A multi-dimensional analysis of the value-relevance of fair value and other disclosures for investments in associates

WESSEL MARTHINUS BADENHORST
Student number 24 035 701

Submitted in fulfilment of the degree

Doctor Philosophiae in Financial Management

in the

FACULTY OF ECONOMIC AND MANAGEMENT SCIENCES

at the

UNIVERSITY OF PRETORIA

PROMOTORS:

Professor LM Brümmer
Professor JHvH de Wet

Submitted:
April 2014

Acknowledgements

I thank my supervisors, Professors Leon Brümmer and Johannes de Wet, for their guidance, patience and support throughout the gruelling processes. I would also like to thank my colleagues, Lizette Kotze, Marna de Klerk and Petri Ferreira, for all their useful advice and encouragement. More generally I would like to thank those of my friends, colleagues and family who are still speaking to me after sharing in the ups and downs of the past few years. Finally I acknowledge that, without the blessing of my heavenly Father, this too would never have come to pass.

Abstract

This study investigates several of the mandatory disclosures for investments in associates. An important investigation of this study is whether or not the information content in disclosed fair values for investments in associated companies subsumes their equity accounted carrying amounts. The study modifies existing value-relevance models for its purposes and compares alternative measurement bases for investments in associates by investigating the significance of changes in error terms. Differences across time and between countries are investigated utiling various statistical approaches as well as an indicator variable approach. Findings suggest that equity accounted carrying amounts and disclosed fair values of *listed* associates are incrementally value-relevant. This implies that investors utilise fundamental information of the associate to develop their own intrinsic valuation of listed associates, which is not equal to current market values. However, this does not equally apply in the case of *unlisted* associates, where disclosed fair values are not incrementally value-relevant to equity accounted carrying amounts. Other findings suggest that the value-relevance of the equity accounted carrying amounts and disclosed fair values of associates differ significantly across time and between countries for both listed and unlisted associates. In addition, findings confirm that an exceptional economic event, such as the global financial crisis of 2007–2008, impacts significantly on the overall value-relevance of accounting information. Lastly, findings of this study imply that the disclosed summarised financial information of associates, although not individually value-relevant, is incrementally value-relevant when considered as a group.

Contents

LIST OF TABLES

1. INTRODUCTION

1.1. Introduction

The objective of financial reporting as per the *Conceptual framework for financial reporting* (IASB, 2010: par. OB2) is to provide information about the reporting entity that is useful to existing and potential investors, lenders and other creditors for making decisions about providing resources to an entity. It follows from this objective that standard-setters primarily consider financial statement information to be of value if it improves the decisions of capital providers. Therefore the "decision-usefulness" of any new accounting requirement is critically considered by accounting researchers. The decision-usefulness of financial reporting requirements has mainly been investigated by a body of research termed the "value-relevance" literature. In this context an accounting amount is considered to be value-relevant if it has a predicted association with equity market values (Barth, Beaver & Landsman, 2001:79), i.e. the amount is utilised by equity investors in valuing the firm's equity and is therefore decision-useful.

Specifically relevant to this study, the decision-usefulness of fair values in financial reporting has been extensively investigated in the value-relevance literature. Increases in the mandatory use of fair values in financial reporting over the past two decades (Power, 2010:197), for measurement as well as disclosure purposes, have provided ample research opportunities. Generally speaking, the use of fair values in financial reporting has been found to be decision-useful, based on the value-relevance of items as wide-ranging as intangible assets (Barth, Clement, Foster & Kaznik, 1998:42) and financial liabilities (Barth, Hodder & Stubben, 2008:659). The associations found in value-relevance studies relate to generally accepted finance theory that a firm's equity market value should reflect the present value of its expected future cash flows (Ilmanen, 2011:66; Shrieves & Wachowicz, 2001:33). This implies that accounting amounts should only be value-relevant if they reflect the present value of the expected future cash flows of the firm as a whole or, alternatively, the present value of the expected future cash flows of a particular asset or liability of the firm. Based on finance theory, prior value-relevance research findings therefore suggest that the fair values used in financial reporting are reflections of discounted cash flows.

However, although prior research has found the fair values of financial assets to be value-relevant (Barth, Beaver & Landsman, 1996:535), investments in associated companies (hereafter: associates) provide greater influence over the investee than other non-controlling holdings. Typically, investments in associates range from 20 per cent to 50 per cent of the investee's issued shares and voting rights. Most investments accounted for as financial assets (and therefore generally carried at fair value) are far smaller. Current accounting standards attempt to recognise the difference between investments in associates and other non-controlling investments by in most circumstances requiring that an investment in an associate be equity accounted, rather than being carried at fair value (Nobes, 2002:37). Equity accounting (or the equity method) entails recognising the investment at the consideration initially paid for it (cost) and adjusting the cost amount for the investor's share of changes in the equity (i.e. the net assets) of the investee subsequent to the acquisition date.

However, significant influence over an investee does not constitute control. The extent to which the reporting entity can influence the decisions and resultant returns of its associate is therefore debatable. Furthermore, an equity accounted carrying amount is based on historical accounting information. It does therefore not necessarily represent the value of investments in associates in terms of finance theory, since it does not primarily reflect the present value of expected future cash flows. By contrast, fair values are based on market prices or directors' valuations. Both of these explicitly or implicitly incorporate the present value of expected future cash flows. Therefore, based purely on the premises of finance theory, fair values could be a more accurate reflection of the value of investments in associates. However, the alternative (equity accounted carrying amounts or disclosed fair values) preferred by market participants depends to a certain extent on their perceptions.

It is possible that investors view investments in associates as merely financial assets to be measured at fair value, which captures expectations of future cash flows, as would be the case for smaller investments. Alternatively, there could be a special relationship between a reporting entity and its associates which is not captured by fair values, but rather by an equity accounting approach. This could be the case if, for example, investors believe that the entity has the ability to advantageously influence the future cash flows of its associates. Such considerations could imply a higher market value for an investment in an associate compared to smaller investments in the same entity which do not provide their owners with an equal degree of influence. The accounting fair value measurement would not incorporate a premium for significant influence in terms of accounting standards. Therefore, an equity accounted carrying amount may serve as an important input into the valuation process. Investors in the reporting entity could use equity accounted carrying amounts independently or in conjunction with reported fair values to value a firm's investments in associates.

It is important to note that neither of the alternative measurement bases for accounting purposes necessarily represents the value that market participants place on an entity's investments in associates. The *Conceptual framework for financial reporting* notes that financial statements do not represent a valuation of an entity, but rather provide information that equity investors and other users utilise when valuing the entity concerned (IASB, 2010: par. OB7). Historically, professional investors and academics have encouraged investors to determine the "intrinsic value" of an investment, which is usually perceived to differ from its current market value (refer to Rutterford, 2004, for a detailed overview of historical changes in equity valuation approaches). Another important consideration is that the intrinsic value may differ between investors, as it depends not only on the estimated future cash flows of the asset, but also on the discount rate applied (Koller, Goedhart & Wessels, 2010:213). As the discount rates reflect an expected rate of return on the asset, different expectations and requirements lead to variations in intrinsic value between investors even when there is consensus about the estimated future cash flows of the asset (Ilmanen, 2011:141–144).

Interestingly, however, this fact does not eliminate the possibility that investors blindly accept fair values (i.e. current market values) as being representative of intrinsic value without further adjustment. Although fair value may sometimes be the most accurate representation of intrinsic value, for instance when the asset will shortly be sold, investors often perceive current market prices themselves to be a measure of intrinsic value. Consider the following comment by Rutterford (2004:141): "Analysts were forced to turn to forecasting cash flows, and to assume high growth rates, to be able to determine values close to market prices." This comment highlights that market values are sometimes forcibly justified, even by sophisticated investors. It is therefore not possible to dismiss outright the information content of either potential measurement base for investments in associates.

In this respect, it is important for the context of this study that current accounting rules for investments in associates require both fair value and equity method measurements. Although fair value is not the basis of measurement in the financial statements of most reporting entities, it is disclosed for listed associates. Significantly, equity accounted carrying amounts (Soonawalla, 2006:411) as well as certain disclosures concerning equity accounted investments (O'Hanlon & Taylor, 2007:284) have been found to be value-relevant. Prior research has also found that the excess of disclosed fair values of listed associates over the carrying amounts thereof are value-relevant (Graham, Lefanowicz & Petroni, 2003b:1075). However, with a different model specification, Barth and Clinch (1998:218) find that disclosed fair values of associates are not value-relevant in most industries for a similar sample period. Differences in sample selection methods, research models and the accounting requirements of different sample countries render the findings of the two studies incomparable. It therefore appears that prior research implies that the fair values of investments in associates are value-relevant under certain circumstances, but the findings are not conclusive.

Although these research findings provide some preliminary insight in many ways, prior research does not consider whether market participants view the fair values of investments in associates as an alternative rather than simply an incremental measurement base. Finance theory suggests that, should fair values accurately and completely capture the present value of expected future cash flows, market participants should view fair values as being the only correct and relevant measurement base. Alternatively, a combination of the equity accounted carrying amount and the disclosed fair value may represent the basis on which market participants determine the present value of expected future cash flows related to the investment in the associate (i.e. the intrinsic value). Yet another possibility is that market participants ignore current market values of investments in associates completely and utilise the equity accounted carrying amounts (or solely information captured thereby) as the basis for their valuation.

Furthermore, prior research has not investigated changes in the value-relevance of the fair values of associates over time. Because the use of fair values in financial reporting has greatly increased in recent years (Power, 2010:197), it may be that fair values of associates have become more value-relevant as the use of fair values became widespread. By implication, there is a possibility that fair values represent an approximation of the present value of expected future cash flows of investments in associates (or an important starting point for determining them). However, market participants might only have realised this over time. Furthermore, changes in the environment could impact on the importance that market participants place on fair values in the financial statements when valuing the reporting entity's equity. Certainly, changes in circumstances and available information have altered the relative importance of various valuation processes in the past and even lead to new processes being developed (Rutterford, 2004).

In addition, prior research relating to equity accounted investments has neglected to consider whether the value-relevance of the fair values of associates differs between countries. Although the difference in the findings of Barth and Clinch (1998) and Graham *et al.* (2003b) is potentially due to the use of different sample countries, as discussed earlier, their research findings are not directly comparable. Therefore, although cross-country differences may explain some of the variance in these findings, it is not certain that they do. Prior research finds that the environment is more important in determining the quality of financial reporting than accounting standards (Ball, Robin & Wu, 2003:259). Furthermore, historical factors play an important role in how investors use financial information. For example, Rutterford (2004:128–129) notes that historical factors, such as tax rules and the reliability of accounting information, led to dividend yield remaining important as a valuation basis for much longer in the United Kingdom than in the United States. Conclusions such as these imply that value-relevance findings (which describe whether or not investors utilise specific financial statement information in valuations) may differ significantly between countries.

Lastly, studies investigating other required disclosures around equity accounted investments have investigated only the value-relevance of disclosed total liabilities of the associate (e.g. O'Hanlon & Taylor, 2007:267). As these studies do not control for fair value disclosures, it is uncertain whether the disclosure of summarised financial information of associates is incrementally value-relevant. In other words, the disclosed fair values of associates may already capture the information content of the disclosed summarised financial information. Furthermore, prior research provides no insight into whether or not disclosed summarised financial information of associates, apart from that relating to total liabilities, is value-relevant. Because prior studies do not control for these other disclosures, it is also impossible to tell whether the disclosed total liabilities are value-relevant in their own right or merely represent a component of the actual valuation inputs utilised by investors. These questions, which have not been addressed by prior research, form the basis of the research question that is discussed in the section which follows.

1.2. Research question

Finance theory suggests that the value of any asset is the present value of its expected future cash flows (Ilmanen, 2011:66). Therefore, the most likely reason that prior value-relevance studies have found fair values to be associated with equity market prices is that fair values of assets represent or contain the present value of expected future cash flows. However, access to the asset is sometimes through a holding entity. In this case, the market's assessment of the present value of expected future cash flows for an asset of the holding entity is not necessarily the disclosed fair value in the reporting entity's financial statements (i.e. the stand-alone market value of the asset). This becomes clear when considering listed closed-end investment funds, where a large body of research is still investigating potential explanations for market premiums and discounts of the net asset value of these funds. Day, Li and Xu (2011:579), for example, investigate the relationship between taxable distributions and discounts to net asset value for a sample of closed-end investment funds. Their findings imply that reported fair values of investments in associates do not necessarily represent the intrinsic value of investments, which is an important contributing factor to the research question of this study.

If investors do not accept reported fair values of associates as being the appropriate value to attribute to these investments, equity accounted carrying amounts and other disclosures around investments in associates could be primary or complementary information for their value assessments. On the other hand, if investors accept reported fair values of associates as accurately and completely representing the present value of the expected future cash flows of such investments, the question arises as to whether or not fair values should replace equity accounted carrying amounts and related disclosures as the preferred measure for investments in associates in financial reports. The likelihood of fair values subsuming equity carrying amounts depends on how investments in associates are viewed by market participants. Investments in associates may be viewed as financial assets, suggesting that measurement at fair value may be most appropriate. Alternatively, investments in associates may be viewed as financial assets with a difference, suggesting that the significant influence of such investments should be recognised in the financial statements through equity accounting. In its purest form, this study therefore investigates a potential alternative measurement base for equity accounted investments in associates, namely fair value, over time and in different environments.

The primary research question is whether or not fair value measurements are an alternative to or an incremental measurement base for equity accounting. In other words, the main question is whether the fair values of associates capture all of the information contained in equity accounted carrying amounts, or merely provide incremental information to equity investors. If the information content of disclosed fair values of associates is incremental to that of equity accounted carrying amounts, it would imply that investors develop their own assessment of intrinsic value, which utilises information captured by both alternative measurement bases.

However, as the use of fair values in financial reporting has become more widespread (Power, 2010:197), fair values of associates may become better understood and more widely used by equity investors in decision-making. Fair values of investments in associates could therefore have greater value-relevance in later periods than in earlier periods. Furthermore, value-relevance findings in one country do not necessarily translate to another. Prior research shows that incentives in the surrounding environment are more important in determining the quality of financial reporting than accounting standards (Ball *et al.*, 2003:259) and that historical factors play an important role in how financial statement information is utilised for valuation purposes (Rutterford, 2004:128–129). As a result, a secondary research question is whether or not fair values of associates remain value-relevant across time and in different countries.

This study also investigates whether or not disclosed summarised financial information of associates is value-relevant, once disclosed fair values have been controlled for. Of particular interest in the summarised financial information disclosures are disclosed total assets, revenues and profit or loss of associates, which have not been investigated by prior research.

1.3. Contribution of the study

As noted earlier, the mandatory use of fair values in financial reporting has been increasing in recent years. This study contributes to the debate surrounding the use of fair values in financial reporting by considering the value-relevance of fair values of associates as an alternative measurement base to their equity accounted carrying amounts across time and in different environments.

Although prior research suggests that the fair value of financial assets is value-relevant (Barth *et al.*, 1996:535), the significant influence related to investments in associates may be more accurately captured in an equity accounted carrying amount. Alternatively, investors may use the equity accounted carrying amount as a starting point to form their own assessment of the present value of the expected future cash flows from investments in associates. Certainly, equity accounted carrying amounts have been found to be value-relevant (Soonawalla, 2006:411) and likewise the difference between the fair value of listed associates and their equity accounted carrying amounts (Graham *et al.*, 2003b:1075). However, the value-relevance of the fair values of associates is not confirmed, because a similar study over a similar sample period (Barth & Clinch, 1998:218) finds limited value-relevance for disclosed fair values of associates. Prior research therefore does not offer conclusive evidence of whether or not disclosed fair values of investment in associates are incorporated into market participants' value-assessments. Furthermore, prior research does not reveal whether or not the value-relevance of associates is changing over time as the use of fair values in financial reporting increases. It also does not indicate whether or not the surrounding regulatory environment has a significant impact on the value-relevance of associates.

This study therefore makes a significant contribution to the existing literature by considering the changing value-relevance of the fair value of associates over time as well as differences in the value-relevance of these fair values between countries. However, the primary contribution of this study is an investigation of whether or not fair values provide alternative or incremental information to equity investors, which reveals the relevance of current financial reporting requirements. The study also contributes to the disclosure versus recognition debate. It sheds light on whether or not an amount, merely disclosed (i.e. fair values), may come to subsume its recognised counterpart (i.e. equity accounted carrying amounts) in time. In addition, by including both developed and developing countries in the sample, this study provides insight into the effect of sophisticated environments on the value-relevance of fair value measurements.

Furthermore, prior research does not consider that the information content of disclosed summarised financial information of associates may be captured by their disclosed fair values. If fair values are accepted by market participants as being the best representation of the present value of expected future cash flows of investments in associates, controlling for disclosed fair values may negate the value-relevance of the disclosed summarised financial information. This study therefore makes a contribution to this branch of research by controlling for disclosed fair values when disclosures of summarised financial information are investigated. The study also investigates a larger number of disclosed summarised financial information items than considered by prior research.

Lastly, findings of this study provide insight to standard-setters in the consideration of accounting requirements for investments in associates. It may well be that fair values capture all of the information contained in equity accounted carrying amounts of associates, while being a more neutral measurement base. Certainly, earlier research suggests that companies deliberately avoided crossing the 20 per cent threshold requiring equity accounting, when associates appeared more likely to report losses (Comiskey & Mulford, 1986:523). These findings suggest that equity accounting requirements could be driving economic decisions. Fair value measurement is already required in terms of existing accounting standards for nearly all equity investments that do not influence the investee. Removing equity accounting could be therefore appropriate if fair value measurements subsume all of the relevant information of equity accounted carrying amounts. This is especially relevant as the removal of the 20 per cent threshold would prevent accounting from driving economic decisions and restore it to being a measurement tool.

1.4. Delimitations

This study investigates only the fair values of associates and findings can therefore not be generalised to other fair value measurements or disclosures. Furthermore, although the accounting requirements for joint ventures are in many instances similar to those of associates, the findings of this study are specifically related to associates and cannot be generalised to equity accounted investments in general. Lastly, the findings are specific to the countries and time period investigated and cannot be freely generalised to other circumstances.

1.5. Summary of the main findings

This study investigates several of the required disclosures for investments in associates. Findings suggest that equity accounted carrying amounts and disclosed fair values of *listed* associates are incrementally value-relevant. This implies that investors utilise both alternative measurement bases to determine the value of an investment in a listed associate, which means that they develop their own intrinsic value of investments in associates. However, these findings do not equally apply in the case of *unlisted* associates, where the alternative measurement bases do not offer incremental information to equity investors. Other findings suggest that the value-relevance of the equity accounted carrying amounts and disclosed fair values of associates differ significantly across time and between countries for both listed and unlisted associates. In addition, findings confirm that an exceptional economic event, such as the global financial crisis of 2007–2008, impacts significantly on the overall value-relevance of accounting information. Lastly, findings of this study suggest that the disclosed summarised financial information of associates, although not individually value-relevant, is incrementally value-relevant when considered as a group.

1.6. Chapter outline

The remainder of this study is set out as follows: in Chapter 2 the findings of prior research is discussed and hypotheses are developed. In Chapter 3 the research methodology is set out, while Chapter 4 details the sampling methodology and the final sample numbers. Chapters 5–12 discuss the detailed findings for each of the hypotheses, and Chapter 13 contains the summary and conclusion of this study.

1.7. Summary and conclusion

The main purpose of this study is to determine whether equity investors view fair values of associates as an incremental or alternative measurement base to equity accounted carrying amounts. In addition, the study investigates differences in the value-relevance of fair values of associates over time and between countries. The value-relevance of disclosed summarised financial information of associates is also investigated. Given the increased use of fair values for financial reporting, this study contributes to the existing literature by considering the use of fair values of associates over time, between countries and specifically for measurement (as opposed to disclosure) purposes. This study also makes an important contribution to the literature on disclosures of summarised financial information of associates by firstly controlling for disclosed fair values in regressions and secondly by investigating a larger number of disclosures than those considered by prior research.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Introduction

This chapter is focused on reviewing current knowledge about valuation and value-relevance research generally and investments in associates specifically. The current state of knowledge leads to the identification of the investigations to be performed and the hypotheses formulated for this study. Discussions in this chapter take place in seven stages. Firstly, the background to the current accounting requirements for investments in associates is discussed. Thereafter an overview of the findings of the general value-relevance literature is provided. A discussion of general valuation research is followed by an analysis of the link between this branch of research and the value-relevance literature. The literature review is concluded with a discussion of research findings specific to investments in associates. The hypotheses are summarised after the findings of prior research have been detailed, followed by a summary and conclusion of the chapter.

2.2. Current accounting requirements for associates

The accounting requirements for associates under International Financial Reporting Standards (IFRS) during the sample period are detailed in IAS 28, *Investments in associates*, effective January 2005 (IASB, 2003). In terms of IAS 28 (IASB, 2003) all entities, with the exception of venture capital organisations, mutual funds, unit trust funds and similar investment entities, are required to apply the equity method to their investments in associates. Those entities exempt from the requirements of IAS 28 (IASB, 2003) are obliged to carry their investments in associates at fair value through profit or loss. The version of IAS 28 (IASB, 2003) in place during the sample period has since been superseded by IAS 28, *Investments in associates and joint ventures*, effective January 2013 (IASB, 2011). However, the requirements for the application of the equity method detailed in this section are virtually unchanged in the new version of the standard.

An entity is considered to have an associate in terms of IAS 28 (IASB, 2003) when it has significant influence over the investee (the power to participate in financial and operating decisions of the investee). If an entity directly or indirectly through subsidiaries holds 20 per cent or more of the voting power of an investee, IAS 28 (IASB, 2003) requires that significant influence be presumed, unless it can be clearly demonstrated that this is not the case. Moreover, the fact that another party controls the investee is not sufficient to conclude that an investor does not have significant influence over the investee. Once management identifies that the investor has significant influence over an investee, IAS 28 (IASB, 2003) requires that the equity method be applied to this investment.

Applying the equity method entails starting with the cost of the investment and adjusting it for the investor’s share of subsequent changes in the equity (i.e. the net assets) of the investee after the acquisition date. Unlike consolidation, equity accounting results in a single line item related to the investee on the statement of financial position, namely the investment in the associate. Similarly, a single amount is disclosed in the statement of profit or loss and other comprehensive income for the entity’s post-tax share of its associate’s profit or loss. The entity’s post-tax share of its associate’s other comprehensive income is also presented as a single line item within other comprehensive income. Therefore, it is only in the statement of changes in equity where the effect of equity accounting the investment in the associate is not distinguished from similar items of the entity and its subsidiaries. Because the share of profits from associates is before dividends have been declared by them, equity accounting would double-count dividend income without further adjustments. As a result, current accounting standards require that dividends received from an associate be eliminated and the equity accounted carrying amount decreased. This results in the change in the equity accounted carrying amount reflecting the net change in equity of the associate. Furthermore, the entity’s share of any unrealised intra-group gains or losses is eliminated.

Should the associate report a negative change in equity larger than the cost of the investment, an entity limits its investment in the associate to zero. In this respect, however, it is not only the investment in the associate which is reduced by the losses of the associate, but also any other long-term interests in the associate which effectively form part of the entity's net investment. Subsequent increases in equity in such a case are first applied against unrecognised deficits until these have been eliminated, before increases in equity may again be recognised in the financial statements.

Furthermore, investments in associates are impaired whenever applying the principles of financial assets indicates that recognition of an impairment loss may be necessary. The impairment loss itself is, however, determined with reference to the principles for the impairment of non-financial assets. Therefore, the recoverable amount of an associate is the higher of its value in use and fair value less costs of disposal. Impairment losses are not allocated to specific assets and may be reversed to the extent that the recoverable amount of the investment in the associate subsequently increases.

Importantly for the purposes of this study, IAS 28 (IASB, 2003) also requires entities to disclose the fair value of investments in associates for which published price quotations are available. This enables the comparison of the equity accounted carrying amount of the associate with its disclosed fair value. Some entities go further than the minimum requirements in IAS 28 (IASB, 2003) and also disclose fair values for unlisted associates. Such fair values represent directors' valuations, rather than market values of the investments in associates. However, prior research suggests that fair value measurements lower in the fair value hierarchy remain value-relevant (Song, Thomas & Yi, 2010:1376–1377). Another disclosure requirement in IAS 28 (IASB, 2003) of interest to this study is that summarised financial information of associates, including total assets, total liabilities, revenue and profit or loss, is required to be disclosed.

At this point, it is important to note that the main focus of this study relates mandatory disclosures in IAS 28 (IASB, 2003). There are many reasons why firms disclose information voluntarily and a wide body of theoretical and empirical research investigating firms' motivations. In the context of this study, however, this literature is far less relevant as the disclosures investigated are virtually all mandatory disclosures. As a result, to retain the focus of this study, this body of literature is not discussed in detail in the text.

The next section starts off the review of prior research by providing an overview of general value-relevance findings.

2.3. Value-relevance research

Broadly speaking, the value-relevance literature attempts to determine the decision-usefulness of accounting numbers. An accounting amount is considered to be value-relevant if it has a predicted association with equity market values (Barth *et al.*, 2001:79), i.e. the amount is utilised by equity investors in valuing the firm's equity and is therefore decision-useful. Decision-usefulness forms the core of value-relevance research, as the purpose of financial reporting as per the *Conceptual framework for financial reporting* (IASB, 2010: par. OB2) is to provide information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity. Although the *Conceptual framework for financial reporting* (IASB, 2010) has only recently been issued, standard-setters have long considered the objective of financial reporting to be the promotion of decision-making; the previous documents of both the IASB and FASB were focused on decision-usefulness as a primary objective of financial reporting. As a result, research evaluating the decision-usefulness of financial statement information has proliferated over the past two decades.

Value-relevance studies have generally found support for the use of fair values in financial reporting for a wide range of assets and liabilities. Barth (1991:457) finds, for example, that the fair values of pension assets and liabilities contain the smallest measurement error amongst various alternative measurement bases. Later research finds that the fair values of intangible assets (Aboody & Lev, 1998:188; Barth *et al.*, 1998:42; Barth & Clinch, 1998:230; Kallapur & Kwan, 2004:160), property, plant and equipment (Aboody, Barth & Kaznik, 1999:175–176) and financial liabilities (Barth, *et al.*, 2008:659) are all value-relevant[1]. More importantly for this study, prior research also finds that the fair values of financial assets are value-relevant. In this respect some earlier research findings did not find universal value-relevance for financial assets, suggesting that only the fair values of marketable securities have value-relevance (Nelson, 1996:181). However, other researchers documented broader evidence at the time, finding that the disclosed or estimated fair values of other financial assets and liabilities, such as loans and deposits, are also value-relevant (Barth *et al.*, 1996:535; Eccher, Ramesh & Thiagarajan, 1996:99). More recently Ahmed, Kilic and Lobo (2006:578) find that not only the fair values of derivatives, but also the fair values of other financial assets and liabilities are value-relevant. As a result, the use of fair values for the measurement of financial assets and liabilities has become self-reinforcing (Power, 2010:205) and therefore widespread.

However, as can be seen from the earlier discussion around equity accounting, investments in associates differ from other financial assets. The existence of an associate depends on the entity's having significant influence over the investee, specifically influence over its financial and operating decisions. In practice, the requirements of IAS 28 (IASB, 2003) also imply that a relatively larger investment is required to establish significant influence. The equity accounting requirements of IAS 28 (IASB, 2003) are an attempt to recognise this special relationship between the entity and its investee in the financial statements (Nobes, 2002:37). The real question is thus whether or not equity accounting

1 For a more comprehensive review of the findings of various value-relevance papers, refer to Holtzhausen and Watts (2001) and Barth, *et al.* (2001).

captures the economic relationship between the entity and its investee and, if so, if equity accounting provides information not captured by fair value measurements. For this to be the case, finance theory suggests that equity accounted carrying amounts should provide information about the present value of expected future cash flows of the investment in the associate which is incremental to the fair value thereof.

While value-relevance research is focused on the decision-usefulness of financial statement information by investigating predicted associations with equity market values (Barth, *et al.*, 2001:79), it also contributes to general valuation research by considering whether or not a particular item of financial statement information is used by market participants. In this respect, however, it should be noted that “value-relevance studies do not attempt to estimate firm value” (Barth, *et al.*, 2001:90). Rather, value-relevance research merely reflects whether or not an accounting amount is an input into a valuation method utilised by market participants to determine the value of a firm’s equity. However, and more importantly in the context of this study, value-relevance methods, appropriately specified, can also shed light on the significance of a piece of financial statement information in market participants’ valuation methods (Barth, 1991:438; Barth, *et al.*, 2001:81). Such specifications allow for one of the key investigations in this study, i.e. whether or not disclosed fair values subsume the information content of equity accounted carrying amounts of investments in associates.

It is important to note that, because “value-relevance studies do not attempt to estimate firm value” (Barth, *et al.*, 2001:90), the market price of the firm is accepted as a given. This separates value-relevance research from general valuation literature as well as literature which investigates information-processing and price-formation within stock markets. While important, this body of literature does not constitute the focus of this study, as this study is only concerned with whether or not financial statement information is incorporated into valuation processes (value-relevance) rather than the valuation processes themselves. As a result, in order to retain focus, the full body of literature around asset pricing has not been examined within the text. However, the validity of value-relevance research rests on its interaction with the broader valuation literature. Therefore, the section which follows discusses some findings of general valuation literature (which does attempt to estimate firm value), followed by a clarification of the interaction and differences between value-relevance research and general valuation research.

2.4. General valuation research

To facilitate the discussion process, this section is divided into two subsections. The first subsection provides an overview of the principles of general valuation research, focusing on how intrinsic value is determined. The second subsection applies these principles in a more specific manner to the valuation of firms with investments in associates.

2.4.1. Overview of the principles of general valuation research

General valuation research attempts to estimate intrinsic firm value. Intrinsic firm value is different from both the book value of equity and the market value of equity. While book value of equity captures the net result of the accounting processes, accounting is not designed to provide a valuation of the firm (Conceptual Framework, 2010: par. OB7). Similarly, while many researchers accept that the market value of equity reflects the consensus view of market participants at a particular moment (Barth, 2000:11), this view does not necessarily reflect the "true" (or intrinsic) value of the firm. The fact that a firm's market value may periodically differ from its intrinsic value has been long understood. Rutterford (2004:134) notes that the concept of intrinsic value was well understood during the early eighteenth century, where critics of the South Sea Bubble identified the concept of "intrinsic value". After the stock market crash of 1929 and the subsequent Great Depression, the concept that the intrinsic value of a firm often differs from its observed market price was reintroduced (Graham &

Dodd, 1934:17). Indeed, some recent research accepts the fact that market values can diverge significantly from intrinsic value and investigates how this affects management decisions (Badertscher, 2011:1514). A natural outcome of accepting that the market price of a firm does not necessarily reflect its intrinsic value is that determining this intrinsic value becomes a significant concern.

Modern finance theory generally accepts that the value of an asset (i.e. its intrinsic value) should reflect the present value of its expected future cash flows (Kaplan & Ruback, 1995:1059; Shrieves & Wachowicz, 2001:33; Ruback, 2002:85; Rutterford, 2004:141; Prather, Chu & Bayes, 2009:227; Ilmanen, 2011:66)[2]. In the context of valuing an investment in a firm, various approaches have been utilised in recent literature; all of which determine a measure of expected future cash flows and apply a discount rate (Fernández, 2007:853–854). For example, one approach discounts the expected free cash flows of the firm at the weighted average cost of capital (requiring a subsequent adjustment for the value of debt to determine the equity value of the firm). Another approach utilises equity cash flows discounted at the required return to equity to arrive directly at the equity value of the firm. Although there are various arguments for the superiority of one approach over another, Fernández (2007:862) shows that results are identical when the correct assumptions for each approach are applied. As a result the discussion below focuses on one approach only, namely discounting the expected free cash flows of the firm at the weighted average cost of capital.

Free cash flow of the firm reflects expected future cash flows generated by its operations, adjusted for expected investment in fixed assets (Fernández, 2007:859). Although simplistic in theory, free cash flow can be complex to calculate. Firstly, free cash flow of the firm can very rarely be equated with an accounting number in the financial statements. Both accounting net cash flow and free cash flow start with a calculation of cash flow generated by

[2] Note that there are also popular heuristic methods of determining the intrinsic value of a firm, such as price-earnings ratios. However, it is “generally accepted that the best method, in theory, for determining intrinsic value is discounted cash flow” (Rutterford, 2004:138).

the operations of the firm, which is usually derived by adjusting accounting profit before tax for non-cash items as well as investments in working capital[3]. However, as the cash flows from non-operational assets and liabilities are usually dissimilar to those of the main operations of the entity, these cash flows are separated in a free cash flow valuation (Nissim & Penman, 2001:112). Separate valuations are performed for non-operational assets and liabilities which are added or subtracted from the present value of the operations at a later stage (Nissim & Penman, 2001:112; Koller *et al.*, 2010:144–147). By contrast, the accounting statement of cash flows is far less focused on distinguishing between operational and non-operational cash flows. The adjustments required for a free cash flow valuation therefore demand a detailed knowledge of both accounting rules and valuation principles, which illustrates the interdependency of the two disciplines.

A second complicating factor is that accounting net cash flow reflects historical cash flows, while free cash flows are necessarily a forecast of future expected cash flows. As a result, calculating free cash flows requires not only an estimate of future cash earnings generated by operations, but also a forecast of working capital and fixed capital requirements (Kaplan & Ruback, 1995:1063). In addition, free cash flow focuses on the cash available to all owners of a firm (including debt holders). Consequently, the results of the free cash flow valuation would be adjusted by the market value of debt in order to value the ordinary equity of the firm (Fernández, 2007:855). If the market value of the debt of the entity is not readily available, the free cash flow valuation could be complicated further. The lack of market values for debt could potentially be overcome, however, by utilising free cash flows to equity. Provided consistent assumptions are utilised elsewhere in the valuation, this methodology would result in a valuation identical to the free cash flow valuation of the firm (Fernández, 2007:862).

3 Although there are other possible starting points, for example earnings before interest and taxation (EBIT), the cash flow number after the relevant adjustments remains the same (Kaplan & Ruback, 1995:1063). Therefore, in the interest of brevity, various permutations of cash flow calculations have not been discussed.

A third factor for consideration is that a free cash flow valuation theoretically requires that all of the remaining cash flows of an asset be estimated and discounted to their present value. Because of the impracticality of estimating cash flows which may well continue indefinitely for the foreseeable future, detailed free cash flows are generally forecasted for a limited period. However, as many prior studies note (Palepu, Healy, Bernard & Peek, 2007:343; Subramanyam & Venkatachalam, 2007:461; Koller *et al.*, 2010:213), the present value of free cash flows occurring after the estimation period (even a period as long as ten years) usually forms a major component of the current market value of an asset. As a result, free cash flow valuations make use of a terminal value, which represents free cash flows after the estimation period, capitalised at a constant growth rate (Palepu *et al.*, 2007:343; Koller *et al.*, 2010:213). However, this has the unfortunate consequence of further complicating the free cash flow valuation. The terminal value forms a significant component of the discounted free cash flow valuation, yet it is very sensitive to changes in the assumed capitalisation rate applied (Koller *et al.*, 2010:213).

As the preceding discussion highlights, estimating the future cash flows for a free cash flow valuation requires a significant number of assumptions and adjustments. Not least of these is the assumed growth rate, within the forecast period as well as in calculating the terminal value. Although there is some consensus that real earnings growth tends to lag behind real GDP growth over the long run by approximately one per cent (Cornell, 2010:61; Ilmanen, 2011:138–140), short-term deviations could potentially occur within the forecast period (Dimson, Marsh & Staunton, 2003:27). Furthermore, even if consensus could be reached on expected real GDP growth, it is not clear that the average real growth rates identified by the aforementioned studies could be applied to an *individual* firm's terminal value, much less the forecast period. As a result, forecasted free cash flows (including the terminal value) involve a large degree of judgement and estimates may differ significantly between individual investors.

Differences in assumptions of forecasted free cash flows are not the only reason that estimates of intrinsic value could differ between individual equity investors. Another potential cause of differences between investors lies in the other component of a free cash flow valuation, namely the discount rate. Theoretically, free cash flows are to be discounted at a single appropriate rate, namely the weighted average cost of capital of the firm (Ruback, 2002:90; Fernández, 2007:855). In actual fact, a large component of the weighted average cost of capital of a firm is the required return on equity. While it is possible to determine a required return on equity using methods such as the capital asset pricing model (Kaplan & Ruback, 1995:1064; Ruback, 2002:89; Fernández, 2007:858), such methods are fraught with controversy.

A major reason for the controversy is that surveys of investors reveal that required return on equity differs significantly between different types of investors (Ilmanen, 2011:141–144; Welch, 2000). In fact, even within the same group of investors, estimates of the required return on equity may differ widely. For example, the results of a survey by Welch (2000:513) reveals that estimates of the 30-year expected equity premium by financial economists range from 1,5 per cent to 15,0 per cent. The result is that, even if investors should agree on the forecasted free cash flows, differences in their required return could lead to significantly different estimates of intrinsic value between individual investors. Note that this conclusion merely describes the observed ebb and flow of stock markets. Although stock market transactions and fluctuations have many causes, one reason is differences in investors' estimates of intrinsic value compared to the current market price.

An important aspect of the free cash flow valuation process as described above is that it provides a valuation of the operations of a firm. The valuation determined by these processes is therefore subsequently adjusted with the valuations of non-operational assets and liabilities (Nissim & Penman, 2001:112; Koller *et al.*, 2010:144–147). Where market values are available for these assets and liabilities, they are often incorporated into the total valuation of the firm without further adjustment. Koller *et al.* (2010:144–147), for example, recommend including the market value of securities and that financial subsidiaries be valued in a similar fashion to any other loan book. This approach with regard to non-operational assets and liabilities establishes a very important valuation principle, namely that assets and liabilities need only be valued together when significant synergy arises between them. Should a firm hold disparate assets with negligible synergy, it is possible to derive a market value for the firm as a whole by determining and subsequently combining valuations for each of the individual assets.

However, although the recommendation to utilise the market value of non-operating assets in the valuation (Nissim & Penman, 2001:112; Koller *et al.*, 2010:144–147) simplifies the process, the market values of these assets do not necessarily reflect their intrinsic values. This becomes clear when listed closed-end investment funds are considered. These funds typically hold non-controlling stakes in other entities and frequently all of their holdings are quoted. Furthermore, the quoted market values are nearly always utilised as the carrying amounts of the assets in terms of current accounting standards. This means that the net asset value of a listed closed-end investment fund is effectively equal to the sum of the market values of its individual assets. As synergy between assets is at best limited and operational activities tend to be non-existent, the accounting net asset value generally represents a potential valuation of the closed-end investment fund. This is because the investment fund could be viewed as a collection of non-operational assets, which implies that each asset could be valued separately and the results combined to arrive at a valuation of the investment fund. However, if the market value of closed-end investment funds' assets is utilised as the intrinsic value, market prices of closed-end investment funds reflect a persistent discount to the valuation (Pattitoni, Petracci & Spisni, 2013:194; Cherkes, Sagi & Stanton, 2009:257).

This unexpected discount has spawned a great deal of research, which investigates possible reasons for discounts to net asset values of listed closed-end investment funds. For example, Pattitoni *et al.* (2013:194) determine that the use of expert assessors results in more conservative property valuations and that their use therefore cannot explain discounts to net asset values of listed Italian real estate investment trusts. Similarly Dietrich, Harris and Muller (2001:155) find that appraisal estimates of the fair value of investment properties in the United Kingdom property industry understate actual selling prices achieved from 1988 to 1996. Some other potential explanations advanced around the discount to net asset values of closed-end investment funds include the illiquidity of underlying investments (Cherkes *et al.*, 2009:258) and the tax consequences of distributions (Day, *et al.*, 2011:592). Whatever the mixture of reasons advanced, however, the fact remains that even when assets are carried at fair (i.e. market) values, investors often place their own valuation on the net assets of a firm and that arbitrage opportunities have not lead to the elimination of this difference.

More specifically to the research question of this study, these research findings potentially imply that investors do not accept disclosed fair values of associates as the most appropriate valuation of the firm's investment. This potential implication is explored further in the section which follows.

2.4.2. Valuation of firms with investments in associates

Investments in equity accounted associates are regarded as non-operating assets for the purposes of valuing the investing firm (Koller *et al.*, 2010:144–147). They are therefore excluded from the valuation of the operations of the firm and separately valued. In the case of investments in associates, investors have several potential valuations to choose from. Firstly the equity accounted carrying amount of the associate is a possibility and likewise its disclosed fair value (i.e. market value in the case of a listed associate or directors' valuation in the case of an unlisted associate). Alternatively, the investor could include his or her own assessment of the intrinsic value of the investment in associate. Each of these alternatives is evaluated below.

The equity accounted carrying amount has been viewed as valuation method in certain countries, such as The Netherlands, in the past (Nobes, 2002:21). In essence the equity accounted carrying amount captures the historical changes in the net asset value (i.e. the book value) of the associate. Furthermore, the equity accounted share of income allows for heuristic methods of valuation, using multiples such as price-earnings ratios (Kaplan & Ruback, 1995:1066–1067; Rutterford, 2004:141). Therefore, investors could potentially consider the investor's share of the net asset value of its associate to be an accurate representation of the investment's value or base a heuristic valuation on the information contained therein.

The second valuation alternative available to equity investors is the disclosed fair value (market value) of the investment in the associate, which is often the recommended alternative in valuation texts. For example, Koller *et al.* (2010:144–147) suggest that investments in associates be valued as any other non-operational investment in marketable securities, i.e. by adding their unadjusted market value to the free cash flow valuation of the firm's operations. However, this solution is somewhat oversimplified. Discounts to the market values of assets have been persistent over long periods of time in the case of listed closed-end investment funds (Pattitoni *et al.*, 2013:194; Cherkes, *et al.*, 2009:257), while these funds do not typically hold investments in associates. This suggests that investors do not accept the market values of underlying assets, even relatively small investments, without adjustment. In this respect, investments in associates, apart from being far larger than other non-controlling investments, also provide a measure of influence over the investee. In fact, equity accounting is an attempt to recognise this influence in the financial statements (Nobes, 2002:35). It therefore follows that differences between the intrinsic value of the associate and its market value may be exacerbated by both the size of the investment and the fact that, unlike other minority investors, the entity could potentially influence the future cash flows of the associate to its advantage. This situation creates the third alternative for investors, namely to determine the intrinsic value of the associate, using the principles of free cash flow valuation, and include that in the valuation of the investing firm. Because an associate is a free-standing business in its own right, it is possible to value the operations of the associate. However, it also requires a detailed assessment of the associate's future cash flows and growth prospects.

An additional question arising for an investor who decides to determine the intrinsic value of the associate is what an appropriate discount rate is. The investor would have several discount rates available. Firstly, there would be the weighted average cost of capital of the associate itself. While this rate would be appropriate to use for investors who hold direct investments in the associate, the required return on equity (a component of the weighted average cost of capital) may be different for the investor in question. Secondly, the investor may choose to use the weighted average cost of capital of the holding entity, i.e. the entity which owns the investment in associate. This discount rate would incorporate the required return on equity of the investor and would be appropriate if the investor requires a similar return from the investment in associate and the other net assets of the holding entity.

Therefore, although finance theory suggests that calculating an independent intrinsic value would be most appropriate, the demands of practical situations should not be disregarded. For instance, the value of the investment in associate relative to the value of the firm as a whole may not merit a detailed free cash flow valuation in an investor's opinion. In such a case investors may prefer to perform a valuation on a heuristic basis or even to utilise the disclosed fair value directly. In addition, the fair value of an associate (i.e. the market price) often serves as an important anchor point for a valuation. Valuation texts often recommend that the results of a valuation should be compared to an observed market price and that any differences should be traced to specific reasons (Palepu *et al.*, 2007:343). Furthermore, even professional investors may call into doubt the results of their valuations if they differ significantly from an observed market price. Consider the following comment by Rutterford (2004:141) relating to the behaviour of analysts during the late 1990s: "Analysts were forced to turn to forecasting cash flows, and to assume high growth rates, to be able to determine values close to market prices." Indeed, if the discount of the firm to the current market value of its underlying assets became large enough, arbitrage opportunities will become profitable and should therefore limit the size of such a discount, even in a moderately efficient market.

Another reason for sometimes using the disclosed fair value of an associate in a valuation of the investing firm is that investors may not believe that the firm intends to hold its investment for a prolonged period of time. If the firm does intend to sell its investment in the foreseeable future, the fair value of the investment in the associate may be the most cost-effective valuation of the expected cash flows to be derived from it. When an investor intends to sell an asset, the terminal value in a free cash flow valuation is best represented by the market value of the asset[4]. As the other cash flows from the investment are far less significant and terminal values generally form the largest part of any valuation (Koller *et al.*, 2007:213), a reasonably accurate valuation can be arrived at with minimal effort.

In summary, investments in associates are usually valued separately from the rest of the firm. Various alternative valuation bases are available to investors, including the equity accounted carrying amount, disclosed fair value or intrinsic value determined by the investors

[4] This approach is utilised by Subramanyam and Venkatachalam (2007:462) who estimate ex-post intrinsic value with reference to actual market prices achieved at the end of a predetermined investment period in order to assess the predictive ability of cash flows and earnings and find earnings to be superior. It is important to note that the underlying assumption of their findings is that the investment will actually be sold.

themselves. This intrinsic value may be determined using the free cash flow valuation methodology discussed earlier or by other heuristic methods. None of these valuation bases can be dismissed outright, because of practical considerations. Certainly, depending on the circumstances, the disclosed fair value of an associate and its intrinsic value to a specific firm may be approximately equal, even if this is not the case for other investors in the associate.

In the section which follows, the link between general valuation research and the value-relevance literature is discussed.

2.5. General valuation research and value-relevance research

The approach of this paper is mainly a value-relevance research approach. It is therefore important to note that although value-relevance studies are not focused on estimating firm value (Barth, *et al.*, 2001:90), they nevertheless contain a valuation element. Value-relevance studies determine whether or not a specific accounting amount is *used* by market participants to determine the market value of equity of a firm. In this respect, value-relevance studies are grounded in earlier seminal research such as that by Ball and Brown (1968:169–170) and Beaver (1968:85), which found that financial reporting information in general is correlated with market values of firms and therefore used for valuation purposes. Utilising a basic premise of finance theory, namely that the value of any asset is the present value of its expected future cash flows (Ilmanen, 2011:66), financial reporting information will by implication be value-relevant if it correlates with the present value of the expected future cash flows of the firm. In fact, free cash flow valuations utilise a great deal of accounting information for cash flow forecasts. If free cash flow valuations correlate with market values (as finance theory argues they must), so will the accounting information contained within them.

In this respect a firm may be viewed as an individual asset to be valued or, alternatively, as a collection of individual assets and liabilities. This would imply that the value of the firm is the sum of the present values of the individual expected future cash flows of its assets and liabilities. An underlying assumption to this approach is that no synergy arises from holding the assets and liabilities as a group, rather than holding them separately. Such synergies could be added explicitly or implicitly to the sum of the individual valuations in order to arrive at the final valuation for the firm. Such an approach is advocated by Nissim and Penman (2001:112), who investigate the use of accounting numbers for valuation purposes and recommend that operating assets and liabilities should be separated from financial assets and liabilities when a firm is valued. Nissim and Penman (2001:120) argue that synergies should only be incorporated into the valuation of the operating assets and liabilities, provided that the financial assets and liabilities being added are carried at or close to market value. This approach is also in harmony with the general valuation literature. Free cash flow valuations are generally only used to determine the intrinsic value of the *operations* of the firm. Non-operational assets and liabilities are valued separately and added to the valuation of the firm's operations in order to arrive at a total valuation for the firm (Koller *et al.*, 2010:144–147).

Therefore, value-relevance studies typically separate an asset or liability of interest (which tends to be non-operating in nature) and determine whether or not the accounting carrying amount (or alternative measurement base) is associated with equity market values (Barth, *et al.*, 2001:79). However, in this context it is important to note that value-relevance of an accounting amount does not imply that it accurately reflects the present value of expected future cash flows of the firm or even of the asset (or liability) in question. Rather, value-relevance studies assume that the market value of equity reflects the consensus view of market participants (Barth, 2000:11) and that any amount associated with this market value is therefore associated with the consensus *valuation approach* of these market participants, rather than being representative of its result.

Market-to-book values often do not equal one because investors' consensus valuation of the firm (i.e. the present value of its expected future cash flows) differs from the accounting amounts, namely book values, recognised in the financial statements. Some have ascribed such differences to unrecognised assets in the financial statements or at least the failure to recognise all increases in value for recognised assets (Khan & Watts, 2009:132; Easton & Pae, 2004:496; Watts, 2003:208). However, attributing the entire difference between the market value of equity and its book value to unrecognised assets is an oversimplification. Consider listed closed-end investment funds whose assets tend to be held entirely in financial instruments, which these funds are almost always required to carry at fair (i.e. market) value. By implication, these investment funds do not have unrecognised or "under-recognised" assets. However, unlike open-ended investment funds, closed-end investment funds do not have market-makers who are prepared to trade the equity instruments of the fund at net asset value. As a result, their market values tend to reflect a persistent discount to net asset value (Pattitoni *et al.*, 2013:194; Cherkes, *et al.*, 2009:257). Prior researchers have advanced a great number of potential reasons to explain this discount, including tax consequences (Day, *et al.*, 2011:592) and illiquidity of underlying investments (Cherkes, *et al.*, 2009:258). However, whatever the mixture of reasons that could potentially explain this discount, the important fact remains that unrecognised assets are not the main reason for market discounts or premiums over book values of equity. Even when assets are carried at fair (i.e. market) values, investors often place their own valuation on the net assets of a firm.

From the above it is clear that accounting amounts do not perfectly capture the valuation that investors place on a specific asset. In the case of assets carried at their fair (i.e. market) values, differences between accounting amounts and market values of holding firms would suggest that investors use their own valuations for underlying assets to value the firm as a whole. However, value-relevance research does provide insight into whether or not investors use a specific accounting amount in valuing a firm. Therefore, when alternative accounting amounts are available, it is possible to determine which accounting amount has a better correlation with market values, i.e. which amount more closely reflects the value that equity investors place on a specific asset (Barth, 1991:438; Barth, *et al.*, 2001:81). In the case of investments in associates, two accounting amounts are indeed available. These are the equity accounted carrying amount and the disclosed fair value of the associate. Theoretically, investors may use either or both of these amounts (or information captured thereby) to determine a value for the firm's investment in its associate. Prior research relating to closed-end investment funds (Cherkes, *et al.*, 2009:258) suggests that investors will not use unadjusted market values of individual investments in their valuation of the firm. This could imply that the equity accounted carrying amount is still used as an input in these valuations. Alternatively, the disclosed fair value may be an equivalent, or even improved, input in such valuations with the result that equity accounted carrying amounts are not used for valuation purposes (i.e. they are not value-relevant).

In order to determine this, due consideration should be given to prior research findings about the accounting requirements of investments in associates. The section that follows therefore focuses on prior research findings of the value-relevance of equity accounted carrying amounts and disclosed summarised financial information of associates.

2.6. Associate accounting research

To facilitate the discussion process, this section is divided into two subsections. The first subsection discusses prior research findings related to the recognition and measurement of investments in associates, while the second subsection evaluates prior research around disclosures of summarised financial information of equity accounted investees.

2.6.1. Research related to the recognition and measurement of investments in associates

An early paper investigating equity accounting is that of Comiskey and Mulford (1986:523). They find that entities deliberately avoided acquiring an interest greater than 20 per cent if an investee appeared likely to report losses. They suggest that the findings imply that equity accounting requirements have real economic consequences (1986:525). The findings of Comiskey and Mulford (1986) are not entirely surprising when considering the history behind the threshold in IAS 28 (IASB, 2003). Nobes (2002:28) notes that the 20 per cent threshold for equity accounting appears to have as its basis a United Kingdom tax rule, whereby tax losses could be shared between the members of the investing consortium if the company had five or fewer shareholders. He suggests that the inclusion of the 20 per cent threshold in accounting standards at the time represented the start of a tradition of standard-setters accommodating companies' wishes (2002:29). The main implication of Nobes' conclusion is that the 20 per cent threshold has no theoretical basis to suggest that a shareholding of 20 per cent results in a significant influence over either legal requirements relating to the decision-making processes of firms or economic relationships.

However, the results of Comiskey and Mulford (1986) should also be considered within the relevant historical context. The accounting measurement requirement for financial assets during the sample years of Comiskey and Mulford (1986:520) was to carry these investments at cost. With changes to accounting standards, financial assets are now generally required to be carried at fair value (Power, 2010:197). As a result, the incremental cost of applying equity accounting may have decreased in the ensuing years and so too the benefits of avoiding its application, as losses of associates are likely to be reflected in decreased fair values for such investments. Indeed Nobes (2002:41) suggests fair value accounting investments in associates as an alternative to the equity method, as fair value accounting does not rely on an arbitrary threshold and is a "more honest" valuation approach. This comment by Nobes (2002) reflects a perception of the equity method as an alternative valuation method, as opposed to a simplified form of consolidation. In fact, the equity method has indeed been viewed as a valuation method in some countries, such as The Netherlands (Nobes, 2002:21).

Perhaps because the equity method is sometimes viewed as a valuation of the investment, prior research suggests that the equity method provides value-relevant information to equity investors. Soonawalla (2006:411) finds, for example, that equity accounted carrying amounts of both associates and joint ventures are value-relevant in Canada and the United Kingdom. The study shows specifically that disaggregation of investments in associates and joint ventures provides value-relevant information to equity investors. In contrast Soonawalla (2006:409) finds that the equity accounted *income* of joint ventures is value-relevant, while that of associates is not. One implication of these findings is therefore that changes in the equity accounted carrying amount of joint ventures appear to be a timelier reflection of changes in the value of the investment than those of associates.

The findings of Soonawalla (2006) were in contrast to prior research by Graham, King and Morrill (2003a:135), who found that proportionate consolidation of joint ventures forecast accounting return on equity more accurately than equity accounted results of joint ventures do. Although these findings relate to joint ventures, they do suggest that the equity method may not be the optimal accounting treatment for significant investments. Interestingly, Richardson, Roubi and Soonawalla (2012:390) subsequently find that when Canada decided to remove the equity method as an alternative for measuring investments in joint ventures in 1995, the firms forced to switch over to proportionate consolidation suffered a decline in value-relevance in certain balance sheet amounts (such as total assets). This would suggest that equity accounting results in information with greater decision-usefulness than that provided in terms of proportional consolidation. To summarise, prior research findings thus suggest that great uncertainty remains around the appropriateness of the equity method as an accounting treatment.

For this reason some prior researchers have empirically considered the use of fair value measurements for investments in associates as an alternative to the equity method. Fair values as a measurement base for investments is grounded in finance theory, whereby the value of any asset is the present value of its expected future cash flows (Ilmanen, 2011:66). Unlike equity accounted carrying amounts, which focus on the net asset value of the associate and historical information, fair values incorporate expectations around future cash flows relating to the investment in the associate. Expected future cash flows are implicitly incorporated into the fair values of listed associates. As the fair values of listed associates are disclosed based on market prices, should market participants take into consideration the future expected cash flows of the associate, these expectations are carried forward to the financial report of the investor. Similarly, fair values of unlisted associates are based on directors' valuations. Directors' valuations represent management's assessment of the value of the investment in the associate. Such a value assessment, finance theory suggests, will represent the present value of expected future cash flows that relate to the investment in the associate. When the reporting entity (i.e. the investor) is valued by market participants, such future cash flow expectations should then be incorporated into the value that they place on the equity of the reporting firm.

In this branch of research, an early study that considers the use of fair values for investments in associates is that of Barth and Clinch (1998). They find that the disclosed fair values of investments in associates were value-relevant only for mining firms. Their sample consisted of Australian firms observed from 1991 to 1995 (1998:217). Barth and Clinch (1998:217) also find that the recognised carrying amounts of investments in associates in their sample are value-relevant, but only for mining and financial firms. However, as equity accounted carrying amounts were only utilised in Australian financial statements from 1998 onwards (Nobes, 2002:26), the Barth and Clinch (1998) study compares fair value measurements with the cost of these investments. A consideration in this respect is that Barth and Clinch (1998:217) utilise the total fair value and carrying amount of investments in associates in their regressions. Therefore, as the study does not utilise a measure of the difference between the fair values and the carrying amounts (cost in this case) of investments in associates, inferences drawn from the total fair value measurements are still relevant, despite changes in accounting requirements. More importantly, because of the changes in accounting requirements to carry investments in associates under the equity method as opposed to cost, it is uncertain how much of the value-relevance of fair values may have been captured by the equity accounted carrying amounts.

