficulties for outsiders to assess the productivity and value of the firm's intangible assets based on the performance and products of other firms within the same industry, thus contributing to information asymmetry.

Further, the absence of an active or liquid market for intangible assets leads to greater information asymmetry. This is mainly because while information in relation to tangible and financial assets values at firm level can be obtained or estimated from market prices of these assets, there is no direct price-based information on firm-specific changes in the value and productivity of intangible assets. As a result, specialised knowledge is often required to assess their potential success (Givoly and Shi, 2008). Apart from that, accounting practices that limit the recognition of intangible assets also contribute to greater information asymmetry for these assets. As discussed earlier, while investors are periodically informed about changes in the values of most tangible and financial assets, investments in intangible assets are uniformly expensed in the financial statements. As a result, no or limited information

is provided about changes in productivity and values of intangible assets to outsiders (Givoly and Shi, 2008).

Information asymmetry leads to adverse selection problems for investors in which they cannot differentiate the most relevant information as well as the quality of the information that represent the firm's activities (Akerlof, 1970). Prior studies also suggest potential harmful consequences of information asymmetry in general and with regards to intangible assets in particular to include high cost of capital, high transaction costs and lower liquidity for trading shares of the firm, systematic undervaluation of intangible assets, inefficient investment decisions, increased expectations of bankruptcy costs, insider gains, deteriorating usefulness of financial statements as well as manipulation of financial information (Myers and Majluf, 1984; Diamond and Verrecchia, 1991; Bartov and Bodnar, 1996; Aboody and Lev, 1998; Tsai, 2008).

The problem of information asymmetry is addressed by signalling theory (Watts and Zimmerman, 1986). The theory illustrates how this asymmetry can be reduced by the party with more information signalling it to others (Morris, 1987; Healy and Palepu, 1993). It is argued that accounting provides an avenue through which managers disseminate privately held information and that accounting choice plays a key role in that communication process (Holthausen and Leftwich, 1983; Watts and Zimmerman, 1990; Fields et al., 2001). Fields et al. (2001), for instance, state that accounting choice may provide a mechanism by which better informed insiders can impart information to less well-informed parties about the timing, magnitude and risk of future cash flows. Nonetheless, the problem of information asymmetry, combined with the discretion in accounting choice also provides incentives for managers to act opportunistically and gain private benefits at the expense of shareholders (Watts and Zimmerman, 1990; Subramanyam, 1996; Cahan, Liu and Sun, 2008). This basically suggests the conflicting arguments to allowing managerial discretion in accounting for intangible assets (Abrahams and Sidhu, 1998; Fields et al., 2001; Godfrey and Koh, 2001). On the one hand, managers are argued to choose

accounting policies to communicate their private information to investors about the firm's value, hence, reducing the problem of information asymmetry (efficient signalling argument). On the other hand, managerial discretion in relation to the recognition of intangible assets can result in opportunistic manipulation of earnings that does not reflect the firm's actual economic performance.

The practice of immediate expensing internally generated intangible assets generally leads to the difficulty of estimation and the high uncertainty of future benefits. This creates ambiguity among investors about the value of intangible assets, thus increasing the information gap between management and investors. Thus, it has been suggested that if the proportion of total investment that is intangible in nature is reported, then the uncertainty associated with the firms' assets and sources of expected earnings and, consequently, the level of investors' investment risk, is more readily determinable (Hunter et al., 2005). Diamond and Verrecchia (1991), for example, show that by revealing information to reduce information asymmetry, firms can reduce their costs of capital by attracting increased demand from investors. Thus, it can be argued that greater information disclosure through the recognition of intangible assets can reduce the problem associated with information asymmetry which, in turn, reduces the firm's cost of capital.

Mohd (2005) finds that the introduction of a standard for accounting for software development costs SFAS No. 86 by the FASB, which provides an exception to the U.S. GAAP requirement of the immediate expensing of R&D costs, reduces information asymmetry and, consequently, the cost of capital. Specifically, the findings indicate that following the introduction of SFAS No. 86, information asymmetry decreased for software firms relative to that of other high-technology firms. Moreover, within the software industry, information asymmetry is found to be significantly lower for firms that choose to capitalise than firms that choose to expense software development costs. It is argued that capitalisation of software development costs reduces investors' uncertainty about the future benefits of these costs. Similarly, Givoly and Si (2008) show that capitalising software development

costs reduces information asymmetry, resulting in a lower cost of capital, and significantly reduces IPO underpricing.

Nonetheless, signalling actions undertaken by firms are costly as the costs associated with more disclosure as well as disclosing imprecise information can outweigh the benefits. These include audit fees, undesirable consequences on share price, potential risk of litigation brought by investors if expected future benefits are not realised and the loss of competitive advantage due to disclosure of proprietary information. Therefore, this implies that in their attempts to maximise firm value, managers will choose accounting methods, from the set available, that reduce information asymmetry only to the point where the expected benefit of the choice is offset by the expected costs of making the choice (Bartov and Bodnar, 1996).

However, the recognition of intangible assets is not the only mechanism that can be used by managers to convey inside information about the expected future benefits of intangible investment. Additionally, managers can also signal their information through voluntary disclosure (Verrecchia, 2001). Voluntary disclosure, however, is not as informative as recognition for two reasons. First, recognised amounts in the financial statements are subject to auditor scrutiny, while voluntary disclosures are not, which lends more credibility to recognition (Tutticci, Krishnan and Percy, 2007). Second, it is more costly for investors to extract useful information from voluntary disclosures than from recognised amounts of intangible assets (Mohd, 2005). Barth, Clinch and Shibano (2003) state that sophisticated investors with accounting expertise can extract information from disclosures at a lower cost, thus gaining an informational advantage over unsophisticated investors. Therefore, it is argued that voluntary disclosures may not necessarily eliminate information asymmetry resulting from the failure to recognise intangible assets (Mohd, 2005). Taken as a whole, it can be argued that providing managers with some discretion in accounting for intangible expenditures potentially facilitates the reduction of information asymmetry between managers and investors.

However, as mentioned earlier, allowing greater discretion for managers, particularly in the presence of high information asymmetry, is also argued to promote opportunistic behaviour. The managerial opportunism argument starts from a different premise from the signalling theory that managers act not to maximise shareholder wealth but, instead, to maximise their own (Fried, 2001). Most prior studies view accounting choice as a function of managers' incentives to behave opportunistically, given contracts in place (Dhaliwal, 1980; Smith and Watts, 1992; Gaver and Gaver, 1993; Skinner, 1993). Based on agency theory, the contracts are assumed to ensure that agents act in the best interest of the principal in which accounting numbers are frequently utilised to monitor and regulate the contracts. Thus, these contracts create incentives for managers to select accounting policies that increase future earnings in their attempts to increase compensation or avoid covenants (Watts and Zimmerman, 1986). It is argued that this is likely because it is costly for shareholders and debt holders to evaluate these accounting policies (Watts and Zimmerman, 1978). For example, Skinner (1993) finds that larger firms are more likely to choose income-decreasing accounting methods, whereas more highly leveraged firms and firms with accounting-based bonus plans are more likely to choose income-increasing accounting methods. This suggests that there is a tendency for managers to choose and to apply accounting methods as a means to mitigate contractual restrictions on their behaviour and maximise personal welfare.

Similarly, in the context of intangible assets, Cazavan-Jeny and Jeanjean (2006) propose that considerable discretion in the recognition of the assets creates an opportunity for managers to engage in earnings management, which consequently may impair the reliability of financial statements. Studies conducted in relation to intangible assets find evidence consistent with the managerial opportunism argument in the recognition of the assets (Dhaliwal et al., 1999; Percy, 2000; Wyatt, 2005; Cazavan-Jeny and Jeanjean, 2006; Oswald, 2008). Specifically, the findings indicate that more highly leveraged, smaller and less profitable firms and firms with less growth opportunities and high earnings variability have a greater tendency to recognise intangible assets. Further, Cazavan-Jeny and Jeanjean (2006) find a

negative association between recognised intangible assets and share prices and argue that the evidence suggests investors' beliefs in the use of accounting choice of capitalisation to manage earnings. Therefore, it can also be argued that managerial choice to recognise intangible assets can enhance managerial wealth because managers have superior information regarding the value of the firm's intangible investments as well as the discretion regarding the amount and timing of the information conveyed to the market.

This discussion reveals the two-sided arguments for the recognition of intangible assets. To date, this particular issue remains highly debated and unresolved, indicating the importance of further research in this area.

2.5 Accounting for Intangible Assets in Australia

This section provides a discussion on the developments that have been taking place in Australia in relation to accounting practices for intangible assets. It is divided into two sub-sections; the period before and the period after the adoption of AIFRS in 2005. The objective of this section is to demonstrate why Australia provides an interesting accounting regulatory setting to investigate the effect of different accounting treatments for intangible assets and, hence, to contribute to existing literature on value relevance.

2.5.1 The Pre-AIFRS Period

The first Australian accounting standard issued relating specifically to intangible assets (albeit only to goodwill) was AAS 18 *Accounting for Goodwill*, which was issued in March 1984 to operate for accounting periods ending on or after 31 March 1985. Australian companies had previously adopted a wide variety of accounting treatments for goodwill before the introduction of AAS 18 (Wines and Ferguson, 1993). The standard required, among other things: (1) a mandatory amortisation of goodwill over the expected period of benefit but not exceeding 20 years on a

straight-line basis; (2) the balance of goodwill to be reviewed annually and written down to the extent that future economic benefits are no longer probable; and (3) prohibited the recognition of internally generated goodwill. Although the introduction of the goodwill standard increased the number of Australian companies systematically amortising goodwill, there was still a significant degree of non-compliance (Carnegie and Gibson, 1987).

ASRB 1013 *Accounting for Goodwill* was later introduced, which had statutory backing and applied to companies reporting in financial periods ending after 18 June 1988. This approved accounting standard however, had similar contents to the previous standard, AAS 18. These standards dichotomised intangible assets into unidentifiable and identifiable assets, with goodwill being defined as an unidentifiable asset. Both standards presumed separate recording for identifiable intangible assets, but were silent on the accounting treatment to be applied to such assets. As a result, the recognition of identifiable intangible assets was purely voluntary (Wyatt et al., 2001; Ritter and Wells, 2006).

The voluntary recognition and disclosure of identifiable intangible assets by Australian firms can be traced back to the early 1970s (Wines and Ferguson, 1993). However, the recognition and disclosure became increasingly common in the period surrounding the issue of AAS 18 in 1984 and ASRB 1013 in 1988. With the introduction of ASRB 1013, many companies sought to minimise the impact of the requirement for the amortisation of goodwill and this was achieved by recognising identifiable intangible assets, thereby reducing the amount that would otherwise have been recorded as goodwill. The AARF later issued an exposure draft, ED 49, in 1989 in an effort to develop an accounting standard on identifiable intangible assets. ED 49 advocated that recorded identifiable intangible assets be amortised to the profit and loss account over a finite period. However, this proposed standard was regarded as controversial and due to the lack of consensus on the subject at both national and international level, the AARF was forced to withdraw it in 1992 (Wines and Ferguson, 1993).

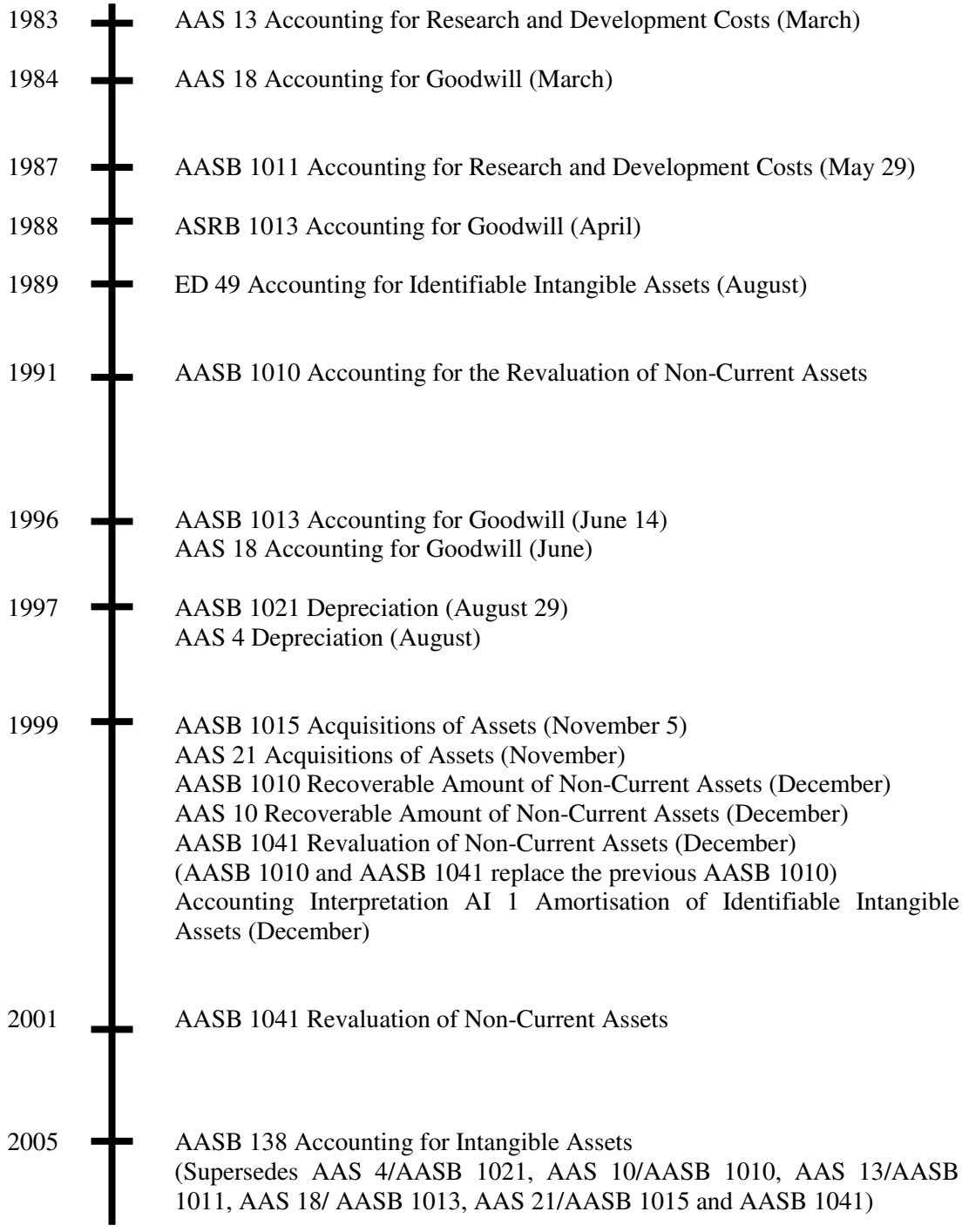
Hence, prior to 2005 there was no single standard governing the accounting treatment for intangible assets in Australia but, rather, there was a number of standards related to the treatment of intangible assets, which were AASB 1013 *Accounting for Goodwill*, AASB 1011 *Accounting for Research and Development Costs*, AASB 1015 *Acquisitions of Assets*, AASB 1021 *Depreciation*, AASB 1010 *Recoverable Amount of Non-Current Assets* and AASB 1041 *Revaluation of Non-Current Assets*. Figure 2.2 illustrates the time line for the adoption of standards related to intangible assets in Australia.

It is also important to note that because of the absence of a specific standard guiding the accounting for intangible assets, firms under this reporting regime had a wide discretion to recognise the identifiable intangible assets, both acquired and internally generated, at cost or value, and employed different accounting practices after initial recognition (Goodwin and Ahmed, 2006). Furthermore, during this period Australian firms had the option to revalue non-current assets upwards to fair value. Wyatt (2002) argues that revaluation was the accounting method used to bring internally generated intangible assets on to the balance sheet. These practices were in major contrast with the accounting practices allowed under the U.S. GAAP, that have adopted a rather restricted approach in the recognition of identifiable intangible assets. Interestingly, Ritter and Wells (2006) claim that despite the varying accounting practices there is no empirical evidence of widespread opportunistic management behaviour.

Concerns about the availability of reliable measures in relation to revalued assets and capitalisation of intangible assets are among major reasons for the U.S. GAAP to proscribe these practices generally (Wyatt, 2002). The FASB and the U.S. Securities and Exchange Commission (SEC), in fact, have maintained a strict immediate expense policy for most internal expenditures of an intangible nature including R&D costs.

Figure 2.2

The Adoption of Accounting Standards Relating To Intangible Assets in Australia



For example, according to SFAS No.2 *Accounting for R&D Costs,* all R&D costs should be written off immediately at the time they are incurred. Since 1985, one exception to the immediate expense policy is software development costs which can be capitalised according to a 'technical feasibility' test under SFAS No. 86. Thus, it appears that during this period, while the recognition of internally generated intangible assets under the U.S. GAAP is limited to certain software development costs, there was no such limit under Australian GAAP. Another difference between these two accounting jurisdictions is that while Australian GAAP permitted the revaluation of identifiable intangible assets, this was not permitted under U.S. GAAP.

Furthermore, up until 2001, U.S. GAAP required identifiable intangible assets to be amortised over a maximum period of forty years, while there was no such limit under Australian GAAP. In June 2001, a new standard on intangible assets, SFAS No. 142 *Goodwill and Other Intangible Assets* was issued that also prohibits the recognition of internally generated identifiable intangible assets including internally generated goodwill.

2.5.2 The Post-AIFRS Period

The implementation of International Financial Reporting Standards (IFRS) by countries in the European Union and certain countries in the Asia-Pacific region from 2005, is intended to increase the comparability of accounting standards and regulations and to enhance the quality and usefulness of financial statements. In a move towards the adoption of AIFRS, AASB 138 *Intangible Assets*, which is equivalent to IAS 138 *Intangible Assets*, was issued on 15 July 2004. This standard applies to annual reporting periods beginning on or after 1 January 2005. It mirrors the requirements in IAS 38 with regards to the recognition and measurement of purchased goodwill, identifiable intangible assets and internally generated goodwill and intangible assets.

A summary of accounting practices in Australia with regards to intangible assets before and after the introduction of AIFRS is illustrated in Table 2.1 and full details of the requirements are presented in Appendix 1. The adoption of AIFRS has fundamentally changed Australian accounting practices especially for identifiable intangible assets as it is more restrictive with respect to asset recognition and measurement (Ritter and Wells, 2006; Chalmers, Clinch and Godfrey, 2008).

From Table 2.1, it appears that the major changes imposed by this new accounting regime in relation to intangible assets are as follows:

1. accounting for goodwill shifted from an amortisation regime to an impairment regime;
2. capitalisation of research expenditure is prohibited and it must be expensed as incurred;
3. certain internally generated intangible assets can no longer be capitalised and must be derecognised;
4. revaluations of identifiable intangible assets are permitted only if an active and liquid market exists; and
5. impairment testing is required for intangible assets at least annually.

Ritter and Wells (2006) argue that with the implementation of AASB 138 requirements, the practice of recognising identifiable intangible assets by Australian firms would be greatly diminished. The above discussion suggests that Australia provides an interesting regulatory setting in which to investigate the relative merits of alternative methods in accounting for intangible assets because of the substantial differences in accounting practices in the pre- and post-AIFRS period.

Table 2.1

Summary of Accounting Regulations for Intangible Assets: The Pre- and Post-AIFRS Period

Intangible asset categories	Pre-AIFRS Period	Post-AIFRS Period
Purchased goodwill	AASB 1013 Accounting for Goodwill AASB 1015 Acquisitions of Assets **Recognition** • Recognised at cost **Useful life and amortisation** • Amortised on a straight-line basis over a period not exceeding 20 years **Measurement subsequent to recognition** • Upward revaluation is prohibited	AASB 3 Business Combination AASB 138 Intangible Assets **Recognition** • Recognise at cost **Useful life and amortisation** • No amortisation required **Measurement subsequent to recognition** • Annual impairment test
Internally generated goodwill	AASB 1013 Accounting for Goodwill **Recognition prohibited**	AASB 138 Intangible Assets **Recognition prohibited**
Research and development	AASB 1011 Accounting for Research and Development Costs AASB 1010 Recoverable Amount of Non-Current Assets **Recognition** • Expensed as incurred unless the future economic benefits were expected beyond reasonable doubt to be recoverable **Useful life and amortisation** • Deferred research and development costs amortised **Measurement subsequent to recognition** • Recoverable amount test	AASB 138 Intangible Assets AASB 3 Business Combination **Recognition** • Acquired – recognise at cost • Internally generated » Expenditures are classified into a research phase and development phase » Research phase - expensed as incurred » Development phase - only recognise if certain conditions are satisfied. » Recognition of specific internally generated intangible assets such as brands, mastheads, publishing titles, customer lists and similar items are prohibited **Useful life and amortisation** • Intangible assets will have either finite or indefinite useful life • Finite useful life - amortised on a systematic basis over its useful life • Indefinite useful life – annual impairment test **Measurement subsequent to recognition** Cost model or revaluation model.

2.6 Summary

This chapter has provided a framework for understanding intangible assets through the discussion of the definition, classification, economic characteristics and reporting of these assets. In particular, this chapter has established that intangible assets represent an important value driver of firms' growth, success and survival in today's modern economy. Despite their increasing importance, accounting for intangible assets is often difficult largely due to the mismatch between their economic characteristics such as inherent uncertainty, partial excludability and non-separability and the asset definition and recognition criteria of current financial reporting models.

However, there are concerns that the under-recognition of intangible assets can have adverse effects on the value relevance of information provided in financial statements which, consequently, can impact users' decisions. The debate on the measurement and reporting of intangible assets, especially those that are internally generated, remains despite the efforts undertaken by relevant parties to deal with this controversial issue. This chapter has shown how the different requirements in the pre- and post-AIFRS periods in Australia provide a unique and interesting setting upon which to investigate further the effect of different accounting treatments for intangible assets on the value relevance of these assets.

In Chapter 3, a review of the literature with regards to value relevance studies will be provided. This includes an overview on value relevance studies, the link between intangible assets and value relevance, the value relevance of accounting choice for intangible assets as well as the effects of the adoption of IFRS on the value relevance intangible assets.

CHAPTER 3

A REVIEW OF THE LITERATURE: VALUE RELEVANCE STUDIES

3.1 Introduction

The main purpose of this chapter is to place this study in context and to inform the study by providing a review of the relevant literature on the value relevance of accounting information in general and intangible assets in particular. In order to do so, first, the definition of value relevance, the importance of value relevance studies and an overview of value relevance models will be discussed. Second, the claims that traditional financial statements are losing relevance will be addressed by reviewing empirical studies concerning the trends in the change of value relevance of accounting information. Third, a discussion on the link between intangible assets and value relevance of accounting information will be presented. This is followed by a review of the literature on the relevance of accounting choice on intangible assets. Finally, a discussion on the possible impacts of AIFRS adoption in Australia on the value relevance of intangible assets will be provided.

3.2 Value Relevance: An Overview

In this section, a general overview of the definition of value relevance, the importance of value relevance research and the commonly used valuation models will be presented. This is to assist in understanding the terminologies and tests used in relation to value relevance studies in subsequent discussions.

3.2.1 Definition of Value Relevance

Although the literature examining the association between accounting data and equity market values has its roots in seminal papers such as Miller and Modigliani (1958), Beaver (1968) and Ball and Brown (1968), the term 'value relevance' in the context of information content of accounting numbers was first introduced by Amir, Harris and Venuti (1993). Following this, subsequent studies have used the term value relevance in reference to the ability of accounting numbers in the financial statements to explain or capture information that affects firm value (see, for example, Collins, Maydew and Weiss, 1997; Francis and Schipper, 1999; Hung, 2001).

The tests of value relevance are performed with the purpose of assessing the characteristics of accounting numbers, primarily, relevance and reliability, as reflected in their association with firm value (Barth, 2000). The nature of the tests suggests that a measure of value is needed. Extant finance and accounting literature such as Ball and Brown (1968) and Beaver (1968) provide evidence of stock market efficiency in processing publicly available information. Publicly available information refers to all information available in the public domain about the firm that is perceived by investors to be relevant in determining firm value (Barth, 2000). Thus, equity market values such as share prices and returns have become the most common measure of firm value used in financial reporting research. Further, the use of equity market values is attractive because, although the market is not totally efficient in processing the valuation implications of all publicly available information, these values reflect the consensus belief of investors (Barth, 2000; Barth et al., 2001).

An accounting number is considered to be value relevant if it is significantly associated with equity market values (Ohlson, 1995; Lo and Lys, 2000; Barth et al., 2001) and this number can be measured with some degree of reliability (Barth, 2000). Furthermore, Lev and Zarowin (1999) outline two main advantages of using

the statistical associations between accounting numbers and equity market values to assess the usefulness of financial information to investors. First, the associations reflect the consequences of investors' actions rather than just their opinions and beliefs which are typically estimated on the basis of questionnaires and interviews. Second, the empirical associations also allow for an assessment of the incremental usefulness of the accounting data relative to other information sources, such as managers' voluntary disclosures and analysts' recommendations. Moreover, it is argued that alternative methods such as interviews and prediction studies in which usefulness is assessed in terms of predictive power generally do not compare the usefulness of accounting data with other information sources.

Based on the above discussion, a similar definition of value relevance is adopted in this study. Specifically, accounting information examined in this study is deemed to be value relevant if it is significantly associated with equity market values.

3.2.2 The Relevance of Value Relevance Research

Despite the increasing volume of research on value relevance, there have been some conflicting views with regards to its contribution. Holthausen and Watts (2001) and Kothari (2001), for example, argue that value relevance research provides limited insights for financial accounting standard setting. Kothari (2001) highlights that the main problem is that existing value relevance studies address the empirical relationship between accounting numbers and stock market values without drawing standard setting inferences. Specifically, most studies fail to specify the objective of standard setting and how using the association criterion between accounting numbers and common equity valuations helps standard setters achieve that objective.

Similarly, Holthausen and Watts (2001) maintain that the theories underlying value relevance studies are not descriptive or adequately specified. For example, most value relevance studies effectively assume that the primary role of accounting from a standard setter's perspective is equity valuation, regardless of the chosen theories of

accounting and standard setting. Holthausen and Watts (2001) also argue that other factors such as conservatism and contracting that influence accounting practices are not taken into consideration in the underlying theories used in the value relevance literature. The combination of these two factors, the literature's concentration on the role of accounting in equity valuation to the exclusion of its other roles and the failure to incorporate or investigate other forces that affect the form and content of accounting, impedes the development of a descriptive theory that is useful to standard setters. Finally, it is argued that even if those underlying theories are descriptive, the literature would still fail to meet its objectives due to the deficiencies in the valuation models used (Holthausen and Watts, 2001). This leads them to believe that the value relevance literature has little impact on standard setting.

However, Barth et al. (2001) point out that to conclude that value relevance research offers no or little insight for standard setting on the ground that the theories of accounting and standard setting underlying the value relevance literature are not descriptive is a misconception. It is argued that these theories are communicated by accounting standard setters in their conceptual frameworks such as in the statements of accounting concepts (Barth et al., 2001). For example, the FASB's criteria for evaluating accounting amounts are articulated in SFAC No. 5. Thus, value relevance studies need only to operationalise the criteria using well-accepted valuation model, and not determine them.

As discussed earlier, tests of value relevance assume that share prices reflect investors' consensus beliefs. With this assumption, resulting inferences relate to the extent to which the accounting information under study reflects the information implicitly assessed by investors as reflected in equity values. Nonetheless, it is important to remember that while an association with accounting numbers and equity values indicates the extent to which the information contained in financial statements is consistent with that used by investors, such an association test, of course, cannot indicate whether the investors actually used the information in assessing security values (Aboody and Lev, 1998). This basically suggests that accounting information

will be value relevant or, as defined in value relevance research, has a predicted significant relationship with equity values, only if the information is deemed useful to investors in valuing the firm and is measured reliably enough to be reflected in equity values.

As a result, value relevance literature should not be viewed as, and intended to be, sufficient input for standard setting. It is, instead, designed to provide evidence to accounting standard setters that can up-date their prior beliefs about how accounting amounts are reflected in equity market values and, thus, can inform their deliberations on accounting standards. As emphasised by Lev and Ohlson (1982), the issue of valuation by fundamental variables is obviously of significant importance from a policy point of view. For example, in the evaluation of marginal contribution of accounting in general, and the specific amount, in particular, relative to other information sources, to determining capital values. In other words, value relevance research in general "aims to inform standard setters, not to make policy recommendations regarding the selection of particular rules" (Barth, 2000, p. 8).

Further, Barth et al. (2001) argue that a primary focus of financial statements is equity investment and that other uses of financial statement information, such as contracting, do not diminish the importance of value relevance research. Most studies investigate financial reporting issues from an investor perspective and adopt valuation approaches for two main reasons (Barth, 2000). First, because investors represent a large class of financial statement users, most research addressing financial reporting issues relevant to practising accountants, particularly standard setters, adopts an investor perspective. Hence, valuation is considered a key input to and a key output of investors' decisions because they are interested in information that can help them assess firm value and, consequently, make informed investment choices. Second, the large and well developed academic literature relating to valuation provides researchers with a solid base upon which to build research designs.

Finally, with regards to the argument that value relevance research omits important characteristics of accounting studies such as conservatism (Holthausen and Watts, 2001), Barth et al. (2001) argue that existing valuation models such as the Ohlson (1995) model and its refinements provide a basis to assess the empirical implications of accounting conservatism. Furthermore, studies on the value relevance of fair value estimates and intangible assets, for example, in which managerial accounting discretion or choice is a highly debated issue, can be viewed as examining conservatism in accounting.

3.2.3 Valuation Models: A Brief Overview

Existing value relevance studies use various valuation models to structure tests. As mentioned earlier, these tests typically use equity market values as the valuation benchmarks to assess how well particular accounting amounts reflect information used by investors and often focus on the coefficients of the accounting amounts in the estimation equation (Barth et al., 2001). In general, value relevance literature relies on valuation models based on the transformed dividend-discount model such as the earnings capitalisation model and the Ohlson (1995) model, as well as the ad hoc balance sheet model (Kothari, 2001; Holthausen and Watts, 2001).

This section presents a brief overview of the models typically used in previous studies to assist readers' understanding in later discussion on the tests used in value relevance studies.

3.2.3.1 The Dividend-Discount Model

The dividend-discount model provides a foundation upon which subsequent alternative valuation models were developed. In this model, share price is defined as the present value of expected future dividends discounted at their risk-adjusted expected rate of return. The model can be expressed as follows:

$$P_t = \frac{\sum_{k=1}^{\infty} E_t[D_{t+k}]}{\prod_{j=1}^{k}\left(1+r_{t+j}\right)}$$

where:

P_t = share price at time *t*;

$\sum$ = summation operator;

$E_t[D_{t+k}]$ = market's expectation of the value of future dividends in period $t + k$;

$\prod$ = product operator;

r_{t+j} = risk-adjusted discount rate that reflects the systematic risk of dividends in period $t + j$.

To express the model in terms of accounting amounts, one must posit a link between expected future dividends and accounting amounts (Barth, 2000). The model can then be used to test theories about the valuation relationship (for example, the estimation of the cost of capital) or to learn about the characteristics of the accounting amounts (for example, test of value relevance of accounting information).

3.2.3.2 The Earnings Capitalisation Model

In the earnings capitalisation model (also known as the returns model), stock returns or the equity values are typically regressed on: (1) earnings and/or changes in earnings; or (2) earnings components and/or changes in earnings components. The basic form of the earnings model can be expressed as follows:

$$R_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$$

where:

R_t = stock return at time *t;*

E_t = level of earnings (before extraordinary items) at time *t;*

ΔE_t = change in earnings (before extraordinary items) at time *t;*

ε_t = error term.

Using this model, evidence of earnings value relevance is reflected in the explanatory power of the ordinary least squares (OLS) regression model (R^2) and the earnings response coefficient (ERC). The ERC is defined as the sum of the slope coefficients on earnings level and change (α_1 and α_2). The R^2 indicates the relative ability of earnings numbers to explain market returns while the ERC indicates the average change in returns associated with a one-dollar change in earnings. A low ERC indicates that reported earnings are not particularly informative to investors, most likely because they are perceived as being transitory or subject to managerial manipulation. A high ERC on the other hand suggests that a large stock price change is associated with reported earnings, reflecting investors' beliefs that earnings are largely permanent (Lev and Zarowin, 1999).

3.2.3.3 The Ohlson (1995) Model

The Ohlson (1995) model provides a direct link between accounting amounts and firm value, thus making the model the most pervasive valuation model in accounting research today (Barth, 2000; Kothari, 2001). Based on the dividend-discount model, share price is written as a linear function of contemporaneous equity book value and the present value of expected future abnormal earnings. The model can be written as follows:

$$P_t = \alpha_0 + \alpha_1 BV_t + \alpha_2 AE_t + \alpha_3 v_t + \varepsilon_t$$

where:

P_t = share price (or market value of equity) at time *t;*

BV_t = book value of equity at time *t;*

AE_t = abnormal earnings at time *t;*

v_t = other value-relevant information useful in predicting future abnormal earnings;
ε_t = error term.

A significant association between the accounting number of interest and share price provides an indication that the information is valued by investors, suggesting it is value relevant.

3.2.3.4 The Balance Sheet Model

The balance sheet model expresses price or the market value of equity as a function of the values of the firm's assets and liabilities (Landsman, 1986; Barth, 1991; Holthausen and Watts, 2001). Asset and liability values are the present value of the expected dividends or cash flows, associated with the underlying rights and obligations (Barth, 2000). This model can be expressed as:

$$MVE_t = MVA_t + MVL_t$$

where:
MVE_t = market value of equity at time *t;*
MVA_t = market value of assets at time *t;*
MVL_t = market value of liabilities at time *t.*

The book values of assets and liabilities are usually used as proxies for asset and liability values in value relevance literature. However, these accounting assets and liabilities do not fully reflect the true value of all assets and liabilities, such as potential synergies and other intangibles that represent firm value (Barth and Landsman, 1995; Kothari, 2001). Consequently, this requires careful consideration of the components of assets and liabilities that might be omitted from this model and which additional variables should be included to ensure the inferences obtained from estimating the equation are not confounded (Barth, 2000). In addition, Kothari (2001) highlights that the balance sheet model is usually augmented to include

earnings as an additional variable which makes it empirically identical to the transformed dividend-discount model.

3.3 The Value Relevance of Accounting Information

In this section, studies in relation to the trends in the change of the value relevance of key accounting information or, more specifically, earnings and book values, are reviewed. This review is crucial mainly due to the widespread claims that historical cost financial statements have lost their relevance particularly over the past decades following the rapid changes in the business environment (see, for example, Rimerman, 1990; Sever and Boisclair, 1990; Amir and Lev, 1996; Lev, 2001).

In order to provide empirical evidence for the claims that the traditional financial statements have lost their relevance, Collins et al. (1997) investigate the systematic changes in the value relevance of earnings and book values over a 41-year period from 1953 to 1993. Utilising the Ohlson (1995) model, they estimate the yearly cross-sectional regressions over the period studied and use the R^2 for the pooled cross-sectional time-series regression to determine the changes in the value relevance of earnings and book values over time. The incremental relevance of both earnings and book values over the period studied are examined by decomposing the combined explanatory power of earnings and book values into three components; the incremental explanatory power of earnings, the incremental explanatory power of book values and the explanatory power common to both earnings and book values. They find that the combined value relevance of earnings and book values has not declined over the period studied but appears to have increased slightly. Based on these findings, they suggest that it is premature to conclude that traditional financial statements have lost value relevance. However, when analysed separately, the findings show that the incremental value relevance of earnings has, in fact, declined over time, having been replaced by an increase in the incremental value relevance of book values.

Francis and Schipper (1999) also investigate the value relevance of financial statements by empirically testing all firm-year observations with available *CRSP* and *Compustat* data over a period of 43 years (1952 to 1994). Two main measures are used in that study to operationalise value relevance. The first measure is the market-adjusted returns that could be earned from foreknowledge of financial statement information, which they term the 'portfolio return test'. This particular test indicates whether investments based on information in financial statements earn progressively less over time. The second measure is the contemporaneous association between market value and accounting information which includes the earnings, the balance sheet and the Ohlson (1995) models.

The overall findings provide mixed evidence for the claim of decreasing value relevance of financial statements, depending on the method used. Specifically, both the portfolio return and earnings tests suggest that there has been a decline in the value relevance of earnings. The balance sheet and the Ohlson (1995) tests, on the other hand, reveal contradictory results. Instead of a decline, the results show an increase in the magnitude of relevance of approximately 57% and 15.5% over the sample period for book values and combined book values and earnings, respectively. This suggests that the results could be sensitive to the measurement approaches used. Nonetheless, it is interesting to observe the relative consistency of some of the findings with the previous study by Collins et al. (1997) considering the fact that this study covers the same time period.

Similarly, Ely and Waymire (1999a) investigate earnings relevance for the valuation of NYSE common stocks. However, the study is conducted over a much longer time period of 67 years from 1927 to 1993. During the period studied, two important events took place in the U.S. accounting standard setting environment that could potentially lead to enhanced accounting information quality. The first event was the empowerment of the Committee on Accounting Procedure (CAP) in 1939 as the first U.S. standard setting body. The second event was the subsequent reorganisations of the standard setting process that led to the establishment of, first, the Accounting

Principles Board (APB) in 1959 until 1973 and, later, the FASB in 1973. Consistent with previous studies, the earnings model and the Ohlson (1995) model are employed to measure value relevance of accounting information.

The findings of both tests provide no support for significantly higher earnings relevance after either the empowerment of CAP in 1939 or the subsequent reorganisations in the U.S. standard setting process that created both the APB and the FASB. The findings based on the Ohlson (1995) model suggest that there is an increase in the combined relevance of earnings and book values during the tenure of the FASB compared to that of the APB. Nevertheless, this is primarily attributable to the abnormally low combined relevance during the APB's tenure rather than abnormally high combined relevance in the FASB era. The results also indicate no significant difference in the combined relevance of earnings and book values between the FASB era and both the pre-CAP and CAP eras. Based on these findings it can be seen that although no decline in value relevance is documented during the period studied, there is no significant increase in the value relevance of earnings and book values either.

In contrast to previous studies, Lev and Zarowin (1999) examine the change in the value relevance of financial information using more recent data and a shorter period of 19 years from 1978 to 1996. Despite the use of similar tests of value relevance, the earnings and the Ohlson (1995) models, they find evidence of declining usefulness of earnings, book value and cash flows over the period studied. More recently, Cortijo, Palmon and Yezegel (2009) also find support for the findings of Lev and Zarowin (1999). Specifically, by employing the Ohlson (1995) model and a sample of 164,545 firm-year observations over a period of 51 years (1953 to 2003), they document a strong downward trend in the value relevance of both earnings and book values.

Following these studies, Goodwin and Ahmed (2006) investigate whether the claims of declining value relevance of financial information under the U.S. GAAP hold in

an Australian setting. The sample used in that study consists of 12,919 firm-year observations over a period of 25 years (1975 to 1999) with the earnings model and the Ohlson (1995) model used in the tests of value relevance. Their initial results suggest that earnings value relevance has declined over the period studied. However, after controlling for losses, they find only weak evidence of decline in earnings value relevance for the average Australian firm.

Brimble and Hodgson (2007) examine the longitudinal value relevance of key accounting information of Australian firms based on a sample of 3,563 firm-year observations over a period of 28 years (1973 to 2001). In keeping with previous studies, the Ohlson (1995) model is utilised to examine the value relevance of earnings, book values and the combination of earnings and book values. They hypothesise that since firm conditions, competitive and economic structures as well as business culture vary significantly in a global sense, there is no compelling reason to assume that the U.S. results will also hold in Australia. The authors extend prior studies in two ways: (1) by controlling for transitory factors in the accounting information using a non-linear model specification more accurately to reflect economic reality; and (2) by controlling future information in the stock price time series or market inefficiencies in the models. In contrast to the findings in Goodwin and Ahmed (2006), the overall results reveal that the value relevance of earnings has not significantly declined but has remained stable over time. Similarly, the value relevance of book values is found to remain relatively stable over the period studied. Further, the findings also indicate that book values do not have as high a predictive power as earnings and are lower than in comparable studies in the U.S. This leads Brimble and Hodgson (2007) to conclude that book values have never been a strong indicator of value in Australia and continue to be weakly relevant.

Overall, the review of the studies in this section indicates inconsistent evidence with regard to the trends in the change of the value relevance of key accounting information. The general consensus from the studies conducted in the U.S. is that the loss in value relevance is concentrated in the earnings components. However, studies

conducted in a different accounting regulatory framework such as Australia provide weak or no support for the claims of declining earnings value relevance. However, whether there has been a loss in the value relevance for balance sheet information is more debatable. It appears from the discussion that while some studies found the declining earnings relevance to be replaced by increasing relevance of book values (Collins et al., 1997; Francis and Schipper, 1999), other studies found book values to be losing relevance (Lev and Zarowin, 1999; Cortijo et al., 2009) or relatively irrelevant (Brimble and Hodgson, 2007).

3.4 Intangible Assets and the Value Relevance of Accounting Information

Early value relevance studies (for example, Amir and Lev, 1996; Lev and Sougiannis, 1996; Collins et al., 1997; Lev and Zarowin, 1999) attribute the documented decline in the value relevance of financial information to the inadequate treatment of intangible assets particularly given the dramatic change in the business environment and the increasing importance of intangible investments. As discussed in Chapter 2, change in firms' operations and economic conditions is driven primarily by innovation, mostly in the form of investment in intangible assets such as R&D, information technology, brands, patents and human resources. Nevertheless, due to the mismatch between the economic characteristics of these assets and accounting principles, this impact is not sufficiently captured by the current financial reporting systems.

The effects of the treatment of intangible assets, or the lack thereof, on the value relevance of key financial information have been investigated using various methods. For example, in some studies indirect tests are performed, particularly in an accounting regime that does not allow for the capitalisation of intangible assets, by focusing on the financial statements of intangible-intensive firms (or industries). Meanwhile, in an accounting regime where the capitalisation of intangible assets is

possible, studies that concentrate directly on the effect of accounting choice for intangible assets on the value relevance of accounting information are conducted.

