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An empirical study of the value-relevance of using proportionate consolidation accounting for investments in joint ventures

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Abstract

This research examines bond risk premiums to determine whether creditors of companies with investments in joint ventures reflect legal or implicit measures of the debts of joint ventures. The legal view suggests that the amount of potential loss from an investment in a joint venture is limited to the investment. The implicit view suggests that the operations of the joint venture and the venturer are interdependent. Equity method accounting reflects the legal view and proportionate consolidation reflects the implicit view.

The study examines whether bond risk premiums are more highly associated with accounting numbers from proportionate consolidation than equity method accounting. The study uses data from 10Ks, the *Wall Street Journal*, and *Moody's Bond Record* from May 1, 1995 through April 30, 1998. These 4 years are used because US interest rates were fairly stable during this period, which is an important factor when examining bond risk premiums. Additionally, the companies in the study needed to remain stable across the window of study – no mergers, acquisitions, buy-outs, or liquidations – in order to maintain a comparative sample over the entire time period. The risk premium model uses measures of default that change between equity method accounting and proportionate consolidation. Differences in the explanatory power of the model determine how creditors view the joint venture debts.

The study shows that approximately half of equity investments represent investments in joint ventures. Furthermore, the average joint venture uses debt to finance about two-thirds of the assets. The results show that proportionate consolidation fails to improve the explanatory power of the model when examining the entire set of companies that invest in joint ventures. However, the data reject

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the null hypothesis of no improvement with proportionate consolidation when examining companies who guarantee the debt of their joint venture. The policy implication of this study indicates that a change to proportionate consolidation would provide more value-relevant information to creditors when companies guarantee the debt of the joint venture.

Keywords: Value-relevance; Proportionate consolidation accounting; Investments; Joint ventures

1. Introduction

This study examines bond risk premiums to determine the extent to which creditors of companies with investments in joint ventures interpret the joint venture debts as if they belong to the co-venturer. Creditors' interpretation of joint venture liabilities provides standard setters guidance in determining the most relevant accounting treatment for financial statement users. United States generally accepted accounting principles (GAAP) require companies with investments in non-controlled joint ventures to recognize their portion of the joint venture net equity as a single line item in the investment section of the balance sheet (APB Opinion No. 18, 1971). GAAP also requires co-venturers to recognize their portion of the joint venture income on one line of the income statement.

The current method of accounting, known as the equity method, fails to recognize the liabilities of the joint venture in the accounts of the venturer. Co-venturers, however, must disclose any debt guarantees as contingencies in the footnotes that accompany the financial statements. Companies with material investments in joint ventures must also disclose the financial position and the income of the joint venture in the notes. The capital structure of the joint venture determines the extent to which joint venture debts become an off-balance sheet item.

The interpretation of joint venture obligations depends on how creditors view the relationship between the joint venture and the co-venturers. One view employs a legal construct (legal model) where potential losses on joint venture investments are limited to the cost of the investment. The legal model appears to correctly represent the investment when the joint venture is organized as a corporation, limited liability company, or limited partnership and there are no purchase agreements, throughput agreements, or debt guarantees. The current equity method of accounting reflects the underlying economics of this model.

A second view of joint venture debt assumes that joint venture investments represent implicit extensions (implicit model) of the venturer. This view suggests that the operations of the venturer and the joint venture are so closely related that the liabilities of the joint venture implicitly are obligations of the venturer. The venturer has an interest in the operating success of the joint venture, regardless of any legal agreements or organizational form. Examples of joint ventures that support the implicit model include vertically integrated joint ventures that provide an important raw material, marketing function, or research and development services to the venturer.

Researchers have not empirically tested whether creditors of companies that invest in joint ventures interpret the joint venture debts using the legal model or the implicit model. If creditors view joint venture debts using the legal interpretation, bond risk measures should

ignore the off-balance sheet joint venture debts because the company's loss is limited to the original investment. On the other hand, if creditors view joint venture debt using the implicit model, bond risk measures should adjust for the off-balance sheet debts. Creditors' interpretation of joint venture debts is inferred from the association of bond risk premiums to alternative accounting measures of debt.

The present study examines whether proportionate consolidation results in accounting measures that are more highly associated with bond risk premiums than the equity method of accounting. The study compares the explanatory power of a bond risk model using proportionate consolidation accounting (implicit model) to that of equity accounting (legal model) for bond risk measures.