A study that gives some insight into this, is that of Graham *et al.* (2003b:1076) who find that the excess of disclosed fair values over the equity accounted carrying amounts of listed associates is value-relevant for a sample of listed United States firms reporting from 1993 to 1997. Similarly, the study finds that the equity accounted carrying amounts of associates are value-relevant. However, because of differences in sampling methods, sample periods, model specifications and accounting requirements, the findings of the Graham *et al.* (2003b) and Barth and Clinch (1998) papers discussed above are not directly comparable. This leads to some unanswered questions, discussed in further detail below.

Apart from the fact that the studies were performed in different countries with sample periods that do not directly overlap, the Graham *et al.* (2003b:1065) paper is focused on investigating investments in associates. To this end, their sample only includes firms where investments in associates comprise more than one per cent of total assets (*ibid.* 1070). As Barth and Clinch (1998:199) investigate several fair value disclosures, their sample is significantly larger and not targeted to investments in associates. Furthermore, Graham *et al.*

(2003b:1073) investigate the value-relevance of the excess of the disclosed fair value over the equity accounted carrying amount of the investments in associates. As the fair value measurement most likely subsumes at least some information included in the equity accounted carrying amount, this would provide a possible explanation for a value-relevance finding for both the disclosed fair value and the equity accounted carrying amount. Contrary to this, although Barth and Clinch (1998:217) consider total fair value measurements and carrying amounts, such a specification only provides insight into the incremental explanatory power of fair value measurements under circumstances when different accounting requirements applied. Therefore, prior research does not provide insight into whether or not fair value measurements may *replace* equity accounted carrying amounts. Instead, findings are limited to the incremental effect of differences between the two measurement alternatives and merely suggest that fair value measurements are value-relevant and therefore a decision-useful disclosure.

The findings of the two papers discussed above do suggest that the value-relevance of accounting measurements may change with changes in accounting requirements. In this respect, the harmonisation of accounting requirements across countries as a result of the growing acceptance of IFRS (Barlev & Haddad, 2007:494) could contribute to changes in the value-relevance of accounting measurements. Collins, Maydew and Weiss (1997:65), for example, document a change in the relative value-relevance of book values and earnings over a 40-year period. They find that the value-relevance of book values has been increasing over time at the expense of the value-relevance of earnings. Some studies suggest that this is due to increasing conservatism over time (Givoly & Hayn, 2000:288; 317). In contrast, other studies argue that although associations between the current year's earnings and current price changes have weakened over time, associations between the current year's earnings and future period cash flows and price changes have increased (Ryan & Zarowin, 2003:551; Kim

& Kross, 2005:778). More recently, Curtis (2012:143) documents a long-run change in the association of prices and accounting fundamentals and suggests that a structural change is responsible.

Relating these research findings to one another requires reference to the Ohlson (1995) valuation model. Ohlson's (1995:666–667) is a basic theoretical model, often utilised in research, and expresses the value of a firm as a function of the book value of equity and a firm's residual earnings. This model is often referred to as the "residual earnings model" and is equivalent to free cash flow valuation, provided the model is properly implemented (Lundholm & O'Keefe, 2001:315–316). If the size of book values is increasing over time, analogically the present value of earnings must decrease if firm value has remained unchanged. The greater use of fair values in accounting should result in book values that are higher than those reported under historical cost accounting, as fair values incorporate future cash flow (and thus earnings) expectations. On average, the present value of future earnings should result in positive effects on book values (which are stated in nominal terms) due to positive inflation and real growth in gross domestic product experienced over the past century, which most likely gets extrapolated into expectations of the future. Therefore, the present value of expected future earnings are by implication capitalised onto statements of financial position and adjusted every year for changes in expectations. This relationship may explain why current earnings, which now include expected future changes therein, better predict realised future cash flows and price changes due to correlation between expected and realised outcomes.

Because of the changes in accounting requirements and the relative importance of book values and earnings for valuation purposes over time, the value-relevance of the carrying amount of associates is likely to have changed since prior research was performed. Specifically, the greater importance of book values over time (Collins *et al.*, 1997:65) suggests that, in contrast to the findings of Barth and Clinch (1998:217), the fair values of investments in associates should be value-relevant across more industries. Graham *et al.* (2003b:1071) appear to confirm this, as they only exclude firms in the finance and insurance industry from their sample, but do not provide insight into whether or not fair values of associates provide alternative, rather than incremental, information to equity investors. The first question that this study therefore investigates is whether or not the fair values of associates provide alternative (as opposed to incremental) information to equity investors.

The next area of investigation in this study centres on fair value disclosures of unlisted associates. The disclosure of fair values for unlisted associates is not a requirement of IAS 28 (IASB, 2003). However, many companies, particularly those with an investment focus, tend to disclose such fair values voluntarily. Prior research (Barth & Clinch, 1998:220) finds that the value-relevance of fair value measurements does not differ between those fair value measurements based on independent valuations and those that represent directors' valuations. More recently, Song *et al.* (2010:1376–1377) confirm that fair value disclosures lower in the fair value hierarchy are value-relevant (although less so than those higher in the hierarchy). The findings of prior research therefore suggest, considering the implications of finance theory, that fair values that are not based on market prices still incorporate the present value of expected future cash flows of assets to a sufficient degree to be associated with the market value of the reporting entity. This would suggest at least some relationship between the valuation disclosed in the financial statements and the valuation determined by market participants for a given asset, although not necessarily a perfect one. However, prior research has not yet specifically investigated the use of lower level fair value measurements in a situation where an alternative valuation amount (the equity accounted carrying amount) is available. The equity carrying amount may potentially provide a reasonable valuation method where directly verifiable fair values do not exist, even if fair values for listed associates, based on actual market prices, may prove to be the better measurement base for listed investments. Therefore this study also investigates, for a subsample of firms, whether or not the disclosed fair values for unlisted associates are an alternative measurement base to the equity accounted carrying amounts.

In addition to the increased importance attached to book value, the widespread adoption of fair values for measurement and disclosure purposes may have resulted in investors becoming more familiar and comfortable with using fair value measurements for decision-making purposes over time. An amount can only effectively be used for decision-making if its significance is properly understood. As part of a learning process, the incorporation of fair value measurements into decision-making could change over time, affecting its value-relevance. This learning process may reflect in the increased value-relevance of book values over time (Collins *et al.*, 1997:65), which has been incorporating fair values to a greater degree. However, if investors have always been using fair values for decision-making, despite the lack of experience with the *accounting* disclosure or recognition thereof, the value-relevance of fair values of associates should not change over time. The real question is whether or not accounting fair values capture the present value of future expected cash flows and, if so, whether or not investors only became aware of this as time passed.

In addition, structural changes could have a significant impact on how investors perceive and use accounting fair values. The global financial crisis, starting in February 2007 (Ryan, 2008:1606), had a significant impact on asset values throughout the world and could have affected investors' perception and use of accounting fair values in diverse ways. If the global financial crisis left a permanent scar on investors' memories, it could mean that investors subsequently view accounting fair values with suspicion. Such an outcome would imply that accounting fair values lost value-relevance as a result of the global financial crisis, as investors decided to make greater use of independently developed fair value estimates (i.e.

intrinsic values). In contrast, investors may well view the global financial crisis to have been a temporary set-back and the value-relevance of accounting fair values may have remained unchanged when periods prior to the start of the global financial crisis are compared to periods subsequent to the recovery in asset prices. Yet a third outcome may be that investors were consistently overconfident before the advent of the financial crisis, preferring their own independent valuations to the accounting fair values incorporated into financial statements. In such circumstances, the global financial crisis may have produced a sobering effect insofar as investors place greater reliance on the expertise of others. The expected result would then be an increase in the value-relevance of accounting fair values when periods prior to the global financial crisis are compared to periods subsequent to the recovery in asset prices.

Because the value-relevance of the fair values of investments in associates may change over time, whether due to gradual long term structural changes or the impact of extreme global events, the second question that this study investigates is whether or not the value-relevance of the fair values of investments in associates has changed over time.

Another question that arises from the differences in the research findings of Barth and Clinch (1998) and Graham *et al.* (2003b) is the impact of the environment (i.e. the country) in which the financial reporting takes place. As mentioned, a direct comparison between the two studies is not possible, because of the differences in sampling methods, sample periods, model specifications and accounting requirements. Therefore it is not possible to determine if the difference in findings is a result of cross-country differences or research specification differences. Prior research does suggest that the value-relevance of accounting numbers differs across countries. Ball *et al.* (2003:259), for example, find that the financial reporting environment is more important than accounting standards as a determinant of the quality of financial reporting. Hung (2001:418) shows that stronger shareholder protection in a country improves the comparative value-relevance of earnings. The third aspect that this study therefore investigates is whether or not the differences in findings of prior researchers around the value-relevance of investments in associates are due to cross-country differences. The efficiency and soundness of this aspect of the study is enhanced by greater harmonisation and convergence of accounting standards across countries in recent years (Barlev & Haddad, 2007:494).

2.6.2. Research related to the disclosures around equity accounted investments

As discussed earlier, the version of IAS 28 (IASB, 2003) applicable during the sample period sets out several disclosure requirements for investments in associates. One of the most important requirements for the purpose of this study is that fair values must be disclosed for associates where quoted prices are available. The research implications of this requirement were discussed in the preceding subsection. However, other relevant disclosures required by IAS 28 (IASB, 2003) include summarised financial information of the associate, including total assets, total liabilities, revenues and profit or loss. The accounting standards relating to joint ventures required similar disclosures for such investments.

Prior research about the value-relevance of disclosures for equity accounted investments has tended to investigate joint ventures and, in particular, the disclosures related to the total liabilities of the equity accounted investment. Baumann (2003:313) finds, for example, that investor-guaranteed obligations of equity accounted investments are significantly negatively associated with the investor’s market value. In a later study O’Hanlon and Taylor (2007:284) find that the disclosed liabilities of equity accounted investments in the United Kingdom are negatively associated with the investor’s market value and that the relationship is stronger for joint ventures than associates. Richardson *et al.* (2012:390) confirm the value-relevance of liability disclosures for the equity accounted Canadian joint ventures in their sample.

However, IAS 28 (IASB, 2003) also requires disclosures around the total assets, revenues and profit or loss of associates. Prior research has not investigated the value-relevance of these disclosures. Based on the Ohlson (1995:666–667) model, the fair value of an investment in an associate should be derived in some measure from its net assets and profit or loss. This suggests that the disclosures around equity accounted investments in associates may be used as inputs into a valuation model to determine an alternative fair value measurement (i.e. intrinsic value) for the associate. The question that therefore arises is whether or not the disclosure of summarised financial information is necessary where the associate is listed and its fair value is already disclosed. If the summarised financial information is indeed incorporated by investors in an intrinsic value of the investment associate for decision-making purposes, then such summarised financial information would be value-relevant. However, if investors accept that the market value of the associate already incorporates all necessary value-relevant information, the additional summarised financial information disclosures should have no value-relevance of their own. Importantly, prior research investigating the value-relevance of liability disclosures of equity accounted investments does not control for the fair value of the investment[5].

Therefore, the fair value of equity accounted investments may subsume the disclosed summarised financial information as well as the equity accounted carrying amount. However, the degree to which this occurs may be significantly affected by the nature of the fair value information available in the financial statements. The fair values of listed associates are determined by market forces and are directly verifiable by users of the financial statements. In contrast, the fair values of unlisted associates depend on the discretion of management. As a result, they may have a comparably muted effect on the value-relevance of disclosed summarised financial information, where investors may use this information to rather develop

[5] In some instances this is because the fair value of the investment is not available. Prior research has mainly been conducted on unlisted joint ventures, for which disclosure of fair values is not required by the accounting standards.

an independent fair value measurement. However, prior research (Song *et al.*, 2010:1376–1377) suggests that investors will still take management's fair value measurement into account in developing a fair value of their own. Accordingly, this study also investigates the value-relevance of the disclosures of summarised financial information of listed and unlisted associates when the fair value of the associate is controlled for.

2.7. Hypotheses

In this section the hypotheses for this study, arising from the discussion in the previous sections, are summarised.

The first investigation of this study is whether or not the disclosed fair values of investments in *listed* associates are an alternative carrying amount to the equity accounted carrying amount required by current accounting standards. Prior research is inconclusive on whether or not the disclosed fair values are value-relevant and do not shed light on whether or not the disclosed fair values subsume the equity accounted carrying amounts or merely provide incremental information to equity investors. The stated hypothesis for this investigation (stated in null form) is therefore:

H1: The disclosed fair values of listed associates do not subsume the equity accounted carrying amounts of the associates.

The second investigation in this study is whether or not the disclosed fair values of investments in *unlisted* associates are an alternative to the equity accounted carrying amounts. Although prior research suggests that such fair values remain value-relevant, findings also suggest that the value-relevance of fair value disclosures with a higher degree of uncertainty is less than those higher in the fair value hierarchy. As a result, findings around listed associates do not necessarily translate to investments in unlisted associates and a separate investigation is warranted. The stated hypotheses for this investigation (stated in null form) is therefore:

H2: The disclosed fair values of unlisted associates do not subsume the equity accounted carrying amounts of the associates.

The third investigation in this study is whether or not the value-relevance of investments in associates' fair values remains consistent over time. Prior research suggests that the overall value-relevance of financial statement information varies across time, but does not investigate the value-relevance of specific financial statement items. Therefore, the stated hypothesis for this investigation (stated in null form) is:

H3: The value-relevance of disclosed fair values and equity accounted carrying amounts of associates is unchanged over time.

The fourth investigation performed in this study is whether or not the value-relevance findings for the fair values of investments in associates apply across countries. Prior research finds that the overall value-relevance of financial statement information differs between countries, but does not investigate specific financial statement items. Therefore, in order to investigate whether or not the surrounding environment impacts on the value-relevance of listed associates' fair values and carrying amounts, the following hypothesis (stated in null form) is investigated:

H4: The value-relevance of disclosed fair values and equity accounted carrying amounts of associates does not differ between countries.

The last investigation in this study relates to the summarised financial information of investments in associates. Prior research does not shed light on the value-relevance of these disclosures for investments in associates, having mainly investigated investments in equity accounted joint ventures. Furthermore, prior research has focused only on the value-relevance of disclosed liabilities, not considering the value-relevance of other disclosed summarised financial information, and does not control for disclosed fair values. Therefore, in order to investigate whether or not summarised financial information of associates is value-relevant once disclosed fair values have been controlled for, the following hypothesis (stated in null form) is tested:

H5: The disclosures of summarised financial information of associates are not value-relevant.

2.8. Summary and conclusion

This study primarily investigates the value-relevance of the disclosed fair values of investments in associates. Prior research suggests that such fair values may be value-relevant, but it is not conclusive and it does not provide an indication of whether or not fair value measurements are an incremental or alternative measurement base to equity accounted carrying amounts. Furthermore, prior research does not investigate differences in the value-relevance of fair values of investments in associates across time or between countries. Prior research also does not specifically investigate the value-relevance of the fair values of unlisted associates. Lastly, prior research that investigates the disclosure of summarised financial information for equity accounted investees does not investigate all of the summarised financial information disclosed, nor does it control for disclosed fair values. The gaps identified by assessing findings from prior research form the basis of this study. In Chapter 3, the research methodology is discussed in detail.

3. RESEARCH METHODOLOGY

3.1. Introduction

This chapter details the research methodology applied in this study. The general approach to testing each of the hypotheses identified in Chapter 2 is to investigate whether or not the accounting item has a predicted association with equity prices (i.e. if the item is value-relevant). As all of the hypotheses of this study relate to the value-relevance of accounting information, models from prior value-relevance studies are modified for the specific requirements of this study. However, because of the different nature of each of the hypotheses and resulting model requirements, the approach is similar but not identical for all tests of the hypotheses. After the research model and instruments for the various hypotheses have been discussed, the sample selection for this study is set out, followed by a summary and conclusion of the chapter.

3.2. Research model and instruments

The models used in this study are similar to those utilised in previous value-relevance studies which investigate the association between accounting numbers and equity market values (Barth *et al.*, 2001:79). Prior value-relevance studies have generally made use of one of two valuation constructs documented in Barth (2000:12–13). The first is the Ohlson (1995:666–667) model, which relates the market value of equity to the book value of equity and net income of the firm, as these accounting numbers are considered to represent summarised measures of financial performance. As earnings are a short-term performance measure, earnings and cash flows tend to approximate over time (Dechow, 1994:35). The Ohlson (1995:666–667) model therefore represents a way of determining the present value of the expected future cash flows of the firm. This model is generally utilised in simplified form in value-relevance studies, resulting in the following:

$$MV_E = \beta_1 BV_E + \beta_2 NI \qquad \textbf{(1)}$$

where MV_E represents the market value of equity of a firm at a specific point in time, BV_E the book value of equity of the firm and NI the net income of the firm, as a proxy for residual income.

The second valuation construct utilised in the value-relevance literature, which is also documented in Barth (2000:12), is theoretically based on the statement of financial position, namely:

$$MV_E = MV_A - MV_L \quad \textbf{(2)}$$

where MV_E represents the market value of equity of a firm at a specific time, MV_A the market value of the assets of the firm and MV_L the market value of the liabilities of the firm. Because the market value of assets and liabilities are not directly observable, book values of these items are used as proxies in empirical studies. To compensate for the fact that not all assets of a firm may be recognised in terms of the accounting standards, net income is usually included as a proxy for unrecognised assets (Barth *et al.*, 1998:52), resulting in the following model:

$$MV_E = BV_A - BV_L + NI + \varepsilon \quad \textbf{(3)}$$

where BV_A represents the book value of assets, BV_L the book value of liabilities and the other variables are as previously defined.

Upon closer inspection, it becomes clear that models **(1)** and **(3)** are essentially the same, the difference being that model **(3)** allows the coefficient on the book value of equity to vary between its component parts (the book values of assets and liabilities) while model **(1)** does not. Therefore, the models utilised in this study can be viewed either as Ohlson (1995:666–667) valuation constructs, utilised in many prior value-relevance studies (Graham *et al.*, 2003b:1073; O'Hanlon & Taylor, 2007:271), or a statement of financial position valuation approach.

As the different hypotheses require somewhat different models and approaches, the research model and instruments utilised for each hypothesis are discussed separately in the subsections that follow.

3.2.1. The value-relevance of disclosed fair values of listed associates

The focus of the first hypothesis is on whether or not the disclosed fair values of investments in listed associates represent an alternative measurement base to the equity carrying amount of these investments, i.e. whether or not the disclosed fair values subsume the equity accounted carrying amounts. As the appropriateness of alternative measurement bases are considered in this hypothesis, the approach in Barth (1991:438) is followed, where the significance of differences in measurement error between the measurement alternatives are considered. The following regression is utilised for this purpose:

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon \qquad \textbf{(4)}$$

Where:

MV_E represents the market value of equity three months after reporting date;

Year represents an indicator variable, set to one if an observation falls into a given sample year and zero otherwise;

CTRY represents an indicator variable, set to one if an observation falls into a given sample country and zero otherwise;

BV_{Eexcl} represents the book value of equity, excluding the equity accounted carrying amount of listed associates, at the reporting date;

NI represents net income from continuing operations attributable to ordinary shareholders of the reporting entity for the reporting period;

Neg is an indicator variable, set to one if net income from continuing operations attributable to ordinary shareholders is negative and zero otherwise; and

ASC represents different specifications of the investment in associate at the reporting date. In the first specification, *ASC* represents the equity accounted carrying amount of the listed associate and in the second specification its disclosed fair value. In the third specification, the equity accounted carrying amount of the listed associate and its disclosed fair value are included simultaneously. This requires the inclusion of two variables relating to the associate, namely ASC_{CA} for the equity accounted carrying amount of the listed associate and ASC_{FV} for its disclosed fair value.

Following Barth and Clinch (1998:207) and Venter, Emanuel and Cahan (2014:10) among others, all variables, except Year, CTRY and Neg, are scaled by number of shares outstanding. Number of shares outstanding has been selected for scaling purposes as Barth and Clinch (2009:283) show that scaling by number of shares outstanding most reliably compensates for incorrect inferences as a result of scale effects. Time and firm subscripts are suppressed. Differences in reporting dates are dealt with by including independent variable observations at reporting date of each firm and the market value of equity three months thereafter, ensuring a consistent lag after reporting date for accounting information to become available to investors.

Model **(4)** is a pooled regression, which does not consider time-specific effects and cross-country differences in detail, as these are separately considered in later investigations. A pooled investigation is useful as it allows an investigation of value-relevance independent of time and country factors. If findings hold irrespective of these factors, it represents an important generalisation of results. However, year and country intercepts are included to allow for fixed-year and fixed-country effects and subsequently investigated separately. The regression is run three times with the different specifications of *ASC* as detailed above. The variable of interest from model **(4)** is the error term (ε). A significant decrease in ε between the model with *ASC* specified as the equity carrying amount of the associate and the model with *ASC* specified as its disclosed fair value would indicate an increase in both relevance and faithful representation of the economic reality.

However, in order to test the hypothesis and truly determine if fair value represents an alternative (as opposed to an incremental) measurement base, a comparison between the variance in ε of the model specifying *ASC* as the disclosed fair value of the listed associate and the variance in ε of the model which includes both ASC_{CA} and ASC_{FV} is necessary. A smaller variance in ε in the latter specification would indicate that investors utilise both the equity accounted carrying amount of the associate and its disclosed fair value in determining market values for the reporting (i.e. the investing) firm. By implication this reflects the possibility that disclosed fair values of associates do not represent the valuation of the associate utilised by equity investors. In other words, the equity accounted carrying amount of the associate and its disclosed fair value would both serve as inputs in the valuation model of equity investors and not as its result in this case. By contrast, an increase in the variance of ε (or a lack of significant change therein) would indicate that the earlier model, including only the disclosed fair value of the associate, already includes all material information that equity investors consider when valuing a firm's investment in its listed associate. Because recent evidence suggests that comparison of R^2s is generally inappropriate (Gu, 2007:1096), the comparison of R^2s is not considered.

Consistent with prior research findings (e.g. Graham *et al.*, 2003b:1076; Venter, *et al.*, 2014:14) , the coefficients on BV_{Eexcl} and NI are predicted to be significantly positive. Because BV_{Eexcl} excludes the equity accounted carrying amount of associates and prior research finds that book values of associates are positively associated with market value of equity (Soonawalla, 2006:411), it is predicted that the coefficient on *ASC* should be positive for the first specification. Because possible inferences from prior research are limited, no predictions are made for the coefficient of *ASC* in the second and third specifications.

As prior research suggests that cross-country differences affect the value-relevance of accounting information (Hung, 2001:418), it is predicted that CTRY should be significantly different from zero. No prediction is made regarding the sign of the coefficient. Although limited inferences around the likely influence of time-period and cross-country differences are possible from model **(4),** the detailed impact of time-period and cross-country differences are considered in the analyses of the subsection that follows.

3.2.2. The value-relevance of disclosed fair values of unlisted associates

The second hypothesis is similar to the first, but considers whether or not disclosed fair values of *unlisted* associates subsume their equity carrying amounts. Because it is not a requirement of IAS 28 (IASB, 2003) to disclose fair values for unlisted associates, the subsample to test this hypothesis differs significantly from those of the previous analyses. In order to test the hypothesis, model **(4)** is utilised, except that the book value of equity now excludes the book values of unlisted associates, while that of listed associates are included in the BV_{Eexcl} variable.

Once again the measure of value-relevance is the differences in the variance of the error term (ε), for similar reasons detailed in the earlier discussion of model **(4)**. In order to test the hypothesis and determine if fair value truly represents an alternative measurement base, a comparison between ε of the model specifying *ASC* as the disclosed fair value of the unlisted associate and ε of the model which includes both ASC_{CA} and ASC_{FV} is necessary. A smaller variance in ε in the latter specification would indicate that investors utilise both the equity accounted carrying amount of the unlisted associate and its disclosed fair value in determining market values for the reporting (i.e. the investing) firm. Value-relevance, i.e. a significant coefficient on *ASC* specified as the disclosed fair value of the unlisted associate, is expected from the results of prior research, which finds that non-market based fair values are value-relevant (Barth & Clinch, 1998:220; Song *et al*¸ 2010:1376–1377). However, in contrast to the fair values of listed associates, those of unlisted associates are less verifiable. Therefore, regardless of the results for listed associates, disclosed fair values for unlisted associates will not necessarily subsume the equity accounted carrying amount thereof. In other words, the decrease in verifiability of the disclosed fair value for an unlisted associate may result in the equity accounted carrying amount of the unlisted associate being a more important input to valuation for equity investors than it is for a listed associate.

Similar to the predictions for model **(4)** it is expected that the coefficient on *ASC* should be positive for the first specification, as prior research finds that book values are generally positively associated with market value of equity. Because possible inferences from prior research are limited, no predictions are made for the coefficients of *ASC* in the second and third specifications.

3.2.3. The value-relevance of the disclosed fair values and equity accounted carrying amounts of associates across time and across countries

The third and fourth hypotheses consider whether or not the value-relevance of the equity accounted carrying amounts and disclosed fair values of associates is affected by differing time periods or sample countries. Although the results for the indicator variables of model **(4)** may offer some preliminary insights, they are not conclusive. This is because the results of model **(4)** do not allow for investigation of structural differences between specific time periods or countries. In this subsection an additional research investigation is therefore set out, which allows a more detailed analysis of time period and cross-country differences. To test the second and third hypotheses, model **(4)** is utilised as a starting point, but with the time and country indicator variables omitted, resulting in the following:

$$MV_E = \alpha_0 + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon \qquad \textbf{(5)}$$

As the third and fourth hypotheses are focused simply on the changes in value-relevance of the two alternative measurement bases, *ASC* has only one specification in model **(5)**, namely two independent variables comprising the equity accounted carrying amount of associates and their disclosed fair values. The other variables are as previously defined. As in model **(4)**, all variables except Neg are scaled by the number of shares outstanding, as this minimises the risk of incorrect inferences due to scale effects (Barth & Clinch, 2009:283). Time and firm subscripts are suppressed. Differences in reporting dates are dealt with by including independent variable observations at reporting date of each firm and the market value of equity three months thereafter, ensuring a consistent lag after reporting date for accounting information to become available to investors.

Model **(5)** is run separately per *ASC* specification for each year or country. Although R^2s are reported for each regression, these do not form the basis of the comparison between countries and years, as Gu (2007:1096) shows that comparison of R^2s across time periods and countries may result in incorrect inferences. Therefore, in order to determine whether differences between regressions are the result of particular time-period or cross-country differences, an indicator variable technique is utilised. In this respect, to investigate whether a structural change has occurred between time periods, each sample year is considered together with its previous year in a specification as follows:

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon \qquad \textbf{(6)}$$

Year is an indicator variable set to one if an observation falls in the sample year and zero if it falls in the previous year. The other variables are as specified in model **(5)**. Once again all variables except Year, CTRY and Neg are scaled by number of shares outstanding. Time and firm subscripts are suppressed. Differences in reporting dates are dealt with by including independent variable observations at reporting date of each firm and the market value of equity three months thereafter, ensuring a consistent lag after reporting date for accounting information to become available to investors.

Although very similar to the original model **(4)**, significance on the indicator variable in model **(6)** would indicate a significant difference between only two years, namely the sample year and the previous year. This enables a determination of whether or not significant differences between sample years exist without comparing R^2s and therefore determining whether or not a structural change has taken place. However, significance on the indicator variable cannot necessarily be attributed to changes in the value-relevance of *ASC*, as prior research finds that the value-relevance of book values as a whole have generally been increasing over time (Collins *et al.*, 1997:65). Therefore, in order to compare the significance of differing coefficients on *ASC*, the difference between the coefficient for *ASC* of the sample year and the coefficient for *ASC* of the previous year is assessed for significance. Competing statistical tests are available for this purpose, but only the test proposed by Brame, Paternoster, Mazerolle and Piquero (1998:258) is utilised in this study. This test by Brame *et al.* (1998) extensively models both available statistical tests and show that their proposed test is significantly less likely to incorrectly reject the null hypothesis than the competing test. Based on prior research, suggesting that the value-relevance of accounting numbers changes over time (Collins *et al.*, 1997:65), it is predicted that the coefficients between time periods will differ significantly. However, because the sample period does not overlap with that of prior research and the sample period straddles the global financial crisis starting in 2007, no prediction is made about the direction of the change in coefficients.

Structural changes between countries are considered in a similar manner to structural changes between time periods. Each sample country is considered, within a pooled time-period regression, to one other sample country in turn, utilising the following specification:

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon \qquad \textbf{(7)}$$

CTRY is an indicator variable set to one if an observation falls in the sample country and 0 if it does not. The other variables are as specified in model **(5)**. All variables except Year, CTRY and Neg are scaled by number of shares outstanding. Time and firm subscripts are suppressed. Differences in reporting dates are dealt with by including independent variable observations at reporting date of each firm and the market value of equity three months thereafter, ensuring a consistent lag after reporting date for accounting information to become available to investors.

Although similar to previous models, significance on the indicator variable in model **(7)** would indicate a significant difference when only two countries are being compared. This enables a determination of whether or not significant differences between countries exist without comparing R^2s. However, significance on the indicator variable cannot necessarily be attributed to changes in the value-relevance of *ASC*, as prior research finds that the value-relevance of accounting numbers as a whole differs between countries (Hung, 2001:418). Therefore, in order to compare the significance in different coefficients on *ASC*, the difference between the coefficients on *ASC* for the two countries is assessed for significance. For this purpose the test proposed in Brame *et al.* (1998:258) is utilised once again.

Based on prior research suggesting that the value-relevance of accounting numbers differs between countries (Hung, 2001:418), it is predicted that the coefficients between countries will differ significantly. However, because value-relevance changes will depend on unique differences between sample countries, no prediction is made of the likely sign of the difference in coefficient between countries.

3.2.4. The value-relevance of disclosures of summarised financial information of associates

The final hypothesis considers the value-relevance of the disclosed summarised financial information of associates. Importantly, in contrast to prior research, the model in this study controls for information content already captured by disclosed fair values. The model utilised to investigate the value-relevance of summarised financial information is specified as follows:

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 ASC_{CA} + \beta_3 ASC_{FV} + \beta_4 DISCL + \beta_5 NI + \beta_6 Neg + \varepsilon \quad \textbf{(8)}$$

Where:

ASC_{BV} represents the equity accounted carrying amount of the associate;

ASC_{FV} represents the disclosed fair value of the associate; and

DISCL represents one element of the summarised financial information being assessed for value-relevance. As such DISCL alternatively represents the total revenue, total profit or loss, total assets or total liabilities of the associate. In a final specification, DISCL is subdivided to include all of the different items of disclosed summarised financial statement information of the associate.

The other variables are the same as specified for model **(4)**. All variables except Year, CTRY and Neg are scaled by number of shares outstanding. Time and firm subscripts are suppressed.

The variable of interest in the various specifications is DISCL, where significance indicates the value-relevance of a specific item of summarised financial information. Significance on this variable indicates whether or not a summarised item of financial information is value-relevant. However, this does not indicate whether or not disclosed fair values of the associate subsume the summarised financial information disclosed. Differences in reporting dates are dealt with by including independent variable observations at reporting date of each firm and the market value of equity three months thereafter, ensuring a consistent lag after reporting date for accounting information to become available to investors.

In order to investigate this, the error term (ε) is important. A base model is firstly specified, which is model **(8)** with DISCL omitted. Thereafter, the variance in ε when model **(8)** includes each specification of DISCL is compared with the variance in ε in the base model. A significant reduction of the variance in ε indicates a significant reduction in measurement error, i.e. an increase in relevance and faithful presentation from that of the base model. This would imply that the summarised financial statement information is not wholly captured by the disclosed fair value of the associate. Because this may merely reflect that all the summarised financial statement information is necessary for investors to determine a fair value for the investment in the associate, a specification where all the summarised financial information is included in the regression is also performed. A reduction in the variance of ε compared to any of the previous specifications, including the base model, would indicate that the summarised financial information provides incremental information to that included in the previous specification. In other words, this would imply that investors utilise the summarised financial information of the associate to determine a fair value for the firm's investment that is not equal to the disclosed fair value. Similar to model **(4)**, differences in R^2s are not considered, as Gu (2007:1096) shows that comparisons of R^2s are generally inappropriate.

Based on prior research relating to disclosures of total liabilities of equity accounted investees, which found a negative relationship between total liabilities and the market value of the firm (O'Hanlon & Taylor, 2007:284; Richardson *et al.*, 2012:390), it is predicted that the coefficient on DISCL will be negative when specified as total disclosed liabilities of the associate. However, as prior research has not investigated other summarised financial information disclosures, no prediction is made regarding the sign of these coefficients.

3.3. Summary and conclusion

This chapter described the research methodology of the study. The research models are based on prior value-relevance research models. The results of the models are generally assessed with reference to the significance of changes in the error term and the significance of coefficients. While the models are similar, each hypothesis is tested by a model tailored to the testing of that hypothesis. However, although most of the hypotheses have been formulated for investments in associates in general, each is investigated with reference to two distinct subsamples, namely listed and unlisted associates. As a result of the differentiated models and subsamples, the empirical results for the hypotheses are necessarily repetitive in nature. This is because the finer nuances of the models required for the different hypotheses as well as the fundamental differences between listed and unlisted associates require separate discussion of the empirical findings. Chapter 4 discusses sample selection and specifically the composition of the sample firm-years in greater detail.

4. SAMPLE SELECTION

4.1. Introduction

In this chapter the sample firms and sample period for this study are discussed. It focuses firstly on the number and nature of the selected sample firms, as well as the reasoning behind the selection. In addition, this chapter discusses the sources of the data obtained and details the resulting sample numbers.

4.2. Sample firms and sample period selected

The sample firms consisted of the 250 largest firms, based on market capitalisation determined as at 31 December 2011, listed on the main boards of the Johannesburg Stock Exchange (JSE) in South Africa, the Australian Securities Exchange (ASX) in Australia and the London Stock Exchange (LSE) in the United Kingdom. The sample countries were selected for several reasons.

Firstly, all three countries have adopted IFRS as their accounting standards. Secondly, these three countries all have stock market capitalisations within the top twenty in the world (WFE, 2014), which ensures a greater similarity of market efficiency than if smaller stock markets were used. Thirdly, Ball *et al.* (2003:259) show that the common or code law characteristics of a country are a significant determinant of cross-country variation in the application of accounting standards. Importantly, however, Ball *et al.* (2003: 259) also find that the cultural incentives of countries have a greater impact on the property of earnings than their code or common law classifications. This means that other potential candidate countries with stock markets in the top twenty in the world, such as Singapore and Hong Kong, have significantly different characteristics to the sample countries selected. The three sample countries (South Africa, the United Kingdom and Australia) have similar legal, professional and regulatory frameworks due to a shared colonial heritage, a portion of cross-country differences could be mitigated. This is important, as any remaining differences between countries in this study are therefore likely to reflect factors other than cultural and legal differences, such as the efficiency of markets and regulations.

The initial sample was reduced to include only those companies with investments in associates in any sample financial year ending within the sample period of 31 December 2005 to 31 December 2011. This sample period was selected as the version of IAS 28 (IASB, 2003) utilised in this study only became effective for financial years starting on or after 1 January 2005, ensuring a consistent accounting standard throughout the sample period. Furthermore, comparison between the sample countries was facilitated by the fact that IFRS were adopted in 2005 in each of the sample countries.

Sample firms initially included firms across all industries. Because of the special characteristics of insurance, financial, mining and utility firms and therefore their unique valuation constructs, the regression results were also assessed in subsequent robustness tests where these firms had been excluded from the sample. Similarly, sample firms initially included loss firms. As loss firms are priced differently from other firms, the models discussed in the previous chapter include an indicator variable to compensate. However, subsequent robustness tests, where these firms were excluded from the sample, were also performed. Outliers were dealt with by deleting observations with residuals more than 2,5 standard deviations above or below the mean.

4.3. Sources of the sample data obtained

Price data and financial statement data for this study were obtained from Datastream, where available, and converted to South African rand (ZAR). Financial statement data was used as per the published financial statements and no attempt was made to compensate for differences in the application of accounting requirements between the different sample countries, as these differences were also the subject of certain investigations of this study. Required data items not available on the database, such as disclosed fair values and summarised financial information, were hand-collected from published financial statements where possible. Should a sample firm neglect to disclose the fair value of a listed associate in its financial statements, the fair value of its stake was determined from publicly available information. Similarly, for listed associates, summarised financial information was obtained from publicly available information such as the latest annual report of the associate of the same or earlier date than that of the investor's annual report to ensure that investors would have had access to the information utilised in this study. The resultant sample numbers are discussed within the subsection that follows.

4.4. Sample numbers

The sample numbers were affected by a number of factors. Firstly, the sample firms were selected as at the end of the sample period. The result is that sample firms were not necessarily included in the 250 largest firms of each market throughout the sample period. This means that sample firms are more diverse, but also that some sample firms were not listed for the whole of the sample period. As a result some sample firm-years were lost as sample firms had to be listed for the whole of each year to be included in the study. However, this selection methodology has the advantage of somewhat mitigating survivorship bias; firms were selected at the end of the sample period, which means that they only needed to exist for one full financial year to be included in the sample.

Another implication of this requirement is that some firm-years were lost where the firm had undergone significant changes during the sample period, specifically where the firm was acquired by or merged with its associate towards the end of the sample period. In these cases, firms were only included in the sample subsequent to the acquisition or merger. A similar approach was followed where the selected sample firm was the result of a major merger of listed firms, resulting in a new combined entity. Because the earlier available data cannot be related to the combined entity, comparable firm-years preceding such a merger cannot be identified. However, when a firm merely obtained control of its associate during the sample period, so that it became a subsidiary, preceding firm-years have been included in the sample. A similar approach was followed where a firm lost control of a subsidiary during the sample period, so that it became an associate. In contrast to the situation discussed earlier, there is a clear acquirer in these transactions and comparable firm-years preceding the transaction can be identified.

In addition, a large number of firms provide inadequate disclosure about their investments in associates in their financial statements and were therefore excluded from the final sample, where this information could not be rectified with reference to other publicly available information. Examples of such inadequate disclosure included firms that did not distinguish the equity accounted carrying amounts of associates and joint ventures or did not disclose the fair value of investments in unlisted associates. Another example of inadequate disclosure is where firms did not disclose summarised financial information of unlisted associates per associate or only disclosed the firm's share of the associates' financial information without distinguishing between associates.

A reconciliation of the potential firm-years and the final number of firm-years available for this study is provided in Table 1. The main reason for the significantly higher numbers obtained from the South African firms, is a higher number of firm-years where fair values and summarised financial information on a hundred per cent basis were disclosed for unlisted associates. When firm-years for listed associates are compared at the end of Table 1, the resultant firm-years are much more similar across the sample countries. It is important to note that the firm-years in Table 1 are therefore not necessarily available to be used for each investigation and that sample firm-years will consequently differ for each investigation conducted within this study.

Table 1: Reconciliation of sample firm-years

	South Africa	Australia	United Kingdom	Total
Number of firm-years listed for full year	1 328	1 354	1 472	4 154
No investment in associate	(650)	(881)	(800)	(2 331)
Investments in associates carried at fair value	(15)	(10)	(2)	(27)
Incomplete disclosure in the financial statements	(154)	(206)	(362)	(722)
Financial statements not available	–	(6)	(30)	(36)
Other	(35)	–	(5)	(40)
Sample firm-years for the study	474	251	273	998
Sample firms for the study	119	69	77	265
Sample firm-years for listed associates:				
Number of firm-years with listed associates	90	84	79	253
Number of firms with listed associates	24	29	22	75

4.5. Summary and conclusion

This chapter describes the sample period as 31 December 2005 to 31 December 2011 and the sample firms as the 250 largest firms by market capitalisation listed on the Johannesburg Stock Exchange, Australian Stock Exchange and the London Stock Exchange determined as at 31 December 2011. The final sample for the first hypothesis in this study is noted as 253 firm-years, although firm-years may differ between analyses due to varying requirements. The chapters that follow include descriptive statistics, detailed findings and robustness tests for each of the research models.

5. DETAILED FINDINGS: FAIR VALUES OF LISTED ASSOCIATES

5.1. Introduction

The first hypothesis of this study (in null form) is that the disclosed fair values of listed associates do not subsume their equity accounted carrying amounts. In the discussions which follow, the detailed results of the tests investigating this hypothesis are set out. Results in this chapter are based on pooled findings across sample countries and sample periods (i.e. sample countries and periods are not separately assessed), as differences between sample countries and changes across time are investigated in greater detail in later chapters. The discussions in the rest of the chapter are divided into the following main areas: descriptive statistics, findings from univariate correlations and findings from the multivariate regression model. These analyses are followed by results of various robustness tests performed and a summary and conclusion of the chapter.

5.2. Descriptive statistics

Descriptive statistics for sample firm-years with listed associates are detailed in Table 2. Sample firm-years where the equity accounted carrying amounts and disclosed fair values of listed associates are equal are excluded from sample firm-years for the descriptive statistics and most of the subsequent analyses, as such a situation renders the two alternative measurement bases indistinguishable. Amounts for all sample firm-years are converted to ZAR for comparative purposes. Table 2 shows that sample firms are generally large, with a mean market value of ZAR 147 186 million during the sample period, although the data is skewed, with a median market value for sample firm-years of ZAR 39 678 million. A similar situation applies to the book value of equity (excluding the equity accounted carrying amounts of listed associates for the purposes of this chapter) which has a mean of ZAR 63 736 million and a median of ZAR 22 074 million. Although net income from continuing operations appears to be significantly less skewed with a mean of ZAR 9 662 million and a median of ZAR 2 730 million, the summary statistics hide extremes in the dataset. Of the 253 sample firm-years, 32 represent a firm-year with a net loss from continuing operations. As a result, the variable ranges from a sample firm-year net loss from continuing operations of ZAR 8 065 million to a sample firm-year net income from continuing operations of ZAR 135 561 million.

Table 2: Descriptive statistics for sample firm-years with listed associates

	N	**Mean ZAR million**	**Median ZAR million**	**Standard Deviation ZAR million**	**Minimum ZAR million**	**Maximum ZAR million**
MV_E	253	147 186	39 678	265 346	288	1 590 911
BV_{Eexcl}	253	63 736	22 074	155 245	–31 585	1 141 598
NI	253	9 662	2 730	19 389	–8 065	135 561
ASC_{CA}	253	6 103	816	17 012	0	135 918
ASC_{FV}	253	13 356	1 017	38 079	3	267 401

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

Of greater interest perhaps is that sample firm-years show mean equity accounted carrying amounts for listed associates of ZAR 6 103 million (median of ZAR 816 million), which differ by more than 200% (20%) from the mean (median) disclosed fair values of these associates of ZAR 13 356 million (ZAR 1 017 million). Both the equity accounted carrying amounts and disclosed fair values of listed associates exhibit skew, as evident from the difference between the means and medians of these variables. Without further analysis, the equity accounted carrying amounts and disclosed fair values of listed associates do not appear to be significant in absolute terms for all sample firm-years, as the minimum for both these variables is comparatively close to zero.

A large part of the skew in the initial data, especially on the book value of equity, can be ascribed to the inclusion of financial services firms in the sample. As Table 3 shows, removing 58 sample firm-years relating to firms operating in the financial services industry significantly reduces the difference between the mean (ZAR 38 004 million) and median (ZAR 21 403 million) of this variable. Interestingly, given the sample period of 31 December 2005 to 31 December 2011, removing firms operating in the financial services industry did not significantly impact on the number of sample firm-years with a net loss from continuing operations; only two firm-years were removed, leaving 30 firm-years with a net loss from continuing operations included in the 195 sample firm-years in Table 3. Despite this, the sample firm-year with the largest net income from continuing operations is much lower at ZAR 82 448 million, suggesting that firms operating in the financial services industry are responsible for a large part of the skew in this variable.

Table 3: Descriptive statistics for sample firm-years with listed associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	195	121 727	38 403	197 533	288	1 138 463
BV_{Eexcl}	195	38 004	21 403	51 564	–31 585	316 545
NI	195	7 432	1 975	14 145	–8 065	82 448
ASC_{CA}	195	3 676	748	8 011	0	44 893
ASC_{FV}	195	8 814	932	23 697	3	138 075

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

Table 3 also shows that, without further analysis, removing firms operating in the financial services industry does not appear to have a significant impact on the equity accounted carrying amounts and disclosed fair values of listed associates. Mean (median) equity accounted carrying amounts of listed associates of ZAR 3 676 million (ZAR 748 million) still reflect differences to disclosed fair values of more than 200% (20%) from the mean (median) disclosed fair values of these associates of ZAR 8 814 million (ZAR 932 million), which differences are similar to those of the total sample.

Elements identified in the descriptive statistics with potential consequences for analyses are addressed in several ways. Skew is dealt with by deleting observations with residuals more than 2,5 standard deviations above or below the mean. The impact of financial services firms on the skew of different variables is addressed during robustness tests, where these firms are excluded from sample firm-years. Similarly, the potential impact on results of including sample firm-years with a net loss from continuing operations is assessed with reference to a robustness test which excludes these sample firm-years.

In the sections which follow, the detailed findings from analysing the sample firm-years are discussed. The next section discusses univariate investigations, followed by multivariate analyses and lastly robustness tests.

5.3. Univariate investigations

The results of univariate investigations are tabulated in Table 4 with Pearson (Spearman) correlations above (below) the diagonal. Significant univariate correlation between the dependent variable and all independent variables at the one per cent level (using two-tailed significance) is evident from Table 4. The fact that this is true for both Pearson and Spearman correlations, suggests that the relationship between the dependent variable and each of the independent variables is linear. Furthermore, the univariate relationships are consistent with prior research findings for the book value equity and net income (Collins *et al.*, 1997). Positive correlations between the dependent variable with the equity accounted carrying amounts and disclosed fair values of listed associates are also in line with prior research findings (Graham *et al.*, 2003b).

Importantly, the equity accounted carrying amounts and the disclosed fair values of listed associates are also significantly correlated at the one per cent level (using two-tailed significance) with a Pearson (Spearman) correlation of 0,573 (0,946). This suggests that the fair value of a listed associate is to a large extent dependent on its equity accounted carrying amount, where the carrying amount essentially represents its net asset value (book value of equity). As a result, the univariate results could imply that there is significant duplication between the equity accounted carrying amounts and fair values of listed associates. However, these are merely suggestive and the conclusions for the first hypothesis are based on the results of the multivariate analyses discussed in the section which follows.

Table 4: Univariate correlations for sample firm-years with listed associates

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}
MV_E		***0,663 (<0,001)	***0,736 (<0,001)	**0,156 (0,013)	***0,281 (<0,001)
BV_{Eexcl}	***0,823 (<0,001)		***0,643 (<0,001)	**0,134 (0,033)	**0,140 (0,026)
NI	***0,779 (<0,001)	***0,686 (<0,001)		***0,344 (<0,001)	***0,279 (<0,001)
ASC_{CA}	***0,491 (<0,001)	***0,433 (<0,001)	***0,483 (<0,001)		***0,573 (<0,001)
ASC_{FV}	***0,556 (<0,001)	***0,445 (<0,001)	***0,573 (<0,001)	***0,946 (<0,001)	
N	253				

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

5.4. Detailed multivariate regression findings

The sample firm-years for the first hypothesis represent a time series and preliminary investigations based on Durbin–Watson statistics reveal that serial correlation (autocorrelation) potentially poses significant problems for certain of the models. Therefore, the reported multivariate regression findings for listed associates in this chapter are autoregression results from maximum likelihood estimation[6]. The results of the main multivariate regression findings are detailed in Table 5, where the only difference between the various models relates to the specification of the independent variable, *ASC*. In Model 1 of Table 5, *ASC* represents the equity accounted carrying amounts of listed associates; in Model 2, *ASC* represents the disclosed fair values of listed associates and in Model 3, both the equity accounted carrying amounts as well as the disclosed fair values of listed associates are included.

As Table 5 shows, book value of equity and net income from continuing operations are significant in all specifications at the one per cent level ($p < 0{,}001$) and positive as predicted. The indicator variable for firm-years where a loss was suffered (Neg) is also significant in all of the specifications at the one per cent level ($p < 0{,}001$), confirming that investors price loss-firms differently from other firms. The year indicator variables, with the exception of 2008 (which is significant at the ten per cent level or better in all specifications) are generally insignificant. This suggests that the financial crisis which started in February 2007 (Ryan, 2008:1606) and consequently affected the financial results of companies in the subsequent year, had a significant effect on the overall value-relevance of the model. Interestingly, although the other year indicator variables all tend to be insignificant, there is a clear change in the sign of the coefficient of these variables from 2008 onwards. Prior to 2008 the coefficients are all positive, changing to a negative sign thereafter. Although these are suggestive of structural differences between the period before and after 2008, only limited inferences are possible from the pooled regression. Changes in value-relevance over time are investigated more deeply in Chapter 7 of this study. Neither of the country indicator variables is significant in any of the specifications. However, the difference in sign of the variables in different specifications of the model does raise an interesting question about potential

[6] Autoregression with maximum likelihood estimation corrects for serial correlation and, as an added advantage, tends to be less sensitive to the impact of outliers, skewness and heteroskedasticity than ordinary least squares as it is a nonparametric estimation method.

differences between the base country, namely South Africa, and each of the other sample countries, namely the United Kingdom and Australia. As only limited inferences are possible from the pooled regression, differences in value-relevance across countries are investigated more thoroughly in Chapter 9 of this study.

Turning to the variable of interest, although the equity accounted carrying amounts of listed associates are negatively associated with market value of equity in Model 1 (prior research findings predict that it should be positive) it is not significantly so ($p = 0{,}241$). However, the equity accounted carrying amounts of listed associates are negative (–1,661) and significant at the one per cent level ($p < 0{,}001$), once the disclosed fair values of listed associates are also included in the model (Model 3). In contrast to this, the disclosed fair values of listed associates are positive and significantly associated with market value of equity at the one per cent level in all specifications where they are included ($p < 0{,}001$). The fact that the coefficients of both the equity accounted carrying amounts and disclosed fair values of listed associates are significant implies that both are value-relevant. Because the equity accounted carrying amounts of listed associates have the opposite sign to that of their disclosed fair values, there is a preliminary suggestion that investors remove equity accounted carrying amounts and replace them with disclosed fair values when analysing financial statements.

However, in order to truly determine whether the alternative measurement bases have incremental information content, this study relies on investigating the variance in the error terms (ε). Gu (2007:1074) shows that it is the dispersion of the error terms which determines the superiority of one model specification over another and not differences in R^2s. The tests utilised to compare the potential measurement bases for listed associates therefore focus on the variance (dispersion) in the error terms.

Table 5: Regression findings for listed associates

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3
2006	+ / –	30,131 (0,120)	27,685 (0,132)	*31,033 (0,080)
2007	+ / –	2,734 (0,887)	0,499 (0,978)	2,106 (0,904)
2008	+ / –	*–33,376 (0,085)	**–37,247 (0,042)	*–29,074 (0,100)
2009	+ / –	–6,163 (0,745)	–12,864 (0,472)	–5,499 (0,750)
2010	+ / –	–1,204 (0,949)	–7,250 (0,683)	–2,868 (0,867)
2011	+ / –	–5,848 (0,756)	–13,801 (0,437)	–8,494 (0,620)
UK	+ / –	–6,792 (0,389)	1,398 (0,850)	2,353 (0,737)
Aus	+ / –	–6,067 (0,432)	1,956 (0,788)	1,913 (0,780)
BV_{Eexcl}	+	***0,717 ($<$0,001)	***0,781 ($<$0,001)	***0,696 ($<$0,001)
NI	+	***10,273 ($<$0,001)	***8,600 ($<$0,001)	***9,719 ($<$0,001)
Neg	+ / –	***44,431 ($<$0,001)	***40,116 ($<$0,001)	***42,408 ($<$0,001)
ASC_{CA}	+ / –	–0,369 (0,241)		***–1,661 ($<$0,001)
ASC_{FV}	+ / –		***0,613 ($<$0,001)	***0,895 ($<$0,001)
N		245	245	245
Structural R^2		74,1%	77,5%	79,9%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

The first of these is the Vuong test, which is appropriate for the comparison of non-nested models (Vuong, 1989). In this study the Vuong test is based on the unstandardised residuals from the structural portion of the maximum likelihood regression. The Vuong test focuses on the variance in the error terms (Gu, 2007:1077) and is often utilised in value-relevance research when alternative accounting specifications are considered (Dechow, 1994:23; Ashbough & Olsson, 2002:116; Pouraghajan, Emamgholipour, Niazi & Samakosh, 2012:45). Note that the Vuong test is directional. If the test statistic is significantly positive, the first model is superior to the second model; conversely, if the test statistic is significantly negative, the second model is superior to the first model.

In addition to the Vuong test, a test is performed which considers variance in the error term with reference to unstandardised residuals from the structural portion of the maximum likelihood regression (the dispersion test). The dispersion test simply compares the variance of the residuals of differing models using a paired sample ANOVA. Although the simplistic nature of this test, unlike the Vuong test, does not compensate for the automatic impact of increasing the number of independent variables on the error term, it should be noted that the three models differ by one independent variable at most. As a result, the results of the dispersion test tend to be qualitatively similar to those of the Vuong test in this study[7]. Therefore, in the interest of brevity, the subsequent discussions focus on the results of the Vuong test. Both of these tests are in fact appropriate for the comparison of model specifications as they ignore the impact of dispersion in the independent variables, which is the reason why R^2s should not be compared across models (Gu, 2007:1076). The results of the comparisons of the different models are tabulated in Table 6.

[7] The dispersion test, due to its simplistic nature, is easy to understand and has therefore been reported, but it should be noted that this test could be inappropriate where competing models differ by a greater number of independent variables.

Table 6: Comparison of the regression findings for listed associates

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	245	2 106		
Model 2	245	1 825	–1,237 (0,217)	–1,258 (0,210)
Model 3	245	1 633	*–1,650 (0,100)	*–1,673 (0,096)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	245	2 106		
Model 3	245	1 633	**–2,226 (0,027)	**–2,305 (0,022)

Model 1 — *ASC* represents the equity accounted carrying amounts of the listed associates
Model 2 — *ASC* represents the disclosed fair values of the listed associates
Model 3 — *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level
(p-values for 2-tailed significance are indicated within brackets)

Although the variance in the error term decreases between each successive model, the Vuong test reveals in Panel A of Table 6 that the variance does not decrease significantly (p = 0,210) when specifying *ASC* to be the disclosed fair value of the listed associate (Model 2), rather than the carrying amount thereof (Model 1). Importantly, the variance in the error term does show a decrease significant at the ten per cent level (p = 0,096) when both the equity accounted carrying amounts of listed associates and their disclosed fair values are included in the model (Model 3), as opposed to the disclosed fair values alone (Model 2). Significantly, the disclosed fair values of listed associates appear to be more important, given that in Panel B of Table 6 the decrease in variance of the error term is significant at the five per cent level (p = 0,022) when the disclosed fair value is added to a model (Model 3) where only the equity accounted carrying amounts of listed associates had previously been included (Model 1). Taken together, these findings suggest that equity accounted carrying amounts and disclosed fair values of listed associates are incrementally value-relevant. By implication, this means that investors do not blindly accept disclosed fair values of listed associates. Rather, investors utilise disclosed fair values as well as equity accounted carrying amounts (or information captured from them) to develop their own assessment of the intrinsic value of an entity’s investments in listed associates. As a result, equity accounted carrying amounts of listed associates are not subsumed by disclosed fair values and it is concluded that each of the alternative measurement bases offer incremental information content.

When potential multi-collinearity is considered, reported VIF (variable inflation) scores are all far below ten. Although maximum likelihood regression is generally robust to heteroskedasticity, a graphical analysis of the residuals reflects that residuals are not heteroskedastic and do not exhibit significant skew, being approximately normally distributed. The maximum likelihood regression effectively corrects for serial correlation with all Durbin–Watson test statistics close to two and above the upper critical value.

In summary, this section details the main multivariate regression results, which are that both the equity accounted carrying amounts of listed associates and their disclosed fair values are value-relevant and offer incremental information content. Therefore it appears that investors utilise both equity accounted carrying amounts (or information captured thereby) and disclosed fair values of listed associates to develop their own assessment of the intrinsic value of an entity’s investments in its listed associates, rather than merely accepting the information in the financial statements. In the section which follows, the main findings are assessed for robustness, by considering various alternative sample selection methods and model specifications.

5.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion.

5.5.1. Using market value of equity at reporting date

The main multivariate regression results utilise market value of equity three months after reporting date as the dependent variable, as this allows for the dissemination of financial reporting information to equity markets. However, prior research (Ball & Brown, 1968) shows that the greater part of the information content of financial reports is already incorporated into the market value of equity at reporting date. As the fair value of investments in listed associates is generally available to market participants on an ongoing basis, it is not inconceivable that the information conveyed by disclosed fair values of these associates may already be incorporated into the market value of equity by reporting date. Therefore, the regression is also run using the market value of equity at reporting date as the dependent variable. The independent variables continue to be specified as at reporting date.