In one of the earliest studies on the effect of intangible assets on the value relevance of accounting information, Amir and Lev (1996) examine the value relevance of earnings, book values and cash flows of independent cellular telephone firms. They argue that given the fast-changing, science-based nature of the cellular communications industry, accounting information of these firms is of limited value to investors. This is mainly because despite heavy investment in intangible assets, such investments are either fully expensed in financial reports or arbitrarily amortised. Consequently, while significant market values are created via production and investment activities, key financial variables such as earnings and book values are often distorted and appear unrelated to market values. During the period in which the study was undertaken, the industry was composed of a relatively small number of large firms, made up of subsidiaries of telephone companies as well as independent operators. Based on a small sample of 14 independent operators covering the period of 10 years from 1984 to 1993, value relevance is analysed using two valuation models; the earnings model and the Ohlson model. Amir and Lev (1996) find that, on a stand-alone basis, reported earnings, book values and cash flows of these firms are largely irrelevant for security valuation purposes. This leads them to conclude that current financial reporting for these firms is inadequate.

The findings of subsequent studies indicate that, in comparison to other firms, intangible-intensive firms are not characterised by a lower association between share prices or returns and accounting information (Collins et al., 1997; Francis and Schipper, 1999). This suggests that the increased importance of intangible investments is not the primary cause for the change in the value relevance of accounting information. However, Collins et al. (1997) find evidence that changes in intangible intensity across time explain the shift in value relevance from earnings to book values, suggesting potential effect of intangible investments on value relevance of accounting information.

Lev and Zarowin (1999), on the other hand, provide support for the assertions that change in value relevance of accounting information is attributable to the treatment of intangible assets. Their findings indicate a link between the increasing importance of intangible investments, through their effect on the rate of business change, and the decline in the value relevance of financial information. Specifically, they demonstrate the adverse informational consequences of the accounting treatment of intangibles by documenting, first, a positive association between the rate of business change and shifts in R&D expenditures and, second, an association between the decrease in the value relevance of earnings and changes in R&D expenditures. Similarly, Cortijo et al. (2009) find that the decline in the value relevance of accounting information is more prominent for high-technology than low-technology firms. The study used the same classification method as Francis and Schipper (1999) to capture intangible intensity but a different methodology to assess value relevance, which is the modified Ohlson (1995) model. Additionally, the data used in their study cover a longer time period and are more recent, being 51 years extending across 1953 to 2003, compared to the 43 years between 1952 and 1994 used by Francis and Schipper (1999).

Based on the above discussion, it may be concluded that the inconsistent findings in these studies are most likely attributable to the choice of method used to capture the intensity of intangible investments. For example, Collins et al. (1997) classify firms as intangible-intensive when they are more likely to have large amounts of unrecorded intangibles. Specifically, firms in the two-digit SIC codes 48 (electronic components and accessories), 73 (business services) and 87 (engineering, accounting, R&D and management-related services); and three-digit SIC codes 282 (plastics and synthetic materials), 283 (drugs) and 357 (computer and office equipment) are classified as intangible-intensive firms. The authors, however, recognise that such classification is rather ad hoc and, hence, could potentially affect their results. Furthermore, in the test to examine whether intangible assets can explain the observed shift in value relevance from earnings to book values, the percentage of firms in intangible-intensive industries is used to proxy for the

increased importance of investment in intangible assets. It can be argued that this proxy was somewhat too simplified and thus cannot fully capture the construct of intangible investments. Similarly, in Francis and Schipper (1999), sample firms are classified into high- and low-technology firm groups based on whether firms in the industry are likely or unlikely to have significant unrecorded intangible assets (see Table 5 of their study for details of the selected samples). Additionally, to assess whether the classification of high- and low-technology industries captures the construct of unrecorded intangible assets, the R&D expenditures (R&D to total assets) and market-to-book ratios of the two samples are compared. Lev and Zarowin (1999) also use the average R&D intensity (R&D to sales) to proxy for the rate of intangible investments. However, in their study sample firms are classified by the direction of the change in R&D intensity (based on R&D intensity cut-off of 1%) into four categories; Low-Low, High-High, Low-High and High-Low groups.

Taken as a whole, this highlights the difficulties associated with the use of such indirect tests in investigating how the accounting treatment of intangible assets affects the value relevance of accounting information. Further, due to the more restrictive accounting for intangible assets under U.S. GAAP, studies conducted in that reporting regime can only indirectly test the proposition that inadequate treatment of intangible assets leads to decreasing value relevance of accounting information. In some reporting regimes however, the effect of the treatment of intangible assets can be captured more accurately by focusing specifically on the accounting method choice for these assets. This consequently provides more useful insights on this issue.

Goodwin and Ahmed (2006), for example, conduct a study under Australian GAAP that allowed for greater managerial discretion in accounting for intangible assets. They examine the impact of accounting for intangible assets on longitudinal value relevance of earnings by estimating the earnings and the Ohlson (1995) models for two groups; capitalising and non-capitalising firms. Overall, the study provides evidence that the treatment of intangible assets is an important factor in the change

of accounting information value relevance among Australian firms. More specifically, they report that earnings value relevance for capitalising firms has increased compared with non-capitalising firms over the sample period (1975 to 1999). The magnitude of the difference in earnings value relevance between the two groups is most pronounced in the latter part of the 1990s and this difference is increasing. It is proposed that this is due either to a shift in investors' assessment of the value of recognised intangible assets or to changes in the type of assets recognised over time (Goodwin and Ahmed, 2006). Additional analysis also suggests that the value relevance of earnings and book values has increased for capitalising firms while no significant improvement was observed for non-capitalising firms.

In general it can be argued that there are unresolved issues in relation to the role of accounting for intangible assets in influencing the value relevance of accounting information. While some studies provide empirical evidence on the link between inadequate treatment for intangible assets and change in value relevance, there are studies that show the increasing importance of intangible assets and their accounting treatment have not undermined the relevance of traditional financial statements. Nonetheless, the inconsistent findings on the role of intangible assets in explaining the usefulness of traditional financial statements, coupled with the increasing significance of intangible investments have generated more research in this area. Issues addressed by existing studies include: (1) what is the most appropriate method in accounting for intangible assets (for example, whether and/or when expenditures on intangibles should be capitalised or expensed, the types of intangible assets that should be capitalised and to what extent should the capitalisation of intangible assets be allowed); (2) what impact does a particular method of accounting for intangible assets have on the quality or usefulness of financial statements; and (3) how does a particular method of accounting for intangible assets affect different reporting environments, groups of firms or users of financial statements. These studies are further discussed in the next sections.

3.5 Accounting Choice for Intangible Assets and the Value Relevance of Intangible Assets: Non-Australian Studies

The issue of the most appropriate accounting choice for intangible assets has generated much discussion, both theoretically and empirically. While most of the theoretical discussions concerning the accounting treatment for intangible assets are presented in Chapter 2, a review of the empirical literature on the assets, especially in relation to their usefulness in financial statements, is provided in this section and in Section 3.6.

3.5.1 Studies on the Value Relevance of Capitalised R&D Costs

An extensive body of research in this area is dedicated to examining R&D costs. This is triggered mainly by the unprecedented growth in the investment in R&D particularly in the U.S. during the 1980s and the emergence of science- and technology-based industries (Lev, 2001). Further, as noted in Chapter 2, given that most intangible expenditures such as R&D costs are required to be expensed when incurred under the U.S. GAAP, these studies have examined the impact of an alternative accounting method choice on financial statements.

Lev and Sougiannis (1996) provide one of the earliest studies that investigates whether the alternative accounting choice of R&D capitalisation results in an improved usefulness of accounting information as reflected in its value relevance. The biggest concern with this study as well as other U.S. studies examining intangible assets is that due to the immediate expensing requirement in the accounting regime, the 'as-if' capitalised intangible assets amounts have to be estimated or formulated. The 'as-if' amount refers to the estimated amount for intangible assets or expenditures in an alternative accounting method choice. As a result, there is a possibility that the estimated amounts may not be statistically reliable, thus affecting the inferences in subsequent analyses. The estimates of capitalised R&D costs, the amortisation rate and the annual R&D amortisation in

Lev and Sougiannis (1996) are derived from the relationship between R&D costs and the firm's current and future earnings. The reported accounting information (earnings and book values) of sample firms are then adjusted for R&D capitalisation based on these estimates. The value relevance of R&D capitalisation is examined using two tests; (1) the contemporaneous association between the R&D adjusted accounting information and stock prices and returns, which is similar to the Ohlson (1995) model, and (2) the inter-temporal association between R&D adjusted accounting information and subsequent stock returns. The former indicates the value relevance of R&D capitalisation, while the latter suggests the extent of contemporaneous adjustment to R&D information. Specifically, it shows whether investors fully recognise the value relevance of R&D capitalisation when it is initially reported or whether investors' reaction to the information is incomplete.

The findings show that the R&D capitalisation estimates are strongly associated with stock prices and returns, suggesting that R&D capitalisation yields value-relevant information to investors. Further, the estimates are also found to be associated with subsequent stock returns, hence, providing evidence that investors fail to recognise fully the value relevance of R&D information when it is reported. The authors propose that this could be due either to a systematic mispricing of the shares of R&D-intensive firms or that the subsequent excess returns are compensating for an extra-market risk factor associated with R&D.

Chan (2001), on the other hand, provides no support for the claim that the practice of immediate expensing of R&D expenditures is detrimental to the usefulness of the financial statements. Initially, he reports an increasing magnitude of R&D expenditures during the period studied and argues that expensing R&D expenditures may lead to distortion in conventional valuation measures such as price-earnings and price-to-book ratios. Nonetheless, he finds that stock prices appropriately account for the value of R&D expenditures, indicated by no significant difference between the average historical stock returns of high and low R&D-intensity firms. Further analysis does, however, indicate that the volatility of stock returns may rise with

R&D expenditures, thereby imposing real costs on investors and possibly affecting the cost of capital for R&D-intensive firms.

Studies such as Chambers, Jennings and Thompson II (2003) and Lev, Nissim and Thomas (2007) provide evidence consistent with Lev and Sougiannis (1996). For example, the magnitude of financial reporting benefits derived from a less conservative accounting policy choice for R&D costs and the extent to which those benefits depend on the level of discretion afforded to managers are examined in Chambers et al. (2003). In that study, earnings and book values for several alternative accounting policies for R&D costs are simulated to reflect the increasing levels of managerial discretion. Then, for each alternative, the extent to which reported earnings and book values (based on current accounting policy of immediate expensing) and adjusted earnings and book values (based on alternative R&D accounting policies) explain the observed cross-section of share prices is analysed. The results indicate that adjusted earnings and book values explain a significantly larger fraction of the cross-sectional distribution of share prices than reported earnings and book values for all alternative accounting policies for R&D costs. Further, the increase in the explanatory power of the models of the alternative accounting policies is parallel to the increase in the level of managerial discretion. This leads Chambers et al. (2003) to report that a shift from the current accounting policy of expensing R&D costs is likely to produce an economically significant increase in the usefulness of accounting information if managers are allowed substantial discretion, particularly over the choices of costs to be capitalised and the rate at which these costs are expensed.

Lev et al. (2007) also find a significant association between earnings and book value information adjusted to reflect R&D capitalisation and contemporaneous share prices and future earnings, indicating the informational usefulness of capitalised and amortised R&D costs. Adjusted earnings and book values are estimated by simply capitalising R&D expenditures followed by straight-line amortisation over assumed industry-specific useful lives, ranging between one and eight years. They point out

that, despite the use of a simplistic adjustments technique in their study, it is able to capture the economic capitalisation of R&D costs. Hence, this emphasises even more strongly the need for standard setters to review current accounting treatment for R&D costs. More importantly, similar to Lev and Sougiannis (1996), the results also show a significant association between the adjusted figures and future stock returns. This suggests that information on the capitalisation of R&D costs is not fully incorporated in contemporaneous share prices. Therefore, Lev et al. (2007) argue that allowing firms to capitalise and subsequently amortise R&D costs would improve the value relevance of this accounting information (earnings and book values).

Studies conducted in different accounting regulatory settings that allowed for managerial discretion in accounting for R&D costs prior to the introduction of IFRS provide generally consistent findings with regards to the value relevance of R&D costs. In these accounting settings where capitalisation of a range of intangible assets was an available alternative, direct observations and tests across different methods of accounting choice were possible. Han and Manry (2004), for example, provide support for the value relevance of R&D costs disclosed by Korean firms. Unlike the U.S., Korean GAAP allowed the capitalisation of R&D expenditures when future economic benefits were reasonably expected from these expenditures. Using a regression model based on the Ohlson (1995) model, the results show that, in general, R&D costs (both capitalised and fully expensed) are positively associated with stock price, suggesting the value relevance of such information. Nonetheless, this association is found to be stronger for the capitalised portion of R&D costs than for the expensed portion. This finding suggests that investors attach higher value relevance to capitalised R&D costs than to those that are fully expensed.

In a study conducted under U.K. GAAP, Oswald and Zarowin (2007) also find evidence of the value relevance of R&D capitalisation for a sample of 201 firms between 1990 and 1999. However, in contrast to previous studies, value relevance is examined in terms of stock price informativeness, which is measured by the future

earnings response coefficient (FERC) in a regression of current stock return against current and future earnings. Firms with a higher FERC are considered to have higher stock price informativeness. Further, they argue that since firms' choices could be endogenously determined by the costs and benefits associated with each R&D accounting method choice, this suggests that the returns-earnings relationship could be influenced by self-selection bias. In other words, it is unlikely that firms choose their accounting method randomly. Thus, the results may be driven by the characteristics of the firms rather than by accounting choice per se. Therefore, the value relevance of accounting choice for R&D costs is investigated through the effect of R&D capitalisation on stock price informativeness by controlling for the endogeneity of accounting choice or self-selection bias.

Preliminary analysis shows significant group differences when sample firms are categorised into capitalisers and expensers and that the capitalisation versus expense accounting choice is a function of the firm-specific characteristics. Overall, R&D capitalisation is found to be associated with a higher FERC than expensing, indicating greater stock price informativeness, even after taking into account the effect of self-selection bias. Therefore, this provides support to the argument made by R&D capitalisation proponents that managerial discretion in accounting policy choice results in value-relevant information (Oswald and Zarowin, 2007).

Using a larger and more recent sample of 603 UK firms over the period of 1996 to 2004, Oswald (2008) extends Oswald and Zarowin (2007) by examining the determinants and value relevance implications of the accounting method choice for R&D costs. However, contrary to Oswald and Zarowin (2007), the effect of accounting choice for R&D costs on the value relevance of financial information (earnings and book values) is estimated using the price and return models that are based on Ohlson (1995) and Feltham and Ohlson (1995; 1996). The value relevance tests are conducted separately for capitalisers and expensers by comparing the reported earnings and book values with the 'as-if' values of these variables. The 'as-if' values for earnings and book values refer to the amounts adjusted for the

alternative accounting method. The findings show that, first, the decision to expense versus capitalise R&D costs is a function of firm life cycle stages. Secondly, the results indicate that for capitalisers, the value relevance of 'as-if expense' earnings and book values is not significantly lower than the value relevance of the reported amounts. Similarly, for expensers, the value relevance of 'as-if capitalise' earnings and book values is not significantly lower than the reported amounts. The authors conclude that this suggests that managers choose the appropriate method in accounting for R&D costs to signal their private information to investors. Overall, the results are inconsistent with the findings in previous studies that provide support for the value relevance of capitalised R&D costs (Lev and Sougiannis, 1996; Han and Manry, 2004; Oswald and Zarowin, 2007).

However, Cazavan-Jeny and Jeanjean (2006) provide evidence contrary to previous findings. Specifically, based on a sample of 197 French companies listed between 1993 and 2002, they find that capitalisation of R&D costs is negatively associated with market values (share prices and returns) which suggests that investors are concerned with and react negatively to capitalisation of R&D. Evidence from the returns analysis also indicates that investors value capitalised and expensed R&D costs differently, with the values of the former found to be negatively associated with stock returns while the values of the latter are found to be positively associated with stock returns. This indicates that capitalisation of R&D costs may be viewed by investors as a signal of earnings manipulation (Cazavan-Jeny and Jeanjean, 2006).

Consistent with Oswald and Zarowin (2007) and Oswald (2008), they also examine whether these results are driven solely by accounting choice for R&D costs or by the characteristics of the firms making the accounting choice by controlling for self-selection. Therefore, the models of stock prices and returns are rerun by adding an explanatory variable in the form of the predicted value of the capitalisation choice. They find that the capitalisation method is preferred by the least successful, smallest, riskiest and most highly-leveraged firms, suggesting that R&D capitalisation is used opportunistically by managers. Most importantly, taking into account the effect of

self-selection bias, the additional tests confirm that capitalised R&D is not associated with higher stock prices and is related to lower return. Finally, the authors conclude that the generally negative coefficients on capitalised R&D are consistent with the argument that investors believe firms manage earnings by capitalising R&D costs.

3.5.2 Studies on the Value Relevance of Other Intangible Assets

Apart from R&D costs, other types of intangible assets examined include identifiable intangible assets (Ely and Waymire, 1999b; Zaleha, Muhd-Kamil, Jagjit and Hamezah, 2008) and other specific classes of identifiable intangible assets such as software development costs (Aboody and Lev, 1998) and brand names (Barth, Clement, Foster and Kasznik, 1998; Kallapur and Kwan, 2004) as well as other non-financial intangible assets (Deng, Lev and Narin, 1999; Trueman, Wong and Zhang, 2000; Rajgopal, Venkatachalam and Kotha, 2003).

Ely and Waymire (1999b), for example, investigate the association between capitalised intangible assets and stock price and reported earnings during the period prior to the establishment of the SEC. This is the period in which management was given considerable discretion to capitalise a wide range of intangible assets and to determine subsequent amortisation and revaluation policies for these assets. The tests conducted involve: (1) the regression of share price against capitalised intangible assets, earnings, book values, book value of tangible assets; and (2) the association between reported earnings and capitalised intangible assets. Based on a sample of 146 *NYSE* firms trading in 1927 that capitalised their intangible assets, no evidence is found to support an association between capitalised intangibles and share price. Instead, the findings show that the coefficient relating earnings to share price is a declining function of the level of capitalised intangibles. Sensitivity tests also indicate that the negative earnings-capitalised intangible assets interaction remains robust after the inclusion of a variable related to risk or earnings management incentives. Similar to Cazavan-Jeny and Jeanjean (2006), the authors conclude that

this is consistent with investors' perceptions that capitalisation of intangible assets allows managers to overstate earnings.

A study conducted in Malaysia that permitted managerial discretion in accounting for intangible assets also provides no evidence of value relevance of such assets (Zaleha et al., 2008). Specifically, using a sample of 4,095 firm-years listed on the main board of Bursa Malaysia throughout a 12-year period from 1990 to 2001, the authors investigate the value relevance of intangible assets across three different economic and accounting environment conditions. These are: (1) strong economic conditions but with less stringent accounting regulations (1990-1996); (2) a financial crisis period combined with the establishment of the Malaysian Accounting Standards Board (1997-1998); and (3) a recovery economic period with a more stringent accounting regulatory framework (1999-2001). Overall, intangible assets are found to be consistently negatively associated with share prices across the three different economic and accounting periods, suggesting that the capitalisation of these assets provides no value-relevant information to investors.

Aboody and Lev (1998) examine the value relevance of capitalised software development costs in the light of the Financial Accounting Standards Board's Statement No. 86 (SFAS 86) where managerial discretion is allowed. As mentioned in Chapter 2, software capitalisation is the only exception under U.S. GAAP to the full expensing rule of R&D costs mandated in SFAS No. 2. The sample consists of 163 firms that were publicly traded during 1987-1995, which are then classified into expensers and capitalisers. The value relevance of software development cost capitalisation is examined using three approaches: the association between capitalisation-related variables and contemporaneous stock returns, stock prices and future earnings. In addition, consistent with previous studies that examine intangible assets in an accounting regime that provides for the choice to capitalise (Cazavan-Jeny and Jeanjean, 2006; Oswald and Zarowin, 2007; Oswald, 2008), Aboody and Lev (1998) also take into account the endogenous effects of accounting choice by controlling for firm-specific characteristics.

The value relevance tests show a significant positive association between, first, the annual software cost capitalisation amount and stock returns and prices and, second, the cumulative software assets and stock returns and prices. This, in general, suggests that software cost capitalisation provides information relevant to investors. Further, software cost capitalisation data were also found to be associated with subsequent reported earnings, suggesting another dimension of value relevance to investors. This is because it is argued that if managers systematically abuse their discretion in determining technological feasibility and expected profitability of the developed projects, there should be no relation between capitalisation of development costs and subsequent performance. The findings hence provide no support for the claim that the judgement involved in software capitalisation decreases the quality of reported earnings. However, the authors suggest caution in making the generalisation to capitalisation of other intangible assets, especially R&D costs, primarily because SFAS No. 86 deals only with the capitalisation of the development expenditures incurred after technological feasibility has been achieved.

Barth et al. (1998) provide evidence relating to the relevance and reliability of estimates of brand values by investigating whether share prices and returns reflect brand values estimated by Financial World (FW), based on the methodology developed by Interbrand Ltd., an established brand valuation consulting firm. The tests are performed by estimating the association between the FW brand value estimates and share prices and the association between year-to-year changes in the brand value estimates and annual share returns. The results report consistent evidence that brand value estimates are significantly associated with equity market values in both specifications, providing evidence in support of their value relevance.

In contrast to Barth et al. (1998) who rely on the valuations of outside parties for brand-value estimates, Kallapur and Kwan (2004) examine the value relevance and reliability of brand assets recognised as part of business acquisitions. However, managers could be subject to contracting incentives to bias the brand recognition (Muller III, 1999), which suggests that there is greater concern with regard to the

reliability of acquired brand values. Therefore, Kallapur and Kwan (2004) test for the reliability of brand-asset measures by examining the differences in brand-capitalisation rates of firms with strong and weak contracting incentives. They argue that if firms with high contracting incentives over-value brands (introduce greater noise), then the stock markets should capitalise their brands at lower rates. Thus, differences in valuation biases or noise among these groups of firms would signify a lack of verifiability, which is a component of reliability. The results suggest that despite managers' incentives to over-value them, recognised brand values are value relevant. However, it is also found that there are differences in the amount of bias or noise in brand valuations of different groups of firms, suggesting that brand-asset measures lack reliability for firms with high contracting incentives.

Due to the difficulties in estimating the value for certain types of intangible assets in monetary forms, especially internally generated intangible assets that are not recognised in the financial statements, some studies investigate the value relevance of these assets as reflected in non-financial information. These studies provide evidence that is generally consistent with intangible assets providing incremental value-relevant information beyond traditional accounting measures. Non-financial information such as various measures of patents (Deng et al., 1999), website pageviews (Trueman et al., 2000) and network advantages of e-commerce firms (Rajgopal et al., 2003) are found to be significantly associated with share prices and returns, indicating their value relevance.

3.5.3 The Impact of IFRS Adoption on the Value Relevance of Intangible Assets

Studies discussed previously in Sections 3.5.1 and 3.5.2 were conducted in the period before the adoption of IFRS in 2005. As mentioned in Chapter 2, IFRS was introduced in an effort to increase the international comparability of financial statements. Following the introduction of this new accounting regime, numerous studies have been conducted in different accounting regulatory settings that examine

the impact of IFRS on accounting information quality. These studies generally examine the effect of the change on accounting information value relevance and report mixed findings. For example, studies conducted in Greece (Karampinis and Hevas, 2009; Iatridis and Rouvolis, 2010) and France (Cormier, Demaria, Lapointe-Antunes and Teller, 2009) provide evidence that IFRS adoption leads to higher quality of financial statements as reflected in the more value relevant accounting measures. Taylor (2009), on the other hand, finds no support to conclude that financial statements prepared under IFRSs in the U.K., Hong Kong and Singapore are incrementally value relevant to financial statements prepared under GAAP, while Mohd Halim, Rozainun and Muhd-Kamil (2009) report improved value relevance for book value but not earnings in Malaysia.

Nonetheless, limited studies have been conducted to examine the effect of IFRS in the context of the value relevance of intangible assets. Morricone, Oriani and Sobrero (2009) for example, investigate whether and to what extent the implementation of IFRS affects the value relevance of intangible assets using a sample of Italian publicly listed firms. Using the Ohlson (1995) model, they examine both the incremental and relative value relevance of intangible assets following the mandatory adoption of IFRS.

The findings show that goodwill and identifiable intangible assets are value relevant under both Italian GAAP and IFRS. However, Italian firms experienced a statistically significant decrease in the value relevance of intangible assets, particularly goodwill, after the introduction of the new accounting standard. They argue that IFRS recognition criteria that require the impairment test of goodwill and the subsequent higher discretion in goodwill valuation may provide investors with less useful information. This is because the Italian reporting environment can be characterised by a weak corporate governance system and low financial transparency, leading to potentially opportunistic behaviour by managers. Further, although the aggregate of the identifiable intangible assets is found to exhibit overall

lower value relevance after IFRS adoption, only two classes of the assets (licences and deferred costs) experience a significant decrease in value relevance.

Using a sample of all non-finance firms listed on the main market of the Portuguese Stock Exchange, Oliveira, Rodrigues and Craig (2010) find that goodwill and the aggregate amount of identifiable intangible assets reported under the Portuguese GAAP are value relevant. However, when considering the subclasses of identifiable intangible assets, the amounts recognised for intellectual property and R&D expenditures do not appear to be value relevant. The findings also suggest that, while the adoption of IFRS had no impact on the value relevance of identifiable intangible assets as a whole, it has a positive effect on the value relevance of goodwill. Further, when the subclasses of identifiable intangible assets are analysed, evidence of an increase in the value relevance is found for other identifiable intangible assets (such as start-up costs, intangible assets in development and prepayments for purchases of identifiable intangible assets) and capitalised R&D costs. They argue that the change in the accounting system potentially reduce earnings manipulation practices due to more restrictive requirements, thus leading to the recognised amounts of these expenditures being regarded by the investors as having future economic benefits.

Taken together, studies discussed in Section 3.5 provide mixed support for the value relevance of accounting choice for intangible assets. While some studies suggest that a less conservative accounting method choice that allowed intangible assets to be recognised as assets rather than expensed when incurred has the potential to provide more relevant information to investors, there are also studies that provide no support for this proposition. Nonetheless, the overall results indicate that the disclosure of non-financial information that captures the notion of intangible assets results in improved information usefulness. Further, the introduction of the new accounting regime (IFRS) is found to have an impact on the value relevance of intangible assets and that this impact varies depending on the accounting regulatory environment.

3.6 Accounting Choice for Intangible Assets and the Value Relevance of Intangible Assets in Australia

Most of the Australian studies in relation to the value relevance of intangible assets so far have been conducted prior to the adoption of AIFRS, in general, and AASB 138, in particular. First, a discussion on the trends in accounting policy choice for intangible assets adopted by Australian firms under Australian GAAP is presented. Next, a review of the literature conducted in the pre-AIFRS period concerning the link between accounting choice for intangible assets and value relevance in the light of opportunistic and value maximising behaviour is provided. Finally, the impact of AIFRS adoption on value relevance is discussed.

3.6.1 Trends in Accounting Choice for Intangible Assets in the Pre-AIFRS Period

Studies have shown that during the more flexible pre-AIFRS reporting period, there was an increase in the percentage of Australian firms recognising but not amortising identifiable intangible assets relative to goodwill (Wines and Ferguson, 1993; Wyatt et al., 2001). For example, in one of the earliest studies on the accounting practice for intangible assets, Wines and Ferguson (1993) examine the financial statements of a random sample of 150 ASX firms over a five-year period of 1985 to 1989. The results reveal an increase in the percentage of firms recognising identifiable intangible assets compared to goodwill with an average annual increase of 21.7% and 4.3%, respectively. The findings also indicate that while the diversity of accounting policies adopted for goodwill has decreased, the opposite trend is observed in accounting for identifiable intangible assets. In particular, more companies chose to amortise goodwill balances systematically and not to amortise identifiable intangible assets.

Wyatt et al. (2001) investigate the annual reports of ASX firms in the period 1993 to 1997. Similarly, they find substantial frequency of intangible asset capitalisation and

a wide diversity in accounting policies for the amortisation of intangible assets. Specifically, goodwill and identifiable intangibles were capitalised by about 50% of the firm-years, while deferred intangibles (defined by the authors as items not fitting neatly into R&D, goodwill or other identifiable intangible assets such as capitalised exploration and evaluation costs) were capitalised by 35%. The results also show that many of the sample firms chose not to amortise identifiable intangible assets (49%) and chose to systematically amortise goodwill over a longer period of 20 years or more (48%).

More recently, Chalmers and Godfrey (2006) examined the 2002 annual reports of 476 ASX-listed companies to provide more insights on the possible impacts of AIFRS on accounting practices for intangible assets. The results indicate that 53% and 50% of sample firms reported goodwill and identifiable intangible assets, respectively, in their 2002 balance sheets. Further, they also find significant diversity in reporting practices relating to both goodwill and identifiable intangible assets. With regards to the amortisation policy, a high proportion of the sample firms (42%) chose to amortise goodwill over the maximum permissible period of 20 years, while 22% did not amortise their identifiable intangible assets.

This trend is consistent with the expectation that firms chose to capitalise more identifiable intangible assets, thereby reducing the amount that would otherwise have been recorded as goodwill. This is due to the more restrictive requirements for the accounting treatments for goodwill, such as the prohibition on the recognition of internally generated goodwill and the mandatory amortisation over a period not exceeding 20 years. The restriction on the useful life for goodwill amortisation is argued to result in large and arbitrary charges on reported earnings. Identifiable intangible assets, on the other hand, may be recognised on acquisition at cost or, subsequent to acquisition, through revaluation in accordance with AASB 1010 (in the period before 1999) and AASB 1041 (in the period after 1999). As a matter of fact, both internally generated identifiable intangible assets and goodwill can be brought on to the balance sheet using the revaluation option offered by these

accounting standards. Therefore, in an attempt to minimise the impact of the requirement for the amortisation of goodwill on reported earnings, firms may eliminate or reduce the amounts reported for goodwill through the capitalisation of identifiable intangible assets. Consequently, it can be argued that there is a potential for managerial discretion with regards to the capitalisation of intangible assets to lead to accounting manipulation in a manner that does not reflect the real economic performance of the firm.

Nevertheless, one can also argue that the increase in the identifiable intangible assets recognition and the diversity of accounting policies do not necessarily represent managers' attempts to manipulate earnings. On the contrary, identifiable intangible assets can be viewed as representing more credible signals of future firm value and, as a result, managers attempt to report the most value-relevant information within the constraints imposed by Australian GAAP (see, for example, Barth and Clinch, 1998; Wyatt, 2005; Ritter and Wells, 2006; Tutticci et al., 2007). In fact, it can be seen that the frequency of firms recognising goodwill and identifiable intangible assets has been fairly stable over the period of 1993-1997 to 2002 (see Wyatt et al., 2001; Chalmers and Godfrey, 2006).

Further, several explanations can be put forward against the occurrence of managerial opportunism. First, was the restrictions imposed by AASB 1010 on the carrying amount of all non-current assets, including that of intangible assets. Specifically, the standard required the carrying amount of non-current assets to be written down to their recoverable amount when their carrying amount is greater than the recoverable amount. Recoverable amount is defined as the net amount that is expected to be recovered through the cash inflows and outflows arising from the continued use and subsequent disposal of an asset. Second, although AASB 1041 allowed for upward revaluations subsequent to initial recognition as assets, the standard also required revaluations to be made with sufficient regularity to ensure that the carrying amounts of non-current assets measured on the fair value basis did not differ materially from their fair values. The standard proposed that the frequency

of revaluations should depend on the frequency and materiality of the changes in the fair values of the assets and should be undertaken at least once in every three years. Furthermore, the carrying amounts of the assets measured on the fair value basis under this standard cannot be over-stated. These requirements, therefore, imply that regular asset valuations involving reference to market prices for the assets or similar assets and/or the estimation of the present value of future profitability and/or cash flows generated by the assets must be undertaken.

Third, to the extent that these valuations were subject to the scrutiny of auditors, this added to the reliability of such figures. For example, based on a sample of ASX firms from 1992 to 2002, Tutticci et al. (2007) report that external monitoring such as the presence of a high-quality auditor led to enhanced reliability of capitalised R&D costs, which suggests the role of the auditor in ensuring that firms do not overstate these assets. Further, they find no evidence to suggest that capitalisation is associated with management opportunistically managing firm performance. Accordingly, if these restrictions are satisfied, then the recognition of intangible assets should be value relevant.

3.6.2 The Value Relevance of Intangible Assets in the Pre-AIFRS Period

Most studies conducted in the pre-AIFRS period provide support to the proposition that the discretion afforded to managers in accounting for intangible assets during this period led to higher value-relevant information, indicating its use in signalling firm value to investors. Barth and Clinch (1998), for instance, report that revalued intangible assets are value relevant and they particularly emphasise the strength and consistency of the association between this particular class of assets and share price, compared to financial and tangible assets. Further, the results also show that revalued intangible assets based on both director and independent appraiser

valuations are significantly positively associated with share price[2]. This suggests that directors' private information enhances value estimates despite the potential to use the discretion for self-interested purposes and, consequently, improves the relevance of information to investors without compromising its reliability.

Similarly, Abrahams and Sidhu (1998), Smith, Percy and Richardson (2001) and Ahmed and Falk (2006) report that capitalised R&D costs under Australian GAAP provide value-relevant information to investors. Using the balance sheet model and a sample of 89 Australian firms operating in 1995, Abrahams and Sidhu (1998) find that capitalised R&D costs are value relevant. In addition, the results show that for the group of capitalisers, R&D accruals improve the association of accounting earnings as a measure of firm performance with stock returns. The authors claim that the managerial discretion permitted under the Australian GAAP actually provides superior measures of firm value and performance and that limiting or removing this discretion will only incur additional investor communication costs. Smith et al. (2001) demonstrate, for a sample of Australian and Canadian capitalisers from 1992-1997, that the discretionary capitalisation of R&D costs results in balance sheet and income statement numbers that are more highly associated with market value than 'as-if' expensing GAAP numbers. However, this result is only found when the sample is partitioned on the basis of materiality, as proxied by capitalised R&D intensity. This indicates that the effect of capitalisation on value relevance is more apparent among R&D-intensive firms.

Ahmed and Falk (2006) also conjecture that the relevance of Australian firms' financial statements will not be enhanced by replacing the flexible Australian R&D accounting practice with a more restrictive standard. They study the value relevance of R&D accounting choice by utilising three main tests and a sample of 342 firms during 1992-1999. In the first test, the association between R&D accounting choice and firm market value is examined using the Ohlson model. Three separate

[2] Australian GAAP permitted revaluations of all non-current assets upwards to fair values as well as revaluation based on independent appraisers' or directors' value estimates, which are argued to differ in reliability.

regression models are run for three groups: firms that capitalise and amortise R&D expenditures (capitalisers), firms that expense R&D expenditures when incurred (expensers) and capitalisers that are adjusted for the mandatory immediate expensing rule (converted capitalisers), while controlling for firms' relative risk positions. In the second test, the effect of industry affiliation is taken into account by partitioning capitalisers and expensers into two broadly defined industrial classifications, extractive firms and the rest of industrial firms. Finally, the authors also investigate the association between R&D costs and firms' subsequent earnings to test whether they generate future benefits to the firm.

The results of the first test show that managerial discretionary accounting practices, regardless of whether they are capitalisation or expensing, are more value relevant than mandatory R&D expensing. However, capitalised R&D expenditure is regarded as more value relevant by the market than expensed R&D expenditure. Further, the authors argue that the results suggest that managers' R&D reporting practices are not affected by opportunistic considerations. In the second test, no evidence is found to support the notion that industry affiliation affects the strength of the relationship between R&D accounting choice and firm value. However, this could be attributable to the use of a very broad industrial classification in the test which could limit the power of the test. Finally, they found capitalised R&D costs to be positively and significantly associated with a firm's future earnings, thus lending support to the argument that discretionary R&D accounting choice conveys credible signals about a firm's future performance.

Similarly, based on share price and returns models, Tutticci et al. (2007) find evidence that the market positively values expensed R&D costs, particularly for firms classified as expensers. However, evidence of value relevance is less consistent when focusing on capitalised R&D costs. While the price model indicates capitalised R&D costs are value relevant, no significant association is observed between capitalised R&D costs and share returns. Overall, the results suggest that the market places a greater weighting on potential growth from R&D when it is expensed rather

than when it is capitalised. This is supported by Chan, Faff, Gharghori and Ho (2007) who find that firms with higher R&D intensity have a significant positive association with future risk-adjusted returns, regardless of the accounting method choice used. Additional tests also reveal that after controlling for R&D intensity, expensers are found to have better long-term future returns than capitalisers. Based on a sample of 172 firms listed in 1999, Godfrey and Koh (2001), however, find no evidence to support the claim that capitalised R&D costs are associated with firm value. They attribute this finding to the small proportion of R&D-intensive companies included in the sample, in which only 12 firms capitalise and amortise R&D costs.

Ke, Pham and Fargher (2004) extend Godfrey and Koh (2001) and investigate their claim that the relatively small number of R&D-intensive firms included in the sample caused the failure to find value relevance for capitalised R&D costs. Ke et al. (2004) use a more recent and larger sample of firms operating over the four year period of 1998 to 2001, which are concentrated in R&D-intensive industry groups. The final sample of 183 firms is drawn from six Global Industry Classification Standard (GICS) sectors; information technology, health care, industrials, telecommunication services, consumer staples and financials. The results show a significant positive association between market value and capitalised R&D costs, suggesting their relevance to firm valuation.

Apart from the specific focus on R&D costs, other studies also investigate the value relevance of other identifiable assets. It is argued that these identifiable intangible assets provide more credible signals of firms' value compared to other types of intangible assets such as capitalised R&D costs and goodwill (Wyatt, 2001). This is primarily because identifiable intangible assets such as brands, patents and trademarks represent intermediate outputs from innovation that are closer to commercial outcomes and thus are less uncertain than, for example, R&D costs. Findings in Godfrey and Koh (2001), Wyatt (2005) and Ritter and Wells (2006), in general, provide evidence of identifiable intangible assets' value relevance.

Specifically, Wyatt (2005) finds evidence that identifiable intangible assets for which management has the highest accounting discretion due to the absence of a specific accounting standard for this type of asset, to be more value relevant than purchased goodwill and capitalised R&D costs. She also argues that the extent to which management makes accounting choices to recognise intangible assets is determined by managers' insights into the underlying economics of the firm's intangible investments. The findings indicate that technology and property-rights-related conditions or, more specifically, technology strengths, technology cycle time and property rights factors are important explanations for management's accounting choice for intangible assets.

Ritter and Wells (2006) argue that despite the previously less restrictive accounting practices on identifiable intangible assets, there is no empirical evidence of widespread opportunistic management behaviour. They investigate the relationship between voluntarily recognised and disclosed identifiable intangible assets, stock prices and future earnings in Australian firms over the period of 1979 to 1997. The Ohlson (1995) model is used to examine the value relevance of identifiable intangible assets. The same explanatory variables are also regressed on future period income to assess the impact of identifiable intangibles on the future earnings. The sample used in Ritter and Wells (2006) consists of 1,078 firm-years and is selected from the largest 150 ASX firms as measured by market capitalisation. The findings indicate evidence of a positive relationship between stock prices and identifiable intangible assets across sample firms and sample periods, indicating that such information is value relevant. The results also show that although there is a positive significant association between identifiable intangible assets and income over a longer period, there is only limited value relevance in the short term. This indicates that identifiable intangible assets provide information relevant to the estimation of future earnings and reflects the time for investments in intangible assets to impact earnings. However, the authors mention that due to the voluntary nature of intangible asset recognition, it was difficult to determine whether the absence of

disclosure is a result of accounting policy choice or simply the non-existence of such assets.

More recently, using the Feltham and Ohlson (1995) model, the value relevance and reliability (as measured by the degree of bias) of purchased goodwill and identifiable intangible assets are investigated in Dahmash et al. (2009). The findings indicate that while the information provided with respect to both goodwill and identifiable intangible assets is value relevant, it is also biased, that is, not viewed by the market as representing reliable estimates of value. Specifically, goodwill tends to be reported conservatively whereas identifiable intangible assets tend to be reported aggressively. Additional tests are also conducted for a sub-sample of high performing firms (as measured by positive abnormal earnings) because these firms are expected to have significant amounts of unrecorded internally generated intangible assets. The results indicate that goodwill is regarded as value relevant and unbiased, while identifiable intangible assets are not value relevant and are reported highly conservatively by high performing firms.

Based on the findings, Dahmash et al. (2009) propose that the implementation of AIFRS is likely to reduce the level of bias in the reporting of intangible assets by the average Australian firm. However, they also argue that the restrictions placed by the new accounting standard, particularly on the recognition and revaluation of identifiable assets under AIFRS, are unlikely to bring significant improvement but may indeed reduce the usefulness of information reported by high performing firms. The more restrictive standard combined with the highly conservative reporting of identifiable intangible assets by these firms will exacerbate further the problems surrounding the recognition of the assets, hence, affecting their value relevance (Dahmash et al., 2009).

Taken together, the discussion in this section presents a valid argument to suggest the value relevance of the discretion in accounting for intangible assets afforded by Australian GAAP, despite the concerns raised by the standards setters that firms

were merely capitalising their intangible assets in an attempt to protect earnings againt the amortisation of goodwill. This, in general, also contradicts the argument for the conservative accounting treatment to expense expenditures on intangible investment as incurred on the grounds of reliability even when adequate evidence of future benefits exists. Thus, it can be argued that limiting management's choices in accounting for intangible assets is more likely to result in lower quality of balance sheet and investor's information set (Wyatt, 2002; 2005).