2. Background

2.1. Joint venture accounting

A joint venture is an arrangement whereby two or more parties undertake an economic activity which by an unincorporated contractual arrangement is subject to joint control. Some ventures use the equity method (legal view), as described in International Accounting Standard 28, Accounting for Investments in Associate, to account for their interest in jointly controlled entities. They argue that interests in jointly controlled entities are similar to investments in associates, since the venturer has a measure of responsibility for the performance of the joint venture and its return on investment. Other venturers argue that in substance, the venturer has control over the flow of its share of the future economic benefits embedded in the assets of the venture (implicit view). Also, the venturer has responsibility for the outflow of economic benefits involved in the settlement of its share of the liabilities of the venture. Hence, this substance and economic reality view is achieved when the venturer uses proportionate consolidation to report its interest in jointly controlled entities. Thus, IAS 31, Financial Reporting of Interest in Joint Ventures, recommends the use of proportionate consolidation so long as the interest in the joint venture is not held for exclusive future subsequent disposal. IAS 31may be interpreted to permit an enterprise to account for some of its joint ventures on a proportionate consolidation basis and some, under the allowed alternative, on an equity basis.

In December 1998, the Australian Accounting Standards Board (AASB) issued a revised standard, AASB 1006, "Interest in Joint Ventures," that distinguishes joint venture entities from joint venture operations. This standard requires the use of the equity method for joint venture entities. It provides that a joint venture should account for its share of the assets, liabilities, revenues, and expenses of joint venture operations that are not joint venture entities. However, pending standard AASB 131 reinforces the AASB preference for the equity method as it has eliminated the option of proporationate consolidation accounting for joint ventures.

In the United States, official accounting literature (APB Opinion No. 18, 1971; ARB No. 51, 1959) states that control of an investee company is the central issue determining whether an investor company reports consolidated financial information. Normally companies use the equity method of accounting for investments in 50% or less owned joint ventures. Using

the equity method, venturers report their portion of the joint venture equity (assets less liabilities) as an investment on one line of the balance sheet and their share of joint venture income as other income on one line of the income statement.

Joint ventures, however, are jointly controlled and jointly operated. Kocan (1962), Nielsen (1965), and Reklau (1977) suggest that active participation of venturers in the joint venture operations indicate that companies share the control of the joint venture. They also suggest that proportionate consolidation would provide better information to financial statement users. Graham, King, and Morril (2003, Fig. 1) provide a detailed example of the differences in a hypothical investor's financial statements using proportionate consolidation versus the equity method. Proponents of proportionate consolidation believe the equity method provides a distorted picture of an entity's profitability and risk by the one-line balance reporting. Hence, the present study uses proportionate consolidation as a reporting alternative to the equity method.

The major differences between the two accounting methods include the reporting of joint venture assets and liabilities on the balance sheet and the level of detail presented in the income statement. Proportionate consolidation reports the venturers' portion of the joint venture assets, liabilities, income, and expenses along with their own assets, liabilities, income, and expenses line by line. Proportionate consolidation moves the venturer's portion of the joint venture debt onto the balance sheet. As such, the equity and income of the venturer are the same regardless of the accounting method.

Standard setters (American Institute of Certified Public Accountants (AICPA, 1977); Financial Accounting Standards Board (FASB) (Milburn & Chant, 1999)); researchers (Nielsen, 1965), and practitioners (e.g., Dieter & Wyatt, 1978; Neuhausen, 1982; Reklau, 1977) question whether the current reporting methods, particularly the method used by the US, meets the informational needs of financial statement users. Until recently, the FASB's agenda included a project titled "Consolidations and Related Matters," which listed accounting for unconsolidated entities, including joint ventures, as one of the topics for further research study (Status Report, 2000). The FASB delayed the unconsolidated entities portion of the project until the G4+1 issued its report on joint ventures. The G4+1 consists of a group of accounting policy makers from Australia, Canada, New Zealand, United Kingdom, United States, and the International Accounting Standards Committee (currently known as the International Accounting Standards Board (IASB)).