The results of this specification are reported in Table 7. Consistent with the main regression results, the year indicator variables, with the exception of 2008 (which is significant at the five per cent level or better in all specifications), tend to be insignificant. However, when market value at reporting date is the dependent variable, all year indicator variables are now negative and there is no longer a sign difference in the coefficients of years preceding 2008 and those thereafter. This emphasises that specific and more detailed investigations of potential differences across time are justified (refer to Chapter 7). When cross-country differences are considered, the signs of the coefficients of the Australian indicator variable continue to differ substantially across model specifications. That of the United Kingdom is now significant in the first specification at the ten per cent level (p = 0,083). However, limited inferences are possible from the pooled model and cross-country differences are investigated in greater detail in Chapter 9. The coefficients on the other control variables, namely book value of equity and net income from continuing operations, continue to be positive and significant at the one per cent level (p < 0,001) in all specifications of the model.

When the variable of interest, namely *ASC*, is considered, the results are consistent overall with those reported earlier. Where *ASC* is specified to be the equity accounted carrying amounts of listed associates (Model 1) it is once again negatively associated with the market value of equity (–0,747), but the coefficient is now significant at the one per cent level (p = 0,009). Specifying *ASC* to be the disclosed fair values of associates (Model 2) results in a significantly positive association with the market value of equity (0,524) at the one per cent level (p < 0,001). If the equity accounted carrying amounts and disclosed fair values of listed associates are both included (Model 3) the results are qualitatively unchanged from the main regression findings. The equity accounted carrying amounts of listed associates remain negatively associated with market value of equity (–1,919) at the one per cent level of significance (p < 0,001) and their disclosed fair values are still positively associated with market value of equity (0,836) at the one per cent level of significance (p < 0,001). Consequently, both the equity accounted carrying amounts and the disclosed fair values of listed associates continue to be value-relevant when the market value at reporting date is used as the dependent variable.

Table 7: Regression findings for listed associates with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted sign	**Model 1**	**Model 2**	**Model 3**
2006	+ / –	–7,517	–13,294	–7,732
		(0,682)	(0,398)	(0,607)
2007	+ / –	–15.,610	–20,850	–16,872
		(0,393)	(0,182)	(0,259)
2008	+ / –	**–41,731	***–49,954	**–38,629
		(0,023)	(0,002)	(0,011)
2009	+ / –	–26,941	**–37,189	*–26,884
		(0,134)	(0,016)	(0,069)
2010	+ / –	–20,428	*–28,989	–22,210
		(0,251)	(0,057)	(0,128)
2011	+ / –	–28,781	**–39,294	**–30,991
		(0,108)	(0,010)	(0,035)
UK	+ / –	*–12,475	–2,937	–1,933
		(0,083)	(0,668)	(0,760)
Aus	+ / –	–3,542	4,326	4,227
		(0,609)	(0,524)	(0,498)
BV_{Eexcl}	+	***0,698	***0,774	***0,667
		(<0,001)	(<0,001)	(<0,001)
NI	+	***10,480	***8,704	***10,121
		(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	***35,969	***31,535	***34,741
		(<0,001)	(0,001)	(<0,001)
ASC_{CA}	+ / –	***–0,747		***–1,919
		(0,009)		(<0,001)
ASC_{FV}	+ / –		***0,524	***0,836
			(<0,001)	(<0,001)
N		244	244	244
Structural R^2		76,7%	79,4%	82,5%

MV_E	Market value of equity at reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 8: Comparison of the regression findings for listed associates with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	244	1 764		
Model 2	244	1 586	–0,710 (0,478)	–0,719 (0,473)
Model 3	244	1 335	**–1,991 (0,048)	**–2,130 (0,034)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	244	1 764		
Model 3	244	1 335	*–1,810 (0,072)	*–1,910 (0,057)

Model 1 *ASC* represents the equity accounted carrying amounts of the listed associates

Model 2 *ASC* represents the disclosed fair values of the listed associates

Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level

As detailed in Table 8, when the variance in error terms (ε) of the various models is compared, results are qualitatively unchanged from those reported earlier. The variance in the error term is not significantly reduced when the disclosed fair values of listed associates (Model 2) are included rather than the equity accounted carrying amounts thereof (p = 0,473). However, when both the equity accounted carrying amounts and disclosed fair values of listed associates are included (Model 3) the variance in the error term is significantly lower at the five per cent level (p = 0,034) compared to including only the disclosed fair value (Model 2). Similarly, a decrease in the variance of the error term is detected when the alternative of including both the equity accounted carrying amounts and disclosed fair values of listed associates (Model 3) is compared to the alternative of including only the equity accounted carrying amounts (Model 1) and this decrease is significant at the ten per cent level ($p = 0{,}057$). Once again both the equity accounted carrying amounts and the disclosed fair values of listed associates appear to be incrementally value-relevant, implying that investors consider both when determining the value of an entity's investment in its associates.

In summary, specifying the dependent variable to be the market value of equity at reporting date, rather than three months thereafter, does not impact on inferences. Although some minor differences are noted, the main inference that the equity accounted carrying amounts and the disclosed fair values of listed associates are incrementally value-relevant remains.

5.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. Certainly, given that this indicator variable is significant in all of the previous regression specifications, it appears that firm-years with a loss from continuing operations are significantly different from other firm-years. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the significant skew induced by financial services firms in the sample and therefore an analysis excluding these firms appears warranted. Mining firms are excluded in a robustness test as findings by Barth and Clinch (1998:218) suggest that their investments in associates are priced differently from those of firms operating in other industries. Utility firms are excluded from the sample for a robustness test due to the impact that their heavy regulatory burden might have on reported results. Results of various regression models, after making the aforementioned adjustments in turn, are tabulated from Table 9 onwards.

Table 9: Regression findings for listed associates when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted sign	Model 1	Model 2	Model 3
2006	+ / –	24,988 (0,135)	21,330 (0,165)	*25,416 (0,063)
2007	+ / –	11,518 (0,485)	8,106 (0,593)	10,705 (0,428)
2008	+ / –	–24,599 (0,142)	*–28,189 (0,068)	–19,239 (0,161)
2009	+ / –	3,846 (0,816)	–3,123 (0,837)	5,370 (0,692)
2010	+ / –	9,308 (0,566)	2,780 (0,852)	7,619 (0,566)
2011	+ / –	2,104 (0,896)	–6,308 (0,671)	–0,479 (0,971)
UK	+ / –	–1,263 (0,865)	6,483 (0,377)	7,403 (0,235)
Aus	+ / –	3,600 (0,636)	*13,898 (0,065)	**12,698 (0,047)
BV_{Eexcl}	+	***0,407 (<0,001)	***0,309 (0,004)	***0,359 (<0,001)
NI	+	***12,907 (<0,001)	***11,247 (<0,001)	***12,510 (<0,001)
ASC_{CA}	+ / –	***–1,264 (<0,001)		***–2,522 (<0,001)
ASC_{FV}	+ / –		***0,493 (<0,001)	***0,897 (<0,001)
N		213	213	213
Structural R^2		79,9%	81,4%	86,3%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 9 reflects the results from the regression model when only those firms-years with a loss from continuing operations are eliminated from the sample. Interestingly cross-country differences appear to have much more significance once loss-making firm-years are eliminated with the Australian indicator variable being significant at the ten per cent level or better in two of the model specifications. However, limited inferences can be made on the basis of the indicator variables and potential cross-country differences are investigated further in Chapter 9. In contrast to this, the year indicator variables are now all inclined to be insignificant, which suggests that differences across time may only be applicable to loss-making firms. However, limited inferences are possible from the pooled regression and changes in value-relevance over time are investigated in greater depth in Chapter 7.

The results for the other control variables are generally unchanged from the main regression, with book value of equity and net income from continuing operations both significant at the one per cent level and positively related to market value of equity as predicted. More importantly, although the equity accounted carrying amounts of listed associates remain negative in all specifications where they are included, they are now also significantly associated with market value of equity in all of these at the one per cent level of significance ($p < 0{,}001$). This implies that the sign of the coefficient in the main regression is not due to the inclusion of firm-years with a loss from continuing operations. Furthermore, the positive sign and significance of the disclosed fair values of listed associates are similar to those of the main regression ($p < 0{,}001$).

Despite the minor differences noted above, Table 10 shows that the inferences relating to the variance in error terms (ε) of the various models remain similar. As detailed in Panel A of Table 10, the variance in the error term does not decrease significantly when the equity accounted carrying amounts of listed associates in Model 1 are replaced with their disclosed fair values in Model 2 ($p = 0{,}940$). However, the variance in the error term does decrease significantly compared to Model 2 at the one per cent level in the Vuong test (p = 0,005) and the five per cent level in the dispersion test (p = 0,019) once both the equity accounted carrying amounts and disclosed fair values of listed associates are included in the regression (Model 3). Consequently, when firm-years with a loss from continuing operations are eliminated, results continue to imply that investors utilise both equity accounted carrying amounts and disclosed fair values of listed associates to value a firm's investments in associates. In other words, the alternative measurement bases are incrementally value-relevant and the one does not subsume the other.

Table 10: Comparison of the regression findings for listed associates when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	213	1 755		
Model 2	213	1 731	–0,075 (0,940)	–0,075 (0,940)
Model 3	213	1 208	**–2,360 (0,019)	***–2,820 (0,005)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	213	1 755		
Model 3	213	1 208	**–2,089 (0,038)	**–2,366 (0,019)

Model 1 *ASC* represents the equity accounted carrying amounts of the listed associates
Model 2 *ASC* represents the disclosed fair values of the listed associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

As evident from the preceding discussion, eliminating firm-years with a loss from continuing operations from the sample does not have a significant impact on inferences, with only minor differences noted in comparison with the main regression results. However, the industry in which a firm operates might also have a significant impact on how it is valued by investors. Therefore, in an additional robustness test, firms operating in the financial services, mining and utility industries were eliminated from the sample. Financial services firms are often eliminated in prior research (Graham *et al.*, 2003b:1071), mainly because of their high leverage and the implications this has for their accruals. Mining firms were eliminated from the sample for robustness purposes as Barth and Clinch (1998:218) found that disclosed fair values of associates were value-relevant only for mining and financial services firms included in their sample. Utility industries were eliminated from the sample, as the heavy regulatory burden applicable to these industries may affect inferences.

Table 11 details the results from the regression model when firms operating in the financial services, mining and utility industries have been eliminated from the sample. When considering the indicator variables, the main difference between these results and those of the main regression is that the year indicator variables are generally insignificant. This suggests that differences between the years of the sample period might be due to firms operating in the abovementioned industries. However, limited inferences can be made from the indicator variables and differences across time are investigated more thoroughly in Chapter 7. In contrast to this, limiting the industries of sample firms increases the significance of country indicator variables, specifically those of the United Kingdom, when compared to the main regression results. Differences between countries are investigated in greater depth in Chapter 9. The other control variables remain qualitatively similar to those of the main regression and have the predicted sign in the case of book value of equity and net income from continuing operations.

Table 11: Regression findings for listed associates when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted sign	Model 1	Model 2	Model 3
2006	+ / –	9,823	14,523	9,102
		(0,683)	(0,424)	(0,547)
2007	+ / –	5,871	11,996	6,740
		(0,804)	(0,500)	(0,648)
2008	+ / –	–36,671	–27,184	**–30,547
		(0,125)	(0,131)	(0,042)
2009	+ / –	–23,610	–16,315	–19,975
		(0,327)	(0,369)	(0187)
2010	+ / –	–3,977	–2,632	–7,164
		(0,866)	(0,882)	(0,628)
2011	+ / –	–10,645	–9,128	–12,110
		(0,652)	(0,608)	(0,413)
UK	+ / –	9,075	***26,038	**15,832
		(0,357)	(0,001)	(0,027)
Aus	+ / –	1,069	12,230	9,494
		(0,909)	(0,113)	(0,158)
BV_{Eexcl}	+	***0,568	***0,540	***0,453
		(<0,001)	(<0,001)	(<0,001)
NI	+	***11,741	***9,621	***11,664
		(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	*26,021	19,100	**25,142
		(0,098)	(0,1317)	(0,023)
ASC_{CA}	+ / –	–0,220		***–2,784
		(0,676)		(<0,001)
ASC_{FV}	+ / –		***0,631	***0,946
			(<0,001)	(<0,001)
N		129	129	129
Structural R^2		78,8%	86,4%	90,1%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

As far as the variables of interest are concerned, the coefficient of the equity accounted carrying amounts of listed associates continues to be negative in the first model (–0,220) but insignificant (p = 0,676). More importantly, the coefficient of the equity accounted carrying amounts of listed associates remains significantly negative (–2,784; p < 0,001) once disclosed fair values are included (Model 3), while disclosed fair values are significant (p < 0,001) and positively associated with the market value of equity in all specifications. Therefore, the findings from the main regression that both equity accounted carrying amounts and disclosed fair values of listed associates are value-relevant are not affected by excluding firms operating in the financial services, mining and utility industries from the sample.

The results of comparing the differing specifications are detailed in Table 12. In comparison with the main regression findings, the two tests of the difference in variance in error terms (ε) provide more divergent results. Replacing equity accounted carrying amounts (Model 1) with disclosed fair values of listed associates (Model 2) results in a mildly significant decrease in the variance of the error term (p = 0,110). However, including both the equity accounted carrying amounts and disclosed fair values in the regression (Model 3) significantly decreases the variance in the error term at the ten per cent level (p = 0,069) as per the Vuong test, although mildly significant at best as per the dispersion test (p = 0,121). However, when equity accounted carrying amounts and disclosed fair values of listed associates are both included (Model 3), the variance in the error term is significantly lower at the one per cent level (p = 0,008) per the Vuong test and the five per cent level per the dispersion test (p = 0,050) when compared to a specification where only equity accounted carrying amounts have been included (Model 1). Inferences from this robustness test therefore remain unchanged, namely that equity accounted carrying amounts and disclosed fair values of listed associates are incrementally value-relevant and therefore both are used by investors to develop their own valuations of the intrinsic value of an entity's investments in associates.

Table 12: Comparison of the regression findings for listed associates when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	129	1 423		
Model 2	129	956	–1,399	–1,608
			(0,164)	(0,110)
Model 3	129	734	–1,563	*–1,835
			(0,121)	(0,069)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	129	1 423		
Model 3	129	734	**–1,982	***–2,685
			(0,050)	(0,008)

Model 1	*ASC* represents the equity accounted carrying amounts of the listed associates
Model 2	*ASC* represents the disclosed fair values of the listed associates
Model 3	*ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

The next consideration is whether inferences in the main regression are significantly influenced by a combination of the two factors considered above, i.e. whether firm-years with a net loss from continuing operations combined with firms operating in specific industries may significantly bias results. Therefore, Table 13 reflects regression results where firms in the financial services, mining and utility industries as well as firm-years with a loss from continuing operations have been eliminated from the sample.

The results tabulated in Table 13 are qualitatively similar to those of the main regression and the previous robustness tests of this subsection. Although the year and country indicator variables reflect differing levels of significance compared to the main regression results, these are merely suggestive and are investigated in greater detail in Chapters 7 and 9. The coefficients of the book value of equity and net income from continuing operations variables remain significant in their predicted directions ($p < 0{,}001$). Interestingly, the equity accounted carrying amounts of listed associates are once more negative in all specifications, although not significantly so ($p = 0{,}720$) in the first specification. This confirms the earlier finding that the negative sign of the coefficient in the main regression is not due to the inclusion of firm-years with a loss from continuing operations. Finally, the disclosed fair values of listed associates remain significantly positive at the one per cent level ($p < 0{,}001$) in all of the specifications in which they have been included.

When the variance in error terms (ε) of the various specifications is compared, inferences are unchanged from those of the main regression. Table 14 reflects that the decrease in the variance of the error term is mildly significant ($p = 0{,}107$) when equity accounted carrying amounts of associates (Model 1) are replaced by their disclosed fair values (Model 2). However, the variance in the error term is significantly lower when both are included (Model 3) rather than only one of the two. Compared to Model 2, the decrease in the variance of the error term is significant at the five per cent level ($p = 0{,}056$) per the Vuong test (although the dispersion test is only mildly significant with a p-value of 0,106), while the decrease is significant at the one per cent level ($p = 0{,}008$) per the Vuong test when compared to Model 1 (although the dispersion test is only significant at the five per cent level with a p-value of 0,049). As a result, findings are consistent with those reported earlier, namely that the alternative measurement bases contain incremental information content.

Table 13: Regression findings for listed associates when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted sign	Model 1	Model 2	Model 3
2006	+ / –	10,046	14,780	9,406
		(0,679)	(0,427)	(0,548)
2007	+ / –	6,190	12,398	7,061
		(0,795)	(0,497)	(0,645)
2008	+ / –	–36,214	–26,977	*–29,799
		(0,134)	(0,145)	(0,056)
2009	+ / –	–24,750	–15,349	–19,693
		(0,317)	(0,417)	(0,216)
2010	+ / –	–1,326	0,104	–4,225
		(0,956)	(0,996)	(0,784)
2011	+ / –	–11,808	–10,382	–13,483
		(0,622)	(0,571)	(0,382)
UK	+ / –	9,463	***27,816	**17,343
		(0,365)	(0,001)	(0,020)
Aus	+ / –	0,809	*14,541	*11,833
		(0,936)	(0,079)	(0,010)
BV_{Eexcl}	+	***0,565	***0,533	***0,446
		(<0,001)	(<0,001)	(<0,001)
NI	+	***11,772	***9,704	***11,813
		(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	–0,195		***–2,769
		(0,720)		(<0,001)
ASC_{FV}	+ / –		***0,630	***0,933
			(<0,001)	(<0,001)
N		120	120	120
Structural R^2		78,1%	85,9%	89,7%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 14: Comparison of the regression findings for listed associates when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	120	1 504		
Model 2	120	1 001	–1,405 (0,163)	–1,625 (0,107)
Model 3	120	757	–1,631 (0,106)	*–1,928 (0,056)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	120	1 504		
Model 3	120	757	**–1,993 (0,049)	***–2,719 (0,008)

Model 1 *ASC* represents the equity accounted carrying amounts of the listed associates
Model 2 *ASC* represents the disclosed fair values of the listed associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

In summary, the findings of the main regression are robust to excluding firm-years with losses from continuing operations and those operating in the financial services, mining and utility industries: the equity accounted carrying amounts and disclosed fair values of associates continue to be incrementally value-relevant in all of the robustness tests detailed in this subsection. The robustness tests of the following subsection consider whether the significance of findings are upwardly biased by excluding firm-years where equity accounted carrying amounts and disclosed fair values of listed associates are equal.

5.5.3. Including firm-years where equity accounted carrying amounts and disclosed fair values are equal

Firm-years where the equity accounted carrying amounts and disclosed fair values are equal have been excluded from the sample for the main regression, as the two alternative measurement bases are indistinguishable for these firm-years. Note that these investments in associates are not measured at fair value. The main reasons for the disclosed fair values being equal to the equity accounted carrying amounts are acquisitions of listed associates close to reporting date (investments in associates are initially recognised at fair value) and impairment losses on equity accounted associates (the recoverable amount of an associate is the higher of fair value less costs of disposal and its value in use). Therefore, the results of the main regression may reflect an unfair advantage to disclosed fair values if they are sometimes equal to the equity accounted carrying amounts.

The robustness test in this subsection investigates the impact on inferences resulting from the inclusion of these firm-years in the sample. Results from this robustness test are detailed in Table 15. There are 15 sample firm-years where equity accounted carrying amounts and disclosed fair values are equal, and the number of firm-years in the sample increased to 259 (from 245 in the main regression). The final increase is less than 15 sample firm-years, as observations with residuals more than 2,5 standard deviations above or below the mean have been deleted. The low number of additional firm-years hints that the impact of including or excluding these firm-years is likely to be insignificant.

Table 15: Regression findings for listed associates when firm-years with equal equity accounted carrying amounts and disclosed fair values are included

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted sign	**Model 1**	**Model 2**	**Model 3**
2006	+ / –	30,231	*28,322	*31,302
		(0,101)	(0,085)	(0,061)
2007	+ / –	2,985	1,279	2,501
		(0,869)	(0,937)	(0,879)
2008	+ / –	*–32,161	**–34,770	*–27,940
		(0,078)	(0,032)	(0,091)
2009	+ / –	–7,510	–12,976	–6,794
		(0,673)	(0,413)	(0,674)
2010	+ / –	–2,554	–7,730	–3,773
		(0,886)	(0,625)	(0,815)
2011	+ / –	–6,190	–13,291	–8,423
		(0,727)	(0,401)	(0,601)
UK	+ / –	–5,628	1,161	2,449
		(0,461)	(0,821)	(0,719)
Aus	+ / –	–5,180	1,828	2,115
		(0,466)	(0,783)	(0,738)
BV_{Eexcl}	+	***0,757	***0,808	***0,729
		(<0,001)	(<0,001)	(<0,001)
NI	+	***9,968	***8,371	***9,555
		(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	***40,146	***36,539	***39,743
		(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	–0,272		***–1,587
		(0,378)		(<0,001)
ASC_{FV}	+ / –		***0,625	***0,891
			(<0,001)	(<0,001)
N		259	259	259
Structural R^2		74,8%	78,9%	80,0%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Indeed, in the first specification, the equity accounted carrying amounts of listed associates remain negative (–0,272) and insignificant (p = 0,378). Furthermore, results for the second and third specifications are qualitatively consistent with those of the main regression model. The disclosed fair values of listed associates are positive and significantly associated with the market value of equity at the one per cent level in the second specification (p < 0,001) as well as the third specification. The results of the indicator variables and other control variables are also qualitatively consistent with those of the main regression model.

Table 16: Comparison of the regression findings for listed associates when firm-years with equal equity accounted carrying amounts and disclosed fair values are included

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	**Mean sum of squares of residual**	**Dispersion test (t-statistic)**	**Vuong test (t-statistic)**
Model 1	259	2 031		
Model 2	259	1 752	–1,323 (0,187)	–1,341 (0,181)
Model 3	259	1 582	–1,562 (0,119)	–1,605 (0,110)

Panel B: Comparison of Model 1 and 3

	N	**Mean sum of squares of residual**	**Dispersion test (t-statistic)**	**Vuong test (t-statistic)**
Model 1	259	2 031		
Model 3	259	1582	**–2,263 (0,024)	**–2,357 (0,019)

Model 1	*ASC* represents the equity accounted carrying amounts of the listed associates
Model 2	*ASC* represents the disclosed fair values of the listed associates
Model 3	*ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

** Significant at the 5% level (p-values for 2-tailed significance are indicated within brackets)

When the variances in the error terms (ε) of the various models are considered, Table 16, Panel B, shows that the decrease in variance in the error term remains significant at the five per cent level (p = 0,019) when both the equity accounted carrying amounts of listed associates and their disclosed fair values are included (Model 3) as opposed to including only the equity accounted carrying amounts (Model 1). The decrease in the variance of the error term achieved by including the disclosed fair value of listed associates (Model 2) rather than their equity accounted carrying amounts (Model 1) remains insignificant (p = 0,181). Consequently, the inferences are consistent with those of the main regression model, namely that investors utilise both equity accounted carrying amounts as well as the disclosed fair values of listed associates when they value the reporting firm's investments in associates.

In the subsection which follows, further robustness tests are performed in order to consider potential causes of differences between the findings of this study and prior research.

5.5.4. Comparisons to prior research findings

Generally the findings of this study are consistent with those suggested by prior research. For example, the coefficients of the book value of equity and net income from continuing operations were significant in the directions predicted by prior research. A significant exception is the equity accounted carrying amounts of listed associates. In contrast to prior research, which finds this to be positively associated with market value of equity, in this study the coefficient has been negative in the main regression and all of the robustness tests. Although previous robustness tests have indicated that the negative coefficient is not due to the inclusion of firms with a loss from continuing operations or the inclusion of financial services firms, two other possible explanations for the difference with prior research are considered in this subsection.

As the paper of Graham *et al.* (2003b) also considers the value-relevance of equity accounted carrying amounts and disclosed fair values of listed associates, differences in the sampling methods between the two studies are considered. Graham *et al.* (2003b:1070) limit their sample firm-years to those where the equity accounted carrying amounts of listed associates are more likely to be significant, by selecting only those firm-years where equity accounted carrying amounts represent at least one per cent of total assets. Therefore, to facilitate comparison with prior research, the model is regressed utilising similar sample requirements. As Graham *et al.* (2003b:1071) also exclude financial services firms from their sample, the same requirement is applied to the robustness test[8].

The results from the regression using the above sample requirements are tabulated in Table 17 and continue to reflect a significant negative coefficient (at the one per cent level) on the equity accounted carrying amounts of listed associates in all specifications where they are included ($p < 0{,}001$). Furthermore, consistent with the main regression findings, the coefficient for the disclosed fair values of listed associates remains positively associated with market value of equity in all models in which they are included and significant at the one per cent level. The findings for most of the control variables are consistent with those of the main regression finding, although greater significance on the year indicator variables suggests that differences across time may be more important for this subsample. However, the most important conclusion from this robustness test remains, namely that the negative coefficient on equity accounted carrying amounts is not due to the sample selection method.

[8] Graham *et al.* (2003) do not specify whether they exclude loss firm-years from their sample. However, as previous robustness tests have shown that the negative coefficient for the equity accounted carrying amounts is not due to the presence of loss firm-years, they are retained for the purposes of the current regression.

Table 17: Regression findings for listed associates with equity accounted carrying amounts greater than one per cent of total assets

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted sign	Model 1	Model 2	Model 3
2006	+ / –	**–69,388 (0,028)	**–77,422 (0,020)	**–70,867 (0,011)
2007	+ / –	**–79,122 (0,012)	***–96,093 (0,004)	***–82,950 (0,003)
2008	+ / –	***–124,945 (<0,001)	***–146,051 (<0,001)	***–121,821 (<0,001)
2009	+ / –	***–81,069 (0,009)	***–108,198 (0,001)	***–84,619 (0,002)
2010	+ / –	***–89,443 (0,004)	***–109,931 (0,001)	***–96,233 (<0,001)
2011	+ / –	***–84,041 (0,007)	***–112,165 (0,001)	***–92,539 (0,001)
UK	+ / –	–5,582 (0,664)	–8,366 (0,533)	3,996 (0,717)
Aus	+ / –	0,311 (0,979)	7,869 (0,527)	9,141 (0,378)
BV_{Eexcl}	+	***1,251 (<0,001)	***1,195 (<0,001)	***1,104 (<0,001)
NI	+	***11,649 (<0,001)	***9,558 (<0,001)	***11,435 (<0,001)
Neg	+ / –	***41,119 (0,009)	**37,743 (0,019)	***44,029 (0,001)
ASC_{CA}	+ / –	***–1,553 (<0,001)		***–2,562 (<0,001)
ASC_{FV}	+ / –		***0,404 (0,002)	***0,756 (<0,001)
N		114	114	114
Structural R^2		82,8%	81,6%	87,6%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 18: Comparison of the regression findings for listed associates with equity accounted carrying amounts greater than one per cent of total assets

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	114	2 355		
Model 2	114	2 468	0,240 (0,810)	0,241 (0,810)
Model 3	114	1 659	**–2,582 (0,011)	***–3,041 (0,003)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	114	2 355		
Model 3	114	1 659	*1,701 (0,092)	*–1,943 (0,055)

Model 1 *ASC* represents the equity accounted carrying amounts of the listed associates
Model 2 *ASC* represents the disclosed fair values of the listed associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

When the variance in the error terms (ε) of the various models is compared, results remain generally consistent with those of the main regression findings. As Panel A of Table 18 shows, including disclosed fair values of listed associates (Model 2) rather than their equity accounted carrying amounts (Model 1) does not significantly increase the variance in the error term (p = 0,810). However, once both the measurement alternatives are included (Model 3) rather than simply the disclosed fair values (Model 2) the decrease of the variance in the error term is significant at the one per cent level per the Vuong test (p = 0,003) and the five per cent level per the dispersion test (p = 0,011). Consequently, both the equity accounted carrying amounts and the disclosed fair values of listed associates remain incrementally value-relevant in this robustness test.

As a final robustness test, in order to determine whether or not the negative coefficient on the coefficient for the equity accounted carrying amounts of listed associates is due to model specification, the main model is regressed once more using the model specification of Graham *et al.* (2003b:1073) as well as their sampling method (p. 1071). This implies that equity accounted carrying amounts of listed associates and the difference between the disclosed fair values and equity accounted carrying amounts are included as the independent variables in the regression model. The results of this robustness test are tabulated in Table 19. Importantly, the equity accounted carrying amounts of listed associates remain negative (–1,806) and significant at the one per cent level ($p < 0,001$). However, consistent with the findings of Graham *et al.* (2003b), the difference between the disclosed fair values and the equity accounted carryings amounts is positive (0,756) and significant at the one per cent level ($p < 0,001$). Consequently, it is concluded that the negative sign on the coefficient for equity accounted carrying amounts of listed associates in this study is not due to model specification. As a result the difference in findings may be attributable to the specific sample firms or sample countries included in the two studies. Alternatively, the difference may be attributable to differences in sample period. As the sample period of the current study is much later than that of Graham *et al.* (2003b), it may be that investors have acquired greater confidence in using fair values over time, with the result that the corresponding importance of equity accounted carrying amounts of listed associates has decreased.

In this subsection, robustness tests have illustrated that utilising sample and model specifications of prior research do not qualitatively alter the main findings of the study. The next section summarises the results of the chapter.

Table 19: Regression findings for listed associates using the model specification of prior research

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 CA + \beta_5 Diff + \varepsilon$$

	Predicted sign	
2006	+ / –	**–70,867 (0,011)
2007	+ / –	***–82,950 (0,003)
2008	+ / –	***–121,821 (<0,001)
2009	+ / –	***–84,619 (0,002)
2010	+ / –	***–96,233 (<0,001)
2011	+ / –	***–92,539 (0,001)
UK	+ / –	3,996 (0,717)
Aus	+ / –	9,141 (0,378)
BV_{Eexcl}	+	***1,104 (<0,001)
NI	+	***11,435 (<0,001)
Neg	+ / –	***44,029 (0,001)
CA	+ / –	***–1,806 (<0,001)
Diff	+ / –	***0,756 (<0,001)
N		114
Structural R^2		87,6%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
CA Equity accounted carrying amounts of listed associates
Diff Difference between disclosed fair values of listed associates and equity accounted carrying amounts

** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

5.6. Summary and conclusion

This chapter contains the detailed findings relating to the first null hypothesis that the disclosed fair values of listed associates do not subsume the equity carrying amounts of associates. The findings from the multivariate regression are that both the equity accounted carrying amounts and disclosed fair values of listed associates are incrementally value-relevant, based on the significance of regression coefficients and differences in the variance in error terms of the three model specifications. This implies that equity investors do not blindly use either of the alternative measurement bases when valuing the reporting entity's investments in listed associates. In other words, the equity accounted carrying amounts and disclosed fair values of listed associates capture different elements of information that investors utilise to develop their own assessment of the intrinsic value of the investments in associates. As a result, the overall finding is that disclosed fair values of listed associates have not subsumed their equity accounted carrying amounts and both have a role to play in the financial reporting and valuation processes. Findings of this chapter are robust to several different sample selection methods and model specifications. The next chapter considers whether the findings of the multivariate regression model apply equally to unlisted associates.

6. DETAILED FINDINGS: FAIR VALUES OF UNLISTED ASSOCIATES

6.1. Introduction

The second hypothesis of this study (in null form) is that the disclosed fair values of unlisted associates do not subsume their equity accounted carrying amounts. Although the investigations of the previous chapter in respect of listed associates give insight into the likely conclusion, these findings are not necessarily generalisable to unlisted associates. Intuitively, the disclosed fair values of listed associates have a greater likelihood of being utilised by investors, as they are derived from publicly available information. In addition, the disclosed fair values of unlisted associates are not disclosed by all firms, as this is not a requirement of current financial reporting standards and depend largely on directors' valuations. On the other hand, investors may perceive directors to have greater insight into their firms' investments and therefore award greater weight to directors' valuations than those they could determine themselves. In the discussions which follow the detailed results of the model to test the second hypothesis are discussed. Results in this chapter are based on pooled findings across sample countries and sample periods (i.e. sample countries and periods are not separately assessed), as differences between sample countries and changes across time are investigated in greater detail in later chapters. The first section of this chapter details descriptive statistics, followed by findings from univariate correlations. Findings from the multivariate regression model are discussed in a separate section, followed by results of various robustness tests. The final section summarises and concludes this chapter.

6.2. Descriptive statistics

Although 838 firm-years within the sample period have unlisted associates, the final sample for the main multivariate investigations of this chapter is 128 firm-years. As detailed in Table 20, the majority (530) of potential sample firm-years are lost because firms do not disclose fair values for their unlisted associates. In addition, a significant number of potential sample firm-years (180) are lost as the disclosed fair values are equal to the equity accounted carrying amounts of the unlisted associates. This situation renders the alternative measurement bases indistinguishable and these firm-years are therefore excluded from the sample for testing the second hypothesis. The resulting sample firm-years are dominated by South African firms. As Table 20 shows, 109 sample firm-years of the total 128 sample firm-years represent South African firms. Although South African firms also represent the highest number of potential sample firm-years based on the number of firm-years with unlisted associates, the loss-ratio across countries is not equal.

Table 20: Reconciliation of sample firm-years for unlisted associates

	South Africa	**Australia**	**United Kingdom**	**Total**
Total firm-years with unlisted associates	425	191	222	838
No fair value disclosed	(149)	(165)	(216)	(530)
Disclosed fair value equal to equity accounted carrying amount	(167)	(8)	(5)	(180)
Number of firm-years with unlisted associates	109	18	1	128

Descriptive statistics for the 128 sample firm-years for the second hypothesis are detailed in Table 21. Amounts for all sample firm-years are converted to ZAR for comparative purposes. Table 21 shows that sample firms are significantly smaller than the sample for listed associates in Chapter 5 with a mean (median) market value of equity of ZAR 37 727 million (ZAR 13 581 million). This difference is, however, consistent with the fact that South African firms represent the majority of sample firm-years in respect of unlisted associates. As the number of listed firms in South Africa is significantly smaller than that of Australia and the United Kingdom, the sample firms represent a larger subset of the market.

The book value of equity (excluding the equity accounted carrying amounts of unlisted associates for the purpose of this chapter) is somewhat skewed. Book value of equity has a mean of ZAR 17 817 million compared to a median of ZAR 6 245 million. Net income from continuing operations reflects a mean of ZAR 3 145 million with a median of ZAR 981 million, but ranges from a net loss from continuing operations of ZAR 3 661 million (five loss firm-years are included in the sample) to a net profit from continuing operations of ZAR 37 208 million. As far as the variables of interest are concerned, the equity accounted carrying amounts of unlisted associates reflect a mean (median) of ZAR 1 491 million (ZAR 243 million) which differs by over 200 per cent (40 per cent) from the mean (median) disclosed fair values for these associates of ZAR 3 447 million (ZAR 362 million). Both variables exhibit skew as evident from the differences in means and medians and their minimum values are comparatively close to zero.

Table 21: Descriptive statistics for sample firm-years with unlisted associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	128	37 727	13 581	69 253	58	455 198
BV_{Eexcl}	128	17 817	6 245	34 949	31	263 738
NI	128	3 145	981	5 733	–3 661	37 208
ASC_{CA}	128	1 491	243	3 685	5	26 510
ASC_{FV}	128	3 447	362	10 399	5	82 286

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

However, a large portion of the skew in sample firm-years, especially in respect of the book value of equity, can be ascribed to the inclusion of financial services firms in the sample. As detailed in Table 22, eliminating these 36 firms from the sample reduces the skew of this variable. After elimination, book value of equity has a mean of ZAR 15 739 million compared to a median of ZAR 6 650. Four loss firm-years are included in this sample, with the result that the distribution of net income from continuing operations is largely unchanged.

In respect of the measurement alternatives for unlisted associates, Table 22 shows that removing financial services firms from the sample does not eliminate differences between these alternatives. The mean (median) equity accounted carrying amounts of unlisted associates of ZAR 1 788 million (ZAR 239 million) differ by more than 250 per cent (40 per cent) from the mean (median) disclosed fair value of unlisted associates of ZAR 4 472 million (ZAR 348 million). These differences are similar to those of the total sample and offer a preliminary suggestion that removing financial services firms from the sample does not appear to have a significant impact on the dataset.

Table 22: Descriptive statistics for sample firm-years with unlisted associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	92	35 619	15 289	54 153	58	233 592
BV_{Eexcl}	92	15 739	6 650	21 562	31	107 269
NI	92	2 955	981	4 766	–3 661	22 417
ASC_{CA}	92	1 788	239	4 283	5	26 510
ASC_{FV}	92	4 472	348	12 118	5	82 286

MV_E Market value of equity, three months after reporting date
BV_{Aexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

Elements identified in the descriptive statistics with potential consequences for analyses are addressed in several ways. Skew is dealt with by deleting outliers of more than 2,5 standard deviations from the mean for both the dependent and continuous independent variables. The impact of financial services firms on the skew of different variables is addressed during robustness tests, where these firms were excluded from sample firm-years. Similarly, the potential impact on results of including sample firm-years with a net loss from continuing operations is assessed with reference to a robustness test which excludes these sample firm-years.

In the sections which follow, the detailed findings from analysing the sample firm-years are discussed. The next section discusses univariate investigations, followed by multivariate analyses and robustness tests in the sections thereafter.

6.3. Univariate investigations

The results of univariate investigations in respect of unlisted associates are detailed in Table 23 with Pearson (Spearman) correlations above (below) the diagonal. All of the dependent variables reflect a significant correlation with the dependent variable at the one per cent level of significance. The fact that this is true for both Pearson and Spearman correlations suggests that the relationship between the dependent variable and each of the independent variables is linear. All the correlations in Table 23 are positive. In respect of book value of equity and net income from continuing operations, these findings agree with those of prior research (Collins *et al.*, 1997). The fact that the equity accounted carrying amounts of unlisted associates are positively associated with market value of equity appears to be in line with prior research on equity accounted investments (Soonawalla, 2006).

The equity accounted carrying amounts and disclosed fair values of unlisted associates are also significantly correlated with each other at the one per cent level. Most likely this is because the equity accounted carrying amount approximates the investor's share of the net assets (book value) of the associate. As the market value (fair value) of a firm correlates strongly with its book value of equity (Collins *et al.*, 1997) this relationship is not unsurprising. However, prior research specific to the disclosed fair values of unlisted associates is limited. Although Barth and Clinch (1998:218) find value-relevance for the disclosed fair values of unlisted associates, this is limited to the mining and financial services industries. As a result, the univariate correlations, which include these industries, may reflect biased results. However, this study relies on the results of multivariate investigations, discussed from the subsequent section onwards, to draw conclusions.

Table 23: Univariate correlations for sample firm-years with unlisted associates

	MV_E	**BV_{Eexcl}**	**NI**	**ASC_{CA}**	**ASC_{FV}**
MV_E		***0,890 (<0,001)	***0,718 (<0,001)	***0,395 (<0,001)	***0,354 (<0,001)
BV_{Eexcl}	***0,884 (<0,001)		***0,782 (<0,001)	***0,395 (<0,001)	***0,321 (<0,001)
NI	***0,899 (<0,001)	***0,879 (<0,001)		***0,385 (<0,001)	***0,399 (<0,001)
ASC_{CA}	***0,460 (<0,001)	***0,441 (<0,001)	***0,509 (<0,001)		***0,934 (<0,001)
ASC_{FV}	***0,552 (<0,001)	***0,490 (<0,001)	***0,584 (<0,001)	***0,945 (<0,001)	
N	128				

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates

*** Significant at the 1% level (p-values for 2-tailed significance are indicated within brackets)

6.4. Detailed multivariate regression findings

The sample firm-years for the second hypothesis represent a time series. As preliminary investigations based on Durbin–Watson statistics reveal that serial correlation (autocorrelation) may be significant, the multivariate regression findings for unlisted associates are based on autoregression results from maximum likelihood estimation. Results from the main multivariate regression are tabulated in Table 24. Differences between the models tabulated relate to the specification of the independent variable, *ASC*. In Model 1, *ASC* represents the equity accounted carrying amounts of unlisted associates; in Model 2, *ASC* represents the disclosed fair values of the unlisted associates and in Model 3, *ASC* represents two variables, namely the equity accounted carrying amounts and disclosed fair values of the unlisted associates.

Table 24: Regression findings for unlisted associates

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3
2006	+ / –	1,474	0,493	0,330
		(0,916)	(0,971)	(0,980)
2007	+ / –	7,459	5,436	3,685
		(0,605)	(0,699)	(0,780)
2008	+ / –	–10,464	–12,645	–13,420
		(0,470)	(0,371)	(0,313)
2009	+ / –	–1,090	–2,793	–4,410
		(0,942)	(0,848)	(0,749)
2010	+ / –	–6,477	–7,963	–9,007
		(0,651)	(0,568)	(0,492)
2011	+ / –	4,538	2,899	1,938
		(0,751)	(0,835)	(0,882)
UK	+ / –	10,135	10,437	3,426
		(0,691)	(0,678)	(0,890)
Aus	+ / –	***–22,795	***–22,329	***–22,021
		(0,001)	(0,001)	(0,001)
BV_{Eexcl}	+	***2,294	***2,315	***2,448
		(<0,001)	(<0,001)	(<0,001)
NI	+	**1,174	**0,963	0,515
		(0,012)	(0,041)	(0,594)
Neg	+ / –	4,973	4,671	3,544
		(0,686)	(0,700)	(0,765)
ASC_{CA}	+ / –	0,361		**–2,030
		(0,222)		(0,017)
ASC_{FV}	+ / –		**0,222	***0,891
			(0,030)	(0,003)
N		120	120	120
Structural R^2		91,4%	91,7%	92,1%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

As is evident from Table 24, few of the indicator variables are significant. In fact, only the indicator variable for Australia is significant at the one per cent level ($p = 0{,}001$) in all of the models. This may reflect a structural difference between the base country, namely South Africa, and Australia or simply the fact that the sample is dominated by South African firms. Cross-country differences for unlisted associates are investigated in greater depth in Chapter 10. Although the year indicator variables are all insignificant, there is a clear change in sign of the coefficients around the year 2008. As a result, a deeper investigation of potential differences across time is detailed in Chapter 8. The control variables, namely book value of equity and net income from continuing operations, are positive in all specifications as predicted. However, only book value of equity is consistently significant at the one per cent level ($p < 0{,}001$). Interestingly, although net income from continuing operations is significant at the five per cent level in the first and second specifications, it is insignificant in the third.

The equity accounted carrying amounts of unlisted associates are positive in Model 1, as predicted, but insignificant ($p = 0{,}222$). This is in contrast to the findings for listed associates where this coefficient was consistently negative, but reinforces the conclusion reached in the previous chapter that the negative coefficient is specific to the sample firms concerned. When the disclosed fair values of unlisted associates are added to the regression, the coefficient of their equity accounted carrying amounts is negative (–2,030) and significant at the five per cent level ($p = 0{,}017$). The disclosed fair values of unlisted associates, by contrast, are significantly positive at the five per cent level or better in all specifications where they are included. Therefore the equity accounted carrying amounts and disclosed fair values of unlisted associates both appear to be value-relevant. However, in order to assess incremental value-relevance (i.e. whether these represent alternative or complementary measurement bases) this study investigates the variance in the error terms (ε) of the various models.

Table 25: Comparison of the regression findings for unlisted associates

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	120	552		
Model 2	120	534	–1,388 (0,168)	–1,438 (0,153)
Model 3	120	501	–1,103 (0,272)	–1,110 (0,269)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	120	552		
Model 3	120	501	–1,337 (0,184)	–1,357 (0,177)

Model 1 *ASC* represents the equity accounted carrying amounts of the unlisted associates
Model 2 *ASC* represents the disclosed fair values of the unlisted associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

The tests utilised to compare the model specifications of this study focus on the variance (dispersion) in the error terms as Gu (2007:1074) shows that it is the dispersion of the error terms which determine the superiority of one model over another. As in the previous chapter, the results of two tests, namely the Vuong test and the dispersion test, are reported. Both tests focus on variance in the error term and are therefore appropriate for the comparisons of models. As the results of the two tests tend to be qualitatively the same, the discussions of this chapter focus on the results of the Vuong test in the interest of brevity.

As Panel A of Table 25 shows, although the variance in the error term decreases with each successive model, no significance of the decrease is detected by either of the tests at conventional levels with p-values of 0,153 and higher. This implies that although the equity accounted carrying amounts and disclosed fair values of listed associates are both value-relevant, they are not incrementally so. As a result, users of financial statements appear to be indifferent to the additional information conveyed by disclosing fair values for unlisted associates. Potential reasons could be that investors are unfamiliar with the disclosed fair values of unlisted associates or concerned about the reliability of the disclosed fair values. Another possibility is that the equity accounted carrying amounts and disclosed fair values of unlisted associates essentially capture the same information. Intuitively, the last reason makes the most sense. Unlisted associates are not like their listed counterparts. In the case of listed associates the disclosed fair values are based on published price quotations and present a relatively independent point of reference for the value of the investment. For unlisted associates the disclosed fair values are derived from items already captured by the equity accounted carrying amount (approximately the net asset value of the associate), such as net income for the current period. Consequently, it is not improbable that the disclosed fair values of unlisted associates capture the same information as their equity accounted carrying amounts, rendering the disclosed fair values incrementally uninformative.

When potential multi-collinearity is considered, reported VIF scores for independent variables are all far below 10. Furthermore, although maximum likelihood regression is generally robust to heteroskedasticity, a graphical analysis of the residuals reflects that residuals do not appear to be heteroskedastic and do not exhibit significant skew. The maximum likelihood regression effectively corrects for serial correlation with all Durbin–

Watson test statistics close to 2 and above the upper critical value for all of the reported results.

In summary therefore, both the equity accounted carrying amounts of unlisted associates as well as their disclosed fair values appear to be value-relevant, but not incrementally so. By implication this provides a potential reason why most firms do not choose to disclose such fair values. However, as the sample for this chapter is dominated by South African firms, the generalisability of findings across countries is somewhat limited. In the section that follows, the results of various robustness tests based on differing sampling approaches and model specifications are detailed.

6.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion process.

6.5.1. Using market value of equity at reporting date

The main multivariate regression results utilise market value of equity three months after reporting date as the dependent variable, as this allows for the dissemination of financial reporting information to equity markets. However, prior research (Ball & Brown, 1968) shows that the greater part of the information content of financial reports is already incorporated into the market value of equity at reporting date. Although the disclosed fair values of unlisted associates are not always publicly available, it is possible that information about a firm's unlisted associates may be available from sources other than the financial reports. As a result, investors may have anticipated disclosed fair values to a significant degree by the reporting date, especially if the published information relates to the inputs necessary for such a valuation. Therefore the regression is also run using market value of equity determined at reporting date as the dependent variable.

Table 26: Regression findings for unlisted associates with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3
2006	+ / –	5,073	4,499	4,454
		(0,724)	(0,744)	(0,744)
2007	+ / –	11,233	9,429	9,013
		(0,446)	(0,504)	(0,519)
2008	+ / –	–11,380	–13,140	–13,377
		(0,443)	(0,357)	(0,343)
2009	+ / –	–1,510	–2,744	–2,991
		(0,921)	(0,852)	(0,837)
2010	+ / –	–3,215	–4,423	–4,662
		(0,826)	(0,752)	(0,736)
2011	+ / –	4,195	2,962	2,722
		(0,772)	(0,831)	(0,843)
UK	+ / –	–12,588	–14,900	–16,423
		(0,621)	(0,555)	(0,520)
Aus	+ / –	***–19,311	***–19,046	***–19,016
		(0,005)	(0,005)	(0,005)
BV_{Eexcl}	+	***2,075	***2,132	***2,161
		(<0,001)	(<0,001)	(<0,001)
NI	+	0,661	0,386	0,288
		(0,161)	(0,425)	(0,578)
Neg	+ / –	5,905	4,728	4,180
		(0,637)	(0,703)	(0,738)
ASC_{CA}	+ / –	***0,877		–0,444
		(0,004)		(0,606)
ASC_{FV}	+ / –		***0,348	0,495
			(0,001)	(0,104)
N		120	120	120
Structural R^2		90,8%	91,0%	91,0%

MV_E	Market value of equity at reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

*** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

The results of measuring the dependent variable at reporting date, rather than three months thereafter, are reported in Table 26. The findings on control variables are qualitatively unchanged from those of the main regression. Year indicator variables continue to be insignificant and only the Australian indicator variable is significant at the one per cent level in all model specifications (p = 0,005). The book value of equity is positively associated with market value of equity in all specifications and significant at the one per cent level (p < 0,001). Interestingly, the coefficient on net income from continuing operations, although positive as predicted, is insignificant in all specifications. No significant outliers from a graphical review of the distribution of residuals are identified which might have offered an explanation.

As far as the variable of interest is concerned, *ASC* is positive (0,877) and significant at the one per cent level (p = 0,004) when it represents the equity accounted carrying amounts of unlisted associates in Model 1. The disclosed fair values of unlisted associates are positive (0,348) and significant at the one per cent level (p = 0,001) in Model 2. However, including both potential measurement bases in Model 3, results in a loss of significance for both. Although the signs of both the equity accounted carrying amounts (–0,444) and disclosed fair values (0,495) are consistent with those of the main regression results, neither is significant at conventional levels; at best the disclosed fair values are mildly significant with a p-value of 0,104. These results could suggest that information for unlisted associates is incorporated into the market value of equity more slowly, but a likelier explanation (consistent with earlier conclusions) is that the two alternative measurement bases do not offer incremental value-relevance, although they are each value-relevant on their own.

Indeed, when the variance in the error terms (ε) of the various models is compared, although successive models all reflect a decrease in variance, none of these are significant. As Table 27 shows, the decrease in variance of the error term reflects p-values of 0,155 or higher. As a result, this robustness test confirms the findings of the main regression result: although equity accounted carrying amounts and disclosed fair values of listed associates appear to be value-relevant on their own, they do not offer incremental information content.

Table 27: Comparison of the regression findings for unlisted associates with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	120	558		
Model 2	120	540	–1,431 (0,155)	–1,305 (0,194)
Model 3	120	536	–0,610 (0,543)	–0,589 (0,557)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	120	558		
Model 3	120	536	–1,196 (0,234)	–1,106 (0,271)

Model 1	*ASC* represents the equity accounted carrying amounts of the unlisted associates
Model 2	*ASC* represents the disclosed fair values of the unlisted associates
Model 3	*ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

6.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the significant skew induced by financial services firms in the sample and therefore an analysis excluding these firms appears warranted. Results of various regression models, after making the aforementioned adjustments in turn, are tabulated from Table 28 onwards.

The results of Table 28 are broadly consistent with those of the main regression results. Importantly, compared to the results of the previous robustness test, the coefficient on net income from continuing operations is positive and significant in two of the three specifications at the five per cent level, which is consistent with the main regression results. Similarly, in the Model 3, the coefficient on net income from continuing operations is insignificant once more, also consistent with the main regression results. The results for other control variables are qualitatively similar to those reported earlier.

When the variable of interest is considered, results are qualitatively similar to those of the main regression. The equity accounted carrying amounts of unlisted associates are positive in the first specification (0,437) but not significantly so ($p = 0{,}170$). In addition, the disclosed fair values of the unlisted associates are positive and significant at the five per cent level ($p = 0{,}027$) in the second specification. Importantly, the results of the third specification are also similar to the main regression results. The equity accounted carrying amounts of unlisted associates are negative (–1,876) and significant at the five per cent level (0,041) while their disclosed fair values have the opposite sign (0,865) and significance at the one per cent level ($p = 0{,}008$). As a result, eliminating firm-years with a net loss from continuing operations does not change the inference that both equity accounted carrying amounts and disclosed fair values of unlisted associates are value-relevant.

Table 28: Regression findings for unlisted associates when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3
2006	+ / –	0,315	–0,619	–0,639
		(0,983)	(0,965)	(0,962)
2007	+ / –	6,375	4,376	2,978
		(0,666)	(0,760)	(0,828)
2008	+ / –	–15,704	–17,864	–18,596
		(0,291)	(0,217)	(0,180)
2009	+ / –	–2,411	–4,121	–5,666
		(0,877)	(0,786)	(0,697)
2010	+ / –	–7,073	–8,563	–9,308
		(0,631)	(0,550)	(0,497)
2011	+ / –	3,840	2,244	1,631
		(0,793)	(0,875)	(0,905)
UK	+ / –	11,549	11,159	5,357
		(0,675)	(0,681)	(0,842)
Aus	+ / –	***–21,970	***–21,456	***–21,339
		(0,004)	(0,004)	(0,004)
BV_{Eexcl}	+	***2,247	***2,274	***2,393
		(<0,001)	(<0,001)	(<0,001)
NI	+	**1,281	**1,057	0,660
		(0,011)	(0,037)	(0,212)
ASC_{CA}	+ / –	0,437		**–1,876
		(0,170)		(0,041)
ASC_{FV}	+ / –		**0,245	***0,865
			(0,027)	(0,008)
N		116	116	116
Structural R^2		90,3%	90,6%	91,0%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates

** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 29: Comparison of the regression findings for unlisted associates when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	**Mean sum of squares of residual**	**Dispersion test (t-statistic)**	**Vuong test (t-statistic)**
Model 1	116	630		
Model 2	116	610	–1,381 (0,170)	–1,422 (0,158)
Model 3	116	583	–0,916 (0,362)	–0,901 (0,369)

Panel B: Comparison of Model 1 and 3

	N	**Mean sum of squares of residual**	**Dispersion test (t-statistic)**	**Vuong test (t-statistic)**
Model 1	116	630		
Model 3	116	583	–1,191 (0,236)	–1,180 (0,241)

Model 1 *ASC* represents the equity accounted carrying amounts of the unlisted associates
Model 2 *ASC* represents the disclosed fair values of the unlisted associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the Model 1 is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

However, to determine whether the alternative measurement bases offer incremental value-relevance, the variance in error terms (ε) of the various models is considered. These results are tabulated in Table 29. As is evident from this table, although the variance in the error term decreases with each successive model, this decrease is not significant with p-values of 0,158 and above. Therefore, the conclusions from comparing the differing models are also consistent with those of the main regression model: the equity accounted carrying amounts and disclosed fair values of unlisted associates do not offer incremental value-relevance. By implication, investors utilise one or the other to determine the value of a firm's investments in its unlisted associates. As discussed earlier, this may be because the disclosed fair values of unlisted associates (unlike those of listed associates) essentially incorporate the same information as their equity accounted carrying amounts and do not offer an independent reference point.

In order to consider whether or not the industry in which a firm operates has a significant impact on results, the regression is also run excluding firms operating in the financial services, mining and utility industries. Financial services firms are often eliminated in prior research (Graham *et al.*, 2003b:1071) because of their high leverage and differing operational models. Mining firms have been eliminated from the sample as Barth and Clinch (1998:218) find that disclosed fair values of associates were value-relevant only for mining and financial services firms included in their sample. Finally, utility industries have been eliminated from the sample as their operations are unusually impacted by regulation. Results from the regression once firms operating in these industries have been eliminated from the sample are tabulated in Table 30.

Because of the sample limitations, the one firm in the United Kingdom is not included in the regression results of Table 30. As far as the indicator variables are concerned, findings are generally similar to those of the main regression, except that the indicator variable for Australia is no longer significant. However, cross-country differences are considered in depth in Chapter 10, as limited inferences are possible from the pooled regression. Interestingly, the coefficient for net income from continuing operations is significant at the one per cent level in all of the specifications of this robustness test. This implies that the insignificant coefficient in the third specification of the main regression was due to the inclusion of a specific industry or industries in the main sample. Book value of equity continues to be positive in all of the specifications and significant at the one per cent level.