Nonetheless, the conclusions drawn by some of the studies that the discretion is not being used opportunistically by the management or that the capitalisation of intangible assets is used to signal firm quality when the information is found to be value relevant could be flawed. This is because the effect of firm-specific characteristics on accounting choice is not controlled for in most of the studies. Holthausen (1990) and Holthausen and Leftwich (1983), for instance, note that one rationale for accounting choices is information signalling, particularly when managers have a competitive advantage in providing information about the firm's future cash flows. These choices are unlikely to be used by firms randomly, suggesting that there are certain firm-specific characteristics that will determine this choice. While this issue is considered in studies conducted in other flexible accounting settings, it is not incorporated in previous Australian studies.

3.6.3 The Value Relevance of Intangible Assets in the Post-AIFRS Period

Significant changes in accounting practices for intangible assets following the adoption of AIFRS are discussed in Chapter 2, while the discussion in Section 3.6.1 highlights the value relevance of such accounting practices and concerns over the effects of a more restrictive or conservative standard. For example, Chalmers and Godfrey (2006) argue that the evidence of significant diversity in reporting practices relating to both goodwill and identifiable intangible assets suggests that the new accounting rules will potentially reshape ASX-listed firms' financial statements by significant amounts.

However, since the adoption of AIFRS in general and AASB 138 in particular, there has been very limited empirical research on their impact on the value relevance of intangible assets. To date, Chalmers et al. (2008) appears to be the only study that specifically examines the effect of AIFRS adoption on the value relevance of intangible assets. Based on a sample of 599 ASX firms listed in 2006, they compare the Australian GAAP and AIFRS balances for goodwill and identifiable intangible assets reported in the annual reports. Since the opening balances of AIFRS annual reports are the restated closing Australian GAAP balances, the authors argue that this enables direct comparison and analysis of the impact of AIFRS adoption at the same point in time.

The results provide partial support for AIFRS-measured goodwill being incrementally value relevant but no support that AIFRS measures of identifiable intangible assets reflect value-relevant information incremental to that conveyed under Australian GAAP. Further, they also find strong support for the claim that identifiable intangible assets measured under Australian GAAP provide value-relevant information to investors beyond AIFRS but weak support that goodwill reported under Australian GAAP is incrementally more value relevant than AIFRS.

Finally, when identifiable intangible assets are disaggregated, the findings indicate that Australian GAAP measures provide positive incremental information relevance for R&D, patents and licences, while AIFRS measures provide positive incremental information relevance for software costs. This leads the authors to conclude that: (1) the results are consistent with the new requirement under AIFRS to remove some potentially useful information by forcing the de-recognition of identifiable intangible assets such as brands; (2) AIFRS may have provided more value-relevant information concerning goodwill by removing the mechanical straight-line amortisation approach under Australian GAAP; and (3) the results can be interpreted as evidence that the approach to recognising and measuring identifiable intangible assets previously adopted under Australian GAAP, which is similar to the AIFRS approach to accounting for goodwill, has more relevance to firm valuation.

3.7 Summary

This chapter provides a review of prior studies concerning value relevance of accounting information, in general, and intangible assets, in particular. In summary, it shows that despite the widespread claim that traditional financial statements have lost relevance in the past two decades, extant studies have provided inconsistent evidence for this argument. Nevertheless, it highlights that the increasing importance of intangible assets over time as well as the inadequate treatment of these assets under certain accounting regulatory settings have some implications for the value relevance of accounting information in general. This unresolved issue has generated numerous studies examining, particularly, the link between accounting choice for intangible assets and value relevance of accounting information, including those of the intangible assets themselves.

A review of the literature also reveals that one of the biggest limitations of studies conducted under the U.S. GAAP is that, due to its more conservative nature in accounting for intangible assets, the comparison between alternative accounting methods has to be based on some estimated or simulated figures. However, in order to yield meaningful and interpretable results in the context of the intangible assets value relevance study, it is important to analyse actual accounting data produced in a more flexible reporting environment where management is allowed to exercise its judgement.

Overall, studies conducted under less restrictive reporting regimes indicate the relevance of accounting choice for intangible assets. Nevertheless, it is interesting to observe that notwithstanding the liberal stance of Australian GAAP in accounting for intangible assets and its evidence of favourable impact on increased information usefulness, not all firms chose to recognise these assets. So, the question remains, why did some firms exercise their accounting discretions and chose to recognise intangible assets, while other firms chose not to? A closer look at previous literature in this area reveals that while studies conducted overseas take into account the effect

of the endogeneity of accounting policy choice, no study conducted under Australian GAAP, with the exception of Wyatt (2005) and Tutticci et al. (2007), controls for firm-specific characteristics in selecting the appropriate accounting treatment for intangible assets. Nevertheless, these studies conclude that accounting choice is used by management to signal firm value.

Thus, it appears that underlying much of the existing Australian studies in this area is the assumption that the influence of accounting choice for intangible assets on their value relevance is monotonic. In other words, it is assumed that the motivations for decisions to capitalise or expense intangible assets are similar across firms. However, it is not valid to assume the monotonic impact of accounting choice as studies have shown that it is a dynamic firm policy that is likely to be determined by firm attributes. Further, this chapter shows that there is very limited empirical research to date on the impact of AIFRS adoption, despite the amount of discussion dedicated to this particular issue. These are, therefore, avenues worth exploring and are discussed further in Chapters 4 and 5.

In the next chapter, an overview of firm life cycle stages will be provided. The firm life cycle concept can be viewed as a representation of firm-specific characteristics that have been used in previous value relevance studies to control for the endogeneity of accounting choice. Therefore, it is important to establish in Chapter 4 that an advantage of employing the concept of firm life cycle stages is that firms in a given life cycle are relatively more homogeneous across multiple characteristics. Chapter 4 will also present a discussion on how firm life cycle stages may affect accounting choice, particularly in relation to intangible assets and value relevance of accounting information. Finally, the links among firm life cycle stages, the nature of intangible assets, accounting choice and the value relevance of intangible assets will be discussed, leading to the development of hypotheses for this study in Chapter 5.

CHAPTER 4

A REVIEW OF THE LITERATURE: FIRM LIFE CYCLE

4.1 Introduction

In Chapter 3 it was established that existing literature recognises the value relevance of accounting choice for intangible assets. This accounting choice, in turn, may be driven by the specific characteristics of the firm. Thus, a discussion on these firm-specific characteristics will be provided in this chapter by focusing on the concept of firm life cycle. The aim of this chapter is to shed more insight on the role of firm life cycle stages in influencing managerial decisions relating to accounting method choice for intangible assets and the value relevance of accounting information. This chapter is organised as follows: first, a brief overview of issues surrounding the concept of firm life cycle stages is presented. Second, a review of the literature on the effect of firm-life cycle stages and accounting choice and value relevance is provided. Finally, the link between firm life cycle stages and the nature of intangible assets is discussed in order to establish the framework for the development of hypotheses in this study.

4.2 The Firm Life Cycle Perspective: An Overview

Firm life cycle theory can be viewed as an extension of the product life cycle concept developed in marketing (Rink and Swan, 1979). Similar to an individual product that moves through a sequence of distinct stages in its life cycle, a firm can be described in terms of life cycle stages that depend on the portfolios of strategies, structures, problems and processes that it faces during a particular period in its life.

Interestingly, despite the extensive literature concerning the firm life cycle, a thorough examination of the basic construct of a life cycle stage has been largely ignored (Olson and Terpstra, 1992; Hanks, Watson, Jansen and Chandler, 1993). In this section, important issues concerning the firm life cycle concepts are addressed and discussed. These include the definition of firm life cycle stages, the models of firm life cycle stages and the limitations and importance of the firm life cycle concepts and the characteristics of each life cycle stage.

4.2.1 Definition and Models of Firm Life Cycle Stages

In their review of the life cycle literature, Hanks et al. (1993) argue that the lack of an explicit definition of life cycle stages leads to difficulties in applying the concept to specific cases. Based on the descriptions used in each life cycle stage, they make two prominent observations concerning firm life cycle stages. First, the life cycle stage construct appears to be a multi-dimensional phenomenon and second, while there is considerable variability between life cycle models, all of them include some dimensions relating to organisational context and organisational structure. Examples of organisational context are firm size, growth rate, key strategies and focal tasks and challenges facing the firm, while examples of organisational structure include structural form, formalisation, centralisation and leadership and management style. These dimensions are interrelated and connected to each other and it is the differences in the pattern and magnitude of these dimensions that separates one life cycle stage from another. Miller and Friesen (1984) use the term configuration, which is a representation of common organisational structures, common scenarios of strategy making in context and common developmental or transitional sequences, to describe the association between these dimensions. Building on this characterisation of configuration, Hanks et al. (1993, p.7) define a life cycle stage as "a unique configuration of variables related to organisation context and structure".

The description of the nature of firm life cycle stages put forward by other authors (see, for example, Quinn and Cameron, 1983; Adizes, 1989; Dickinson, 2009) is

largely consistent with Chandler's (1962) proposition that firms develop patterns of organisation structure in response to common growth and market challenges. For example, Lester, Parnell and Carraher (2003) refer to life cycle stage as a loosely comprised set of organisational activities and structures. Meanwhile, Dickinson (2009) describes firm life cycle stages as distinct and identifiable phases that arise from changes in internal factors such as firms' strategy choices, financial resources and managerial ability and/or external factors such as the competitive environment and macro-economic factors due to strategic activities undertaken by the firm.

Numerous multi-stage life cycle models have been proposed using a diverse array of measures such as organisational context or situation, strategic orientation, decision-making responsibility, leadership style, critical developmental areas, problems and structural characteristics to describe each stage of development (Miller and Friesen, 1983; Quinn and Cameron, 1983; Smith, Mitchell and Summer, 1985; Flamholtz, 1986; Adizes, 1989; Hanks et al., 1993; Lester et al., 2003). Although the number of stages proposed for the life cycle models ranges broadly from three (Smith et al., 1985) to ten stages (Adizes, 1989), all models reveal a fairly consistent pattern of firm development. Models with more stages appear to break down general stages to specific developmental periods, while models with fewer broader stages integrate two or more developmental periods to achieve more parsimonious stages (Lester et al., 2003).

A review of the firm life cycle literature suggests that despite the various models, the life cycle of a firm in most prior studies can generally be categorised into five common stages, which are start-up, growth, maturity, revival and decline. Therefore, a five-stage model is used in the subsequent discussion (see Section 4.2.2) for the purpose of parsimony and ease of comparison. Table 4.1 shows a comparison of the models of firm life cycle stages that are partitioned based on the five-stage model.

Table 4.1

A Comparison of the Models of Firm Life Cycle Stages

Model	Start-up Stage	Growth Stage	Maturity Stage	Revival Stage	Decline Stage
Quinn and Cameron (1983)	1. Entrepreneurial	2. Collectivity	3. Formalisation	4. Elaboration of Structure	
Miller and Friesen (1983)	1. Birth	2. Growth	3. Maturity	4. Revival	5. Decline
Flamholtz (1986)	1. New Venture	2. Expansion	3. Professionalisation 4. Consolidation	5. Diversification 6. Integration	7. Decline
Adizes (1989)	1. Courtship 2. Infancy	3. Go-Go 4. Adolescence	5. Prime 6. Stable		7. Aristocracy 8. Early Bureaucracy 9. Bureaucracy 10. Death
Smith et al. (1985)	1. Inception	2. High Growth	3. Maturity		
Pashley and Philippatos (1990)	1. Pioneering	2. Expansion	3. Maturity		4. Decline
Anthony and Ramesh (1992)		1. Growth	2. Mature		3. Stagnant
Hanks et al. (1993)	1. Start-up	2. Expansion	3. Maturity	4. Early Diversification	
Black (1998)	1. Start-up	2. Growth	3. Maturity		4. Decline
Lester et al. (2003)	1. Existence	2. Survival	3. Success	4. Renewal	5. Decline
Elsayed and Patton (2009)	1. Initial Growth	2. Rapid Growth	3. Maturity	4. Revival	

4.2.2 Characteristics of Firm Life Cycle Stages

Central to most life cycle models is the notion that the firm's strategic dynamics such as competitive challenges, opportunities and strategy responses, vary across the different stages of the firm life cycle (Jenkins, Kane and Velury, 2004; Filatotchev, Toms and Wright, 2006). As noted in the above discussion, firms typically progress through predictable and consistent life cycle stages, such as start-up, growth, maturity and decline. Nonetheless, it is also important to note that this sequence is non-deterministic in nature. This suggests that depending on the challenges and different strategic and structural choices, firms can revert to earlier stages, remain in a particular stage of development for a very long time or even fail to progress past an early stage, sometimes regressing quickly to decline or death.

Taking into account the purpose of the current study, the discussion in this section is focused primarily to the financial-related dimensions of the firm life cycle stages. The use of the five-stage model of life cycle in this discussion is considered appropriate to provide a synthesis of the commonly employed models of firm life cycle in existing accounting literature.

4.2.2.1 Start-up Stage

In the start-up stage, there are few assets-in-place and a large portion of a start-up firm's value consists of the value of its ideas, intellectual property and growth opportunities (Hand, 2005). Thus, attempts to innovate will predominate during this stage in which firms are expected to undertake strategies that involve substantial innovations in product lines, risk taking and surpassing the competitor (Miller and Friesen, 1983). Start-up firms also usually experience low levels of initial sales and profit, and commonly incur losses, due to high start-up costs (Pashley and Philippatos, 1990) and negative operating cash flows and, hence, pay virtually no dividends (Black, 1998; Dickinson, 2009). Firms in the start-up stage of the life

cycle are characterised by a high degree of risk and uncertainty about their continued survival (Mueller, 1972). Thus earnings at this stage are expected to be more volatile and less permanent.

Although the firm may need financing in the start-up stage to be able to invest in positive net present value growth opportunities (Black, 1998), the high degree of uncertainty at the early stage of the life cycle makes it difficult for most start-up firms to raise outside capital. As a result, these firms usually rely on owners' resources or capital. Restricted access to funds, coupled with the difficulty of attracting equity financing, also results in heavy reliance on short-term financing such as trade credit and short-term loans from banks (Pashley and Phillippatos, 1990).

4.2.2.2 Growth Stage

In the growth stage, the fraction of firm value attributable to assets-in-place has increased although, similar to the start-up stage, growth opportunities form a large fraction of the overall firm value (Black, 1998; Hand, 2005). Consequently, growth firms place more emphasis on strategies that can sustain organisational competencies such as through substantial or incremental innovation in product lines or broadening the product or market scope into closely related areas (Miller and Friesen, 1983). Also, once the firm enters the market, it starts generating sales, earnings and operating cash flows and may start paying dividends (Pashley and Philippatos, 1990; Black, 1998). At this stage, the risk and uncertainty associated with the future survival of the firm are reduced slightly although they remain relatively high (Mueller, 1972). Obtaining necessary financing is still a concern, thus, these high growth firms typically resort to the equity market to raise capital (Mueller, 1972; Pashley and Phillippatos, 1990).

4.2.2.3 Mature Stage

Contrary to the growth stage, assets-in-place dominate firm value during the mature stage of the life cycle and growth opportunities decrease substantially (Black, 1998; Jenkins et al., 2004), which means that investments are now less rewarding. In terms of strategy, this will shift from major or incremental innovation to capitalising on efficiencies. As the market has become saturated, strategies such as imitation, lobbying and advertising become substitutes for innovation and support greater efficiency (Miller and Friesen, 1983). Mature firms are also characterised by strong cash flow from operations and positive, more stable and permanent earnings (Black, 1998; Martinez, 2003; Hand, 2005), thus reducing the needs for external financing. At this stage, the firm has high internally generated funds and, thus, has the capacity to distribute high dividends (Pashley and Phillippatos, 1990). As its uncertainty is low, managers also become more risk-averse (Martinez, 2003).

4.2.2.4 Revival Stage

Firms in the revival stage exhibit similar characteristics to the firms in the mature stage, except for their decreasing but fairly stable earnings (Dickinson, 2009). This is attributable mainly to the highly heterogeneous, competitive and dynamic environment faced by these firms (Miller and Friesen, 1984). This stage is described typically as a phase of diversification and expansion of product and/or market scope by firms to maintain their positions in the market (Miller and Friesen, 1984; Lester et al., 2003). Similarly, Dickinson (2009) argues that as competition increases, markets become more saturated and operating profits start to decline, firms are forced either to rejuvenate their operations through structural changes, such as mergers, acquisitions and joint ventures, or through expansion into other markets. Therefore, the revival stage can result in firms acquiring additional assets to foster innovation and/or liquidating unproductive assets-in-place in their attempt to channel those resources into new projects that can generate positive returns.

4.2.2.5 Decline Stage

Growth opportunities are likely to be limited in the decline phase, although a large fraction of firm value is made up of assets-in-place (Black, 1998). Firms at this stage have low levels of innovation and resort to strategies such as price-cutting, consolidation of product markets and liquidation of subsidiaries (Miller and Friesen, 1984). Declining firms also experience a significant drop in sales leading to losses and, as a consequence, dividend distribution ceases (Pashley and Phillippatos, 1990). These declining firms are not necessarily going to fail because they can regenerate by investing in new product lines and technology. They can either return to the growth and/or mature stage or forestall failure for many years. At this stage, the ability to generate future cash flows is largely restricted compared to other stages. Furthermore, as investors realise that the firm is in decline, a firm's financing opportunities are more limited or costly (Black, 1998).

Several life cycle models do not consider decline as an explicit life cycle stage for a number of reasons (Hanks et al., 1993; Lester et al., 2003; Elsayed and Paton, 2009). First, it is argued that decline can occur at any time and in any stage of the firm's development; and second, the effect of decline is less predictable if it is compared with the effect of growth and expansion. Miller and Friesen (1984) and Lester et al. (2003), however, argue that decline stage should be incorporated in the life cycle models as a separate identifiable set of organisational activities and structures. Miller and Friesen (1984) for example, show that during the twenty-year time span of their longitudinal study, several firms such as Ford, Volkswagenwerk, United Airlines and Macy's were found to experience periods of decline without going out of business.

The above discussion indicates that while the characteristics of firms in the growth, mature and decline stages can be differentiated quite clearly, firms in the start-up and growth stages appear to share relatively similar characteristics. Similarly, mature and

revival firms exhibit comparable characteristics, which makes it difficult to distinguish between these two stages of life cycle.

4.2.3 Limitations and Importance of the Firm Life Cycle Concept

While a comparison among the life cycle models suggests a generally consistent and predictable sequence of firm development, these models suffer from a relatively wide variance in the number of stages and the measures used to delineate the various stages of development. In fact, these inconsistencies are considered the main limitations in employing the life cycle concept and can be attributed to the lack of: (1) a proper definition of life cycle stages; (2) the specificity in the use of measures to distinguish life cycle stages; and (3) the empirical research to validate the models (Olson and Terpstra, 1992; Hanks et al., 1993; Elsayed and Paton, 2009).

With no consensus on the definition of the life cycle stages, it is hard to identify directly the dimensions to be utilised in describing and distinguishing between life cycle stages. Consequently, this will affect the number of stages proposed in the life cycle models. The varying number of stages also means studies have to deal with issues such as the model or number of stages that best reflect the evolution or development of a firm and whether all firms evolve through the same series of stages. Finally, most of the life cycle literature is conceptually rather than empirically developed. Therefore, this suggests that further empirical evidence is needed in this area of research.

The dearth of empirical studies is mostly attributable to the difficulties in operationalising the life cycle concept, which is closely related to the lack of specificity in measures used to classify firms into life cycle stages (Olson and Terpstra, 1992; Hanks et al., 1993; Elsayed and Paton, 2009). For example, among the most commonly used firm-dimensions in life cycle models is firm size but few specific measures are provided to operationalise this particular dimension. While

Flamholtz (1986), for instance, employs annual sales growth as a measure of size, the same measure is used in Anthony and Ramesh (1992) for firm growth rate. Miller and Friesen (1983) and Hanks et al. (1993), on the other hand, use number of employees to measure firm size.

In addition, other dimensions, for example, those concerning organisational structure are addressed only in general categorical terms (Hanks et al., 1993). Consequently, life cycle stage descriptions remain vague, resulting in the need for a certain degree of discretion to determine into which particular stage a firm currently falls. Hence, there are suggestions to move from the broad categorical measures of firm life cycle dimensions to higher level measures that are more amenable to empirical analysis and provide greater specificity for classification purposes (Olson and Terpstra, 1992; Hanks et al., 1993). Several financial accounting studies that apply the life cycle concept (Pashley and Philippatos, 1990; Anthony and Ramesh, 1992; Black, 1998) appear to have a strong foundation in developing these measures to distinguish firm life cycle stages. Nonetheless, similar to other methods, the methodology is subject to criticism. For example, because these studies have defined life cycle stages a priori using existing conceptualisations, it is argued that this could lead to potential over-simplification in classifying firms into a predetermined number of life cycle stages (Elsayed and Paton, 2009).

In addition, while the conceptual literature generally postulates a fairly consistent, structured and not easily reversed sequence of stages, progressing from start-up to growth to maturity and finally to revival or decline (Greiner, 1972; Adizes, 1979; Quinn and Cameron, 1983), subsequent longitudinal empirical studies provide some evidence of a non-deterministic sequence of life cycle stages (Tichy, 1980; Miller and Friesen, 1984). Specifically, it is found that although a majority of the firms tend to demonstrate long-term evolutionary patterns similar to those proposed by the life cycle literature, there are still some firms that fail to exhibit the common life cycle progression. This suggests a large number of transitional paths available to

organisations and that firm development does not necessarily conform to the predictable paths proposed in the life cycle theory. Overall, it is important to recognise that there are inherent limitations in the development and application of the life cycle concept before determining which model is the most suitable to be used in this study.

Despite the criticisms surrounding the life cycle concept, it is nonetheless an important tool in understanding organisations (Olson and Terpstra, 1992) and has been extensively applied to various disciplines such as micro-economics (Grabowski and Mueller, 1975), strategic management (Miller and Friesen, 1984; Hanks et al., 1993) and, more recently, in financial accounting (Pashley and Philippatos, 1990; Anthony and Ramesh, 1992; Black, 1998), management accounting (Moores and Yuen, 2001; Chen and Kuo, 2004; Kallunki and Silvola, 2008) and finance (Berger and Udell, 1998). The fundamental consensus among the extant life cycle authors is that as firms move through the various stages of development, differing problems must be addressed, resulting in the need for different management skills, financial decisions and priorities as well as structural configurations (Davis, 1951; Chandler, 1962; Mueller, 1972; Gup, 1980; Miller and Friesen, 1983; Smith et al., 1985).

The value in understanding the firm life cycle lies in the ability to identify where the firm is in its life cycle and to recognise critical organisational transitions as well as pitfalls the firm should seek to avoid. This, in turn, will enable managers to make strategic or more informed decisions that can ensure sustained firm investments, growth and value (Gup, 1980; Hanks et al. 1993).

4.3 Firm Life Cycle and Accounting Choice

The purpose of this section is to establish a link between firm-specific characteristics that can be represented by firm life cycle stages and managerial decisions concerning accounting choice, especially for intangible assets. Numerous studies have been

conducted to investigate the association between firm life cycle stages on accounting choice, including for intangible assets, either directly or indirectly (Skinner, 1993; Aboody and Lev, 1998; Dhaliwal et al., 1999; Oswald and Zarowin, 2007; Oswald, 2008). Earlier studies such as Skinner (1993) and Dhaliwal et al. (1999) do not examine directly the effect of firm life cycle stages on accounting choice but focus on firms' investment opportunity sets (IOS) or the relative mix between assets-in-place and growth opportunities that characterises the concept of firm life cycle stages. They, however, provide some evidence on the link between firm life cycle stages and accounting choice.

For example, Skinner (1993) argues that a firm's composition of assets-in-place versus growth opportunities affects accounting choice indirectly through its effect on firm contracts or, more specifically, a firm's use of debt covenants and bonus plans. Firstly, he argues that firms with relatively more assets-in-place (low growth firms) will be more highly levered than firms whose value is composed principally of growth opportunities (high growth firms). This is because firms generally only issue risky debt that can be supported by assets-in-place. Since debt covenants are written to reduce the conflict of interest between firms' shareholders and bondholders (Smith and Warner, 1979), bondholders of firms with higher financial leverage require a higher degree of protection.

Prior studies indicate that firms with high levels of financial leverage are associated with the use of income-increasing accounting choices to loosen debt-covenant constraints. Thus, Skinner (1993) hypothesises that low growth firms are more likely to choose income-increasing accounting policies because of debt covenants. Secondly, he also argues that low growth firms are more likely to employ accounting earnings numbers in compensation contracts because these numbers reflect better performance for these firms. The contractual terms of these bonus plans, in turn, provide managers with incentives to make income-increasing accounting choices.

Thus, he predicts that low growth firms are more likely to choose income-increasing accounting choices.

Consistent with the hypotheses, firms with high financial leverage and earnings-based bonus plans are found to be more likely to select income-increasing accounting choice. The findings also indicate that low growth firms are more likely to employ earnings-based debt covenants in their public debt contracts and bonus plans that tie bonuses directly to accounting earnings. As a result, Skinner (1993) concludes that given the nature of the firms' contracts, low growth firms (firms with more assets-in-place) have greater incentives to select income-increasing accounting choice.

Dhaliwal et al. (1999) extend Skinner (1993) by providing a framework that supports a direct link between the IOS and accounting choice. Dhaliwal et al. (1999) refer to both Miller and Modigliani's (1961) and Myers's (1977) models of firm value to provide a conceptual framework for describing the IOS and distinguishing between high and low growth firms. High growth firms are viewed as those with lower levels of assets-in-place and higher levels of growth opportunities and vice versa for low growth firms. The role of the IOS in management's decision to capitalise or expense significant costs is examined in two different settings: (1) accounting for exploration and development (E&D) costs by firms in the oil and gas industry; and (2) accounting for R&D costs by firms across industries prior to 1974. This is the period prior to the adoption of SFAS 2 that requires the direct expensing method for R&D costs.

Dhaliwal et al. (1999) argue that the association between the IOS (as represented by the composition of assets-in-place and growth opportunities) and the decision to capitalise or expense is influenced by managerial incentives to reduce the variance of accounting earnings. In particular, they hypothesise that high growth firms are more likely to have more variable earnings, which creates greater incentives for these

firms to reduce earnings variability compared to their low growth counterparts. Consequently, high growth firms are more likely to capitalise their E&D and R&D costs since this accounting method generally results in a lower variance of reported earnings than the expensing method.

The results show that high growth firms in both the oil and gas and R&D samples have significantly higher coefficients of variation in their earnings stream than low growth firms. More importantly, the findings indicate that even after controlling for firm size and debt contracts, high growth firms are more likely than low growth firms to select the capitalisation method of accounting for both E&D and R&D costs. This provides support for the proposition that the relative mix of assets-in-place and growth opportunities that underpin the firm life cycle concept affects accounting choice for both E&D and R&D costs by providing managerial incentives to reduce the variance of accounting earnings. Further, this suggests that the findings of both Skinner (1993) and Dhaliwal et al. (1999) are consistent with the assumption in relation to the opportunistic use of accounting choice by managers to manipulate earnings.

In examining the value relevance of software development costs in accordance with the treatment proposed by SFAS No. 86, Aboody and Lev (1998) distinguish their sample as capitalisers or expensers. This is done to investigate whether capitalisation is practised by underperforming firms acting opportunistically to enhance reported earnings and also to control for the endogenous effect of accounting choice in value relevance tests. Capitalisation intensity, measured as the annually capitalised software development cost divided by year-end market value, is regressed on several firm-specific attributes to investigate capitalisation accounting choice. The results indicate that smaller, less profitable, more highly leveraged firms and those with higher development intensity (as measured by the ratio of development costs to sales) tend to capitalise more of their software development costs. These

characteristics are consistent with those of the firms in the early stage of their life cycle.

Following Aboody and Lev (1998), Tutticci et al. (2007) and Oswald and Zarowin (2007) also control for firm-specific characteristics in their value relevance tests. Tutticci et al. (2007) find that R&D capitalisation is associated with firm age, leverage, R&D intensity and firms' growth opportunities. Specifically, the analysis reveals that firms that demonstrate the characteristics of the early stage of life cycle are more likely to capitalise R&D costs. These are younger firms and firms with higher levels of R&D investment, leverage and growth opportunities. Similarly, Oswald and Zarowin (2007) find evidence of significant group differences when sample firms are categorised into capitalisers and expensers and conclude that the capitalisation versus expense accounting choice is a function of a firm's life cycle stage. Capitalisers are found to exhibit the characteristics typical of early life cycle firms (smaller, riskier and less profitable firms), whereas expensers reflect the characteristics of more mature firms. Overall, this suggests that firm-specific characteristics as captured by firm life cycle stages have an effect on managerial decisions to capitalise or expense intangible expenditures.

In another study, Oswald (2008) examines the determinants of the choice of accounting for intangible assets (R&D costs) of U.K. firms. Nine variables are used as empirical proxies to capture firm life cycle: earnings variability (a measure of risk and persistence), profitability, firm size (market value of equity), market-to-book ratio (a measure of risk and growth), R&D intensity, leverage, beta, firm age and R&D steady-state. The choice to capitalise versus expense R&D costs is examined using a logit regression. The overall findings indicate that the decision to expense versus capitalise R&D costs is a function of firm life cycle stages. Specifically, smaller firms, firms with greater earnings variability, higher leverage, negative earnings, less R&D intensity and those firms not in steady-state in relation to their R&D programs are more likely to choose to capitalise their R&D costs.

Nonetheless, because the author refers to a variety of firm characteristics as a representation of firm life cycle stages, without identifying these characteristics into specific life cycle stages (such as high growth versus low growth or growth versus mature) conflicting conclusions can be formed in relation to the link between a particular firm life cycle and accounting choice. For example, smaller firms, firms with greater earnings variability, higher leverage and negative earnings correspond to the characteristics of firms in the early stage of their life cycle, while firms with less R&D intensity and not in the steady-state of their R&D programs are representative of firms in the maturity stage of their life cycle. The implication is that although the results provide evidence of accounting choice for R&D costs as a function of firm life cycle stages, the decision either to capitalise or to expense cannot be attributable solely to a particular group of firms.

Finally, Oswald (2008) argues that linking the accounting choice for intangible assets to the concept of firm life cycle is consistent with Lev et al. (2007) who found that the effect of accounting choice on reported profitability is influenced by firm life cycle stages. In addressing the highly debated issue of accounting choice for internally generated intangible assets, Lev et al. (2007) argue that no accounting practice can be applied consistently throughout a firm's life. They argue that over the lifetime of a firm, if reported earnings under a conservative accounting practice are understated (relative to a less conservative practice) during certain periods, they have to be overstated in other periods. This is essentially because conservative and aggressive accounting practices shift earnings from one period to another. In the early stage of firm life cycle, when the growth of intangible investment typically exceeds the firm's return on equity, capitalisation is regarded as a more attractive accounting method choice because it enhances reported earnings. However, as the firm matures, its profitability increases while the rate of intangible investment declines. At this stage, the increasing amortisation charges of the capitalised assets largely offset the income-enhancing effect of capitalisation, making expensing a more attractive accounting choice in maximising earnings.

Thus, Lev et al. (2007) hypothesise that if R&D expenditures have any future economic benefits under any period of the firm life cycle, immediate expensing will produce systematic performance reporting biases (understated or overstated earnings) relative to earnings reported under R&D capitalisation. The general findings indicate that the differences between R&D growth rates and key profitability measures (earnings momentum and return on equity) lead to systematic reporting biases in the profitability measures. Specifically, firms with high R&D growth rates relative to their profitability, which are typically firms in their early life cycle stage, are more likely to report profits conservatively (understate earnings), whereas firms with low R&D growth rates relative to their profitability or mature firms tend to report profits aggressively (overstate earnings).

Overall, the discussion in this section reveals that there is no specific study that directly examines accounting choice in the light of the firm life cycle concept discussed in Section 4.2, that is, by classifying firms into particular life cycle stages. However, the discussion enables an inference to be made based on the characteristics of firms that can translate into firm life cycle stages. Therefore, it can be concluded that previous studies, in general, have provided evidence on the effect of firm life cycle on accounting choice.

4.4 Firm Life Cycle and the Value Relevance of Accounting Information

Section 4.2.2 emphasised that the characteristics of an individual firm vary significantly across its life cycle stages due to the differences in the opportunities and challenges faced and strategies undertaken by the firm. Black (1998) argues that because firm's characteristics differ across life cycle stages, the relative value relevance of accounting measures may not be the same in each stage. Beginning with Anthony and Ramesh (1992), a line of empirical financial accounting research has focused on better understanding the effect of firm life cycle stages on the value

relevance of key accounting information such as sales, earnings, profitability, cash flows and capital expenditures (Black, 1998; Martinez, 2003; Jenkins et al., 2004; Kousenidis, 2005; Xu and Cai, 2005) as well as on intangible assets (Chin, Tsao and Chi, 2005).

Anthony and Ramesh (1992) examine the effect of firm life cycle on the value relevance of two main accounting performance measures, sales growth and capital expenditure, using the market-based approach of stock market response. Based on life cycle theory, they posit that appropriate growth and capital capacity strategies undertaken by a firm are a function of its life cycle stage. The argument is that changes in sales growth and capital expenditure signal the strategic emphasis undertaken by the firm and that the cost effectiveness of these strategies is highest in the early stage of firm life cycle. Thus, they hypothesise that unexpected positive sales growth and capital expenditure are most valued by the capital market during the growth stage and least valued during the decline stage of the firm life cycle. The test of the life cycle hypothesis is conducted by regressing the cumulative abnormal return (CAR) from the market model on three accounting performance measures; unexpected earnings, capital expenditure and sales growth, with dummy variables representing the life cycle stages (growth, mature and decline).

In general, the results indicate that the stock market reaction to performance measures, that is, the value relevance of sales growth and capital expenditure, is a function of firm life cycle stage. Specifically, the univariate analysis shows that the response coefficients of unexpected sales growth and capital expenditure are higher for growth firms compared to mature firms. For the multivariate procedure, the results indicate a nearly monotonic decline both in the magnitude and statistical significance of the response coefficients of unexpected sales growth and capital expenditure from growth to decline stages. Additional analyses also reveal that this relation is robust even after taking into consideration firm size effects, differences in firm risk or the time-series properties of performance measures across life cycle

stages. However, although the authors also include an earnings variable in their regressions, they neither identify any hypotheses concerning this variable nor discuss reasons for the change in the coefficient.

Most subsequent financial accounting studies that consider the role of firm life cycle employ a similar methodology to that of Anthony and Ramesh (1992). These studies provide evidence of the increase of both incremental and relative value relevance of earnings and cash flow information when sample firms are partitioned on the basis of life cycle stages (Black, 1998; Jenkins et al., 2004; Aharony, Falk and Yehuda, 2006). Black (1998), for example, investigates the value relevance of earnings and cash flow measures across life cycle stages using the Feltham and Ohlson (1995) model. He hypothesises that earnings and operating cash flows are value relevant in the growth, mature and decline stages while investing and financing cash flows are value relevant in the start-up and growth stages. In keeping with Anthony and Ramesh (1992), firms are assigned to growth, mature and decline stages using a multivariate classification method. However, since there is no guideline in Anthony and Ramesh (1992) in relation to the classification for start-up firms, four main criteria unique to the study are used in Black (1998) to classify firms into the start-up stage.

Based on the Ohlson (1995) valuation model, earnings and all three measures of cash flow (operating, financing and investing) are included in the value relevance test for each life cycle stage. The findings show that, in general, firm life cycle stages influence the value relevance of earnings and cash flow measures. Specifically, there is evidence of incremental earnings value relevance for firms in the growth, mature and decline stages but not in the start-up stage. Further, all cash flow measures are found to be value relevant in the growth and decline stages. Investing and financing cash flows are incrementally value relevant for firms in the start-up stage, while operating cash flows are incrementally value relevant for firms in the mature stage.

Jenkins et al. (2004) extend both Anthony and Ramesh (1992) and Black (1998) by examining the relative value relevance of key accounting performance measures that compose and drive aggregated earnings across different firm life cycle stages. They maintain that the disaggregated components provide a better mapping of accounting data to firms' strategic choices. Therefore, a model containing the disaggregated components better explains the returns-earnings association compared to the aggregated amount. Specifically, earnings are disaggregated into three components; earnings change from change in sales, earnings change from change in profitability and an interaction term comprising both sales change and profitability change, which are regressed on stock returns. The results show that there is a shift in the relative value relevance of earnings components from change in sales to change in profitability as firms move through their life cycle. In particular, when firms are in the growth stage, change in sales is more highly valued by the investors. However, as firms progress into the later stages of the life cycle of maturity and decline, the change in profitability becomes proportionately more important with respect to the value relevance of earnings. Additionally, the findings also reveal that controlling for different life cycle stages significantly improves the explanatory power of the returns-earnings model in general.

Unlike Black (1998) who concentrates on the incremental value relevance of earnings and cash flows, Aharony et al. (2006) investigate the value relevance of the three cash flow measures relative to three corresponding accrual accounting measures by employing more recent data. Using Anthony and Ramesh's (1992) classification methodology, sample firms in the study are divided equally into three life cycle groups; growth, mature and decline. Two regression models are used to investigate the value relevance of cash flow information relative to its accrual counterparts. These models examine the association between: (1) stock return and changes in the three cash flow measures; operating, investing and financing cash flows; and (2) stock return and changes in income, investment in non-current assets and capital financing transactions. The results reveal that when the sample is

considered as a whole, the explanatory power of the cash flow information set is not significantly different from that of the accrual accounting set. However, when firm-year observations are categorised into the life cycle stages the explanatory power of both cash flows and accruals information in each life cycle stage increases compared to that of the whole sample, suggesting an increase in value relevance. The findings also indicate that all three cash flow measures are more value relevant than accrual measures in the growth stage of the firm life cycle. However, accrual measures are more value relevant than cash flow measures for firms in the mature and decline stages.

Martinez (2003) investigates the impact of firm-specific attributes such as size, level of debt and firm life cycle on the relative value relevance of earnings and cash flows under French GAAP. However, in contrast to previous studies, the market-to-book ratio is used as the proxy for classifying firms into two life cycle stages which are growth and mature. The overall findings report that size, level of debt and firm life cycle have significant effects on the value relevance of earnings and cash flows. Specifically, the results show that accounting information regarding the earnings level is more value relevant for firms that are small, have high debt levels and are in the growth stage of the life cycle. In contrast, earnings change is more value relevant for large firms, firms with low levels of debt and mature firms. However, with regards to cash flows, the results indicate that the information is not regarded as value relevant by investors. The author attributes such findings to the practices of French financial analysts who tend to focus on earnings variables. The findings suggest the potential impact of different accounting regulatory settings on the association between firm life cycle stages and the value relevance of accounting information.

Similarly, Kousenidis (2005) provides evidence that the life cycle effect may be sensitive to the accounting regulatory setting by examining the effect of firm size and life cycle on the value relevance of earnings for a sample of Greek firms. The

association between earnings and stock returns is tested using the model developed by Easton and Harris (1991) that incorporates both earnings levels and change. Similar to most of the prior studies, the life cycle classification follows the multivariate ranking procedure of Anthony and Ramesh (1992). The results indicate that in a simple earnings-returns model, both the earnings levels and change are not considered by investors to provide value-relevant information. Consistent results are obtained even when the tests are conducted across the life cycle sub-samples in which no evidence is found to support the prediction that earnings value relevance is influenced by differences in firm life cycle stages. Kousenidis (2005) argues that the inability of the study to provide support for the life cycle hypothesis in accordance with those obtained from larger and more mature capital markets could indicate the potential manipulations of earnings figures.

In another study, Hand (2005) investigates the value relevance of financial and non-financial information within and across the pre-IPO private equity market (or venture capital market) and post-IPO public equity market for a sample of U.S. biotechnology companies. This venture capital market consists of typically intangible-intensive and technology-orientated private firms that are funded by investments from venture capital partnerships, corporations, pension funds and university endowments. The firms are characterised as smaller, younger and riskier than the majority of firms in public equity markets but engage in fundamentally the same kinds of operating, financing and investing activities as firms in public equity markets.

The financial statement variables used in Hand's (2005) regressions are the major components of a firm's balance sheet and income statement. Non-financial statement information is defined as firm-specific information that is correlated with future investment opportunities (such as the number and scope of patents issued, firm age and the number of upstream and downstream strategic alliances) and non-firm-specific information that is correlated with the profitability of existing investment

and/or industry- and economy-wide future investment opportunities (such as the level of equity values in the firm's industry). The findings reveal that financial statement data and non-financial statement information are information substitutes rather than complements. Specifically, as firms mature or progress into the post-IPO public equity market, the value relevance of their financial statements increases, while the value relevance of non-financial information decreases. The author argues that this divergence occurs because as firms mature, the importance of assets-in-place increases relative to that of investment opportunities and financial statement data are better than non-financial information at reflecting the value stemming from assets-in-place.

In contrast to prior studies that investigate mostly earnings and cash flows, Chin et al. (2005) focus directly on intangible assets by examining whether the association between trademarks and accounting performance is a function of firm life cycle stages. Using a sample of 1,386 firm-year observations of publicly-listed Taiwanese firms, they investigate whether trademarks are valued differently in an environment where legal protection of trademarks is relatively poor compared to developed markets. They also examine the role of life cycle stages in explaining the association between trademarks and firm performance. The underlying assumption is that firms can create permanent cost and/or revenue or demand advantages over competitors if they acquire trademarks in the early stage of their life cycle. On the other hand, investment in trademarks is less rewarding in the later part of the life cycle (mature and decline stages). Thus, a monotonic decline in economic benefits arising from trademarks is hypothesised from the early to the later stages of the firm life cycle. The study also adopts Anthony and Ramesh's (1992) method to classify sample firms into life cycle stages.

The results indicate that even in an emerging market with weak legal protection of intellectual property, trademarks can increase firm performance. Also, as predicted, the evidence suggests that trademarks have a higher effect on firm performance for firms in the growth stage than firms in the mature and decline stages of the life cycle.

Finally, the results also indicate a monotonic decline in the estimated trademark value from the early to the later firm life cycle stages.

In general, a review of the literature provided in this section establishes a link between firm life cycle stages and the value relevance of accounting information provided by firms. Thus, it highlights the importance of considering the impact of firm life cycle stages when conducting value relevance tests.