Part of the current debate among international accounting standard setters focuses on identifying the appropriate method of reporting investments in joint ventures (Milburn & Chant, 1999). The G4+1 report presents three methods of reporting investments in joint ventures: (1) the equity method, (2) the proportionate consolidation method, and (3) the expanded equity method. The G4+1 recommends the equity method for international adoption but the IASB recommends (IAS 31) and Canada requires (CICA Handbook, Section 3055) proportionate consolidation. However, since the G4+1 report, the FASB has listed the unconsolidated entities portion of the study as inactive (Status Report, 2001). On January 14, 2004, the FASB removed from its agenda the Accounting for Unconsolidated Entities research project. "The Board acknowledged the importance of the financial reporting issues that would be addressed by the [research] projects, but agreed that the nature and timing of such projects should be considered in the context of a coordinated agenda with the IASB" (FASB Report, 2004).

The present study focuses on proportionate consolidation and equity methods because of the widespread differences in the presentation of the two methods. The expanded equity method simply reports the venturer's portion of the joint venture in each major classification of the financial statements. Each major classification would have a line reporting the company's share of current assets, long-term assets, etc., of the joint venture. The expanded equity reporting method clearly segregates for the readers what the company independently controls from other jointly controlled amounts (Dieter & Wyatt, 1978). Reporting under the expanded equity method, for purposes of this study, yields the same results as proportionate consolidation reporting. Consequently, the expanded equity method offers no additional analysis beyond proportionate consolidation and is no longer considered as a reporting alternative in this study.

One of the consistent themes in the joint venture literature focuses on the off-balance sheet nature of venturers' reported interests in joint ventures. For decades, practitioners (Kocan, 1962; Neuhausen, 1982; Reklau, 1977), credit analysts (Vruwink, 1985), the AICPA (1977), and corporate accountants (Gamble, 1990) exposed the off-balance sheet debts of joint ventures resulting from equity method accounting. The reported net investment, using equity accounting, masks the magnitude of the debt of the joint venture. Berg and Friedman (1978) and Gamble (1990) report that off-balance sheet reporting provides the primary motive for some companies to structure a business as a joint venture rather than a wholly owned or controlled subsidiary.

Much of the early literature discusses potential problems with equity reporting. Kocan (1962) and Reklau (1977) suggest that venturers use joint ventures as a way to extend their operations. They suggest that venturers implicitly guarantee the joint venture's solvency regardless of any formal agreements. Others (Gamble, 1990; Stallkamp, 1995; Vruwink, 1985) report that joint ventures explicitly depend on the venturers for financial assistance, including direct and indirect guarantees of debt, e.g., promises of capital for expansion, throughput agreements, and/or take-or-pay contracts. This literature supports the implicit model tested in this study.

2.2. Bond risk premiums

This study uses bond risk premiums data to assess the association of reported accounting information to bond market data. Bond risk premiums are defined as the difference between the yield on a risky security (corporate bond) and the yield on a risk-free bond that is identical in all other aspects. That is, both securities have the same maturity, coupon rate, call provisions, and sinking fund requirements (if any). Fisher's (1959) classic empirical study on the determinants of yields hypothesizes that bond risk premiums are a function of the default risk of the firm and the marketability of the bond issue for a given maturity.

Fisher's proxies for default risk include the coefficient of variation in the firm's net income over the past 9 years, the length of time the firm has operated without causing creditors a loss, and the ratio of the market value of equity to the par value of debt. Fisher uses the total market value of firms' publicly traded bonds that are outstanding as a proxy for marketability. Marketability can influence the price of a bond if the market is thin for a bond that an investor must liquidate. Consequently, investors demand extra compensation for risks due to price uncertainty of thinly traded bonds.

Bond risk studies examine the association of accounting information and bond risk premiums. Nearly all studies use a form of the following basic conceptual model:

$$\text{risk premium} = f(\text{default risk, issue characteristics, and macroeconomic conditions}).$$

Some studies (Backmon & Vickrey, 1997; Reiter, 1992) add an extra variable for the variable of interest while others (Abdel-khalik, Thompson, & Chen, 1981; Abdel-khalik, Thompson, & Taylor, 1978) simply change the existing variables to reflect the new information. This study extends the literature that uses risk premiums to examine the association of accounting information to risk premiums.

2.3. Contingent claims analysis

The contingent claims theory (Black & Scholes, 1973; Merton, 1974) provides a different insight into pricing default risk. Contingent claims analysis, or option pricing, views bondholders as the owners of the company who sell a European call option to equity holders with the strike price as the amount of the obligation (see Chen, 1978; Geske, 1977; Jones, Mason, & Rosenfeld, 1984; Trussel, 1997). At the exercise date (when the obligation is due) the equity holders exercise their option to buy the company if the value of the company is greater than the obligation. Otherwise, the equity holders do not exercise the option and the bondholders remain the owners of the company.