Table 30: Regression findings for unlisted associates when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3
2006	+ / –	–0,772	–2,232	7,175
		(0,960)	(0,880)	(0,623)
2007	+ / –	1,251	–0,954	7,790
		(0,937)	(0,949)	(0,599)
2008	+ / –	–14,481	–17,216	–8,456
		(0,353)	(0,247)	(0,562)
2009	+ / –	–5,434	–7,939	0,802
		(0,741)	(0,615)	(0,959)
2010	+ / –	–3,685	–6,248	4,086
		(0,816)	(0,679)	(0,786)
2011	+ / –	–9,841	–11,885	–1,799
		(0,527)	(0,422)	(0,903)
Aus	+ / –	–7,369	–7,796	–6,388
		(0,157)	(0,124)	(0,194)
BV_{Eexcl}	+	***0,725	***0,851	***0,973
		(0,002)	(0,001)	(<0,001)
NI	+	***5,321	***4,305	***4,087
		(0,003)	(0,004)	(0,005)
Neg	+ / –	6,033	4,352	3,216
		(0,533)	(0,650)	(0,726)
ASC_{CA}	+ / –	0,328		**–2,332
		(0,350)		(0,022)
ASC_{FV}	+ / –		*0,223	***1,015
			(0,077)	(0,006)
N		70	70	70
Structural R^2		91,1%	91,4%	92,1%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

More importantly, the findings for the variable of interest, *ASC*, remain qualitatively consistent with those of the main regression results. When only the equity accounted carrying amounts of the unlisted associates are included in the regression, its coefficient is positive (0,328) but insignificant (p = 0,350). However, when combined with the disclosed fair values, the coefficient of the equity accounted carrying amounts turns significantly negative at the five per cent level (–2,332, p = 0,022). By contrast, the disclosed fair values of unlisted associates are significantly positive at the ten per cent level or better in all of the specifications in which they are included. As a result, inferences remain unchanged from those of the main regression: both the equity accounted carrying amounts and disclosed fair values of unlisted associates are individually value-relevant.

However, the main findings that the alternative measurement bases are not incrementally value-relevant remain unchanged. As detailed in Table 31, the decrease in the variance of the error terms (ε) of the various models remains statistically insignificant. This implies that investors do not obtain additional information from the disclosed fair values of unlisted associates that is not already captured by their equity accounted carrying amounts.

A final robustness test in this subsection considers whether the combination of firm-years with a net loss from continuing operations and a limit on the industries in which they operate could significantly impact on inferences. The regression is therefore also run where firm-years with a net loss from continuing operations as well as firms that operate in the financial services, mining and utility industries have been eliminated.

Table 31: Comparison of the regression findings for unlisted associates when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	70	227		
Model 2	70	217	–0,674 (0,503)	–0,753 (0,453)
Model 3	70	197	–0,779 (0,438)	–0,867 (0,394)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	70	227		
Model 3	70	197	–0,798 (0,428)	–0,897 (0,373)

Model 1 — *ASC* represents the equity accounted carrying amounts of the unlisted associates
Model 2 — *ASC* represents the disclosed fair values of the unlisted associates
Model 3 — *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

The results from this robustness test are tabulated in Table 32. As far as the control variables are concerned, the results are generally similar to those of the main regression results. Year indicator variables remain insignificant and the country indicator variable for Australia is significant at the ten per cent level in all of the specifications. The coefficient of book value of equity remains positive and significant at the one per cent level in all of the specifications and, importantly, net income from continuing operations is also positive and significant at the one per cent level in all specifications ($p < 0{,}001$). This confirms that it was indeed firms in specific industries that caused the earlier insignificance of the coefficient for net income from continuing operations in Model 3.

Table 32: Regression findings for unlisted associates when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

	Predicted Sign	**Model 1**	**Model 2**	**Model 3**
2006	+ / –	8,312 (0,473)	7,846 (0,493)	8,716 (0,454)
2007	+ / –	9,502 (0,424)	8,976 (0,446)	9,660 (0,418)
2008	+ / –	–1,991 (0,865)	–2,559 (0,825)	–1,881 (0,873)
2009	+ / –	4,120 (0,740)	3,504 (0,775)	4,225 (0,734)
2010	+ / –	11,860 (0,329)	11,271 (0,348)	12,061 (0,322)
2011	+ / –	9,639 (0,423)	9,052 (0,449)	9,573 (0,427)
Aus	+ / –	*–7,225 (0,065)	*–7,253 (0,063)	*–7,029 (0,076)
BV_{Eexcl}	+	***0,597 (<0,001)	***0,610 (<0,001)	***0,652 (0,001)
NI	+	***7,166 (<0,001)	***7,035 (<0,001)	***6,798 (<0,001)
ASC_{CA}	+ / –	0,022 (0,928)		–0,417 (0,641)
ASC_{FV}	+ / –		0,022 (0,820)	0,178 (0,611)
N		67	67	67
Structural R^2		95,5%	95,5%	95,5%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 33: Comparison of the regression findings when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	67	121		
Model 2	67	121	–0,252 (0,802)	–0,263 (0,793)
Model 3	67	120	–0,283 (0,778)	–0,294 (0,770)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	67	121		
Model 3	67	120	0,310 (0,758)	–0,325 (0,746)

Model 1 *ASC* represents the equity accounted carrying amounts of the unlisted associates
Model 2 *ASC* represents the disclosed fair values of the unlisted associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

When the variable of interest is considered, while the signs of the equity accounted carrying amounts and disclosed fair values of unlisted associates are consistent with those reported earlier, they are now insignificant in all specifications. The fact that disclosed fair values have no incremental value-relevance is confirmed by the results of the Vuong test and dispersion test tabulated in Table 33. As is evident, by comparing the mean sum of squares of the residuals of each of the models, the variance in the error terms (ε) is virtually unchanged for this robustness test. Therefore, despite the loss of significance of the coefficients, the most significant conclusion of the main regression remains, namely that equity accounted carrying amounts of unlisted associates and their disclosed fair values have no incremental value-relevance.

6.5.3. Limiting the sample to those firm-years with significant investments in unlisted associates

In order to facilitate comparisons with findings on listed associates, two final robustness tests are performed. For both robustness tests, sample firm-years were limited to those where the equity accounted carrying amount represents at least one per cent of total assets. Furthermore, firms operating in the financial services industry were eliminated from the sample. In the first robustness test, the model specifications utilised in the rest of this study are used, while the model specification of Graham *et al.* (2003b:1073) is used for the second robustness test.

The results of limiting sample firm-years to those where equity accounted carrying amounts represent at least one per cent of total assets are reported in Table 34. An immediate difference from all of the preceding results reported is that the coefficient for net income from continuing operations is negative in all of the specifications, although insignificant in most. A possible reason for this is a slight negative skew in the data, but a more likely explanation is that the proportion of mining firms has increased compared to earlier samples. As previous robustness tests have shown, excluding mining firms from the sample significantly affects the coefficient for net income from continuing operations. The other control variables are qualitatively consistent with those reported earlier. Similarly, the inferences for the equity accounted carrying amounts of unlisted associates and their disclosed fair values are also consistent with those of the main regression. When they are included separately, both are positive and significant at the ten per cent level or better in the respective specifications. However, in Model 3 the coefficient of the equity accounted carrying amounts is negative (–2,765) and significant at the five per cent level (p = 0,043) while disclosed fair values have the opposite sign (1,313) and significance at the one per cent level (p = 0,006). This is consistent with the main regression results and suggests that both potential measurement bases are individually value-relevant.

Table 34: Regression findings for unlisted associates with equity accounted carrying amounts greater than one per cent of total assets

$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$

	Predicted Sign	Model 1	Model 2	Model 3
2006	+ / –	41,343	41,389	*57,338
		(0,238)	(0,211)	(0,078)
2007	+ / –	50,541	46,664	*56,985
		(0,171)	(0,180)	(0,083)
2008	+ / –	26,174	19,357	30,103
		(0,489)	(0,588)	(0,367)
2009	+ / –	49,967	42,346	46,551
		(0,222)	(0,247)	(0,172)
2010	+ / –	32,025	29,837	47,782
		(0,376)	(0,382)	(0,184)
2011	+ / –	36,700	35,030	45,852
		(0,300)	(0,282)	(0,116)
Aus	+ / –	–19,875	–16,482	–13,600
		(0,150)	(0,215)	(0,287)
BV_{Eexcl}	+	***2,245	***2,287	***2,442
		(<0,001)	(<0,001)	(<0,001)
NI	+	–0,335	–0,751	*–1,295
		(0,638)	(0,294)	(0,088)
Neg	+ / –	–9,209	–7,786	–5,837
		(0,659)	(0,696)	(0,766)
ASC_{CA}	+ / –	*0,855		**–2,765
		(0,084)		(0,043)
ASC_{FV}	+ / –		***0,423	***1,313
			(0,010)	(0,006)
N		51	51	51
Structural R^2		91,8%	92,6%	93,2%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 35: Comparison of the regression findings for unlisted associates with equity accounted carrying amounts greater than one per cent of total assets

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	51	1 035		
Model 2	51	939	*–1,741 (0,088)	*–1,953 (0,056)
Model 3	51	807	–1,039 (0,304)	–1,037 (0,305)

Panel B: Comparison of Model 1 and 3

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	51	1035		
Model 3	51	807	–1,291 (0,203)	–1,316 (0,194)

Model 1 *ASC* represents the equity accounted carrying amounts of the unlisted associates
Model 2 *ASC* represents the disclosed fair values of the unlisted associates
Model 3 *ASC* represents two variables, namely the disclosed fair values and equity accounted carrying amounts of unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level (p-values for 2-tailed significance are indicated within brackets)

When the variance in the error terms (ε) of the various models is compared, it is interesting to note that including only the disclosed fair values of the unlisted associates (Model 2) appears to result in a significantly lower variance at the ten per cent level when compared to Model 1 where only the equity accounted carrying amounts have been included (p = 0,056). Because the variance in the error term does not significantly decrease again when the equity accounted carrying amount is added (Model 3), this would imply that only the disclosed fair values are value-relevant. However, given the small sample size for this particular robustness test and the disproportionate impact of mining firms, these results are most likely not generalisable.

As a final test, to compare to the results of listed associates, the regression was also run using the model specification and sampling methodology of prior research. The results of this regression are detailed in Table 36. A similar problem arises in Table 36 where the coefficient on net income from continuing operations is negative. However, as discussed before, this is most likely due to the increased proportion of mining firms in the sample. The coefficient on the equity accounted carrying amounts of unlisted associates remains negative, consistent with the previous findings in this subsection, although it is only mildly significant ($p = 0{,}119$). The difference between the disclosed fair value of the unlisted associates and their equity accounted carrying amounts is, however, positive (1,313) and significant at the one per cent level ($p = 0{,}006$). However, the main takeaway from this particular robustness test is that the negative coefficient on the equity accounted carrying amounts of unlisted associates is not due to the sample selection methodology or model specification of this study.

This is the final robustness test of this chapter. The following section summarises the findings of the various investigations and concludes the chapter.

6.6. Summary and conclusion

This chapter details the regression results for the second null hypothesis of the study, namely that the disclosed fair values of unlisted associates do not subsume their equity accounted carrying amounts. The results of this chapter show that although the equity accounted carrying amounts of unlisted associates and their disclosed fair values both tend to be value-relevant, they are not incrementally so. Results of robustness tests suggest that firms in the mining industry have a significant impact on results, especially on the sign and significance of net income from continuing operations.

Table 36: Regression findings for unlisted associates using the model specification of prior research

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 CA + \beta_5 Diff + \varepsilon$$

	Predicted sign	
2006	+ / –	*57,338 (0,078)
2007	+ / –	*56,985 (0,083)
2008	+ / –	30,103 (0,367)
2009	+ / –	46,551 (0,172)
2010	+ / –	42,782 (0,184)
2011	+ / –	48,852 (0,116)
Aus	+ / –	–13,600 (0,287)
BV_{Eexcl}	+	***2,442 (<0,001)
NI	+	*–1,295 (0,088)
Neg	+ / –	–5,837 (0,766)
CA	+ / –	–1,452 (0,119)
Diff	+ / –	***1,313 (0,006)
N		51
Structural R^2		93,2%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
CA Equity accounted carrying amounts of unlisted associates
Diff Difference between disclosed fair values of unlisted associates and equity accounted carrying amounts

Firms in financial services have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

However, eliminating these firms from the sample does not have a significant impact on the most important finding, namely that the two alternative measurement bases are not incrementally value-relevant. This means that both measurement bases essentially capture the same information. In addition, as both measurement bases are value-relevant in isolation (although not incrementally), it suggests that investors determine their own assessment of the intrinsic value of a firm's investments in unlisted associates, rather than utilising either measurement basis directly.

A potential reason why the alternative measurement bases are not incrementally value-relevant may be that the disclosed fair values of unlisted associates (directors' valuations) and their equity accounted carrying amounts are essentially derived from the same information set and therefore do not add to investors' understanding of the value of the investment in unlisted associates. By contrast the disclosed fair values of listed associates offer an independent reference point, incorporating additional information (as results in the previous chapter suggest) which investors utilise in the determination of intrinsic values.

These findings do raise an interesting question: if investors do not find incremental usefulness in fair value disclosures for investments in unlisted associates, why do firms disclose this information (given that it is not mandatory)? One possible reason could be that the firm intends to sell the associate within the foreseeable future. However, this can only explain a limited number of these disclosures. A more plausible explanation is that the director's valuation offers some support that investments in unlisted associates need not be impaired. Consequently it encourages investors to value the investments as closer to book value. Given, that both measurement bases have similar value-relevance (lack of incremental value-relevance), this could very well be the intention of management.

The chapters that follow investigate whether the value-relevance of the alternative measurement bases has changed across time.

7. DETAILED FINDINGS: VALUE-RELEVANCE OF LISTED ASSOCIATES ACROSS TIME

7.1. Introduction

The third hypothesis of this study (in null form) is that the value-relevance of disclosed fair values and equity accounted carrying amounts of associates is unchanged over time. In order to facilitate the discussion of the tests in respect of this hypothesis, the results of investigating listed and unlisted associates are contained in separate chapters. This chapter discusses the detailed findings relating to the value-relevance of *listed* associates over time, while detailed findings relating to the value-relevance of *unlisted* associates over time are discussed in Chapter 8. Importantly, the samples for these chapters only include associates where equity accounted carrying amounts differ from disclosed fair values and results relate to pooled findings across countries (i.e. only time periods are separated). The next section of this chapter details descriptive statistics, which are followed by the results of univariate investigations. Subsequent sections set out the results of multivariate investigations, robustness tests and a summary and conclusion of the chapter.

7.2. Descriptive statistics

Descriptive statistics for each sample year during the sample period of 31 December 2005 to 31 December 2011 are detailed in Table 37. All amounts are converted into ZAR for comparative purposes. When interpreting this table, it is important to note that this study does not utilise constant sample firms, with the result that distributions of variables are not directly comparable across sample years. Furthermore, the table shows that there are only ten firms with a financial year-end in 2005, largely because only firms with a December year-end qualify for inclusion in the sample in 2005. Because of the low number of firms for 2005, especially when taking into account that robustness testing would reduce the number of firms further, the analyses in this chapter are based on financial years ending during 2006 to 2011.

As is evident from Table 37, the number of firms within each of the retained sample years remains small and therefore discussions below and further in this chapter should be interpreted and generalised with caution. The impact of the global financial crisis on the sample firm-years is not immediately apparent from Table 37. For example, the highest net income from continuing operations for a single sample firm is in 2007 at ZAR 135 561 million. However, if one accepts the start of the financial crisis as February 2007 (Ryan, 2008:1606) it is plausible that the effect of the financial crisis only reflects in net income from continuing operations at a later stage. This is indeed the case, with the largest loss from continuing operations for a single firm amounting to ZAR 8 065 million occurring in 2008. Similarly, excluding 2005, mean net income from continuing operations peaks in 2007 at ZAR 12 158 million; although the lowest mean net income from continuing operations of ZAR 7 026 million is only recorded in 2009.

More importantly, the differences between equity accounted carrying amounts and disclosed fair values of listed associates vary widely between sample years. For example, in 2007 the difference between the mean (median) equity accounted carrying amounts of listed associates of ZAR 4 476 million (ZAR 816 million) and their mean (median) disclosed fair values of ZAR 14 638 million (ZAR 1 089 million) is over 200 per cent (30 per cent) of the equity accounted carrying amounts. By contrast, in 2008 this difference is 61 per cent when the means of the variables are compared and a mere 11 per cent for the comparison of median values. Some skew is evident in both of these variables, but not as much as book value of equity (excluding the equity accounted carrying amounts of listed associates for the purposes of this chapter).

Table 37: Descriptive statistics for individual sample years with listed associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: 2005						
MV_E	10	332 313	107 089	408 625	16 532	1 173 201
BV_{Eexcl}	10	114 692	33 511	190 399	1 853	609 171
NI	10	22 976	8 647	30 330	–1 043	93 255
ASC_{CA}	10	6 548	1 460	11 542	60	33 285
ASC_{FV}	10	19 013	2 004	34 350	100	99 528
Panel B: 2006						
MV_E	33	175 606	55 727	321 704	2 289	1 466 068
BV_{Eexcl}	33	47 035	17 646	106 221	1 065	609 300
NI	33	9 770	3 145	19 049	–575	92 270
ASC_{CA}	33	3 421	722	6 894	10	31 943
ASC_{FV}	33	10 074	1 073	25 227	12	126 041
Panel C: 2007						
MV_E	35	170 268	51 419	316 390	659	1 590 911
BV_{Eexcl}	35	57 030	21 682	151 341	93	903 440
NI	35	12 158	3 197	26 137	–4 275	135 561
ASC_{CA}	35	4 476	816	12 536	0	68 826
ASC_{FV}	35	14 638	1 089	47 375	3	264 132
Panel D: 2008						
MV_E	34	120 101	28 307	213 828	288	926 362
BV_{Eexcl}	34	70 956	31 960	170 274	107	996 180
NI	34	9 826	3 399	16 208	–523	73 433
ASC_{CA}	34	8 419	1 261	21 774	0	116 200
ASC_{FV}	34	13 592	1 410	36 961	10	194 577
Panel E: 2009						
MV_E	46	124 088	35 083	230 730	516	1 296 749
BV_{Eexcl}	46	66 380	21 676	173 565	–145	1 141 598
NI	46	7 026	2 209	16 309	–8 065	82 448
ASC_{CA}	46	6 490	1 018	17 792	0	110 679
ASC_{FV}	46	13 477	892	43 323	18	267 401
Panel F: 2010						
MV_E	48	122 969	36 107	221 770	918	1 229 793
BV_{Eexcl}	48	58 561	20 887	150 400	–31 585	997 205
NI	48	7 355	2 084	15 162	–3 802	92 773
ASC_{CA}	48	5 956	562	17 550	0	114 192
ASC_{FV}	48	13 232	860	38 231	13	219 388

Table 37: Descriptive statistics for individual sample years with listed associates (cont.)

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel G: 2011						
MV_E	47	137 589	35 843	248 423	600	1 233 069
BV_{Eexcl}	47	67 089	22 207	160 921	–1 360	1 053 490
NI	47	9 713	2 562	19 562	–1 148	112 211
ASC_{CA}	47	7 200	874	20 810	0	135 918
ASC_{FV}	47	13 338	1 107	35 855	11	160 000

MV_E Market value of equity, three months after reporting date

BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates

NI Net income from continuing operations, attributable to ordinary shareholders of the parent

ASC_{CA} Equity accounted carrying amounts of the listed associates

ASC_{FV} Disclosed fair values of the listed associates

A large part of the skew in book value of equity is due to the inclusion of financial services firms in the sample. As Table 38 shows, removing firms operating in this industry from the sample reduces the skew in this variable. Removing financial services firms from the sample also impacts on the distribution of other variables. For example, mean net income from continuing operations now peaks in 2008 at ZAR 8 939 million, although only marginally so with the corresponding value for 2007 being ZAR 8 713 million. Differences between the equity accounted carrying amounts and disclosed fair values of listed associates continue to vary widely between sample years. The difference between the mean (median) equity accounted carrying amounts of listed associates and their mean (median) disclosed fair values for 2007 is now 210 per cent (39 per cent) of the equity accounted carrying amounts. In 2008 the difference is 67 per cent when the means of the variables are compared and negative 20 per cent for the comparison of median values.

Table 38: Descriptive statistics for individual sample years with listed associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: 2005						
MV_E	6	260 902	107 089	345 319	16 532	936 107
BV_{Eexcl}	6	36 423	31 318	29 402	1 853	82 260
NI	6	13 418	4 160	20 608	–1 043	52 651
ASC_{CA}	6	4 684	1 460	8 658	60	22 199
ASC_{FV}	6	13 406	2 004	25 157	100	63 890
Panel B: 2006						
MV_E	24	155 956	58 160	254 648	5 171	1 138 463
BV_{Eexcl}	24	31 041	19 331	35 100	1 236	142 316
NI	24	7 760	2 226	13 755	–575	58 848
ASC_{CA}	24	2 333	720	4 675	10	20 671
ASC_{FV}	24	6 677	731	15 877	16	72 268
Panel C: 2007						
MV_E	28	136 692	58 580	214 752	659	933 191
BV_{Eexcl}	28	31 703	20 855	33 845	93	137 362
NI	28	8 713	2 094	16 284	–4 275	74 520
ASC_{CA}	28	2 235	720	5 749	0	29 242
ASC_{FV}	28	6 942	1 000	20 306	3	105 276
Panel D: 2008						
MV_E	27	103 160	27 234	175 211	288	769 120
BV_{Eexcl}	27	41 908	31 371	44 079	107	145 356
NI	27	8 939	2 331	16 105	–523	73 433
ASC_{CA}	27	4 979	1 186	11 371	0	44 893
ASC_{FV}	27	8 318	946	20 399	10	102 171
Panel E: 2009						
MV_E	36	123 188	52 101	171 299	371	638 925
BV_{Eexcl}	36	42 853	21 676	63 182	–145	306 889
NI	36	6 347	1 705	16 447	–8 065	82 448
ASC_{CA}	36	4 252	1 030	8 882	0	37 073
ASC_{FV}	36	8 532	892	22 504	18	120 594
Panel F: 2010						
MV_E	37	102 323	31 326	160 448	918	666 482
BV_{Eexcl}	37	36 842	17 972	58 882	–31 585	291 371
NI	37	5 229	1 884	8 568	–3 802	34 132
ASC_{CA}	37	3 548	557	7 481	0	31 251
ASC_{FV}	37	9 545	812	25 795	13	125 454

Table 38: Descriptive statistics for individual sample years with listed associates excluding financial services firms (cont.)

Panel G: 2011

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	37	100 083	36 342	131 795	601	525 329
BV_{Eexcl}	37	41 137	19 999	60 833	407	316 545
NI	37	7 440	2 339	12 667	–1 148	58 550
ASC_{CA}	37	4 090	794	8 117	0	32 941
ASC_{FV}	37	10 777	1 107	31 553	11	138 078

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

The potential problems that the distributions of the independent variables pose for analyses are dealt with in several ways. Skew is reduced by deleting outliers of more than 2,5 standard deviations from the mean. The impact of financial services firms on the skew of different variables is addressed during robustness tests, where these firms are excluded from sample firm-years. Similarly, the potential impact on results of including sample firm-years with a net loss from continuing operations is assessed with reference to a robustness test which excludes these sample firm-years.

7.3. Univariate investigations

The results of univariate investigations for each of the sample years (2005 being excluded for the reasons detailed earlier) are tabulated in Table 39 with Pearson (Spearman) correlations above (below) the diagonal in each of the panels. As Table 39 shows, net income from continuing operations and book value of equity are positive and significantly associated with market value in all of the sample years at the one per cent level. This is consistent with prior research findings that both these variables are consistently important components in explaining the market value of equity (Ohlson, 1995; Collins *et al.*, 1997).

Table 39: Univariate correlations for individual sample years with listed associates

	MV_E	**BV_{Eexcl}**	**NI**	**ASC_{CA}**	**ASC_{FV}**
Panel A: 2006 (N = 33)					
MV_E		***0,660	***0,837	0,224	*0,303
		(<0,001)	(<0,001)	(0,210)	(0,087)
BV_{Eexcl}	***0,872		***0,819	0,263	**0,373
	(<0,001)		(<0,001)	(0,140)	(0,032)
NI	***0,743	***0,630		*0,323	***0,481
	(<0,001)	(<0,001)		(0,066)	(0,005)
ASC_{CA}	***0,574	***0,542	***0,525		***0,902
	(<0,001)	(0,001)	(0,002)		(<0,001)
ASC_{FV}	***0,601	***0,540	***0,666	***0,961	
	(<0,001)	(0,001)	(<0,001)	(<0,001)	
Panel B: 2007 (N = 35)					
MV_E		***0,723	***0,465	**0,361	***0,434
		(<0,001)	(0,005)	(0,033)	(0,009)
BV_{Eexcl}	***0,849		***0,565	0,267	*0,299
	(<0,001)		(<0,001)	(0,121)	(0,082)
NI	***0,745	***0,706		**0,382	**0,382
	(<0,001)	(<0,001)		(0,024)	(0,024)
ASC_{CA}	***0,431	**0,374	***0,507		***0,921
	(0,010)	(0,027)	(0,002)		(<0,001)
ASC_{FV}	***0,435	**0,348	***0,580	***0,943	
	(0,009)	(0,041)	(<0,001)	(<0,001)	
Panel C: 2008 (N = 34)					
MV_E		***0,789	***0,875	0,113	**0,413
		(<0,001)	(<0,001)	(0,525)	(0,015)
BV_{Eexcl}	***0,838		***0,704	0,103	0,133
	(<0,001)		(<0,001)	(0,560)	(0,454)
NI	***0,888	***0,773		**0,427	***0,479
	(<0,001)	(<0,001)		(0,012)	(0,004)
ASC_{CA}	***0,459	**0,401	***0,440		***0,544
	(0,006)	(0,019)	(0,009)		(0,001)
ASC_{FV}	***0,594	***0,465	***0,573	***0,935	
	(<0,001)	(0,006)	(<0,001)	(<0,001)	

Table 39: Univariate correlations for individual sample years with listed associates (cont.)

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}
Panel D: 2009 (N = 46)					
MV_E		***0,671	***0,533	0,145	*0,248
		(<0,001)	(<0,001)	(0,335)	(0,096)
BV_{Eexcl}	***0,842		***0,457	0,057	0,145
	(<0,001)		(0,001)	(0,705)	(0,337)
NI	***0,727	***0,609		*0,265	**0,339
	(<0,001)	(<0,001)		(0,076)	(0,021)
ASC_{CA}	***0,448	**0,315	**0,302		***0,742
	(0,002)	(0,033)	(0,042)		(<0,001)
ASC_{FV}	***0,513	**0,338	***0,403	***0,945	
	(<0,001)	(0,022)	(0,005)	(<0,001)	
Panel E: 2010 (N = 48)					
MV_E		***0,836	***0,918	0,183	**0,306
		(<0,001)	(<0,001)	(0,212)	(0,035)
BV_{Eexcl}	***0,843		***0,789	0,117	0,166
	(<0,001)		(<0,001)	(0,428)	(0,259)
NI	***0,843	***0,757		**0,365	*0,240
	(<0,001)	(<0,001)		(0,011)	(0,100)
ASC_{CA}	***0,535	***0,374	***0,607		***0,501
	(<0,001)	(0,009)	(<0,001)		(<0,001)
ASC_{FV}	***0,634	***0,448	***0,639	***0,944	
	(<0,001)	(0,001)	(<0,001)	(<0,001)	
Panel F: 2011 (N =47)					
MV_E		***0,749	***0,749	*0,278	***0,460
		(<0,001)	(<0,001)	(0,058)	(0,001)
BV_{Eexcl}	***0,827		***0,641	0,143	0,108
	(<0,001)		(<0,001)	(0,338)	(0,472)
NI	***0,825	***0,704		***0,582	**0,359
	(<0,001)	(<0,001)		(<0,001)	(0,013)
ASC_{CA}	***0,594	***0,493	***0,561		***0,625
	(<0,001)	(<0,001)	(<0,001)		(<0,001)
ASC_{FV}	***0,615	***0,464	***0,604	***0,951	
	(<0,001)	(0,001)	(<0,001)	(<0,001)	

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

When the variables of interest are considered, Pearson correlations for the equity accounted carrying amounts of associates and the market value of equity, while consistently positive, are not significant in all of the sample years. Intriguingly, the sample years in which these particular correlations are insignificant are mainly clustered from 2008 to 2010. As the start of the global financial crisis is documented as February 2007 (Ryan, 2008:1606) the lack of significance for these correlations in these specific years could be evidence that the crisis shook investors' faith in measurements produced by accounting processes. By contrast, the disclosed fair values of listed associates are consistently positive and significantly correlated with market value of equity in each of the sample years.

Although the lack of significance for Pearson correlations in respect of equity accounted carrying amounts of associates for some of the sample years suggests that its value-relevance may vary over the sample period, this study relies on the results of the multivariate analyses detailed in the next section.

7.4. Detailed multivariate regression findings

The multivariate regression findings of this chapter are based on ordinary least squares regression results. As each sample year does not individually constitute a time series, there is no need to compensate for serial correlation (autocorrelation) as in previous chapters. The results of the main regression are tabulated in Table 40.

In this table the signs of the control variables, namely book value of equity and net income from continuing operations, are positive as predicted for all sample years. Both variables are significant in most of the sample years at the ten per cent level or better, with the exception of 2006 where book value of equity is not significant ($p = 0{,}518$). In each of the sample years the equity accounted carrying amounts of listed associates are negative and significant at the ten per cent level or better, with the exception of 2009, where the sign of the coefficient remains negative, but insignificantly so ($p = 0{,}406$). In addition the disclosed fair values of listed associates are positive and significant in all of the sample years at the five per cent level or better. Overall, the results per individual sample year are therefore consistent with those of the pooled regressions in Chapter 5: the equity accounted carrying amounts of listed associates as well as their disclosed fair values are value-relevant across time.

Table 40: Regression findings for listed associates for individual sample years

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	2006 #	2007	2008	2009	2010 #	2011 #
BV_{Eexcl}	+	0,256	*0,742	***0,378	***1,056	***0,846	***0,601
		(0,518)	(0,060)	(<0,001)	(<0,001)	(<0,001)	(0,001)
NI	+	***12,528	***6,202	***9,086	***5,380	***8,239	***10,759
		(<0,001)	(0,007)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	n/a	–17,824	13,841	23,704	17,259	**33,342
			(0,489)	(0,145)	(0,131)	(0,130)	(0,030)
ASC_{CA}	+ / –	***–11,866	*–5,113	***–1,965	–0,520	***–4,012	***–8,907
		(0,006)	(0,095)	(<0,001)	(0,406)	(<0,001)	(<0,001)
ASC_{FV}	+ / –	**3,673	**2,305	***1,007	***0,983	***2,423	***4,674
		(0,027)	(0,039)	(<0,001)	(0,004)	(<0,001)	(0,002)
N		28	32	33	44	44	42
Adjusted R^2		92,0%	76,2%	96,2%	74,9%	89,0%	86,5%
Indicator variable of the current versus prior year			*–15,102	**–13,716	**14,368	0,451	–4,639
			(0,087)	(0,043)	(0,040)	(0,945)	(0,385)
Difference in coefficients:							
– ASC_{CA}			1,395	1,068	**2,200	***3,395	**2,173
			(0,163)	(0,286)	(0,028)	(0,001)	(0,030)
– ASC_{FV}			0,733	1,207	0,063	**2,199	1,470
			(0,464)	(0,227)	(0,950)	(0,028)	(0,142)

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

In each of these sample years, the observation with the highest Cook's distance was deleted in order to normalise the distribution of the residuals, based on graphical analysis.

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

When the overall value-relevance of the regression between sample years is considered, the indicator variable for the current year is significant in three of the five comparisons. When 2007 is compared to 2006, the indicator variable for 2007 is negative (–15,102) and significant at the ten per cent level (p = 0,087). The indicator variable for 2008 when compared to 2007 is also negative (–13,716) and significant at the five per cent level (p = 0,043). However, the sign on the indicator variable for 2009 is positive (14,368) and significant at the five per cent level (p = 0,040) when 2009 is compared to the previous year. Both the other indicator variables are insignificant.

These results appear consistent with economic circumstances during the sample period. Ryan (2008:1606) traces the start of the financial crisis to February 2007. The negative coefficient on the 2007 indicator variable therefore suggests that equivalent fundamentals (accounting information) in 2006 and 2007 would have resulted in a lower market value for a specific firm in 2007. A similar conclusion is reached for 2008. If the turn in fortunes of the equity markets in late 2008 to early 2009 is accepted as indicative of an inflection point (at the very least) of the financial crisis, the positive indicator variable for 2009, representing the normalisation of economic circumstances, also makes intuitive sense.

The test statistic recommended by Brame *et al.* (1998:258) is used to consider whether the individual value-relevance for the variables of interest, namely the equity accounted carrying amounts of listed associates and their disclosed fair values, differ between one sample year and the preceding year. This statistic is insignificant in the majority of cases. However, post the financial crisis years of 2007–2008, the coefficient of the equity accounted carrying amounts of listed associates differs at the five per cent level or better between sample years. In addition, the coefficient of disclosed fair values of listed associates differs at the five per cent level (p = 0,028) between 2010 and 2009. The fact that the differences in value-relevance only occur during the post-crisis years, suggests that uncertainty among investors increased as a result of the financial crisis and it had not completely recovered by the end of the sample period.

When the specification of the models is considered, all VIF scores of the individual sample years are below ten and multi-collinearity therefore does not appear to be present. As far as the distribution of residuals is concerned, for the purposes of the initial regressions only outliers more than 2,5 standard deviations from the mean were deleted. However, in three of the sample years, namely 2006, 2010 and 2011, a graphical analysis of the initial results reveals that residuals are not normally distributed. For each of these sample years, one additional observation with the highest Cook's distance has therefore been deleted. In every sample year the deleted observation's Cook's distance was at least five times that of the observation with the second highest Cook's distance. After deleting these observations, the distributions of the sample years in question as well as those of the other sample years appear approximately normal. However, because of the small sample sizes, perfectly normal distributions are not achievable.

Including these observations, as opposed to deleting them, has a different impact on each of the affected sample years. In 2006 book value of equity would have a negative sign and the disclosed fair values of listed associates would be insignificant (p = 0,158). In 2010 results would be qualitatively unchanged from those reported, while including this observation in 2011 would reduce the significance on the disclosed fair value of listed associates (p = 0,108) while leaving the signs of all the variables unchanged from those reported.

In summary, the findings of this section suggest that the financial crisis years of 2007 and 2008 had a significant impact on value-relevance. Overall value-relevance of the model decreases significantly during these years and only normalises in 2009. The financial crisis also appears to have induced greater uncertainty amongst investors with the value-relevance of equity accounted carrying amounts and disclosed fair values of listed associates reflecting significant fluctuations in the post-crisis period. However, because of the small sample sizes for individual sample years, power is low and results should be generalised with caution. In the section which follows, the results of various robustness tests are detailed.

7.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion.

7.5.1. Using market value of equity at reporting date

In the main regression, the dependent variable is market value of equity three months after reporting date. This allows for the natural process whereby accounting information is not immediately available to investors. However, as prior research (Ball & Brown, 1968) shows that most accounting information is incorporated into the market value of equity by reporting date, the model is also run utilising market value of equity at reporting date. The results of this robustness test are detailed in Table 41.

Results relating to the control variables are in line with those reported in the main regression results. Book value of equity as well as net income from continuing operations are consistently positive and significant in all of the sample years at the five per cent level or better, excluding 2006, where book value of equity is positive, but insignificantly so ($p = 0{,}369$). The results for the equity accounted carrying amounts of listed associates are also generally consistent with those of the main regression. An exception is 2007 where the coefficient on this variable is now insignificant, although the sign remains negative. Disclosed fair values of listed associates remain positive in all sample years and significant at the ten per cent level or better. These results therefore confirm that the equity accounted carrying amounts of listed associates as well as their disclosed fair values are value-relevant across the sample period.

However, when overall value-relevance between sample years is compared, the indicator variables for the current year are all insignificant, although the signs are consistent with those of the main regression. This suggests that value-relevance between sample years does not differ at reporting date, but is induced by the passage of time. A possible cause could be that investors extrapolate accounting information from those reported in the prior years. If the current reporting period does not fundamentally differ from these prior years, value-relevance at reporting date and three months thereafter would not be impacted significantly. However, the financial crisis made extrapolating accounting information far more complex, which would increase the risk that predicted accounting information differs significantly from actual results. Therefore, the presence of the financial crisis years of 2007 and 2008 in the sample period is a possible reason why overall value-relevance differs when market values subsequent to the release of actual financial accounting information is utilised (as in the case in the main regression) but not at reporting date when only predicted values would be available.

When changes in the coefficients of the equity accounted carrying amounts and disclosed fair values of listed associates are considered, significant fluctuations are clustered in the post-crisis period. With the exception of 2007, where the value-relevance of the equity accounted carrying amounts of listed associates differs at the ten per cent level from that of 2006, all of the significant differences in value-relevance of this variable are detected in 2009–2011, subsequent to the financial crisis. Similarly, the only significant difference in coefficients for disclosed fair values of listed associates occurs when 2011 and 2010 are compared. As a result, findings appear broadly in line with those of the main regression, namely that the financial crisis induced greater uncertainty amongst investors about the valuation of investments in associates, which had not yet dissipated by the end of the sample period.

Table 41: Regression findings for listed associates for individual sample years with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	2006 #	2007	2008	2009	2010	2011 #
BV_{Eexcl}	+	0,273	**0,785	***0,494	***0,937	***0,529	***0,557
		(0,369)	(0,046)	(0,003)	(<0,001)	(0,002)	(0,002)
NI	+	***11,815	**5,281	***9,048	***5,230	***10,167	***10,292
		(<0,001)	(0,019)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	n/a	–19,141	8,394	19,356	**28,200	**29,169
			(0,453)	(0,652)	(0,215)	(0,031)	(0,042)
ASC_{CA}	+ / –	***–10,631	–3,520	***–1,939	–0,225	***–1,910	***–7,645
		(0,002)	(0,205)	(<0,001)	(0,717)	(0,001)	(<0,001)
ASC_{FV}	+ / –	***3,448	*1,684	*0,793	**0,688	***0,976	***3,846
		(0,009)	(0,086)	(0,073)	(0,039)	(<0,001)	(0,006)
N		28	32	33	44	46	42
Adjusted R^2		94,4%	73,8%	87,0%	72,2%	87,8%	86,7%
Indicator variable of the current versus prior year			–11,875	–6,357	6,845	0,250	–1,493
			(0,146)	(0,436)	(0,374)	(0,969)	(0,788)
Difference in coefficients:							
– ASC_{CA}			*1,761	0,578	**2,260	**2,097	***2,840
			(0,078)	(0,563)	(0,024)	(0,036)	(0,005)
– ASC_{FV}			1,164	0,863	0,198	0,831	**2,159
			(0,244)	(0,388)	(0,843)	(0,406)	(0,031)

MV_E Market value of equity at reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and tests whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

In each of these sample years, the observation with the highest Cook's distance was deleted in order to normalise the distribution of the residuals, based on graphical analysis.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

Similar to the main regression, in addition to deleting outliers more than 2,5 standard deviations from the mean, the observation with the highest Cook's distance is deleted in 2006 and 2011 in order to normalise the dispersion of the residuals. The resulting dispersions are approximately, but not perfectly, normal in all sample years due to the relatively small sample sizes. Including this observation (rather than deleting it) reduces all variables, excluding net income from continuing operations, to insignificant in 2006 and changes the sign on disclosed fair values of listed associates to negative. Including this observation for 2011, reduces the significance of the disclosed fair values of listed associates (p = 0,234) but leaves the remainder of the results qualitatively unchanged.

In summary, specifying the dependent variable at reporting date, rather than three months thereafter, does not alter the conclusion that the equity accounted carrying amounts and disclosed fair values of listed associates are value-relevant across sample years. However, overall value-relevance no longer differs between sample years, although the value-relevance of equity accounted carrying amounts and disclosed fair values of listed associates still differs significantly between sample years in the post-financial crisis years of 2009 to 2011. In the subsection that follows, the impact of eliminating loss-making firms and/or firms operating in certain industries is considered.

7.5.2. Eliminating firm-years with a loss and in certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. However, firm-years with a loss from continuing operations are different from other firm-years and an indicator variable may be an insufficient control. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the skew induced by financial services firms in the sample and therefore an analysis excluding these firms appears warranted. Results of various regression models, after making the aforementioned adjustments in turn, are tabulated from Table 42 onwards.

Table 42 reflects results from the regression model for each of the sample years when loss firm-years have been eliminated. The findings for the control variables are generally qualitatively consistent with those of the main regression. More specifically, book value of equity is positive in each of the sample years, but now insignificant in 2006 and 2007. Net income from continuing operations remains significantly positive at the one per cent level in every sample year. When the variables of interest are considered, results are also generally consistent with those of the main regression. The equity accounted carrying amounts of listed associates are negative in all sample years and significant at the five per cent level or better. In addition, their disclosed fair values remain positive in every sample year and significant at the one per cent level in all. Therefore, eliminating loss firm-years from the sample does not alter the conclusion that equity accounted carrying amounts and disclosed fair values of listed associates are both value-relevant across sample years.

When the overall value-relevance of sample years is compared, results are also similar to those of the main regression. Although the indicator variable for 2007 is now only mildly significant when the value-relevance of that year is compared to 2006 ($p = 0{,}135$), its negative sign is consistent with those of the main results. Similarly, the signs of the indicator variables for 2008 to 2011 are all consistent with those reported earlier. In addition, the indicator variables for 2008 and 2009 are significant at the five per cent level for 2008 ($p = 0{,}029$) and the ten per cent level for 2009 ($p = 0{,}078$). Equivalent inputs into the model would result in a significantly lower market value of equity for a firm in 2008 compared to 2007, while the market value would in turn be significantly higher in 2009 when compared to 2008. These conclusions appear to be in line with the underlying changes in economic circumstances during the sample period with the financial crisis severely affecting 2008 and the subsequent recovery affecting 2009.

Table 42: Regression findings for listed associates for individual sample years when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted Sign	2006 #	2007	2008	2009 #	2010	2011 #
BV_{Eexcl}	+	0,256	0,343	***0,374	***1,043	**0,453	**0,487
		(0,518)	(0,385)	(<0,001)	(<0,001)	(0,028)	(0,016)
NI	+	***12,528	***7,616	***9,176	***5,868	***11,267	***11,007
		(<0,001)	(0,003)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	***–11,866	**–6,919	***–1,966	**–3,356	***–2,051	***–9,555
		(0,006)	(0,042)	(<0,001)	(0,014)	(0,002)	(<0,001)
ASC_{FV}	+ / –	**3,673	***3,547	***0,991	***2,901	***0,740	***5,136
		(0,027)	(0,003)	(<0,001)	(0,003)	(<0,001)	(0,002)
N		28	31	29	32	40	39
Adjusted R^2		92,0%	77,0%	95,9%	80,2%	83,9%	85,3%
Indicator variable of the current versus prior year			–15,643	**–17,755	*12,540	3,751	–8,018
			(0,135)	(0,029)	(0,078)	(0,623)	(0,238)
Difference in coefficients:							
– ASC_{CA}			0,985	1,531	1,077	0,931	***3,252
			(0,325)	(0,126)	(0,282)	(0,352)	(0,001)
– ASC_{FV}			0,067	**2,357	**2,064	**2,381	***2,902
			(0,947)	(0,018)	(0,039)	(0,017)	(0,004)

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and tests whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

In each of these sample years, the observation with the highest Cook's distance was deleted in order to normalise the distribution of the residuals, based on graphical analysis.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

Interestingly, in contrast to the results of the main regressions, when loss firm-years are eliminated from the sample, differences in the coefficients of the individual variables are generally not detected for the equity accounted carrying amounts of listed associates. In Table 42 it is the coefficients of disclosed fair values of listed associates that reflect significant changes between sample years. The coefficient of the equity accounted carrying amounts differs significantly only between 2011 and 2010 (p = 0,001). However, similar to the main regression results, all of the significant differences in the value-relevance of the individual variables are clustered in post-crisis sample years. As a result, the conclusion that the financial crisis significantly increased the uncertainty contained in investors' valuation processes remains consistent with that of the main regression.

In this robustness test, as with those reported earlier, the observation with the highest Cook's distance in 2006, 2009 and 2011 respectively is deleted and outliers more than 2,5 standard deviations from the mean are also deleted in order to normalise the dispersion of the residuals. Although these deletions improve the dispersions so that they are approximately normal, the small sample sizes prevent the realisation of a perfectly normal distribution. Deleting this observation in 2006 ensures that the sign for book value of equity and the disclosed fair values of listed associates is positive rather than negative. In 2009, deleting this observation increases the significance of the equity accounted carrying amounts of listed associates where it was previously insignificant (p = 0,213) and in 2011 the significance of the disclosed fair values of the listed associates is increased, where they were previously only mildly significant (p = 0,114). In the latter two years, however, the signs on all coefficients remain unchanged as a result of deleting these observations.

When the industries in which sample firms operate are considered, excluding firms operating in the financial services, mining and utility industries significantly reduces sample sizes in each of the sample years, as evident from Table 43. As a result, the power of the regressions is further reduced. However, the results for the control variables are generally consistent with those of the main regression model. The sign of book value of equity is positive in all of the sample years and significant at the ten per cent level or better. Net income from continuing operations is also positive in all of the sample years, although it is now insignificant in 2009 (p = 0,355).

Table 43: Regression findings for listed associates for individual sample years when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	2006	2007	2008	2009	2010	2011
BV_{Eexcl}	+	*0,712 (0,059)	***1,267 (0,009)	*0,172 (0,065)	**0,592 (0,022)	***0,531 (0,006)	*0,333 (0,062)
NI	+	***14,083 (<0,001)	***13,826 (<0,001)	***11,546 (<0,001)	1,745 (0,355)	***13,897 (<0,001)	***15,863 (<0,001)
Neg	+ / –	n/a	n/a	10,651 (0,458)	–28,859 (0,359)	11,157 (0,543)	***65,100 (0,001)
ASC_{CA}	+ / –	–1,400 (0,833)	2,528 (0,578)	***–3,494 (<0,001)	–0,173 (0,857)	–1,100 (0,128)	***–11,963 (<0,001)
ASC_{FV}	+ / –	0,762 (0,614)	0,745 (0,492)	***1,146 (<0,001)	***1,477 (0,001)	0,618 (<0,001)	***5,635 (0,003)
N		15	20	20	22	22	22
Adjusted R^2		93,7%	90,1%	97,1%	80,2%	94,1%	95,8%
Indicator variable of the current versus prior year			–4,264 (0,593)	***–37,005 (0,001)	8,004 (0,390)	8,217 (0,488)	–1,623 (0,851)
Difference in coefficients:							
– ASC_{CA}			0,503 (0,615)	1,347 (0,178)	***2,894 (0,004)	0,796 (0,426)	***4,851 (<0,001)
– ASC_{FV}			0,009 (0,993)	0,373 (0,709)	0,811 (0,417)	**2,341 (0,019)	***3,134 (0,002)

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and tests whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

The equity accounted carrying amounts of listed associates remain negatively associated with market value of equity in most of the sample years, but are only significant in 2008 and 2011. In 2007 this variable is now positive, but insignificant (p = 0,578). Disclosed fair values of listed associates are positive throughout, but only significantly associated with market value of equity in 2008, 2009 and 2011. Results therefore suggest that these variables are no longer value-relevant, but this may be due to the low power of the regressions.

When the overall value-relevance of sample years is compared, the indicator variable is significant only in respect of the comparison of 2008–2007 at the one per cent level ($p = 0{,}001$). However, the signs of the coefficients of each of the indicator variables are consistent with those of previously reported results. This would imply that financial services and mining firms were disproportionately affected by the financial crisis and that other firms therefore had a relatively smaller recovery to make. The loss of significance for the coefficient for 2009 may also be due to the low power of the regressions and results should therefore be interpreted with caution. When differences in value-relevance for the individual variables are considered, significant differences in coefficients between sample years are once again clustered in 2009–2011. This confirms earlier conclusions that investors' uncertainty increased as a result of the financial crisis and had not abated by the end of the sample period.

In Table 44 results from the regression model where loss firm-years as well as firms operating in the financial services, mining and utility industries have been excluded from the sample are detailed. Although the power of the regression models reduces further, the results in respect of the control variables are now more broadly in line with those of the main regression than those detailed in Table 43. In Table 44, both the book value of equity and net income from continuing operations are consistently positive and significant at the ten per cent level or better. However, the equity accounted carrying amounts of listed associates are again insignificant in most sample years and have a positive sign in 2007, although it is insignificant in this year ($p = 0{,}578$). Similarly the disclosed fair value of listed associates is only significant (at the one per cent level) in 2008, 2009 and 2011.

Table 44: Regression findings for listed associates for individual sample years when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted Sign	2006	2007	2008	2009	2010	2011
BV_{Eexcl}	+	*0,712	***1,267	*0,172	**0,405	**0,537	*0,317
		(0,059)	(0,009)	(0,065)	(0,013)	(0,019)	(0,076)
NI	+	***14,083	***13,826	***11,546	***9,791	***13,112	***16,132
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	–1,400	2,528	***–3,494	**–1,450	–1,094	***–11,689
		(0,833)	(0,578)	(<0,001)	(0,025)	(0,205)	(<0,001)
ASC_{FV}	+ / –	0,762	0,745	***1,146	***1,069	0,624	***5,400
		(0,614)	(0,492)	(<0,001)	(<0,001)	(<0,001)	(0,005)
N		15	20	19	16	21	20
Adjusted R^2		93,7%	90,1%	97,1%	94,5%	91,2%	96,2%
Indicator variable of the current versus prior year			–4,264	***–37,005	**14,642	*16,124	–9,312
			(0,593)	(0,001)	(0,013)	(0,093)	(0,317)
Difference in coefficients:							
– ASC_{CA}			0,503	1,347	**2,419	0,363	***4,622
			(0,615)	(0,178)	(0,016)	(0,717)	(<0,001)
– ASC_{FV}			0,009	0,373	0,273	*1,924	***2,964
			(0,993)	(0,709)	(0,785)	(0,054)	(0,003)

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

When indicator variables for changes in overall value-relevance are considered, the results are generally consistent with those of the main regression model. Firstly, all of the signs of the indicator variables are the same and secondly, the indicator variable for 2008 is significantly negative at the one per cent level (p = 0,001) while that of 2009 is significantly positive at the five per cent level (p = 0,013). These results imply that the financial crisis of

2007–2008 had a significant negative impact on overall value-relevance, while the subsequent recovery in 2009 reflects a significant positive correction. Once again, significant differences in value-relevance on individual variables are clustered in the post-crisis period from 2009 to 2011. Although significant differences in coefficients are more widely spread between the measurement alternatives, in contrast to the main regression findings, the conclusion remains that the financial crisis increased the uncertainty of investors when valuing investments in associates and that this had not abated by the end of the sample period.

7.6. Summary and conclusion

This chapter investigates the null hypothesis that the value-relevance of disclosed fair values and equity accounted carrying amounts of associates is unchanged over time. Findings from the multivariate regression model suggest that both overall value-relevance of accounting information as well as the value-relevance specific to equity accounted carrying amounts and disclosed fair values of listed associates were significantly impacted by the financial crisis of 2007–2008.

Overall value-relevance appears to have recovered from the impact of the financial crisis, as no significant differences in value-relevance between sample years are detected beyond 2009. However, the financial crisis seems to have increased investors' uncertainty when valuing a firm's investment in its listed associates. Significant differences in the coefficients of the equity accounted carrying amounts and disclosed fair values of listed associates are clustered in the post-crisis sample years. Furthermore, this uncertainty continues to the end of the sample period with significant differences in value-relevance being recorded for 2011 for one or both of the measurement alternatives in each of the analyses of this chapter.

Generally speaking, results are robust to different model specifications and samples. However, overall value-relevance at reporting date did not differ between sample years, possibly because investors' extrapolations of other available information during the financial crisis did not accurately predict the actual accounting information which became available at a later date. Importantly, the power of the investigations of this chapter was relatively low, especially in a number of the robustness tests, and results should therefore be generalised with caution.

In Chapter 8, the same null hypothesis is investigated for a different sample, namely unlisted associates with disclosed fair values.

8. DETAILED FINDINGS: VALUE-RELEVANCE OF UNLISTED ASSOCIATES ACROSS TIME

8.1. Introduction

The third null hypothesis of this study is that the value-relevance of disclosed fair values and equity accounted carrying amounts of associates is unchanged over time. While the previous chapter discussed the findings relating to value-relevance across time in respect of *listed* associates, this chapter discusses the detailed findings for the same hypothesis in respect of *unlisted* associates where disclosed fair values differ from equity accounted carrying amounts. Results in this chapter relate to pooled findings across countries (i.e. only time periods are separated). The rest of the chapter is set out as follows: the subsequent section discusses descriptive statistics, followed by the results of univariate investigations. Detailed findings related to multivariate investigations and robustness tests are discussed in separate sections after which the chapter is summarised and concluded.

8.2. Descriptive statistics

Descriptive statistics for each sample year during the sample period of 31 December 2005 to 31 December 2011 are tabulated in Table 45. All amounts are stated in South African rand (ZAR) for comparative purposes. As this study does not utilise constant sample firms, it is important to note that the distribution of variables is not directly comparable across sample years. Furthermore, the table shows that there are only six firm-years with a financial year-end in 2005. This is mainly because only firms with a December year-end can be included in the sample for 2005. As a result of the low number of firms for 2005, the analyses in this chapter are based on financial years ending during 2006 to 2011. In addition, Table 45 shows that the mean and median market value of equity of sample firms are much lower than those reported for listed associates in Chapter 7. The small number of firms within each sample year together with the smaller size of sample firms implies that the findings in this chapter should be interpreted extremely cautiously.

Table 45: Descriptive statistics for individual sample years with unlisted associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: 2005						
MV_E	6	31 231	22 109	30 985	1 680	77 355
BV_{Eexcl}	6	10 805	6 453	10 937	969	25 652
NI	6	2 697	2 484	2 268	158	6 368
ASC_{CA}	6	269	182	249	18	657
ASC_{FV}	6	360	299	280	94	852
Panel B: 2006						
MV_E	22	27 880	14 605	38 199	58	174 909
BV_{Eexcl}	22	11 373	6 264	13 330	31	52 095
NI	22	3 216	1 192	4 532	0	16 846
ASC_{CA}	22	1 106	215	3 395	5	16 109
ASC_{FV}	22	2 598	305	8 774	5	41 564
Panel C: 2007						
MV_E	19	28 703	14 026	43 256	1 818	186 103
BV_{Eexcl}	19	12 424	4 731	15 962	550	62 577
NI	19	2 912	1 050	4 172	130	17 030
ASC_{CA}	19	1 549	236	4 876	7	21 555
ASC_{FV}	19	4 316	312	14 356	7	62 969
Panel D: 2008						
MV_E	19	27 688	9 479	53 455	681	233 592
BV_{Eexcl}	19	14 141	6 458	19 189	427	80 380
NI	19	3 055	1 019	5 256	–13	22 417
ASC_{CA}	19	2 242	195	6 052	6	26 510
ASC_{FV}	19	5 992	391	18 747	23	82 286
Panel E: 2009						
MV_E	18	32 452	12 025	54 690	147	180 101
BV_{Eexcl}	18	14 694	5 921	22 067	282	90 777
NI	18	1 237	854	3 490	–3 661	13 648
ASC_{CA}	18	1 171	238	1 758	6	6 957
ASC_{FV}	18	2 852	363	4 247	12	14 165

Table 45: Descriptive statistics for individual sample years with unlisted associates (cont.)

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel F: 2010						
MV_E	21	55 587	15 181	98 002	471	411 065
BV_{Eexcl}	21	26 926	6 276	51 679	390	230 087
NI	21	4 025	1 010	7 166	–7	30 340
ASC_{CA}	21	1 630	270	2 718	9	10 817
ASC_{FV}	21	3 215	369	6 004	11	20 782
Panel G: 2011						
MV_E	23	52 407	16 055	101 712	457	455 198
BV_{Eexcl}	23	27 426	6 304	57 158	133	263 738
NI	23	4 148	785	8 435	141	37 208
ASC_{CA}	23	1 635	289	2 773	10	11 540
ASC_{FV}	23	3 131	542	6 131	11	22 715

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates

The impact of the global financial crisis on sample firm-years is not greatly apparent from Table 45 with mean (median) net income from continuing operations reaching a low of ZAR 1 237 million (ZAR 785 million) in 2009 (2011). Taking the start of the financial crisis as February 2007 (Ryan, 2008:1606), this variable reaches its minimum at too late a stage to be attributed to the impact of the financial crisis. However, this may be due to the fact that the sample does not reflect constant sample firms. Due to the relatively small sample sizes, the impact of the financial crisis may simply be difficult to infer from the distributions of individual variables. Unlike listed associates (refer Chapter 7) the differences between the two measurement alternatives for unlisted associates, namely equity accounted carrying amounts and disclosed fair values, are far more consistent across sample years. In all sample years mean disclosed fair values of the unlisted associates differ by 90 per cent or more from their mean equity accounted carrying amounts with no noticeable trend in the differences. A large part of the skew for book value of equity (excluding the equity accounted carrying amounts of unlisted associates in this chapter) reflected in Table 45 is due to the inclusion of firms operating in the financial services industry. As Table 46 shows, excluding firms operating in this industry reduces the skew in this variable.