4.5 Linking Firm Life Cycle to Intangible Assets, Accounting Choice and Value Relevance

The value of a firm can be represented by its present value of assets-in-place as a result of past investments and the present value of future profitable investments or growth opportunities (Miller and Modigliani, 1961; Myers, 1977). The value of assets-in-place relative to the value of growth opportunities changes as a firm develops through its life cycle and is expected to differ in each of the life cycle stages (Black, 1998). For example, as discussed in Section 4.2.3, when a firm is first set up, its value consists almost exclusively of ideas the founders or owners have for profitable future investments, which are in the form of growth opportunities, rather than its assets-in-place (Myers, 1977). However, as the firm matures, its growth opportunities are financed and converted into assets (and liabilities) and the fraction of value attributable to its assets-in-place increases relative to that of its growth opportunities. Based on Myers' (1977) framework, Black (1998) proposes that, at a given time, a firm's value relevant attributes consist of the following six factors.

1. Liquidation value of assets-in-place;
2. Amount of future cash flows from assets-in-place;
3. Risk of future cash flows from assets-in-place;
4. Amount of future cash flows from growth opportunities;
5. Risk of future cash flows from growth opportunities; and

6. Value of the option to invest in growth opportunities.

Throughout the firm life cycle, although firms are required to report the same information, differential value relevance of accounting information occurs because the set of value relevant attributes about future cash flows for the two components of assets-in-place and growth opportunities is different in each life cycle stage (Black, 1998). Furthermore, assuming market efficiency with respect to public information, the information conveyed by accounting numbers about these attributes can change over the firm life cycle. In order to be value relevant, accounting numbers must provide information about at least one of the six factors. If the relative importance investors place on each of these six factors differs in different stages of the life cycle of the firm, then the value relevance provided by accounting numbers is also likely to be different. This suggests that a firm, at different stages of its life cycle, can be valued differently depending on the relative proportion of its assets-in-place and growth opportunities.

Assets-in-place are generally tangible assets such as property, plant and equipment (PPE) and financial assets whose value to the firm can be approximated by market values independent of the firm's strategy (Dhaliwal et al, 1999; Godfrey and Koh, 2001). Growth opportunities,[3] on the other hand, are real options that a firm has or may create to make future investments that earn a rate of return in excess of its opportunity cost of capital (Myers, 1977). Thus, a distinguishing feature of growth opportunities is that their value depends on future managerial discretion which, in turn, is contingent on the evolving market and/or technological conditions (Kester, 1984; Godfrey and Koh, 2001). This indicates that assets-in-place and growth opportunities can be viewed as tangible and intangible assets, respectively. Viewing Myers' (1977) distinction between assets-in-place and growth opportunities as tangible and intangible assets, respectively, is also consistent with Godfrey and Koh (2001) and Skinner (2008).

[3] The terms growth opportunities, real options, growth options and investment opportunities are used interchangeably (see, for example, Myers, 1977; Kester, 1984; Skinner, 2008).

Growth opportunities are firm-specific and to some extent are embodied in real assets and can also be generated by experience curves, learning-by-doing or via direct expenditure in research and development, advertising and training. Growth opportunities can be further classified into two main components: growth opportunities from assets already in place; and growth opportunities from new assets (Sudarsanam, Sorwar and Marr, 2006). The first component includes, for example, traditional investments such as maintenance and replacement projects, mining or exploration rights, patents that result from R&D investments already made, product or process improvements and market extension for existing products. The opportunities represented by this component are short-dated opportunities of an incremental nature. Meanwhile, examples of the second component include R&D on new technology, entry into a new market, acquisitions of other firms and investments in advertising, marketing and knowledge assets that can lead to new investment opportunities that, in turn, affect the value of existing growth opportunities. Also, in contrast to the first component, these particular opportunities are long-dated opportunities of a more speculative kind and, therefore, are characterised by greater uncertainty.

As discussed in Chapter 2, investments in intangible assets give rise to two major sources of value: (1) operating and investing flexibility arising from the collection of options generated by managers' past investments that enable them to time and/or revise investment decisions at some future point in time; and (2) strategic value arising from interdependencies between existing (accumulated options and capabilities) and future sequential investment decisions which represent the characteristics of growth opportunities. This suggests that intangible assets, in general, contribute to a firm's value creation as they give rise to growth opportunities (Myers, 1977; Godfrey and Koh, 2001; Abernethy et al., 2003; Sudarsanam et al., 2006). Exploitation of these growth opportunities requires investments and whether such investments will be made depends on the result of initial investments to develop intangible assets. Thus, intangible assets represent an

option to pursue growth or to abandon such opportunities. This discussion illustrates that intangible assets, whose value is relatively unobservable and highly contingent on future managerial discretions, constitute a significant part of growth opportunities.

In summary, the facts that: (1) firm value at a particular time is represented by assets-in-place and growth opportunities; (2) the proportion of assets-in-place and growth opportunities varies in accordance with firm life cycle stages; and (3) firm life cycle can be linked to intangible assets through growth opportunities, have two important implications. First, because the proportion of these two firm value components differs in each life cycle stage, the value relevance of intangible asset information will be different depending on the firm's position in its life cycle stages. Second, due to the varying proportion of firm value components, firms in different stages of their life cycle will have different needs with regard to accounting choice for intangible assets, especially in signalling firm value and reducing information asymmetry. This implies that the effect of accounting choice for intangible assets on the value relevance of these assets is potentially moderated by firm life cycle stages.

4.6 Summary

In this chapter, an overview of the framework concerning firm life cycle stages, including the definition, models, limitations, importance and characteristics of firm life cycle stages was presented. A review of the literature conducted in this chapter also revealed the potential influence of firm life cycle stages on both accounting choice and value relevance of accounting information. Finally, the link between firm life cycle stages and intangible assets through growth opportunities was presented and discussed. This is important in establishing the relationships among firm life cycle stages, accounting choice for intangible assets and the value relevance of these assets. The hypotheses concerning these relationships are proposed in the next chapter.

CHAPTER 5

HYPOTHESES DEVELOPMENT

5.1 Introduction

In Chapter 2, a framework for understanding issues associated with intangible assets was provided. It was established in that chapter that intangible assets represent an important value driver of firms' growth, success and survival, particularly in the modern economy. Nonetheless, despite their increasing significance, accounting for intangible assets has been, and still is, an unfinished and controversial task. Chapter 2 also demonstrated that the mismatch between the economic characteristics of the assets and financial accounting reporting models has led to their under-recognition in conventional financial statements. As a result, there are concerns that this can have adverse effects on the usefulness or value relevance of information provided in those financial statements.

However, it was also highlighted in Chapter 2 that the recognition of intangible assets is always a two-sided argument in that it can be used by managers to act opportunistically in managing accounting numbers, resulting in information that does not reflect firm value (managerial opportunism argument); or it can be used by managers as a signalling mechanism to reduce information asymmetry by conveying their superior inside information, hence, maximising firm value (efficient signalling argument). Chapter 2 also showed how the substantially different requirements in the pre- and post-AIFRS periods in Australia provide an interesting setting to investigate further the issues concerning the different accounting treatments for intangible assets.

In Chapter 3, a review of the literature addressing the concerns of the value relevance of accounting information, in general, and intangible assets, in particular, was presented. Overall, it provided evidence on the value relevance of accounting choice for intangible assets, in which the managerial decision to capitalise is generally associated with higher value relevance of intangible asset information. Chapter 3 also indicated that the value relevance tests can be used to examine the managerial opportunism versus efficient signalling argument discussed in Chapter 2. Specifically, evidence of value-relevant information will provide support to the use of capitalisation in signalling managers' private information to investors, as this information is impounded in firm value. The lack of value relevance, on the other hand, may indicate that capitalisation of intangible assets is viewed by the investors as a signal of managerial opportunistic behaviour. Finally, it was highlighted in Chapter 3 that there are few empirical studies to date that investigate the impact of the adoption of IFRS on the value relevance of intangible assets (Morricone et al., 2009; Oliveira et al., 2010), with only one Australian study known to investigate this issue (Chalmers et al., 2008). This is despite the amount of discussion dedicated to addressing this issue, especially in the period just prior to the adoption of AIFRS and AASB 138 in 2005.

A review of the literature concerning firm life cycle stages was provided in Chapter 4. It was noted in that chapter that firm life cycle stages may influence managerial accounting choice for intangible assets and the value relevance of accounting information. Further, a link between firm life cycle stages and the nature of intangible assets was also established to provide guidance in putting together the arguments concerning firm life cycle, accounting choice for intangible assets and the value relevance of these assets.

The purpose of this chapter is to develop a set of testable hypotheses for this study concerning the relationships among firm life cycle stages, accounting choice for intangible assets and the value relevance of such assets. Three hypotheses regarding:

(1) the effect of accounting choice for intangible assets on the value relevance of these assets; and (2) the moderating effect of firm life cycle stages on the association between accounting choice for intangible assets and the value relevance the assets, in the pre-AIFRS period, are developed in Section 5.2. Also, three hypotheses are developed in Section 5.3 concerning the impact of the adoption of AIFRS on the relationships among firm life cycle stages, accounting choice and the value relevance of intangible assets.

5.2 Intangible Assets: The Pre-AIFRS Period

As mentioned in Chapter 2, one of the distinguishing features of Australian GAAP in relation to accounting for intangible assets was the substantial managerial discretion provided particularly with respect to the capitalisation of identifiable intangible assets. This discretion was primarily due to the liberal stance on fair value accounting that has traditionally characterised Australian regulation and enforcement of financial reporting practice (Wyatt, 2002). Accounting for goodwill in the pre-AIFRS period, on the contrary, was subject to more restrictive requirements such as the prohibition of internally generated goodwill and the mandatory amortisation over a period not exceeding 20 years.

However, due to the lack of a specific standard for identifiable intangible assets, both internally generated identifiable intangible assets and internally generated goodwill can be brought on to the balance sheet using the revaluation option offered by AASB 1010. AASB 1010 was later reissued in 1999 as AASB 1010 and AASB 1041 but the requirements have not been changed substantially. This section provides a discussion in relation to intangible assets in the period prior to the adoption of AIFRS.

5.2.1 Accounting Choice for Intangible Assets and the Value Relevance of Intangible Assets: The Pre-AIFRS Period

From the review of the literature conducted and presented in Chapter 3, it can be seen that studies conducted in the pre-AIFRS period have shown an increase in the percentage of Australian firms recognising but not amortising identifiable intangible assets. This trend is consistent with the expectation that firms choose to capitalise more identifiable intangible assets in order to reduce the amount that would otherwise have been recorded as goodwill, hence, reducing the effect of goodwill amortisation charges on earnings. This indicates that there is a possibility that the discretion afforded to managers could lead to accounting manipulation in a manner that does not reflect the real economic performance of the firm, hence, supporting the managerial opportunism argument presented in Chapter 2.

However, it can also be argued that such discretion does not necessarily result in managers behaving opportunistically. Accounting choice for intangible assets can be argued to provide a potentially important mechanism for managers in communicating private information to investors in order to reduce the problem of information asymmetry and, consequently, maximise firm value, consistent with the efficient signalling argument. This is because when managers choose to capitalise intangible assets, they signal superior inside information to the market about the quality and success of these assets which, in turn, affects investors' beliefs about their future cash flows. However, the signalling mechanism undertaken by managers is costly. Therefore, the capitalisation of intangible assets can only convey value to investors and reduce the information asymmetry if the benefits of capitalisation are greater than the associated costs. This implies that management should have precise information about the expected future benefits of the investments in these assets in order to provide a credible signal and differentiate their quality. If, however, management's information about the expected future benefits of the assets is no

more precise than what is already known to the investors, then there is no value in signalling through capitalisation.

A review of prior studies in Chapter 3 has shown that despite the substantial discretion, not all Australian firms chose to capitalise intangible assets. This suggests that the constraint in formulating reliable measurement of intangible assets prevents managers abusing the discretion provided and manipulating earnings. In this circumstance, managers are aware that the costs of communicating private information may exceed the benefits associated with reduced information asymmetry. However, if managers can estimate the investment outcomes with precision and can establish that the benefits of capitalisation are greater than the costs, they have greater incentives to communicate this information via capitalisation to signal this favourable private information to investors. If this conjecture is true, and the market believes that the assets have future economic benefits, then the capitalised amount will be value relevant, thus providing support for the efficient signalling argument. If, however, the market is sceptical about the capitalisation undertaken by management, then it would not value the capitalised amount. Lack of value relevance of the capitalisation of intangible assets could indicate that managers may be acting opportunistically to manage earnings and maximise their own utility, consistent with the managerial opportunism argument. It is important to note that this study does not examine the determinants of managerial accounting choice for intangible assets but, rather, it takes the accounting choice as given. This suggests that the arguments of both efficient signalling and managerial opportunism can be used.

It was demonstrated in Chapter 3 that the empirical Australian evidence available to date suggests that managers' accounting choices to capitalise intangible assets are likely to be value relevant. Given that managers in Australia have had more discretion with respect to the reporting of intangible assets in the pre-AIFRS period, the proposition is that managers will use this discretion to reflect appropriately the

value of intangible assets and, thus, this reported information will be valued as such by the investors. This leads to the following hypothesis, expressed in the alternative form:

H1: Intangible assets capitalised during the pre-AIFRS period are value relevant

5.2.2 Firm Life Cycle, Accounting Choice for Intangible Assets and the Value Relevance of Intangible Assets: The Pre-AIFRS Period

As discussed in Chapter 4, underpinning the concept of firm value are assets-in-place and growth opportunities and the proportion of these two components changes as a firm moves through its life cycle. Assets-in-place can be represented by tangible assets whose values to the firm are more certain and can be approximated by market values. Intangible assets, whose values are highly contingent on future managerial discretion and are characterised by greater uncertainty, constitute a significant part of growth opportunities. If the relative importance investors place on factors related to these components differs in different stages of the firm life cycle, then the value relevance provided by accounting numbers is also likely to be different.

A firm in the early stage of its life cycle has almost all of its value attributable to profitable expected future growth opportunities rather than assets-in-place, so factors related to growth opportunities carry more weight when valuing the firm. Therefore, accounting numbers that provide information about the growth opportunities available to the firm are expected to be more value relevant in the early life cycle stages. However, as the firm matures, it obtains financing, makes investments and undertakes operating activities, all of which convert potential growth opportunities into actual assets-in-place. As a result, factors related to assets-in-place carry more weight in firm valuation. Similarly, a firm in the later stage of its life cycle has limited growth opportunities and relies heavily on its existing assets-in-place to

generate cash flows. Therefore, accounting numbers that provide information about the firm's assets-in-place are expected to be more value relevant during the later stage of a firm's life cycle.

The discussion in Chapter 3 showed that despite evidence in previous studies on the effect of firm-specific characteristics on accounting policy choice for intangible assets, extant studies in Australia have assumed that managerial decisions either to capitalise or to expense are similar across firms. A review of the literature in Chapters 3 and 4 has indicated that: (1) firm life cycle provides a potential explanation for the variation in firms' accounting policy choice; and (2) both accounting choice and firm life cycle affect the value relevance of accounting information, including that of intangible assets.

Thus, it is argued in this study that there are relationships among firm life cycle, accounting choice for intangible assets and the value relevance of these assets. Specifically, given managerial discretion in accounting for intangible assets in the pre-AIFRS period, it is proposed that the influence of accounting choice for intangible assets on the value relevance of these assets is unlikely to be monotonic, but, rather will vary with firm life cycle. It is conjectured that greater alignment between firm life cycle and accounting choice will result in higher value relevance of intangible assets to investors. Put differently, in the context of intangible assets, firm life cycle acts to moderate the relationship between accounting choice and value relevance.

However, it is also highlighted in Chapter 4 that the lack of consensus on the model or number of life cycle stages and the methodology used to describe and distinguish the different life cycle stages are major limitations in employing the firm life cycle concept. A review of the financial accounting literature on the application of the firm life cycle concept revealed the use of three main life cycle stages; growth, mature and decline. Further, the discussion in Chapter 4 also indicates considerable

similarities between the characteristics of firms in the start-up and growth stages and firms in the mature and revival stages, respectively. Therefore, the three-stage model introduced by Anthony and Ramesh (1992) and adopted in subsequent financial accounting studies is used in this study. In the following discussion, it is assumed that a firm moves through three main phases in its life cycle which are growth, mature and decline.

It was argued in Section 5.2.1 that firms may choose to capitalise intangible assets in order to signal private management information to investors, hence reducing the problems of information asymmetry. The incentive to capitalise is particularly more important for firms in the early stage of their life cycle or growth firms because they are subject to greater information asymmetry. Since growth firms have more of their value attributable to future growth opportunities, the inside information possessed by management should concern mainly these growth opportunities, as represented by intangible assets. As a consequence, managers of growth firms are more likely to signal the firms' economic performance such as the probability of success of their intangibles investments to the investors by selecting to capitalise intangible assets. Additionally, because investors also assign higher weights to factors associated with growth opportunities in valuing growth firms, it can be expected that the choice of capitalisation will consequently result in higher value relevance of the information concerning intangible assets for this type of firm.

In contrast to growth firms, mature firms have more valuable assets-in-place and less growth opportunities. Nonetheless, mature firms have a greater capability to forecast intangible investment outcomes, thus making them more certain. This is primarily because mature firms usually have a well established reputation, have reached feasibility on several projects and can rely on historical data better to forecast future benefits (Lester et al., 2003). These characteristics suggest that mature firms are also likely to choose an accounting method for intangible assets that can reveal their quality, thus allowing investors to assess the value of such assets. Hence, firms in

this life cycle stage have a high tendency to capitalise their intangible assets to signal the value of their intangible investments. However, because the proportion of assets-in-place dominates firm value at this stage, the inside information possessed by management of these firms should concern mainly the existing assets-in-place. As factors related to growth opportunities carry less weight in firm valuation by investors, the value relevance of capitalised intangible assets will be lower for mature firms compared to their growth counterparts. Hence, it is hypothesised, in the alternative form, that:

H2a: Growth firms that choose to capitalise intangible assets during the pre-AIFRS period have higher value relevance of intangible assets than mature firms.

In order for accounting choice for intangible assets to be a signal, it must be credible, in that low quality firms must not be able to mimic the signal. Therefore, it is predicted that firms in the decline stage of the life cycle have more incentives to expense their intangible assets. This is primarily because, first, decline firms are characterised by very limited future growth opportunities, which means that managers' decisions to capitalise intangible assets will possibly not enhance the value of their signal. Second, it is difficult for these firms to mimic other high quality firms by capitalising their intangible assets. Limited growth opportunities and high levels of uncertainty associated with future intangible investment outcomes are likely to contribute to managerial inability to formulate the appropriate accounting estimates for intangible assets. Based on these arguments, it is expected that the capitalisation of intangible assets is not likely to convey useful information to investors. However, it can be argued that managers behaving opportunistically might choose capitalisation in the decline stage to manipulate reported earnings. Therefore, the proposition in this study is that decline firms that choose to capitalise their intangible assets are likely to have the lowest value relevance of intangible assets. The next hypothesis, as expressed in the alternative form is:

H2b: Decline firms that choose to capitalise intangible assets during the pre-AIFRS period have lower value relevance of intangible assets than mature firms.

5.3 Intangible Assets: A Comparison of the Pre- and Post-AIFRS Period

It was shown in Chapter 2 that following the adoption of AIFRS and the introduction of AASB 138, accounting for intangible assets has become more restrictive. In Chapter 3, it was revealed that this change in accounting practice has generated much discussion and prediction especially with regards to the usefulness or value relevance of intangible assets. A review of the literature on the impact of AIFRS adoption on intangible assets, however, provided only very limited empirical evidence. Therefore, the aim of this section is to develop hypotheses regarding the impact of AIFRS implementation on the value relevance of intangible assets.

5.3.1 Accounting Choice for Intangible Assets and the Value Relevance of Intangible Assets: The Post-AIFRS Period

With the adoption of AIFRS in 2005, reporting for intangible assets has become more restrictive. Therefore, it can be predicted reasonably that there will be a change in the value relevance of intangible assets. Nevertheless, the effect of the adoption of AIFRS in relation to intangible assets depends primarily on firms' accounting policies in the pre-AIFRS period. The inability to capitalise research expenditure associated with the research phase of internally generated intangible assets, the de-recognition of specific internally generated intangible assets and the inability to revalue identifiable intangible assets for which there is no active and liquid market could reduce the relevance of the intangible assets in the balance sheets of firms previously engaging in such accounting practices (Chalmers and Godfrey, 2006).

It was highlighted in Chapter 3 that accounting practices in the post-AIFRS period have the potential to reduce information flows to the market mainly because managers are no longer able to signal information that is useful for firm valuation. Further, Chalmers et al. (2008) find no evidence to support the contention that the post-AIFRS measurement of identifiable intangible assets reflects valuation-relevant information incremental to that conveyed under pre-AIFRS measurement. Thus, the expectation in this study is that firms that previously chose to capitalise their intangible assets will have higher value relevance of intangible assets in the pre-AIFRS period compared to the period after the adoption of AIFRS. The hypothesis, expressed in the alternative form is:

H3: ***The value relevance of intangible assets for firms that choose to capitalise intangible assets is higher during the pre-AIFRS than the post-AIFRS period.***

5.3.2 Firm Life Cycle, Accounting Choice for Intangible Assets and the Value Relevance of Intangible Assets: The Post-AIFRS Period

The expectation on the effect of the adoption of AIFRS on the value relevance of intangible assets presented in Section 5.3.1 also extends for firms across their life cycle stages. This implies that growth and mature firms that chose to capitalise are more likely to have higher value relevance in the pre-AIFRS period compared to the post-AIFRS period. Further, the value of growth firms comprises largely growth opportunities, which means that growth firms are more likely to suffer from the problems associated with information asymmetry compared to mature firms. As a consequence, it is predicted that the substantially restrictive standard on intangible assets in the post-AIFRS period will remove or reduce managers' ability to communicate credible signals about their quality.

Hence, it is proposed that the effect in the change of value relevance of intangible assets is likely to be more pronounced in growth firms. The next hypothesis, expressed in the alternative form, is:

H4a: ***The effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is higher for growth firms than mature firms.***

Due to the very limited growth opportunities and difficulties in formulating the estimates for intangible assets, decline firms are expected to choose to expense these assets in both the pre- and post-AIFRS periods. If decline firms maintain the expensing method, then there will be no significant impact on the value relevance of intangible assets information for these firms. However, some firms may choose to capitalise in the pre-AIFRS period. As firms in the decline stage have the least amount of profitable future growth opportunities compared to growth and mature firms, it is expected that the effect in the change of value relevance of intangible assets is the lowest for these firms. Hence, it is hypothesised, in the alternative form, that:

H4b: ***The effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is lower for decline firms than mature firms.***

5.4 Summary

In this chapter, six hypotheses are developed concerning the relationships among firm life cycle stages, accounting choice for intangible assets and the value relevance of these assets. The first three hypotheses in Section 5.2 explore the relationships within the pre-AIFRS context and examine: (1) the effect of accounting choice for intangible assets on the value relevance of the assets; and (2) the moderating effect

of firm life cycle stages on the association between accounting choice and value relevance. Section 5.4 presented three hypotheses concerning the impact of AIFRS adoption on the relationships among firm life cycle, accounting choice and value relevance by comparing the pre- and post-AIFRS periods.

The following chapter describes the firm life cycle and the Ohlson (1995) frameworks as well as the research design that will be used to operationalise the testing of the hypotheses.

CHAPTER 6

RESEARCH METHOD

6.1 Introduction

The main purpose of this chapter is to present a discussion on the research method used to address the hypotheses specified in Chapter 5. First, a classification of firms into their respective life cycle stages is necessary to establish an appropriate research design. Therefore, a review of the methods for firm life cycle classification used in previous studies is discussed and, based on this review, a classification procedure is proposed for this study. This discussion on firm life cycle classification is presented in Section 6.2.

Next, to perform the tests of value relevance, this study employs the Ohlson (1995) valuation framework which is introduced and discussed in Section 6.3. Nonetheless, the use of this model in its basic form is not sufficient to answer the research questions of this study. Therefore, Section 6.4 presents the research design undertaken to operationalise the Ohlson (1995) model in order to examine empirically the hypotheses stated in the previous chapter.

6.2 Firm Life Cycle Classification

The ability to distinguish among life cycle stages can help managers to decide on and implement appropriate strategies (Galbraith, 1982) and to benchmark their performance against other firms in the same contextual setting (Hanks et al., 1993). As discussed in Chapter 4, despite the importance of the firm life cycle concept, two major problems arise in understanding and employing the concept. First, there appears to be no agreement on the operational definition that should be employed to

distinguish the life cycle stages. This results in a wide variation in the models of firm life cycle or the number of firm life cycle stages. For example, there are five-stage (Miller and Friesen, 1983; 1984), four-stage (Pashley and Philippatos, 1990), and three-stage models (Anthony and Ramesh, 1992). Second, there is also a lack of an established methodology for identifying each life cycle stage. The various methods proposed in existing life cycle studies, therefore, offer inconsistent approaches to the firm life cycle classification procedure.

This section provides a discussion on the most commonly used methodologies for classifying firms into life cycle stages and proposes a methodology suitable for this study.

6.2.1 A Review of Previous Methods for Classifying Firm Life Cycle Stages

In one of the earliest empirical studies in this area, Miller and Friesen (1983) classify firms into five different life cycle stages which are birth, growth, maturity, revival and decline, based on a series of histories for 36 firms that had been in existence for at least 20 years. This series of histories is developed based on information gathered from books, annual reports, a series of *Fortune* articles and various magazine articles written about the firms concerning their environment, organisational structures, decision-making styles and strategies. This information is later verified by top executives or former top executives of the firms via questionnaires sent to them.

The scoring of the firms' histories is performed in three stages. First, based on the information gathered, a firm's history is divided into representative periods or 'snapshots'. This is performed at the point of inflection of the firm's transition, that is, before and after any significant changes in the variables representing the firm's environment, structure, decision-making styles and strategies. The procedure ultimately yields a total of 171 profiles or periods. The second stage involves assigning scores to 24 variables at each of the 171 periods. Based on a 7-point scale,

scores are assigned according to whether the variables for the period in question are much higher, much lower or about the same as other periods in their overall history. The validity of the scores is established by comparing the results with the responses from the top executives of 12 firms who had presided over a particular period of analysis. Finally, all the 171 periods are assigned to the five phases of life cycle based on two numeric criteria (firm age and sales growth) and descriptive criteria which are based on organisational structure, decision making and strategy.

The main advantage of this method is that the development of the series of histories for each firm provides in-depth insights into its evolution over the life cycle stages, and hence, more accurate classification. Nonetheless, this also creates a major concern in that it requires a tremendous amount of information about the firms before they can be assigned to different periods. This rigorous classification method consequently leads to a relatively small sample size. Moreover, Miller and Friesen's (1983) classification criteria in which the 171 periods are assigned into five life cycle phases are conducted on the basis of their own expert knowledge, which suggests that the results are hard to replicate.

Pashley and Philippatos (1990) utilise a multivariate cluster analysis to partition voluntarily divesting firms into four stages of firm life cycle: late expansion/early maturity, late maturity/early decline, regenerating maturity and decline. This classification procedure uses measures of firm financial characteristics which are liquidity, financial leverage, operating profitability, dividend payment policy, sales generating ability and market power. A multivariate cluster analysis is performed using 18 variables, which results in four main clusters. Therefore, the divesting firms in these four clusters are classified into four life cycle stages. Table 6.1 shows the financial characteristics of the major clusters or life cycle stages used in Pashley and Philippatos (1990).

Table 6.1

Financial Characteristics of Major Clusters Used in Pashley and Philippatos (1990)

Financial Characteristics	Cluster/Firm Life Cycle Stages			
	I (Late expansion/Early maturity)	**II (Late maturity/Early decline)**	**III (Regenerating maturity)**	**IV (Decline)**
Market share	Moderate	High-Moderate	Low	Moderate
Degree of financial leverage	High-Moderate	High	High-Moderate	Low
Dividends	Moderate	High	Moderate	Low
Debt	High	Low	High-Moderate/Low	Moderate
Liquidity	High	Mod-High	Low-Moderate	Low
Market power	High	Low	High-Moderate	Moderate-High
Sales generating ability	Low-Moderate	Low-Moderate	High	Low-Moderate
Profitability	High	Moderate-High	Low/High-Moderate	Low-Moderate

(Source: Pashley & Philippatos, 1990)

Black (1998) argues that this is not a satisfactory procedure because after performing a cluster analysis, the life cycle stage must still be determined using univariate measures, which is done in the multivariate classification. Further, and probably one of the biggest concerns of this particular method, is that the number of firm life cycle stages will vary depending on the type of cluster analysis used as well as the resulting clusters. For example, while seven clusters were initially chosen based on initial analysis, only four clusters were used in the final analysis. The remaining three clusters had to be discarded because each contained two outlier cases (Pashley and Philippatos, 1990). However, should there be no extreme values or outliers in these three clusters, then, the use of this procedure will produce seven main clusters from which to classify the sample firms into life cycle stages.

Moreover, the numbers of clusters vary depending on the type of cluster analysis used. For example, in the complete linkage and average linkage methods, the number

of clusters is reduced from eight to seven, while the single and centroid hierarchical methods show a decrease from seven to six clusters. Such inconsistencies will consequently affect both the number of life cycle stages as well as the number of observations included in each life cycle stage. For example, using seven variables, Elsayed and Paton (2009) utilise a relatively similar method of factor analysis followed by the hierarchical cluster analysis and end up with four clusters. These are labelled as cluster 1 (initial growth), cluster 2 (rapid growth), cluster 3 (maturity) and cluster 4 (revival). This suggests that this method does not allow for any presumption as to how many life cycle stages should be distinguished before the analysis begins.

Finally, since the focus of Pashley and Philippatos (1990) was on voluntary divestiture phenomenon, firms can only be classified in the later stages of their life cycles. As a result, there is no group which could unequivocally be viewed as consisting of pioneering or early expansion stage firms (Pashley and Phillipatos, 1990). In addition, the life cycle classification method used results in relatively small samples, ranging from 31 to 38 observations in each life cycle stage. Given the nature of this study in which pre-determined propositions are made on firm life cycle stages as outlined in Chapter 5, it appears that this particular method does not fit the purpose of the study. Further, since the focus of this study is on ASX listed firms, this method cannot accommodate the potentially large sample size.

Most subsequent accounting studies (for example, Black, 1998; Martinez, 2003; Jenkins et al., 2004; Kousenidis, 2005) that examine firm life cycle rely on the basic classification method introduced by Anthony and Ramesh (1992). Four classification variables are utilised in Anthony and Ramesh (1992), which are; annual dividend as a percentage of income (DP), percentage of sales growth (SG), capital expenditure as a percentage of total value of the firm (CEV), and age of the firm (AGE). These variables are chosen for their frequency of reference in the economics, management and management accounting literature.

Further, Anthony and Ramesh (1992) argue that because the financial classification variables used are also directly related to firm risk, firms sorted on these variables could have a differential response to performance measures, even without life cycle considerations. Thus, a non-financial variable (AGE) is chosen to minimise the effect of possible correlation of risk with life cycle stages. The argument is that firms in early life cycle stages, on average, exhibit higher sales growth, have higher investment in plant and equipment and have lower dividend payout ratios given their opportunity set of positive net present value projects. Moreover, younger firms are more likely to have new products. Table 6.2 provides the expectations concerning the life cycle descriptors.

Table 6.2

Expectations for Firm-Specific Descriptors of Life Cycle Stages Used in Anthony and Ramesh (1992)

Life Cycle Stages	Life Cycle Descriptors			
	DP	**SG**	**CEV**	**AGE**
Growth	Low	High	High	Young
Mature	Medium	Medium	Medium	Adult
Stagnant	High	Low	Low	Old

(Source: Anthony & Ramesh, 1992, p. 207)

Firms are classified into their respective life cycle stages using both univariate and multivariate ranking procedures. In the univariate procedure, firms are ranked on each of the four life cycle descriptors and grouped into various life cycle stages in each year according to Table 6.2. Then, each firm is given a score: growth=1, mature=2 and stagnant=3. In the multivariate ranking procedure, a composite score is computed by summing the individual variable scores. Based on this composite score, each firm-year observation is assigned to five life cycle groups: growth, growth/mature, mature, mature/stagnant and stagnant.

Similar to other previous methods, there are also several issues about this life cycle classification procedure. The first issue concerns the inclusion of age of the firm as

one of the life cycle descriptors. Studies such as Miller and Friesen (1984) and Lester et al. (2003) reveal non-deterministic life cycles of firms and argue that most firms do not pass inexorably from one stage of development to another in the traditional biological sense. For example, Miller and Friesen (1984) highlight that firms that simply get older, but do not grow and diversify, are unlikely to move between stages. Although older firms tend to be more complex, elaborate and bureaucratic than their younger counterparts, they state that this is attributable largely to growth and strategy than maturity.

Second, classifying firms into life cycle stages by ranking them among all the firms in each year can result in misclassification and compromise the power of the tests. This is because every firm is different and has a unique path of development (Fischer, 2006). For example, while a 10 percent sales growth may be fairly high for a firm in a stable industry, such as food and beverage, it may be considered low for a firm in the pharmaceuticals and biotechnology industry.

Nonetheless, the main advantage of this method is that it incorporates some interactions among different variables in determining life cycle stages. While a univariate classification that uses only one proxy has the potential to result in a misclassification (Gaver and Gaver, 1993; Black, 1998), a multivariate classification can provide more accurate results. This is because the joint presence of, for example, high sales growth and high capital expenditure, is likely to preclude misclassification of firms with cash flow problems that are not growth firms.

Other studies that applied the method introduced by Anthony and Ramesh (1992) did so with some modifications. For example, sample firms in Black (1998) are also assigned into growth, mature and decline stages. However, the firm-year is classified under any of the three life cycle stages as follows.

1. Growth stage if it has:
    - the highest quintile of the combined ranked score for sales growth and capital expenditure and
    - the lowest quintile of the combined score for dividend payout and firm age.
2. Mature stage if it has:
    - the middle (third) quintile of the combined score for sales and growth expenditure,
    - the highest quintile of the ranking on dividend payout and
    - the middle quintile of the ranking on firm age.
3. Decline stage if it has:
    - the lowest (fifth) quintile of the combined score for sales growth and capital expenditure,
    - the second quintile of the ranking on dividend payout and
    - either of the two highest quintiles of firm age.

Park and Chen (2006) and Yan and Zhao (2009) consider the potential effect of industry by ranking firms relative to other firms in their industry and using industry-adjusted data, respectively.

6.2.2 Firm Life Cycle Classification Procedure Employed in This Study

The nature of this study that requires a focus on the financial reporting practices of ASX-listed firms suggests that the main selection criterion for a life cycle classification methodology is its ability to support a large sample size. Thus, this indicates that the use of the methodology offered either by Miller and Friesen (1983) or Pashley and Philippatos (1990) may not be a satisfactory choice. Furthermore, because this study is interested in addressing accounting practice for intangible assets, this implies the need for a life cycle classification methodology that can capture the relative mix between growth opportunities and assets-in-place described

in Chapters 4 and 5. This can be achieved by utilising multiple financial-based life cycle proxies. Therefore, the life cycle classification procedure employed in this study is based on Anthony and Ramesh (1992) with some modifications to take into account the requirements and scope of this study.

Several proxies have been used in the accounting and finance literature to capture Myers' (1977) characterisation of growth opportunities or investment opportunity set. The main reason is that empirical specification of these growth opportunities is problematic because they are largely unobservable and hence, no consensus has emerged concerning an appropriate proxy variable (Gaver and Gaver, 1993; Kallapur and Trombley, 1999). Nonetheless, a review of previous literature suggests that they can be classified into three categories which are price-based proxies, investment-based proxies and variance measures (Kallapur and Trombley, 1999).

The price-based proxies assume that if growth prospects of the firm are at least partially impounded in stock prices, then growth firms will have higher market values relative to their assets-in-place. The most commonly used price-based proxies include market-to-book value of assets (MBA) ratio (Smith and Watts, 1992; Gaver and Gaver, 1993; Jones, 2003), market-to-book value of equity (MBE) ratio (Lewellen, Loderer and Martin, 1987; Collins and Kothari, 1989; Chung and Charoenwong, 1991; Gaver and Gaver, 1993), earnings-to-price (EP) ratio (Kester, 1984; Chung and Charoenwong, 1991; Smith and Watts, 1992; Gaver and Gaver, 1993), Tobin's Q (Skinner, 1993) and property, plant and equipment (PPE) to firm value ratio (Skinner, 1993).

The investment-based proxies on the other hand are used based on the proposition that a high level of investment activity is positively related to the growth opportunities of the firm (Kallapur and Trombley, 1999). The operationalisation of these proxies usually depends on variables concerning firms' research intensity and capital expenditure. These include the ratio of R&D expenditures to firm value

(Smith and Watts, 1992), total assets (Gaver and Gaver, 1993), sales (Skinner, 1993) and the ratio of capital expenditures to firm value (Smith and Watts, 1992), depreciation expense (Dhaliwal et al., 1999) and book value of PPE (Dhaliwal et al., 1999). Finally, the rationale for the use of variance measures is that the value of any option is an increasing function of the variability of returns on the underlying asset. Examples include the variance of returns on the firm (Smith and Watts, 1992; Gaver and Gaver, 1993) and asset betas (Skinner, 1993).

Therefore, using multiple life cycle proxies, the classification procedure is as follows.

6.2.2.1 Step 1: Select the Proxy Variables for Firm Life Cycle Classification

Based on previous studies (for example, Kallapur and Trombley, 1999; Adam and Goyal, 2008), three proxy variables are selected to be used for the firm life cycle stage classification: market-to-book value of assets ratio, capital expenditures to property, plant and equipment ratio and percentage of sales growth. Besides being the most commonly used proxies for firm life cycle, two of the variables also represent one of the economic characteristics of firms important to this study, which is the proportion of assets-in-place relative to growth opportunities in representing firm value. The chosen proxy variables also reflect organisational change and sales generating ability and, therefore, are expected to signal differences in firms' strategic emphases. Overall, these life cycle classification proxies conform to Hanks et al. (1993)'s observations of a firm life cycle stage construct being a multi-dimensional phenomenon.

The following discussion provides justifications for the proxy variables chosen for firm life cycle stages classification in this study as well as the exclusion of two life cycle proxies commonly used in previous studies.

6.2.2.1.1 Market-to-Book Value of Assets (MBA) Ratio

The MBA ratio, which is a price-based proxy, represents the mix between a firm's assets-in-place and its growth opportunities and is perhaps the most commonly used proxy. The book value of assets represents assets-in-place, while the market value of assets represents the economic value of assets-in-place and present value of future growth opportunities (Vishwanath, 2007; Adam and Goyal, 2008). Therefore, a high MBA ratio indicates that a firm has more investment opportunities relative to its assets-in-place. However, one limitation in the use of the MBA ratio to proxy for growth opportunities is that the market value of assets requires an estimation of the market value of debt, which information is often not publicly available. Extant studies, therefore, rely on book value of debt as a proxy for market value of debt (Smith and Watts, 1992; Kallapur and Trombley, 1999; Adam and Goyal, 2008).

Despite this particular limitation, the validity of the MBA ratio as a proxy for growth opportunities is supported empirically (Kallapur and Trombley, 1999; Adam and Goyal, 2008). These studies examine the performance of several commonly used proxy variables for a firm's investment opportunity set on the basis of their associations with realised growth and real option measures (value of reserves and resources), respectively. For example, Kallapur and Trombley (1999) find significant and consistent associations between the book-to-market ratios including the ratio of book-to-market value of assets, which is the reciprocal of the MBA ratio, and realised growth. This suggests that these ratios are valid proxies for investment opportunities. Further, among the commonly used proxies, the book-to-market measures, namely, MBA, MBE and Tobin's Q, are found to be most highly correlated with future growth. This finding is particularly emphasised by Kallapur and Trombley (1999) because this indicates that simpler proxies are as effective as the more difficult-to-calculate Tobin's Q.

Previous studies such as Smith and Watts (1992) find that several of their regression coefficients become insignificant when the EP ratio instead of the MBA ratio is used as the growth proxy. Similarly, the EP ratio in Kallapur and Trombley (1999) does not exhibit significant correlation with realised growth and additional analysis reveals that growth firms have higher returns on assets in the previous year. Based on this, Kallapur and Trombley (1999) argue that although growth firms have lower assets-in-place relative to firm value, those assets-in-place generate a higher income stream than in non-growth firms. As a result, these two offsetting effects equalise the mean EP ratios for both types of firms. In addition, the EP ratio is not a meaningful measure for firms that report zero or negative earnings because this implies that firms with losses have growth opportunities with net present values in excess of their total equity value, which is rather nonsensical (Gaver and Gaver, 1993; Adam and Goyal, 2008). This will consequently reduce the information content of EP ratios as well as the sample size of firms included in the analysis. In addition, the EP ratios have several other interpretations in the accounting and finance literature. For example, they have been used as an earnings growth indicator (Litzenberger and Rao, 1971; Cragg and Malkiel, 1982; Penman, 1996), a risk measure (Ball, 1978), an earnings capitalisation rate (Boatsman and Baskin, 1981; Alford, 1992) and an indicator of mispriced stocks (Basu, 1977).

Adam and Goyal (2008) investigate the relative and incremental information content of several proxy variables for investment opportunities including the MBA, the MBE and the EP ratios. They find that the MBA ratio has the highest information content with respect to firms' investment opportunities. Moreover, it is found that although both the MBE and EP ratios are also related to investment opportunities they do not provide incremental information about investment opportunities beyond that already contained in the MBA ratio. Overall, Adam and Goyal (2008) conclude that the MBA ratio appears to be the best performing proxy for investment opportunities. In addition, the findings provide support to Smith and Watts (1992) and Kallapur and Trombley (1999) concerning the EP ratio not being the most appropriate proxy for

investment opportunities. Thus, based on the findings of these studies, the MBA ratio is selected as one of the life cycle proxies.