The option pricing model provides an important theoretical link between accounting information and bond prices. In the model, the option price does not depend on the expected rate of return on the bond. This accounting information is already built into the formula with the inclusion of the bond price, which itself depends on the bond's risk and return characteristics. The model is predicated on the assumption that the underlying asset has a constant income (dividend) yield. The effect of off-balance sheet obligations, including joint ventures, can be inferred from option pricing theory. Merton (1974) restates the Black-Scholes model in terms of risk premiums. Merton's model states that the price or the risk premium of a particular debt security depends on the riskless rate, issue characteristics (coupon rate, maturity date, call terms, seniority, sinking fund provisions), and the default risk. Assumptions in the model include efficient markets, continuous trading, and flat term structure. Merton's risk premium model is as follows:

$$R(\tau) - r = \frac{-1}{\tau}\log\{\phi[h_2(d, \sigma^2\tau)] + \frac{1}{d}\phi[h_1(d, \sigma^2\tau)]\}$$

where V is the value of the firm, D the face value of debt due at calendar date T, ϕ the cumulative normal distribution density function, $R(\tau)$ the yield-to-maturity on the risky debt, r the risk free rate of interest, τ length of time until maturity, σ^2 instantaneous variance of the return on the firm per unit time, $d = De^{-r\tau}/V$, $h_1(d, \sigma^2\tau) = -[1/2\sigma^2\tau - \log(\mathrm{d})]/\sigma\sqrt{t}$, $h_2(d,\sigma^2\tau) = -[1/2\sigma^2\tau + \log(d)]/\sigma\sqrt{t}$ (adapted from Merton (1974)).

For a given term to maturity, the risk premium is a function of the variance of the firm's operating returns (a measure of volatility) and the ratio of the present value of the debt to the current value of the firm. The discount rate for the present value of the debt is the riskless rate of interest. Holding the risk free rate and maturity constant, the risk premium increases as the debt ratio increases. For joint ventures, the volatility of income does not change but

the debt to equity ratio increases with proportionate consolidation. Hence, the increase in debts (and the debt to equity ratio) from joint ventures should be associated with an increase in the risk premium.

3. Hypotheses

To examine the association of financial statement information to bond risk premiums, this study examines the explanatory power, as measured by the adjusted R^2, of the risk premium model. The study compares one regression equation that includes accounting information generated using equity method accounting to a second equation that uses information from proportionate consolidation accounting.

The hypothesis in the alternative form is $h_{a\text{-}1}H_{a\text{-}1}$The explanatory power (adjusted R^2) of the risk premium model improves with the use of proportionate consolidation accounting. $h_{a\text{-}1}$

3.1. Guaranteed debt

If creditors interpret joint venture debts using the legal model, where the only risk investors' face is the amount of their investment, then proportionate consolidation may not offer any improvement to the explanatory power of the risk model. Whittred and Zimmer (1994), however, found that Australian companies in the extractive industry use proportionate consolidation for investments in unincorporated joint ventures when the venturer guarantees the debt of the joint venture because it reduces contracting costs. Creditors of companies with investments in joint ventures (venturers) that guarantee the debt of the joint venture should assess a greater risk of default because of the presence of guarantee.

This study examines whether splitting the sample by guarantees and non-guarantees has any influence on the explanatory power of the bond risk model. The guarantee can take the form of an actual debt guarantee, a throughput agreement, take-or-pay contracts, or any type of deficiency agreement. Under these conditions, one would expect the explanatory power of the model to increase with the inclusion of the joint venture debt as required with proportionate consolidation.

The hypothesis in the alternative form is $h_{a\text{-}2}H_{a\text{-}2}$The explanatory power (adjusted R^2) of the risk premium model improves with the use of proportionate consolidation accounting when limiting the sample to companies that guarantee the debt of the joint venture. $h_{a\text{-}2}$

4. Methods

The sample consists of firms listed in *Compustat's* database for years ending April 30, 1996–1999. The study refers to these 4 years as windows with Window 1 (year ends between May 1, 1995 and April 30, 1996) as the oldest year and Window 4 as the most recent year. To be included in the sample, the companies must

- have an investment in a joint venture,

- report supplemental financial information about the joint venture in the notes on SEC filings, and
- report at least one bond in *Moody's Bond Record* 3 months after the year-end.