Table 46: Descriptive statistics for individual sample years with unlisted associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: 2005						
MV_E	3	14 057	6 220	17 653	1 680	34 272
BV_{Eexcl}	3	3 360	1 819	3 432	969	7 293
NI	3	1 400	851	1 588	158	3 190
ASC_{CA}	3	79	93	55	18	125
ASC_{FV}	3	161	130	86	94	258
Panel B: 2006						
MV_E	17	28 391	15 992	41 551	58	174 909
BV_{Eexcl}	17	10 727	5 994	13 134	31	52 095
NI	17	3 346	1 008	4 976	0	16 846
ASC_{CA}	17	1 228	214	3 855	5	16 109
ASC_{FV}	17	3 128	311	9 977	5	41 564
Panel C: 2007						
MV_E	15	32 002	15 367	47 673	1 818	186 103
BV_{Eexcl}	15	13 139	5 989	16 842	550	62 577
NI	15	3 182	1 195	4 549	130	17 030
ASC_{CA}	15	1 857	236	5 483	7	21 555
ASC_{FV}	15	5 323	263	16 118	7	62 969
Panel D: 2008						
MV_E	14	34 029	14 577	61 196	681	233 592
BV_{Eexcl}	14	17 043	9 933	21 263	609	80 380
NI	14	3 721	1 600	5 967	–13	22 417
ASC_{CA}	14	2 779	251	7 018	20	26 510
ASC_{FV}	14	7 847	412	21 731	23	82 286
Panel E: 2009						
MV_E	12	44 066	16 201	64 116	516	180 101
BV_{Eexcl}	12	19 447	8 893	25 445	636	90 777
NI	12	1 514	901	4 260	–3 661	13 648
ASC_{CA}	12	1 428	281	2 053	11	6 957
ASC_{FV}	12	3 551	392	4 952	12	14 165

Table 46: Descriptive statistics for individual sample years with unlisted associates excluding financial services firms (cont.)

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel F: 2010						
MV_E	14	44 604	17 226	64 682	471	200 246
BV_{Eexcl}	14	19 116	6 311	26 039	623	93 669
NI	14	3 029	976	4 568	–7	15 941
ASC_{CA}	14	2 020	212	3 217	10	10 817
ASC_{FV}	14	4 355	372	7 124	11	20 782
Panel G: 2011						
MV_E	17	37 788	16 055	58 051	457	215 385
BV_{Eexcl}	17	18 756	7 377	27 668	133	107 269
NI	17	2 962	785	4 989	141	19 794
ASC_{CA}	17	1 835	287	3 152	10	11 540
ASC_{FV}	17	3 790	542	7 026	11	22 715

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

The potential problems that the distributions of the independent variables pose for analyses are dealt with in several ways. Skew is reduced by deleting outliers more than 2,5 standard deviations from the mean. Similarly, the potential impact on results of including sample firm-years with a net loss from continuing operations is assessed with reference to a robustness test which excludes these sample firm-years. As subsequent discussions will detail, it was not possible to assess the robustness of results with regard to the industries in which sample firms operate.

8.3. Univariate investigations

The results of univariate investigations for each of the sample years (excluding 2005) are tabulated in Table 47 with Pearson (Spearman) correlations above (below) the diagonal in each of the panels. As Table 47 shows, most independent variables have significant positive correlations with the dependent variable, market value of equity, in all of the sample years. More specifically, the correlation between the market value of equity and the two control variables, book value of equity and net income from continuing operations, is significant at the five per cent level or better in all sample years.

By contrast, although they have significant and positive Pearson correlations with market value of equity in most years, the equity accounted carrying amounts of unlisted associates have insignificant Pearson correlations with market value of equity in 2006 and 2008. The disclosed fair values of listed associates also have an insignificant Pearson correlation with market value of equity in 2006, but continue to be significant in 2008 at the ten per cent level ($p = 0{,}080$). Although both measurement alternatives for unlisted associates, the equity accounted carrying amounts and disclosed fair values, are positive and significantly associated with market value of equity at the one per cent level in 2010 and 2011, this is not consistently the case in earlier years. This is an initial suggestion that the value-relevance of the measurement alternatives could differ between sample years, but this study relies on the results from the multivariate investigations, which are detailed in the next section.

8.4. Detailed multivariate regression findings

The multivariate regression findings of this chapter are based on ordinary least squares regression results. Similar to the previous chapter which investigated listed associates, each sample year does not individually constitute a time series and there is no need to compensate for serial correlation (autocorrelation). The results of the main regression are detailed in Table 48.

Table 47: Univariate correlations for individual sample years with unlisted associates

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}
Panel A: 2006 (N = 22)					
MV_E		***0,936	**0,501	0,275	0,260
		(<0,001)	(0,018)	(0,215)	(0,242)
BV_{Eexcl}	***0,899		**0,492	0,275	0,245
	(<0,001)		(0,020)	(0,215)	(0,273)
NI	***0,855	***0,898		0,262	0,351
	(<0,001)	(<0,001)		(0,239)	(0,109)
ASC_{CA}	***0,669	***0,687	***0,824		***0,991
	(0,001)	(<0,001)	(<0,001)		(<0,001)
ASC_{FV}	***0,712	***0,637	***0,819	***0,887	
	(<0,001)	(0,001)	(<0,001)	(<0,001)	
Panel B: 2007 (N =19)					
MV_E		***0,961	***0,955	*0,450	**0,465
		(<0,001)	(<0,001)	(0,053)	(0,045)
BV_{Eexcl}	***0,742		***0,991	*0,395	*0,389
	(<0,001)		(<0,001)	(0,094)	(0,100)
NI	***0,856	***0,896		*0,420	*0,401
	(<0,001)	(<0,001)		(0,073)	(0,088)
ASC_{CA}	***0,637	*0,412	**0,539		***0,988
	(0,003)	(0,079)	(0,017)		(<0,001)
ASC_{FV}	***0,707	**0,465	***0,611	***0,953	
	(0,001)	(0,045)	(0,005)	(<0,001)	
Panel C: 2008 (N =19)					
MV_E		***0,940	***0,985	0,377	*0,412
		(<0,001)	(<0,001)	(0,112)	(0,080)
BV_{Eexcl}	***0,902		***0,934	0,365	0,384
	(<0,001)		(<0,001)	(0,124)	(0,104)
NI	***0,935	***0,902		**0,456	**0,505
	(<0,001)	(<0,001)		(0,050)	(0,027)
ASC_{CA}	0,347	0,270	0,372		***0,971
	(0,145)	(0,263)	(0,117)		(<0,001)
ASC_{FV}	***0,602	**0,484	***0,616	***0,916	
	(0,006)	(0,036)	(0,005)	(<0,001)	

Table 47: Univariate correlations for individual sample years with unlisted associates (cont.)

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}
Panel D: 2009 (N =18)					
MV_E		***0,825	***0,694	*0,460	**0,569
		(<0,001)	(0,001)	(0,055)	(0,014)
BV_{Eexcl}	***0,940		***0,934	**0,535	**0,541
	(<0,001)		(<0,001)	(0,022)	(0,020)
NI	***0,926	***0,860		0,324	0,360
	(<0,001)	(<0,001)		(0,190)	(0,142)
ASC_{CA}	**0,478	*0,426	0,397		***0,761
	(0,045)	(0,078)	(0,103)		(<0,001)
ASC_{FV}	***0,643	**0,542	**0,550	***0,924	
	(0,004)	(0,020)	(0,018)	(<0,001)	
Panel E: 2010 (N =21)					
MV_E		***0,934	***0,969	***0,648	***0,600
		(<0,001)	(<0,001)	(0,001)	(0,004)
BV_{Eexcl}	***0,883		***0,945	***0,623	**0,522
	(<0,001)		(<0,001)	(0,003)	(0,015)
NI	***0,964	***0,917		***0,600	***0,603
	(<0,001)	(<0,001)		(0,004)	(0,004)
ASC_{CA}	**0,432	*0,422	**0,503		0,843
	(0,050)	(0,057)	(0,020)		(<0,001)
ASC_{FV}	***0,557	**0,509	***0,614	***0,953	
	(0,009)	(0,018)	(0,003)	(<0,001)	
Panel F: 2011 (N =23)					
MV_E		***0,950	***0,758	***0,622	***0,537
		(<0,001)	(<0,001)	(0,002)	(0,008)
BV_{Eexcl}	***0,837		***0,852	***0,601	**0,473
	(<0,001)		(<0,001)	(0,002)	(0,023)
NI	***0,873	***0,754		***0,534	***0,591
	(<0,001)	(<0,001)		(0,009)	(0,003)
ASC_{CA}	0,323	0,344	**0,429		***0,828
	(0,133)	(0,108)	(0,041)		(<0,001)
ASC_{FV}	*0,375	0,351	**0,458	***0,966	
	(0,078)	(0,101)	(0,028)	(<0,001)	

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

The impact of the small sample sizes is immediately evident in Table 48. Neither book value of equity nor net income from continuing operations is consistently positive or significant for all of the sample years. This is in stark contrast to prior research (Collins *et al.*, 1997) which found a positive relationship between both coefficients and market value of equity. In contrast, the variables of interest, namely the equity accounted carrying amounts and disclosed fair values of unlisted associates, are significant at the ten per cent level or better in all of the sample years, except 2010. This confirms that the alternative measurement bases, namely the equity accounted carrying amounts and disclosed fair values of unlisted associates, are value-relevant across the sample period. However, in 2008 both these variables have the opposite sign to the findings of the pooled regression in Chapter 6 as well as the findings of listed associates in Chapters 5 and 7. This suggests that the sign in 2008 may well be due to the small sample size involved. However, 2008 also represents the peak of the financial crisis, which started in February 2007 (Ryan, 2008:1606), and the change in sign of the coefficients could therefore also be attributed to this temporal change.

Comparing the overall value-relevance of each sample year with that of the year immediately preceding it seems to support the latter interpretation. The signs of the indicator variables (indicating the current year) are consistent with those reported for listed associates in Chapter 7. More specifically, the indicator variables for 2007 and 2008 (the years of the financial crisis) are negative, which suggest in each case that equal fundamentals in these years (accounting information) lead to a lower market value of equity compared to the prior year. Although insignificant in 2007, overall value-relevance decreases significantly in 2008 at the five per cent level ($p = 0,045$). Similar to the findings for listed associates, 2009 appears to represent a normalisation where the indicator for 2009 (when 2009 is compared to 2008) is positive and significant at the five per cent level ($p = 0,015$). Indicator variables for all of the other sample years are insignificant, suggesting that structural differences were at play only during the financial crisis years.

Table 48: Regression findings for unlisted associates for individual sample years

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted Sign	**2006**	**2007**	**2008**	**2009**	**2010**	**2011 #**
BV_{Eexcl}	+	***2,406	–0,003	–0,090	0,074	–0,054	***1,149
		(<0,001)	(0,998)	(0,738)	(0,858)	(0,858)	(0,005)
NI	+	0,828	**11,006	***10,900	***10,208	***12,726	3,024
		(0,743)	(0,049)	(<0,001)	(0,001)	(<0,001)	(0,180)
Neg	+ / –	n/a	n/a	8,958	0,770	–1,167	n/a
				(0,417)	(0,880)	(0,876)	
ASC_{CA}	+ / –	***–40,234	***–9,306	*1,563	**–5,777	–2,303	***–11,752
		(0,005)	(0,002)	(0,085)	(0,025)	(0,133)	(0,003)
ASC_{FV}	+ / –	***15,547	***3,295	**–0,753	***6,664	1,795	***10,967
		(0,004)	(0,001)	(0,022)	(0,009)	(0,110)	(0,003)
N		20	18	18	14	18	19
Adjusted R^2		92,1%	97,4%	98,6%	97,9%	99,2%	98,9%
Indicator variable of the current versus prior year			–1,601	**–13,885	**9,457	0,281	–3,464
			(0,786)	(0,045)	(0,015)	(0,924)	(0,342)
Difference in coefficients:							
– ASC_{CA}			**2,551	***4,417	***3,345	1,402	***2,645
			(0,011)	(<0,001)	(0,001)	(0,161)	(0,008)
– ASC_{FV}			***2,674	***4,965	***3,953	**2,293	***2,899
			(0,008)	(<0,001)	(<0,001)	(0,022)	(0,004)

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

In this sample year, the observation with the highest Cook's distance was deleted in order to normalise the distribution of the residuals, based on graphical analysis.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

Differences in value-relevance for the individual measurement bases are considered using the test statistic recommended by Brame *et al.* (1998:258). Unlike listed associates in

Chapter 7, where differences tend to be insignificant in the pre-crisis period, significant differences at the five per cent level or better are detected between almost all of the sample years for both measurement bases of unlisted associates. The exception is 2010 where the coefficient of the equity accounted carrying amounts of unlisted associates does not significantly differ from that of 2009. This suggests that investors face far more uncertainty when valuing unlisted associates than listed associates and that this uncertainty changes significantly between years. Furthermore, it also appears that this uncertainty exists in respect of investments in unlisted associates irrespective of surrounding economic circumstances. However, this interpretation is dependent on a small sample size and may not be generalisable.

When the specification of the models is considered, multi-collinearity is present in all of the sample years with VIF scores much higher than ten. This is true for all of the independent variables, including the control variables. In addition, because of the small sample sizes the distribution of residuals is not perfectly normal. As with all prior regressions, outliers more than 2,5 standard deviations from the mean were deleted to reduce the skew of the data. In addition, in 2011 the observation with the highest Cook's distance was deleted in order to produce a residual distribution which is closer to normality. Deleting this observation improves the significance of all of the variables, but removes previous significance of net income from continuing operations. The signs of the variables remain unchanged. Attempting the same procedure on the other sample years did not improve the distribution of residuals. Furthermore, due to the small sample sizes, the distribution of residuals tends to be slightly skewed in most sample years, with the exception of 2007 and 2008 where distributions appear approximately normal.

In summary, due to the small sample sizes, results of this chapter should be interpreted extremely cautiously. However, findings do suggest that the financial crisis negatively impacted on overall value-relevance and furthermore that the value-relevance of equity accounted carrying amounts and disclosed fair values of unlisted associates change over time. In the section which follows, the results of several robustness tests are discussed.

8.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion process.

8.5.1. Using market value of equity at reporting date

In the main regression, the dependent variable is market value of equity three months after reporting date. This allows for the natural process whereby accounting information is not immediately available to investors. However, because prior research (Ball & Brown, 1968) shows that most accounting information is incorporated into the market value of equity by reporting date, the model was also run utilising market value of equity at reporting date. The results of this robustness test are detailed in Table 49.

As is evident from Table 49, the small sample sizes of this chapter continue to have a significant impact on reported results when the dependent variable is taken at reporting date. Although net income from continuing operations is now positive and significant in all sample years except 2006, the sign and significance of the coefficient on book value of equity remains erratic. In addition, the signs and significance of the alternative measurement bases for unlisted associates, namely the the equity accounted carrying amounts and disclosed fair values, are not consistent with those reported elsewhere in this study. More specifically, these variables are significant at the five per cent level or better only in 2007 and 2010, in which years the signs are also consistent with those of earlier results; the equity accounted carrying amounts are negative while disclosed fair values are positively associated with market value of equity.

Table 49: Regression findings for unlisted associates for individual sample years with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted Sign	2006 #	2007	2008	2009	2010	2011
BV_{Eexcl}	+	***1,367	–1,122	0,550	**–0,910	–0,398	0,162
		(<0,001)	(0,447)	(0,118)	(0,014)	(0,252)	(0,686)
NI	+	–0,206	**13,916	**8,251	***15,521	***15,973	***10,565
		(0,759)	(0,020)	(0,012)	(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	n/a	n/a	7,925	1,020	2,107	n/a
				(0,519)	(0,841)	(0,783)	
ASC_{CA}	+ / –	8,670	***–8,766	1,380	0,699	**–3,332	0,042
		(0,431)	(0,004)	(0,154)	(0,602)	(0,042)	(0,967)
ASC_{FV}	+ / –	1,022	***3,132	–0,555	0,889	**2,692	–0,382
		(0,588)	(0,003)	(0,234)	(0,458)	(0,026)	(0,394)
N		20	18	17	15	17	21
Adjusted R^2		94,3%	96,6%	95,8%	98,0%	97,3%	98,2%
Indicator variable of the current versus prior year			9,954	**–13,391	*6,033	3,451	–3,772
			(0,211)	(0,028)	(0,091)	(0,303)	(0,317)
Difference in coefficients:							
– ASC_{CA}			1,591	***3,833	0,434	**2,096	*1,943
			(0,112)	(<0,001)	(0,664)	(0,036)	(0,052)
– ASC_{FV}			1,047	***3,959	1,183	1,174	***2,748
			(0,295)	(<0,001)	(0,237)	(0,240)	(0,006)

MV_E Market value of equity, at reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

In this sample year, the observation with the highest Cook's distance was deleted in order to normalise the distribution of the residuals, based on graphical analysis.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

When differences in overall value-relevance between sample years are considered, results are generally consistent with those of the main regression. The exception is 2007 where the sign of the indicator variable for the current year changes to positive, although it remains insignificant (p = 0,211). More importantly, the indicator variable for 2008 remains significantly negative at the five per cent level (p = 0,028) while that of 2009 remains positive, although only at the ten per cent level (p = 0,091). In addition, all of the other indicator variables remain insignificant. Although these results are in line with those of the main regressions, they differ from the results for listed associates, where utilising the market value of equity at reporting date resulted in no significant difference in overall value-relevance between any of the sample years. There are two possible reasons for this. One is that the results for unlisted associates remain inherently more difficult to forecast, especially during a financial crisis. The other is that the sample firms for this chapter tend to be smaller firms as the mean market value of equity is much lower than in the listed associates' sample. As a result, the continued significance around the financial crisis may reflect increased uncertainty amongst investors when forecasting for smaller firms during a crisis period, which does not transfer to larger firms with lower information asymmetry (e.g. firms contained in the listed associates sample in Chapter 7).

In Table 49 it is also evident that the coefficients for equity accounted carrying amounts and disclosed fair values of listed associates continue to differ significantly between some sample years. However, in contrast to the main regression results, these differences are only detected in the years from 2008 onwards. This continues to suggest that investors experience great uncertainty with the valuation of unlisted associates. However, this may also be a factor of the small sample sizes.

As with the main regression results, small sample sizes cause the distributions of residuals for each of the sample years to be somewhat skewed. In addition to deleting outliers greater than 2,5 standard deviations from the mean, the observation with the highest Cook's distance is deleted in 2006 in order to improve the normality of the distribution. Retaining this observation would not qualitatively impact on the reported results for this sample year, except that the sign for net income from continuing operations would turn positive. Overall, however, limited success can be achieved with such a small sample and results should be generalised with caution.

In the next subsection, the impact on results of eliminating loss-firms and those operating in certain industries is discussed.

8.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. However, firm-years with a loss from continuing operations are different from other firm-years and an indicator variable may be an insufficient control. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the skew induced by financial services firms in the sample and therefore an analysis excluding these firms appears warranted. Results of the regression model, after eliminating loss firm-years, are tabulated in Table 50.

In Table 50, where only loss-making firms have been eliminated, results on the control variables remain fairly consistent with those reported earlier, but are also erratic. Interestingly, the coefficients on equity accounted carrying amounts and disclosed fair values of unlisted associates are now only significant with a sign consistent with pooled results up to the end of 2007. The results for indicator variables indicating the current year are qualitatively consistent with those of the main regression results and suggest that overall value-relevance was significantly impacted by the financial crisis and the subsequent normalisation. However, in contrast to the main results, significant differences between sample years for the equity accounted carrying amounts and disclosed fair values are only detected in 2007 and 2008. Importantly, however, the results of the robustness test relies on sample sizes of 12 to 20 firms per sample year and should be considered and compared to the main regression results with caution.

Table 50: Regression findings for unlisted associates for individual sample years when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted Sign	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
BV_{Eexcl}	+	***2,406	–0,003	–0,090	–0,821	–0,054	*0,845
		(<0,001)	(0,998)	(0,738)	(0,117)	(0,858)	(0,077)
NI	+	0,828	**11,006	***10,900	***14,484	***12,726	**6,096
		(0,743)	(0,049)	(<0,001)	(<0,001)	(<0,001)	(0,032)
ASC_{CA}	+ / –	***–40,234	***–9,306	*1,563	–0,738	–2,303	–0,916
		(0,005)	(0,002)	(0,085)	(0,726)	(0,133)	(0,362)
ASC_{FV}	+ / –	***15,547	***3,295	**–0,753	1,940	1,795	*0,903
		(0,004)	(0,001)	(0,022)	(0,311)	(0,110)	(0,079)
N		20	18	17	12	17	20
Adjusted R^2		92,1%	97,4%	98,6%	95,6%	99,2%	98,3%
Indicator variable of the current versus prior year			–1,601	**–13,885	**7,992	4,423	–3,654
			(0,786)	(0,045)	(0,039)	(0,153)	(0,314)
Difference in coefficients:							
– ASC_{CA}			**2,551	***4,417	1,054	0,634	0,807
			(0,011)	(<0,001)	(0,292)	(0,526)	(0,420)
– ASC_{FV}			***2,674	***4,965	1,498	0,071	0,784
			(0,008)	(<0,001)	(0,134)	(0,943)	(0,433)

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample year is equal to that of the immediately preceding sample year.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

Sample sizes are reduced further when the industries in which sample firms operate are restricted. Where only an industry limitation is applied, sample sizes vary from 9 to 13 firms per sample year. When loss-firms are excluded from the sample with a simultaneous industry limitation, sample sizes vary from 6 to 13 firms per sample year. Because of the reduced sample sizes, results (untabulated) become ever more erratic. This is true for the control variables, where signs are not correct and variables are insignificant, as well as the equity accounted carrying amounts and disclosed fair values of unlisted associates. Furthermore, significant differences between sample years all but disappear. However, these results are clearly due to the small sample sizes and cannot be relied upon. Therefore the robustness of the main conclusions of this chapter cannot be reliably assessed in respect of the industries in which firms operate.

The following section of this chapter summarises and concludes its results.

8.6. Summary and conclusion

This chapter investigates the hypothesis (in null form) that the value-relevance of disclosed fair values and equity accounted carrying amounts of unlisted associates does not vary across time. Although the small sample sizes of this chapter limits significant generalisation, results suggest that the financial crisis had a significant impact on overall value-relevance. The value-relevance of equity accounted carrying amounts and disclosed fair values of unlisted associates also appears to fluctuate significantly between sample years. Results appear robust to specifying the dependent variable at reporting date (rather than three months thereafter) and excluding loss-firms from the sample. However, because of the small sample sizes, robustness of results to excluding firms operating in certain industries cannot be reliably assessed and were therefore not performed.

9. DETAILED FINDINGS: VALUE-RELEVANCE OF LISTED ASSOCIATES BETWEEN COUNTRIES

9.1. Introduction

This chapter investigates the fourth hypothesis of this study. This hypothesis (in null form) states that the value-relevance of disclosed fair values and equity accounted carrying amounts of associates does not differ between countries. In order to facilitate the discussion process, the detailed findings of the investigations focused on this hypothesis are reported in two chapters. The current chapter discusses detailed findings in respect of *listed* associates (where disclosed fair values differ from equity accounted carrying amounts), while the next chapter discusses detailed findings in respect of *unlisted* associates. Results reported in this chapter are pooled over time (i.e. only countries are separated). The rest of this chapter is set out as follows: descriptive statistics are discussed in the subsequent section and the results of univariate investigations in the section thereafter. Detailed findings from the multivariate regression model and various robustness tests are discussed in separate sections. The final section summarises the detailed findings and concludes the chapter.

9.2. Descriptive statistics

The descriptive statistics for firms with investments in listed associates are detailed in Table 51 per sample country. For comparison purposes all amounts are converted to South African rand (ZAR). It is immediately apparent from this table that average sample firms in the United Kingdom are larger than average sample firms in the other two sample countries. Mean (median) market value of equity three months after reporting date is ZAR 347 388 million (ZAR 170 262 million) in the United Kingdom, compared to a mean (median) of market value of ZAR 48 092 million (ZAR 34 438 million) in South African and ZAR 65 074 million (ZAR 27 063 million) in Australia. A similar trend is evident for book value of equity. Mean (median) book value of equity, which excludes the equity accounted carrying amounts of listed associates for the purposes of this chapter, in the United Kingdom is ZAR 145 304 million (ZAR 61 045 million) for sample firms. This compares to mean (median) book value of equity of ZAR 19 168 million (ZAR 16 428 million) in South Africa and ZAR 34 775 million (ZAR 16 015 million) in Australia.

Table 51: Descriptive statistics for individual sample countries with listed associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: South Africa						
MV_E	90	48 092	34 438	48 955	288	269 352
BV_{Eexcl}	90	19 168	16 428	17 577	–1 360	64 043
NI	90	3 027	2 174	3 451	–4 275	12 779
ASC_{CA}	90	3 174	540	6 218	0	25 061
ASC_{FV}	90	8 125	780	19 932	3	137 700
Panel B: United Kingdom						
MV_E	79	347 388	170 262	393 775	8 923	1 590 911
BV_{Eexcl}	79	145 304	61 045	253 707	–31 585	1 141 598
NI	79	23 902	11 547	29 024	–1 237	135 561
ASC_{CA}	79	14 329	2 128	27 943	0	135 918
ASC_{FV}	79	31 557	3 579	60 875	11	267 401
Panel C: Australia						
MV_E	84	65 074	27 063	99 303	659	455 198
BV_{Eexcl}	84	34 775	16 015	54 933	–145	251 001
NI	84	3 380	1 220	7 499	–8 065	37 208
ASC_{CA}	84	1 505	421	2 882	0	13 308
ASC_{FV}	84	1 843	389	3 835	13	18 576

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates

However, when the variables of interest (the equity accounted carrying amounts of listed associates and their disclosed fair values) are considered, the United Kingdom no longer represents the exception. Although the mean and median values of these variables are still much higher in absolute terms for the United Kingdom compared to the other sample countries, their relative sizes are similar to that of South Africa. More specifically, the mean (median) disclosed fair values of listed associates are 120 per cent (68 per cent) higher than their mean (median) equity accounted carrying amounts for the United Kingdom sample firms. This compares to a difference between the mean (median) disclosed fair values and equity accounted carrying amounts of listed associates in South African sample firms of 156 per cent (44 per cent). Indeed, for these variables, the Australian sample firms represent the anomaly. For Australian sample firms the mean (median) disclosed fair values of ZAR 1 843 million (ZAR 389 million) exceed (are below) the mean (median) equity accounted carrying amounts of listed associates by 22 per cent (8 per cent). This implies that cross-country differences, if they exist, are influenced by multiple variables.

Excluding financial services firms from the sample reduces the skew evident from the main descriptive statistics almost universally across the different variables and sample countries, as evident from the descriptive statistics tabulated in Table 52. Excluding financial services firms from the sample particularly narrows the differences between the mean and median of particularly book value of equity and net income from continuing operations. However, a similar effect is evident for the disclosed fair values and equity accounted carrying amounts of listed associates. In respect of these variables, Australian sample firms still represent an anomaly. The mean (median) disclosed fair values of listed associates in Australia differ by 18 per cent (7 per cent) from their mean (median) equity accounted carrying amounts. By contrast, the mean (median) difference in South Africa is 236 per cent (32 per cent) and 125 per cent (89 per cent) in the United Kingdom. The descriptive statistics therefore suggest that the disclosed fair values and equity accounted carrying amounts of listed associates for Australian sample firms are much closer together than in the other sample countries. This provides an initial indication that analysing cross-country differences could be insightful.

Potential implications for analyses, highlighted by the descriptive statistics, are dealt with in several ways. Skew is reduced by deleting outliers more than 2,5 standard deviations from the mean. The potential impact of financial services firms on inferences is assessed with reference to robustness tests, where these firms are excluded from the sample. Similarly, robustness tests also consider whether eliminating loss firms from the sample impacts on inferences. The next section details the results of univariate investigations.

Table 52: Descriptive statistics for individual sample countries with listed associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: South Africa						
MV_E	61	48 763	32 570	52 602	288	269 352
BV_{Eexcl}	61	18 631	16 770	14 807	107	56 335
NI	61	2 306	1 884	2 963	–4 275	11 680
ASC_{CA}	61	2 493	536	5 200	0	23 380
ASC_{FV}	61	8 387	706	22 547	3	137 700
Panel B: United Kingdom						
MV_E	65	274 105	134 757	276 120	8 924	1 138 463
BV_{Eexcl}	65	70 490	59 070	68 757	–31 585	316 545
NI	65	18 465	10 040	19 832	–1 237	82 448
ASC_{CA}	65	7 753	1 834	11 581	0	44 893
ASC_{FV}	65	17 458	3 470	32 855	11	138 078
Panel C: Australia						
MV_E	69	42 686	24 244	61 730	659	276 207
BV_{Eexcl}	69	24 527	15 207	37 589	–145	174 899
NI	69	1 571	657	4 252	–8 065	18 703
ASC_{CA}	69	890	430	1 411	0	7 293
ASC_{FV}	69	1 048	400	2 182	13	14 833

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

9.3. Univariate investigations

The discussion in this section of the chapter focuses on the results of univariate investigations, the results of which are tabulated in Table 53. Generally speaking, the independent variables all reflect significant positive correlation with the dependent variable (market value of equity) at the one per cent level. The first exception is disclosed fair values of listed associates for South African firms where the Pearson correlation is only significant at the five per cent level ($p = 0{,}047$). The second exception is equity accounted carrying amounts of listed associates, which have insignificant Pearson correlations with the dependent variable in South Africa and the United Kingdom. As far as the equity accounted carrying amounts of listed associates are concerned, Australia appears to be the exception, where this variable has a significant positive Pearson correlation with market value of equity at the one per cent level ($p < 0{,}001$). This is suggestive of cross-country differences, but this study relies on the findings of the multivariate regressions, which are discussed in the section that follows.

9.4. Detailed multivariate regression findings

This section discusses the findings from multivariate regression findings, run separately for each sample country and then compared. Each country sample represents a time series, and initial Durbin–Watson statistics reveal significant serial correlation (autocorrelation). Therefore the results reported in this chapter are based on autoregression results from maximum likelihood estimation[9]. Outliers more than 2,5 standard deviations from the mean are deleted in order to reduce skew and normalise the distribution of residuals. The detailed findings of the main investigation are tabulated in Table 54.

---

[9] Autoregression with maximum likelihood estimation corrects for serial correlation and, as an added advantage, tends to be less sensitive to the impact of outliers, skewness and heteroskedasticity than ordinary least squares as it is a nonparametric estimation method.

Table 53: Univariate correlations for individual sample countries with listed associates

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}
Panel A: South Africa (N = 90)					
MV_E		***0,806	***0,738	0,091	**0,210
		(<0,001)	(<0,001)	(0,394)	(0,047)
BV_{Eexcl}	***0,844		***0,648	0,165	*0,205
	(<0,001)		(<0,001)	(0,121)	(0,053)
NI	***0,629	***0,563		***0,311	**0,222
	(<0,001)	(<0,001)		(0,003)	(0,036)
ASC_{CA}	***0,429	**0,226	***0,440		***0,616
	(<0,001)	(0,032)	(<0,001)		(<0,001)
ASC_{FV}	***0,465	**0,267	***0,513	***0,938	
	(<0,001)	(0,011)	(<0,001)	(<0,001)	
Panel B: United Kingdom (N = 79)					
MV_E		***0,510	***0,772	0,116	***0,475
		(<0,001)	(<0,001)	(0,311)	(<0,001)
BV_{Eexcl}	***0,436		***0,609	0,066	0,040
	(<0,001)		(<0,001)	(0,564)	(0,728)
NI	***0,788	***0,495		***0,324	***0,463
	(<0,001)	(<0,001)		(0,004)	(<0,001)
ASC_{CA}	***0,296	***0,418	***0,372		***0,737
	(0,008)	(<0,001)	(0,001)		(<0,001)
ASC_{FV}	***0,394	***0,367	***0,441	***0,933	
	(<0,001)	(0,001)	(<0,001)	(<0,001)	
Panel C: Australia (N = 84)					
MV_E		***0,752	***0,828	***0,557	***0,538
		(<0,001)	(<0,001)	(<0,001)	(<0,001)
BV_{Eexcl}	***0,843		***0,693	*0,184	*0,183
	(<0,001)		(<0,001)	(0,093)	(0,096)
NI	***0,777	***0,728		***0,370	***0,397
	(<0,001)	(<0,001)		(0,001)	(<0,001)
ASC_{CA}	***0,664	***0,583	***0,492		***0,957
	(<0,001)	(<0,001)	(<0,001)		(<0,001)
ASC_{FV}	***0,644	***0,540	***0,498	0,955	
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	

MV_E Market value of equity, three months after reporting date

BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates

NI Net income from continuing operations, attributable to ordinary shareholders of the parent

ASC_{CA} Equity accounted carrying amounts of the listed associates

ASC_{FV} Disclosed fair values of the listed associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

Table 54: Regression findings for individual sample countries with listed associates

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted Sign	South Africa	United Kingdom	Australia
BV_{Eexcl}	+	***1,922	***0,502	***0,689
		(<0,001)	(0,004)	(<0,001)
NI	+	***6,578	***8,027	***7,173
		(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	**58,863	22,943	**12,819
		(0,017)	(0,415)	(0,023)
ASC_{CA}	+ / –	***–2,717	***–2,853	***5,669
		(0,001)	(<0,001)	(0,001)
ASC_{FV}	+ / –	***0,694	***2,466	–0,915
		(<0,001)	(<0,001)	(0,467)
N		87	78	82
Structural R^2		88,5%	79,9%	93,1%

Indicator variable on country comparisons (South Africa and Australia are the base countries):

	South Africa	United Kingdom	Australia
South Africa		–10,063	–6,538
		(0,254)	(0,340)
United Kingdom	–10,063		–0,113
	(0,254)		(0,986)
Australia	–6,538	–0,113	
	(0,340)	(0,986)	

Difference in coefficients (ASC_{CA} above and ASC_{FV} below the diagonal):

	South Africa	United Kingdom	Australia
South Africa		0,144	***4,461
		(0,886)	(<0,001)
United Kingdom	***3,899		***4,779
	(<0,001)		(<0,001)
Australia	1,277	**2,560	
	(0,202)	(0,011)	

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Consistent with the results of the pooled regressions in Chapter 5, book value of equity and net income from continuing operations are positive (as predicted) and significantly associated with market value of equity at the one per cent level for all sample countries in Table 54. In respect of the variables of interest (disclosed fair values and equity accounted carrying amounts of listed associates), Australia consistently reflects results which differ from those of the other two sample countries as well as the pooled regression. More specifically, the equity accounted carrying amounts of listed associates are negative and significant at the one per cent level in South Africa and the United Kingdom, which is consistent with the results of the pooled regression. However, in Australia the equity accounted carrying amounts are positive (5,669) and significant at the one per cent level ($p = 0{,}001$). Similarly, the disclosed fair values of listed associates in South Africa and the United Kingdom are positive and significant at the one per cent level ($p < 0{,}001$), which is consistent with the results of the pooled regression in Chapter 5. In Australia the disclosed fair values of listed associates are negative (-0,915), but insignificant ($p = 0{,}467$).

These results suggest that both measurement alternatives are value-relevant in South Africa and the United Kingdom (consistent with the pooled regression findings), but that only one measurement alternative is value-relevant in Australia. Importantly, the results for the Australian sample are consistent with those of prior research. Barth and Clinch (1998:217) find that disclosed fair values of listed associates are only value-relevant for the mining and financial services firms within their sample of Australian firms. It could therefore be that the results for Australia in this study are dominated by firms operating in other industries. This possibility is further investigated in subsequent robustness tests.

When an indicator variable approach is used to compare overall value-relevance between countries, all of the indicator variables are insignificant (with p-values of 0,254 and higher). This implies that overall value-relevance does not differ between the sample countries and that no significant structural differences therefore exist. Given these countries' shared history and similar accounting standards (IFRS) during the sample period, this finding is somewhat predictable. However, given that South Africa is a developing country, it is interesting that the indicator variable between South African and each of the other sample countries (both developed countries) is negative when South Africa is the base country. This is somewhat counterintuitive, as it implies that companies operating in developing countries command a market premium. However, this premium does not appear to be significant and may be specific to the sample period as it straddles a global financial crisis, which originated in developed markets.

However, significant cross-country differences become apparent when the value-relevance of the individual variables of interest is compared. The test statistic recommended by Brame *et al*. (1998) is utilised for this purpose. These investigations show that the coefficients of equity accounted carrying amounts of listed associates differ significantly between Australia and each of the other sample countries at the one per cent level ($p < 0{,}001$). By contrast, the coefficients of equity accounted carrying amounts of listed associates do not differ significantly between South Africa and the United Kingdom ($p = 0{,}886$). Australian sample firms therefore continue to represent an anomaly.

Interestingly, the same does not apply to the disclosed fair values of listed associates. Here the coefficient of the variable for United Kingdom sample firms differs significantly from that of South Africa at the one per cent level ($p < 0{,}001$) and that of Australia at the five per cent level ($p = 0{,}011$). By contrast, no significant difference in the coefficients of disclosed fair values of listed associates is detected when the South African and Australian sample firms are compared ($p = 0{,}202$). This would suggest that disclosed fair values of listed associates are more readily used by equity investors in the United Kingdom than in the other two sample countries. A possible explanation in the case of Australia could be that investors prefer to rely on the equity accounted carrying amounts of these associates, although this explanation does not apply to the difference detected between South Africa and the United Kingdom.

The results from the maximum likelihood regression reflect Durbin–Watson statistics close to two for Australia and the United Kingdom, indicating that serial correlation has successfully been corrected. The test statistic for the South African sample is 1,907, which is an inconclusive result at the five per cent level. However, as test statistic is very close to the upper limit and results for South Africa are consistent with those of the pooled regression, any remaining serial correlation is unlikely to alter inferences. Results from the regression model are also analysed graphically, which reveals that residuals are approximately normally distributed in each sample country and do not exhibit heteroskedasticity. Multi-collinearity does not appear to be significant for the South African and United Kingdom samples, with VIF scores well below ten for all variables. In Australia, the VIF score for the disclosed fair values and equity accounted carrying amounts of listed associates is approximately 13. When one or the other of these variables is omitted for the Australian sample firms, the remaining variable is significant at the one per cent level. In this respect, note that the descriptive statistics detected comparatively small differences between the equity accounted carrying amounts and disclosed fair values of listed associates for this sample country. It is therefore likely that the reason for the findings for Australia is that the disclosed fair values and equity accounted carrying amounts of listed associates are statistically indistinguishable. However, these findings merely confirm earlier conclusions that, unlike in the other sample countries, only one of the measurement alternatives is value-relevant in Australia.

In summary, the main regression findings in this chapter suggest that equity accounted carrying amounts and disclosed fair values of listed associates are both value-relevant in South Africa and the United Kingdom, but not in Australia, where only the equity accounted carrying amounts appear to be value-relevant. Overall value-relevance does not differ significantly between sample countries. However, the individual value-relevance of equity accounted carrying amounts of listed associates differs significantly between Australia and each of the other sample countries. In addition, the individual value-relevance of disclosed fair values of listed associates differs significantly between the United Kingdom and each of the other sample countries. The results therefore suggest that equity accounted carrying amounts of listed associates play a much more important role in Australia than the other two sample countries and that the same is true for disclosed fair values in the United Kingdom. The next section of this chapter details the results of several robustness tests conducted.

9.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion process.

9.5.1. Using market value of equity at reporting date

The main regression in this chapter specifies the dependent variable as market value of equity three months after reporting date. This allows for the natural period of time between the end of the reporting period and the date that financial reports are published. However, prior research (Ball & Brown, 1968) finds that most of the information content of financial reports is anticipated by markets and already incorporated into the market value of equity at reporting date. Furthermore, it is not implausible that relevant information relating to listed associates may be incorporated in the investor’s market value of equity on an ongoing basis, as information about these associates is also in the public domain. Therefore, the results of the main regression are assessed for robustness by running the regression when the dependent variable (market value of equity) is specified to be at reporting date (rather than three months thereafter). The results of this robustness test are tabulated in Table 55.

Table 55: Regression findings for listed associates for individual sample countries with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	South Africa	United Kingdom	Australia
BV_{Eexcl}	+	***2,015	***0,423	***0,917
		(<0,001)	(0,009)	(<0,001)
NI	+	***5,075	***7,886	***5,358
		(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	***60,027	11,237	8,067
		(0,003)	(0,684)	(0,180)
ASC_{CA}	+ / –	***–2,371	***–2,819	*3,037
		(<0,001)	(<0,001)	(0,066)
ASC_{FV}	+ / –	***0,697	***2,400	–0,183
		(<0,001)	(<0,001)	(0,879)
N		87	78	82
Structural R^2		90,8%	78,9%	92,3%

Indicator variable on country comparisons (South Africa and Australia are the base countries):

	South Africa	United Kingdom	Australia
South Africa		–9,215	–6,814
		(0,252)	(0,270)
United Kingdom	–9,215		–1,571
	(0,252)		(0,805)
Australia	–6,814	–1,571	
	(0,270)	(0,805)	

Difference in coefficients (ASC_{CA} above and ASC_{FV} below the diagonal):

	South Africa	United Kingdom	Australia
South Africa		0,556	***3,103
		(0,578)	(0,002)
United Kingdom	***3,897		***3,434
	(<0,001)		(0,001)
Australia	0,732	**2,038	
	(0,464)	(0,042)	

MV_E Market value of equity at reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

As evident from this table, the control variables, namely book value of equity and net income from continuing operations, are positive (as predicted) and significant at the one per cent level. These results are consistent with those of the main regression. In addition, the findings for the variables of interest (the equity accounted carrying amounts of listed associates and their disclosed fair values) are qualitatively consistent with those of the main regression for South Africa and the United Kingdom.

More specifically, the equity accounted carrying amounts of listed associates are negative and significant at the one per cent level ($p < 0{,}001$) in these countries, while disclosed fair values are positive and significant at the one per cent level ($p < 0{,}001$). Although the positive sign for the equity accounted carrying amounts of listed associates for the Australian sample firms is consistent with the main regression results, it is now only significant at the ten per cent level ($p = 0{,}066$). However, the disclosed fair values of listed associates remain negative (–0,183) and insignificant ($p = 0{,}879$) for the Australian sample firms. These results suggest that only one of the alternative measurement bases (the equity accounted carrying amounts) for listed associates is value-relevant in Australia. This is in contrast to the two other sample countries where both measurement bases are value-relevant, but consistent with the main regression results.

Overall value-relevance between the sample countries is compared using an indicator variable technique. These indicator variables are insignificant and indicate that overall value-relevance does not differ significantly between sample countries. Furthermore, the signs of the indicator variables are consistent with those of the main regression findings. Results therefore imply that findings around cross-country differences in overall value-relevance are robust to specifying the dependent variable at reporting date (rather than three months thereafter).

Using the test statistic recommended by Brame *et al.* (1998), findings around the value-relevance of individual independent variables are also consistent with those of the main regression. The coefficient of equity accounted carrying amounts of listed associates in Australia differs significantly (at the one per cent level) when compared to either of the other sample countries. By contrast the coefficient of equity accounted carrying amounts of listed associates does not differ significantly between the sample firms of South Africa and the United Kingdom (p = 0,578). Turning to the disclosed fair value of listed associates, the test statistic finds significant differences between the coefficient in the United Kingdom and each of the other sample countries at the five per cent level or better, but fails to detect a significant difference between South African and Australian sample firms (p = 0,464).

In summary, specifying the dependent variable at reporting date (rather than three months thereafter) does not impact on inferences. Although the significance of the equity accounted carrying amounts of Australian firms declines, all other results are qualitatively similar to those of the main regression. The subsection which follows considers the impact of loss firms and different industries on inferences.

9.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. However, the indicator variable may not sufficiently compensate for differences between loss and profit firms and therefore a robustness test is performed, where these firms are excluded from the sample. Furthermore, the main sample includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the skew induced by financial services firms in the sample and therefore an analysis excluding these firms appears warranted. Omitting mining firms is of particular interest for the investigations of this chapter as prior research on Australian firms finds that disclosed fair values of listed associates are only value-relevant for financial services and mining firms in this country (Barth & Clinch, 1998:217). Results of various regression models, after making the aforementioned adjustments in turn, are tabulated from Table 56 onwards.

Table 56 details the results from the regression model when only firms with a net loss from continuing operations are excluded from the sample. Results when applying this sample requirement are qualitatively consistent with those of the main regression of this chapter. In particular, book value of equity and net income remain positive, as predicted, and significant at the one per cent level in all sample countries. More importantly, the equity accounted carrying amounts of listed associates are still negative and significant at the one per cent level ($p < 0,001$) for sample firms from South Africa and the United Kingdom. The equity accounted carrying amounts of listed associates are positive (3,666) for Australian sample firms (consistent with the main regression results) although the level of significance declines to the five per cent level ($p = 0,036$). Disclosed fair values of listed associates are positive and significant at the one per cent level ($p < 0,001$) in South Africa and the United Kingdom, but negative in Australia (–0,287), although not significantly so ($p = 0,809$). Results therefore continue to imply that only one of the alternative measurement bases for listed associates (the equity accounted carrying amounts) is value-relevant in Australia, but that both are value-relevant in the other two sample countries.

When overall value-relevance is assessed, the country indicator variables are all insignificant. These results are consistent with those of the main regression and imply that overall value-relevance does not differ significantly between the sample countries. Interestingly, the signs of the indicator variables are now positive when the United Kingdom and Australia are compared to South Africa (the base country). This indicates that the negative sign in the main regression could be due to the inclusion of loss firms in the sample, although the impact is not sufficient to alter inferences regarding overall value-relevance differences between sample countries.

Inferences around differences in the value-relevance of individual variables when loss firms are excluded from the sample are qualitatively unchanged from those of the main regression. The coefficient of equity accounted carrying amounts of Australian listed associates differs significantly (at the one per cent level) from the coefficients in each of the other sample countries. Differences in the coefficients of the disclosed fair values of listed associates are also qualitatively similar to those of the main regression. In this respect, the coefficient in the United Kingdom differs significantly from each of the other sample countries. However, no significant difference ($p = 0{,}382$) is detected between the coefficients of disclosed fair values of South African and Australian sample firms. Results are therefore consistent with those of the main regression and continue to suggest that disclosed fair values of listed associates are more readily used by equity investors in the United Kingdom than in the other two sample countries.

In the above results, in addition to removing outliers more than 2,5 standard deviations from the mean, one additional observation (with the highest residual) has been deleted from the South African sample in order to normalise the distribution of the residuals. Including the observation, rather than deleting it, leaves the results qualitatively unchanged.

The next robustness test excludes mining, financial services and utility firms from sample firms in each of the sample countries. As Table 57 shows, excluding firms operating in these industries leaves results for the control variables almost unchanged; book value of equity and net income from continuing operations remain positive and significant at the five per cent level or better in all sample countries. Findings in respect of the equity accounted carrying amounts of listed associates are also similar to those of the main regression.

Table 56: Regression findings for individual sample countries with listed associates when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted Sign	South Africa #	United Kingdom	Australia
BV_{Eexcl}	+	***1,692	***0,503	***0,450
		(<0,001)	(0,004)	(<0,001)
NI	+	***6,926	***8,050	***10,465
		(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	***–2,770	***–2,868	**3,666
		(<0,001)	(<0,001)	(0,036)
ASC_{FV}	+ / –	***0,747	***2,461	–0,287
		(<0,001)	(<0,001)	(0,809)
N		79	75	61
Structural R^2		92,6%	78,4%	95,8%

Indicator variable on country comparisons (South Africa and Australia are the base countries):

	South Africa	United Kingdom	Australia
South Africa		2,198	3,362
		(0,783)	(0,590)
United Kingdom	2,198		–2,766
	(0,783)		(0,694)
Australia	3,362	–2,766	
	(0,590)	(0,694)	

Difference in coefficients (ASC_{CA} above and ASC_{FV} below the diagonal):

	South Africa	United Kingdom	Australia
South Africa		0,131	***3,598
		(0,896)	(<0,001)
United Kingdom	***3,846		***3,667
	(<0,001)		(<0,001)
Australia	0,875	**2,192	
	(0,382)	(0,028)	

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

\# One additional observation was deleted from the sample for this country in order to normalise the distribution of residuals.

** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Table 57: Regression findings for individual sample countries with listed associates when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	South Africa	United Kingdom	Australia
BV_{Eexcl}	+	**0,795	***0,877	***0,683
		(0,020)	(<0,001)	(<0,001)
NI	+	***6,849	***12,120	***7,420
		(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	33,212	*60,989	19,088
		(0,156)	(0,083)	(0,158)
ASC_{CA}	+ / –	***–1,940	***–11,395	*5,017
		(0,001)	(0,001)	(0,088)
ASC_{FV}	+ / –	***0,877	***3,983	0,159
		(<0,001)	(<0,001)	(0,939)
N		43	43	44
Structural R^2		92,8%	92,9%	90,3%

Indicator variable on country comparisons (South Africa and Australia are the base countries):

	South Africa	United Kingdom	Australia
South Africa		***29,046	9,061
		(0,007)	(0,133)
United Kingdom	***29,046		11,937
	(0,007)		(0,157)
Australia	11,937	9,061	
	(0,157)	(0,133)	

Difference in coefficients (ASC_{CA} above and ASC_{FV} below the diagonal):

	South Africa	United Kingdom	Australia
South Africa		***3,198	**2,394
		(0,001)	(0,017)
United Kingdom	***3,636		***4,030
	(<0,001)		(<0,001)
Australia	0,348	*1,718	
	(0,728)	(0,086)	

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Equity accounted carrying amounts of listed associates remain negative and significant at the one per cent level in South Africa and the United Kingdom (p = 0,001). Furthermore, this variable remains positive in Australia (5,017) but is only significant at the ten per cent level (p = 0,088). However, disclosed fair values of listed associates are now positive in all sample countries, but only significant (at the one per cent level) in South Africa and the United Kingdom. Disclosed fair values of listed associates remain insignificant in Australia (p = 0,939). Therefore, results appear to be in line with those of the main regression. Although the sign of the disclosed fair values of listed associates is now positive for Australian firms, the variable is still insignificant.

When differences in overall value-relevance are considered, findings relating to the indicator variables differ substantially from those of the main regression. In Table 57 a significant difference at the one per cent level (p = 0,007) is now detected between the United Kingdom and South Africa, where it was previously insignificant. The sign of the indicator variable is positive (29,046), which indicates that firms operating in the United Kingdom command a significantly higher market value than South African counterparts with identical fundamentals (accounting information). In addition, the indicator variable is also positive for these results when South African and Australian sample firms are compared, although at best mildly significant (p = 0,133). The indicator variable when the United Kingdom and Australian sample are compared reflects similar results (p = 0,157). Overall value-relevance therefore tends to differ more significantly between countries once firms in financial services, mining and utilities are excluded from the sample.

A plausible explanation is that these firms, especially financial services and mining firms, have global business models which are not impacted by the country in which they happen to be listed. Mining firms tend to operate in the same countries as the location of their activities is determined by geology and therefore cross-country differences could be less prevalent, especially when larger mining firms are considered. Financial services firms (particularly in developed markets) tend to operate across borders and have business models which are often indistinguishable across countries. Detecting differences in overall value-relevance when these firms are eliminated from the sample therefore suggests that country-specific factors have a larger impact on firms operating in less globalised industries.

When the value-relevance of individual variables is compared between sample countries, results are also affected by restricting the industries of sample firms. Consistent with the main regression results, Table 57 shows that the coefficient of the equity accounted carrying amounts of listed associates in the Australian sample differs from the same coefficient in both other sample countries at the five per cent level or better. However, a significant difference in coefficient is now also detected between South Africa and the United Kingdom at the one per cent level (p = 0,001). Cross-country differences in respect of the disclosed fair values of listed associates are similar to those detected in the main regression, although the significance of differences between Australia and the United Kingdom declines to the ten per cent level (p = 0,086). Excluding mining, financial services and utility firms from the sample therefore exacerbates cross-country differences in respect of value-relevance for individual variables.

In summary, the findings of this robustness test therefore suggest that cross-country differences are more prevalent when the industries of sample firms are restricted. This is true for both overall value-relevance and the value-relevance of individual variables. To assess the combined impact of excluding loss firms and firms operating in the financial services, mining and utility industries, an additional robustness test is performed. These results are detailed in Table 58. However, applying these restrictions result in relatively small sample sizes for the individual countries, which appears to reflect in the results for the control variables. Although net income from continuing operations is positive and significant in all sample countries at the one per cent level ($p < 0{,}001$), book value of equity is only significant at conventional levels in South Africa and the United Kingdom. Results for the variables of interest, namely equity accounted carrying amounts of listed associates and their disclosed fair values, also differ from those of the main regression. Although equity accounted carrying amounts of listed associates remain negative and significant at the one per cent level ($p = 0{,}001$) in South Africa and the United Kingdom, they are now also negative in Australia (–0,131), although insignificant ($p = 0{,}962$). In addition, disclosed fair values of listed associates are now positive in all three countries. They are significant (at the one per cent level) in South Africa and the United Kingdom, but insignificant in Australia ($p = 0{,}711$). Overall results appear to be in line with those of the main regression, except for the loss of significance and change in sign of equity accounted carrying amounts in the Australian sample. This could also reflect that investments in associates are relatively unimportant in the Australian context, once firms are profitable and operating in less globalised industries.

Comparing the countries using an indicator variables approach suggests that overall value-relevance between countries is impacted by the industry in which a firm operates as well as its profitability. As Table 58 shows, overall value-relevance now differs at the one percent level between countries when South Africa is compared to each of the other sample countries. The indicator variables are both positive, which suggests that firms listed in the United Kingdom and Australia command a market premium (South Africa is the base country). However, consistent with the main regression results, overall value-relevance between Australia and the United Kingdom does not differ significantly ($p = 0{,}965$). These findings imply that a developed market premium applies outside of the globalised mining and financial services industries.

Table 58: Regression findings for individual sample countries with listed associates when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC + \varepsilon$$

	Predicted Sign	South Africa	United Kingdom	Australia #
BV_{Eexcl}	+	**0,689	***0,877	0,148
		(0,041)	(<0,001)	(0,207)
NI	+	***7,239	***12,122	***15,845
		(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	***–1,960	***–11,376	–0,131
		(0,001)	(0,001)	(0,962)
ASC_{FV}	+ / –	***0,888	***3,979	0,648
		(<0,001)	(<0,001)	(0,711)
N		41	42	37
Structural R^2		92,8%	92,6%	95,1%

Indicator variable on country comparisons (South Africa and Australia are the base countries):

	South Africa	United Kingdom	Australia
South Africa		***30,617	***19,095
		(0,006)	(0,004)
United Kingdom	***30,617		0,344
	(0,006)		(0,965)
Australia	***19,095	0,344	
	(0,004)	(0,965)	

Difference in coefficients (ASC_{CA} above and ASC_{FV} below the diagonal):

	South Africa	United Kingdom	Australia
South Africa		***3,191	0,669
		(0,001)	(0,504)
United Kingdom	***3,624		***2,849
	(<0,001)		(0,004)
Australia	0,139	*1,730	
	(0,890)	(0,084)	

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

One additional observation was deleted from the sample for this country in order to normalise the distribution of residuals.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Findings for disclosed fair values of listed associates are generally consistent with those of the main regression. The coefficient differs significantly at the one per cent level when South Africa and the United Kingdom are compared and is still insignificant for a comparison between South Africa and Australia. The only difference from the main regression results in respect of the disclosed fair values of listed associates is that the level of significance of the difference decreases when comparing the coefficient between Australia and the United Kingdom (p = 0,084). However, findings for the equity accounted carrying amounts of listed associates reflect greater differences with those of the main regression. The coefficient in the United Kingdom and South Africa now differs significantly at the one per cent level (p = 0,001) where it was previously insignificant. Although the coefficient still differs significantly between the United Kingdom and Australia (p = 0,004), the difference between Australia and South Africa is now insignificant (p = 0,504). These results confirm that cross-country differences for individual value-relevance do exist. However, they also suggest that listed associates are considered to be far more important in the United Kingdom than in the other sample countries once the sample restrictions of this robustness tests are applied.

The above results are reported after deleting outliers more than 2,5 standard deviations from the mean. In addition, in order to normalise the distribution of residuals, one additional observation with the highest residual was deleted from the Australian sample. Retaining this observation, rather than deleting it, leaves inferences qualitatively unchanged.