6.2.2.1.2 Capital Expenditures to Property, Plant and Equipment (CE) Ratio

Two main reasons can be put forward for the selection of another proxy variable for life cycle classification. First, the inclusion of another variable can potentially reduce or minimise potential misclassification of firms into their respective growth opportunities characteristics compared to if only one measure for growth opportunities is used. For example, while most studies use the proxies individually and evaluate the sensitivity of the results to the choice of a particular proxy variable, Gaver and Gaver (1993) and Baber, Janakiraman and Kang (1996) use a composite measure of growth opportunities. The underlying argument is that since the investment opportunity set is inherently unobservable it is likely to be imperfectly measured by any single empirical proxy. Therefore, this approach is intended to reduce the measurement and classification error inherent in selecting a single variable to proxy for investment opportunities. Second, the use of a market measure as the primary proxy for firms' growth opportunities can potentially result in spurious correlations with other variables in the value relevance tests, Third, Gaver and Gaver (1993) argue that while market-to-book ratios capture in spirit the Myers (1997) characterisation of growth opportunities, a disadvantage of these measures is that they rely on stock price and the inverse relation between financial leverage and stock price makes them sensitive to the capital structure of the firm. As a result, an alternative measure of firms' growth opportunities that utilises pure accounting numbers can be used.

For example, studies such as Smith and Watts (1992) and Skinner (1993) use research intensity to capture growth opportunities. However, the main problem with this particular measure is that R&D is just one example of the vast array of discretionary expenditures available to support growth options and may be less

relevant for firms in certain industries. Furthermore, it should be noted that the treatment of R&D expenditures under U.S. GAAP differs significantly from Australian GAAP especially in the pre-AIFRS period in which the accounting standards permitted companies to capitalise their R&D expenditures if the future economic benefits can be readily established, making its use as a proxy variable problematic. Further, Kallapur and Trombely (1999) find that R&D intensity as measured by the ratios of R&D expenditures to sales, assets and firm market value does not exhibit the significant or consistent associations expected with realised growth. The results hold even after a sub-set of the sample firms is adjusted for median industry levels of the R&D ratios and when R&D is excluded from discretionary expenditures (defined as the sum of capital expenditures, advertising and R&D). This leads them to conclude that R&D intensity is a less powerful and reliable measure of firms' growth opportunities.

The main motivation for the use of the CE ratio is that capital expenditures are largely discretionary and lead to the acquisition of new investment opportunities. Firms that invest more acquire more investment opportunities relative to their existing assets-in-place than do firms that invest less. However, one disadvantage of this measure is that, similar to R&D costs or other discretionary expenditures as a matter of fact, capital expenditures may or may not lead to the acquisition of investment opportunities. Thus, it is not clear whether the relationship between expenditures and the value of the acquired investment options is linear (Adam and Goyal, 2008). Nonetheless, Adam and Goyal (2008) find this purely accounting-based proxy to be positively related to the value of investment opportunities although it appears to be performing less well than other price-based proxies such as the MBA, the MBE and the EP ratios. Additional analysis using a broader sample size, however, does not suggest lesser performance of the CE ratio compares to other proxies.

Meanwhile, Kallapur and Trombley (1999) find capital investment activity as measured by capital expenditures to assets to be positively correlated with realised growth, implying the validity of this particular variable as a proxy for growth opportunities. In addition, the CE ratio is also one of the most commonly used life cycle proxies for life cycle stages classification. This proxy has been used mainly by Anthony and Ramesh (1992) and subsequent life cycle studies such as Black (1998) to proxy for the relative value of assets-in-place compared to growth opportunities. Based on the above arguments, therefore, the CE ratio is selected to be used as one of the life cycle proxies in this study.

6.2.2.1.3 Percentage of Sales Growth (SG)

The justification for the inclusion of SG as one of the life cycle proxies is fairly straightforward. That is, firms in the early stage of their life cycle, namely growth firms, usually have higher sales growth than firms that are in the later part of their life cycle stages. Mature firms, on the other hand, are characterised by mature product markets and considerable competition (Pashley and Philippatos, 1990; Anthony and Ramesh, 1992) and, as a consequence, sales growth stagnates while market share remains unchanged or declines. Meanwhile, a firm's product dies away in the decline stage, causing sales to drop off significantly and losses to occur. However, most importantly, this particular proxy variable has been used in all prior life cycle studies (for example, Miller and Friesen, 1983; Pashley and Philippatos, 1990; Anthony and Ramesh, 1992) despite the differences in the method used for life cycle classification.

6.2.2.1.4 The Exclusion of Firm Age and Dividend Payout Ratio from Life Cycle Proxies

Two main variables, which are Firm age (AGE) and Dividend payout ratio (DP) have been used in most prior studies in life cycle stage classification (Anthony and

Ramesh, 1992; Black, 1998; Jenkins et al., 2004; Elsayed and Patton, 2009). These variables, however, are not utilised in this study for several reasons. The argument against the use of AGE as a proxy variable for life cycle classification has been presented earlier in Section 6.2.1. It highlights the non-sequential nature of the firm life cycle and the poor correlation between AGE and stage of firm development. Dickinson (2009) maintains that if AGE is used as a life cycle proxy, an implicit and likely flawed assumption is that a firm moves sequentially through its life cycle. Firm life cycle, however, is cyclical and non-sequential in nature because a firm's performance is a portfolio of many products, each with a distinct product life cycle stage.

Based on their review of the characteristics of life cycle stages, Hanks et al. (1993) are able to synthesise that as firms evolve through various life cycle stages, they are theorised to increase in age and size. Nonetheless, while the parallel movement between firm age and life cycle stages can be observed from the start-up stage until maturity stage, the association no longer holds in the decline stage. In other words, firms can enter the decline stage at any age. Moreover, a firm's primary objective of profit maximisation, which is achieved through continual product and market innovation and expansion, as well as organisational structural changes, implies that firm age is non-linearly related to its life cycle stage (Dickinson, 2009). This illustrates that there is an obvious disconnect between firm age and firm life cycle stages.

Similar to AGE, DP is also among the most commonly used life cycle proxy variables in prior life cycle studies, in which the argument for the use of this variable centres upon firms' levels of liquidity. Specifically, low dividend payout ratios are usually associated with firms in the early life cycle stages mainly because they require cash to meet their operating needs and fund huge capital expenditures. Mature firms are less likely to incur large amounts of capital expenditure since these firms typically have excess capacity, thus, any further investment in capacity is

likely to result in reduced profitability (Park and Chen, 2006). Thus, they are more likely to have higher dividend payout ratios. The relationship between dividend payout ratios and decline firms, on the other hand, is relatively ambiguous. This is because while some may pursue divestiture to improve liquidity and maintain dividend payments, some may choose to stop paying dividends in favour of other operating activities.

A multivariate analysis in Kallapur and Trombley (1999) suggests that dividend payment policy may reveal some incremental information about the firm's growth prospects relative to book-to-market measures alone. In their examination of several other corporate policy variables, which are financing, dividend and compensation policies that may affect firms' realised growth in addition to growth opportunities, the dividend policy variables are found to be negatively correlated with realised growth as expected. The findings also indicate that other corporate policy variables examined seem to show little promise for constructing a multivariate growth proxy. This leads them to suggest that a classification model which includes both market-to-book ratios and dividend policy ratios may provide a better growth proxy than market-to-book ratios alone.

However, one major problem associated with the use of DP is that its scoring procedure depends on other life cycle variables. For example, a low DP could indicate either high growth opportunities (thus be given a score of 1 or 2) or cash flow problems (thus be given a score of 4 or 5). Due to the inconsistency and ambiguity on what score is to be assigned, the final decision depends on the composite score of other life cycle variables. This complicates the scoring process because the composite score has to be determined twice; first, to assign a score for DP and, second, to classify firms into their respective life cycle stages. Furthermore, studies such as Kousenidis (2005) and Liu (2008) find a high concentration of zero values for DP throughout their study period. While DP is not employed in Kousenidis (2005) for this reason, it is still used in Liu (2008) causing an uneven

distribution of observations across life cycle stages. Similarly, a high concentration of zero values for DP in its quintiles is found in this study during the data collection process. Recognising these limitations, DP is therefore, not considered as one of the life cycle proxies in the firm life classification procedure in this study.

6.2.2.2 Step 2: Calculate the Life Cycle Proxies for Each Sample Firm in Each Year

Based on prior studies and the information obtained from Aspect Huntley FinAnalysis, the following life cycle proxies are computed for each firm in each year between 2002 and 2009.

(1) MBA = [(Number of ordinary shares outstanding) x (Closing share price) + Total debt – Cash] ÷ Book value of net assets

(2) CE = Capital expenditures ÷ Book value of net property, plant and equipment

(3) SG = (Current year net sales – Previous year net sales) ÷ Previous year net sales

Depending on the availability of the data, these proxies are calculated yearly at the end of the financial year of the firm. The computation for life cycle proxies and firm life cycle classification starts from 2002 and ends in 2009 in order to allow for additional tests to be performed in relation to the stability and consistency of the classification in both the pre- and post-AIFRS periods. This procedure is explained further in Section 6.2.2.6.

6.2.2.3 Step 3: Calculate the Industry Quintiles for the Life Cycle Proxies for Each Year Using All ASX Listed Firms with the Same Two-Digit Global Industry Classification Standard (GICS) as Target Firms

This particular step takes into account the limitation in Anthony and Ramesh (1992) with regards to the life cycle variables scoring process. Anthony and Ramesh (1992) classify sample firms into life cycle stages by ranking them on each of the life cycle variables among all firms in the year irrespective of industry. By pooling over the entire cross-section of firms, the study implicitly assumes a homogeneous, economy-wide benchmark. However, it is known that industries, like individual firms, have unique operating structures that cause financial ratios to cluster by industry groupings. This indicates that ranking firms using this approach can potentially result in misclassification. For example, as mentioned before, a comparison of the percentage of sales growth between a firm operating in the consumer services industry and a firm in the information technology industry would be a pointless and perhaps misleading exercise due to the differences in the way these two industries generate sales. Additional analysis in Black (1998) reveals some clustering of industries in their life cycle stage portfolios. He states that clustering by industry is likely because industries also have life cycles that affect the firm life cycle and failure to control for industry factors can lead to the power of the tests being compromised.

As a result, the use of industry quintiles in assigning the scores for each firm on individual life cycle proxies will better capture firms' economic characteristics and strategic emphases within the industry and, consequently, improve the life cycle classification procedure. The industry sectors according to the two-digit GICS code are; Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Information Technology, Telecommunication Services and Utilities.

6.2.2.4 Step 4: Assign Scores to the Life Cycle Proxies for Each Year According to the Industry Quintile Classification

Scores are assigned for individual life cycle proxies in each year to allow for temporal shifts in the life cycle stage of sample firms. The life cycle proxies are given a score as follows.

Table 6.3

Scores Assigned to Firm Life Cycle Proxies

Industry Quintiles	MBA	CE	SG
0%-20%	5	5	5
21%-40%	4	4	4
41%-60%	3	3	3
61%-80%	2	2	2
81%-100%	1	1	1

where:

1 = Growth

2 = Growth/Mature

3 = Mature

4 = Mature/Decline

5 = Decline

6.2.2.5 Step 5: Calculate the Composite Scores for Each Firm in Each Firm Year and Assign Into Firm Life Cycle Stages

The composite scores for each firm are obtained by summing the individual scores of life cycle proxy variables in each year. Previous studies such as Kousenidis (2005) and Park and Chen (2006) divide their sample firms into three life cycle groups; growth, mature and decline, by sorting the composite range into three approximately equal parts. The range of the composite score depends on the number of variables used for life cycle classification. For example, since four life cycle variables are used in Park and Chen (2006), the range of the composite scores is between four and

twenty. A firm-year is classified in the (1) growth stage if its composite score is between 16 and 20, (2) mature stage if its composite score is between nine and fifteen and (3) decline stage is its composite score is between four and eight.

Therefore, with three variables, the composite score in this study ranges from three to fifteen. Note that sample firms in this study are to be classified into three main life cycle stages which are growth, mature and decline. Two conditions must be satisfied in determining how the scores should be partitioned. First, the approach should yield a large enough sample for the tests of value relevance. Keeping in mind that the tests of value relevance will require sample firms to be further classified according to their accounting choice for intangible assets and pre- and post-AIFRS periods, it is essential for life cycle classification not to reduce significantly the sample size. Nevertheless, the approach should also enable a homogeneous group for each life cycle stage to be obtained. This is important to ensure the predictive ability of the life cycle variable and not to compromise the power of subsequent tests.

Taking these two conditions into consideration, this study will initially follow the method applied in Anthony and Ramesh (1992) and Jenkins et al. (2004) in which sample firms are ranked on their composite scores and divided into five life cycle groups; growth, growth/mature, mature, mature/decline and decline. The life cycle stage classification is as follows:

Table 6.4

Firm Life Cycle Classification Based on the Composite Score

Firm Life Cycle Stage	Composite Score
Growth	3 – 6
Growth/Mature	7
Mature	8 – 11
Mature/Decline	12
Decline	13 – 15

Next, firms classified in the intermediate categories; growth/mature and mature/decline are deleted in order to increase the homogeneity among life cycle categories. Consequently, only three main life cycle groups will be retained for further tests.

6.2.2.6 Step 6: Additional Test

An additional test is performed to examine the life cycle classification methodology used in this study. Existing theoretical and empirical studies have shown that life cycle stages are not necessarily connected to each other in a deterministic sequence and can move back and forth between stages (Tichy, 1980; Walton, 1980; Miller and Friesen, 1984). Nonetheless, it is an accepted consensus that the development of a firm as an evolving entity is both propelled and constrained by multiple interacting external and internal forces (Hanks et al., 1993; Dickinson, 2009). Therefore, while it is possible for these forces to have shocks such as mergers and acquisitions which consequently affect the life cycle stages of a firm, they should remain relatively stable and continuous at macro-, industry- or firm-level during most of the time (Black, 1998; Yan and Zhao, 2009). Further, it has been demonstrated that there is a common but by no means universal tendency for firms to move through the phases of the firm life cycle in a particular sequence (Miller and Friesen, 1984). That is, for example, the start-up stage will be followed by a growth phase which, in turn, will result in a period of maturity.

This suggests that, if the firm life cycle has any economic meaning, each life cycle should remain relatively stable for a certain period of time and exhibit a regular pattern rather than a random walk. Further, it has been found that each stage lasts for six years on average, with the shortest interval being 18 months and the longest 20 years (Miller and Friesen, 1984). Additionally, Miller and Friesen (1984) observe that aside from the tendency to remain within the same stage, there is also a tendency to follow the life cycle stages.

Based on these arguments, a check is made on the stability of the firm-year life cycle classification to substantiate further the classification methodology. This method is also employed by Anthony and Ramesh (1992) and Black (1998). If a firm-year is classified in a particular life cycle stage, an examination is made in a year before and after the year of classification to determine in which life cycle stage the firm is classified in those years. Two assumptions are made in this test. First, the life cycle classification will be sticky. That is, most firms will remain in the same life cycle stage from one year (t) to the next (from t-1 to t and t to t+1). The second assumption concerns the progressive nature of the life cycle in which the classification will exhibit a forward rather than a backward movement in life cycle stages.

6.3 The Ohlson (1995) Valuation Model

The Ohlson (1995) valuation model is considered as one of the most important, yet controversial research developments in capital market-based studies (Bernard, 1995; Lundholm, 1995; Kothari, 2001; Beaver, 2002). The development of this model can be viewed as one of the few attempts to develop a 'theory of accounting' (Beaver, 2002, p. 457) that is a formal representation of firm value in terms of accounting numbers. The model is argued to provide a logically consistent unifying framework lacking in previous studies in the valuation of accounting numbers (Bernard, 1995). Further, Dechow, Hutton and Sloan (1999) assert that the model offers a useful alternative to the traditional view by linking firm value directly to financial statement data without explicit consideration of dividends. As a consequence, it has become one of the main references in the capital market-based accounting research (Giner and Iñiguez, 2006; Barth and Clinch, 2009). This section will provide a brief overview of the development of the Ohlson (1995) model and highlight its strengths and weaknesses.

6.3.1 Theoretical Background to the Ohlson (1995) Model

The Ohlson (1995) model was mostly concerned with a valuation function that relates a firm's market value to contemporaneous accounting/information variables in developing the model. Ohlson (1995) argues that although some of the assumptions used to derive the model may seem relatively restrictive, many of the model's key features apply under more general circumstances. Three basic assumptions formulate the valuation function; (1) firm value equals the present value of expected dividends, (2) accounting data and dividends satisfy the clean surplus relation, and (3) linear information models capture the stochastic time-series behaviour of abnormal earnings. These assumptions are discussed further in the following sections.

6.3.1.1 Present Value of Future Expected Dividends (PVED) Assumption

Based on the classical dividend discount model, the first assumption of the Ohlson (1995) model is that firm value or market value of equity equals the present value of future expected dividends ($d_{t+\tau}$) discounted at their risk-adjusted expected rate of return. It can be illustrated by the following equation:

$$P_t = \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t\left[\tilde{d}_{t+\tau}\right] \qquad (1)$$

where:

P_t = the market value, or price, of the firm's equity at date t

$\tilde{d}_{t+\tau}$ = random variable of net dividends at date $t + \tau$

R_f = the discount rate (assumed as the risk-free rate plus one)

$E_t[.]$ = the expected value operator conditioned on date t information

This assumption reflects the price that results when interest rates are non-stochastic, beliefs are homogeneous and individuals are risk-neutral. The use of the risk-free rate as a discount rate in Equation (1) and subsequent assumptions of the model implies that the theory is based on risk neutrality. This is largely for the purpose of simplicity to allow for a straightforward derivation of the valuation function. Ohlson (1995), however, provides a brief discussion on how to modify the analysis to incorporate risk in the model. Specifically, Ohlson (1995) proposes the use of the firm's cost of equity capital derived using the Capital Asset Pricing Model (CAPM) as the most direct and simple approach to determining the discount rate. Although he argues that this proxy for firm's discount rate lacks theoretical appeal, it should be useful and adequate in many empirical applications or evaluations of the Ohlson (1995) model.

6.3.1.2 Clean Surplus Relation (CSR) Assumption

The regular owners' equity accounting applies in this second assumption which requires book value changes over time to satisfy the CSR. That is, the change in book value from period to period is equal to earnings minus net dividends. Hence, the following mathematical restrictions are introduced:

$$y_t = y_{t-1} + x_t - d_t \qquad (2)$$

where:
y_t = (net) book value of equity at date t
x_t = earnings for the period ($t-1$, t)

The CSR assumption implies that all value-relevant information is eventually reflected in the profit and loss statement. This allows a value attribute known as abnormal earnings or residual income (x_t^a), that is, the amount the firm earns in excess of the risk-free rate of interest on the book value, which can be expressed as:

$$x_t^a = x_t - (R_f - 1)y_{t-1} \quad (3)$$

Equations (2) and (3) are then applied to express Equation (1) which yields the following Residual Income Valuation (RIV) model, with $\tilde{x}_{t+\tau}^a$ = random variable of abnormal earnings at date $t+\tau$:

$$P_t = y_t + \sum_{\tau=1}^{\infty} R^{-\tau} E_t[\tilde{x}_{t+\tau}^a] \quad (4)$$

In short, by using earnings, book value and the CSR to carry the dividend information, the discounted dividend valuation can be rewritten as a discounting of accounting numbers. This also enables the valuation analysis to focus on the prediction of abnormal earnings rather than dividends. However, the problem with the RIV model is that it does not relate current accounting figures to equity value (McCrae and Nilsson, 2001). The variables on the right-hand side of the RIV model are expected future value, not past realisations. The next assumption which extends the RIV model provides a solution to this limitation.

6.3.1.3 Linear Information Dynamics (LIMs) Assumption

The third assumption places restrictions on the standard dividend discount model to yield dividend irrelevancy and to link value to current accounting numbers. Ohlson (1995) emphasises that the empirical implications of the model depend critically on this final assumption that concerns the time-series behaviour of abnormal earnings. This can be expressed by the following two equations:

$$\tilde{x}_{t+1}^a = \omega x_t^a + v_t + \varepsilon_{1t+1} \quad (5a)$$

$$\tilde{v}_{t+1} = \gamma v_t + \varepsilon_{2t+1} \quad (5b)$$

where:

v_t = other value-relevant information that is useful in predicting future abnormal earnings

ε_{it} = unpredictable, zero-mean disturbance term

ω, γ = fixed persistence parameters that are non-negative and less than one

These two equations imply the following restrictions: abnormal earnings follow a first-order autoregressive AR(1) process, other information begins to be incorporated into earnings with exactly one lag and the impact of other information on earnings is gradual, following an AR(1) process. Combining the information dynamics in Equations (5a) and (5b) with the RIV model in Equation (4) results in the following valuation function:

$$P_t = y_t + \alpha_1 x_t^a + \alpha_2 v_t \qquad (6)$$

where:

$\alpha_1 = \omega/(R_f - \omega) \geq 0$ and

$\alpha_2 = R_f/(R_f - \omega)(R_f - \gamma) > 0$

In short, the basic valuation function introduced by Ohlson (1995) treats the market value of shareholders' equity as the sum of the book value adjusted for (i) the current profitability as measured by abnormal earnings and (ii) other information that modifies the prediction of future profitability.

6.3.2 Strengths and Weaknesses of the Ohlson (1995) Model

This section provides a general discussion of the strengths and weaknesses of the Ohlson (1995) model that have been frequently highlighted in the literature. One of the key features of the model that makes it attractive to empirical research is the

ability to predict and explain stock prices better than other models based on discounting short-term forecasts of dividends and cash flows (Bernard, 1995; Penman and Sougiannis, 1997).

Traditionally, the relationship between financial statement data and firm value is developed based on a three-step process (Beaver, 1989). First, the current financial statement data and firm value must be linked to the future financial statement data. Second, the relationship between the future financial statement data and future dividends must be specified and, third, based on the dividend-discount model, future dividends are linked to current value. Based on the dividend-discount model as the starting point, several studies have attempted to explain the relationship between prices and earnings or future earnings (Fama and Miller, 1972; Beaver, Lambert and Morse, 1980; Kormendi and Lipe, 1987; Collins and Kothari, 1989; King and Langli, 1998). Nonetheless, an important limitation in these studies is that the relationship between either earnings and dividends or earnings and cash flows has been specified in an ad hoc fashion (Bernard, 1995; Dechow et al., 1999).

The Ohlson (1995) model, on the other hand, requires no assumptions on how earnings relate to either dividends or cash flows besides the CSR assumption. This suggests that the three-step process in Beaver (1989) can be simplified into (1) the link between current information and forecasts of future financial statement data and (2) the link between those forecasts and current value. Hence, it provides a useful alternative to the traditional view in valuation-based accounting research by linking future financial statement data directly to firm value, without explicit forecasts of future dividends (Bernard, 1995; Barth, 2000) or additional assumptions about the computation of terminal value in the valuation model (Dechow et al., 1999). Further, it does not depend on the concept of permanent earnings or assets and liabilities since the model is expressed in terms of accounting earnings and equity book value. Thus, empirical implementation of the model does not require a link to be specified

between accounting amounts and economic constructs such as permanent earnings (Bernard, 1995; Barth et al., 2001).

Nonetheless, similar to other valuation models, it is not without criticisms. For example, Holthausen and Watts (2001) criticise the model for not incorporating the possibility of economic rents. However, it is argued that a key feature of the model is that economic rents are captured by the persistence parameter of abnormal earnings and by other information in the linear information dynamics assumption (Barth et al., 2001). Barth et al. (2001) further highlight that in addition to the abnormal earnings and other information parameters, economic rents are also attributable to intangible assets. Therefore, economic rents can also be incorporated in the model by including intangible assets that capture the present value of the future cash flows attributable to those rents as a component of equity book value.

In addition to that, there have been some concerns regarding the violation of CSR in the application of this model (Lo and Lys, 2000; Holthausen and Watts, 2001). In practice, the restricted CSR cannot be applied perfectly because it does not precisely conform to current GAAP (Holthausen and Watts, 2001). For example, subsequent revaluations of property, plant and equipment (see AASB 16, para. 31) is allowed in Australia, which means that the revaluations of the book value of these assets should explain more of the change in firm market values, not income or earnings. Another example of accounting treatment that violates the assumption of CSR is the U.S. GAAP treatment of foreign currency translations (Lo and Lys, 2000). Since items other than income and transactions with shareholders (such as investments and dividends) affect the change in the book value of equity, this reflects the existence of dirty surplus.

However, some authors argue that the restricted CSR assumption is a relatively minor issue when the empirical power of the model is considered (Bernard, 1995; Lundholm, 1995; King and Langli, 1998; Lo and Lys, 2000). For example, Bernard

(1995) maintains that even if the firm's current book value contains dirty surplus items, the relationship in the models will hold as long as expected changes in book value satisfy the CSR. The violation of the CSR assumption, however, is an inherent limitation in empirically testing the RIV model. It is emphasised that rather than focusing solely on the RIV model, the Ohlson's (1995) contribution to the valuation theory comes from the modelling of the information dynamics that provides additional structure in linking the dividend-discount model to observable accounting variables (Bernard, 1995; Ohlson, 2001; Hand, 2005).

The attractiveness of the Ohlson (1995) model to empiricists is that it provides a testable pricing equation that identifies the roles of accounting and non-accounting information and only three accounting constructs are required to summarise the accounting components (Lo and Lys, 2000). However, this also leads to other concerns in the implementation of the model in that there is no clear guidance on how to operationalise these constructs. For example, there have been claims that the interpretation of abnormal earnings is clouded (Kothari, 2001; Dahmash et al., 2009) as well as arguments on whether or not to include 'other information' (v) in the model (Hand, 2001; McCrae and Nilsson, 2001; Ohlson, 2001; Callen and Segal, 2005). A more detailed discussion on these issues is provided in Section 6.4.

Notwithstanding the criticisms, the model has generated substantial interest among accounting academics and is continually being expanded (for example, Feltham and Ohlson, 1995, 1996; Ohlson, 2001) and tested (Frankel and Lee, 1998; Hand and Landsman, 1998; Dechow et al., 1999; Myers, 1999). This active stream of research provides evidence on the validity of the model's assumptions and the insights one can obtain from using the model (Barth, 2000). Additionally, most empirical applications of the Ohlson (1995) model in the literature have not been directly concerned with testing the model per se (Stober, 1999). Instead, most have been motivated by policy-relevant research questions that involve amounts that are recognised or disclosed in firms' financial statements.

In general, the Ohlson (1995) model can be viewed as representing a rigorous valuation methodology with strong theoretical and empirical implications suitable to the analysis of firm value in place of several ad hoc models (Dechow et al., 1999; Lo and Lys, 2000; Beaver, 2002; Dahmash et al., 2009). Because the model has been developed in the context of perfect capital markets, it is not meant to be entirely descriptive of the real world (Lo and Lys, 2000).

6.4 Research Design

In order to examine empirically the hypotheses developed in Chapter 5, the valuation framework introduced by Ohlson (1995) and discussed in Section 6.3 is utilised in this study. The use of this model is also consistent with the definition of value relevance presented in Chapter 3. The definition assumes that market value of equity reflects all publicly available, relevant information and, thus, the value relevance of accounting information is reflected by its ability to explain this value.

The discussion in this section is divided into several parts that deal with the tests of value relevance of intangible assets in the pre-AIFRS period and the tests that compare value relevance between the pre- and post-AIFRS periods, the measurement of variables used in the tests, other issues related to model specification as well as the sample and data to be used in this study.

6.4.1 Value Relevance of Intangible Assets in the Pre-AIFRS Period: Tests of H1, H2a and H2b

Drawing upon previous studies on the value relevance of intangible assets, H1 predicts that intangible assets capitalised by firms in the pre-AIFRS period do provide value-relevant information. Specifically, the hypothesis is:

H1: Intangible assets capitalised during the pre-AIFRS period are value relevant

Based on earlier discussion, the basic Ohlson (1995) model can be expressed as:

$$MV_{it} = \alpha_0 + \alpha_1 BV_{it} + \alpha_2 AE_{it} + \varepsilon_{it} \quad (7)$$

where:

MV_{it} = market value of equity of firm *i* 90 days after the end of financial year *t*;

BV_{it} = book value of equity of firm *i* at the end of financial year *t;*

AE_{it} = abnormal earnings of firm *i* at the end of financial year *t*.

ε_{it} = error term

A more detailed explanation on the definition and measurement of all variables used in this study is provided in Section 6.4.3. As mentioned earlier in Section 6.3.2, among the issues in the implementation of the Ohlson (1995) model is the operationalisation of the 'other information' (*v*) because this variable is not clearly specified, which can be argued to lead to the omitted variable problem. While *v* is suppressed and does not explicitly appear in the valuation function (Liu and Ohlson, 2000) or is included in the error term of the model (Lev and Zarowin, 1999), there are also studies that use analysts' forecasts to proxy for *v* (Frankel and Lee, 1998; McCrae and Nilsson, 2001). Nonetheless, Callen and Segal (2005) emphasise that the main limitation is that, due to the ill-defined nature of *v*, it can always be argued that whatever the results, the tests of the model are not meaningful because the wrong *v* is chosen or that the model failed to incorporate all relevant proxies for *v*.

Thus, in this study, managerial accounting choice for intangible assets can be viewed to represent *v*, consistent with prior studies in this area (Barth and Clinch, 1998; Ritter and Wells, 2006). Further, Matolcsy and Wyatt (2006) find increased analysts' forecast accuracy for firms with more certain underlying intangible assets that convey this information by capitalising the assets. This suggests a role for

accounting choice for intangible assets in providing information relevant to the determination of future period income that is not captured by other accounting variables used in the model.

H1 hypothesises that given the discretion in accounting for intangible assets, a firm's choice to capitalise intangible assets will provide value-relevant information to the market. Intangible assets investigated in this study refer to those that are affected and covered by AASB 138, which exclude intangible assets that are within the scope of another accounting standard. Therefore, intangible assets in this study can be defined as identifiable intangible assets, including capitalised R&D expenditures, but excluding purchased goodwill and extractive industry exploration, evaluation and development expenditures. Further, this definition or scope of intangible assets is also consistent with previous Australian studies (Wyatt, 2005; Chalmers and Godfrey, 2006; Goodwin and Ahmed, 2006). This leads Equation (7) to be re-written as:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \varepsilon_{it} \quad (8)$$

where:

ADJ_BV_{it} = book value of equity of firm *i* at the end of financial year *t* less $IIA_{it;}$

IIA_{it} = identifiable intangible assets of firm *i* at the end of financial year *t*.

Equation (8) is used to test H1 in which if the market believes managerial choice to capitalise intangible assets is value relevant, then a significant positive association between intangible assets component IIA and MV should be observed. In other words, the coefficient for IIA is expected to be positive and significant ($\alpha_2 > 0$).

H2a and H2b examine, for a given set of capitalising firms, whether there is any difference in the value relevance of capitalised intangible assets across firm life cycle stages. The hypotheses are as follows:

H2a: Growth firms that choose to capitalise intangible assets during the pre-AIFRS period have higher value relevance of intangible assets than mature firms.

H2b: Decline firms that choose to capitalise intangible assets during the pre-AIFRS period have lower value relevance of intangible assets than mature firms.

These hypotheses predict that the size of a regression coefficient for IIA will vary across groups, which requires a comparison of the coefficients across the three groups of the life cycle stages. Therefore, a moderated regression analysis is used to examine whether the relationship between IIA and MV that capture the value relevance of intangible assets, varies as a function of a moderator variable, firm life cycle stages. Moderated regression analysis typically examines whether a third variable influences the strength and/or direction of the relationship between the independent variables and dependent variables (Tharenou, Donohue and Cooper, 2007).[4]

This is done by incorporating interaction terms that represent the moderating effect of firm life cycle stages in Equation (8). Specifically, dummy variables that represent the number of firm life cycle stages developed in this study are used to examine whether firm life cycle influences or moderates the association between capitalised IIA and MV. Thus, the interaction between capitalised IIA and firm life cycle stages is represented by creating two additional dummy variables to represent firm life cycle stages in the existing equation. To construct the interaction terms that represent the interaction effects between capitalised IIA and firm life cycle stages, the two variables are multiplied. Therefore, Equation (8) is re-constructed to incorporate the interaction terms between dummy variables for life cycle stages and coefficients on

[4] See Jaccard, Turrisi and Wan (1990) and Aiken and West (1991) for further discussions on interaction effects and moderated multiple regression.

IIA, which allows the estimates for IIA to vary for Growth, Mature and Decline firms. This leads to the following regression:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 G_{it} + \alpha_5 D_{it} + \alpha_6 (G_{it} * IIA_{it}) + \alpha_7 (D_{it} * IIA_{it}) + \varepsilon_{it} \quad (9)$$

where:

G_{it} = a dummy variable equal to 1 for firms in the Growth stage of firm life cycle, and 0 otherwise for firm *i* at the end of financial year *t*;

D_{it} = a dummy variable equal to 1 for firms in the Decline stage of firm life cycle, and 0 otherwise for firm *i* at the end of financial year *t*.

In Equation (9), Mature is selected as the reference group, thus the coefficients on the interaction terms will measure the difference in the value relevance of capitalised IIA between Growth and Mature and Decline and Mature. As mentioned earlier, the interaction terms in Equation (9) allow the intercept to vary across firm life cycle groups and the coefficients of IIA to vary across groups. For example, for firms in Mature group, G and D are both zero, so all terms of the equation that include G and D are also zero. Thus, the regression for Mature group can be written as: $MV_t = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \varepsilon_{it}$, which is basically the original equation (Equation 8) before adding the interaction terms. In other words, coefficient α_2 in Equation (9) now captures the effect of IIA on MV for the Mature groups.

Meanwhile, coefficients α_6 and α_7 estimate the interaction effects, each of which tests the hypothesis that the value relevance of capitalised IIA is different across the life cycle stages. Specifically, coefficient α_6 captures the difference in the value relevance of IIA between Growth and Mature firms. Therefore, H2a is supported if α_6 has a significant positive coefficient ($\alpha_6 > 0$). Similarly, coefficient α_7 measures the difference in the value relevance of IIA between Decline and Mature. Since it is hypothesised that the value relevance of capitalised intangible assets would be higher

for Mature firms than Decline firms, therefore, a significant negative coefficient is expected for α_7 to satisfy H2b ($\alpha_7 < 0$).

6.4.2 A Comparison of the Pre- and Post-AIFRS Periods: Tests of H3, H4a and H4b

H3, H4a and H4b are concerned mainly with the effect of AIFRS adoption on firms that chose to capitalise intangible assets in the pre-AIFRS period. Specifically, the test of H3 is designed to assess whether there is any change in the relative value relevance of intangible assets between the two periods (pre- and post-AIFRS). The hypothesis states that:

H3: ***The value relevance of intangible assets for firms that choose to capitalise intangible assets is higher during the pre-AIFRS than the post-AIFRS period.***

H3 requires the coefficient for IIA to be compared across two groups, that is, between the pre- and post-AIFRS periods. Therefore, to test H3, Equation (8) is re-written in which an interaction term between the two accounting periods and IIA is included in the equation.

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 (PRE_{it} * IIA_{it}) + \varepsilon_{it} \quad (10)$$

where:

PRE_{it} = a dummy variable equal to 1 for firms in the pre-AIFRS period, and 0 otherwise for firm *i* at the end of financial year *t*.

A dummy variable that represents the pre-AIFRS period (PRE) is created to compare the difference in the regression coefficients for IIA across the pre- and post-AIFRS periods. In Equation (10), the interaction term between IIA and PRE (α_5) measures

the difference in value relevance of IIA between pre- and post-AIFRS periods. Evidence consistent with H3 would require α_5 to exhibit a positive significant coefficient ($\alpha_5>0$).

Hypotheses H4a and H4b deal with the effect of the introduction of AIFRS on the value relevance of capitalised IIA across the firm life cycle groups. More specifically, the hypotheses are:

H4a: ***The effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is higher for growth firms than mature firms.***

H4b: ***The effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is lower for decline firms than mature firms.***

To address H4a and H4b, the estimation in Equation (10) is re-constructed to include three-way interaction terms between IIA, pre- and post-AIFRS periods and firm life cycle stages. This leads to the following equation:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 G_{it} + \alpha_6 D_{it} + \alpha_7(PRE_{it}*IIA_{it}) + \alpha_8(PRE_{it}*G_{it}) + \alpha_9(PRE_{it}*D_{it}) + \alpha_{10}(G_{it}*IIA_{it}) + \alpha_{11}(D_{it}*IIA_{it}) + \alpha_{12}(PRE_{it}*G_{it}*IIA_{it}) + \alpha_{13}(PRE_{it}*D_{it}*IIA_{it}) + \varepsilon_{it} \quad (11)$$

In Equation (11), α_{12} and α_{13} reflect the estimated difference between the two-way interaction parameters for IIA and the first-order moderator variable (pre- versus post-AIFRS periods) as a function of the second-order moderator variable (firm life cycle stages). In other words, the effect of the change in the accounting regime for intangible assets on the value relevance of such assets differs as a function of firm life cycle stages.

Therefore, H4a is supported if α_{12} has a positive significant coefficient ($\alpha_{12} > 0$), while evidence consistent with the prediction in H4b will indicate a negative significant coefficient for α_{13} ($\alpha_{13} < 0$).

6.4.3 Measurement of Variables

6.4.3.1 Dependent Variable

In each regression, the market value of equity (MV_{it}) of the firm 90 days after the end of the financial year *t* (measured as share price times the number of ordinary shares outstanding) will be utilised as the dependent variable. Consistent with section 319 of the Australian Corporations Act, firms normally release their financial statements about three months after the end of their financial year (Ahmed and Falk, 2006). Therefore, the use of MV at that date takes into consideration the delay in the reporting of firms' financial results.

Moreover, this allows the latest information in financial reports to be in the public domain, hence, more fully impounded in the market response. The use of this variable as the benchmark of firm value also is in keeping with previous studies such as Ritter and Wells (2006) and Dahmash et al. (2009).

6.4.3.2 Independent Variables

The first independent variable in the model, BV_{it} refers to the book value of shareholders' equity at the end of financial year *t*, which represents the total net assets of the firm. $EBIT_t$ less ($r*BV_{t-1}$) is used to proxy for abnormal earnings (AE_{it}), in which $EBIT_t$ refers to earnings before tax, abnormal items and net interest for year *t* and r is the discount rate (or the cost of equity capital). This operationalisation of AE is also consistent with previous empirical studies (McCrae and Nilsson, 2001;

Bryant, 2003; Morel, 2003; Dahmash et al., 2009), and most importantly with the approach suggested in Ohlson (1995; 2001). Further, Barth (2000) suggest that the inclusion of lagged book value of equity (BV_{t-1}) in the abnormal earnings equation partially relaxes the assumption that the cost of equity capital associated with calculating abnormal earnings is a predetermined rate, because current and lagged BV are highly correlated. The determination of the discount rate is further discussed in the next section.

IIA_t is defined as the reported identifiable intangible assets less any accumulated amortisation at the end of financial year *t*. Specifically, IIA includes items such as R&D expenditures, trademarks, copyrights, patents, licences, software costs, mastheads and so on that are capitalised by the sample firms, depending on the period of analysis (pre- or post-AIFRS). Finally, G_{it} and D_{it} refer to the category of firm life cycle stage into which a firm has been classified into in a particular financial year end *t* and PRE_{it} is a dummy variable coded as 1 for the pre-AIFRS period and 0 for the post-AIFRS period. Table 6.5 provides a summary on the measurement for the variables used in the tests of the hypotheses.

6.4.3.3 Operationalising the Discount Rate (r)

Despite the obvious importance of AE as a variable that influences a firm's value in the Ohlson (1995) model[5], a majority of previous value relevance studies rely on other measures such as net income (see, for example, Aboody and Lev, 1998; Kallapur and Kwan, 2004; Goodwin and Ahmed, 2006; Ritter and Wells, 2006; Oswald, 2008), mostly for the sake of convenience. This is primarily due to the difficulties in operationalising AE, in which one the biggest hurdles is in the selection of an appropriate discount rate.

[5] The main contribution of the Ohlson model is on how a firm's value is conceptualised by predicting abnormal earnings that do not depend on the dividend policy, and Ohlson (1995) argues that "the significance of this point cannot be overemphasised" (p. 682).

Table 6.5

Variable Definition and Measurement

VARIABLE	DEFINITION	MEASUREMENT
MV	Market value of equity 90 days after the end of financial year	Share price times the number of ordinary shares outstanding 90 days after the end of financial year
BV	Book value of equity	Book value of shareholders' equity at the end of financial year
ADJ_BV	Adjusted book value of equity	Book value of shareholders' equity less net reported identifiable intangible assets at the end of financial year
IIA	Identifiable intangible assets	Reported identifiable intangible assets (net of any accumulated amortisation) at the end of financial year
AE	Abnormal earnings	$EBIT_t$ less ($r*BV_{t-1}$) where: $EBIT_t$ = Earnings Before Interest and Tax for the year ; r = The discount rate and, BV_{t-1} = Lagged book value of shareholders' equity
G	Growth firms	A dummy variable that is coded 1 for Growth firms and 0 otherwise
D	Decline firms	A dummy variable that is coded 1 for Decline firms and 0 otherwise
PRE	Pre-AIFRS period	A dummy variable that is coded 1 for Pre-AIFRS period and 0 otherwise

Prior U.S. studies have, for example, used a constant discount rate of 13 percent (Bernard, 1995; Tse and Yensah, 1999) and 12 percent (Dechow et al., 1999; Ahmed, Morton and Schaefer, 2000), while studies conducted in Australia have used a discount rate of 10 percent (Smith et al., 2001) and 8 percent (Dahmash et al., 2009) throughout the period of their studies. On the use of these constant discount rates, Beaver (1999, p. 37), on one hand, argues that it is astonishing that the assumption of a constant discount rate across firms and time is the "best we can do" considering the effort spent by Miller and Modigliani (1966) to estimate the cost of capital for one industry for three years. Dechow et al. (1999), on the other hand,

maintain that attempts to document predictable variation in expected returns that are consistent with the predictions of asset pricing models have met with limited success. Similarly, in the Australian setting, there has been considerable debate about which asset pricing model is the most appropriate to use for the Australian equity market (Truong, Partington and Peat, 2008; Dahmash et al., 2009). These difficulties consequently lead to problems in the calculation of a firm-specific discount rate.