4.1. Model development

Creditors must evaluate default risk to determine which specific debt securities to purchase. Equity accounting and proportionate consolidation provide different sets of numbers and relationships that long-term creditors use to assess default risk. Finance theory suggests that security prices or yields adjust as the default risk changes. Prior accounting literature (Backmon & Vickrey, 1997; Reiter, 1992) illustrates that creditors adjust the required yields for off-balance sheet obligations of pensions and loss contingency disclosures.

Empirical evidence (e.g., Fisher, 1959; Kaplan & Urwitz, 1979; Merton, 1974) shows that the debt to equity ratio, interest coverage, and return on assets are among the variables that help creditors evaluate default risk. Different accounting treatments for investments in joint ventures change the value of the debt to equity ratio, times interest earned, and return on assets ratio. The amount of change in the ratios depends on the extent to which the joint venture uses debt in the capital structure.

The effect of off-balance sheet obligations on bond risk premiums is inferred from option pricing theory (Black & Scholes, 1973; Merton, 1974). Merton (1974) concludes that the value of debt depends on the return on riskless debt, indenture provisions, and the probability of default. The off-balance sheet debt from investments in joint ventures affects measures that estimate the probability of default. If venturers use debt in the capital structure of their joint ventures and investors view the joint venture obligations as obligations to the venturer, one would expect to find a stronger association between information reported using proportionate consolidation and risk premiums than between information reported using equity method accounting and risk premiums. One important assumption in the study is that bond prices (and yields) appropriately reflect information about off-balance sheet obligations; the bond market is efficient.

The model to examine the association of bond-risk premiums to ratios that proxy for default risk is adapted from Reiter's (1992) study of pension obligations. Each company provides two observations: one using the equity method as reported in *Compustat* and the second using restated proportionate consolidation accounting. The financial information using the proportionate consolidation method combines the information from *Compustat* with the joint venture information from 10Ks on file with the SEC. In effect, the numbers used in the study represent what companies would report if GAAP required companies to use proportionate consolidation for reporting investments in joint ventures.

4.2. Dependent variable

The dependent variable in the model is bond risk premium. The yield spread serves as the measure of bond risk premium and is adapted from prior studies (Backmon & Vickrey, 1997; Reiter, 1990, 1991, 1992). The yield spread is the difference between the yield on a risky bond and the yield on a Treasury bond with similar characteristics. If companies have multiple bonds outstanding, the bond with the closest match to a Treasury bond is selected.

Corporate yield and treasury yield information is gathered after the annual reports are issued. The time lag allows time for the financial markets to absorb the company's financial information. This study operationalizes the time lag as 3 months after the company's year-end.

An algorithm developed by Rusbarsky and Vicknair (1999) provides the yield on the corporate bond. The calculation adjusts for interest payment dates that do not coincide with the valuation date. Inputs include the price, date of valuation, maturity date, and the date and frequency of interest payments. The treasury yield is obtained from the *Wall Street Journal*. The selected Treasury security has a maturity date and coupon yield close to the corporate bond.

If one compares the yield of a risky corporate bond to a Treasury bond with the same issue characteristics at the same date, then term structure of interest is controlled and the difference represents the default risk premium. The term structure establishes the shape of the yield curve. The term structure of interest measures the underlying economic condition for establishing the overall interest rate. The risk premium approach assumes that Treasury bonds and corporate bonds face the same underlying market conditions. Therefore, the bond risk premium focuses on differences that are unique to the bond in question, i.e., default risk. The bond risk premium measures the required yield for the default risk associated with a particular bond. For a more complex bond, the risk premium also reflects call options and sinking fund effects.

The following subsections provide an analysis of categories of independent variables for the current study. The categories are default variables, issue characteristic variables, and macroeconomic variables.

4.3. Default variables

Default risk variables are adapted from Kaplan and Urwitz's (1979) bond rating prediction model and Reiter's (1992) bond pricing model. Independent variables that explain default risk include the following: size of firm, interest coverage ratio, return on assets ratio, debt to equity ratio, and the coefficient of variation in earnings.