In summary, the robustness tests of this subsection find that, although loss firms do not on their own have a significant impact on inferences, when the industries in which sample firms operate are also restricted, the findings of the main regression are impacted. Results suggest that cross-country differences are more prevalent once firms operating in the financial services, mining and utility industries are excluded from the sample.

9.6. Summary and conclusion

This chapter investigates the null hypothesis that the value-relevance of fair values and equity accounted carrying amounts of associates does not differ between countries in respect of *listed* associates. The findings show that, similar to pooled regression findings, equity accounted carrying amounts and disclosed fair values of listed associates are both value-relevant in South Africa and the United Kingdom. However, only the equity accounted carrying amounts are value-relevant for the Australian sample. No significant difference in overall value-relevance is detected between sample countries, but the value-relevance of equity accounted carrying amounts differs significantly between Australia and each of the other sample countries in respect of equity accounted carrying amounts. In addition the value-relevance of disclosed fair values of listed associates differs significantly between the United Kingdom and each of the other sample countries.

Results are robust to specifying the dependent variable at reporting date, rather than three months thereafter, and to excluding loss firms from the sample. However, results suggest that restricting the sample to exclude mining, financial services and utility firms (especially when excluding loss firms at the same time) increases the prevalence of cross-country differences in respect of overall value-relevance as well as the value-relevance of individual variables. A plausible explanation is that removing firms from relatively globalised industries from the sample (especially in the case of mining and financial services firms) highlights underlying country differences by which other firms are more affected. Generally speaking, the results from these robustness tests indicate that equity investors in the United Kingdom attach greater importance to both equity accounted carrying amounts and disclosed fair values of listed associates than those in the other two sample countries. This leads to an overall conclusion that investments in listed associates are of greater import to investors in the United Kingdom than in the other sample countries.

10. DETAILED FINDINGS: VALUE-RELEVANCE OF UNLISTED ASSOCIATES BETWEEN COUNTRIES

10.1. Introduction

The fourth null hypothesis of this study is that the value-relevance of disclosed fair values and equity accounted carrying amounts of associates does not differ between countries. In the previous chapter the findings relating to value-relevance between countries for *listed* associates were discussed, while this chapter discusses the detailed findings for the same hypothesis for *unlisted* associates (where disclosed fair values differ from equity accounted carrying amounts). Results in this chapter are pooled findings across time periods (i.e. only countries are separated). The rest of the chapter is set out as follows: the subsequent section discusses descriptive statistics, followed by the results of univariate investigations. Detailed findings related to multivariate investigations and robustness tests are discussed in separate sections after which the chapter is summarised and concluded.

10.2. Descriptive statistics

As the United Kingdom has only one unlisted associate with a disclosed fair value different from its carrying amount, it has been excluded from the discussion and analyses of this chapter. Even so, Table 59 shows that the remaining sample firms consist mainly of South African firms (109) with only 18 Australian firms qualifying for analysis. The power of cross-country comparisons and analyses of Australian firms in this chapter is therefore low and regression results should be interpreted with caution.

The descriptive statistics in Table 59 are stated in ZAR millions for comparative purposes. As evident from the table, the South African sample firms are smaller than their Australian counterparts with a mean (median) market value of ZAR 32 375 million (ZAR 11 781 million) compared to ZAR 69 248 million (ZAR 25 480 million). However, similar to the sample of listed associates in the previous chapter, differences between the alternative measurement bases appear to be much higher in South Africa than in Australia. More specifically, mean (median) disclosed fair values of unlisted associates are 150 per cent (59 per cent) higher than mean (median) equity accounted carrying amounts in South Africa. This compares to a mean (median) difference of 11 per cent (33 per cent) in Australia between the alternative measurement bases. Some skew is evident when the mean and median values of book value of equity (excluding the equity accounted carrying amounts of unlisted associates in this chapter) and net income from continuing operations for both sample countries are compared.

Table 59: Descriptive statistics for individual sample countries with unlisted associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: South Africa						
MV_E	109	32 375	11 781	51 580	58	233 592
BV_{Eexcl}	109	13 081	5 194	20 441	31	107 269
NI	109	2 712	873	4 434	–58	22 417
ASC_{CA}	109	1 509	198	3 951	5	26 510
ASC_{FV}	109	3 777	315	11 227	5	82 286
Panel B: Australia						
MV_E	18	69 248	25 480	132 952	8 139	455 198
BV_{Eexcl}	18	46 342	18 683	73 922	7 377	263 738
NI	18	5 803	2 782	10 579	–3 661	37 208
ASC_{CA}	18	1 456	898	1 479	124	5 780
ASC_{FV}	18	1 616	1 191	1 502	127	5 823

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

However, when financial services firms are excluded from the sample, a similar amount of skew is apparent for the South African sample, although it improves somewhat for the Australian sample (refer to Table 60). More importantly, excluding financial services firms from the sample does not appear to impact significantly on the differences between the alternative measurement bases. Mean (median) disclosed fair values of unlisted associates in South Africa of ZAR 5 117 million (ZAR 290 million) exceed their equity accounted carrying amounts by 175 per cent (132 per cent). By contrast, mean (median) disclosed fair values of unlisted associates in Australia are only 10 per cent (42 per cent) higher than their equity accounted carrying amounts.

Table 60: Descriptive statistics for individual sample countries with unlisted associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: South Africa						
MV_E	75	37 906	12 836	59 535	58	233 592
BV_{Eexcl}	75	14 495	5 941	23 210	31	107 269
NI	75	3 100	923	5 120	–13	22 417
ASC_{CA}	75	1 858	125	4 963	5	26 510
ASC_{FV}	75	5 117	290	13 333	5	82 286
Panel B: Australia						
MV_E	16	23 762	24 365	10 323	8 139	38 826
BV_{Eexcl}	16	21 271	16 547	11 001	7 377	40 371
NI	16	2 307	2 446	2 810	–3 661	6 720
ASC_{CA}	16	1 558	1 231	1 543	124	5 780
ASC_{FV}	16	1 707	1 751	1 573	127	5 823

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

The potential impact that the distribution of variables may have on analyses is dealt with in several ways. Skew is reduced by deleting outliers more than 2,5 standard deviations from the mean. The impact of financial services firms on findings is assessed in a robustness test where these firms are excluded from the sample and a similar approach is followed to assess the impact of loss firms. It is important to note that the sample firms for this chapter are generally smaller than those with listed associates in the previous chapter. As a result, the findings of this chapter are dominated by smaller firms. Consequently, although the aforementioned procedures reduce the potential impact of the distribution of sample firms on results, results should inherently be interpreted with caution. The section that follows details the results of univariate investigations.

10.3. Univariate investigations

The results of univariate investigations for each sample country are detailed in Table 61 with Pearson (Spearman) correlations above (below) the diagonal. As Panel A of the table shows, the independent variables are all positively correlated with the dependent variable, market value of equity, at the one per cent level ($p < 0,001$) for South African sample firms. The equity accounted carrying amounts of unlisted associates and their disclosed fair values are also positively correlated at the one per cent level ($p < 0,001$), confirming that the fair value of such investments is strongly influenced by the underlying book value of equity. By contrast, in Panel B of the table, only book value of equity and net income from continuing operations are significantly correlated with market value of equity (at the one per cent level) for Australian sample firms. The Pearson correlation for equity accounted carrying amounts of unlisted associates is insignificant ($p = 0,709$). Similarly, the disclosed fair values of unlisted associates also have an insignificant Pearson correlation with market value of equity ($p = 0,699$). The contrasting results between the sample countries are suggestive of cross-country differences, but this study relies on the results of the multivariate investigations detailed in the subsequent section.

Table 61: Univariate correlations for individual sample countries with unlisted associates

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}
Panel A: South Africa (N =109)					
MV_E		***0,890	***0,705	***0,395	***0,348
		(<0,001)	(<0,001)	(<0,001)	(<0,001)
BV_{Eexcl}	***0,897		***0,776	***0,405	***0,326
	(<0,001)		(<0,001)	(<0,001)	(0,001)
NI	***0,907	***0,898		***0,383	***0,394
	(<0,001)	(<0,001)		(<0,001)	(<0,001)
ASC_{CA}	***0,554	***0,516	***0,581		***0,936
	(<0,001)	(<0,001)	(<0,001)		(<0,001)
ASC_{FV}	***0,626	***0,557	***0,644	***0,946	
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	
Panel B: Australia (N = 18)					
MV_E		***0,996	***0,962	0,095	0,098
		(<0,001)	(<0,001)	(0,709)	(0,699)
BV_{Eexcl}	***0,955		***0,959	0,127	0,130
	(<0,001)		(<0,001)	(0,614)	(0,607)
NI	***0,631	**0,575		0,087	0,093
	(0,005)	(0,013)		(0,731)	(0,713)
ASC_{CA}	–0,395	–0,366	–0,125		***0,999
	(0,104)	(0,135)	(0,622)		(<0,001)
ASC_{FV}	–0,362	–0,325	–0,117	***0,994	
	(0,140)	(0,188)	(0,645)	(<0,001)	

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

** Significant at the 5% level *** Significant at the 1% level
(p-values for 2-tailed significance are indicated within brackets)

10.4. Detailed multivariate regression findings

This section discusses the findings from multivariate regression findings run separately for each sample country and then compared. Each country sample represents a time series and initial Durbin–Watson statistics reveal significant serial correlation (autocorrelation). Therefore, the results reported in this chapter are based on autoregression results from maximum likelihood estimation[10]. Outliers more than 2,5 standard deviations from the mean are deleted in order to reduce skew and normalise the distribution of residuals. The detailed findings of the main regression are tabulated in Table 62.

Table 62: Regression findings for individual sample countries with unlisted associates

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	**South Africa**	**Australia #**
BV_{Eexcl}	+	***2,259	***1,801
		(<0,001)	(0,001)
NI	+	0,584	0,124
		(0,335)	(0,953)
Neg	+ / –	7,828	n/a
		(0,678)	
ASC_{CA}	+ / –	***–2,798	5,391
		(0,008)	(0,516)
ASC_{FV}	+ / –	***1,149	–5,780
		(0,002)	(0,487)
N		106	17
Structural R^2		89,8%	99,9%
Indicator variable on country comparisons (South Africa is the base country)			**–21,079
			(0,014)
Difference in coefficients:			
– ASC_{CA}			0,603
			(0,547)
– ASC_{FV}			0,482
			(0,630)

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

One additional observation was deleted from the sample for this country.

** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

[10] Autoregression with maximum likelihood estimation corrects for serial correlation and, as an added advantage, tends to be less sensitive to the impact of outliers, skewness and heteroskedasticity than ordinary least squares as it is a nonparametric estimation method.

In Table 62 book value of equity is positive (as predicted) and significantly associated with market value of equity at the one per cent level for both sample countries. However, net income from continuing operations, although positive, is insignificant in both sample countries. This may be due to the fact that sample firms tend to be smaller and therefore less liquid than those holding investments in listed associates, as the earlier descriptive statistics highlight. In respect of the alternative measurement bases, differences between the two sample countries are immediately apparent. While the equity accounted carrying amounts of unlisted associates are negative (–2,798) for South African firms at the one per cent level (p = 0,008), which is consistent with the pooled regression results, they are positive (5,391) for Australian firms, although insignificant (p = 0,516). Similarly, disclosed fair values of unlisted associates are positive (1,149) for the South African sample at the one per cent level (p = 0,002), again consistent with the pooled regression results, while disclosed fair values of unlisted associates are negative (–5,780) for the Australian sample, although not significantly so (p = 0,487).

Comparing overall value-relevance between the sample countries finds that South African sample firms (the base country) has higher overall value-relevance than firms in Australia at the five per cent level of significance (p = 0,014). However, because of the small sample size for Australia (17 firms) this finding could be sample-specific. Indeed, value-relevance for the individual alternative measurement bases does not differ significantly between the two sample countries. The test statistic recommended by Brame *et al.* (1998) relating to differences in coefficients is insignificant for comparisons of both equity accounted carrying amounts and disclosed fair values of unlisted associates between the sample countries.

When the dispersion of residuals is considered, they appear approximately normal for the South African sample. However, in the results reported above, the observation with the largest negative residual has been deleted from the Australian sample in addition to deleting outliers more than 2,5 standard deviations from the mean. Retaining this observation would leave results qualitatively unchanged for Australian sample firms in respect of the alternative measurement bases. However, net income from continuing operations would be negative (although not significantly so). After the deletion, the distribution of residuals for the Australian sample appears to be approximately normal based on a graphical analysis, although the small size of the sample limits the success of the process. In addition, a graphical analysis does not suggest that significant heteroskedasticity is present in either of the sample countries.

Other investigations indicate that the Durbin–Watson statistic is close to two for South Africa after applying autoregression, indicating that serial correlation has successfully been corrected. However, the result for the Australian sample is inconclusive at the five per cent level with a test statistic of 3,378. However, because of the small sample size it is not possible to attempt further correction. Although the South African sample does not contain multi-collinearity (all the VIF scores are far below ten) significant multi-collinearity is detected for the Australian sample. Multi-collinearity exists between book value of equity and net income from continuing operations and also between equity accounted carrying amounts and disclosed fair values of unlisted associates. Deleting one of the alternative measurement bases for unlisted associates leaves the remaining measurement base insignificant; this outcome does not impact on inferences for the Australian sample.

In summary, the main regression results show that both equity accounted carrying amounts and disclosed fair values of unlisted associates are value-relevant for South African sample firms, but neither is value-relevant for Australian sample firms. Overall value-relevance appears to differ significantly between sample countries, but the value-relevance of the individual measurement bases does not. However, because of the small Australian sample size (17 firms), these results should be generalised with caution. In the section that follows, the results of various robustness tests are discussed.

10.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements they address in order to facilitate the discussion process.

10.5.1. Using market value of equity at reporting date

The main regression utilised market value of equity three months after reporting date as the dependent variable. This allows for the natural delay relating to the publication of financial reporting information. However, prior research (Ball & Brown, 1968) shows that most of the information content in financial reporting information is anticipated by the market and already incorporated into market value of equity at reporting date. Therefore, as an initial robustness test, the model is also regressed using market value of equity at reporting date as the dependent variable. The results of this robustness test are tabulated in Table 63.

Consistent with the main regression results and as predicted, book value of equity is positive and significant at the one per cent level for both sample countries. The other main control variable, net income from continuing operations, is positive and significant at the ten per cent level ($p = 0{,}072$) for the South African sample. However, for the Australian sample this variable is negative (–3,724), although insignificant ($p = 0{,}280$). This anomaly may be due to the small sample size for Australia (17 firms).

The results for the alternative measurement bases are affected for both sample countries when the dependent variable is specified at reporting date. In the case of South Africa, the equity accounted carrying amounts of unlisted associates remain negative and their disclosed fair values positive. However, both variables are now insignificant at conventional levels. Although these results differ from those of the main regression in that they represent a loss of significance, they are in line with results of the earlier pooled regressions when specifying the dependent variable at reporting date. Consequently, a similar conclusion is reached, namely that investors face greater uncertainty when valuing investments in unlisted, rather than listed, associates and that the main source of their information is the financial statements of the investor, which are not available at reporting date.

In the case of the Australian sample, the results differ from those of the main regression as the disclosed fair values (as well as the equity accounted carrying amounts) of unlisted associates now have a positive sign. However, both the alternative measurement bases remain insignificant. Although these results should be generalised cautiously due to the small sample size, the conclusion that the alternative measurement bases are not value-relevant for the Australian sample stands.

When overall value-relevance in the two sample countries is compared by means of an indicator variable, inferences are similar to those of the main regression. More specifically, the indicator variable remains negative (–20,358) although the level of significance decreases to the ten per cent level ($p = 0,052$). However, once value-relevance for the individual measurement bases is compared, no significant differences are detected between the coefficients for South Africa and Australia. These findings agree with those of the main regression.

All of the above results have been reported after outliers more than 2,5 standard deviations from the mean have been deleted. In addition, an additional observation with the highest residual was deleted from the Australian sample in order to normalise the distribution of residuals. Retaining this observation would lead to a significantly negative coefficient for net income from continuing operations for Australian firms ($p = 0,087$) although all other inferences would remain qualitatively the same.

In summary, specifying the dependent variable at reporting date, rather than three months thereafter, does not impact on inferences relating to cross-country differences. However, the alternative measurement bases for unlisted associates are insignificant in individual regression in each of the sample countries.

Table 63: Regression findings for unlisted associates for individual sample countries with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC + \varepsilon$$

	Predicted Sign	South Africa	Australia #
BV_{Eexcl}	+	***2,025	***2,065
		(<0,001)	(0,005)
NI	+	*1,337	–3,724
		(0,072)	(0,280)
Neg	+ / –	2,797	n/a
		(0,901)	
ASC_{CA}	+ / –	–1,356	0,417
		(0,276)	(0,969)
ASC_{FV}	+ / –	0,609	0,585
		(0,169)	(0,956)
N		106	17
Structural R^2		85,9%	99,7%
Indicator variable on country comparisons (South Africa is the base country)			*–20,358
			(0,052)
Difference in coefficients:			
– ASC_{CA}			0,204
			(0,838)
– ASC_{FV}			0,014
			(0,989)

MV_E Market value of equity at reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

One additional observation was deleted from the sample for this country in order to normalise the distribution of residuals.

* Significant at the 10% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

10.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. However, the indicator variable may not sufficiently compensate for differences between loss and profit firms and therefore a robustness test is performed, omitting these firms from the sample. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the skew induced by financial services firms in the Australian sample and therefore an analysis excluding these firms appears warranted. Results of various regression models, after making the aforementioned adjustments in turn, are tabulated from Table 64 onwards.

As Table 64 shows, removing loss firms from the sample leaves inferences qualitatively similar to those of the main regression. In respect of the main control variables, book value of equity is consistently positive in both sample countries at the one per cent level. Net income from continuing operations is positive in South Africa, but still insignificant at conventional levels (p = 0,166) while the variable is negative for the Australian sample, but insignificant (p = 0,554). Turning to the variables of interest, the equity accounted carrying amounts of unlisted associates remain negative in South Africa (–2,079) although only at the ten per cent level (p = 0,051). Disclosed fair values of unlisted associates remain positive in this sample country (0,915), now at the five per cent level (p = 0,016). These variables also reflect results generally consistent with those of the main regression in respect of the Australian sample. Equity accounting carrying amounts of unlisted associates are positive (2,975) in this case, although insignificant (0,754). Disclosed fair values of these associates are negative for the Australian sample firms (–3,292), but also insignificant (0,728).

Comparing results between the sample countries also yields results qualitatively similar to those of the main regression. The indicator variable used to assess differences in overall value-relevance between the sample countries remains negative (–24,471) and significant at the five per cent level ($p = 0{,}011$). In respect of the alternative measurement bases, the coefficients for equity accounted carrying amounts and disclosed fair values of unlisted associates do not differ significantly between sample countries. Therefore, consistent with the main regression results, it is inferred that value-relevance for the individual variables does not differ significantly between the sample countries.

Table 64: Regression findings for individual sample countries with unlisted associates when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

	Predicted Sign	**South Africa**	**Australia**
BV_{Eexcl}	+	***2,104 (<0,001)	***2,056 (0,002)
NI	+	0,877 (0,166)	–1,800 (0,554)
ASC_{CA}	+ / –	*–2,079 (0,051)	2,975 (0,754)
ASC_{FV}	+ / –	**0,915 (0,016)	–3,292 (0,728)
N		104	16
Structural R^2		89,2%	99,9%
Indicator variable on country comparisons (South Africa is the base country)			**–24,471 (0,011)
Difference in coefficients:			
– ASC_{CA}			0,554 (0,580)
– ASC_{FV}			0,466 (0,656)

MV_E Market value of equity at reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

The next robustness test assesses the impact of the industries in which sample firms operate by omitting financial services, mining and utility firms from the sample. Detailed findings of this robustness test are tabulated in Table 65. Book value of equity remains positive in both sample countries and significant at the one per cent level ($p < 0{,}001$). In the case of net income from continuing operations, the variable is positive as predicted (4,009) and significant for the South African sample ($p = 0{,}002$), but negative (–1,240) for the Australian sample, although insignificant ($p = 0{,}270$). Findings for the main control variables are therefore consistent with those of the main regression. In respect of the alternative measurement bases for unlisted associates (equity accounted carrying amounts and disclosed fair values) findings for the South African sample are qualitatively consistent with those of the main regression. Specifically, the equity accounted carrying amounts of unlisted associates are negative and significant at the one per cent level ($p < 0{,}001$), while the disclosed fair values are positive and significant at the one per cent level ($p < 0{,}001$). For the Australian sample firms, the equity accounted carrying amounts of unlisted associates remain positive (3,946), but are now mildly significant ($p = 0{,}106$). Disclosed fair values of unlisted associates remain negative (–2,806), although insignificantly so ($p = 0{,}219$). This shows that financial services, mining and utility firms impact on the results for the Australian sample.

The impact on results is also evident when overall value-relevance between sample countries is compared. Overall value-relevance no longer differs significantly between the sample countries. The indicator variable remains negative, but is insignificant at conventional levels ($p = 0{,}172$). In addition, the coefficients of the alternative measurement bases now differ significantly based on the test statistic recommended by Brame *et al*. (1998). The coefficients of the equity accounted carrying amounts of unlisted associates differ significantly at the one per cent level ($p < 0{,}001$) between South African and Australian sample firms, while the coefficients of disclosed fair values differ significantly at the five per cent level (p = 0,024). Removing financial services, mining and utility firms from the sample therefore impacts on the results for individual variables as well as comparisons of value-relevance between sample countries. Interestingly, however, results of this robustness test are very similar to those of listed associates in the previous chapter in respect of cross-country differences.

Table 65: Regression findings for individual sample countries with unlisted associates when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 \mathit{ASC} + \varepsilon$$

	Predicted Sign	South Africa	Australia
BV_{Eexcl}	+	***1,026	***1,300
		(<0,001)	(<0,001)
NI	+	***4,009	–1,240
		(0,002)	(0,270)
Neg	+ / –	–6,425	n/a
		(0,561)	
ASC_{CA}	+ / –	***–4,530	3,946
		(<0,001)	(0,106)
ASC_{FV}	+ / –	***1,791	–2,806
		(<0,001)	(0,219)
N		57	16
Structural R^2		94,3%	99,9%
Indicator variable on country comparisons (South Africa is the base country)			–5,623
			(0,172)
Difference in coefficients:			
– ASC_{CA}			***3,734
			(<0,001)
– ASC_{FV}			**2,259
			(0,024)

MV_E	Market value of equity at reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

The final robustness test of this chapter omits loss firms as well as financial services, mining and utility firms from the sample. Results of this robustness test are tabulated in Table 66. This table shows that findings related to the main control variables are consistent with those of the main regression. Book value of equity is positive and significant at the one per cent level in both sample countries, while net income from continuing operations is only positive and significant (p = 0,002) for the South African sample. For the Australian sample net income from continuing operations is once again negative (–1,239), although insignificant (p = 0,526). More importantly, the equity accounted carrying amounts of unlisted associates are negative (–4,539) and significant at the one per cent level (p < 0,001) for South African sample firms, but positive (4,184) for Australian firms, although not significant (p = 0,212). Disclosed fair values of the unlisted associates remain significantly positive for the South African sample (p < 0,001) and insignificantly negative for the Australian sample (p = 0,336). The results for the alternative measurement bases are therefore also consistent with those of the main regression.

When overall value-relevance between the sample countries is compared, results are similar to those of the main regression. Although the level of significance has declined to the ten per cent level (p = 0,100), the sign of the indicator variable remains negative (–7,365). However, the coefficients of equity accounted carrying amounts of unlisted associates now differ between sample countries at the one per cent level (p = 0,004), while the coefficients of their disclosed fair values differ at the five per cent level (p = 0,025). These results confirm that financial services, mining and utility firms have a significant impact on differences in value-relevance across sample countries. Eliminating loss firms from the sample while restricting firm industries at the same time, reveals an overall value-relevance difference between South Africa and Australia (although only at the ten per cent level) but also significant differences in the value-relevance for individual variables.

Table 66: Regression findings for individual sample countries with unlisted associates when certain industries and loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 \mathit{ASC} + \varepsilon$$

	Predicted Sign	South Africa	Australia
BV_{Eexcl}	+	***1,008	***1,290
		(<0,001)	(0,006)
NI	+	***4,060	–1,239
		(0,002)	(0,526)
ASC_{CA}	+ / –	***–4,539	4,184
		(<0,001)	(0,212)
ASC_{FV}	+ / –	***1,798	–3,021
		(<0,001)	(0,336)
N		55	14
Structural R^2		94,0%	99,9%
Indicator variable on country comparisons (South Africa is the base country)			*–7,365
			(0,100)
Difference in coefficients:			
– ASC_{CA}			***2,886
			(0,004)
– ASC_{FV}			**2,244
			(0,025)

MV_E Market value of equity at reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the unlisted associates
ASC_{FV} Disclosed fair values of the unlisted associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

The difference in coefficients utilises the test statistic recommended in Brame *et al.* (1998) and test whether the coefficient of the variable in the specific sample country is equal to that of the comparative sample country.

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Interestingly, the robustness tests of this subsection reveal that the value-relevance of individual measurement bases only differs between sample countries when firm industries are restricted, while overall value-relevance differs between sample countries irrespective of firm industry. This could be a factor of the smaller size of sample firms compared to those used to compare listed associates across countries, but also reflects inherent differences in perception of investments in associates in South Africa and Australia. However, because of the small Australian sample size, results should be generalised with caution.

10.6. Summary and conclusion

This chapter investigates the null hypothesis that the value-relevance of fair values and equity accounted carrying amounts of associates does not differ between countries in respect of *unlisted* associates. The findings show that, similar to pooled regression findings, equity accounted carrying amounts and disclosed fair values of listed associates are both value-relevant in South Africa. However, neither measurement base is generally value-relevant for the Australian sample firms. Significant differences in overall value-relevance are detected between sample countries, but the value-relevance of individual variables differs significantly between the sample countries only when the industries of sample firms are restricted. Findings of this chapter should nevertheless be generalised with caution due to the small Australian sample size and the fact that the average size of sample firms is also relatively small.

11. DETAILED FINDINGS: OTHER DISCLOSURES OF LISTED ASSOCIATES

11.1. Introduction

The last hypothesis of this study (in null form) is that the disclosures of summarised financial information of associates are not value-relevant. This chapter investigates the hypothesis with reference to *listed* associates, while Chapter 12 contains the detailed findings in respect of *unlisted* associates. Both chapters focus on situations where disclosed fair values differ from the equity accounted carrying amounts of the associates in question. Reported findings are based on pooled regression where time periods and sample countries are not separately investigated. Subsequent sections of this chapter discuss descriptive statistics for the sample, results of univariate investigations as well as results from the multivariate regression model. These sections are followed by a discussion of findings of various robustness tests and a summary and conclusion of the chapter.

11.2. Descriptive statistics

The descriptive statistics for the sample of this chapter are detailed in Table 67. Amounts have been converted to South African rand (ZAR) for comparative purposes. From the table it appears that sample firms are fairly large with a mean (median) market value of equity of ZAR 155 311 million (ZAR 39 987 million). By comparison the mean (median) book value of equity, which excludes the equity accounted carrying amounts of listed associates for the purposes of this chapter, is ZAR 66 986 million (ZAR 21 928 million). The difference between the mean and median of book value of equity is suggestive of some skew in the sample which is also present in net income from continuing operations which has a mean value of ZAR 10 100 million compared to a mean of ZAR 2 485 million.

When the variables specific to investments in associates are considered, it is worth noting that the mean (median) disclosed fair values of ZAR 13 645 million (ZAR 1 017 million) are higher than the mean (median) equity accounted carrying amounts by 124 per cent (17 per cent). The new scale variables introduced in this chapter all relate to the summarised disclosed financial information of listed associates. This information suggests, not unexpectedly, that associates are generally smaller firms than their investors. For example, mean (median) disclosed net profit of listed associates is ZAR 3 604 million (ZAR 132 million) which is markedly smaller than the net income from continuing operations of the sample firms. The skew evident when the means and medians of the disclosed total assets and total liabilities of listed associates are compared is due to the inclusion of financial services firms in the sample. As associates generally tend to operate in the same industry as their investors, total assets and liabilities of the associates of financial services firms tend to be much higher than those of firms operating in other industries.

Table 67: Descriptive statistics for sample firm-years with summarised disclosed financial information for listed associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	235	155 311	39 987	273 564	288	1 590 911
BV_{Eexcl}	235	66 986	21 928	160 613	–31 585	1 141 598
NI	235	10 100	2 485	20 037	–8 065	135 561
ASC_{CA}	235	6 092	872	17 529	0	135 918
ASC_{FV}	235	13 645	1 017	39 363	3	267 401
AP	235	3 604	132	13 457	–3 103	114 417
AR	235	21 204	968	77 145	0	708 305
ATA	235	216 846	4 892	1 150 720	5	10 816 217
ATL	235	186 799	1 957	1 072 227	2	10 129 655

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
AP	Disclosed net profit of the listed associates
AR	Disclosed revenue of the listed associates
ATA	Disclosed total assets of the listed associates
ATL	Disclosed total liabilities of the listed associates

Indeed, when financial services firms are excluded from the sample, a reduction in skew is evident for the disclosed summarised financial information of listed associates as well as other scale variables. More specifically, as Table 68 shows, the mean book value of equity is ZAR 39 479 million when financial services firms are excluded from the sample, compared to a median of ZAR 21 017 million. In addition, skew is reduced for disclosed total assets of listed associates, which now has a mean of ZAR 18 158 million compared to median of ZAR 4 060 million. A similar effect is evident for net income from continuing operations as well as disclosed revenue and disclosed total liabilities of the listed associates. However, the difference between the mean (median) equity accounted carrying amounts and mean (median) disclosed fair values of listed associates remains relatively unchanged at 154 per cent (25 per cent).

Table 68: Descriptive statistics for sample firm-years with summarised disclosed financial information for listed associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	179	129 402	39 674	204 339	288	1 138 463
BV_{Eexcl}	179	39 479	21 017	53 470	–31 585	316 545
NI	179	7 758	1 884	14 694	–8 065	82 448
ASC_{CA}	179	3 426	748	7 979	0	44 893
ASC_{FV}	179	8 704	932	24 455	3	138 078
AP	179	1 268	65	3 638	–3 103	22 043
AR	179	9 065	780	21 280	0	131 545
ATA	179	18 158	4 060	38 237	5	241 941
ATL	179	8 428	1 468	20 025	2	144 471

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
AP	Disclosed net profit of the listed associates
AR	Disclosed revenue of the listed associates
ATA	Disclosed total assets of the listed associates
ATL	Disclosed total liabilities of the listed associates

The potential impact of the sample distribution on the results of analyses is dealt with in several ways. Skew is reduced by deleting outlying sample firm-years more than 2,5 standard deviations from the mean. The potential impact of financial services firms on inferences is considered with reference to a robustness test where firm-years in this industry are excluded from the sample. Similarly, the potential impact of firm-years with a net loss from continuing operations on results is assessed by excluding them from the sample in robustness tests.

In the sections that follow, the detailed findings from analysing the sample firm-years are discussed. The next section discusses univariate investigations, followed by multivariate analyses and robustness tests thereafter.

11.3. Univariate investigations

The results of univariate investigations are tabulated in Table 69 with Pearson (Spearman) correlations above (below) the diagonal. Most of the independent variables have significant positive correlations with the dependent variable (market value of equity, three months after reporting date) at the one per cent level. The exceptions are the equity accounted carrying amounts of listed associates and their disclosed summarised financial information. Equity accounted carrying amounts have a positive Pearson correlation with market value of equity, which is significant at the ten per cent level ($p = 0{,}051$). Disclosed net profit of listed associates and their disclosed revenue also have positive correlations with market value of equity, but at the five per cent level of significance.

The remaining disclosed summarised financial information, namely disclosed total assets and total liabilities of listed associates, have insignificant Pearson correlations with market value of equity. Oddly, in the case of disclosed total assets, the correlation is negative, although very insignificant ($p = 0{,}816$). However, a large number of the independent variables are significantly correlated with each other at the one per cent level. The disclosed total assets and disclosed total liabilities of associates have an especially high Pearson correlation (0,978) at the one per cent level of significance ($p < 0{,}001$). This is not unsurprising as these variables comprise the components of book value of equity and the ability to incur liabilities is often determined with reference to a firm's assets. Importantly, this correlation suggests that the negative sign on disclosed total assets could be due to the correlation with disclosed total liabilities (i.e. that the disclosed total assets are not statistically distinguishable from the disclosed total liabilities).

The fact that not all summarised disclosed financial information exhibits significant correlations with market value of equity offers an initial suggestion that not all of these are value-relevant. However, this study relies on the results of the multivariate investigations. These are discussed in the section that follows.

11.4. Detailed multivariate regression findings

The main regression results of this chapter are detailed in Table 70. The first model in this table represents the base model in which no summarised disclosed financial information of listed associates has been included. In each of the successive models, one item of summarised disclosed financial information is introduced, while the final model (Model 6) includes all of the different disclosures for listed associates. Importantly, the models differ from those of prior research in that they investigate disclosures other than the disclosed total liabilities of associates and that they control for the disclosed fair values of these (listed) associates.

Because the firm-years of the sample represent a time series, serial correlation (autocorrelation) represents a significant concern. As initial Durbin–Watson statistics suggest that significant serial correlation is present, reported results in this chapter are autoregression results from maximum likelihood estimation[11].

[11] Autoregression with maximum likelihood estimation corrects for serial correlation and, as an added advantage, tends to be less sensitive to the impact of outliers, skewness and heteroskedasticity than ordinary least squares as it is a nonparametric estimation method.

Table 69: Univariate correlations for sample firm-years with summarised disclosed financial information for listed associates

	MV_E	BV_{Eexcl}	NI	ASC_{CA}	ASC_{FV}	AP	AR	ATA	ATL
MV_E		***0,659	***0,741	*0,127	***0,267	**0,159	**0,156	–0,015	–0,047
		(<0,001)	(<0,001)	(0,051)	(<0,001)	(0,015)	(0,017)	(0,816)	(0,475)
BV_{Eexcl}	***0,819		***0,637	0,088	*0,111	0,047	0,038	–0,005	–0,028
	(<0,001)		(<0,001)	(0,181)	(0,090)	(0,469)	(0,560)	(0,943)	(0,668)
NI	***0,772	***0,669		***0,283	***0,236	***0,316	***0,294	0,070	0,012
	(<0,001)	(<0,001)		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(0,285)	(0,854)
ASC_{CA}	***0,479	***0,402	***0,469		***0,536	***0,893	***0,809	***0,439	***0,260
	(<0,001)	(<0,001)	(<0,001)		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
ASC_{FV}	***0,544	***0,418	***0,568	***0,944		***0,692	***0,539	***0,238	**0,133
	(<0,001)	(<0,001)	(<0,001)	(<0,001)		(<0,001)	(<0,001)	(<0,001)	(0,041)
AP	***0,321	***0,220	***0,534	***0,593	***0,663		***0,876	***0,570	***0,414
	(<0,001)	(0,001)	(<0,001)	(<0,001)	(<0,001)		(<0,001)	(<0,001)	(<0,001)
AR	***0,480	***0,397	***0,558	***0,754	***0,780	***0,659		***0,738	***0,620
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)		(<0,001)	(<0,001)
ATA	***0,493	***0,477	***0,486	***0,911	***0,870	***0,548	***0,803		***0,978
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)		(<0,001)
ATL	***0,465	***0,453	***0,490	***0,820	***0,782	***0,518	***0,817	***0,960	
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	

N 235

MV_E	Market value of equity, three months after reporting date	AP	Disclosed net profit of the listed associates
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates	AR	Disclosed revenue of the listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent	ATA	Disclosed total assets of the listed associates
ASC_{CA}	Equity accounted carrying amounts of the listed associates	ATL	Disclosed total liabilities of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates		

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

Table 70: Regression findings for listed associates with summarised disclosed financial information

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	***0,929 (<0,001)	***0,846 (<0,001)	***0,947 (<0,001)	***0,930 (<0,001)	***0,930 (<0,001)	***0,900 (<0,001)
NI	+	***9,257 (<0,001)	***9,607 (<0,001)	***9,142 (<0,001)	***9,200 (<0,001)	***9,209 (<0,001)	***9,003 (<0,001)
Neg	+ / –	***55,842 (<0,001)	***46,247 (<0,001)	***55,928 (<0,001)	***55,242 (<0,001)	***55,334 (<0,001)	***44,903 (<0,001)
ASC_{CA}	+ / –	***–1,559 (<0,001)	–0,111 (0,884)	***–1,954 (0,001)	***–1,450 (0,001)	***–1,504 (<0,001)	–0,609 (0,542)
ASC_{FV}	+ / –	***0,831 (<0,001)	***1,042 (<0,001)	***0,805 (<0,001)	***0,831 (<0,001)	***0,830 (<0,001)	***1,065 (<0,001)
AP	+ / –		**–4,739 (0,025)				***–8,390 (0,002)
AP_{Neg}	+ / –		**17,826 (0,033)				*14,494 (0,080)
AR	+ / –			0,316 (0,295)			***1,523 (0,001)
ATA	+ / –				–0,020 (0,496)		–0,041 (0,891)
ATL	–					–0,018 (0,544)	–0,021 (0,946)
N		230	230	230	230	230	230
Structural R^2		76,9%	78,2%	77,0%	76,9%	76,9%	79,5%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
AP	Disclosed net profit of the listed associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the listed associates
ATA	Disclosed total assets of the listed associates
ATL	Disclosed total liabilities of the listed associates

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

In all of the models the control variables are significant at the one per cent level. Specifically, book value of equity and net income from continuing operations are positive as predicted and significant at the one per cent level ($p < 0{,}001$). The indicator variable for loss firms is also significant at the one per cent level ($p < 0{,}001$). Furthermore, the results for the equity accounted carrying amounts and disclosed fair values of listed associates for the base model (Model 1) are consistent with those reported in earlier chapters. The equity accounted carrying amounts of the listed associates are significantly negative at the one per cent level ($p < 0{,}001$) and their disclosed fair values significantly positive ($p < 0{,}001$). However, once the variables representing disclosed summarised financial information of listed associates are introduced into the various models, the equity accounted carrying amounts are not consistently significant. This suggests that the equity accounted carrying amounts of listed associates are significant in the base model because they capture some of the information content of the disclosed summarised financial information.

Indeed, when the disclosed net profit of listed associates is included in the regression (Model 2), the equity accounted carrying amounts of these associates are insignificant ($p = 0{,}884$), although still negative (–0,111). This relationship between the variables explains the negative sign on the coefficient of the disclosed net profit of listed associates (–4,739) which is significant at the five per cent level ($p = 0{,}025$). Model 2 also includes an indicator variable to compensate for the fact that associates reporting a net loss would be priced differently from other associates (AP_{Neg}) which is significant at the five per cent level ($p = 0{,}033$).

When the other disclosed summarised financial information items of listed associates are considered, none of the variables are significant when they are included individually (Models 3 to 5). In these models the equity accounted carrying amounts of listed associates are once more significant at the one per cent level. However, when all of the disclosure variables are included in a single regression (Model 6), the equity accounted carrying amounts of listed associates are once more insignificant ($p = 0{,}542$). In this model, the variables representing disclosed net profit (AP) and disclosed revenues (AR) of listed associates are both significant at the one per cent level, although the other variables remain insignificant.

Although the coefficient of the disclosed total liabilities of listed associates is negative as predicted, it is also insignificant in all of the models in which it has been included. This is in contrast to prior research such as that of O'Hanlon and Taylor (2007:284), who find that disclosed total liabilities of equity accounted investees are to a significant degree negatively associated with market value of equity. Importantly, prior research did not control for disclosed fair values of equity accounted investees and in all of the models disclosed fair values of listed associates are positive and significant at the one per cent level ($p < 0,001$). However, if the model is run without controlling for the disclosed fair values of listed associates, the coefficient of the disclosed liabilities, although negative, remains insignificant. The reason for continued insignificance may be that prior research did not distinguish between listed associates and other associates. Furthermore, most prior studies (Baumann, 2003; Richardson *et al.*, 2012) focused on equity accounted investees in general (i.e. including mainly unlisted joint ventures). Therefore, a more appropriate comparison with prior research findings would be with the results for unlisted associates, which are far more prevalent (cf. the reconciliation of firm-years in Chapter 4). For this reason, a more detailed comparison with prior research results is discussed in Chapter 12.

Although the above findings suggest that only certain summarised financial information disclosures are value-relevant, this study relies on a comparison of the error terms (ε) of the various models to assess the incremental value-relevance of each disclosure. Gu (2007:1074) shows that it is the dispersion of the error terms which determines the superiority of one model specification over another and not differences in R^2s. The tests utilised to consider the incremental value-relevance of the disclosed summarised financial information of listed associates therefore focus on comparing the variance (dispersion) in the error terms of the various models.

The first of these is the Vuong test which is appropriate for the comparison of non-nested models (Vuong, 1989). In this study the Vuong test is based on the unstandardised residuals from the structural portion of the maximum likelihood regression. The Vuong test focuses on the variance in the error terms (Gu, 2007:1077) and is often utilised in value-relevance research when alternative accounting specifications are considered (Dechow, 1994:23; Ashbough & Olsson, 2002:116; Pouraghajan *et al.*, 2012:45). Note that the Vuong test is directional. If the test statistic is significantly positive, the first model is superior to the second model and, conversely, if the test statistic is significantly negative, the second model is superior to the first model.

In addition to the Vuong test, a test is performed which considers variance in the error term with reference to unstandardised residuals from the structural portion of the maximum likelihood regression (the dispersion test). The dispersion test simply compares the variance of the residuals of differing models using a paired sample ANOVA. Although the simplistic nature of this test, unlike the Vuong test, does not compensate for the automatic impact on the error term of increasing the number of independent variables, it should be noted that the models differ by a small number of independent variables. Furthermore, the results of the dispersion test tend to be qualitatively similar to those of the Vuong test in this study[12]. Therefore, in the interest of brevity, the subsequent discussions focus on the results of the Vuong test. Importantly, however, both of these tests are appropriate for the comparison of model specifications as they ignore the impact of dispersion in the independent variables, which is the reason that R^2s should not be compared across models (Gu, 2007:1076). The results of the comparisons of the different models are tabulated in Table 71.

[12] The dispersion test, due to its simplistic nature, is easy to understand and has therefore been reported, but it should be noted that this test could be inappropriate where competing models differ by a greater number of independent variables.

Table 71: Comparison of the regression findings for listed associates with summarised disclosed financial information

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion- test (t-statistic)	Vuong test (t-statistic)
Model 1	230	2 069		
Model 2	230	1 945	*–1,773 (0,078)	*–1,961 (0,051)
Model 3	230	2 057	1,500 (0,135)	1,610 (0,109)
Model 4	230	2 065	0,441 (0,659)	0,446 (0,656)
Model 5	230	2 066	0,659 (0,510)	0,678 (0,498)
Model 6	230	1 834	**–2,366 (0,019)	***–2,731 (0,007)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	230	–124	*–1,773 (0,078)	*–1,961 (0,051)
Model 3 vs 1	230	–12	–0,842 (0,401)	–0,864 (0,389)
Model 4 vs 1	230	–4	–0,598 (0,551)	–0,604 (0,547)
Model 5 vs 1	230	–3	–0,537 (0,592)	–0,541 (0,589)
Model 6 vs 1	230	–235	**–2,401 (0,017)	***–2,780 (0,006)

Model 1	Containing only the equity accounted carrying amounts and disclosed fair values of listed associates
Model 2	Containing only the disclosed net profit of the listed associates
Model 3	Containing only the disclosed revenue of the listed associates
Model 4	Containing only the disclosed total assets of the listed associates
Model 5	Containing only the disclosed total liabilities of the listed associates
Model 6	Containing all of the disclosed summarised financial information of the listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

In Panel A of Table 71 each model is compared to the immediately preceding model to assess whether the latest model has incremental value-relevance. This panel shows that adding the disclosed net profit of listed associates to the base model (Model 2 versus Model 1) significantly reduces the variance in the error term of the model at the ten per cent level of significance (p = 0,051). Models 3 to 5 each fail to improve on the one immediately preceding them, although the increase in error term variance is insignificant at conventional levels for all comparisons. However, Model 6 (which includes all of the variables relating to disclosed summarised financial information of listed associates) has a lower variance in the error term compared to including only the disclosed total liabilities of these associates (Model 5). This decrease in variance of the error term is significant at the one per cent level (p = 0,007) and indicates that including all of the disclosures has incremental value-relevance.

Similar inferences are derived from Panel B of Table 71 where each model is compared to the base model (Model 1) which did not include any of the disclosure variables. Although each model has lower variance in the error term than the base model (all of the test statistics are negative), the decrease is insignificant in most cases. In fact, only Model 2, which adds the disclosed net profit of listed associates, and Model 6, which adds all of the summarised disclosed financial information variables, are significant improvements on the base model. The decrease in error term variance when Model 2 is compared to the base model is significant at the ten per cent level (p = 0,051), while it is significant at the one per cent level (p = 0,006) when Model 6 is compared to the base model. These results continue to imply that although each element of the disclosed summarised financial information of listed associates may not be incrementally value-relevant on its own (apart from disclosed net profit), when combined they are incrementally value-relevant.

Assessments of the statistical properties of the regression models reveal that the autoregression procedure is less successful in correcting serial correlation than in previous chapters. Although the base model has successfully been corrected with no serial correlation detected at the five per cent level, all of the other models have inconclusive results based on Durbin–Watson test statistics[13]. Test statistics are, however, close to the upper critical limits.

As far as heteroskedasticity is concerned, a graphical analysis does not suggest that heteroskedasticity is present in the sample, while the distribution of residuals is approximately normal. However, significant multicollinearity is detected between disclosed net profit from associates and equity accounted carrying amounts thereof with a VIF score greater than 10. This is also a concern for disclosed total assets and total liabilities of associates in Model 6. Therefore, the regression is also run utilising the disclosed book value of equity of listed associates, rather than its comprising elements (assets and liabilities). In untabulated results, this new variable is negative, but insignificant ($p = 0,888$), while the results for all of the other variables remain qualitatively unchanged from the reported results. Interestingly, including the disclosed book value of listed associates as a new variable also reduces the multicollinearity between the equity accounted carrying amounts and disclosed net profits of these associates, although the VIF scores are still high. However, these results do imply that multicollinearity does not significantly impact on the results reported earlier.

In summary, the findings of the main regression in this chapter are that disclosed summarised financial information of listed associates are incrementally value-relevant to their equity accounted carrying amounts and disclosed fair values. Although no individual element disclosed is incrementally value-relevant (with the exception of disclosed net profit), collectively the summarised disclosed financial information has incremental value-relevance.

---

13 Utilising autoregression methods other than maximum likelihood similarly fails to correct for serial correlation and tests statistics remain inconclusive.

In the section that follows the findings of the main regression model are assessed for robustness, using various different model specifications and sampling limitations.

11.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion process.

11.5.1. Using market value of equity at reporting date

The main multivariate regression results utilise market value of equity three months after reporting date as the dependent variable, as this allows for the natural delay in the dissemination of financial reporting information to investors. However, prior research (Ball & Brown, 1968) shows that the greater part of the information content of financial reports is already incorporated into the market value of equity at reporting date. As extensive information relating to a firm's listed associates is generally available to market participants on an ongoing basis, it is not inconceivable that this information may already be incorporated into the market value of equity at the reporting date. Therefore, the regression is also run using the market value of equity at reporting date as the dependent variable. The independent variables continue to be specified as at reporting date.

The results of this robustness test are tabulated in Table 72. This table shows that results for the control variables are consistent with those of the main regression. For example, book value of equity and net income from continuing operations are significant at the one per cent level ($p < 0,001$) in all of the models in the predicted direction. The equity accounted carrying amounts of listed associates remain significantly negative at the one per cent level in the base model ($p < 0,001$) while their disclosed fair values are still positive at the same level of significance ($p < 0,001$).

Table 72: Regression findings for listed associates with summarised disclosed financial information with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	***0,907 (<0,001)	***0,848 (<0,001)	***0,919 (<0,001)	***0,909 (<0,001)	***0,909 (<0,001)	***0,885 (<0,001)
NI	+	***9,185 (<0,001)	***9,470 (<0,001)	***9,113 (<0,001)	***9,128 (<0,001)	***9,133 (<0,001)	***9,039 (<0,001)
Neg	+ / –	***42,432 (<0,001)	***34,831 (0,001)	***42,836 (<0,001)	***41,817 (<0,001)	***41,878 (<0,001)	***34,476 (0,001)
ASC_{CA}	+ / –	***–1,452 (<0,001)	–0,334 (0,647)	***–1,813 (0,001)	***–1,362 (0,001)	***–1,399 (0,001)	–1,005 (0,299)
ASC_{FV}	+ / –	***0,780 (<0,001)	***0,943 (<0,001)	***0,760 (<0,001)	***0,779 (<0,001)	***0,778 (<0,001)	***0,966 (<0,001)
AP	+ / –		*–3,668 (0,070)				***–6,757 (0,009)
AP_{Neg}	+ / –		*13,936 (0,078)				11,336 (0,151)
AR	+ / –			0,275 (0,334)			***1,291 (0,004)
ATA	+ / –				–0,014 (0,591)		0,051 (0,858)
ATL	–					–0,014 (0,614)	–0,106 (0,713)
N		229	229	229	229	229	229
Structural R^2		79,9%	80,7%	80,0%	80,0%	80,0%	81,6%

MV_E	Market value of equity at reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
AP	Disclosed net profit of the listed associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the listed associates
ATA	Disclosed total assets of the listed associates
ATL	Disclosed total liabilities of the listed associates

* Significant at the 10% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Consistent with the main regression results, when the disclosed net profits of listed associates are added to the base model in Model 2, the coefficient on equity accounted carrying amounts is negative, but insignificant (p = 0,647). Similar to earlier results, the disclosed net profits of associates remain negative, although the level of significance declines to the ten per cent level (p = 0,070). The results of Models 3 to 5 are qualitatively consistent with those of the main regression with all of the other disclosed financial information variables insignificant at conventional levels when included individually. Furthermore, the results of Model 6 are also qualitatively similar to those of the main regression. The only noteworthy difference is that the coefficient for disclosed total assets of listed associates is now positive (0,051) although it is still insignificant (p = 0,858).

However, when the variance in the error terms of the different models is compared, the levels of significance decline compared to the main regression results, although the direction of decreases and increases remains consistent. As both panels of Table 73 show, the variance in the error term of the model when disclosed net profits of listed associates are included in the model (Model 2) is no longer significantly lower than that of the base model (Model 1) with a p-value of 0,143. However, as evident from Panel B of the table, collectively the disclosed summarised financial information of listed associates has incremental value-relevance. The Vuong test reflects a decrease in error term variance significant at the five per cent level (p = 0,035) while the dispersion test detects a decrease at the ten per cent level (p = 0,060) when Model 6 is compared to the base model (Model 1).

Overall results of this robustness test are therefore consistent with those of the main regression. Although the levels of significance decrease somewhat when the variance of various models is compared, results continue to suggest that collectively disclosed summarised financial information of listed associates are incrementally value-relevant, but individually they are not.

Table 73: Comparison of the regression findings for listed associates with summarised disclosed financial information with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	229	1 801		
Model 2	229	1 722	–1,350 (0,178)	–1,468 (0,143)
Model 3	229	1 793	1,135 (0,258)	1,209 (0,228)
Model 4	229	1 799	0,400 (0,692)	0,399 (0,690)
Model 5	229	1 799	0,312 (0,755)	0,316 (0,752)
Model 6	229	1 651	*–1,870 (0,063)	**–2,091 (0,038)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	229	–79	–1,350 (0,178)	–1,468 (0,143)
Model 3 vs 1	229	71	–0,685 (0,494)	–0,693 (0,489)
Model 4 vs 1	229	6	–0,465 (0,642)	–0,468 (0,641)
Model 5 vs 1	229	0	0,449 (0,654)	–0,450 (0,653)
Model 6 vs 1	229	–150	*–1,892 (0,060)	**–2,116 (0,035)

Model 1	Containing only the equity accounted carrying amounts and disclosed fair values of listed associates
Model 2	Containing only the disclosed net profit of the listed associates
Model 3	Containing only the disclosed revenue of the listed associates
Model 4	Containing only the disclosed total assets of the listed associates
Model 5	Containing only the disclosed total liabilities of the listed associates
Model 6	Containing all of the disclosed summarised financial information of the listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level

(p-values for 2-tailed significance are indicated within brackets)

11.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. Certainly, given that this indicator variable is significant in all of the previous regression specifications, it appears that firm-years with a loss from continuing operations are significantly different from other firm-years. As loss-making associates are also likely to be priced differently from other associates, profitable firms with loss-making associates are also excluded from the sample when assessing the impact of loss firms on results. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted the significant skew induced by financial services firms in the sample and therefore an analysis excluding these firms appears warranted. Mining firms are excluded in a robustness test as findings by Barth and Clinch (1998:218) suggest that their investments in associates are priced differently from those of firms operating in other industries. Utility firms are excluded from the sample for a robustness test due to the impact that their heavy regulatory burden might have on reported results. Findings of various regression models, after making the aforementioned adjustments, are tabulated from Table 74 onwards.

As the results in Table 74 show, eliminating loss firm-years from the sample has a fairly large impact on inferences. In the first place, although the control variables remain positive in all of the models, book value of equity is now only significant at the five per cent level in most. Net income from continuing operations, however, remains significant at the one per cent level ($p < 0{,}001$) in all of the models. Consistent with earlier results, the disclosed fair values of listed associates is positive and significant at the one per cent level ($p < 0{,}001$) in the base model. However, the results for the equity accounted carrying amounts of listed associates differ from those of the main regression. Although the negative sign is consistent with earlier results, the equity accounted carrying amounts are now significant at the one per cent level in all of the regression models.

Table 74: Regression findings for listed associates with summarised disclosed financial information when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC_{CA} + \beta_4 ASC_{FV} + \beta_5 DISCL + \varepsilon$$

	Predicted Sign	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
BV_{Eexcl}	+	**0,219 (0,024)	**0,216 (0,026)	**0,238 (0,016)	**0,220 (0,024)	**0,219 (0,024)	***0,292 (0,005)
NI	+	***12,099 (<0,001)	***12,109 (<0,001)	***11,953 (<0,001)	***12,050 (<0,001)	***12,051 (<0,001)	***11,246 (<0,001)
ASC_{CA}	+ / –	***–2,113 (<0,001)	***–1,871 (0,005)	***–2,383 (<0,001)	***–2,059 (<0,001)	***–2,079 (<0,001)	***–2,301 (0,006)
ASC_{FV}	+ / –	***0,962 (<0,001)	***0,990 (<0,001)	***0,947 (<0,001)	***0,961 (<0,001)	***0,960 (<0,001)	***0,998 (<0,001)
AP	+ / –		–0,755 (0,676)				–2,954 (0,261)
AR	+ / –			0,212 (0,365)			**0,933 (0,023)
ATA	+ / –				–0,001 (0,670)		0,061 (0,794)
ATL	–					–0,001 (0,661)	–0,117 (0,620)
N		160	160	160	160	160	160
Structural R^2		86,2%	86,2%	86,2%	86,2%	86,2%	86,6%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the listed associates
ASC_{FV}	Disclosed fair values of the listed associates
AP	Disclosed net profit of the listed associates
AR	Disclosed revenue of the listed associates
ATA	Disclosed total assets of the listed associates
ATL	Disclosed total liabilities of the listed associates

** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

In addition, none of the elements of the summarised disclosed financial information of associates are value-relevant when included on their own (Models 2 to 5). When all the elements are included simultaneously in Model 6, only the disclosed revenue of listed associates remains significant, but now only at the five per cent level (p = 0,023). Another difference with the main regression results is that the coefficient for disclosed total assets of the listed associates is positive in this regression (although it remains insignificant). In combination, these results suggest that the disclosed summarised financial information of listed associates is not incrementally value-relevant when loss-firms are excluded from the sample. More formal comparisons, using the Vuong test and dispersion test, confirm the initial conclusion. Both tests fail to detect a significant change in variance of the error terms between any of the successive models at conventional levels as detailed in Panel A of Table 75. In Panel B of this table, it becomes clear that the error term variance of each model, although lower than that of the base model in all cases, is also insignificant. These results confirm that disclosed summarised financial information of listed associates offers no incremental value-relevance over the equity accounted carrying amounts and disclosed fair values of these associates in the case of profitable investing firms.