As discussed in Section 6.3.1.1, the risk free rate (R_f) is used to proxy for discount rate in the Ohlson (1995) model for the purpose of simplicity. However, the use of cost of equity capital based on CAPM has been suggested by Ohlson (1995) to incorporate risk in the discount rate. Thus, the cost of equity capital (R_e) is used as a proxy for discount rate, *r*, in the calculation of AE. The cost of equity capital (R_e) in this study is calculated using CAPM. Although this model has come under academic attacks (Fama and French, 1992; 1993), it is found to be the most widely used method in estimating the cost of equity capital among practitioners (see Kester et al. (1999) and Truong et al. (2008) for Australian studies and Graham and Harvey (2001), McLaney, Pointon, Thomas and Tucker (2004) and Ryan and Ryan (2002) for studies conducted overseas). Furthermore, Durand, Limkriangkrai and Smith (2006) argue that the Fama and French three-factor model does not apply in the Australian market while Truong et al. (2008) find that alternative asset pricing models such as the multi-factor asset pricing model and the Fama and French three-factor model are not being adopted by Australian firms. Finally, because it is not the objective of this study to evaluate alternative asset pricing models and methods for estimating discount rates, the use of CAPM is justifiable.

R_e is calculated at financial year-end date of the firm and is estimated as:

$$R_e = R_f + \beta (R_m - R_f) \qquad (12)$$

The breakdown of the formula is as follows:

R_f = risk-free rate of return

β = equity beta

$R_m - R_f$ = equity market risk premium

The individual component of Equation (12) is discussed below.

6.4.3.3.1 Risk-free Rate of Return (R_f)

R_f refers to the risk-free rate of return that can be earned from investing in a riskless investment. Although the market rarely offers a riskless investment, an investment in a government security is generally considered as risk-free because of the remote risk of default by the government (Siu, 2002). There are many Australian Government securities on the market from 30-day paper to 10-year bonds, each with differing rates. However, the most liquid government bond with the longest term to maturity is considered to match more closely the perpetual life time horizon of a firm (Siu, 2002). Truong et al. (2008) find that 87% of Australian firms examined in their survey used the long-term government bond to represent R_f. Furthermore, a comparison with Australian regulatory practice between 2001 and 2006 also reveals that the majority of local regulators used the 10-year government bond rates to proxy for R_f (Truong et al., 2008). Taking these into account, the 10-year government bond yield at the estimation date, that is, the financial year end of the firm is used as a proxy for R_f.

6.4.3.3.2 Equity Beta (β)

Equity beta (β) reflects the estimates of the statistical relationships between returns on equity and the market portfolio of all risky assets and is used to measure the reaction of a firm's share price in comparison to movements of broader benchmark indices (Siu, 2002). Many academics and practitioners advocate the use of

aggregated industry beta in place of a firm-specific beta (Gray et al., 2005). This is mainly because firm-specific beta estimates are statistically imprecise and often characterised by large standard errors, especially if estimated over a short period of time. As a consequence, this study employs the industry beta in the estimation of R_e. It is estimated using the market model, that is, the regression of monthly stock returns of the industry's equity on the monthly market returns over a period of 48 months. The estimated coefficient of the independent variable is then taken to be the industry beta. In this study, the S&P/ASX 200 is used as a proxy for the market returns since it covers approximately 80% of the Australian equity market by capitalisation. Hence, it is considered to be representative of the Australian market. This industry beta is calculated for each of the sample years.

Since equity betas depend on both the operations of the individual firm and its capital structure, this implies that even firms in the same industry with similar operations will have different equity betas due to these capital-structure differences. Therefore, the effect of leverage must be taken into account when comparing equity betas across firms. This is done by, first, unlevering the industry equity betas into industry asset betas, which is a process that removes the effect that different rates of leverage has on the equity betas. The following Hamada Equation is used (Hamada, 1972; Gray et al., 2005; Cohen, 2008):

$$\beta_{aj} = \frac{\beta_{ej}}{\left[1 + (1-t)\frac{D_j}{E_j}\right]} \tag{13}$$

where:

β_{aj} = industry asset beta

β_{ej} = industry equity beta

D_j = average industry market value of debt

E_j = average industry market value of equity

t = corporate tax rate

The application of this equation requires the data for the average industry debt-to-equity ratio, which is calculated each year using all firms in the industry. However, because the data concerning market value of debt is often not available publicly, book value of debt (both short-term and long-term debts) at the date of the estimation, that is, the financial year end, is used to proxy for the market value of debt. Meanwhile, the market value of equity is proxied by market capitalisation, that is, the number of ordinary shares outstanding multiplied by share price at the end of firm financial year.

Next, the industry asset beta is relevered using firm-specific debt-to-equity ratios to derive the individual firm's equity betas. The following equation is used to relever the asset beta:

$$\beta_{ei} = \beta_{aj}\left[1 + (1-t)\frac{D_i}{E_i}\right] \qquad (14)$$

where:

β_{aj} = industry asset beta

β_{ei} = equity beta of firm i

D_i = market value of debt of firm i

E_i = market value of equity of firm i

t = corporate tax rate

6.4.3.3.3 Equity Market Risk Premium ($R_m - R_f$)

The equity market risk premium ($R_m - R_f$) represents the returns investors expect to earn from investing in the stock market over and above the risk-free rate on a government security to compensate them for the extra risk associated with investing in the stock market. The estimations of the equity market risk premium are frequently based on the historical average annual excess return obtained from investing in the stock market over a risk-free security (Siu, 2002). However, it is

important to note that similar to other concepts used in the calculation of AE so far, there is neither a uniformly accepted precise definition nor agreement on how the equity premium should be computed (Welch, 2000).

The most widely cited historical estimates of Australian equity market risk premia include Officer (1989) for the period 1882-1897 of 7.9 percent, Dimson, Marsh and Staunton (2003) for the period 1900-2002 of 7.6 percent, Ball and Bowers (1986) that covers a relatively short period from 1973 to 1985 of 5.6 percent and Brailsford, Handley and Maheswaran (2008) for the period of 1958-2005 of 6.3 percent. Siu (2002) argues that in recent years analysts have adopted lower equity market risk premium rates from the previously estimated rates of 7 and 8 percent due to higher confidence in the performance of the stock market, hence, lower risk of investing in equities.

Truong et al. (2008) find that the majority of Australian firms in their survey used a market risk premium rate in the range of 5 to 7 percent. Specifically, 47%, 11% and 18% of the firms used 6, 5 to 5.5 and 6.5 to 7 percent as their market risk premium rate, respectively. Additionally, it was found that all local Australian regulators surveyed also used the market risk premium of 6 percent or a range close to this value (Truong et al., 2008). Further, in another recent study, Handley (2008) shows that the equity risk premium relative to 10-year government bond has averaged 6 percent p.a. over the period of 1958-2008. Therefore, based on these findings, the annual equity market risk premium of 6 percent is used in this study as it represents the most current estimation and has been widely used by Australian firms and regulatory authorities.

6.4.4 Other Model Specification Issues

A review of extant empirical literature on value relevance reveals the use of the levels and/or returns models in assessing the value relevance issues. In the levels

model, the stock price level is regressed directly on accounting variables that are also measured in levels, while in the returns model stock returns are regressed on scaled or deflated accounting numbers (Landsman and Magliolo, 1988; Kothari and Zimmerman, 1995; Gu, 2005). One major problem in capital market-based accounting studies, in general, and value relevance studies, in particular, is that there have always been considerable arguments over which model should be used to estimate regression specifications and what should the precise specification be (Christie, 1987; Kothari and Zimmerman, 1995; Barth, 2000; Barth et al., 2001; Holthausen and Watts, 2001; Kothari, 2001).

Several papers have discussed the conceptual strengths and weaknesses of these two models. Gonedes and Dopuch (1974), for example, argue that the returns models are theoretically superior to the levels models in the absence of a sound and well-developed theory of valuation under uncertainty[6]. However, Lev and Ohlson (1982) describe the two models as being complementary in which theoretically, if information content of accounting information exists, it should manifest itself in both security-price levels and changes. Similarly, Christie (1987) states that because market-based accounting studies are underpinned by a cash flow valuation model, this indicates that the levels and returns models are economically equivalent. However, while the levels models are subject to specification errors and spurious inference problems, the returns models are econometrically less problematic (Christie, 1987). However, Kothari and Zimmerman (1995) discuss the strengths and limitations of both models and conclude that, contrary to the widely-held beliefs of the returns models superiority, the levels models dominate for certain applications. Specifically, the estimated slope coefficients are found to be substantially less biased for the levels models whereas the returns models exhibit less serious heteroscedasticity and/or other specification problems.

[6] Landsman and Magliolo (1988) provide a review on the historical origins of returns model specification, which are argued to contribute to the attractiveness of the returns-based methodology, resulting in the dominance of this model in market-based accounting research.

Nevertheless, despite the importance of the econometric considerations, the ultimate decision in selecting which model should be used rests upon the hypotheses dictated by the research questions (Lev and Ohlson, 1982; Landsman and Magliolo, 1988; Gu, 2005). Therefore, researchers should be aware of the econometric limitations of these models in designing their tests. For example, it is argued that the scale effects present in accounting data cause coefficients bias and lead to heteroscedasticity (Barth and Kallapur, 1996; Cortijo et al., 2009). Scale effects arise due to differences in firm size, either across firms or over time, in which large (small) firms usually have large (small) values of many variables (Barth and Kallapur, 1996). This may cause the error term (ε) to violate assumptions underlying the estimation of the models used to test the hypotheses. Gu (2005) examines whether the choice between the levels models and the returns models is determined by the potential scale effect. This is largely due to the arguments that the returns model should be preferred because it could control for a potential scale problem in the levels model. However, the findings indicate that the scale factor does not appear to be able to explain the differences between the two models and it is concluded that the choice of model should not depend on any scale factor concerns. Further, Gu (2005) argues that one of the major difficulties in disentangling the scale effect is that the original scale-free relation is generally unknown, which makes it impossible to control for the effect.

Barth and Clinch (2009) propose that one of the most effective solutions to mitigate specific scale effects requires the researcher to diagnose the type of scale present in the data. Based on the Ohlson (1995) model, they examine five different types of scale effects: multiplicative and additive effects, scale-varying coefficients, survivorship effects and heteroscedasticity that can result in inference problems. However, it is found that empirical tests designed to diagnose specific scale effects are largely ineffective at identifying whether scale effects are present in the data or which type of scale effect is present. For example, the findings reveal that although

the White (1980) test[7] is generally effective at identifying heteroscedasticity, it often indicates an effect is present when no scale effect exists. Hence, they suggest that researchers rely on estimation specifications to mitigate various potential scale effects. Barth and Clinch (2009) also compare several estimation equation specifications to determine the extent to which each specification mitigates the five types of scale effects. Specifically, by modifying the Ohlson (1995) model, specifications with market value of equity, share price, equity market-to-book ratio, price-to-lagged price, returns and equity market value-to-market value ratio as the dependent variable are estimated. The results show that share price and undeflated market value of equity specifications generally perform the best, regardless of the type of scale effect.

Therefore, it appears that the use of the undeflated market value of equity in the modified Ohlson (1995) model in this study is generally consistent with the suggestion in Barth and Clinch (2009) to mitigate the scale effect and, consequently, the coefficient bias. Further, additional tests will be performed in this study during the exploratory data analysis process to check formally for the presence of heteroscedasticity. This is in contrast to the prior studies that deflate the regression variables by a scale proxy such as book value of equity and number of shares outstanding (Ahmed and Falk, 2006; Goodwin and Ahmed, 2006) but consistent with the method adopted in Dahmash et al. (2009). With regards to this approach, Barth and Kallapur (1996) argue that deflation does not noticeably reduce heteroscedasticity and can, in fact, decrease estimation efficiency. Similarly, Christie (1987) and Kim (1999) highlight that deflation or, more specifically, the choice of deflator, could lead to potential misspecification. This is because even if deflation eliminates the scale differences, it will introduce spurious inference problems particularly if the deflator is not a function of the independent variables. This indicates that deflation should not be undertaken lightly.

[7] The White (1980) test is a test of general misspecification, but is often used by researchers as a test for heteroscedasticity (e.g. Kothari and Zimmerman, 1995).

Apart from heteroscedasticity or scale effects, there is also a problem concerning measurement error. The parameter estimate or coefficient on a variable is biased and can also be inconsistent when incorrectly measured variables are included in the regression (Swamy, Chang, Mehta and Tavlas, 2003). It is argued that the problem of measurement error is more apparent in certain classes of assets, particularly intangible assets mainly due to the difficulties in estimating the real value of these assets (Boone, 2002). In order to account for this particular problem, alternative measurements of IIA will be used in the value relevance tests to examine the sensitivity of the coefficient estimates. In addition, the use of a constant discount rate across firms and time could potentially lead to measurement error (Boone, 2002). This suggests that the use of firm-specific discount rate in each year in the calculation of AE, as discussed previously in Section 6.4.3.3, could mitigate the problem of estimation inefficiency associated with measurement error.

Finally, the use of multiple regression models in this study also indicates the importance of conducting other model misspecification tests that include tests for linearity, normality, outliers and influential observations and autocorrelation (Tabachnick and Fidell, 2001; Field, 2005). Overall, it appears that an implication of using the levels model is that it is important to be aware of its econometric limitations such as heteroscedasticity and measurement error, and exercise more caution and care in model specification.

6.4.5 Sample and Data

The sample used in this study includes all ASX listed firms in the year 2003 and 2004 for the pre-AIFRS period and the year 2007 and 2008 for the post-AIFRS period. This study does not cover the periods 2005 and 2006 to allow for the transitional effect of AIFRS implementation on the reporting of intangible assets. Firms in the Financials industry are excluded from the sample due to significant differences in the structure of financial statements of firms in this industry, which is

also in keeping with previous studies (Wyatt, 2005; Ritter and Wells, 2006; Dahmash et al., 2009). Using this initial sample, the firm life cycle classification procedure described in Section 6.2.2 is conducted to classify sample firms into the three stages of Growth, Mature and Decline. In order to test the hypotheses in this study, sample firms also need to be categorised into capitalisers and non-capitalisers in both the pre- and post-AIFRS periods. Consistent with the definition of intangible assets used in this study, the accounting treatment for identifiable intangible assets is used to perform this classification.

Specifically, a firm that recognises its identifiable intangible assets and/or provides a clear disclosure concerning the use of the accounting method of capitalisation for its identifiable intangible assets in the notes to the accounts in the year of observation is identified as a capitaliser. This definition of capitalisers includes firms that may choose to capitalise partially their identifiable intangible assets. That is, they recognise certain amounts and/or types of identifiable intangible assets and expense others. A firm that chooses to expense fully its intangible expenditures and/or provides a clear disclosure relating to the use of the expensing method in the notes to the accounts as well as a firm that does not recognise identifiable intangible assets and/or provides no disclosure relating to the accounting method for these assets is classified as a non-capitaliser. To achieve this level of detail, the relevant accounting data will be hand-collected from the annual reports in order to extract the data from the notes to the accounts and the balance sheet.

Data needed to conduct the analyses in this study, for example, the list of ASX firms in each industry, share prices, number of ordinary shares outstanding, EBIT, book value of equity, capital expenditures, sales and total debt as well as sample firms' annual reports are obtained from FinAnalysis Aspect Huntley and DatAnalysis Aspect Huntley databases maintained by the University of Tasmania Library. Further, data used in the calculation of the discount rates, such as the 10-year government bond yield, are obtained from the Reserve Bank of Australia website

(http://www.rba.gov.au/). Meanwhile, data concerning the monthly stock price of the industry's equity and market returns (S&P/ASX 200 index) are taken from Australian Yahoo!7 Finance (http://au.finance.yahoo.com/). Firms are only included in the final sample if all required data are available.

6.5 Summary

The methodology used to perform the firm life cycle classification procedure and the tests of value relevance are presented and discussed in this chapter. First, it provided an overview of the methods used in prior studies for firm life cycle classification. Following the review, a life cycle classification procedure based on the methodology introduced by Anthony and Ramesh (1992) is employed in this study. Taking into account the focus of this study on the accounting practice for intangible assets and their value relevance, the classification procedure is designed to capture the mix between assets-in-place and growth opportunities that underpins the argument on the moderating effect of firm life cycle on the relationship between accounting choice and the value relevance of intangible assets. However, it departs from most prior studies in this area because two life cycle proxies (AGE and DP) are not considered in this study due to their limitations.

Second, it presented an overview of the nature, importance, contribution and weaknesses of the Ohlson (1995) valuation framework. Taken together, it appears that although the Ohlson (1995) model offers a rigorous theoretical framework for value relevance studies, a modification is necessary in order to examine appropriately the hypotheses outlined in this study. Thus, and finally, a research design is presented and discussed in which the original Ohlson (1995) model is varied to incorporate the variables of interest. The discussion on the research design also includes issues associated with model specification, sampling and data collection processes.

In the next chapter, a discussion on the final sample as well as the outcomes of the procedures performed to assess the regression models to be used in the analyses as developed in this chapter will be presented. Further, it will also present the results of the tests conducted to examine empirically the hypotheses developed in Chapter 5.

CHAPTER 7

ANALYSIS AND RESULTS

7.1 Introduction

This chapter presents the empirical analyses of the data and the results to address the hypotheses developed in Chapter 5. In Section 7.2 the process used to obtain the final sample employed in this study as well as descriptive statistics of the sample are discussed. This is followed by a discussion on the procedures used to assess the regression models used in hypotheses testing in Section 7.3. Sections 7.4 and 7.5 present the primary findings for the tests of value relevance of identifiable intangible assets in the pre- and post-AIFRS periods. Section 7.6 reports the results of the additional tests conducted to examine the robustness of the primary findings. Finally, Section 7.7 provides a summary of the chapter.

7.2 Sample Description and Descriptive Statistics

The sample selection process is illustrated in Table 7.1 and can be described as follows; first, an initial sample of all firms listed on the ASX excluding firms in the Financials industry for the years 2003 to 2004 for the pre-AIFRS period and 2007 and 2008 for the post-AIFRS period is selected. This initial sample, composed of a total of 6,160 firm-years, is used to perform the firm life cycle stages classification. Next, firms with missing data that are needed to perform the firm life cycle stages classification are dropped from the sample, leaving 5,518 firm-year observations.

Table 7.1

Sample Selection Process (2003-2004 and 2007-2008)

Description	**Firm-Years**
Initial number of firm-years	6,160
Less: Firm-years with missing data for firm life cycle classification	(642)
Less: Firm-years not meeting the Growth, Mature and Decline classification	(1,000)
Number of firm years with firm life cycle stages	4,518
Less: Firm-years with missing data for further regression analysis	(220)
Less: Non-capitalisers	(2,171)
Less: Firm-years not meeting the model specification tests	(2)
Final Number of Firm-Years for Capitalisers	***2,125***

As discussed in Chapter 6, an additional test is conducted to examine the stability of the firm life cycle classification methodology employed in this study. There are two assumptions in this test. First, the life cycle classification is sticky, which means most firms will remain in the same life cycle stage from one year to the next (t-1 to t and t to t+1). Second, the life cycle classification exhibits a forward rather than a backward movement. The results of the test are presented in Appendix 2 and show that a majority of the firms remain in the same life cycle stage in the year before and after the classification, providing evidence for stability in classification. Further, the results indicate that except for Mature to Decline/Decline stage, the classification provides evidence of forward, rather than backward movement, in life cycle stages. Specifically, it is found that while firms in Growth/Growth to Mature stage have a greater tendency to move to Mature stage, firms in the Mature stage are likely to remain in the same stage rather than to progress to the next stage of Mature/Mature to Decline. Nonetheless, the difference between Mature and Mature/Mature to Decline stage is not substantial. Overall, this suggests the stability and consistency of the life cycle classification method used in this study for both the pre- and post-AIFRS periods.

In the next step of the sample selection procedure, a total of 1,000 firm-years are excluded from the sample because these observations cannot be classified into the three major life cycle stages to be used in this study, which are Growth, Mature and Decline. These are the firm-years that have been classified into the intermediate categories of Growth/Mature and Mature/Decline. This leaves a total of 4,518 firm-year observations with useful firm life cycle stages. Next, 220 firm-years with missing data for conducting further regression analysis or, more specifically, unavailable annual reports, share price and other relevant information are excluded. 2,171 firm-years from non-capitalising firms according to the definition presented in Chapter 6 are then deleted from the sample. Finally, 2 firm-years not meeting the model specification tests discussed in Section 7.3 are also excluded. This procedure yields a final sample of 2,125 firms-years, with 900 firm-years in the pre-AIFRS period and 1,225 firm-years in the post-AIFRS period. Overall, the sample selection process indicates that 34.5% of the total population within the period studied can be classified as capitalisers. Table 7.2 presents the distribution of the firm-year observations by industry and firm life cycle stages. The full list of the firms included in the final sample is provided in Appendix 3.

Panel A of Table 7.2 reveals that the number of firm-year observations in a year ranges from a high of 631 in 2008 to a low of 437 in 2003. The number of firm-year observations in an industry ranges from a high of 430 (20.24%) for Consumer Staples to a low of 46 (2.16%) for Utilities. A comparison of the percentage of sample (sample size) to the percentage of population (population size) of the industry shows that Telecommunications and Utilities have the smallest difference of less than 1 percent. Panel A also shows that while Consumer Staples, Consumer Discretionary, Health Care, Industrial and Information Technology are generally over-represented, Energy and Materials are under-represented in the final sample. The difference between sample size and population size in these industries, except for Materials, ranges from 0.44 % to 8.16%.

Table 7.2

Distribution of Firm-Year Observations

Panel A: Industry Breakdown						
Industry	**2003**	**2004**	**2007**	**2008**	**Sample (% of Sample)**	**Population (% of Population)**
Consumer Staples	100	102	121	107	430 (20.24)	778 (12.63)
Consumer Discretionary	45	46	41	46	178 (8.38)	280 (4.55)
Energy	8	9	29	40	86 (4.05)	711 (11.54)
Health Care	70	91	114	113	388 (18.26)	622 (10.10)
Industrial	75	81	116	130	402 (18.92)	837 (13.59)
Information Technology	76	71	75	73	295 (13.88)	511 (8.30)
Materials	40	41	71	89	241 (11.34)	2197 (35.67)
Telecommunications	13	12	16	18	59 (2.78)	118 (1.92)
Utilities	10	10	11	15	46 (2.16)	106 (1.72)
Total	**437**	**463**	**594**	**631**	**2125 (100.00)**	**6160 (100.00)**
Panel B: Firm Life cycle Stages Breakdown						
Firm Life cycle Stages	**2003**	**2004**	**2007**	**2008**	**Sample (% of Sample)**	**Population (% of Population)**
Growth	119	129	156	142	546 (25.69)	902 (19.96)
Mature	270	289	370	421	1350 (63.53)	3006 (66.53)
Decline	48	45	68	68	229 (10.78)	610 (13.50)
Total	**437**	**463**	**594**	**631**	**2125 (100.00)**	**4518 (100.00)**

Materials, however, shows the largest difference (24.33%) between the size of the sample and the population. This is mainly attributable to the nature of the industry in which less firms report identifiable intangible assets and more firms report deferred intangible assets, mostly in the form on extractive industry exploration and evaluation costs. As mentioned in Chapter 6, these capitalised exploration and evaluation expenditures are excluded from the definition of intangible assets used this study as well as other previous studies because they are classified as PPE in Australian GAAP financial reports. This leads to most of the firms in this industry being classified as non-capitalisers, and therefore, not included in the final sample.

Panel B reports the distribution of firm-year observations according to firm life cycle stages. It shows that the highest and the lowest concentrations of the sample are in

Mature and Decline firms, respectively (63.53% and 10.78%). Further examination also reveals that Growth firms are over-represented while both Mature and Decline firms are under-represented in the final sample. The difference between the sample size and the population size, nonetheless, is relatively small.

Tables 7.3 and 7.4 present the descriptive statistics for the continuous variables used in the analyses conducted in the pre-AIFRS period and post-AIFRS period, respectively. A comparison across firm life cycle stages in Panels B, C and D shows that Mature and Decline firms have the highest and the lowest means for MV, ADJ_BV, IIA and AE, respectively. Further analysis (results not tabulated) indicates that there are some significant differences in these variables across firm life cycle stages. Specifically, Growth firms have significantly lower ADJ_BV and MV than Mature firms (*t*-test for equality of means, unequal variance assumed, t = -1.858 and -1.778, respectively). Meanwhile, MV, IIA and ADJ_BV for Decline firms are found to be significantly lower than Mature firms (*t*-test for equality of means, unequal variance assumed, t = -4.387 for MV, t = -4.828 for IIA; and t = -3.106 for ADJ_BV).

Table 7.3 also reports the ratio of IIA on book value of equity (IIA/BV)[8], in which it can be seen that Growth and Decline firms have the highest and the lowest mean for IIA/BV, respectively. This is consistent with the characteristics of the firms according to their life cycle stages as discussed in Chapter 4. Specifically, these figures reflect the high proportion of growth opportunities for Growth firms and the limited growth opportunities for Decline firms compared to their counterparts (Pashley and Philippatos, 1990; Black, 1998).

[8] Further analysis conducted to examine the negative value for IIA/BV indicates that 1.89% and 0.90% of the sample firm-years have negative IIA/BV in the pre- and post-AIFRS period, respectively. This raises concerns about its effect on the firm life cycle classification procedure as most of these firm-years are categorised in the Mature stage due mainly to the utilisation of financial proxies. Nonetheless, the analysis also reveals that as at 30/6/2010, 9 out of 13 firms (pre-AIFRS period) and 8 out of 9 firms (post-AIFRS period) remain listed and traded on the ASX, suggesting their continuity or existence. Moreover, similar results discussed in Sections 7.4 and 7.5 are obtained for the additional value relevance tests performed by excluding firm-years with negative IIA/BV.

Table 7.3

Descriptive Statistics: The Pre-AIFRS Period

VARIABLE	Panel A: Full Sample (n=900)				
	Mean	**Median**	**Std. Deviation**	**Minimum**	**Maximum**
MV (AUD)	1,029,538,786	62,240,089	4,857,169,993	0	65,639,215,245
ADJ_BV (AUD)	276,818,886	12,047,889	1,260,785,027	-544,089,000	19,120,467,485
IIA (AUD)	80,005,132	809,443	359,177,950	0	3,428,645,914
AE (AUD)	-1,414,098,123	-85,185,946	6,195,209,385	-84,432,938,460	19,679,511,706
IIA/BV (%)	0.222	0.038	0.514	-7.15	4.57
Panel B: Growth Firms (n=248)					
MV (AUD)	777,102,147	98,451,251	2,115,348,942	0	13,918,695,439
ADJ_BV (AUD)	198,906,190	13,820,713	635,067,102	-544,089,000	3,723,477,000
IIA (AUD)	73,073,298	1,076,211	358,680,908	0	3,428,645,914
AE (AUD)	-1,367,450,000	-97,148,474	4,174,185,054	-25,958,467,389	732,187,371
IIA/BV (%)	0.248	0.053	0.392	-1.26	2.27
Panel C: Mature Firms (n=559)					
MV (AUD)	1,286,403,237	66,112,971	5,981,315,425	684,000	65,639,215,245
ADJ_BV (AUD)	340,641,215	13,699,000	1,530,861,844	-522,034,000	19,120,467,485
IIA (AUD)	94,447,165	1,101,000	386,633,245	0	3,428,645,914
AE (AUD)	-1,580,303,130	-88,134,086	7,292,040,867	-84,432,938,460	19,679,511,706
IIA/BV (%)	0.220	0.045	0.579	-7.15	4.57
Panel D: Decline Firms (n=93)					
MV (AUD)	158,754,468	17,722,390	439,359,508	516,000	2,407,824,086
ADJ_BV (AUD)	100,965,841	7,035,000	404,609,469	-4,581,000	3,544,397,267
IIA (AUD)	11,682,536	14,178	49,613,685	0	375,000,000
AE (AUD)	-539,475,919	-55,228,418	2,192,764,650	-19,315,466,351	9,495,874
IIA/BV (%)	0.168	0.0002	0.359	-.013	2.08

Variables are defined as follows:
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Adjusted Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; BV = Book value of equity.

Table 7.4

Descriptive Statistics: The Post-AIFRS Period

Variable	Panel A: Full Sample (n=1,225)				
(AUD)	Mean	Median	Std. Deviation	Minimum	Maximum
MV (AUD)	1,622,719,842	50,574,609	10,939,777,312	0	257,672,745,000
ADJ_BV (AUD)	356,048,961	20,464,000	1,462,951,464	-2,000,032,000	20,266,560,799
IIA (AUD)	103,541,283	1,227,000	524,504,230	0	8,879,907,621
AE (AUD)	-2,044,506,104	-123,950,472	8,649,521,884	-103,896,499,390	25,571,806,047
IIA/BV (%)	0.198	0.035	0.504	-3.42	6.62
	Panel B: Growth Firms (n=298)				
MV (AUD)	1,570,982,281	79,017,534	10,671,704,736	0	173,273,901,638
ADJ_BV (AUD)	222,125,189	19,740,177	1,084,499,079	-738,152,000	15,182,000,000
IIA (AUD)	82,679,566	1,463,291	420,410,457	0	4,408,000,000
AE (AUD)	-1,070,406,982	-98,452,232	4,290,429,346	-33,211,267,684	25,571,806,047
IIA/BV (%)	0.228	0.073	0.528	-0.60	6.54
	Panel C: Mature Firms (n=791)				
MV (AUD)	1,740,290,397	48,784,023	11,775,154,829	0	257,672,745,000
ADJ_BV (AUD)	365,606,351	23,307,166	1,381,998,382	-2,000,032,000	16,603,022,876
IIA (AUD)	121,687,960	1,200,000	595,488,191	0	8,879,907,621
AE (AUD)	-2,270,518,891	-142,954,151	9,416,882,777	-103,896,499,390	25,571,806,047
IIA/BV (%)	0.194	0.029	0.518	-3.42	6.62
	Panel D: Decline Firms (n=136)				
MV (AUD)	1,052,274,871	20,764,293	4,768,704,029	1,021,402	38,060,482,800
ADJ_BV (AUD)	593,912,112	14,489,163	2,354,470,233	-267,108,000	20,266,560,799
IIA (AUD)	43,708,707	335,500	154,415,428	0	1,157,476,000
AE (AUD)	-2,864,398,930	-132,315,563	10,761,916,696	-83,446,392,452	25,571,806,047
IIA/BV (%)	0.154	0.018	0.336	0.000	1.99

Variables are defined as follows:
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Adjusted Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; BV = Book value of equity.

Tables 7.3 and 7.4 enable a comparison between the pre- and post-AIFRS periods. Panel A in both Tables show that the means for all variables in the post-AIFRS period are higher than the pre-AIFRS period. However, further examination in the form of *t*-test for equality of means (results not tabulated) reveals, with the exception of MV (unequal variance assumed, t = -1.683), that there is no significance difference in these variables across the two periods. Table 7.4 also shows that in the post-AIFRS period, Mature firms have the highest means for MV, IIA and AE. Decline firms have the highest mean for ADJ_BV and this could be attributable to more firms, particularly from the Mature group, moving into the Decline stage, thus increasing the variable for this group of firms. Similar to the pre-AIFRS period, Growth and Decline firms have the highest and the lowest mean for IIA/BV indicating greater and lower reliance on growth opportunities, respectively, for these firms.

Tables 7.3 and 7.4 show that the minimum value for IIA for the full sample and across the firm life cycle stages is zero, indicating that there are firms identified as capitalisers that do not report any intangible assets or report zero value of intangible assets (net of accumulated amortisation). However, the results are consistent with the observations during the data collection process in which there are firms that have zero value of net intangible assets although they do disclose that it is their accounting policy choice to capitalise intangible assets.

AE has negative means in both pre- and post-AIFRS periods and this is attributable probably to its operationalisation as described in Chapter 6. Specifically, the use of EBIT and current book value of equity to derive AE resulted in generally negative estimates for AE. This is because additional analyses reveal that 43.1 percent of sample firms in the pre-AIFRS period and 44.2 percent in the post-AIFRS period, respectively, have negative EBIT. Finally, Panel A of both Tables also report substantial differences between the means and medians as well as extreme maximum values, indicating skewness in the variable distributions. These issues are further addressed in the next section.

7.3 Model Specification Tests: Assessing the Regression Model

This section provides a summary of the procedures undertaken to test the specifications of the models used in the study. The procedures are crucial to ensure the validity of the regression models used and of the inferences drawn from the models. This is based largely on Tabachnick and Fidell (2001) and Field (2005). The tools used to perform the diagnostics on multiple regression models used in this study are presented in Table 7.5.

Table 7.5

Diagnostic Tools Used in Model Specification Tests

Model Specification Test	Diagnostic Tool(s)
Assumption of normality	• Histograms • Normality plots • Kolmogorov-Smirnov test
Assumption of linearity	• Scatterplots
Assumption of homoskedasticity	• Scatterplots • Levene's test • White's t test
Independence of errors (autocorrelation)	• Durbin-Watson test
Outliers and influential observations	• Standardised residuals • Cook's Distance
Multicollinearity	• Pearson correlations • Variance Inflation Factors (VIFs) • Tolerance statistics

The regression models used to test the hypotheses in this study are explained in Chapter 6. These models, which are based on Equations (8), (9), (10) and (11) in Chapter 6, are presented below.

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \varepsilon_{it} \quad \textbf{(Model 1)}$$

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 G_{it} + \alpha_5 D_{it} + \alpha_6 (G_{it} * IIA_{it}) + \alpha_7 (D_{it} * IIA_{it}) + \varepsilon_{it} \quad \textbf{(Model 2)}$$

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 (PRE_{it} * IIA_{it}) + \varepsilon_{it}$$

(Model 3)

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 G_{it} + \alpha_6 D_{it} + \alpha_7 (PRE_{it} * IIA_{it}) + \alpha_8 (PRE_{it} * G_{it}) + \alpha_9 (PRE_{it} * D_{it}) + \alpha_{10} (G_{it} * IIA_{it}) + \alpha_{11} (D_{it} * IIA_{it}) + \alpha_{12} (PRE_{it} * G_{it} * IIA_{it}) + \alpha_{13} (PRE_{it} * D_{it} * IIA_{it}) + \varepsilon_{it}$$

(Model 4)

where:

MV_{it} = market value of equity of firm *i* 90 days after the end of financial year *t*;

ADJ_BV_{it} = book value of equity of firm *i* at the end of financial year *t* less $IIA_{it;}$

IIA_{it} = identifiable intangible assets of firm *i* at the end of financial year *t;*

AE_{it} = abnormal earnings of firm *i* at the end of financial year *t;*

G_{it} = a dummy variable equal to 1 for firms in the Growth stage of firm life cycle, and 0 otherwise for firm *i* at the end of financial year *t*;

D_{it} = a dummy variable equal to 1 for firms in the Decline stage of firm life cycle, and 0 otherwise for firm *i* at the end of financial year *t;*

PRE_{it} = a dummy variable equal to 1 for firms in the pre-AIFRS period, and 0 otherwise for firm *i* at the end of financial year *t*.

First, a check is made on the ratio of cases to independent variables, that is the adequacy of the sample size and any missing cases. The simplest rule of thumb for the minimum acceptable sample size is $N \geq 104 + m$ (where N is the number of cases or sample size and m is the number of independent variables) for the individual predictors to predict the dependent variable (Green, 1991). Therefore, with 900 and 2,125 firm-year observations in the pre-AIFRS period and both pre- and post-AIFRS period respectively, and a maximum of 13 independent variables, the number of cases is well above the minimum requirement of 117 (104 + 13). Further, the data screening process also reveals that there are no missing cases in the final sample.

Next, an initial data screening is performed prior to conducting the multiple regression analysis to examine whether the data used meet the assumptions of parametric tests. This data screening procedure aims to check for the distribution of data and to evaluate the assumptions of linearity, normality and homoscedasticity. It involves examining the descriptive statistics, using the graphical methods such as histograms, normality plots and scatterplots, as well as performing statistical tests which are the Kolmogorov-Smirnov (K-S) and Levene's tests.

The initial screening process in general indicates violations of linearity, normality and homoscedasticity assumptions as well as the presence of outliers. For example, departures from linearity and homoscedasticity between two variables are assessed by the inspection of bivariate scatterplots. If both the linearity and homoscedasticity assumptions are met, the scatterplot is oval-shaped (Tabachnick and Fidell, 2001). The scatterplots indicate that there are some problems with linearity, particularly for AE and violation of homoscedasticity (or evidence of heteroscedasticity), for all variables. Further, the scatterplots also indicate the presence of potential outliers for all variables.

Meanwhile, in testing for normality, the histograms show that the data are not normally distributed, due to the: (1) peakedness of the distribution of the data for all variables; (2) positive skewness of the distribution for MV, ADJ_BV and IIA; and (3) negative skewness of the distribution for AE. This is consistent with the descriptive statistics presented in Tables 7.3 and 7.4, in which the means are found to be larger than the medians for all of the variables, indicating that the distributions are skewed. Similarly, the results from normality plots show deviations from normality. Using the normality plots, a normal distribution is evident when the points for the cases fall along the straight diagonal line running from the lower left to upper right while deviations from normality shift the points away from the diagonal (Tabachnick and Fidell, 2001; Field, 2005). Additionally, the use of statistical tests, that is, the K-S test for normality and Levene's test for homogeneity of variance, also suggest that these assumptions are not met. Specifically, the K-S test is significant (p<0.05) for all variables, indicating that

they are not normally distributed. Levene's test is also found to be significant (p<0.05) for all variables, therefore, it can be concluded that the assumption of homogeneity of variances has been violated, providing support to earlier findings using scatterplots.

This suggests that the transformation of variables is necessary to reduce skewness and the number of outliers and, consequently, to achieve a closer approximation to linearity, homoscedasticity and normality. The procedures outlined in Tabachnick and Fidell (2001) and Field (2005) are followed in transforming the data. Based on the results during the initial data screening process, logarithmic and square root transformations are performed. The transformed distributions are checked once again for linearity, homoscedasticity and linearity assumptions to examine whether they show any considerable improvements. As a result, logarithmic transformations are used on MV, ADJ_BV and IIA, while a square root transformation is used on AE as these are identified to correct the problems associated with linearity, heteroscedasticity and normality.

Therefore, using the transformed variables, Models 1, 2, 3 and 4 are run and once again, a check is made on all regressions to identify any violations of assumptions, independence of errors and problems with outliers, influential observations and multicollinearity. Since multiple regression analysis is based on a number of assumptions, the fit between the data and these underlying assumptions is assessed before any inferences can be made. An examination of residuals scatterplots provides a simultaneous test of assumptions of normality, linearity and homoscedasticity between predicted dependent variable scores and errors of prediction (Tabachnick and Fidell, 2001). When these assumptions are met, the plot of residuals, which are the differences between obtained and predicted dependent variable scores, should look like a rectangular band with a concentration of residuals along the centre (Tabachnick and Fidell, 2001; Field, 2005). If non-linearity is present, the overall shape of the scatterplot is curved instead of rectangular. If the band enclosing the residuals becomes wider at larger predicted values or funnels out, this indicates the presence of heteroscedasticity.

The violation of normality is indicated by a pile-up of residuals in the upper part of the centre of the plot.

The residuals scatterplots indicate that the assumptions of linearity and normality are tenable in all regression models. However, the scatterplots indicate that there could be some potential problem with heteroscedasticity in the models. Therefore, White's tests are conducted to examine formally the presence of heteroscedasticity (White, 1980; Gupta, 1999). However, the results of the White's tests reveal that heteroscedasticity is not present in any of the models. This implies that the transformation of the variables has not only improved linearity and achieved better approximation of normality, it has also eliminated heteroscedasticity.

Another assumption of regression, testable through residual analysis, is that errors of prediction are uncorrelated or independent of one another. This assumption is tested with the Durbin-Watson test that tests for serial correlation between errors (Tabachnick and Fidell, 2001; Field, 2005). The test statistic can vary between 0 and 4 with a value of 2 or closer to 2 suggesting that the residuals are uncorrelated. A value greater than 2 indicates a negative correlation, while a value below 2 indicates a positive correlation. Field (2005) suggests that a conservative rule of thumb, values less than 1 or greater than 3 are cause for concern. The Durbin-Watson statistics in all regression models indicate the assumption of the independence of errors in these models has been met. Specifically, the test statistic is 1.424 for Model 1, 1.464 for Model 2, 1.393 for Model 3 and 1.433 for Model 4.

The presence of outliers and influential observations are examined by looking at cases with standardised residuals greater than ±3 and their associated Cook's distance. Cook's distance is a measure of the overall influence of a single case on the model as a whole in which it assesses the change in regression coefficients when a case is deleted. It has been suggested that cases with standardised residuals greater than 3 are potential outliers and a Cook's score greater than 1 indicates that the case is having an undue influence on the model and may be

cause for concern (Cook and Weisberg, 1982; Tabachnick and Fidell, 2001; Field, 2005). An examination of the standardised residuals identified six potential outliers in Models 1 and 2 and seven potential outliers in Models 3 and 4. Closer examination shows that two of the potential outliers in Models 1 and 2 have a Cook's distance greater than 1, suggesting that they are having an undue influence on the models. Therefore, these two outliers are deleted, leaving 900 cases for analysis in Models 1 and 2. However, none of the seven potential outliers in Models 3 and 4 is found to have a Cook's distance greater than 1, indicating that these cases are not having an undue influence on the models. As a result, all cases are retained in these models.