The second robustness test of this subsection investigates the impact of the industry in which sample firms operate by excluding mining, financial services and utility firms from the sample. Results from this robustness test are tabulated in Table 76 and reflect several differences with the main regression model. The first significant difference is that the equity accounted carrying amounts of listed associates, although negative, are insignificant in the base model (p = 0,567). In addition, the coefficient of this variable is no longer consistently negative in all of the models, although it remains insignificant throughout. In addition, the disclosed fair values of listed associates are now only significant at the ten per cent level in Model 6 (p = 0,057), although positive and significant at the one per cent level in all of the other models. The control variables (book value of equity and net income from continuing operations), however, are still positive in all of the models and significant at the one per cent level (p < 0,001).

Table 75: Comparison of the regression findings for listed associates with summarised disclosed financial information when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC_{CA} + \beta_4 ASC_{FV} + \beta_5 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	160	1 064		
Model 2	160	1 062	–0,400 (0,689)	–0,401 (0,689)
Model 3	160	1 055	–0,595 (0,553)	–0,616 (0,539)
Model 4	160	1 063	0,699 (0,486)	0,725 (0,469)
Model 5	160	1 064	0,566 (0,572)	0,569 (0,570)
Model 6	160	1 020	–1,307 (0,193)	–1,402 (0,163)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	160	–2	–0,400 (0,689)	–0,401 (0,689)
Model 3 vs 1	160	–9	–0,901 (0,369)	–0,952 (0,343)
Model 4 vs 1	160	–1	–0,098 (0,922)	–0,099 (0,921)
Model 5 vs 1	160	0	–0,032 (0,975)	–0,032 (0,975)
Model 6 vs 1	160	–44	–1,299 (0,196)	–1,390 (0,166)

Model 1	Containing only the equity accounted carrying amounts and disclosed fair values of listed associates
Model 2	Containing only the disclosed net profit of the listed associates
Model 3	Containing only the disclosed revenue of the listed associates
Model 4	Containing only the disclosed total assets of the listed associates
Model 5	Containing only the disclosed total liabilities of the listed associates
Model 6	Containing all of the disclosed summarised financial information of the listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

Table 76: Regression findings for listed associates with summarised disclosed financial information when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

	Predicted Sign	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
BV_{Eexcl}	+	***0,501	***0,491	***0,520	***0,495	***0,484	***0,485
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
NI	+	***11,588	***11,696	***11,132	***11,588	***11,703	***10,991
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	**25,448	**26,643	**23,734	**24,814	**25,778	**24,947
		(0,023)	(0,020)	(0,035)	(0,026)	(0,020)	(0,028)
ASC_{CA}	+ / –	–0,579	–0,245	–1,683	1,203	1,036	0,117
		(0,567)	(0,836)	(0,228)	(0,532)	(0,575)	(0,953)
ASC_{FV}	+ / –	***0,674	***0,750	***0,688	***0,616	***0,573	*0,553
		(<0,001)	(0,001)	(<0,001)	(<0,001)	(<0,001)	(0,057)
AP	+ / –		–1,642				–2,595
			(0,629)				(0,497)
AP_{Neg}	+ / –		–5,078				–7,215
			(0,581)				(0,437)
AR	+ / –			0,600			**1,555
				(0,251)			(0,028)
ATA	+ / –				–0,308		0,493
					(0,276)		(0,481)
ATL	–					–0,514	–1,870
						(0,297)	(0,164)
N		113	113	113	113	113	113
Structural R^2		91,5%	91,5%	91,5%	91,6%	91,6%	92,1%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates
AP Disclosed net profit of the listed associates
AP_{Neg} Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR Disclosed revenue of the listed associates
ATA Disclosed total assets of the listed associates
ATL Disclosed total liabilities of the listed associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Similar to the results when excluding loss firms from the sample, limiting firm industries leads to insignificant results for the disclosure variables when each element of the disclosed summarised financial information of associates is introduced into the regression individually (Models 2 to 5). Furthermore, when all the elements are included simultaneously in Model 6, only the disclosed revenue of listed associates remains significant at the five per cent level (p = 0,028). In contrast to the main regression results, the coefficient on disclosed total assets of the listed associates is now positive (0,493), but insignificant (p = 0,481). When the variance in error terms of the various models is compared, no significant differences are detected. As Table 77 shows, neither test detects a significant difference between successive models (Panel A) nor a significant difference between any of the models and the base model (Panel B). These results imply that disclosed summarised financial information of listed associates is not incrementally value-relevant outside of the mining, financial services and utility industries.

However, in order to assess the combined impact of excluding loss firms from the sample and restricting the industries of sample firms, a third robustness test is performed. The results of this robustness test are detailed in Table 78. Interestingly, the results from this combined robustness test are much more similar to those of the main regression than results from applying the sample restrictions individually. Although the equity accounted carrying amounts of listed associates are generally insignificant in the various models, they are negative in all but two (Models 4 and 5). Disclosed fair values of the listed associates are positive and significant at the one per cent level of significance in all of the models, except when disclosed net profit of associates is included in the model. When disclosed net profit is included (Models 2 and 6), disclosed fair values of listed associates have a negative sign. Although mildly significant in Model 6 (p = 0,107), this variable is insignificant when only the disclosed net profit of listed associates is included in Model 2 (p = 0,698).

Table 77: Comparison of the regression findings for listed associates with summarised disclosed financial information when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	113	612		
Model 2	113	610	–0,372 (0,710)	–0,369 (0,713)
Model 3	113	603	–0,368 (0,714)	–0,379 (0,706)
Model 4	113	606	0,167 (0,867)	0,170 (0,865)
Model 5	113	607	0,147 (0,883)	0,149 (0,882)
Model 6	113	574	–1,251 (0,214)	–1,365 (0,175)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	113	–2	–0,372 (0,710)	–0,369 (0,713)
Model 3 vs 1	113	–9	–0,630 (0,530)	–0,659 (0,512)
Model 4 vs 1	113	–6	–0,957 (0,341)	–0,966 (0,336)
Model 5 vs 1	113	–5	–0,572 (0,568)	–0,574 (0,567)
Model 6 vs 1	113	–38	–1,368 (0,174)	–1,488 (0,140)

Model 1	Containing only the equity accounted carrying amounts and disclosed fair values of listed associates
Model 2	Containing only the disclosed net profit of the listed associates
Model 3	Containing only the disclosed revenue of the listed associates
Model 4	Containing only the disclosed total assets of the listed associates
Model 5	Containing only the disclosed total liabilities of the listed associates
Model 6	Containing all of the disclosed summarised financial information of the listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

Table 78: Regression findings for listed associates with summarised disclosed financial information when loss firm-years and certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC_{CA} + \beta_4 ASC_{FV} + \beta_5 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	***0,460	***0,504	***0,481	***0,457	***0,449	***0,488
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
NI	+	***12,453	***11,530	***11,842	***12,445	***12,518	***10,905
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	+ / –	–0,247	**–3,231	–1,707	1,140	1,031	–0,972
		(0,844)	(0,049)	(0,294)	(0,611)	(0,632)	(0,657)
ASC_{FV}	+ / –	***0,622	–0,116	***0,619	***0,577	***0,544	–0,595
		(<0,001)	(0,698)	(<0,001)	(0,001)	(0,004)	(0,107)
AP	+ / –		***15,737				***18,597
			(0,007)				(0,004)
AR	+ / –			0,927			1,173
				(0,155)			(0,148)
ATA	+ / –				–0,241		0,323
					(0,452)		(0,679)
ATL	–					–0,423	–2,145
						(0,459)	(0,158)
N		93	93	93	93	93	93
Structural R^2		90,5%	91,3%	90,7%	90,6%	90,6%	92,1%

MV_E Market value of equity, three months after reporting date
BV_{Eexcl} Book value of equity, excluding the equity accounted carrying amounts of listed associates
NI Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA} Equity accounted carrying amounts of the listed associates
ASC_{FV} Disclosed fair values of the listed associates
AP Disclosed net profit of the listed associates
AR Disclosed revenue of the listed associates
ATA Disclosed total assets of the listed associates
ATL Disclosed total liabilities of the listed associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

As far as the disclosure variables themselves are concerned, with the exception of the disclosed net profit of listed associates, they are all insignificant when included individually. When the disclosed net profit is added to the base model it is positive (15,737) and significant at the one per cent level (p = 0,007). This change in sign from the main regression results is also present when all of the elements of the disclosed summarised financial information are added to the base model (Model 6). Here the disclosed net profit of listed associates is the only disclosure variable with significance (p = 0,004). In comparison with the main regression results, the disclosed revenues of listed associates are no longer significant at conventional levels (p = 0,148), although the sign of the variable is consistent with that of the main regression. Although the significance of the disclosed total liabilities improves from the main regression model, the variable is still insignificant at conventional levels (p = 0,158). Disclosed total assets of listed associates remain insignificant (p = 0,679), although the variable is now positive (0,323).

These results suggest that the disclosed net profit of listed associates is value-relevant on its own or in combination with the rest of the disclosed summarised financial information. However, incremental value-relevance is assessed with reference to the change in variance in the error term of the various regression models in this study. Results of these tests are detailed in Table 79. This table shows that, although adding disclosed net profit of listed associates to the base model reduces the error term variance of the model, this decrease is now mildly significant at best (p = 0,135). Comparing the successive models (Panel A of Table 79) reflects that the change in error term variance between successive models is not significant, with the exception of comparing Model 6 (which includes all of the disclosure variables) to Model 5 (which includes only the disclosed total liabilities of listed associates). This decrease in the variance of the error term is significant at the ten per cent level for both the Vuong test and dispersion test.

Table 79: Comparison of the regression findings for listed associates with summarised disclosed financial information when loss firm-years and certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	93	716		
Model 2	93	652	–1,384 (0,170)	–1,508 (0,135)
Model 3	93	698	1,009 (0,316)	1,055 (0,294)
Model 4	93	710	0,443 (0,658)	0,454 (0,651)
Model 5	93	710	–0,016 (0,988)	–0,016 (0,988)
Model 6	93	594	*–1,716 (0,090)	*–1,882 (0,063)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	93	–64	–1,384 (0,170)	–1,508 (0,135)
Model 3 vs 1	93	–18	–0,691 (0,491)	–0,715 (0,477)
Model 4 vs 1	93	–6	–1,012 (0,314)	–1,027 (0,307)
Model 5 vs 1	93	–6	–0,687 (0,494)	–0,697 (0,488)
Model 6 vs 1	93	–122	*–1,776 (0,079)	*–1,953 (0,054)

Model 1	Containing only the equity accounted carrying amounts and disclosed fair values of listed associates
Model 2	Containing only the disclosed net profit of the listed associates
Model 3	Containing only the disclosed revenue of the listed associates
Model 4	Containing only the disclosed total assets of the listed associates
Model 5	Containing only the disclosed total liabilities of the listed associates
Model 6	Containing all of the disclosed summarised financial information of the listed associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level

(p-values for 2-tailed significance are indicated within brackets)

Panel B of Table 79 shows that a model containing any of the disclosure variables is an improvement on the base model, but that the decrease in error term variance is mostly insignificant. In fact, the only decrease significant at conventional levels is when the base model is compared with the model including all of the disclosure variables (Model 6). Here the decrease in error term variance is significant at the ten per cent level (p = 0,054).

Consequently, results from the robustness test in this section suggest that the support for inferences is weaker when loss firms and firms operating in the mining, financial services and utility industries are excluded from the sample. However, results continue to suggest that including all of the disclosed summarised financial information in the model is preferable to including a single element only. By implication, disclosed summarised financial information of listed associates is only incrementally value-relevant as a group.

11.6. Summary and conclusion

The fifth hypothesis of this study (in null form) is that the disclosures of summarised financial information of associates are not value-relevant. This chapter investigates the hypothesis with reference to *listed* associates. Results suggest that disclosed summarised financial information of listed associates are not individually value-relevant, with the exception of disclosed net profit. However, disclosed summarised financial information of listed associates collectively has incremental value-relevance, which implies that this information is used by equity investors to value a firm's investments in its listed associates. In addition, the disclosed summarised financial information offers incremental information content above the equity accounted carrying amounts and disclosed fair values. This suggests that investors utilise information captured by the alternative measurement bases, rather than the measurement bases themselves, to determine an intrinsic value of the reporting entity's investments in associates.

Results are robust to specifying the dependent variable at reporting date, as opposed to three months thereafter. However, results are weaker when the sample excludes loss firms or firms operating in the financial services, mining or utility industries in turn. Applying these restrictions simultaneously lead to similar conclusions to those of the main regression, although at lower levels of significance. A possible reason for the decline in significance could be that the operations of profitable firms in other industries may dominate the valuation process of investors. In other words, accurate valuations of investments in listed associates have greater importance for investors when a firm is suffering losses or operating in the mining or financial services industries, because the latter industries tend to carry greater operational risk.

12. DETAILED FINDINGS: OTHER DISCLOSURES OF UNLISTED ASSOCIATES

12.1. Introduction

The final hypothesis of this study (in null form) is that the disclosures of summarised financial information of associates are not value-relevant. This previous chapter investigated this hypothesis with reference to *listed* associates. This chapter contains the detailed findings in respect of *unlisted* associates. Both chapters focus on situations where disclosed fair values differ from the equity accounted carrying amounts of the associates in question. Results are reported on a pooled basis, where countries and time periods are not separately investigated. Subsequent sections of this chapter discuss descriptive statistics for the sample, results of univariate investigations as well as results from the multivariate regression model. These sections are followed by a discussion of findings of various robustness tests and some additional analyses. The final section summarises and concludes the chapter.

12.2. Descriptive statistics

The descriptive statistics for sample firms with unlisted associates are tabulated in Table 80. Amounts have been converted to South African rand (ZAR) in this table for comparative purposes. Average sample firms with unlisted associates (with disclosed fair values different from their equity accounted carrying amounts) appear to be somewhat smaller than the sample firms with listed associates in the previous chapter. Mean (median) market value of equity for the sample firms of this chapter is ZAR 34 395 million (ZAR 12 056 million). However, the difference between the mean (median) disclosed fair value of unlisted associates and their mean (median) equity accounted carrying amounts is 124 per cent (25 per cent) for sample firms. This compares well to the differences noted for sample firms with listed associates. Some skew is evident in the sample with mean book value of equity (which excludes the equity accounted carrying amounts of unlisted associates for the purposes of this chapter) of ZAR 14 972 million and median book value of equity of ZAR 5 867 million.

Table 80: Descriptive statistics for sample firm-years with summarised disclosed financial information for unlisted associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	83	34 395	12 056	56 831	147	233 592
BV_{Eexcl}	83	14 972	5 867	22 696	282	107 269
NI	83	2 784	785	4 889	–3 661	22 417
ASC_{CA}	83	982	270	1 412	7	6 462
ASC_{FV}	83	2 201	337	4 283	7	22 715
AP	83	409	67	871	–497	4 668
AR	83	1 790	881	2 301	1	10 647
ATA	83	4 496	1 212	8 663	20	49 651
ATL	83	2 197	441	4 944	6	28 799

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

This skew is also evident for many of the disclosure variables. For example, mean disclosed total assets of unlisted associates of ZAR 4 496 million compares with a median of ZAR 1 212 million. Similar to the listed associate sample of the previous chapter, unlisted associates appear to be much smaller than their investors. This is evident when, for example, the distribution of disclosed net profit of the unlisted associates (AP) is compared with the net income from continuing operations of the investing firms (NI). Not unsurprisingly, firms tend to hold significant investments only in firms smaller than themselves.

When financial services firms are excluded from the sample, Table 81 shows that the skew noted earlier for various variables is not markedly reduced for the sample firms.

However, the difference between mean (median) equity accounted carrying amounts and mean (median) disclosed fair values of listed associates now appears much higher (lower) at 169 per cent (1 per cent). Importantly, excluding financial services firms from the sample does not affect the minimum and maximum values of the disclosure variables. This means that the higher mean values for all of these variables are more affected by the extreme observations in the smaller sample, although the medians are lower due to removal of financial services firms. These changes in the descriptive statistics imply that excluding financial services firms from the sample has a marked impact on the distribution of the variables.

Table 81: Descriptive statistics for sample firm-years with summarised disclosed financial information for unlisted associates excluding financial services firms

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
MV_E	56	44 294	15 289	65 950	681	233 592
BV_{Eexcl}	56	18 744	7 581	25 773	421	107 269
NI	56	3 452	1 015	5 694	–3 661	22 417
ASC_{CA}	56	1 046	271	1 586	7	6 462
ASC_{FV}	56	2 810	272	5 073	7	22 715
AP	56	508	37	1 037	–497	4 668
AR	56	1 744	422	2 586	53	10 647
ATA	56	4 833	578	10 321	20	49 651
ATL	56	2 317	147	5 872	6	28 799

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

The potential impact of the distribution of variables on inferences is dealt with in several ways in the regression models. Skew is reduced by deleting observations more than

2,5 observations from the mean. The potential impact of financial services firms on results is assessed with reference to a robustness test where these firms have been excluded from the sample. A similar approach is followed in the case of firms with a net loss from continuing operations. In the section that follows, the results of univariate investigations are discussed.

12.3. Univariate investigations

The results of univariate investigations are tabulated in Table 82 with Pearson (Spearman) correlations above (below) the diagonal. In this table, all of the independent variables reflect significant positive correlations with the dependent variable, namely market value of equity three months after reporting date, with the exception of the disclosed net profit of unlisted associates. This variable is positive, but the Pearson correlation is insignificant at conventional levels ($p = 0,167$). Importantly, the disclosed total assets and total liabilities of unlisted associates have a high Pearson correlation (0,947), which is significant at the one per cent level ($p < 0,001$). Although not unsurprising, considering that these variables represent the components of book value of equity, this suggests that significant multicollinearity may be present in the subsequent regression models.

The fact that not all of the disclosure variables have significant correlations with the dependent variable suggests that some may not be value-relevant. However, this study relies on the results of multivariate investigations in order to draw conclusions. These results are discussed in the section that follows.

Table 82: Univariate correlations for sample firm-years with summarised disclosed financial information for unlisted associates

	$\mathbf{MV_E}$	$\mathbf{BV_{Eexcl}}$	**NI**	$\mathbf{ASC_{CA}}$	$\mathbf{ASC_{FV}}$	**AP**	**AR**	**ATA**	**ATL**
MV_E		***0,906	***0,699	***0,620	***0,543	0,167	***0,328	***0,596	***0,498
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(0,131)	(0,002)	(<0,001)	(<0,001)
BV_{Eexcl}	***0,867		***0,774	***0,548	***0,444	*0,195	***0,454	***0,709	***0,649
	(<0,001)		(<0,001)	(<0,001)	(<0,001)	(0,078)	(<0,001)	(<0,001)	(<0,001)
NI	***0,895	***0,859		***0,348	***0,408	***0,315	***0,392	***0,522	***0,496
	(<0,001)	(<0,001)		(0,001)	(<0,001)	(0,004)	(<0,001)	(<0,001)	(<0,001)
ASC_{CA}	***0,442	***0,424	***0,445		***0,750	***0,320	***0,498	***0,669	***0,497
	(<0,001)	(<0,001)	(<0,001)		(<0,001)	(0,003)	(<0,001)	(<0,001)	(<0,001)
ASC_{FV}	***0,564	***0,488	***0,550	***0,935		***0,683	***0,530	***0,409	***0,300
	(<0,001)	(<0,001)	(<0,001)	(<0,001)		(<0,001)	(<0,001)	(<0,001)	(0,006)
AP	***0,382	***0,285	***0,415	***0,568	***0,617		***0,497	***0,280	**0,255
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	<0,001)		(<0,001)	(0,010)	(0,020)
AR	***0,634	***0,521	***0,584	***0,823	***0,834	***0,676		***0,568	***0,488
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	<0,001)	(<0,001)		(<0,001)	(<0,001)
ATA	***0,546	***0,523	***0,541	***0,942	***0,882	***0,591	***0,869		***0,947
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	<0,001)	(<0,001)	(<0,001)		(<0,001)
ATL	***0,574	***0,510	***0,563	***0,830	***0,762	***0,571	***0,876	***0,918	
	(<0,001)	(<0,001)	(<0,001)	(<0,001)	<0,001)	(<0,001)	(<0,001)	(<0,001)	

N 83

MV_E	Market value of equity, three months after reporting date	AP	Disclosed net profit of the unlisted associates
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates	AR	Disclosed revenue of the unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent	ATA	Disclosed total assets of the unlisted associates
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates	ATL	Disclosed total liabilities of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates		

* Significant at the 10% level   *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

12.4. Detailed multivariate regression findings

In this section the detailed findings from the main multivariate regression model are discussed. As the sample firm-years form a time series, serial correlation (autocorrelation) is a potential concern. In addition, an initial assessment reveals significant serial correlation based on Durbin–Watson test statistics. Therefore, results reported in this chapter are autoregression results, based on maximum likelihood estimation[14]. The main regression results are tabulated in Table 83. Model 1 in this table represents the base model, in which no disclosure variables are included. Each of the successive models introduces a different disclosure variable, while Model 6 includes all of the disclosure variables simultaneously.

Although book value of equity is positive and significant in all of the models at the one per cent level ($p < 0,001$), net income from continuing operations is only mildly significant in the base model ($p = 0,104$). However, as this variable is consistently positive and significant at the ten per cent level or better in all of the other models, the lack of significance may be due to the specific sample distribution. Interestingly, the equity accounted carrying amounts of unlisted associates are positive and significant at the five per cent level in the base model ($p = 0,029$) while the disclosed fair values are insignificant ($p = 0,222$). This confirms earlier conclusions that the disclosed fair values of unlisted associates are not incrementally value-relevant to their equity accounted carrying amounts.

[14] Autoregression with maximum likelihood estimation corrects for serial correlation and, as an added advantage, tends to be less sensitive to the impact of outliers, skewness and heteroskedasticity than ordinary least squares as it is a nonparametric estimation method.

Table 83: Regression findings for unlisted associates with summarised disclosed financial information

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	***2,157	***2,074	***2,221	***2,388	***2,362	***2,319
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
NI	+	1,280	**1,635	*1,256	**1,728	**1,462	***1,764
		(0,104)	(0,032)	(0,072)	(0,012)	(0,042)	(0,001)
Neg	+ / –	8,157	–6,787	–0,847	–2,988	–0,141	–9,899
		(0,703)	(0,759)	(0,964)	(0,869)	(0,994)	(0,603)
ASC_{CA}	+ / –	**3,223	1,809	***4,227	***6,858	***4,803	***6,952
		(0,029)	(0,218)	(0,002)	(<0,001)	(0,001)	(0,001)
ASC_{FV}	+ / –	0,626	**1,726	**1,173	–0,132	0,174	0,425
		(0,222)	(0,014)	(0,014)	(0,767)	(0,711)	(0,551)
AP	+ / –		**–6,430				–0,635
			(0,036)				(0,824)
AP_{Neg}	+ / –		17,065				8,169
			(0,246)				(0,522)
AR	+ / –			***–2,371			**–1,268
				(<0,001)			(0,031)
ATA	+ / –				***–1,490		*–1,838
					(<0,001)		(0,065)
ATL	–					***–1,751	1,182
						(<0,001)	(0,372)
N		82	82	82	82	82	82
Structural R^2		92,4%	93,3%	94,2%	94,6%	93,8%	95,3%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

In contrast to the findings for listed associates, each of the disclosure variables is value-relevant when introduced into the base model individually. More specifically, the disclosed net profit of unlisted associates is significant at the five per cent level (p = 0,036) when introduced in Model 2. Although the sign is unexpectedly negative, the result is consistent with those reported for listed associates in the previous chapter. Interestingly, the equity accounted carrying amounts of unlisted associates are insignificant in this regression model (p = 0,218) while disclosed fair values are now significant at the five per cent level (p = 0,014). When disclosed revenue of unlisted associates is introduced (Model 3), the coefficient is strangely negative (—2,371) but significant (p < 0,001). However, both the equity accounted carrying amounts and disclosed fair values of unlisted associates are significant in this regression model at the one and five per cent levels respectively.

The results for Model 4 show that introducing disclosed total assets of associates leaves only the equity accounted carrying amounts of the unlisted associates significant (p < 0,001), although the disclosed total assets variable is also significant (p < 0,001). Once again the variable has an unexpected negative sign, but this could be explained by the high correlation detected between this variable and the total disclosed liabilities of unlisted associates.

Indeed, when the disclosed total liabilities of the unlisted associates are added to the base model in Model 5, they also have a negative sign. In addition, consistent with results of prior research (O'Hanlon & Taylor, 2007:284) the variable is significant at the one per cent level. However, when all of the disclosure variables are entered into the model simultaneously, only the disclosed revenue (p = 0,031) and disclosed total assets (p = 0,065) are significant at conventional levels. In fact, disclosed total liabilities have the incorrect sign in this regression, although the variable is insignificant (p = 0,372). The results for the alternative measurement bases are consistent with those of the main regression, although the equity accounted carrying amounts are now significant at the one per cent level (p = 0,001).

Results from the regression model therefore appear to imply that not all summarised financial information disclosures of unlisted associates are value-relevant. However, in order to assess incremental value-relevance of this information, changes in the variance of the various models are investigated as Gu (2007:1074) shows that it is the dispersion (variance) of the error terms which determines the superiority of one model specification over another and not differences in R^2s. The tests utilised to consider the incremental value-relevance of the disclosed summarised financial information of listed associates therefore focus on comparing the variance (dispersion) in the error terms of the various models.

The first of these is the Vuong test which is appropriate for the comparison of non-nested models (Vuong, 1989). In this study the Vuong test is based on the unstandardised residuals from the structural portion of the maximum likelihood regression. The Vuong test focuses on the variance in the error terms (Gu, 2007:1077) and is often utilised in value-relevance research when alternative accounting specifications are considered (Dechow, 1994:23; Ashbough & Olsson, 2002:116; Pouraghajan *et al.*, 2012:45). Note that the Vuong test is directional. If the test statistic is significantly positive, the first model is superior to the second model and conversely, if the test statistic is significantly negative, the second model is superior to the first model.

In addition to the Vuong test, a test is performed which considers variance in the error term with reference to unstandardised residuals from the structural portion of the maximum likelihood regression (the dispersion test). The dispersion test simply compares the variance of the residuals of differing models using a paired sample ANOVA. Although the simplistic nature of this test, unlike the Vuong test, does not compensate for the mechanical impact of increasing the number of independent variables on the error term, it should be noted that the models differ by a small number of independent variables. Furthermore, the results of the dispersion test tend to be qualitatively similar to those of the Vuong test in this study[15]. Therefore, in the interest of brevity, the subsequent discussions focus on the results of the

[15] The dispersion test, due to its simplistic nature, is easy to understand and has therefore been reported, but it should be noted that this test could be inappropriate where competing models differ by a greater number of independent variables.

Vuong test. Importantly, however, both of these tests are appropriate for the comparison of model specifications as they ignore the impact of dispersion in the independent variables, which is the reason that R^2s should not be compared across models (Gu, 2007:1076). The results of the comparisons of the different models are tabulated in Table 84.

Panel A of Table 84 details the results of comparing successive regression models. Although most models reflect a decrease in variance from the preceding model, none of the decreases in variance are significant at conventional levels. Importantly, the only model which has greater dispersion in the error term than the previous model is Model 5, which includes the disclosed total liabilities of unlisted associates. Although the increase, compared to Model 4 which includes the disclosed total assets of unlisted associates, is only mildly significant (p = 0,138) this may explain why the disclosed total assets of unlisted associates dominate in the earlier regression results for Model 6. In addition to comparing the variance in the error term of successive models, the variance in each model is also compared to that of the base model. The results of these comparisons are detailed in Panel B of Table 84.

While each model has a lower variance in the error term than that of the base model, the decrease is insignificant for most of the models. However, when all of the disclosure variables are included in Model 6, the Vuong test detects a significant decrease in the variance of the error term at the five per cent level (p = 0,050). The result for the dispersion test, however, is only mildly significant (p = 0,111). However, overall results from the comparison of models suggest that, although none of the disclosure variables are incrementally value-relevant on their own, collectively the disclosed summarised financial information of unlisted associates is incrementally value-relevant and significantly so.

Table 84: Comparison of the regression findings for unlisted associates with summarised disclosed financial information

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	82	1 100		
Model 2	82	978	–0,813 (0,418)	–0,905 (0,368)
Model 3	82	853	–0,824 (0,412)	–0,857 (0,394)
Model 4	82	845	–0,050 (0,960)	–0,051 (0,960)
Model 5	82	936	1,281 (0,204)	1,497 (0,138)
Model 6	82	724	–1,268 (0,208)	–1,467 (0,146)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	82	–122	–0,813 (0,418)	–0,905 (0,368)
Model 3 vs 1	82	–247	–1,284 (0,203)	–1,529 (0,130)
Model 4 vs 1	82	–255	–1,534 (0,129)	*–1,838 (0,070)
Model 5 vs 1	82	–164	–1,382 (0,171)	–1,567 (0,121)
Model 6 vs 1	82	–376	–1,613 (0,111)	**–1,993 (0,050)

Model 1 Containing only the equity accounted carrying amounts and disclosed fair values of unlisted associates
Model 2 Containing only the disclosed net profit of the unlisted associates
Model 3 Containing only the disclosed revenue of the unlisted associates
Model 4 Containing only the disclosed total assets of the unlisted associates
Model 5 Containing only the disclosed total liabilities of the unlisted associates
Model 6 Containing all of the disclosed summarised financial information of the unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level

(p-values for 2-tailed significance are indicated within brackets)

Assessments of the statistical properties of the regression models reveal that the autoregression procedure is less successful in correcting serial correlation than in previous chapters. All of the models have inconclusive results based on Durbin–Watson test statistics[16]. Test statistics are, however, close to the upper critical limits.

As far as heteroskedasticity is concerned, a graphical analysis does not suggest that heteroskedasticity is present in the sample, while the distribution of residuals is approximately normal. However, significant multicollinearity is detected between disclosed total assets and disclosed total liabilities of associates in Model 6 with a VIF score of more than 10. Therefore, the regression is also run utilising the disclosed book value of equity of unlisted associates, rather than its comprising assets and liabilities. In untabulated results, this new variable is significantly negative at the one per cent level ($p = 0{,}006$), while the results for all of the other variables remain qualitatively unchanged from the reported results. These results imply disclosed total assets and liabilities of unlisted associates serve a similar purpose in the valuation process and are not uniquely value-relevant.

In summary, the findings of the main regression in this chapter are firstly that each disclosure has individual value-relevance. However, individually they lack incremental value-relevance and it is only as a group that the disclosed summarised financial information of unlisted associates reduces the variance of the error term and therefore has incremental value-relevance.

12.5. Results of robustness tests

In this section the results of various robustness tests are detailed. The robustness tests are grouped into subsections according to the elements which they address in order to facilitate the discussion process.

16 Utilising autoregression methods other than maximum likelihood similarly fail to correct for serial correlation and test statistics remain inconclusive.

12.5.1. Using market value of equity at reporting date

The main multivariate regression results utilise market value of equity three months after reporting date as the dependent variable, as this allows for the natural delay in the dissemination of financial reporting information to investors. However, prior research (Ball & Brown, 1968) shows that the greater part of the information content of financial reports is already incorporated into the market value of equity at reporting date. Therefore, the regression is also run using the market value of equity at reporting date as the dependent variable. The results of this robustness test are tabulated in Table 85.

As the table shows, specifying the dependent variable at reporting date leaves results generally unchanged from those of the main regression. In fact, the results for the control variables are more consistent. Book value of equity is positive as predicated throughout and significant at the one per cent level ($p < 0,001$) while the significance of net income from continuing operations improves so that it is positive and significant at the five per cent level or better in all of the models. The equity accounted carrying amounts of unlisted associates remain significantly positive in the base model ($p = 0,006$) and, although the sign is now negative, disclosed fair values of these associates remain insignificant ($p = 0,560$) in this model.

Table 85: Regression findings for unlisted associates with summarised disclosed financial information with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	***1,857	***1,722	***2,089	***1,999	***1,980	***2,080
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
NI	+	**2,496	***3,116	**2,111	***3,487	***3,022	***3,029
		(0,012)	(0,002)	(0,013)	(<0,001)	(0,002)	(0,001)
Neg	+ / –	–1,949	–26,282	–8,681	–14,722	–10,639	–24,277
		(0,942)	(0,341)	(0,704)	(0,521)	(0,667)	(0,292)
ASC_{CA}	+ / –	***4,757	**3,375	***5,276	***8,812	***6,579	***8,783
		(0,006)	(0,044)	(0,001)	(<0,001)	(<0,001)	(<0,001)
ASC_{FV}	+ / –	–0,355	0,663	0,551	**–1,241	–0,879	–0,567
		(0,560)	(0,407)	(0,322)	(0,027)	(0,136)	(0,507)
AP	+ / –		***–6,114				0,767
			(0,010)				(0,825)
AP_{Neg}	+ / –		27,567				14,675
			(0,123)				(0,345)
AR	+ / –			***–2,950			***–1,910
				(<0,001)			(0,004)
ATA	+ / –				***–1,541		*–2,033
					(<0,001)		(0,082)
ATL	–					***–1,686	1,466
						(0,003)	(0,348)
N		82	82	82	82	82	82
Structural R^2		89,1%	90,7%	92,1%	92,1%	90,8%	93,6%

MV_E	Market value of equity at reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

When the disclosure variables are considered, each remains negative and significant at the one per cent level when introduced individually to the base model. Including all of the disclosure variables simultaneously in Model 6 leaves only the disclosed revenue of unlisted associates significant at the one per cent level, with the disclosed total assets of unlisted associates significant at the ten per cent level. The sign of disclosed net profit of unlisted associates turns positive (0,767), but remains insignificant ($p = 0{,}825$). Results for all of the other disclosure variables in Model 6 are qualitatively unchanged from those of the main regression model. In addition, the disclosed fair values of unlisted associates are insignificant in this model ($p = 0{,}507$) while their equity accounted carrying amounts are significant at the one per cent level ($p < 0{,}001$). This confirms earlier conclusions that the disclosed fair values of unlisted associates are not incrementally value-relevant to their equity accounted carrying amounts.

The results of comparing the variance in the error terms of the various models are detailed in Table 86. In panel A of the table, successive models are compared. Results in this part of the table have greater significance than in the main regression results. The variance in error terms is reduced at the ten per cent level of significance ($p = 0{,}076$) when the disclosed revenue of unlisted associates (Model 3) rather than their disclosed net profits (Model 2) is included in the model. In addition, a significant decrease in the variance of the error term is detected ($p = 0{,}040$) when all of the disclosure variables are included in Model 6, rather than simply the disclosed total liabilities of the unlisted associates (Model 5). None of the other models have an error term variance which differs significantly from the preceding model. However, including the disclosed revenue of unlisted associates in the model also reduces the error term variance when compared to the base model. As Panel B of Table 86 shows, this decrease is significant at the five per cent level ($p = 0{,}043$). Similarly, including all of the disclosure variables in the regression (Model 6) also reduces the variance in the error term significantly at the five per cent level ($p = 0{,}017$) compared to the base model.

Table 86: Comparison of the regression findings for unlisted associates with summarised disclosed financial information with market value of equity at reporting date

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	82	1 751		
Model 2	82	1 630	–0,631 (0,530)	–0,656 (0,514)
Model 3	82	1 251	–1,655 (0,102)	*–1,797 (0,076)
Model 4	82	1 538	0,948 (0,346)	0,951 (0,345)
Model 5	82	1 623	0,870 (0,387)	0,922 (0,359)
Model 6	82	1 161	*–1,823 (0,072)	**–2,084 (0,040)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	82	–121	–0,631 (0,530)	–0,656 (0,514)
Model 3 vs 1	82	–500	*–1,799 (0,076)	**–2,056 (0,043)
Model 4 vs 1	82	–213	–0,854 (0,396)	–0,928 (0,356)
Model 5 vs 1	82	–128	–0,710 (0,480)	–0,764 (0,447)
Model 6 vs 1	82	–590	*–1,914 (0,059)	**–2,432 (0,017)

Model 1 Containing only the equity accounted carrying amounts and disclosed fair values of unlisted associates
Model 2 Containing only the disclosed net profit of the unlisted associates
Model 3 Containing only the disclosed revenue of the unlisted associates
Model 4 Containing only the disclosed total assets of the unlisted associates
Model 5 Containing only the disclosed total liabilities of the unlisted associates
Model 6 Containing all of the disclosed summarised financial information of the unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level
(p-values for 2-tailed significance are indicated within brackets)

As none of the other models have an error term variance significantly different from the base model, it is concluded that the disclosed summarised financial information of unlisted associates is only incrementally value-relevant as a group.

These results are qualitatively unchanged from those of the main regression. Consequently, specifying the dependent variable at reporting date, rather than three months thereafter, does not alter inferences. In the subsequent subsection, the results of additional robustness tests are discussed.

12.5.2. Eliminating firm-years with a loss and within certain industries

The main multivariate model compensates for the fact that firms with a loss from continuing operations are priced differently from other firms through the use of an indicator variable. However, this may be insufficient compensation for valuation differences. As loss-making associates are also likely to be priced differently from other associates, profitable firms with loss-making associates are also excluded from the sample when assessing the impact of loss firms on results. Furthermore, the main model includes firm-years in the financial services, mining and utility industries. The descriptive statistics discussed earlier in this chapter highlighted that financial services firms have a notable impact on the distribution of certain variables in the sample, and therefore an analysis excluding these firms appears warranted. Mining firms are excluded in a robustness test as findings by Barth and Clinch (1998:218) suggest that their investments in associates are priced differently from those of firms operating in other industries. Utility firms are excluded from the sample for a robustness test due to the impact that their heavy regulatory burden might have on reported results. Detailed findings of various regression models, after making the aforementioned adjustments in turn, are tabulated from Table 87 onwards.

Table 87 details regression results when loss firm-years are excluded from the sample. Applying this restriction to the sample results in continued significance for the control variables. Book value of equity remains significantly positive at the one per cent level throughout ($p < 0{,}001$). However, net income from continuing operations, although consistently positive, is only mildly significant in Model 6 ($p = 0{,}142$).

Interestingly, eliminating loss firms from the sample results in a negative coefficient on the equity accounted carrying amounts of unlisted associates in the base model, although this is only mildly significant ($p = 0{,}116$). The coefficient for the disclosed fair values of these associates, however, is now positive and significant at the one per cent level in the base model ($p = 0{,}001$). Although these results differ from the main regression model, they are consistent with results reported when other hypotheses were investigated.

Turning to the variables of interest; when the elements of disclosed summarised financial information of unlisted associates are introduced to the base model, results differ from those of the main regression model. Firstly, the coefficient on the disclosed net profit of unlisted associates is now positive (11,019) in Model 2 and significant at the one per cent level ($p < 0{,}001$). The sign of disclosed total liabilities remains negative in Model 5, but is mildly significant at best ($p = 0{,}136$). All of the other elements of disclosed summarised financial information are now insignificant at conventional levels when introduced to the base model individually.

When the disclosure variables are entered into the model simultaneously (Model 6), the disclosed net profit of unlisted associates is now also positive and significant at the one per cent level ($p < 0001$). By contrast, the disclosed revenue of unlisted associates loses its significance ($p = 0{,}155$) and is now positive. In addition, disclosed total assets of unlisted associates now have a more predictable positive sign and are significant at the one per cent level ($p = 0{,}009$). Disclosed total liabilities of unlisted associates are negative and significant at the one per cent level ($p = 0{,}002$) in Model 6.

Table 87: Regression findings for unlisted associates with summarised disclosed financial information when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC_{CA} + \beta_4 ASC_{FV} + \beta_5 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	***1,915	***1,850	***1,898	***2,049	***2,034	***1,684
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
NI	+	**1,257	*0,884	**1,262	**1,299	**1,208	0,707
		(0,032)	(0,098)	(0,033)	(0,035)	(0,037)	(0,142)
ASC_{CA}	+ / –	–1,856	**–2,709	–2,299	–0,176	–0,934	***–8,716
		(0,116)	(0,014)	(0,120)	(0,920)	(0,483)	(0,001)
ASC_{FV}	+ / –	***1,288	–0,149	***1,265	**1,015	***1,122	–0,123
		(0,001)	(0,764)	(0,001)	(0,019)	(0,005)	(0,806)
AP	+ / –		***11,019				***14,739
			(<0,001)				(<0,001)
AR	+ / –			0,304			0,706
				(0,618)			(0,155)
ATA	+ / –				–0,413		***2,707
					(0,195)		(0,009)
ATL	–					–0,578	***–3,898
						(0,136)	(0,002)
N		68	68	68	68	68	68
Structural R^2		93,7%	95,1%	93,8%	93,9%	94,0%	96,3%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

Therefore, when loss firms are eliminated from the sample, the signs of disclosure variables change and appear more predictable. Although most variables, with the exception of disclosed net profit, now lack value-relevance when introduced to the base model individually, a majority is significant when included simultaneously (Model 6). However, to assess whether the disclosed summarised financial information has incremental value-relevance, the variance in the error terms of the various models is compared. The results of this comparison are detailed in Table 88.

In Panel A of this table a significant decrease in error term variance is detected at the ten per cent level (p = 0,063) when the disclosed net profit of listed associates is introduced to the base model (Model 2 versus Model 1). In addition, Model 6 (the full model) has significantly lower variance at the five per cent level (p = 0,013) in the error term than Model 5, which includes only the disclosed total liabilities of unlisted associates. Consistent with the main regression results, Panel B of Table 88 reflects a decrease in error term variance for each of the models compared to the base model. However, this decrease is only significant at conventional levels when the element introduced is the disclosed net profit of unlisted associates (p = 0,063) or when all of the disclosure variables are included simultaneously in Model 6 (p = 0,004). The conclusion of the main regression results is therefore unaffected when loss firms are excluded from the sample. Although some differences are identified, the disclosure variables are incrementally value-relevant as a group.

The next robustness test considers whether inferences are affected when the sample excludes mining, financial services and utility firms. As Table 89 shows, the sample size is significantly reduced when these limitations are applied and, as a result, the power of the test is comparatively low. Indeed, low power may be the reason why book value of equity is insignificant in all of the regression models of this robustness test and net income from continuing operations in half of them. However, the equity accounted carrying amounts of unlisted associates are significantly negative in the base model at the five per cent level (p = 0,041) and their disclosed fair values significantly positive at the one per cent level (p = 0,001). Although these results differ from those of the main regression, they are in line with results for unlisted associates reported in earlier chapters.

Table 88: Comparison of the regression findings for listed associates with summarised disclosed financial information when loss firm-years are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC_{CA} + \beta_4 ASC_{FV} + \beta_5 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	68	473		
Model 2	68	368	*–1,680 (0,098)	*–1,889 (0,063)
Model 3	68	470	1,611 (0,112)	*1,801 (0,076)
Model 4	68	459	–0,314 (0,754)	–0,326 (0,746)
Model 5	68	453	–1,020 (0,311)	–1,067 (0,290)
Model 6	68	292	**–2,317 (0,024)	**–2,545 (0,013)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	68	–105	*–1,680 (0,098)	*–1,889 (0,063)
Model 3 vs 1	68	–3	–0,331 (0,742)	–0,336 (0,738)
Model 4 vs 1	68	–14	–0,432 (0,667)	–0,452 (0,652)
Model 5 vs 1	68	–20	–0,586 (0,560)	–0,622 (0,536)
Model 6 vs 1	68	–181	**–2,424 (0,018)	***–2,960 (0,004)

Model 1	Containing only the equity accounted carrying amounts and disclosed fair values of unlisted associates
Model 2	Containing only the disclosed net profit of the unlisted associates
Model 3	Containing only the disclosed revenue of the unlisted associates
Model 4	Containing only the disclosed total assets of the unlisted associates
Model 5	Containing only the disclosed total liabilities of the unlisted associates
Model 6	Containing all of the disclosed summarised financial information of the unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level

(p-values for 2-tailed significance are indicated within brackets)

Table 89: Regression findings for unlisted associates with summarised disclosed financial information when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
BV_{Eexcl}	+	0,245	0,017	0,127	0,024	0,044	–0,160
		(0,446)	(0,951)	(0,667)	(0,942)	(0,891)	(0,598)
NI	+	*4,579	3,239	3,064	**4,907	**4,969	2,971
		(0,075)	(0,113)	(0,197)	(0,048)	(0,045)	(0,185)
Neg	+ / –	2,176	–3,258	–1,191	3,658	4,252	–8,996
		(0,812)	(0,687)	(0,888)	(0,676)	(0,628)	(0,306)
ASC_{CA}	+ / –	**–15,259	**–13,504	–7,730	**–14,472	–11,707	–6,581
		(0,041)	(0,031)	(0,286)	(0,043)	(0,106)	(0,401)
ASC_{FV}	+ / –	***15,763	***11,989	3,671	*9,788	*9,234	3,197
		(0,001)	(0,009)	(0,551)	(0,064)	(0,086)	(0,580)
AP	+ / –		10,190				–13,755
			(0,138)				(0,306)
AP_{Neg}	+ / –		***11,818				*8,347
			(0,005)				(0,055)
AR	+ / –			**1,979			*2,298
				(0,018)			(0,070)
ATA	+ / –				*1,517		0,807
					(0,073)		(0,770)
ATL	–					*2,048	0,266
						(0,068)	(0,944)
N		39	39	39	39	39	39
Structural R^2		97,8%	98,5%	98,3%	98,1%	98,1%	98,8%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

When individual items of the disclosed summarised financial information of unlisted associates are introduced into the model (Models 2 to 5) the sign of these variables is opposite to that of the main regression. In addition, the level of significance declines for all the variables with the result that disclosed net income is only mildly significant in Model 2 (p = 0,138), while disclosed total liabilities and total assets are only significant at the ten per cent level in Models 4 and 5. When all of the disclosed summarised financial information of unlisted associates is included simultaneously in Model 6, only the disclosed revenue is significant at the ten per cent level (p = 0,070). In this model neither the equity accounted carrying amounts nor the disclosed fair values of the unlisted associates are significant.

However, in order to determine if the disclosed summarised financial information of unlisted associates offers incremental value-relevance, the variance in the error terms of the various models is compared. The results of these comparisons are detailed in Table 90. Panel A of this table shows that most of the successive models reflect no significant change in error term variance when compared to those immediately preceding. However, when all of the disclosure variables are included in Model 6, the variance in the error term is significantly lower than that of Model 5 (which only includes the disclosed total liabilities of associates) at the five per cent level (p = 0,041).

Panel B of Table 90 shows that each of the models reflects a decrease in error term variance in comparison to the base model. Although not significant at conventional levels, the decrease is mildly significant when the disclosed revenues (p = 0,101), disclosed total assets (p = 0,114) or disclosed total liabilities (p = 0,131) are individually introduced to the base model. However, when all of the disclosure variables are simultaneously included in Model 6, the decrease in the variance of the error term compared to the base model is significant at the five per cent level (p = 0,011).

Table 90: Comparison of the regression findings for unlisted associates with summarised disclosed financial information when certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	39	45		
Model 2	39	41	–0,747 (0,460)	–0,781 (0,440)
Model 3	39	35	–1,447 (0,156)	–1,545 (0,131)
Model 4	39	39	0,912 (0,368)	0,904 (0,372)
Model 5	39	39	0,240 (0,812)	0,250 (0,804)
Model 6	39	28	*1,912 (0,063)	**–2,115 (0,041)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	39	–4	–0,747 (0,460)	–0,781 (0,440)
Model 3 vs 1	39	–10	–1,544 (0,131)	–1,682 (0,101)
Model 4 vs 1	39	–6	–1,355 (0,184)	–1,617 (0,114)
Model 5 vs 1	39	–6	–1,327 (0,192)	–1,545 (0,131)
Model 6 vs 1	39	–17	**–2,156 (0,037)	**–2,665 (0,011)

Model 1 Containing only the equity accounted carrying amounts and disclosed fair values of unlisted associates
Model 2 Containing only the disclosed net profit of the unlisted associates
Model 3 Containing only the disclosed revenue of the unlisted associates
Model 4 Containing only the disclosed total assets of the unlisted associates
Model 5 Containing only the disclosed total liabilities of the unlisted associates
Model 6 Containing all of the disclosed summarised financial information of the unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level
(p-values for 2-tailed significance are indicated within brackets)

The results in Table 90 suggest that the summarised disclosed financial information of unlisted associates has incremental value-relevance as a group, even when financial services, mining and utility firms have been eliminated from the sample. However, the last robustness test of this subsection considers the combined effect of excluding loss firms and those firms operating in financial services, mining and utilities from the sample. The results of this robustness test are tabulated in Table 91. Once again the power of this test is comparatively low as the sample restrictions result in a sample size of 32 firm-years.

Perhaps as a result of the low power, book value of equity is insignificant in all of the regression models of this robustness test. However, net income from continuing operations remains significant at the ten per cent level or better in all of the regression models. Equity accounted carrying amounts of unlisted associates are negative throughout and significant at the ten per cent level or better in all but Model 6. Disclosed fair values of unlisted associates, by contrast, are positive in all of the regression models, although not significant when disclosed revenues of unlisted associates are introduced to the base model (Model 3) or when all of the disclosure variables are included simultaneously (Model 6). Although the results for the alternative measurement bases are not consistent with the results of the main regression model in this chapter, they are consistent with results for unlisted associates reported in earlier chapters.

The disclosure variables are all significant at the five per cent level or better when introduced to the base model individually (Models 2 to 5). However, the positive signs of all of the variables are opposite to those of the main regression. When all of the disclosure variables are included simultaneously (Model 6), none is significant. However, the only significant variable in this regression is net income from continuing operations ($p = 0,032$) which suggests that the lack of significance may be due to low power in the regression, and which is amplified as more variables are introduced.

Table 91: Regression findings for unlisted associates with summarised disclosed financial information when loss firm-years and certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 ASC_{CA} + \beta_4 ASC_{FV} + \beta_5 DISCL + \varepsilon$$

	Predicted Sign	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
BV_{Eexcl}	+	0,094	0,056	–0,063	–0,211	–0,220	–0,339
		(0,728)	(0,817)	(0,791)	(0,409)	(0,367)	(0,272)
NI	+	**4,959	**4,659	*3,831	**5,448	***5,631	**4,976
		(0,042)	(0,033)	(0,065)	(0,011)	(0,007)	(0,032)
ASC_{CA}	+ / –	**–15,814	**–16,280	*–10,690	***–16,135	**–13,896	–9,150
		(0,023)	(0,011)	(0,078)	(0,008)	(0,015)	(0,195)
ASC_{FV}	+ / –	***15,311	**10,278	5,179	**9,108	**8,425	4,182
		(<0,001)	(0,018)	(0,294)	(0,027)	(0,033)	(0,428)
AP	+ / –		**14,373				–13,849
			(0,041)				(0,360)
AR	+ / –			**1,761			1,507
				(0,013)			(0,229)
ATA	+ / –				**1,671		0,153
					(0,012)		(0,954)
ATL	–					***2,430	2,377
						(0,006)	(0,521)
N		32	32	32	32	32	32
Structural R^2		98,7%	99,0%	99,1%	99,1%	99,2%	99,3%

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
ASC_{FV}	Disclosed fair values of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

Firms in financial services, mining and utilities have been eliminated, using industry classifications as per Datastream.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level
(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

To assess the incremental value-relevance of the disclosure variables, the variance in the error terms of the various models is once more compared. The results of these comparisons are detailed in Table 92. Panel A of this table shows that introducing the disclosed revenue of unlisted associates (Model 3) rather than their disclosed net profit

(Model 2) reduces the variance in the error term significantly at the five per cent level (p = 0,044). In addition, including all of the disclosure variables simultaneously (Model 6), rather than only the disclosed total liabilities of unlisted associates (Model 5), reduces the error term variance at the ten per cent level (p = 0,066). None of the other models show a significant change in the variance of the error term when compared to the preceding model.

Panel B of Table 92 shows that introducing any disclosure variable reduces the variance in the error term when compared to that of the base model. However, this decrease is not significant when disclosed net income of unlisted associates is introduced (p = 0,267). For all of the other disclosure variables the decrease in error term variance compared to the base model is significant at the ten per cent level or better when they are introduced individually. Introducing all of the disclosure variables simultaneously (Model 6) significantly reduces the error term variance compared to the base model at the five per cent level (p = 0,049). Therefore, although disclosed revenue, disclosed total liabilities and disclosed total assets all have individual incremental value-relevance compared to the base model, including disclosed net profit of unlisted associates still improves the overall value-relevance of the model. As a result, the conclusion of this robustness test is consistent with that of the main regression model: disclosed summarised financial information of unlisted associates has incremental value-relevance when they are considered collectively.

In summary, although the results of robustness tests in this subsection reflect some differences with those of the main regression, the main conclusion remains: collective disclosed summarised financial information of unlisted associates has incremental value-relevance. Individual disclosures, however, are not always incrementally value-relevant on their own. The section that follows contains some additional analyses with the purpose of relating the findings of this study to those of prior research.

Table 92: Comparison of the regression findings for unlisted associates with summarised disclosed financial information when loss firm-years and certain industries are eliminated

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 ASC_{FV} + \beta_6 DISCL + \varepsilon$$

Panel A: Comparison of successive models

	N	Mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 1	32	42		
Model 2	32	38	–0,991 (0,329)	–1,130 (0,267)
Model 3	32	32	**–2,051 (0,049)	**–2,101 (0,044)
Model 4	32	34	0,600 (0,553)	0,606 (0,549)
Model 5	32	34	0,204 (0,840)	0,212 (0,834)
Model 6	32	30	*–1,752 (0,090)	*–1,906 (0,066)

Panel B: Comparison of each model to the base model

	N	Change in mean sum of squares of residual	Dispersion test (t-statistic)	Vuong test (t-statistic)
Model 2 vs 1	32	–4	–0,991 (0,329)	–1,130 (0,267)
Model 3 vs 1	32	–10	–1,503 (0,143)	*–1,699 (0,099)
Model 4 vs 1	32	–8	–1,619 (0,116)	**–2,087 (0,045)
Model 5 vs 1	32	–8	–1,418 (0,166)	*–1,711 (0,097)
Model 6 vs 1	32	–12	*–1,693 (0,100)	**–2,052 (0,049)

Model 1 Containing only the equity accounted carrying amounts and disclosed fair values of unlisted associates
Model 2 Containing only the disclosed net profit of the unlisted associates
Model 3 Containing only the disclosed revenue of the unlisted associates
Model 4 Containing only the disclosed total assets of the unlisted associates
Model 5 Containing only the disclosed total liabilities of the unlisted associates
Model 6 Containing all of the disclosed summarised financial information of the unlisted associates

The dispersion test assesses the significance of changes in the variance of the error term (ε) using unstandardised residuals from each model in a paired sample ANOVA.

The Vuong test (Vuong, 1989) is directional. Positive test statistics indicate that the first model is superior to the second model, while negative test statistics indicate that the second model is superior to the first model.

* Significant at the 10% level ** Significant at the 5% level
(p-values for 2-tailed significance are indicated within brackets)

12.6. Results of additional analyses

This section details the results of multivariate analyses conducted in addition to the main regression. The purpose of these analyses is to relate the findings of this study to those of prior research. Prior research (O'Hanlon & Taylor, 2007:284) finds that the disclosed total liabilities of equity accounted investees (comprising associates and joint ventures) show a significant negative relationship with market value of equity. These findings hold true for both the associates and joint ventures. By contrast, in this study, the disclosed total liabilities of associates are sometimes insignificant. However, it is not clear whether this is due to the control variables introduced into the model or to sampling differences. Therefore, the analyses of this section specifically focus on the value-relevance of disclosed total liabilities of associates and consider the sample selection methods of prior research.

12.6.1. Descriptive statistics

Prior research on the value-relevance of disclosed total liabilities (Baumann, 2003; O'Hanlon & Taylor, 2007; Richardson *et al.*, 2012) does not control for the disclosed fair values of associates, especially as some of the research was focused on equity accounted investees in the broader sense. Importantly, prior research did not control for other summarised disclosed information of associates, which are also introduced into the regression models of this study. Therefore, for the purposes of comparing results to prior research, the sample is expanded to include all firms that disclose summarised financial information for investments in unlisted associates, regardless of whether they also disclose fair values for these investments. By implication, those firms for which disclosed fair values of their associates are equal to the equity accounted carrying amounts are also included in the sample. As prior research has generally focused on equity accounted joint ventures, which tend to be unlisted, listed associates are not included in the sample.

Table 93: Additional descriptive statistics for sample firm-years with summarised disclosed financial information for unlisted associates

	N	Mean ZAR million	Median ZAR million	Standard Deviation ZAR million	Minimum ZAR million	Maximum ZAR million
Panel A: Disclosed fair values differing from equity accounted carrying amounts						
MV_E	83	34 395	12 056	56 831	147	233 592
BV_{Eexcl}	83	14 972	5 867	22 696	282	107 269
NI	83	2 784	785	4 889	–3 661	22 417
ASC_{CA}	83	982	270	1 412	7	6 462
AP	83	409	67	871	–497	4 668
AR	83	1 790	881	2 301	1	10 647
ATA	83	4 496	1 212	8 663	20	49 651
ATL	83	2 197	441	4 944	6	28 799
Panel B: Disclosed fair values equal to equity accounted carrying amounts						
MV_E	118	18 037	2 601	45 107	116	281 704
BV_{Eexcl}	118	5 530	1 737	10 017	–10	52 117
NI	118	1 301	276	3 054	–554	17 042
ASC_{CA}	118	97	21	185	0	1 167
AP	118	25	2	79	–288	473
AR	118	227	48	635	0	5 698
ATA	118	475	68	1 005	0	5 537
ATL	118	345	38	832	0	4 720
Panel C: No fair values disclosed						
MV_E	530	51 944	14 574	114 257	88	1 256 547
BV_{Eexcl}	530	21 473	5 392	45 726	–7 510	684 368
NI	530	2 989	745	8 908	–70 489	82 448
ASC_{CA}	530	1 635	94	13 046	0	289 088
AP	530	429	12	4 182	–6 812	91 970
AR	530	4 161	338	22 551	0	442 787
ATA	530	8 398	490	38 316	0	616 694
ATL	530	4 406	261	18 859	0	262 411

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

Descriptive statistics for the enlarged sample are detailed in Table 93. The sample is divided into three distinct subsamples, based on the information they disclose relating to the fair value of their investments in unlisted associates. In Panel A, descriptive statistics are provided for those firms disclosing a fair value for their unlisted associates that differs from their equity accounted carrying amounts. This is also the sample for the main analyses of this chapter. Panel B contains descriptive statistics for sample firms that disclose a fair value for their unlisted associates, but this fair value is equal to their equity accounted carrying amounts. The last panel of Table 93, Panel C, contains descriptive statistics for firms disclosing summarised financial information, but no fair values, for their investments in unlisted associates. All amounts are converted to South African rand (ZAR) for comparative purposes.

While descriptive statistics for sample firms in Panel A and C are not obviously dissimilar, it is immediately apparent that firms with disclosed fair values equal to their associates' equity accounted carrying amounts (Panel B) are much smaller than other sample firms. Their mean (median) market value of equity is ZAR 18 037 million (ZAR 2 601 million) compared to a mean (median) market value of equity of ZAR 34 395 million (ZAR 12 056 million) and ZAR 51 944 million (ZAR 14 574 million) in Panel A and Panel C respectively. In addition, the mean (median) equity accounted carrying amounts of the unlisted associates of these firms also appears to be much lower than those of the other two subsamples at ZAR 97 million (ZAR 21 million). The relatively small size of the firms and their investments in unlisted associates offers a potential explanation of why these firms do not perform detailed valuations of their investments in associates.

Table 93 also shows that most of the variables exhibit some skew, evident from the discrepancy between mean and median values for these variables. This is addressed by deleting outliers more than 2,5 standard deviations from the mean. The section that follows discusses the detailed results of multivariate regression findings for the enlarged sample.

12.6.2. Detailed multivariate regression results

The enlarged sample still represents a time series and therefore serial correlation (autocorrelation) remains a potential concern. Similar to the rest of this study, serial correlation is addressed by reporting autoregression results from maximum likelihood estimation. Initially, the regression is run using the sample specifications of this study that includes financial services firms in the sample. The regressions do not control for disclosed fair values, firstly to enable a comparison with prior research and secondly as they are not available for all of the sample firm-years.

Results from the initial regression are tabulated in Panel A of Table 94 for the pooled regression as well as each of the subsamples. When only the disclosed total liabilities of unlisted associates are included in the pooled regression, the variable is negative and significant at the one per cent level ($p < 0,001$). In addition, as disclosed fair values are not controlled for, the equity accounted carrying amounts of unlisted associates are positive and significant at the one per cent level ($p < 0,001$). However, when the other disclosure variables are also included in the regression, the pooled regression results show an insignificant coefficient on disclosed total liabilities ($p = 0,991$). In this regression the disclosed total assets have a negative coefficient which is significant at the five per cent level ($p = 0,046$). This suggests that the multicollinearity between the disclosed total assets and total liabilities of unlisted associates causes the change in sign. However, in contrast to prior research, the results of the pooled regression model suggest that the disclosed total liabilities of unlisted associates are only value-relevant as a component of book value of equity. In other words, controlling for other disclosures of summarised financial information of unlisted associates negates the individual value-relevance of disclosed total liabilities.

Table 94: Additional regression findings for unlisted associates with summarised disclosed financial information

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 DISCL + \varepsilon$$

Panel A: Regression findings

	Predicted Sign	Pooled		Nature of disclosed fair value of unlisted associates					
				None disclosed		Equal to CA		Different to CA	
		ATL only	All discl.	ATL only	All discl.	ATL only	All discl.	ATL only	All discl.
BV_{Eexcl}	+	***0,976	***0,990	***0,953	***0,974	***0,585	0,058	***1,883	***1,470
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(0,001)	(0,787)	(<0,001)	(<0,001)
NI	+	***7,489	***7,530	***7,677	***7,579	***8,425	***9,081	***4,222	***6,862
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	***17,509	***15,671	***18,817	***18,186	10,462	9,450	8,188	0,960
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(0,364)	(0,409)	(0,654)	(0,949)
ASC_{CA}	+	***4,277	***6,196	***2,287	**2,454	***–32,167	–3,237	***5,755	***10,227
		(<0,001)	(<0,001)	(0,004)	(0,038)	(<0,001)	(0,746)	(<0,001)	(<0,001)
AP	+ / –		***–2,995		0,505		–22,808		**–4,810
			(0,009)		(0,742)		(0,111)		(0,021)
AP_{Neg}	+ / –		*5,204		4,572		–6,125		5,670
			(0,063)		(0,142)		(0,283)		(0,583)
AR	+ / –		***0,113		**0,075		2,512		–0,704
			(<0,001)		(0,021)		(0,109)		(0,155)
ATA	+ / –		**–0,647		–0,024		***–14,289		***–3,418
			(0,046)		(0,951)		(0,003)		(<0,001)
ATL	–	***–0,586	0,005	*–0,302	–0,442	**5,269	***21,188	***–1,694	***3,269
		(<0,001)	(0,991)	(0,066)	(0,333)	(0,013)	(<0,001)	(<0,001)	(0,003)
N		717	717	523	523	113	113	81	81
Structural R^2		84,4%	85,1%	79,3%	79,6%	94,6%	95,0%	94,4%	96,7%

Table 94: Additional regression findings for unlisted associates with summarised disclosed financial information (cont.)

Panel B: Results of Chow test (comparisons above the diagonal are those of full models, comparisons below the diagonal are those of models containing only ATL)

	No fair value disclosed	**Disclosed fair value equal to carrying amount**	**Disclosed fair value different from carrying amount**
No fair value disclosed		***3,909 (<0,001)	***3,567 (<0,001)
Disclosed fair value equal to carrying amount	***4,508 (<0,001)		***6,008 (<0,001)
Disclosed fair value different from carrying amount	***3,697 (<0,001)	***5,571 (<0,001)	

The Chow test (Chow, 1960) tests whether the coefficients in the each regression are equal to those in the comparative regression. The test statistic is an F-test.

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

The negative sign on disclosed net profit and total assets of unlisted associates is probably caused by the omission of disclosed fair values of the unlisted associates from the regression models. In previous regressions, the alternative measurement bases have tended towards opposite signs. This implies that equity investors remove one measurement base of investments in associates and replace it with an adjusted valuation of their own. By omitting the disclosed fair value from regressions, the negative sign found on one of the two measurement bases in most of the prior regressions is transferred to the disclosure variables.

The subsample regression results in Panel A of Table 94 show that, for firms who do not disclose any fair value for their unlisted associates, the disclosed total liabilities of associates are negative and significant at the ten per cent level when included alone (p = 0,066). However, once the other disclosure variables are introduced, this variable is insignificant (p = 0,333). In the other subsamples, the disclosed total liabilities variable is positive and significant at the one per cent level when other disclosure variables are controlled for. However, because the coefficient on disclosed total assets is significantly negative with multicollinearity between the disclosed total assets and liabilities, the same conclusion from the pooled regression applies: disclosed total liabilities of unlisted associates are only value-relevant as a component of the book value of unlisted associates and not as an individual disclosure.

In Panel B of Table 94, the results of an additional test, to determine if the coefficients of the variables differ between the subsamples, are detailed. The Chow test (Chow, 1960) tests the null hypothesis of equality of coefficients between regressions when a known structural break exists. As Panel B of Table 94 shows, every subsample differs significantly from each of the other subsamples at the one per cent level. The likely reason for these differences is twofold. Firstly, fair value disclosures for investments in unlisted associates or the lack thereof impact on the value-relevance of disclosed summarised financial information.

Secondly, the comparatively smaller size of sample firms where the equity accounted carrying amounts and disclosed fair values are equal may also impact on subsample differences.

However, in order to facilitate a more direct comparison with prior research findings, the regressions are also run with financial services firms excluded from the sample. This sample restriction is common in prior research in this area (O'Hanlon & Taylor, 2007:274). Furthermore, as O'Hanlon and Taylor (2007:272) control for loss firms in their sample with an indicator variable, this approach is retained for the purposes of the additional analyses. The results of the additional analyses, with financial services firms excluded from the sample, are tabulated in Table 95.

The findings for the pooled regression in Panel A of Table 95 are similar to those reported in Table 94. When disclosed total liabilities of unlisted associates are included in the regression on their own (similar to prior research) their coefficient is negative (–0,617) and significant at the one per cent level ($p < 0{,}001$). However, once the other disclosure variables are introduced into the regression, this coefficient is no longer significant ($p = 0{,}874$). As disclosed total assets of unlisted associates are negative and significant at the ten per cent level in this regression ($p = 0{,}067$), it is once more concluded that the multicollinearity between the two variables is the cause. As a result, the conclusion from the earlier regression is confirmed: disclosed total liabilities of unlisted associates are only value-relevant as a component of the book value of these associates and not individually.

Table 95: Additional regression findings for unlisted associates with summarised disclosed financial information excluding financial services firms

$$MV_E = \alpha_0 + \alpha_1\Sigma Year + \alpha_2\Sigma CTRY + \beta_1 BV_{Eexcl} + \beta_2 NI + \beta_3 Neg + \beta_4 ASC_{CA} + \beta_5 DISCL + \varepsilon$$

Panel A: Regression findings

	Predicted Sign	Pooled		Nature of disclosed fair value of unlisted associates					
				None disclosed		Equal to CA		Different to CA	
		ATL only	All discl.	ATL only	All discl.	ATL only	All discl.	ATL only	All discl.
BV_{Eexcl}	+	***0,963	***0,978	***0,887	***0,907	*0,385	–0,112	***1,671	***1,123
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(0,097)	(0,669)	(<0,001)	(0,001)
NI	+	***7,724	***7,742	***8,178	***8,085	***8,612	***9,133	***4,369	***7,493
		(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)	(<0,001)
Neg	+ / –	***15,674	***13,336	***15,736	***15,011	16,237	13,360	2,713	11,965
		(0,002)	(0,007)	(0,002)	(0,004)	(0,406)	(0,466)	(0,887)	(0,477)
ASC_{CA}	+	***4,693	***6,922	**1,593	1,532	***–26,572	2,276	***9,490	***12,804
		(<0,001)	(<0,001)	(0,040)	(0,195)	(0,001)	(0,838)	(<0,001)	(<0,001)
AP	+ / –		***–4,104		–0,627		*–25,882		**–5,633
			(0,001)		(0,693)		(0,062)		(0,012)
AP_{Neg}	+ / –		4,996		2,459		–2,763		–2,750
			(0,106)		(0,462)		(0,676)		(0,808)
AR	+ / –		***0,111		*0,063		*2,480		–0,861
			(0,001)		(0,052)		(0,083)		(0,102)
ATA	+ / –		*–0,623		0,222		***–13,647		*–4,263
			(0,067)		(0,567)		(0,009)		(0,061)
ATL	–	***–0,617	–0,069	*–0,270	–0,656	**4,825	***19,998	***–2,259	5,402
		(<0,001)	(0,874)	(0,100)	(0,153)	(0,039)	(0,001)	(0,006)	(0,143)
N		582	582	437	437	91	91	54	54
Structural R^2		86,4%	87,3%	81,4%	81,5%	96,2%	96,7%	97,6%	98,5%

Table 95: Additional regression findings for unlisted associates with summarised disclosed financial information excluding financial services firms (cont.)

Panel B: Results of Chow test (comparisons above the diagonal are those of full models, comparisons below the diagonal are those of models containing only ATL)

	No fair value disclosed	**Disclosed fair value equal to carrying amount**	**Disclosed fair value different from carrying amount**
No fair value disclosed		***4,139	***3,242
		(<0,001)	(<0,001)
Disclosed fair value equal to carrying amount	***5,031		***4,949
	(<0,001)		(<0,001)
Disclosed fair value different from carrying amount	***4,876	***5,356	
	(<0,001)	(<0,001)	

The Chow test (Chow, 1960) tests whether the coefficients in the each regression are equal to those in the comparative regression. The test statistic is an F-test.

MV_E	Market value of equity, three months after reporting date
BV_{Eexcl}	Book value of equity, excluding the equity accounted carrying amounts of unlisted associates
NI	Net income from continuing operations, attributable to ordinary shareholders of the parent
Neg	Indicator variable set to one if a firm-year reflects a loss from continuing operations and zero otherwise
ASC_{CA}	Equity accounted carrying amounts of the unlisted associates
AP	Disclosed net profit of the unlisted associates
AP_{Neg}	Indicator variable set to one if a net loss from listed associates is disclosed and zero otherwise
AR	Disclosed revenue of the unlisted associates
ATA	Disclosed total assets of the unlisted associates
ATL	Disclosed total liabilities of the unlisted associates

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

(Autoregression maximum likelihood p-values for 2-tailed significance are indicated within brackets)

The subsample regression results in Panel A of Table 95 show that, for firms that do not disclose any fair value for their unlisted associates, the disclosed total liabilities of associates are negative and significant at the ten per cent level when included alone (p = 0,100). However, once the other disclosure variables are introduced, this variable is insignificant (p = 0,153), although it retains its negative sign. In the other subsamples, the disclosed total liabilities variable is positive when other disclosure variables are controlled for. However, because the coefficient on disclosed total assets is significantly negative with multicollinearity between the disclosed total assets and liabilities, the same conclusion from the pooled regression applies. Disclosed total liabilities of unlisted associates are only value-relevant as a component of the book value of unlisted associates and not as an individual disclosure.

In Panel B of Table 95, the results of an additional test to determine if the coefficients of the variables differ between the subsamples are detailed. The Chow test (Chow, 1960) tests the null hypothesis of equality of coefficients between regressions when a known structural break exists. As Panel B of Table 95 shows, every subsample differs significantly from each of the other subsamples at the one per cent level. The likely reason for these differences is twofold. Firstly, fair value disclosures for investments in unlisted associates or the lack thereof impact on the value-relevance of disclosed summarised financial information. Secondly, the comparatively smaller size of sample firms where the equity accounted carrying amounts and disclosed fair values are equal may also impact on subsample differences.

In summary, the additional analyses of this chapter suggest that prior research has found disclosed total liabilities of associates to be individually value-relevant, as models did not control for the other disclosed summarised financial information of associates. Once this information is controlled for, disclosed total liabilities are only value-relevant as a component of the book value of unlisted associates and not individually.

12.7. Summary and conclusion

The fifth hypothesis of this study (in null form) is that the disclosures of summarised financial information of associates are not value-relevant. This chapter investigates the hypothesis with reference to *unlisted* associates. Results suggest that disclosed summarised financial information of unlisted associates is not incrementally value-relevant individually. However, disclosed summarised financial information of unlisted associates collectively has incremental value-relevance, which implies that this information is used by equity investors to value a firm's investments in its unlisted associates. In addition, the disclosed summarised financial information offers incremental information content above the equity accounted carrying amounts and disclosed fair values. This suggests that investors utilise information captured by the alternative measurement bases, rather than the measurement bases themselves, to determine an intrinsic value of the reporting entity's investments in associates.

Results are robust to specifying the dependent variable at reporting date, as opposed to three months thereafter, as well as eliminating loss firms from the sample or restricting the sample to exclude mining, financial services and utility firms. Additional analyses are also conducted in this chapter to facilitate a comparison with prior research, which found disclosed total liabilities of associates to be individually value-relevant (O'Hanlon & Taylor, 2007). The results of the additional analyses suggest that prior research findings are dependent on model specification. Once other summarised disclosed financial information is controlled for, disclosed total liabilities of unlisted associates are only value-relevant as a component of the book value of associates and not individually. These results support the main findings of this chapter, namely that summarised disclosed information of unlisted associates has incremental value-relevance only when considered collectively.

13. SUMMARY AND CONCLUSION

13.1. Introduction

This study investigates various disclosures around investments in associates. Specifically, the study considers whether disclosed fair values of listed and unlisted associates subsume the equity accounted carrying amounts and whether the value-relevance of these alternative measurement bases differ across time and between countries. In addition, this study investigates whether disclosed summarised financial information of both listed and unlisted associates has incremental value-relevance. The section that follows summarises the main findings of the study.

13.2. Summary of the main findings

To facilitate the discussion process, the summary of the main findings is detailed in subsections with reference to each of the main hypotheses.

13.2.1. The disclosed fair values of listed (unlisted) associates do not subsume the equity accounted carrying amounts of the associates.

The findings of this study fail to reject the first null hypothesis that the disclosed fair values of listed associates do not subsume the equity accounted carrying amounts of the associates. However, both alternative measurement bases for listed associates, namely the equity accounted carrying amounts and disclosed fair values, are found to be value-relevant. In addition each of the alternative measurement bases are also incrementally value-relevant. In other words, investors utilise both measurement bases to derive the intrinsic value of a firm's investments in listed associates. However, the fact that both measurement bases are value-relevant implies that investors do not use either measurement base directly for valuation purposes. Therefore the disclosed fair values of listed associates, which are based on objective and publicly available market values, and their equity accounted carrying amounts both have information content which investors use to determine an intrinsic value of the reporting firm's investments in associates.

Similarly, the findings of this study fail to reject the null hypothesis that the disclosed fair values of unlisted associates do not subsume the equity accounted carrying amounts of these associates. However, in contrast to the findings for listed associates, although the alternative measurement bases (equity accounted carrying amounts and disclosed fair values) are both value-relevant, they are not incrementally so. In other words, disclosed fair values of unlisted associates convey no additional information above equity accounted carrying amounts to equity investors, so that they are indifferent between the alternative measurement bases of unlisted associates. A potential reason is that, while the disclosed fair value of a listed associate provides an independent reference point against which to check a valuation, the disclosed fair value of an unlisted associate is essentially derived from the same information as the equity accounted carrying amount.

The findings around the incremental value-relevance of the alternative measurement bases are an important contribution to the existing literature, as prior research on disclosed fair values of associates (Barth & Clinch, 1998; Graham *et al.*, 2003b) only considers individual value-relevance. In addition, prior research results were conducted in countries and during time periods when accounting requirements were not uniform and findings were therefore not generalisable to current circumstances. Findings of this study also support current accounting standards, which only require fair values to be disclosed in respect of listed associates. The next hypotheses of this study focus specifically on potential differences across time and between countries. These results are discussed in the subsections that follow.

13.2.2. The value-relevance of disclosed fair values and equity accounted carrying amounts of associates is unchanged over time.

This study investigates the null hypothesis that the value-relevance of disclosed fair values and equity accounted carrying amounts is unchanged over time for both listed and unlisted associates. The null hypothesis is rejected for both samples in respect of both overall value-relevance of the independent variables collectively as well as the value-relevance of the individual measurement bases. More specifically, results show that overall value-relevance of accounting information was significantly impacted by the 2007–2008 global financial crisis in both samples. However, by the end of the sample period (2011) overall value-relevance had recovered and no longer differed significantly between sample years.

In the case of listed associates, the 2007–2008 global financial crisis introduced significant uncertainty around the valuation of these investments. Tests reveal significant differences between the coefficients of equity accounted carrying amounts and disclosed fair values of listed associates in the post-crisis period. By contrast, significant uncertainty appears to always have been present in the case of unlisted associates, where the value-relevance of individual measurement bases differs significantly between all sample years. However, although individual value-relevance of the alternative measurement bases fluctuates, both remain value-relevant in the different sample years.

Because of the small sample sizes utilised for these investigations, results should be generalised with caution. This is especially true in the case of the unlisted associates sample, where robustness of results for different industries could not be assessed. However, these findings contribute to the existing literature by suggesting that value-relevance findings for specific variables should be cautiously generalised across time periods. In addition, findings also confirm that an economic event on the scale of the 2007–2008 global financial crisis significantly impacts on the overall value-relevance of accounting fundamentals during the crisis period.

13.2.3. The value-relevance of disclosed fair values and equity accounted carrying amounts of associates does not differ between countries.

The fourth null hypothesis that this study investigates is that the value-relevance of disclosed fair values and equity accounted carrying amounts does not differ between countries. This hypothesis is rejected for both listed and unlisted associates.

In the case of listed associates, overall value-relevance in the main investigation does not differ significantly between sample countries. However, when firms operating in the mining, financial services and utility industries are excluded from the sample, overall value-relevance differs significantly between the sample countries. A possible reason is that these represent relatively globalised industries (especially in the case of mining and financial services) for which cross-country differences matter less. Importantly, the disclosed fair values of listed associates are only value-relevant in South Africa and the United Kingdom, whereas equity accounted carrying amounts are the value-relevant variable for the Australian sample. Comparison of the value-relevance of individual measurement bases for listed associates suggests that investors in the United Kingdom place the most importance on investments in associates.

For the unlisted associates sample, overall value-relevance differs between the South African and Australian sample firms. On the other hand, the value-relevance of individual measurement bases differs significantly between sample countries only when utility, mining and financial services firms are excluded from the sample. However, findings for cross-country comparisons of unlisted associates should be generalised with caution, as the Australian sample as well as the sample firms themselves are small in comparison with the listed associates sample.

Results do, however, confirm that differences across countries impact on value-relevance of investments in associates as well as overall value-relevance. The results of this study make a particularly insightful contribution, as the sample countries (South Africa, Australia and the United Kingdom) have a shared culture and all utilised the same accounting standards during the sample period.

13.2.4. The disclosures of summarised financial information of associates are not value-relevant.

The final hypothesis for this study is that the disclosed summarised financial information of associates is not value relevant. This hypothesis is investigated for both listed and unlisted associates with similar results. The tests of this study fail to consistently reject the null hypothesis for individual elements of disclosed summarised financial information for both samples. However, when the elements of disclosed summarised financial information are considered collectively, the null hypothesis is rejected for both listed and unlisted associates. This implies that the disclosed summarised financial information is incrementally value-relevant as a group, even though individual elements are not value-relevant. In addition, the disclosed summarised financial information offers incremental information content above the equity accounted carrying amounts and disclosed fair values. This suggests that investors utilise information captured by the alternative measurement bases, rather than the measurement bases themselves, to determine an intrinsic value of the reporting entity's investments in associates.

This finding is important, as the disclosed summarised financial information remains value-relevant even when disclosed fair values of associates are controlled for. In addition, prior research (O'Hanlon & Taylor, 2007) focuses on disclosed total liabilities and does not control for other disclosures in respect of associates. Results in this study imply that the findings of prior research are influenced by the model specifications used. Once other disclosures in respect of associates are controlled for, disclosed total liabilities are value-relevant only as a component of the book value of equity of the associate and not individually.

13.3. Summary and conclusion

This study investigates several of the required disclosures for investments in associates but cannot be generalised to other fair value measurements or disclosures. Furthermore, although the accounting requirements for joint ventures are in many instances similar to those of associates, the findings of this study are specifically related to associates and cannot be generalised to equity accounted investments in general. Lastly, the findings are specific to the countries and time period investigated and cannot be freely generalised to other circumstances.

Findings suggest that equity accounted carrying amounts and disclosed fair values of listed associates are incrementally value-relevant, but that this does not equally apply in the case of unlisted associates. Other findings suggest that the value-relevance of the equity accounted carrying amounts and disclosed fair values of associates differ significantly across time and between countries for both listed and unlisted associates. In addition, findings confirm that an exceptional significant economic event, such as the global financial crisis of 2007–2008 impacts significantly on the overall value-relevance of accounting information. Lastly, findings of this study suggest that the disclosed summarised financial information of associates, although not individually value-relevant, is incrementally value-relevant when considered as a group. In short, the findings of this study therefore imply that financial information does not need to be recognised in financial statements to be used in the valuation process of investors. In the case of investment in associates, this study makes a significant contribution to understanding whether and how investors use the available financial information.

The findings for this study offer support for many of the current accounting requirements for investments in associates. Note, however, that this study does not imply that current requirements are the optimal accounting solution, but merely that they lead to information which is used in the valuations of equity investors. The International Accounting Standards Board (IASB) could therefore consider investigating what constitutes the intrinsic value of investments in associates and whether it is possible to faithfully represent this in the financial statements. This would align the information in the financial statements with that which equity investors incorporate in their valuations.

However, this is also a question of interest to researchers. They may wish to investigate how this intrinsic value is determined by equity investors and whether or not this process could be improved. Researchers may also be interested in investigating which factors affect the deviation of intrinsic values from disclosed fair values and how these factors differ between countries. These are just a few examples of the unanswered questions left to future research.

REFERENCES

Aboody, D., Barth, M.E. & Kaznik, R., 1999. Revaluation of fixed assets and future firm performance: evidence from the UK. *Journal of Accounting and Economics*, 26:149–178.

Aboody, D. & Lev, B., 1998. The value relevance of intangibles: the case of software capitalisation. *Journal of Accounting Research*, 36:161–191.

Ahmed, A.S., Kilic, E. & Lobo, G.J., 2006. Does recognition versus disclosure matter? Evidence from banks' recognized and disclosed derivative financial instruments. *Accounting Review*, 81(3):567–588.

Ashbough, H. & Olsson, P., 2002. An exploratory study of the valuation properties of cross-listed firms' IAS and US GAAP earnings and book values. *Accounting Review*, 77(1):107–126.

Badertscher, B.A., 2011. Overvaluation and the choice of alternative earnings management mechanisms. *Accounting Review*, 86(5):1491–1518.

Ball, R. & Brown, P., 1968. An empirical evaluation of accounting income numbers. *Journal of Accounting Research*, 6:159–178.

Ball, R., Robin, A. & Wu, J.S., 2003. Incentives versus standards: properties of accounting income in four East Asian countries. *Journal of Accounting and Economics*, 36:235–270.

Barlev, B. & Haddad, J.R., 2007. Harmonisation, comparability and fair value accounting. *Journal of Accounting, Auditing and Finance*, 22(3):493–509.

Barth, M.E., 1991. Relative measurement errors among alternative pension asset and liability measures. *Accounting Review*, 66(3):433–463.

Barth, M.E., 2000. Valuation-based accounting research: implications for financial reporting and opportunities for future research. *Accounting and Finance*, 40:7–31.

Barth, M.E., Beaver, W.H. & Landsman, W.R., 1996. Value-relevance of banks' fair value disclosures under SFAS No. 107. *Accounting Review*, 71(4):513–537.

Barth, M.E., Beaver, W.H. & Landsman, W.R., 2001. The relevance of the value-relevance literature for financial accounting standard setting: another view. *Journal of Accounting and Economics*, 31:77–104.

Barth, M.E., Clement, M.B., Foster, G. & Kaznik, R., 1998. Brand values and capital market valuation. *Review of Accounting Studies*, 3:41–68.

Barth, M.E. & Clinch, G., 1998. Revalued financial, tangible and intangible assets: associations with share prices and non-market-based value estimates. *Journal of Accounting Research*, 36:199–233.

Barth, M.E. & Clinch, G., 2009. Scale effects in capital markets-based accounting research. *Journal of Business Finance and Accounting*, 36(3) & (4):253–288.

Barth, M.E., Hodder, L.D. & Stubben, S.R., 2008. Fair value accounting for liabilities and own credit risk. *Accounting Review*, 83(3):629–664.

Baumann, M.P., 2003. The impact and valuation of off-balance-sheet activities concealed by equity method accounting. *Accounting Horizons*, 17(4):303–314.

Beaver, W.H., 1968. The information content of annual earnings announcements. *Journal of Accounting Research*, 6:67–92.

Brame, R., Paternoster, R., Mazerolle, P. & Piquero, A., 1998. Testing for the equality of maximum-likelihood regression coefficients between two independent equations. *Journal of Quantitative Criminology*, 14(3):245–261.

Cherkes, M., Sagi, J. & Stanton, R., 2009. A liquidity-based theory of closed-end funds. *Review of Financial Studies*, 22(1):257–297.

Chow, G.C., 1960. Tests of equality between sets of coefficients in two linear regressions. *Econometrica*, 28:591–605.

Collins, D.W., Maydew, E.L. & Weiss, I.S., 1997. Changes in the value-relevance of earnings and book values over the past forty years. *Journal of Accounting and Economics*, 24:39–67.

Comiskey, E.E. & Mulford, C.W., 1986. Investment decisions and the equity accounting standard. *Accounting Review*, 61(3):519–525.

Cornell, B., 2010. Economic growth and equity investing. *Financial Analysts Journal*, 66(1):54 – 64.

Curtis, A., 2012. A fundamentals-analysis-based test for speculative prices. *Accounting Review*, 87(1):121–148.

Day, T.E., Li, G.Z. & Xu, Y., 2011. Dividend distributions and closed-end fund discounts. *Journal of Financial Economics*, 100:579–593.

Dechow, P.M., 1994. Accounting earnings and cash flows as measures of firm performance: the role of accounting accruals. *Journal of Accounting and Economics*, 18:3–42.

Dietrich, J.R., Harris, M.S. & Muller, K.A., 2001. The reliability of investment property fair value estimates. *Journal of Accounting and Economics*, 30:125–158.

Dimson, E., Marsh, P. & Staunton, M., 2003. Global evidence on the equity risk premium. *Journal of Applied Corporate Finance*, 15(4):27–38.

Easton, P. & Pae, J., 2004. Accounting conservatism and the relation between returns and accounting data. *Review of Accounting Studies*, 9:495–521.

Eccher, E.A., Ramesh, K. & Thiagarajan, S.R., 1996. Fair value disclosures by bank holding companies. *Journal of Accounting and Economics*, 22:79–117.

Fernández, P., 2007. Valuing companies by cash flow discounting: ten methods and nine theories. *Managerial Finance*, 33(11):853–876.

Givoly, D. & Hayn, C., 2000. The changing time-series properties of earnings, cash flows and accruals: has financial reporting become more conservative? *Journal of Accounting and Economics,* 29:287–320.

Graham, B. & Dodd, D.L., 1934. *Security analysis.* New York. McGraw-Hill.

Graham, R.C., King, R.D. & Morrill, C.K.J., 2003. Decision usefulness of alternative joint venture reporting methods. *Accounting Horizons*, 17(3):123–137.

Graham, R.C., Lefanowicz, C.E. & Petroni, K.R., 2003. The value-relevance of equity method fair value disclosures. *Journal of Business Finance and Accounting*, 30(7) & (8):1065–1088.

Gu, Z., 2007. Across-sample incomparability of R^2s and additional evidence on value-relevance changes over time. *Journal of Business Finance and Accounting*, 34(7) & (8):1073–1098.

Holthausen, R.W. & Watts, R.L., 2001. The relevance of the value-relevance literature for financial accounting standard setting. *Journal of Accounting and Economics*, 31: 3–75.

Hung, M., 2001. Accounting standards and value-relevance of financial statements: an international analysis. *Journal of Accounting and Economics*, 30:401–420.

IASB – see International Accounting Standards Board.

Ilmanen, A., 2011. Expected returns: An investor's guide to harvesting market rewards. Chichester. John Wiley & Sons Ltd.

International Accounting Standards Board, 2003. *Investments in associates*. December, London. IFRS Foundation.

International Accounting Standards Board, 2010. *Conceptual framework for financial reporting*. September. London. IFRS Foundation.

International Accounting Standards Board, 2011. *Investments in associates and joint ventures*. May. London. IFRS Foundation.

Kallapur, S. & Kwan, S.Y.S., 2004. The value relevance and reliability of brand assets recognised by UK firms. *Accounting Review*, 79(1):151–172.

Kaplan, S.N. & Ruback, R.S., 1995. The valuation of cash flow forecasts: an empirical analysis. *Journal of Finance*, 50(4):1059–1093.

Khan, M. & Watts, R., 2009. Estimation and empirical properties of a firm-year measure of accounting conservatism. *Journal of Accounting and Economics*, 48:132–150.

Kim, M. & Kross, W., 2005. The ability of earnings to predict future operating cash flows has been increasing – not decreasing. *Journal of Accounting Research*, 43(5):753–780.

Koller, T., Goedhart, M. & Wessels, D., 2010. Valuation: measuring and managing the value of companies. New Jersey. John Wiley & Sons Inc.

Lundholm, R. & O'Keefe, T., 2001. Reconciling value estimates from the discounted cash flow model and the residual income model. *Contemporary Accounting Research*, 18(2):311–335.

Nelson, K.K., 1996. Fair value accounting for commercial banks: an empirical analysis of SFAS 107. *Accounting Review*, 2:161–182.

Nissim, D. & Penman, S.H., 2001. Ratio analysis and equity valuation: from research to practice. *Review of Accounting Studies*, 6:109–154.

Nobes, C., 2002. An analysis of the international development of the equity method. *Abacus*, 38(1):16–45.

O'Hanlon, J. & Taylor, P., 2007. The value-relevance of disclosures of liabilities of equity accounted investees: UK evidence. *Accounting and Business Research*, 37(4):267–284.

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

Palepu, K.G., Healy, P.M., Bernard, V.L. & Peek, E., 2007. Business analysis and valuation: IFRS edition, text and cases. London. Thomson Learning.

Pattitoni, P., Petracci, B. & Spisni, M., 2013. NAV discounts in REITs: the role of expert assessors. *Applied Economic Letters*, 20(2):194–198.

Pouraghajan, A., Emamgholipour, M., Niazi, F. & Samakosh, A., 2012. Information content of earnings and operating cash flows: evidence from the Tehran stock exchange. *International Journal of Economics and Finance*, 4(7):41–51.

Power, M., 2010. Fair value accounting, financial economics and the transformation of reliability. *Accounting and Business Research*, 40(3):197–210.

Prather, L.J., Chu, T. & Bayes, P.E., 2009. Market reactions to announcements to expense options. *Journal of Economics and Finance*, 33(3):223–245.

Richardson, A.W., Roubi, R.R. & Soonawalla, K., 2012. Decline in financial reporting for joint ventures? Canadian evidence on removal of financial reporting choice. *European Accounting Review*, 21(2):373–393.

Ruback, R.S., 2002. Capital cash flows: a simple approach to valuing risky cash flows. *Financial Management*, 31(2):85–103.

Rutterford, J., 2004. From dividend yield to discounted cash flow: a history of UK and US equity valuation techniques. *Accounting, Business & Financial History*, 14(2):115–149.

Ryan, S., 2008. Accounting in and for the subprime crisis. *Accounting Review*, 83(6):1605–1638.

Ryan, S.G. & Zarowin, P.A., 2003. Why has the contemporaneous linear returns-earnings relation declined? *Accounting Review*, 78(2):523–553.

Shrieves, R.E. & Wachowicz, J.M., 2001. Free cash flow (FCF), economic value added (EVA) and net present value (NPV): a reconciliation of variations of discounted-cash-flow (DCF) valuation. *Engineering Economist*, 46(1):33–52.

Song, C.J., Thomas, W.B. & Yi, H.., 2010. Value-relevance of FAS No. 157 fair value hierarchy information and the impact of corporate governance mechanisms. *Accounting Review*, 85(4):1375–1410.

Soonawalla, K., 2006. Accounting for joint ventures and associates in Canada, UK, and US: do US rules hide information? *Journal of Business Finance and Accounting*, 33(3) & (4):395–417.

Subramanyam, K.R. & Venkatachalam, M., 2007. Earnings, cash flows and ex post intrinsic value of equity. *Accounting Review*, 82(2):457–481.

Venter, E.R., Emanuel, D. & Cahan, S.F., 2014. The value relevance of mandatory non-GAAP earnings. *Abacus*, 50(1):1–24.

Vuong, Q.H., 1989. Likelihood ratio tests for model selection and non-nested hypotheses. *Econometrica*, 57(2):307–333.

Watts, R., 2003. Conservatism in accounting part I: explanations and implications. *Accounting Horizons*, 17(3):207–221.

Welch, I., 2000. Views of financial economists on the equity premium and on professional controversies. *Journal of Business*, 73(4):501–537.

WFE – see World Federation of Exchanges

World Federation of Exchanges, 2014. [online] http://www.world-exchanges.org/statistics/monthly-reports (accessed 16 June 2014)

APPENDIX 1: LIST OF ALL SAMPLE FIRMS

South Africa

Firm name per Datastream	Industry classification per Datastream
ABSA GROUP LTD.	Banks
ADCORP HOLDINGS LIMITED	Bus.Train & Employmnt
AECI LTD.	Specialty Chemicals
AFGRI LTD.	Farming & Fishing
AFN.RAINBOW MRLS.LTD.	General Mining
AFRICAN & OS.ENTS.LTD.	Apparel Retailers
AFRICAN OXYGEN LTD.	Specialty Chemicals
AFROCENTRIC INV.CORP LTD	Healthcare Providers
ALLIED ELTN.CORP.LTD.	Electrical Equipment
ANDULELA INV.HDG.LTD.	Specialty Finance
ANGLO AMERICAN PLAT.LTD.	Plat.& Precious Metal
ANGLOGOLD ASHANTI LTD.	Gold Mining
ARCELORMITTAL SA.LTD.	Iron & Steel
ASPEN PHMCR.HDG.LIMITED	Pharmaceuticals
ASTRAPAK LIMITED	Containers & Package
BARLOWORLD LTD.	Divers. Industrials
BASIL READ HOLDINGS LTD.	Heavy Construction
BEIGE HOLDINGS LIMITED	Personal Products
BLUE LABEL TELECOMS LTD.	Mobile Telecom.
BUS.CONNEXION GROUP LTD.	Computer Services
CAPITAL PROPERTY FD.	Ind. & Office REITs
CARGO CARRIERS LTD.	Trucking
CAXTON & CTP PB&PRT.LTD.	Publishing
CIPLA MEDPRO STH.AF.LTD.	Pharmaceuticals
CLIENTELE LTD.	Life Insurance
COMAIR LTD.	Airlines
COMBINED MOTOR HDG.LTD.	Specialty Retailers
COMPU CLEAR.OUTSC.LTD.	Computer Services
CONDUIT CAPITAL LTD.	Specialty Finance
CONVERGENET HDG.LTD.	Computer Services
CORONATION FD.MGRS.LTD.	Asset Managers
DIGICORE HDG.LIMITED	Electronic Equipment
DISCOVERY HOLDINGS LTD.	Life Insurance
DISTELL GROUP LIMITED	Distillers & Vintners
DS.& WHSG.NETWORK LTD.	Building Mat.& Fix.
EOH HOLDINGS LIMITED	Computer Services
EXXARO RESOURCES LIMITED	Coal
FIRSTRAND LTD.	Banks
GIJIMA GROUP LIMITED	Computer Services
GOLD FIELDS LTD.	Gold Mining
GRAND PARADE INVS.LTD.	Specialty Finance
GRINDROD LIMITED	Marine Transportation
GROUP FIVE LIMITED	Heavy Construction
HARMONY GOLD MNG.CO.LTD.	Gold Mining
HOWDEN AFRICA HDG.LTD.	Industrial Machinery
HYPROP INVESTMENTS LTD.	Real Estate Hold, Dev
ILLOVO SUGAR LTD.	Food Products
IMPALA PLATINUM HDG.LTD.	Plat.& Precious Metal
IMPERIAL HOLDINGS LTD.	Transport Services
INSIMBI RF&ALY.SUPS.LTD.	Nonferrous Metals
INVICTA HOLDINGS LIMITED	Industrial Machinery
ITALTILE LTD.	Home Improvement Ret.
JASCO ELTN.HDG.LTD.	Electrical Equipment
JD GROUP LTD.	Home Improvement Ret.

South Africa

Firm name per Datastream	Industry classification per Datastream
JSE LIMITED	Investment Services
KAGISO MEDIA LTD.	Broadcast & Entertain
KUMBA IRON ORE LTD.	Iron & Steel
LIFE HEALTHCARE GP.HLTD.	Healthcare Providers
MASSMART HOLDINGS LTD.	Broadline Retailers
MEDICLINIC INTL.LTD.	Healthcare Providers
METAIR INVESTMENTS LTD.	Auto Parts
METMAR LIMITED	Nonferrous Metals
MMI HOLDINGS LIMITED	Life Insurance
MORVEST BUS.GROUP LTD.	Business Support Svs.
MTN GROUP LIMITED	Mobile Telecom.
MURRAY&ROBERTS HDG.LTD.	Heavy Construction
MUSTEK LTD.	Computer Hardware
NAMPAK LIMITED	Containers & Package
NASPERS LTD.	Broadcast & Entertain
NEDBANK GROUP LIMITED	Banks
NETCARE LTD.	Healthcare Providers
NEW BOND CAPITAL LTD.	Business Support Svs.
NORTHAM PLATINUM LIMITED	Plat.& Precious Metal
OCTODEC INVESTMENTS LTD.	Real Estate Hold, Dev
OMNIA HOLDINGS LIMITED	Specialty Chemicals
ONELOGIX GROUP LIMITED	Business Support Svs.
PEREGRINE HOLDINGS LTD.	Asset Managers
PETMIN LIMITED	General Mining
PHUMELELA GMG.& LEIS.LTD	Gambling
PICK N PAY STORES LTD.	Food Retail,Wholesale
PIONEER FOOD GROUP LTD.	Food Products
PPC LTD.	Building Mat.& Fix.
PREMIUM PROPERTIES LTD.	Real Estate Hold, Dev
PSG GROUP LIMITED	Investment Services
PURPLE CAPITAL LIMITED	Investment Services
RAUBEX GROUP LIMITED	Heavy Construction
REDEFINE PROPERTIES LTD.	Real Estate Hold, Dev
REMGRO LTD.	Divers. Industrials
RESILIENT PR.INC.FD.	Real Estate Hold, Dev
REUNERT LTD.	Electrical Equipment
REX TRUF.CLOTH.CO.LTD.	Apparel Retailers
RMB HOLDINGS LIMITED	Banks
SA CORPORATE RL.EST.FUND	Retail REITs
SANLAM LTD.	Life Insurance
SANTAM LTD.	Prop. & Casualty Ins.
SANYATI HOLDINGS LIMITED	Heavy Construction
SASFIN HOLDINGS LIMITED	Investment Services
SASOL LIMITED	Integrated Oil & Gas
SEKUNJALO INVS.LTD.	Specialty Finance
SENTULA MINING LTD.	General Mining
SEPHAKU HOLDINGS LTD.	General Mining
SPAR GROUP LIMITED	Food Retail,Wholesale
SPUR CORPORATION LIMITED	Restaurants & Bars
STEINHOFF INTL.HDG.LTD.	Furnishings
SUPER GROUP LTD.	Transport Services
THE FOSCHINI GROUP LTD.	Apparel Retailers
TIGER BRANDS LTD.	Food Products
TONGAAT-HULETT LIMITED	Food Products
TRADEHOLD LTD.	Real Estate Hold, Dev
TRANS HEX GROUP LIMITED	Diamonds & Gemstones

South Africa

Firm name per Datastream	Industry classification per Datastream
TRENCOR LTD.	Transport Services
VALUE GROUP LTD.	Transport Services
VUNANI LTD.	Investment Services
WINHOLD LTD.	Industrial Suppliers
WLSN.BAYLY HOLMES-OVCON	Heavy Construction
WOOLWORTHS HDG.LIMITED	Broadline Retailers
ZCI LTD.	Nonferrous Metals
ZEDER INVESTMENTS LTD.	Specialty Finance
ZURICH IN.CO.SA LIMITED	Prop. & Casualty Ins.

United Kingdom

Firm name per Datastream	Industry classification per Datastream
AEGIS GROUP PLC.	Media Agencies
AFREN PLC.	Exploration & Prod.
AMEC PLC.	Oil Equip. & Services
AMLIN PLC.	Prop. & Casualty Ins.
ANGLO AMERICAN PLC.	General Mining
ANTOFAGASTA PLC.	General Mining
ASHMORE GROUP PLC.	Asset Managers
AVIVA PLC.	Life Insurance
BAE SYSTEMS PLC.	Defense
BARCLAYS PLC.	Banks
BBA AVIATION PLC.	Transport Services
BEAZLEY PLC.	Prop. & Casualty Ins.
BELLWAY PLC.	Home Construction
BRIT.SKY BCAST.GP.PLC.	Broadcast & Entertain
BRITISH AMER.TOB.PLC.	Tobacco
BT GROUP PLC.	Fixed Line Telecom.
BTG PLC.	Biotechnology
CENTRICA PLC.	Gas Distribution
CHEMRING GROUP PLC.	Defense
CRODA INTERNATIONAL PLC.	Specialty Chemicals
DE LA RUE PLC.	Business Support Svs.
DIAGEO PLC.	Distillers & Vintners
EASYJET PLC.	Airlines
EURASIAN NATRES.CORP.PLC	General Mining
EUROMONEY INSTL.INVR.PLC	Publishing
FERREXPO PLC.	Iron & Steel
G4S PLC.	Business Support Svs.
GLAXOSMITHKLINE PLC.	Pharmaceuticals
HALMA PLC.	Electronic Equipment
HIKMA PHARMS.PLC.	Pharmaceuticals
HISCOX LTD.	Prop. & Casualty Ins.
HOCHSCHILD MINING PLC.	General Mining
HSBC HOLDINGS PLC.	Banks
INCHCAPE PLC.	Specialty Retailers
INTERTEK GROUP PLC.	Business Support Svs.
INTL.CONS.AIRL.GROUP SA	Airlines
INVESTEC PLC.	Investment Services
ITV PLC.	Broadcast & Entertain
JARDINE LLOYD THMP.PLC.	Insurance Brokers
JOHNSON MATTHEY PLC.	Specialty Chemicals
KAZAKHMYS PLC.	General Mining

United Kingdom

Firm name per Datastream	Industry classification per Datastream
LANCASHIRE HOLDINGS LTD.	Prop. & Casualty Ins.
LONDON STOCK EX.GP.PLC.	Investment Services
LONMIN PLC.	Plat.& Precious Metal
MAN GROUP PLC.	Asset Managers
MLLM.& CPTH.HTLS.PLC	Hotels
OLD MUTUAL PLC.	Life Insurance
PLAYTECH LTD.	Gambling
PRUDENTIAL PLC.	Life Insurance
QINETIQ GROUP PLC.	Defense
RENTOKIL INITIAL PLC.	Business Support Svs.
RESOLUTION LTD.	Life Insurance
RESTAURANT GROUP PLC.	Restaurants & Bars
REXAM PLC.	Containers & Package
ROLLS-ROYCE HOLDINGS PLC	Aerospace
SABMILLER PLC.	Brewers
SCHRODERS PLC.	Asset Managers
SEVERN TRENT PLC.	Water
SHIRE PLC.	Pharmaceuticals
SMITH (DS) PLC.	Containers & Package
SPIRAX-SARCO ENGR.PLC.	Industrial Machinery
SPORTS DIRECT INTL.PLC.	Apparel Retailers
SSE PLC.	Con. Electricity
STAGECOACH GROUP PLC.	Travel & Tourism
TESCO PLC.	Food Retail,Wholesale
THE MORGAN CRUC.CO.PLC.	Electrical Equipment
TUI TRAVEL PLC.	Travel & Tourism
UBM PLC.	Publishing
ULTRA ELT.HDG.PLC.	Defense
UNITED UTILITIES GP.PLC.	Water
VEDANTA RESOURCES PLC.	General Mining
VODAFONE GROUP PLC.	Mobile Telecom.
WEIR GROUP PLC.	Industrial Machinery
WHITBREAD PLC.	Restaurants & Bars
WOLSELEY PLC.	Industrial Suppliers
WPP PLC.	Media Agencies
XSTRATA PLC.	General Mining

Australia

Firm name per Datastream	Industry classification per Datastream
ABACUS PROPERTY GROUP	Diversified REITs
AGL ENERGY LIMITED	Multiutilities
AMCOR LTD.	Containers & Package
AMP LTD.	Life Insurance
ASCIANO LTD.	Transport Services
ASPEN GROUP	Ind. & Office REITs
ATLAS IRON LIMITED	General Mining
AURORA OIL & GAS LTD.	Exploration & Prod.
AUS.AND NZ.BANKING GLD.	Banks
AUSDRILL LIMITED	Business Support Svs.
AUSTRALIAN AGRI.CO.LTD.	Farming & Fishing
AWE LIMITED	Exploration & Prod.
BEACH ENERGY LIMITED	Exploration & Prod.
CABCHARGE AUSTRALIA LTD.	Financial Admin.

Australia

Firm name per Datastream	Industry classification per Datastream
CALTEX AUSTRALIA LTD.	Exploration & Prod.
CAPE LAMBERT RES.LTD.	Iron & Steel
CFS RETAIL PR.TST.GROUP	Retail REITs
CHALLENGER LTD.	Life Insurance
CHARTER HALL GROUP	Diversified REITs
COCKATOO COAL LTD.	Coal
COMMONWEALTH PR.OFFE.FD.	Ind. & Office REITs
CROWN LTD.	Gambling
DEXUS PROPERTY GROUP	Diversified REITs
DUET GROUP	Multiutilities
ENERGY WORLD CORP.LTD.	Con. Electricity
FKP PROPERTY GROUP	Real Estate Hold, Dev
FLIGHT CENTRE LIMITED	Travel & Tourism
GOODMAN GROUP	Diversified REITs
INDOPHIL RESOURCES NL	General Mining
INSURANCE AUS.GROUP LTD.	Prop. & Casualty Ins.
IOOF HOLDINGS LIMITED	Specialty Finance
IVANHOE AUSTRALIA LTD.	General Mining
JB HI-FI LIMITED	Specialty Retailers
LEND LEASE GROUP	Real Estate Services
MACQUARIE GROUP LTD.	Investment Services
MESOBLAST LTD.	Biotechnology
MINERAL RESOURCES LTD.	General Mining
MIRVAC GROUP	Residential REITs
NAVITAS LIMITED	Spec.Consumer Service
NUFARM LIMITED	Specialty Chemicals
ORICA LTD.	Specialty Chemicals
ORIGIN ENERGY LTD.	Multiutilities
OZ MINERALS LTD.	General Mining
PALADIN ENERGY LTD.	Nonferrous Metals
PERILYA LIMITED	General Mining
PERSEUS MINING LIMITED	Gold Mining
PREMIER INVESTMENTS LTD.	Specialty Finance
PRIMARY HEALTH CARE LTD.	Healthcare Providers
QANTAS AIRWAYS LIMITED	Airlines
QBE INSURANCE GROUP LTD.	Reinsurance
RCR TOMLINSON LIMITED	Industrial Machinery
RESOLUTE MINING LTD.	Gold Mining
SAI GLOBAL LIMITED	Business Support Svs.
SANTOS LTD.	Exploration & Prod.
SEEK LTD.	Bus.Train & Employmnt
SENEX ENERGY LTD.	Exploration & Prod.
SEVEN GROUP HDG.LTD.	Broadcast & Entertain
SILEX SYSTEMS LTD.	Electronic Equipment
SIMS METAL MAN.LTD.	Iron & Steel
SOUTHERN CROSS MDA.GLD.	Broadcast & Entertain
STOCKLAND	Residential REITs
SUNCORP GROUP LTD.	Specialty Finance
TELSTRA CORPORATION LTD.	Fixed Line Telecom.
TEN NETWORK HDG.LTD.	Broadcast & Entertain
TOLL HOLDINGS LTD.	Transport Services
TRANSFIELD SERVICES LTD.	Business Support Svs.
TRANSURBAN GROUP	Transport Services
VIRGIN AUS.HOLDINGS LTD.	Airlines
WESFARMERS LTD.	Home Improvement Ret.

APPENDIX 2: LIST OF SAMPLE FIRMS WITH LISTED ASSOCIATES

South Africa

Firm name per Datastream	**Industry classification per Datastream**
ABSA GROUP LTD.	Banks
AFROCENTRIC INV.CORP LTD	Healthcare Providers
ANGLO AMERICAN PLAT.LTD.	Plat.& Precious Metal
ANGLOGOLD ASHANTI LTD.	Gold Mining
ARCELORMITTAL SA.LTD.	Iron & Steel
CAPITAL PROPERTY FD.	Ind. & Office REITs
CORONATION FD.MGRS.LTD.	Asset Managers
FIRSTRAND LTD.	Banks
GOLD FIELDS LTD.	Gold Mining
GRAND PARADE INVS.LTD.	Specialty Finance
HARMONY GOLD MNG.CO.LTD.	Gold Mining
IMPERIAL HOLDINGS LTD.	Transport Services
MURRAY&ROBERTS HDG.LTD.	Heavy Construction
NASPERS LTD.	Broadcast & Entertain
PHUMELELA GMG.& LEIS.LTD	Gambling
PSG GROUP LIMITED	Investment Services
REDEFINE PROPERTIES LTD.	Real Estate Hold, Dev
REMGRO LTD.	Divers. Industrials
RESILIENT PR.INC.FD.	Real Estate Hold, Dev
RMB HOLDINGS LIMITED	Banks
SA CORPORATE RL.EST.FUND	Retail REITs
SANLAM LTD.	Life Insurance
STEINHOFF INTL.HDG.LTD.	Furnishings
TIGER BRANDS LTD.	Food Products

United Kingdom

Firm name per Datastream	**Industry classification per Datastream**
AEGIS GROUP PLC.	Media Agencies
AFREN PLC.	Exploration & Prod.
ANGLO AMERICAN PLC.	General Mining
ANTOFAGASTA PLC.	General Mining
AVIVA PLC.	Life Insurance
BARCLAYS PLC.	Banks
BRITISH AMER.TOB.PLC.	Tobacco
BT GROUP PLC.	Fixed Line Telecom.
DIAGEO PLC.	Distillers & Vintners
GLAXOSMITHKLINE PLC.	Pharmaceuticals
HOCHSCHILD MINING PLC.	General Mining
HSBC HOLDINGS PLC.	Banks
INTL.CONS.AIRL.GROUP SA	Airlines
INVESTEC PLC.	Investment Services
KAZAKHMYS PLC.	General Mining
MLLM.& CPTH.HTLS.PLC	Hotels
ROLLS-ROYCE HOLDINGS PLC	Aerospace
SABMILLER PLC.	Brewers
UNITED UTILITIES GP.PLC.	Water
VEDANTA RESOURCES PLC.	General Mining
WPP PLC.	Media Agencies
XSTRATA PLC.	General Mining

Australia

Firm name per Datastream	Industry classification per Datastream
AGL ENERGY LIMITED	Multiutilities
AMCOR LTD.	Containers & Package
AMP LTD.	Life Insurance
ATLAS IRON LIMITED	General Mining
AURORA OIL & GAS LTD.	Exploration & Prod.
AUS.AND NZ.BANKING GLD.	Banks
AWE LIMITED	Exploration & Prod.
BEACH ENERGY LIMITED	Exploration & Prod.
CAPE LAMBERT RES.LTD.	Iron & Steel
CHALLENGER LTD.	Life Insurance
CHARTER HALL GROUP	Diversified REITs
CROWN LTD.	Gambling
GOODMAN GROUP	Diversified REITs
IVANHOE AUSTRALIA LTD.	General Mining
LEND LEASE GROUP	Real Estate Services
MACQUARIE GROUP LTD.	Investment Services
MIRVAC GROUP	Residential REITs
NUFARM LIMITED	Specialty Chemicals
OZ MINERALS LTD.	General Mining
PERSEUS MINING LIMITED	Gold Mining
QANTAS AIRWAYS LIMITED	Airlines
RESOLUTE MINING LTD.	Gold Mining
SANTOS LTD.	Exploration & Prod.
SEEK LTD.	Bus.Train & Employmnt
TELSTRA CORPORATION LTD.	Fixed Line Telecom.
TEN NETWORK HDG.LTD.	Broadcast & Entertain
TOLL HOLDINGS LTD.	Transport Services
TRANSFIELD SERVICES LTD.	Business Support Svs.
WESFARMERS LTD.	Home Improvement Ret.