Finally, the Variance Inflation Factors (VIFs) and tolerance statistics are used to examine multicollinearity. The VIF indicates whether a predictor has a strong linear relationship with the other predictors, whereas the tolerance statistic is its reciprocal, 1/VIF (Field, 2005). As a general rule of thumb, any VIF greater than 10 and a tolerance value smaller than 0.1 or 0.2 indicate that multicollinearity is a concern in the multiple regression model (Field, 2005). The analysis reveals that in Model 4, there is evidence of multicollinearity for variables PRE and PRE*G with VIFs exceeding 10 (17.004 and 17.996, respectively) and tolerance statistics below 0.1 (0.059 and 0.056, respectively). The high correlation for PRE*G is expected as it is an interaction term[9]. However, it can be argued that because both PRE and interaction term PRE*G in this model are not the variables of interest, any possible multicollinearity due to the high correlation between these two variables would not cause problems (Berry and Feldman, 1985). The results also indicate that none of the variables in the remaining models has any VIF that is greater than 10 or a tolerance value that is smaller than 0.2, suggesting that multicollinearity is not an issue in these models.

The presence of multicollinearity can also be examined by looking at the stability of coefficient estimates and the standard errors of coefficient estimates (Berry

[9] Centring which is achieved by subtracting the mean score from each observation, of the original independent variables that form the interaction term is usually proposed as a means of reducing multicollinearity. However, traditionally, dummy variables are not centred thus the procedure will only help for interactions with continuous variable (Jaccard et al., 1990).

and Feldman, 1985; Ethington, Thomas and Pike, 2002). If the coefficients differ dramatically across different samples and large, inflated standard errors for these coefficients are found in the regression models, this will provide evidence that multicollinearity may be a problem. Standard errors for coefficient estimates are found to be relatively consistent in all models with no sign of large, inflated standard errors in any of them, suggesting that multicollinearity is not a cause for concern.

Nevertheless, to analyse further if multicollinearity is present, a check is performed to examine the stability of the coefficient estimates in the Model 4 across different samples and specification. The results of this analysis are reported in Section 7.6.4.

7.4 Value Relevance of Intangible Assets in the Pre-AIFRS Period: Tests of H1, H2a and H2b

Chapter 5 presented the three hypotheses that will be tested in the analyses reported in this section. The hypotheses are as follows.

H1: ***Intangible assets capitalised during the pre-AIFRS period are value relevant.***

H2a: ***Growth firms that choose to capitalise intangible assets during the pre-AIFRS period have higher value relevance of intangible assets than mature firms.***

H2b: ***Decline firms that choose to capitalise intangible assets during the pre-AIFRS period have lower value relevance of intangible assets than mature firms.***

Table 7.6 reports the correlation coefficients between all the variables used in the regression analyses to test the hypotheses. Preliminary analysis indicates that MV is correlated with all variables of interest (IIA, G*IIA and D*IIA) in the expected direction, suggesting that there is an association between these variables. Further

analysis with multiple regressions will confirm the results for the tests of the hypotheses. Table 7.6 shows that the strongest correlations are for G and G*IIA (0.811), whereas the remaining pairs of independent variables have reasonable correlation with each other. However, a high correlation between these two variables is expected because G*IIA is the product of the interaction term between G and IIA. Most importantly, none of the correlations appear to be of such magnitude to cause concerns about multicollinearity in any of the analyses.

Table 7.6

Pearson Correlation Matrix for Variables Used in the Tests of Value Relevance of Intangible Assets (The Pre-AIFRS Period): Tests of H1, H2a and H2b

	MV	ADJ_BV	IIA	AE	G	D	G*IIA	D*IIA
MV	**1.000**	.552***	.307***	-.3.00***	.066**	-.199***	.130***	-.097**
ADJ_BV		**1.000**	.141***	-.339***	-.025	-.051*	.016	.005
IIA			**1.000**	-.185***	.041	-.157***	.324***	.122***
AE				**1.000**	-.017	.036	-.073**	.002
G					**1.000**	-.209***	.811***	-.145***
D						**1.000**	-.170***	.692***
G*IIA							**1.000**	-.118***
D*IIA								**1.000**

** Correlation is significant at the 0.05 level (two-tailed).
*** Correlation is significant at the 0.01 level (two-tailed).
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise.

Panel A of Table 7.7 presents the regression results based on Model 1. It can be seen that, consistent with the expectation in H1, the coefficient on IIA is significant and positive at the 1 percent level ($\alpha_2 = 0.068$, *t*-statistic = 8.130). This finding indicates that the capitalisation of IIA is value relevant and thus provides support for H1. Further, the result is consistent with previous Australian studies (Godfrey and Koh, 2001; Ahmed and Falk, 2006; Ritter and Wells, 2006; Dahmash et al., 2009).

Table 7.7

The Tests of Value Relevance of Intangible Assets: The Pre-AIFRS Period

Test of H1:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \varepsilon_{it}$ ***(Model 1)***

Test of H2a and H2b:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 G_{it} + \alpha_5 D_{it} + \alpha_6 (G_{it} * IIA_{it}) + \alpha_7 (D_{it} * IIA_{it}) + \varepsilon_{it}$ ***(Model 2)***

Variables	Predicted Sign	Panel A		Panel B	
		H1		H2a and H2b	
		Coefficient	*t*-statistic	Coefficient	*t*-statistic
Intercept	+/-	3.824	16.804***	3.857	16.943***
ADJ_BV	+/-	0.019	17.222***	0.019	17.411***
IIA	+	***0.068***	***8.130******	0.070	6.743***
AE	+/-	0.000	-3.281***	0.000	-3.257***
G	+/-			0.154	1.391
D	+/-			-.249	-1.945*
G*IIA	+			***-.013***	***-.682***
D*IIA	-			***-.047***	***-1.717****
N		900		900	
Adj. R2		0.363		0.383	
F-statistic		172.085***		80.628***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise.

The variables of interest are in bold and italic.

H2a and H2b are examined by utilising Model 2 and the results are presented in Panel B of Table 7.7. The interaction term G*IIA is included in the model and captures the difference in value relevance of IIA between Growth and Mature firms. Specifically, it is hypothesised that Growth firms will have higher value relevance of IIA than Mature firms during the pre-AIFRS period. However, the coefficient on G*IIA is in the opposite direction to that predicted in the hypothesis (α_6 = -.013, *t*-statistic = -.682) and is also insignificant, indicating that there is no support for H2a.

This suggests that during the pre-AIFRS period, the Australian market did not perceive the value relevance of IIA capitalised by Growth firms to be any different from those capitalised by Mature firms. Meanwhile, the interaction term D*IIA represents the difference in value relevance of IIA between Decline and Mature firms. H2b predicts that the value relevance of IIA for Decline firms will be lower than Mature firms. The findings presented in Panel B provide support for H2b as it can be seen that the coefficient for D*IIA is negative and significant at the 5 percent level as expected (α_7 = -.047, *t*-statistic = -1.717).

A post hoc analysis is conducted to see whether the result for H1 is influenced by the presence of value relevance in one group and the lack of value relevance in another. This analysis also provides greater insights into H2a and H2b or, more specifically, the moderating effect of firm life cycle stages. Therefore, Model 1 is run separately for each firm life cycle stage. The results (not tabulated) indicate significant positive coefficients on IIA for both Growth (α_2 = 0.038, *t*-statistic = 2.037) and Mature (α_2 = 0.072, *t*-statistic = 7.202) firms, indicating their value relevance. However, the results also provide evidence of negative and insignificant coefficient on IIA for Decline firms (α_2 = -.006, *t*-statistic = -.291). This suggests that while capitalised IIA of Growth and Mature firms is regarded as value relevant by the Australian market, no value is attached to capitalised IIA by Decline firms. In fact, the results indicate that the amount is negatively valued by the market, although the valuation is not statistically significant.

In summary, the results indicate that the IIA capitalised by Australian firms during the pre-AIFRS are perceived by the Australian market to be value relevant (H1 is supported). However, when extending the analysis across firm life cycle stages, the findings suggest that although there is a significant difference in the value relevance of IIA between Decline and Mature firms (H2b is supported), the same evidence is not present between Growth and Mature firms (H2a is not supported). In other words, the market did not value IIA for Growth firms any differently from IIA for Mature firms[10]. Additional analysis also indicates that the capitalisation of IIA by both Growth and Mature firms is value relevant, but not for Decline firms.

7.5 A Comparison of the Pre- and Post-AIFRS Periods: Tests of H3, H4a and H4b

The hypotheses developed in Chapter 5 for investigating the effect of AIFRS adoption are restated below.

H3: ***The value relevance of intangible assets for firms that choose to capitalise intangible assets is higher during the pre-AIFRS than the post-AIFRS period.***

H4a: ***The effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is higher for growth firms than mature firms.***

H4b: ***The effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is lower for decline firms than mature firms.***

[10] Similar results are obtained when all tests, including the additional tests, are run using P (Share price of the firm 90 days after the end of financial year) as the dependent variable.

Table 7.8

Pearson Correlation Matrix for Variables Used in the Tests of Value Relevance of Intangible Assets (A Comparison of the Pre- and Post-AIFRS Period): Tests of H3, H4a and H4b

	MV	ADJ_BV	IIA	AE	PRE	G	D	PRE*IIA	PRE*G	PRE*D	G*IIA	D*IIA	PRE*IIA*G	PRE*IIA*D
MV	**1.000**	.546***	.385***	-.363***	.019	.074***	-.146***	.141***	.044**	-.121***	.146***	-.021	.082***	-.053**
ADJ_BV		**1.000**	.223***	-.500***	-.037	-.050**	-.003	.032	.001	-.042	.004	.072***	-.002	-.009
IIA			**1.000**	-.165***	-.075***	.050**	-.111***	.399***	-.021	-.128***	.291***	.141***	.180***	.069***
AE				**1.000**	.000	.043**	.006	-.060***	-.028	.033	-.002	-.046**	-.015	.011
PRE					**1.000**	.036	-.009	.744***	.696***	.252***	.003	-.053**	.354***	.175***
G						**1.000**	-.205***	.046**	-.351***	-.127***	.847***	-.156***	.517***	-.088***
D							**1.000**	-.078***	-.208***	.619***	-.174***	.760***	-.106***	.431***
PRE*IIA								**1.000**	.549***	.081***	.144***	.007	.466***	.211***
PRE*G									**1.000**	-.129***	-.297***	-.158***	-.182***	-.090***
PRE*D										**1.000**	-.108***	.360***	-.066***	.696***
G*IIA											**1.000**	-.132***	.613***	-.075***
D*IIA												**1.000**	-.081***	.546***
PRE*IIA*G													**1.000**	-.046**
PRE*IIA*D														**1.000**

** Correlation is significant at the 0.05 level (two-tailed).
*** Correlation is significant at the 0.01 level (two-tailed).
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise; PRE = A dummy variable that is coded 1 for Pre-AIFRS period and 0 otherwise.

Table 7.8 shows the correlations between the variables used in testing H3, H4a and H4b. Correlations reported in this table are consistent with the predicted positive associations between MV and PRE*IIA and MV and PRE*IIA*G and negative association between MV and PRE*IIA*D. Table 7.8 also reveals no substantially high correlation between the independent variables, suggesting that multicollinearity might not be a problem in the regression models.

The test of H3 is based on Model 3 and the regression results are presented in Panel A of Table 7.9. H3 posits that the coefficient on PRE*IIA will be positive and significant. However, the result shows that although the coefficient for PRE*IIA is significant, the sign of the coefficient is in the opposite direction from what is predicted in H3 (α_5 = -.044, *t*-statistic = -3.665). This indicates that the value relevance of IIA in the post-AIFRS period is higher than the pre-AIFRS period and, hence, provides no support for H3.

Meanwhile, it is predicted in H4a and H4b that the effect of the change in the value relevance of intangible assets between the pre- and post-AIFRS periods is different across firm life cycle stages. The findings are provided in Panel B of Table 7.9. In general, the findings do not support either H4a or H4b. Specifically, it is expected that the coefficient on the interaction term PRE*IIA*G that captures the effect of the change in value relevance of intangible assets for Growth and Mature firms will exhibit a significant positive sign in order to be consistent with H4a. The coefficient on the interaction term PRE*IIA*D captures the effect of the change in value relevance for Decline and Mature firms and is hypothesised to show a negative significant sign to provide support for H4b.

However, as can be seen in Panel B of Table 7.9, none of the coefficients is significant suggesting that there is no evidence to support either H4a or H4b. Specifically, the coefficient on PRE*IIA*G is found to be in the opposite direction from the expectation in H4a, suggesting that Mature firms might have greater relevance of IIA than Growth firms.

Table 7.9

The Tests of Value Relevance of Intangible Assets:
A Comparison of the Pre- and Post-AIFRS Period

Test of H3:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 (PRE_{it} * IIA_{it}) + \varepsilon_{it}$$

(Model 3)

Test of H4a and H4b:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 G_{it} + \alpha_6 D_{it} + \alpha_7 (PRE_{it} * IIA_{it}) + \alpha_8 (PRE_{it} * G_{it}) + \alpha_9 (PRE_{it} * D_{it}) + \alpha_{10} (G_{it} * IIA_{it}) + \alpha_{11} (D_{it} * IIA_{it}) + \alpha_{12} (PRE_{it} * G_{it} * IIA_{it}) + \alpha_{13} (PRE_{it} * D_{it} * IIA_{it}) + \varepsilon_{it}$$

(Model 4)

Variables	**Predicted Sign**	**Panel A**		**Panel B**	
		H3		**H4a and H4b**	
		Coefficient	***t*-statistic**	**Coefficient**	***t*-statistic**
Intercept	+/-	-25.828	-18.213***	-26.194	-18.660***
ADJ_BV	+/-	3.448	21.533***	3.487	22.020***
IIA	+/-	0.117	13.989***	0.113	11.223***
AE	+/-	0.000	-5.085***	0.000	-5.247***
PRE	+/-	0.333	4.837***	0.356	2.401**
PRE*IIA	+	***-.044***	***-3.665******	-.040	-2.740***
G	+/-			0.168	1.348
D	+/-			-0.274	-1.994**
PRE*G	+/-			-.010	-.059
PRE*D	+/-			-0.090	-.397
G*IIA	+/-			0.004	0.204
D*IIA	+/-			-.004	-.157
PRE*G*IIA	+			***-.020***	***-.679***
PRE*D*IIA	-			***-.022***	***-.588***
N		2125		2125	
Adj. R2		0.384		0.400	
F-statistic		265.992***		110.009***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise; PRE = A dummy variable that is coded 1 for Pre-AIFRS period and 0 otherwise.

The variables of interest are in bold and italic.

This result, however is not supported due to the insignificant coefficient (α_{12} = -.020, *t*-statistic = -.679). Meanwhile, although the coefficient on PRE*IIA*D has the predicted negative sign, it is also insignificant, and thus providing no support for H4b (α_{13} = -.022, *t*-statistic = -.588).

Similar to the tests of value relevance in the pre-AIFRS period described in Section 7.4, a post hoc analysis is performed to examine further whether the results of H3 vary across different firm life cycle stages. This also presents more insights on the moderating effect of firm life cycle stages in the post-AIFRS period, providing more perspective to H4a and H4b. Therefore, Model 3 is run separately for the three life cycle stages. The results (not tabulated) provide evidence of improved value relevance of IIA in the post-AIFRS period across all firm life cycle stages. Specifically, a significant negative coefficient on the interaction term PRE*IIA is observed in all stages of Growth (α_5 = -.059, *t*-statistic = -2.327), Mature (α_5 = -.041, *t*-statistic = -2.823) and Decline (α_5 = -.061, *t*-statistic = -1.674). This indicates that the increase in the value relevance of IIA is not exclusive to any particular life cycle stage, which explains the earlier findings of no significance difference across life cycle stages.

Overall, the findings indicate that the Australian market attaches higher value relevance for IIA after the introduction of the new standard for intangible assets (H3 is not supported). The findings also provide evidence that the effect of the change in the value relevance of IIA between the pre- and post-AIFRS period does not apply across firm life cycle stages in which no difference is evident between Growth, Mature and Decline firms (H4a and H4b are not supported). However, additional post hoc analysis reveals that there is an increase in the value relevance of IIA in the post-AIFRS period in all three life cycle stages, indicating improved value relevance after the implementation of the new accounting regime. The increase is particularly apparent for Decline firms as evidence of value relevance of IIA is found only in the post-AIFRS period.

7.6 Additional Tests

A number of additional tests are undertaken to assess the robustness of the results discussed in Section 7.4 and 7.5. Specifically, supplementary regression analyses are performed by considering: (1) the use of an alternative measure of intangible assets; (2) industry and intangible intensity effects; and (3) potential time effects. Further, as mentioned in Section 7.3, these additional tests will also provide for the test of the presence of multicollinearity. The results of each of the tests are discussed in the following sections.

7.6.1 Alternative Measure of Intangible Assets (IIA)

The empirical specification in this study used net identifiable intangible assets to proxy for IIA. This includes various types of intangible asset such as brand names, patents and trademarks, licences, copyrights, designs and capitalised R&D costs. However, as discussed in Chapter 2, there is a lack of consistent approach in the definition and classification of intangible assets, which includes identifiable intangible assets. Therefore, while the classification adopted in this study is in accordance with the types of intangible asset affected by and covered in AASB 138 as well as studies conducted in Australia on identifiable intangible assets (see, for example, Chalmers and Godfrey, 2006, Goodwin and Ahmed, 2006 and Dahmash et al., 2009), it differs in certain areas from the approach taken by other studies. Godfrey and Koh (2001) and Wyatt (2001, 2005), for example, consider R&D costs (along with purchased goodwill) separately from other identifiable intangible assets.

Further, it is argued that identifiable intangible assets (excluding R&D costs) are more credible signals of firms' future prospects compared to R&D costs and goodwill. This is mainly because identifiable intangible assets such as brands, patents and trademarks are typically intermediate outputs from innovation which are closer to commercial outcomes (Wyatt, 2001). Wyatt (2005) finds evidence that identifiable intangible assets for which management has the highest accounting

discretion[11] are more value relevant than purchased goodwill and capitalised R&D costs. Besides, while a firm may focus on R&D-related investment in the earlier stage of its life cycle, this can change towards other types of intangible assets in the later stage. For example, instead of investing heavily on R&D as it has done in the past, Ford Motor Company is restructuring itself by focusing on brands and brand building and consumer relations (Lev, 2001). This suggests that R&D could potentially affect the results obtained in the primary analyses.

Therefore, additional tests are run to examine whether the primary results obtained are sensitive to a different measure of intangible assets, that is, when R&D costs are excluded from the total of net identifiable intangible assets to proxy for IIA. This additional test also takes into account a possible cause of model misspecification discussed in Chapter 6, which is measurement error, by testing the sensitivity of the coefficient estimates when a different proxy for IIA is used in the model. Results of the tests are presented in Table 7.10 with the new proxy for IIA denoted by ADJ_IIA.

Panel A shows that the use of this alternative proxy for IIA results only in a small increase in the explanatory power of the model (Adj. R^2 = 0.374) compared to the original model used to test H1 (Adj. R^2 = 0.363). Panel A also shows that the coefficient on ADJ_IIA is positive and significant as expected (α_2 = 0.074, *t*-statistic = 9.094), hence, providing support for H1. Similarly, Panel B of Table 7.10 reveals that the use of ADJ_IIA results in no significant increase in the explanatory power of the model (Adj. R^2 = 0.393) in comparison to the previous model (Adj. R^2 = 0.383). However, most importantly, similar results to the primary analysis using IIA are obtained in which contrary to the expectation, the coefficient on G*ADJ_IIA is negative and insignificant (α_6 = -.023, *t*-statistic = -1.234).

[11] Recall the discussion in Chapter 2 that there was no specific standard for identifiable intangible assets such as brand names, patents, trademarks, copyrights, licences and mastheads in the pre-AIFRS period, while accounting for R&D costs and goodwill are addressed by AASB 1011 and AASB 1013 respectively.

Table 7.10

Additional Test: The Use of Alternative Measure of Intangible Assets (The Pre-AIFRS Period)

Test of H1:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 ADJ\_IIA_{it} + \alpha_3 AE_{it} + \varepsilon_{it}$ ***(Model 1)***

Test of H2a and H2b:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 ADJ\_IIA_{it} + \alpha_3 AE_{it} + \alpha_4 G_{it} + \alpha_5 D_{it} + \alpha_6 (G_{it} * ADJ\_IIA_{it}) + \alpha_7 (D_{it} * ADJ\_IIA_{it}) + \varepsilon_{it}$ ***(Model 2)***

Variables	**Predicted Sign**	**H1**		**H2a and H2b**	
		Coefficient	***t*-statistic**	**Coefficient**	***t*-statistic**
Intercept	+/-	3.906	17.278***	3.926	17.396***
ADJ_BV	+/-	0.019	17.073***	0.018	17.259***
ADJ_IIA	+	***0.074***	***9.094******	0.078	7.818***
AE	+/-	0.000	-3.130***	0.000	-3.123***
G	+/-			0.190	1.854*
D	+/-			-.264	-2.187**
G*ADJ_IIA	+			***-.023***	***-1.234***
D*ADJ_IIA	-			***-.044***	***-1.597****
N		900		900	
Adj. R2		0.374		0.393	
F-statistic		180.217***		84.176***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets and capitalised R&D costs); ADJ_IIA = Identifiable intangible assets reported for the year (adjusted for net capitalised R&D costs); AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise.

The variables of interest are in bold and italic.

Therefore, it can be concluded that there is no support for H2a. Second, consistent with the expectation, the coefficient on D*ADJ_IIA is negative and significant (α_7 = -.016, *t*-statistic = -1.597), hence, providing support for H2b.

Results for the tests of H3, H4a and H4b are shown in Table 7.11. Overall, it can be seen that there is only a minor increase in the explanatory power of both models with ADJ_IIA (Adj. R^2 = 0.385 and 0.401) compared to the original models. However, similar to previous findings, the coefficient on PRE*IIA shows a negative significant sign (α_5 = -.031, *t*-statistic = -2.675), indicating higher value relevance in the post-AIFRS period and providing no support for H3. Additionally, Panel B indicates that no evidence is found to support both H4a and H4b. This is illustrated by the insignificant coefficients on both interaction terms of PRE*IIA*G and PRE*IIA*D. While the coefficient on PRE*IIA*D is in the expected direction, PRE*IIA*G has a negative sign, which is in the direction opposite to the prediction.

The consistent results when using IIA and ADJ_IIA could be attributable to the small amount of R&D costs recognised in the balance sheet in both periods. This is also evident in the small difference in the overall explanatory power of the models when IIA and ADJ_IIA are used. Additional analysis (results not tabulated) confirms that R&D costs have the lowest capitalisation ratio (to total assets) compared to other classes of intangible assets in both pre- and post-AIFRS periods.

Specifically, the ratio of capitalised R&D costs, goodwill and other identifiable intangible assets to total assets in the pre-AIFRS period is 0.07%, 13.8% and 11.14%, respectively. Meanwhile, in the post-AIFRS period, the ratio of capitalised R&D costs, goodwill and other identifiable intangible assets to total assets is 0.17%, 20.43% and 9.78%, respectively. These statistics are also consistent with previous studies on intangible asset recognition practices such as Godfrey and Koh (2001), Wyatt (2001, 2005), and Chalmers and Godfrey (2006). These studies, however, are conducted using the data in the pre-AIFRS period.

Table 7.11

Additional Test: The Use of Alternative Measure of Intangible Assets (A Comparison of the Pre- and Post-AIFRS Period)

Test of H3:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 ADJ\_IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 (PRE_{it} * ADJ\_IIA_{it}) + \varepsilon_{it}$ ***(Model 3)***

Test of H4a and H4b:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 ADJ\_IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 G_{it} + \alpha_6 D_{it} + \alpha_7 (PRE_{it} * ADJ\_IIA_{it}) + \alpha_8 (PRE_{it} * G_{it}) + \alpha_9 (PRE_{it} * D_{it}) + \alpha_{10} (G_{it} * ADJ\_IIA_{it}) + \alpha_{11} (D_{it} * ADJ\_IIA_{it}) + \alpha_{12} (PRE_{it} * G_{it} * ADJ\_IIA_{it}) + \alpha_{13} (PRE_{it} * D_{it} * ADJ\_IIA_{it}) + \varepsilon_{it}$ ***(Model 4)***

Variables		**H3**		**H4a and H4b**	
	Predicted Sign	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**
Intercept	+/-	-25.596	-18.030***	-25.976	-18.484***
ADJ_BV	+/-	3.430	21.405***	3.469	21.884***
ADJ_IIA	+/-	0.110	13.565***	0.107	10.983***
AE	+/-	0.000	-5.055***	0.000	-5.228***
PRE	+/-	0.272	4.197***	0.275	1.986**
PRE*ADJ_IIA	+	***-.031***	***-2.675******	-.029	-2.007**
G	+/-			0.223	1.931*
D	+/-			-.271	-2.075**
PRE*G	+/-			0.020	0.125
PRE*D	+/-			-.082	-.384
G*ADJ_IIA	+/-			-.005	-.241
D*ADJ_IIA	+/-			-.004	-.182
PRE*G*ADJ_IIA	+			***-.019***	***-.663***
PRE*D*ADJ_IIA	-			***-.013***	***-.354***
N		2125		2125	
Adj. R2		0.385		0.401	
F-statistic		266.945***		110.336***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets and capitalised R&D costs); ADJ_IIA = Identifiable intangible assets reported for the year (adjusted for net capitalised R&D costs); AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise; PRE = A dummy variable that is coded 1 for Pre-AIFRS period and 0 otherwise.

The variables of interest are in bold and italic.

Overall, this suggests that the results are not influenced by an alternative measure of IIA (that is when capitalised R&D costs are excluded) and thus, provides support for the robustness of the primary results.

7.6.2 Industry and Intangible Intensity Effects

Intangible assets are generally associated with industry structure (Ritter and Wells, 2006) and due to differences in industries' reliance on intangible assets, industry groupings are considered to have different types of exposures to changes in financial reporting as a result of AIFRS adoption (Chalmers and Godfrey, 2006). Furthermore, Aboody and Lev (1998) and Smith et al. (2001) find that the effects of capitalisation on the value relevance of intangible assets are more apparent when sample firms are further partitioned on the basis of materiality of the intangible assets' capitalisation. Therefore, sensitivity tests are conducted to investigate whether the primary results hold when a different sub-sample is used, which is based on intangible-intensive industries. In this test, an industry is excluded from the intangible-intensive industry classification if it has an intangible asset capitalisation ratio (as measured by the ratio of total identifiable intangible assets to total assets) in both pre- and post-AIFRS periods that is lower than the average capitalisation ratio of the whole sample (note that the average capitalisation ratios in the pre- and post-AIFRS period are 14.6% and 19.0%, respectively).

Based on this classification, three industries are excluded from the intangible-intensive sub-sample; Consumer Staples, Energy and Materials. Therefore, additional tests are performed using the remaining six industries which are; Consumer Discretionary, Health Care, Industrial, Information Technology, Telecommunications and Utilities. The results of this test are presented in Table 7.12. It shows that the use of this sub-sample leads to a decrease in the overall explanatory power of the models to test H1, H2a and H2b (Adj. R^2 = 0.235 and 0.253, respectively).

Table 7.12

Additional Test: Industry and Intangible Intensity Effects
(The Pre-AIFRS Period)

Test of H1:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \varepsilon_{it}$ ***(Model 1)***

Test of H2a and H2b:

$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 G_{it} + \alpha_5 D_{it} + \alpha_6 (G_{it} * IIA_{it}) + \alpha_7 (D_{it} * IIA_{it}) + \varepsilon_{it}$ ***(Model 2)***

Variables	**Predicted Sign**	**H1**		**H2a and H2b**	
		Coefficient	***t*-statistic**	**Coefficient**	***t*-statistic**
Intercept	+/-	4.020	12.938***	4.024	12.893***
ADJ_BV	+/-	0.015	9.356***	0.015	9.511***
IIA	+	***0.067***	***6.974******	0.070	5.942***
AE	+/-	0.000	-3.474***	0.000	-3.446***
G	+/-			0.165	1.661*
D	+/-			-.238	-1.618
G*IIA	+			***-.019***	***-.792***
D*IIA	-			***-.044***	***-1.419****
N		711		711	
Adj. R2		0.235		0.253	
F-statistic		73.771***		35.453***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise.

The variables of interest are in bold and italic.

Nonetheless, the primary results still hold in this test. As evident in Panel A, the coefficient on IIA is positive and highly significant (α_2 = 0.067, *t*-statistic = 6.974), providing support for H1. Panel B also reveals that consistent with previous findings, while support is found for H2b (α_7 = -.044, *t*-statistic = -1.419), there is still no evidence to support H2a, as indicated by the negative and insignificant coefficient on G*IIA (α_6 = -.019, *t*-statistic = -.792).

Table 7.13 provides the results for the tests of H3, H4a and H4b. The results indicate, firstly, that there is a decrease in the overall explanatory power of the models (Adj. R^2 = 0.312 and 0.332) in comparison to the original models. Secondly, consistent with previous primary findings, no support is found for H3, H4a and H4b. Specifically, Panel A reveals that the coefficient on PRE*IIA is negative and significant, which suggests no support for H3 (α_5 = -.052, *t*-statistic = -3.867). Similarly, in contrast to the predictions in H4a and H4b, Panel B shows that the coefficients on PRE*IIA*G and PRE*IIA*D are insignificant (α_{12} = -.020, *t*-statistic = -.589 and α_{13} = -.025, *t*-statistic = -.609). Further, consistent with the findings in previous analyses, while the coefficient on PRE*D*IIA has the expected negative sign, the coefficient on PRE*G*IIA is not in the direction expected. Hence, it can be concluded that both hypotheses are not supported. In general, the results of these additional tests confirm the primary findings as reported in Sections 7.4 and 7.5.

7.6.3 Time Effects

The final sensitivity test is where the period of analysis is confined to 2004 and 2007 for the pre- and post-AIFRS period, respectively. A shorter time period following the adoption of AIFRS is selected to investigate the possibility that the effect of AIFRS on the value relevance of intangible assets could be transitory. This test is run only for Models 3 and 4 that compare the pre- and post-AIFRS periods and the results are presented in Table 7.14.

Table 7.13

Additional Test: Industry and Intangible Intensity Effects
(A Comparison of the Pre- and Post-AIFRS Period)

Test of H3:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 (PRE_{it} * IIA_{it}) + \varepsilon_{it}$$

(Model 3)

Test of H4a and H4b:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 G_{it} + \alpha_6 D_{it} + \alpha_7 (PRE_{it} * IIA_{it}) + \alpha_8 (PRE_{it} * G_{it}) + \alpha_9 (PRE_{it} * D_{it}) + \alpha_{10} (G_{it} * IIA_{it}) + \alpha_{11} (D_{it} * IIA_{it}) + \alpha_{12} (PRE_{it} * G_{it} * IIA_{it}) + \alpha_{13} (PRE_{it} * D_{it} * IIA_{it}) + \varepsilon_{it}$$

(Model 4)

Variables		**H3**		**H4a and H4b**	
	Predicted Sign	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**
Intercept	+/-	-27.292	-12.412***	-28.336	-12.981***
ADJ_BV	+/-	3.601	14.475***	3.708	15.028***
IIA	+/-	0.115	12.090***	0.109	9.594***
AE	+/-	0.000	4.989***	0.000	-3.838***
PRE	+/-	0.382	4.989***	0.311	1.0815*
PRE*IIA	+	***-.052***	***-3.867******	-.044	-2.696***
G	+/-			0.236	1.630
D	+/-			-.241	1.647*
PRE*G	+/-			0.071	0.363
PRE*D	+/-			0.120	0.475
G*IIA	+/-			0.002	0.066
D*IIA	+/-			-.022	-.799
PRE*G*IIA	+			***-.020***	***-.589***
PRE*D*IIA	-			***-.025***	***-.609***
N		1620		1620	
Adj. R2		0.312		0.332	
F-statistic		148.032***		62.880***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise; PRE = A dummy variable that is coded 1 for Pre-AIFRS period and 0 otherwise.

The variables of interest are in bold and italic.

Table 7.14

Additional Test: Time Effects
(A Comparison of the Pre- and Post-AIFRS Period)

Test of H3:

$$MV_t = \alpha_0 + \alpha_1 ADJ\_BV_t + \alpha_2 IIA_t + \alpha_3 AE_t + \alpha_4 PRE + \alpha_5 (PRE*IIA_t) + \varepsilon_t$$

(Model 3)

Test of H4a and H4b:

$$MV_{it} = \alpha_0 + \alpha_1 ADJ\_BV_{it} + \alpha_2 IIA_{it} + \alpha_3 AE_{it} + \alpha_4 PRE_{it} + \alpha_5 G_{it} + \alpha_6 D_{it} + \alpha_7 (PRE_{it}*IIA_{it}) + \alpha_8 (PRE_{it}*G_{it}) + \alpha_9 (PRE_{it}*D_{it}) + \alpha_{10} (G_{it}*IIA_{it}) + \alpha_{11} (D_{it}*IIA_{it}) + \alpha_{12} (PRE_{it}*G_{it}*IIA_{it}) + \alpha_{13} (PRE_{it}*D_{it}*IIA_{it}) + \varepsilon_{it}$$

(Model 4)

Variables		**H3**		**H4a and H4b**	
	Predicted Sign	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**
Intercept	+/-	-27.045	-13.472***	-27.873	-13.989***
ADJ_BV	+/-	3.578	15.947***	3.678	16.521***
IIA	+/-	0.117	9.402***	0.106	7.103***
AE	+/-	0.000	-4.156***	0.000	-4.001***
PRE	+/-	0.142	1.428	0.297	1.423
PRE*IIA	+	***-.035***	***-2.000****	-.032	-1.497
G	+/-			-.054	-.299
D	+/-			-.242	-1.144
PRE*G	+/-			-.132	-.546
PRE*D	+/-			-.532	-1.573
G*IIA	+/-			0.041	1.360
D*IIA	+/-			-.023	-.606
PRE*G*IIA	+			***-.044***	***-1.065***
PRE*D*IIA	-			***0.047***	***0.850***
N		1057		1057	
Adj. R2		0.384		0.403	
F-statistic		132.676***		55.853***	

***Significant at the 1% level (one-tailed test when the sign is predicted; two-tailed otherwise)
**Significant at the 5% level (one-tailed test when the sign is predicted; two-tailed otherwise)
*Significant at the 10% level (one-tailed test when the sign is predicted; two-tailed otherwise)
MV = Market value of equity 90 days after the end of financial year; ADJ_BV = Book value of equity (adjusted for reported net identifiable intangible assets); IIA = Identifiable intangible assets reported for the year; AE = Abnormal earnings; G = A dummy variable that is coded 1 for Growth firms and 0 otherwise; D = A dummy variable that is coded 1 for Decline firms and 0 otherwise; PRE = A dummy variable that is coded 1 for Pre-AIFRS period and 0 otherwise.

The variables of interest are in bold and italic.

In general, it indicates that the use of this different period of analysis results in no significant improvement in the overall explanatory power of the model (Adj. R^2 = 0.384 and 0.403). Moreover, similar to the primary findings discussed in Section 7.5, no support is found for H3, H4a and H4b. Panel A shows that although the coefficient on PRE*IIA is significant, its sign is negative (α_5 = -.035, *t*-statistic = -2.000), which is inconsistent with the prediction in H3.

Meanwhile, Panel B reports that the coefficients on both PRE*IIA*G and PRE*IIA*D are insignificant and in the opposite direction of the expectation, suggesting that H4a and H4b are not supported. Overall, these additional tests confirm the robustness of the primary findings reported in Section 7.5.

7.6.4 Multicollinearity

In Section 7.3, some potential problems with multicollinearity were detected in Model 4, particularly with variables PRE and PRE*G that have VIFs greater than 10 and tolerance statistics lower than 0.1. As mentioned in Section 7.3, multicollinearity is also investigated by checking the stability of coefficient estimates in the model across different samples and model specification, that is, when an alternative measurement for a variable is used. Substantial differences in coefficients estimates across different sample sizes and specification will indicate the presence of multicollinearity (Berry and Feldman, 1985; Ethington, Thomas and Pike, 2002).

Additional tests discussed in this section provide evidence that coefficient estimates in Model 4, particularly the variables of interest, are relatively stable across different samples and specification tests (see Panels B of Tables 7.9, 7.11, 7.13 and 7.14). Therefore, it can be concluded that there is no indication of the presence of extreme multicollinearity that can bias the estimates drawn from the regression analysis.

7.7 Summary

This chapter provides a discussion on the procedures used in the model specification tests to assess the regression models used in the analyses. It also presents the findings of the empirical tests of value relevance of IIA in both the pre- and post-AIFRS periods. The results indicate support for H1, in which the capitalisation of IIA in the pre-AIFRS period is found to be value relevant. Additionally, while no support is found for H2a that predicts the value relevance of IIA to be higher for Growth firms that capitalise IIA than Mature firms, the empirical results provide evidence of different value relevance of IIA between Mature and Decline firms, thus supporting H2b. Specifically, the results show that the value relevance of IIA for Decline firms is lower than Mature firms, suggesting the limited ability of Decline firms to use capitalisation of IIA to signal useful information to investors. Findings from the post hoc analysis indicate the presence of value relevance of IIA in only certain stages of firm life cycle. The results show that while capitalised amounts of IIA by both Growth and Mature firms are found to be value relevant, the capitalisation of IIA by Decline firms is not regarded as value relevant by the market.

The empirical findings also provide no evidence to support H3, H4a and H4b. Contrary to the expectation in H3, the value relevance of IIA is found to be higher in the post-AIFRS period compared to the pre-AIFRS period. Apart from that, the effect of the change in value relevance of IIA pre- and post-AIFRS periods is found to be similar across firm life cycle stages. The post hoc analysis also suggests that there is an increase in the value relevance of IIA in the post-AIFRS period across all firm life cycle stages, with the most noticeable result for Decline firms. In the pre-AIFRS period, capitalised IIA is not found to be value relevant but, following the adoption of AIFRS, evidence of improved value relevance is found for Decline firms. Finally, additional tests are also performed in which it is found that the primary findings are robust to alternative empirical specifications.

In the next chapter, a discussion and conclusion of the findings obtained in this chapter will be provided. In addition, the contributions, implications and limitations of the study as well as the directions for future research will also be discussed.

CHAPTER 8

DISCUSSION AND CONCLUSIONS

8.1 Introduction

Accounting for intangible assets is a highly controversial issue that has generated much interest among standard-setters and academics. Chapter 2 has shown that despite the general consensus that intangible assets are one of the key catalysts for growth, success and continual survival of a firm, difficulties in accounting for these assets often lead to their under-recognition in the financial statements. This, is turn, is argued to have detrimental consequences on the usefulness of financial statements as reflected in their reduced value relevance. Prior to the adoption of AIFRS in 2005, the lack of a specific standard on identifiable intangible assets under the Australian GAAP allowed wide discretion for managers in accounting for these assets. However, with the implementation of AIFRS, the discretion has been largely restricted. This change facilitates investigation of the concerns about whether providing managerial discretion in recognising intangible assets produces information that is considered value relevant by the investor.

A review of the literature in Chapters 3 and 4 has indicated that: (1) accounting choice for intangible assets affects their value relevance; (2) firm life cycle could potentially moderate the effect of accounting choice for intangible assets on the value relevance of these assets; and (3) that there is very limited empirical evidence on the impact of AIFRS adoption on intangible assets, despite the widespread claims of reduced value relevance following the new reporting regime. Therefore, in general, the primary purpose of the study is to examine the relationships among firm life cycle stages, accounting choice for intangible assets and the value relevance of intangible assets in the period before and after the adoption of AIFRS.

The discussion on the findings and main conclusions from this study are presented in this chapter. First, the summary of the key findings are discussed in Section 8.2. This is followed by a discussion of the contributions and implications of the research in Sections 8.3 and 8.4. Next, the inherent limitations of this study are presented in Section 8.5 while Section 8.6 offers some suggestions on future research areas. Finally, the conclusions of this study are provided in Section 8.7.

8.2 Findings and Discussion

This study aims to answer the following research questions.

RQ1: Are the amounts reported for intangible assets during the pre-AIFRS period value relevant?

RQ2: During the pre-AIFRS period, does firm life cycle moderate the relationship between accounting choice for intangible assets and the value relevance of these assets?

RQ3: What is the effect of AIFRS adoption on the value relevance of intangible assets?

RQ4: Does the effect of AIFRS adoption on the relationship between accounting choice for intangible assets and the value relevance of these assets vary significantly across firm life cycle stages?

Four regression models based on the Ohlson (1995) valuation model were used to investigate the hypothesised associations among firm life cycle, accounting choice for intangible assets and value relevance of the assets in both the pre-AIFRS (2003 and 2004) and post-AIFRS (2007 and 2008) periods. As discussed in Chapter 2, the efficient signalling perspective suggests that accounting choice can be utilised by managers to communicate intangible asset quality in an attempt to reduce information asymmetry. If the recognised amounts of intangible assets are found to be value relevant, this provides support for the efficient signalling argument.

Nevertheless, accounting choices can also be used opportunistically by self-interested managers in the belief that higher earnings will result in higher stock prices, contributing to their compensation or reputation. If the market believes that managers recognise intangible assets in order to maximise their own utility, then there will be no association between market value and intangible assets. This section provides a discussion on the key findings in this study.

8.2.1 Value Relevance of Intangible Assets in the Pre-AIFRS Period: Tests of H1, H2a and H2b

H1 examines whether the accounting choice of capitalisation for identifiable intangible assets results in value-relevant information for these assets. Consistent with previous Australian studies, the results provide support for the hypothesis. In other words, given the discretion in accounting for intangible assets during the pre-AIFRS period, identifiable intangible assets capitalised by Australian firms are generally regarded by the market as value relevant.

H2a and H2b narrow the focus to firm life cycle and investigate its moderating effect on the relationship between the accounting choice of capitalisation and the value relevance of intangible assets. The findings do not provide support for H2a, with no significant difference in the value relevance of identifiable intangible assets evident between Growth and Mature groups. As a matter of fact, the result suggests that identifiable intangible assets reported by Mature firms are more highly valued by the market than Growth firms, although the difference is not statistically significant. Nonetheless, in the test of H2b, the results indicate that there is a significant difference in the value relevance of the reported intangible assets of Mature firms and Decline firms. More specifically, identifiable intangible assets reported by the Mature group are found to have higher value relevance than the Decline group, which is consistent with the prediction in H2b. A post hoc analysis conducted for separate firm life cycle stages indicates that the identifiable intangible assets are value relevant for both Growth and Mature firms but not for Decline firms.

As discussed in Chapter 2, the argument against the capitalisation of intangible assets originates mostly from concerns about firms' ability to formulate and provide reliable estimates for intangible assets in the financial statements. This, in turn, is due to the uncertainty of the future benefits of intangible investments. This problem is more pronounced in Growth firms since a higher fraction of their value is attributable to growth opportunities. Intangible assets, whose values are highly contingent on future managerial discretion and are characterised by greater uncertainty, constitute a significant part of growth opportunities for Growth firms. This implies that Growth firms are more likely than Mature firms to face difficulties in providing reliable estimates of intangible assets which could affect investors' assessment of their future economic benefits.

Furthermore, there is a high possibility that most of the intangible investments in Growth firms have not yet reached the feasibility stage required for capitalisation. Therefore, there are concerns that Growth firms' choices to capitalise could signify managerial opportunistic behaviour rather than signalling action. However, additional analysis indicates that the capitalisation choice by Growth firms is associated with market value, suggesting that the market is not sceptical about the amounts recognised in the financial statements. This provides evidence that Growth firms are, in fact, employing the capitalisation accounting choice as a credible signal to communicate the quality of their investments in intangible assets to the market.

As discussed in Chapters 4 and 5, unlike their Growth counterparts, Mature firms have a lower proportion of firm value attributable to growth opportunities (or intangible assets) and a higher proportion attributable to assets-in-place. Therefore, the expectation in H2a is that, because factors related to growth opportunities carry less weight in investors' assessment of firm value compared to factors related to assets-in-place, the value relevance of intangible assets for Mature firms will be lower than for Growth firms. Contrary to the expectation, the findings indicate that the difference in the value relevance between these two groups, however, is not statistically significant, providing no support to H2a. Nevertheless, the post hoc analysis performed for separate firm life cycle stages demonstrates that the market

believes intangible assets reported by Mature firms have future economic benefits. It can be argued that although Mature firms have a lower fraction of growth opportunities compared to Growth firms, they have greater capability in estimating reliable intangible investment outcomes. This is largely because these firms usually have reached the feasibility status on many intangible investments and can rely on historical data better to forecast future benefits for intangible assets. Therefore, investors' confidence in the reliability of the estimates for intangible assets reported by Mature firms is mirrored by the significant value relevance of these estimates.

Overall, it can be concluded that the findings in both primary and post hoc analyses provide evidence consistent with the role of accounting choice for intangible assets as a signalling mechanism amongst firms in the Growth and Mature stages of their life cycle. Evidence of value relevance within these groups suggests that the market recognises appropriately firms' choices to capitalise intangible assets as their attempts to signal quality.

In contrast, the results indicate that identifiable intangible assets capitalised by Decline firms are not regarded by the Australian market as providing value-relevant information. This contributes to the statistically significant difference in value relevance between Mature and Decline firms which provides support for H2b. The lack of value relevance suggests that intangible assets reported by Decline firms are not considered as assets with future economic value by the market. Therefore, this provides support to the argument that these firms' choices to capitalise intangible assets are likely to be motivated by managerial opportunism rather than signalling firm quality to investors. Although it is often difficult to differentiate clearly between the two characteristics of relevance and reliability, any value relevant accounting number must be relevant to investors and sufficiently reliable to be reflected in the measure of value (Barth, 2000). However, in cases where relevance is a maintained assumption, failure to find a significant association between intangible assets and market value is attributed, therefore, to a lack of reliability.

As discussed in Chapter 4, Decline firms are characterised by, amongst other things, very limited growth and financing opportunities and low levels of sales growth, profitability and innovation. These characteristics could influence the amounts and reliability of recognised intangible assets by Decline firms. As a result, the firm's capitalisation of intangible assets is unlikely to be regarded as signalling credible and high quality information, as reflected in investors' assessments on the relevance of the information.

Taken together, the findings provide support for the proposition that firm life cycle moderates the effect of accounting choice on the value relevance of intangible assets. The overall results indicate that accounting choice has the strongest impact on value relevance in Growth and Mature stages and the weakest impact in the Decline stage of the firm life cycle. Further, although the findings provide support to the conjecture of previous Australian studies on the use of accounting choice of intangible assets as a useful signalling mechanism during the pre-AIFRS period, there is evidence to suggest that it is not employed homogeneously across firms. The lack of value relevance for intangible assets reported by Decline firm indicates that their choice of capitalisation is regarded by investors as an attempt to window-dress financial statements, suggesting the presence of managerial opportunism. Therefore, this finding provides new insight to the claims made in previous studies that there is no empirical evidence to suggest opportunistic management behaviour.

8.2.2 A Comparison of the Pre- and Post-AIFRS Periods: Tests of H3, H4a and H4b

H3 investigates the impact of AIFRS adoption on the value relevance of intangible assets. There has been a long running debate on this issue which is discussed particularly in the light of capitalised intangible assets' value relevance during the pre-AIFRS period. The result shows that, contrary to the expectation in H3, the value relevance of identifiable intangible assets is higher in the post-AIFRS than the pre-AIFRS period.

H4a and H4b seek to answer whether the effect of AIFRS adoption on the value relevance of intangible assets is more significant in a particular firm life cycle stage than another. The proposition is that given the differences in firm-specific characteristics across firm life cycle stages, particularly with regards to the mix between assets-in-place and growth opportunities, changes in accounting choice for intangible assets will affect the value relevance of these assets differently across life cycle stages. The findings indicate that the effect of the change in value relevance of intangible assets between the pre- and post-AIFRS periods does not vary significantly across different firm life cycle stages, thus providing no support for either H4a or H4b. Specifically, no statistically significant difference is found in the value relevance of intangible assets between these firms (Mature versus Growth and Mature versus Decline) following the adoption of AIFRS.

A post hoc analysis is also conducted to provide more information on the impact of AIFRS on value relevance of these assets in specific firm life cycle stages. Due to the differences in the proportion of tangible and intangible assets in different life cycle stages, the adoption of AIFRS might be beneficial to some firms but detrimental to other firms. The results reveal that the adoption of AIFRS has led to an improved value relevance of intangible assets in all three firm life cycle stages, providing a new perspective and more support to the findings in H4a and H4b. Nonetheless, comparing the pre- and post-AIFRS periods, the most noticeable and substantial difference is for Decline firms. This is because while intangible assets reported by Decline firms are not regarded as value relevant in the pre-AIFRS period, these assets are highly valued by the market in the post-AIFRS period, indicating improved investor confidence in their future economic benefits. This is in obvious contrast to Growth and Mature firms, in which capitalised intangible assets are found to be value relevant in the period before and after the adoption of AIFRS.

The finding reported in the test of H3 provides evidence that despite the substantial change in accounting practices for intangible assets following AIFRS implementation, the value relevance of the assets has increased significantly. This is inconsistent with Chalmers et al. (2008) who find no evidence that the post-AIFRS

measure conveys value-relevant information on intangible assets beyond the pre-AIFRS measure. However, the inconsistent finding is attributable mainly to the differences in the methodology adopted. Chalmers et al. (2008) investigate intangible assets' value relevance by comparing the closing balance (measure of intangible assets in 2005) to the opening balance (measure of intangible assets in 2006) disclosed in the 2006 annual reports. Further, it can be argued that because Chalmers et al. (2008) examine the period immediately subsequent to the introduction of AIFRS, the impact of AIFRS on intangible assets might not have been fully impounded in the financial statements.

During this period, the market is likely to be more familiar with the old accounting regime and is still trying to adjust to the new accounting practice which could affect its assessment of intangible assets. However, over a longer period of AIFRS implementation, as the market has become more accustomed to the new standard on intangible assets, a significant increase in the value relevance can be observed. Iatridis and Rouvolis (2010), for instance, find that the IFRS implementation effects in the official adoption period of 2005 are unfavourable on the value relevance of accounting information of Greek listed firms. However, it appears to enhance the value relevance of accounting measures significantly in subsequent implementation periods.

Further, it can be argued that, due to the more restrictive accounting practice for intangible assets, firms can only recognise certain amounts within the constraints of AASB 138 which improves their overall value relevance. This is manifest in the findings for H4a and H4b and also in the post hoc analyses. Not only do the findings suggest that AIFRS implementation enhances value relevance in all firm life cycle stages, they also indicate that there is no significant difference in value relevance between the three life cycle stages. However, analyses concerning the impact of AIFRS on specific firm life cycle stages indicate that, while evidence of value relevance is found for Growth and Mature firms in both pre- and post-AIFRS periods, a different result is obtained for Decline firms. As mentioned earlier, intangible assets recognised by Decline firms are not regarded as value relevant by

the market during the pre-AIFRS period. However, the situation changed following the implementation of AIFRS in which evidence of value relevance is found.

Based on the findings, it appears that the restrictions in accounting for intangible assets do not remove or reduce the ability of the managers of Growth and Mature firms to communicate credible signals on intangible asset quality. As a matter of fact, it can be argued that the adoption of AIFRS improves the credibility of the signalling mechanism used by these firms, most likely through the increase in the reliability of amounts reported for intangible assets. Meanwhile, for Decline firms, it can be seen that in the pre-AIFRS period, there is a tendency for them to use the accounting choice of capitalisation to behave opportunistically instead of signalling value to the investors. However, in the post-AIFRS period, the discretion allowed for managers to recognise intangible assets has been largely reduced. This, in a way, has restricted the potential occurrence of managerial opportunistic behaviour among Decline firms, leading to increased investors' confidence in the reliability of intangible assets amounts recognised by these firms. Consequently, in the post-AIFRS period, the market no longer discounts the value of intangible assets reported by Decline firms when compared to other firms. Therefore, it can be argued that the overall improvement in the value relevance of intangible assets in the period after the implementation of AIFRS is driven largely by the change within Decline firms.

In general, the findings provide evidence that the implementation of AIFRS is associated with an increase in the quality or value relevance of information concerning intangible assets. This is despite the widespread claims that restrictions in managerial choice in accounting for intangible assets are likely to result in reduced ability to signal firm quality appropriately, leading to reduced information relevance. Further, the results indicate that although there is an increase in the value relevance in all three firm life cycle stages in the post-AIFRS period, no significant difference is observed between these life cycle stages. However, when focusing on specific firm life cycle stages, there is evidence to suggest that the increase in the value relevance is attributable mostly to the improved value relevance among Decline firms. This suggests that, although the effect of the adoption of the new

standard on intangible assets is favourable to all firm life cycle stages, its impact is more substantial for Decline firms.

Therefore, it can be concluded that the concerns over investors receiving lower quality information on intangible assets following the adoption of AIFRS could be overstated. In fact, it appears that, first, the adoption of AIFRS has a restraining effect on the potential use of the discretion in accounting for intangible assets during the pre-AIFRS period by managers to behave opportunistically. Second, AIFRS implementation also enhances the use of accounting for intangible assets as a more credible signal by firms to communicate future value of the assets to investors.

Several supplementary tests were performed to assess the sensitivity of the results to alternative specifications. These include the use of an alternative measure of (identifiable) intangible assets, the effects of industry, intangible intensity and time. Overall, the results in these tests were consistent with the primary results discussed in Sections 8.2.1 and 8.2.2 above, confirming the robustness of the findings in this study.

8.3 Contributions

This study can be regarded as an extension of previous studies in two research areas: research on the implications of accounting choice and research on the value relevance of intangible assets capitalisation. In this section, the contributions of this study that are both empirical and methodological in nature to these areas of research are presented and discussed.

According to Fields et al. (2001), one key market imperfection is the information asymmetry between managers (insiders) and shareholders (outsiders). It is proposed in this study that, in the context of intangible assets, accounting choice is one of the mechanisms used by managers to convey their private information to shareholders which, consequently, affects the usefulness of the information concerning these assets. This study, therefore, contributes to the research assessing the economic

implications of accounting choice in connection with the market imperfections driving such choices.

First, it provides greater insights into the role of accounting choice as a signalling mechanism unique to the Australian setting. Most prior Australian studies have claimed that despite the wide discretion to capitalise during the pre-AIFRS period, no evidence is found to indicate the presence of managerial opportunism. In addressing this issue, Wyatt (2002), for example, argues that existing research suggests uncertainty about intangible investment outcomes as the main criterion which could quasi-regulate accounting capitalisation practice of intangible assets in a discretionary accounting setting. Nevertheless, the accounting choice literature demonstrates that it is often difficult to distinguish between the efficient signalling and managerial opportunism perspectives. Moreover, these studies have assumed that managerial decisions either to capitalise or to expense intangible expenditures are similar across firms regardless of the evidence that these accounting choices are unlikely to be used randomly by firms.

Therefore, this study adds to and extends the body of knowledge in understanding the relationship between accounting choice and value relevance of intangible assets by incorporating the moderating effects of firm life cycle stages. Firm life cycle can be linked to intangible assets through the fraction of firm value attributable to growth opportunities which resemble intangible investments. Therefore, by focusing explicitly on the underlying economics of the firm's intangible investments, this study offers greater understanding about the existence or otherwise of an efficient signalling mechanism. Overall, it provides evidence that while accounting choice may be used to signal value by firms in the Growth and Mature stages of their life cycle, the same mechanism may be used by firms in the Decline stage to act opportunistically. Therefore, it can be seen that, managerial discretion in accounting for intangible assets afforded during the pre-AIFRS period may not be used homogeneously by firms as a signalling mechanism. The findings of this study suggest that firms in the Decline stage of their life cycle have a greater tendency to

abuse the discretion and, hence, demonstrate managerial opportunistic behaviour, contradictory to the claims of previous studies.

Second, this study also contributes to the literature on the value relevance of intangible asset capitalisation by providing more empirical evidence on the issue surrounding AIFRS implementation. The adoption of AIFRS has triggered much debate as to whether the new accounting regime is likely to affect adversely the quality of financial reporting in Australia. This is based primarily on the conclusions derived from previous Australian studies on capitalised intangible assets being value relevant with very limited empirical evidence to support the proposition. The findings in this study indicate a significant improvement in the value relevance of intangible assets, overall and across all firm life cycle stages. The findings are in contrast to the period before the adoption of AIFRS in which capitalised intangible assets are found to be highly valued by the market only for firms in the Growth and Mature stages of their life cycle. Further analysis also reveals that the effect of AIFRS implementation on the change in value relevance is more pronounced for firms in their Decline stage of life cycle. This suggests that although the favourable effect of AIFRS adoption on value relevance is spread across all firm life cycle stages, firms in the Decline stage benefit more in terms of increased financial reporting quality for intangible assets. Overall, the findings demonstrate the effectiveness of the more restrictive accounting practice in the post-AIFRS period in: (1) curbing any potential managerial opportunistic behaviour; and (2) providing the opportunity for firms to use capitalisation as a more credible signal of firm value.

Further, this study sheds more light on the timing of the effect of AIFRS implementation on value relevance of intangible assets. Chalmers et al. (2008) find no significant increase in value relevance in the period subsequent to the official adoption of AIFRS. However, by utilising the 2007 and 2008 data, this study shows significant improvement in value relevance in the post-AIFRS period. This suggests the effect of AIFRS on value relevance may not be apparent in the early implementation period and that the benefits may only start to penetrate after a certain period. After the market has adjusted to the change and becomes more familiar with

the new accounting regime, AIFRS appears to improve the quality of financial statements and potentially reduce managerial opportunism. Thus, taken as a whole, this study extends previous research in this area by offering support to the implementation of AIFRS.

Moreover, the use of abnormal earnings in operationalising the Ohlson (1995) valuation model can be viewed as one of this study's methodological contributions. With the exception of a few studies such as Dahmash et al. (2009), most value relevance studies conducted either in Australia or other accounting settings, relied on other measures of historical income in employing this model. This is done mostly for the sake of convenience. However, in Dahmash et al. (2009) a constant discount rate of 8 percent is used throughout the ten-year period of their study to calculate abnormal earnings. In this study, a firm-specific discount rate for each sample firm-year is operationalised to derive abnormal earnings. The rigorous methodology applied in this study highlights its strength and offers some guidance to employing abnormal earnings in the Ohlson (1995) model which is an issue unattended by most prior studies.

The second methodological contribution relates to the operationalisation of firm life cycle concept in the Australian equity market setting. Specifically, this study reflects an attempt to classify ASX listed firms into distinct life cycle stages, particularly on the basis of their intangible investments. Although based on Anthony and Ramesh's (1992) classification methodology, this study focuses mainly on firms' underlying economic attributes relating to growth opportunities or intangible assets. Further, in contrast to Anthony and Ramesh (1992) and most life cycle studies, life cycle proxies that could produce ambiguous firm classification such as firm age and dividend payout ratio are not employed in this study. Thus, this classification will enable more meaningful inferences on research concerning accounting choice and value relevance in the context of intangible assets. This life cycle classification method should also be useful to other research areas related to intangible assets such as voluntary disclosures of intangibles information or firm life cycle studies such as their effects on managerial financial decisions.

8.4 Implications

The findings in this study have implications for the research on accounting choice and value relevance, particularly with regards to intangible assets. They provide evidence that firm life cycle moderates the relationship between accounting choice for intangible assets and their value relevance in both the pre- and post-AIFRS periods. Assuming no differences in firm-specific characteristics across sample firms, prior studies have concluded that accounting choice of capitalisation is used by firms to signal value. However, when firm life cycle is factored in, the results show that in an accounting setting where managerial discretion is permitted, its use as a signalling mechanism is greater for firms in the Growth and Mature stages of their life cycle. In contrast, there is a potential for Decline firms to utilise this choice to behave opportunistically and manipulate accounting information. Similarly, the findings in this study indicate that even in the new accounting regime where the discretion is substantially restricted, firm life cycle stages still have an impact on the relationship between accounting for intangible assets and their value relevance. This impact is particularly more pronounced for Decline firms in which evidence of significant value relevance is found only in the post-AIFRS period.

Evidence of the moderating effect of firm life cycle suggests that future research on accounting choice and value relevance or both should control for this effect. The findings indicate that the moderating effect of firm life cycle is present regardless of the degree of the flexibility in the accounting regime or setting. These findings thus, highlight the firm life cycle as one of the omitted variables in the analysis of existing accounting choice and value relevance studies. Therefore, future research conducted without taking into account firm life cycle effect or considers only certain groups of firms could obtain potentially misleading conclusions. For example, if all firms are included in the analysis without separating them into different life cycle stages (or if only firms in the mature stage of the life cycle are considered), it could be concluded that the more restrictive accounting requirements for intangible assets will have a similar impact on their value relevance. Additionally, studies conducted in an accounting setting where managers are allowed greater discretion in accounting

choice could conclude that the discretion is used by all firms in a similar manner, that is as a mechanism to signal value (or to pursue opportunistic behaviour).

Further, this study should be useful to both researchers and accounting standard setters in the ongoing debate on allowing managerial choice in accounting for intangible assets. This is important especially in discussing the impact of AIFRS implementation on financial reporting quality of Australian firms. While previous studies are concerned that AIFRS will lead to reduced value relevance of intangible assets and consequently limits the investors' information set, this study offers some of the earliest empirical evidence on this issue.

Findings in the pre-AIFRS period show that managerial discretion in accounting for intangible assets may not be used homogenously across all firms to signal value to investors. This variation in the effect of managerial discretion on the value relevance of intangible assets across different firm life cycle stages reflects the importance of incorporating or considering this factor in developing an accounting standard for these assets. Specifically, in an accounting regulatory setting where managerial discretion is allowed, accounting standard setters should be aware that accounting choice is utilised differently by firm, which consequently affects the usefulness of accounting information provided to investors. For example, in the Australian context, the findings of this study suggest that it is important for the AASB to note that a more flexible accounting treatment for intangible assets for growth and mature firms may not be detrimental to the quality of the information provided by these firms. However, caution should be exercised for decline firms as they have more tendencies to abuse accounting disretion. This suggests that accounting discretion allowed by Australian GAAP, particularly the ability to recognise intangible assets may only benefit some firms.

In general, evidence of higher value relevance of intangible assets in the post-AIFRS period provides support to the implementation of AIFRS. Further, this study suggests that AIFRS adoption, in the context of intangible assets, improves firms' ability to signal favourable inside information and at the same time limits managerial

opportunistic behaviour. Although the implementation of AIFRS leads to favourable economic implications in terms of increased value relevance of intangible assets across all firm life cycle stages, the benefit is greater for firms in the Decline stage than other firms.

These findings provide evidence that the new standard on intangible assets affects firms differently depending on, amongst other factors, their position in the life cycle. While the information provided by growth and mature firms is regarded as value relevant in both accounting regimes (that is with greater or lesser managerial discretion), a more restrictive standard for intangible assets appears to be more useful for decline firms to deliver value-relevant information to the investors. This highlights that the one-size-fits-all approach in accounting for intangible assets is not always the best solution to communicate effectively information relating to these assets. This is because, depending on its position in the life cycle, a firm may need to employ different approach to provide users of financial statements with relevant information useful for decision making. Therefore, the findings in this study should assist the AASB in the future development of an accounting standard or other suitable guidelines for intangible assets by highlighting the need to concentrate particularly on the different requirements of firms to ensure the information provided remains useful for the market.

8.5 Limitations

Several limitations inherent in this study are provided in this section. The first limitation relates to the sample used. While this study attempts to cover all possible firms during the data collection process, problems such as the unavailability of data, the nature of firm life cycle classification and firm's accounting choice for intangible assets result in some observations being excluded from the final sample.

Second, reliance on specific proxies during the firm life cycle classification may also affect the number of firms included in the final sample as well as the life cycle stage assigned to a particular firm. Further, due to the scope of this study, these proxies are

largely based on the underlying economics of the firm's intangible investments, which could influence the classification results. Therefore, the use of other life cycle proxies could possibly lead to a firm being classified into a different life cycle stage. Previous studies have shown that firm-specific attributes influence both accounting choice and the value relevance of accounting information. However, firm life cycle represents only one of the methods to classify firms into identifiable groups according to their shared characteristics. Third, due to the nature of the value relevance test, the inferences in this study are based wholly on publicly available data. Finally, because the findings of this study are limited to the Australian market, they might not be generalisable to other countries, for example, those that are also affected by the implementation of IFRS.

8.6 Directions for Future Research

The dearth of empirical research on the impact of AIFRS adoption on intangible assets suggests that more studies are needed to provide more insights into this issue. Further, the findings provided in this study are inconsistent with Chalmers et al. (2008) possibly due to the difference in the implementation period. Thus, future research could examine different periods following the implementation of AIFRS to ascertain the trends in the change of value relevance. Moreover, there is also a possibility that due to the more restrictive accounting practice for intangible assets, firms might rely on other alternatives to communicate quality to investors, such as voluntary disclosure in either narrative or visual forms. Therefore, future research could be conducted to examine whether this signalling alternative is being used more aggressively by firms after the adoption of AIFRS either to substitute or to complement intangible assets recognition.

Additionally, future research could replicate this study in different countries to gauge the robustness of the findings in different capital markets and accounting regulatory settings. Finally, while firm life cycle can be viewed as capturing firm-specific characteristics, there are other factors that should be considered when examining the relationship between accounting choice and value relevance. This implies that with

myriad variables affecting accounting choice and value relevance, different results could be obtained. Consequently, studies conducted in this area should be of great interest to accounting standard setters.

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Appendices

Appendix 1

Summary of Accounting Regulations for Intangible Assets: The Pre- and Post-AIFRS Period

Intangible asset categories	Pre-AIFRS Period	Post-AIFRS Period
Purchased goodwill	AASB 1013 Accounting for Goodwill AASB 1015 Acquisitions of Assets **Recognition** • Recognise at cost as a non-current asset at acquisition (AASB 1013.5.1) • Measured as the difference in the fair value of the net identifiable assets acquired and the cost of acquisition i.e. using the purchase method (AASB 1013. 5.7) **Useful life and amortisation** • Amortised on a straight-line basis over a period not exceeding 20 years (AASB 1013.5.2) **Measurement subsequent to recognition** • The unamortised balance of goodwill must be reviewed at each reporting period and expensed to the extent that future benefits are no longer probable (AASB 1013.5.4) • Upward revaluation of purchased goodwill is prohibited (AASB 1013.5.5)	AASB 3 Business Combination AASB 138 Intangible Assets **Recognition** • Recognised at cost as an asset (AASB 3.51) • Measured as the difference in the fair value of the net identifiable assets acquired (including identifiable intangibles) and the cost of acquisition (AASB 3.51) **Useful life and amortisation** • No amortisation required (AASB 3.55) **Measurement subsequent to recognition** • Test for impairment at least annually (AASB 3.55) • Measured at cost less any accumulated impairment losses (AASB 3.54)
Internally generated goodwill	AASB 1013 Accounting for Goodwill Recognition prohibited (para. 4.1)	AASB 138 Intangible Assets Recognition prohibited (para. 48)
Research and development	AASB 1011 Accounting for Research and Development Costs AASB 1010 Recoverable Amount of Non-Current Assets **Recognition** • Research and development costs expensed as incurred unless the future economic benefits were expected beyond reasonable doubt to be recoverable (ASB 1011.30-31)	AASB 138 Intangible Assets AASB 3 Business Combination **Recognition** • Acquired - Identifiable intangible assets separately acquired normally satisfy the recognition criteria and are recognised at cost

	Useful life and amortisation • Deferred research and development costs amortised in line with the future benefits commencing with commercial production (AASB 1011.32) **Measurement subsequent to recognition** • Requires the application of the recoverable amount test in which the unamortised deferred research and development costs must be reviewed at each reporting period, and recognised as an expense to the extent that the carrying amount exceed the recoverable amount i.e. when future benefits were no longer probable (AASB 1011.33 and AASB 1010.5.1) • Research and development costs not meeting the criterion for deferral and previously expensed could not be written back in the light of subsequent events (AASB 1011.50)	(AASB 138.24-25) - Identifiable intangible assets acquired in business combination are recognised separately from goodwill if the asset satisfies the definition of an intangible asset and its fair value at acquisition date can be measured reliably (AASB 138.33). • Internally generated - Asset generation is classified into a research phase and development phase (AASB 138.52) - If the research phase cannot be distinguished from the development phase, the expenditure on the project is classified as research and it must be expensed (AASB 138.53) - Internally generated intangible assets arising from the research phase are expensed as incurred (AASB 135.54) - Internally generated intangible assets arising from the development phase can only be recognised if **all** of the following can be demonstrated (AASB 138.57): (i) Technical feasibility (ii) Intention to complete and use or sell (iii) Ability to use or sell (iv) Assets will generate future economic benefits (v) Availability of resources (vi) Reliable measurement - Prohibition of recognition of specific internally generated intangible assets such as brands, mastheads, publishing titles, customer lists and similar items (AASB 138.63) • Subsequent expenditure on recognised identifiable assets is expensed unless it is probable the expenditure increases the future economic benefits embodied in the asset and the expenditure can be measured and attributed reliably to the asset (AASB 138.68).
Acquired and internally generated identifiable intangible assets	AASB 1015 Acquisitions of Assets AASB 1010 Recoverable Amount of Non-Current Assets AASB 1021 Depreciation AASB 1041 Revaluation of Non-Current Assets **Recognition** • Acquired identifiable intangible assets must be recognised at fair value at the date of acquisition (AASB 1015.6.2). • No specific standard clarifying the recognition for internally generated identifiable intangible assets. However any costs incurred that give rise to internally generated identifiable intangible assets are required to be capitalised to the extent that those costs are expected beyond reasonable doubt to be recoverable (refer to AASB 1011) **Useful life and amortisation** • No presumed useful life and specific amortisation requirement for identifiable intangible assets. • However most assets were assumed	

	to have limited useful lives (AASB 1021.5.5.4) • Identifiable intangible assets with finite lives are required to be amortised on a systematic basis over their useful lives (AASB 1021.5.1), with no arbitrary limit applied to the determination of useful life. • No requirement to amortise identifiable intangible assets with indefinite lives **Measurement subsequent to recognition** • No specific standard that regulates the accounting for internally generated identifiable intangible assets or the post-acquisition accounting for acquired identifiable intangible assets. • Recognised identifiable intangible assets could be carried at their cost less any accumulated amortisation and impairment losses or revalued on a regular basis (AASB 1010.7.1-7.2 and AASB 1041.5.1) • Requires the application of the recoverable amount test in which the unamortised balance of identifiable intangible assets had to be reviewed at each reporting period and recognised as an expense to the extent that the carrying amount exceeds the recoverable amount i.e. when future benefits were no longer probable (AASB 1010.5.1) • Upward and downward revaluations were permitted for both acquired and internally generated identifiable intangible assets (AASB 1041.5.4 and 5.5)	**Useful life and amortisation** • Intangible assets will have either finite or indefinite useful life (AASB 138.88). • An identifiable intangible asset with a finite useful life is amortised on a systematic basis over its useful life (AASB 138.97). • The amortisation period, method and useful life must be reviewed at least at the end of each annual reporting period (AASB 138.104) • An identifiable intangible asset with an indefinite useful life is not amortised but will rather be tested annually for impairment (AASB 138.107-108). • However, its useful life must be reviewed annually to ensure that events and circumstances continue to support an indefinite useful life assessment for the asset (AASB 138.109). **Measurement subsequent to recognition** • Choice of cost model or revaluation model. However, the revaluation model may only be used if fair value can be determined with reference to an active market (AASB 138.72). • Using the cost model, intangible assets are carried at their cost less any accumulated amortisation and impairment losses (AASB 138.74). • Using the revaluation model, intangible assets are carried at their revalued amount less any accumulated amortisation impairment losses subsequent to their revaluation (AASB 138.75).

Appendix 2

Firm Life Cycle Transition Matrices

Panel A: Subsequent Year (*t to t*+1)

Firm Life Cycle (Year *t*)	**Firm Life Cycle (Year *t*+1)**			
Growth/Growth to Mature	***Growth/Growth to Mature***	***Mature***	***Mature to Decline/Decline***	***Not Available***
Materials	175	212	20	13
Consumer Discretionary	112	68	8	16
Consumer Staples	93	22	6	12
Energy	64	78	7	8
Health Care	77	73	4	6
Industrial	135	83	6	7
Information Technology	70	59	8	4
Telecommunication Services	17	12	1	1
Utilities	11	13	0	1
TOTAL	**754**	620	60	68
PERCENTAGE	**50.20**	41.28	3.99	4.53
Mature				
Materials	220	796	173	57
Consumer Discretionary	66	190	51	18
Consumer Staples	19	32	6	10
Energy	65	197	64	19
Health Care	59	175	53	14
Industrial	73	195	57	16
Information Technology	44	144	36	29
Telecommunication Services	7	47	9	6
Utilities	9	40	9	1
TOTAL	562	**1816**	458	170
PERCENTAGE	18.70	**60.41**	15.24	5.66
Mature to Decline/Decline				
Materials	24	165	146	35
Consumer Discretionary	9	47	58	15
Consumer Staples	4	11	7	0
Energy	15	64	47	5
Health Care	14	42	41	5
Industrial	13	49	69	5
Information Technology	12	41	27	7
Telecommunication Services	0	11	3	1
Utilities	2	10	5	1
TOTAL	93	**440**	403	74
PERCENTAGE	9.21	**43.56**	39.90	7.33

Panel B: Previous Year (*t*-1 *to t*)

Firm Life Cycle (Year *t*)	**Firm Life Cycle (Year *t*-1)**			
Growth/Growth to Mature	***Growth/Growth to Mature***	***Mature***	***Mature to Decline/Decline***	***Not Available***
Materials	156	205	21	38
Consumer Discretionary	122	66	6	10
Consumer Staples	99	20	4	10
Energy	69	65	13	10
Health Care	72	63	15	10
Industrial	133	72	13	13
Information Technology	74	55	12	0
Telecommunication Services	22	8	0	1
Utilities	13	7	2	3
TOTAL	760	561	86	95
PERCENTAGE	**50.60**	37.35	5.73	6.32
Mature				
Materials	202	699	163	182
Consumer Discretionary	67	194	44	20
Consumer Staples	27	27	11	2
Energy	73	164	55	53
Health Care	66	163	42	30
Industrial	75	176	55	35
Information Technology	56	141	48	8
Telecommunication Services	8	52	8	1
Utilities	11	34	11	3
TOTAL	585	**1650**	437	334
PERCENTAGE	19.46	**54.89**	14.54	11.11
Mature to Decline/Decline				
Materials	16	158	131	65
Consumer Discretionary	6	48	68	7
Consumer Staples	0	13	7	2
Energy	6	60	41	24
Health Care	6	46	43	7
Industrial	6	54	65	11
Information Technology	7	43	29	8
Telecommunication Services	0	7	7	1
Utilities	1	4	9	4
TOTAL	48	**433**	400	129
PERCENTAGE	4.75	**42.87**	39.60	12.77

Appendix 3

List of Firms (By Industry and ASX Code) Included in the Final Sample

Consumer Discretionary					Consumer Staples		Energy		Telecomm.
AAU	BSI	HAM	NWS	SVW	AAC	LNN	AAE	PES	AMM
ABS	BYI	HII	OCE	SWG	AAQ	LWB	AED	PSA	BBB
ABV	CAI	HLD	OCV	SXL	ABB	MPA	AOK	REY	BGL
ACE	CBT	HVN	ODG	TAB	ABQ	MSF	AQA	RHE	BRO
ADG	CCV	HWT	OEC	TAH	AFF	MTI	ARW	SYS	CAG
AEM	CDO	HYO	OOH	TCO	AVF	MTS	AWE	TDO	CMO
AEO	CFK	IAS	ORL	TEN	AVG	NAM	BAS	TNP	EFT
AGI	CIL	IAW	PBB	TLC	AWB	NFD	BCC	UEQ	FRE
AHD	CLK	ICH	PBG	TPL	AWL	NFO	BLY	WHC	FUL
AIG	CMJ	INV	PGA	TTS	BHL	OLE	BPT	WHE	HTA
ALH	CNC	ION	PMV	TTV	BNV	OZB	BUY	WOR	IIN
ALL	COJ	IPP	PMX	TVL	BPC	PFL	CCD	PAX	IPX
ALO	CPR	ISK	PNW	TVN	BUG	PHW	CIG	PDN	MNZ
APB	CTY	IVC	PPN	TWD	CCL	PLW	CKK		MTU
APE	CVB	JBH	PRT	TXT	CGJ	QCH	CNA		NBS
APN	CWN	JEL1	QFX	UTB	CHB	RGP	CTX		NWT
ARP	DDT	JET	QTI	VMT	CHQ	RIC	DLS		PWT
ASC	DES	JST	QTM	VRL	CKR	RLA	DYL		QUE
ASP	DJS	JUP	QXQ	VTG	CSS	SHV	EDE		REF
ATI	DMP	JYC	RCG	WAG	CVS	SOI	EPG		SGT
ATJ	DTO	KDS	RCT	WAN	DMY	SPC	EPX		TEL
ATP	EBG	KME	REA	WAT	DSF	SRP	EQX		TLS
AUN	EBT	KRS	REG	WEB	EAC	TAN	ESG		TPM
AVR	EIO	LAS	RFG	WHS	ECQ	TGR	FIS		UNW
BBG	FAC	MAC	RMA	WTF	EEE	WBA	FLX		WRR
BBL	FFL	MCG	RUP	WWG	ELD	WCB	GLL		WTG
BCL	FLT	MCP	SBC	BRZ	FFI	WES	JAT		
BDS	FPA	MCU	SDR	BSA	FGL	WOW	KAR		
BER	FUN	MEG	SEL	GXG	FLR	KHF	LME		
BIC	FWD	MES	SFC	GZL	FNP	LAL	LNC		
BIR	FXJ	MHI	SFH	NHH	FOA		MEO		
BKM	GAP	MKB	SGS	NVT	FRM		NEC		
BKR	GLB	MNL	SGU	STV	GFD		NEN		
BLE	GLE	MNW	SKC	SUL	GFF		NHC		
BRG	GRT	MRN	SKT		GNC		NXS		
BRG	GTV	MVH	SPG		GRB		NZO		
BRK	GUD	NBL	SSI		GSF		ORG		

Health Care				Industrials					Utilities
AAH	COH	ITD	PRR	AAX	CND	HUM	QAN	TCL	AEJ
ACG	CSL	KKT	PRY	ADQ	CNN	IDL	QAN	THO	AEN
ACL	CST	KSX	PSD	ADZ	COA	ITO	QED	TOL	AES
ACR	CTE	LBT	PXS	AEI	COF	ITS	QHL	TOX	AGK
ACU	CUV	LCT	PYC	AET	COS	IVT	QUB	TPI	AGL
ADO	CXD	LIP	QRX	AFT	COZ	IWF	RBL	TSE	APA
AGX	CXS	MDE	RBY	AIE	CPB	JVG	RBS	TTI	APK
ALT	CYC	MDG	RHC	AIO	CRG	KSC	RCM	TWO	BBI
AMT	CYT	MDV	RMD	AIZ	CSH	KTL	RCR	TZL	CIF
ANN	CZD	MIA	SBN	AJL	CSR	LAU	RCY	UGL	DUE
ANP	DNX	MLA	SDI	ALS	CXG	LCL	REH	UMS	ENV
AOP	DVA	MOD	SFP	AMA	CXN	LCM	REX	VBA	EVM
APH	DVC	MSB	SHC	AMB	CXP	LDW	RFT	VGP	GDY
API	ELX	MTR	SHL	ANG	CYG	LMC	RGD	VTI	GPE
AQL	EMS	MVP	SIE	ANQ	DEX	LYL	RHD	VTX	IFN
ATW	FER	NAL	SIG	ASB	DGX	LZC	RHL	WLL	JGL
AVE	FPH	NAN	SIP	ASB	DMX	MAH	RHT	WTP	NVE
AVH	GBI	NDL	SLA	BAX	DOW	MAP	RIS	WWA	PHY
AVT	GEN	NEU	SLT	BDL	DUL	MIN	RTL	XRF	SOO
AVX	GGL	NLS	SOM	BEI	ECS	MMS	RUB	YSL	SPN
AXN	GIA	NRT	SPL	BIS	EDS	MND	SAI	ZGL	TSI
AYX	GLH	NSP	SRX	BLG	EGL	MRM	SAV		VIR
BDM	GRO	OBJ	STI	BOL	EHL	MSI	SCC		
BGN	GTG	OIL	SYB	BXB	EMB	MSL	SDM		
BIT	HCN	OMI	TDX	CAB	EMM	MST	SDS		
BKL	HCT	PAA	TEO	CAQ	EON	MXI	SEK		
BLT	HEA	PAB	TIS	CBD	EOS	NER	SHR		
BNE	HGN	PBO	UCM	CDC	ESI	NFK	SIV		
BNO	HIN	PBP	UNS	CDD	ESS	NHR	SKE		
BOD	HSP	PBT	VCR	CDX	FGE	NLX	SKS		
BPH	HTX	PCC	VHL	CEG	FRR	NOD	SLM		
BPO	HXL	PEP	VLA	CEU	GCG	OLH	SMA		
BRC	HZL	PGL	VSC	CFU	GRD	PCG	SMN		
BTA	ICS	PHG	VSG	CLH	GWT	PEH	SPT		
CBB	IDT	PLD	VSL	CLO	HIL	PHK	SRH		
CDY	IMC	PLI	XCD	CLQ	HIT	PMG	SSM		
CGS	IMI	PLT	ZTL	CLX	HJB	PMP	STG		
CIR	IMU	PME		CMG	HMC	PRG	SWK		
CLV	IPD	PNM		CMI	HNG	PST	SYP		
CMP	IPN	POH		CMV	HST	PTB	TBG		

Materials						Information Technology			
AAI	CWH	CRT	RUL			AAS	GEE	ONQ	TSH
ABC	CZA	CSE	SSX			AAT	HLI	PIE	TTA
ADD	DML	CVY	SYM			ADA	HSN	PRO	ULT
ADU	DXL	MGU	SBL			ADL	HTC	PSY	UXC
ADX	EAF	MLX	SDL			ALU	HWG	PWR	VCM
AEC	EAR	MML	SGM			ARR	IAT	QML	VGL
AGG	EVG	MPD	SRI			ASU	ICP	QMT	VID
AGO	FBU	MSC	SRK			ASZ	IDE	QRS	VIP
AIW	FEA	MTX	SYR			BVA	IFM	RCA	VXS
AJM	FMG	NCI	TAS			BXP	IGG	RDF	WAL
AJX	FYI	NEM	TFC			CCK	INT	RFL	WCG
AMC	GBM	NLB	THR			CDA	IRE	RKN	WNS
AND	GDN	NPX	TIM			CDR	IRI	RPD	WSY
ANE	GNS	NUF	TKG			CGO	ISS	RPX	XTE
ANO	GRN	OGL	TMM			CLT	ITX	RTN	ZMG
APG	GUL	OMH	TTT			CMS	IUL	RTS	
ASL	HAN	ORI	TTY			COM	JMB	RZR	
ATM	HAZ	OST	UCL			COO	KAZ	SCD	
AXT	HGO	PEV	USN			CPS	KLM	SEN	
BAU	HTI	PGC	VII			CPU	KYC	SIU	
BCD	IGX	PLV	WEC			CSV	LAK	SLC	
BHP	ILU	PMH	WFL			CTI	LGD	EZE	
BKW	IMD	PNA	WMR			CTL	LMS	FCS	
BLD	INL	POL	WVL			CUS	LOK	GCN	
BRD	IPL	PPG	WYL			DBS	LRG	NTC	
BRS	IPT	PPX	ZDX			DID	LRX	OCL	
BSL	JHX	PPY				DMN	MBA	OKN	
CAA	KAS	PSH				DSQ	MCL	SLX	
CAP	KGL	PSV				DTL	MIK	SNR	
CCU	KIS	PZC				DWS	MLB	SNX	
CDU	KOR	QNL				DYE	MMZ	SOH	
CGG	LGL	RAU				EHG	MRY	STE	
CGX	LML	RCO				EOL	MVU	SVG	
CHM	LYC	RIN				EPD	MWC	TCN	
CHY	MAS	RIO				EPY	MWR	TLZ	
CKL	MCC	RMG				ESN	MYO	TNC	
CLY	MDL	RNG				ESV	NOP	TNE	