The size of firm variable for the study is total assets. For the interest coverage ratio, the study uses the ratio of operating income to interest expense. However, this does present a complication because neither GAAP nor the SEC requires the disclosure of the amount of interest expense that joint ventures recognize. This study estimates the joint venture interest by taking the bond rate of the venturer times the long-term debt of the joint venture.

Accounting data supply the information to calculate the return on assets and the debt to equity ratio. Bowman (1980) finds that the market value of equity and the book value of debt provide the best inputs to assess leverage. Hence, the current study uses the market value of equity to examine the debt to equity ratio. The coefficient of variation in earnings comes from the past 9 years of net income. Net income does not differ between the two accounting methods but prior studies (e.g., Black & Scholes, 1973; Merton, 1974) show that the variation in earnings helps explain a portion of the bond risk premium.

The presence of negative earnings (losses) complicates the ratio analysis because the impact on the ratio changes as the earnings move from a positive to a negative number. In all cases the return on assets ratio moves toward zero when converting to proportionate

consolidation. The effect on the times interest earned ratio is indeterminable because the conversion to proportionate consolidation causes the numerator and denominator to change.

Foster (1986) offers a number of techniques to deal with negative numbers including removing the observation and using alternative measures. This study does not remove observations with losses because these companies may also be the companies that are trying to keep debt off the balance sheet.

Studies (Barnes, 1982; Deakin, 1976; Lev & Sunder, 1979) show that most financial ratios fail to meet tests of normality because of upper or lower technical bounds, lack of proportionality, or mathematical complications when the ratio contains a negative number. Normally distributed data is important in the present study because the model uses ordinary least squares (OLS) regression. Foster (1986) also offers suggestions to deal with the lack of normality of financial ratios.

The options Foster (1986) discusses to convert non-normal distributions to a normal distribution include winsorizing, trimming, and transforming the data. Winsorizing restates extreme observation values to less extreme values. One advantage of winsorizing is that it keeps observations in the sample. Trimming removes the top and bottom x percent of the observations until the remaining sample has a normal distribution. The study avoids trimming to keep as many observations as possible in the study. Foster's final suggestion, data transformation, converts non-normal data to a normal distribution. Foster (1986) reports that two frequently used transformations are the natural log and the square root of the raw ratio. For both of these transformations, however, the ratio must be positive. To compensate for negative ratios, Foster suggests shifting the distribution to the right before the transformation so that all the observations are positive. The current study shifts and transforms ratios that take on negative values. These include the debt to equity ratio and the times-interest-earned ratio. Shifting allows the inclusion of companies with losses and negative equity to remain in the study. The debt to equity ratio is non-monotonic and impossible to interpret prior to shifting the ratio to the right. The empirical model uses the log of total assets for the size variable, the square root of the shifted ROA as the measure for ROA, log of debt to market equity to measure D/E, the log of the shifted TIE to measure TIE, and log of the absolute value of the variance of net income for the measure of income variation.

4.4. Issue characteristic variables

Recent research (Backmon & Vickrey, 1997; Reiter, 1992) considers a number of issue traits and their impact on bond risk premiums. Finance literature (Chen, 1978; Geske, 1977; Jones et al., 1984; Trussel, 1997; Van Horne, 1998) describes the purchase of a bond with a call provision as the simultaneous purchase of a non-option bond and the sale of a call option to the issuing corporation. The call option is "in the money" only when the current interest rate is less than the stated rate on the bond. If companies issue bonds when the interest rate is low, the likelihood of calling the issue is low. The current study uses a dummy variable to indicate when a bond is callable.

A second issue characteristic is the term-to-maturity of a bond. Finance theory suggests that term-to-maturity is directly related to bond price/yield because of the greater exposure to interest rate risk with a longer time to maturity (e.g., Fabozzi, 1996; Van Horne, 1998). Interest rate risk is the risk that investors face if they must sell a bond prior to maturity date and

reinvest the proceeds at a different interest rate. This study controls for the term-to-maturity or interest rate risk by comparing bonds with the same length to maturity. The underlying argument is that the risk-free security has the same interest rate risk as the corporate bond.

The final issue characteristic the study considers is subordination. Reiter (1992) shows that including a dummy variable for subordination improves the explanatory power of the bond risk premium model in her study. Hence, the current study also includes a dummy variable to control for the effects of subordination on risk premiums.

4.5. Macroeconomic variables

In addition to firm-specific variables (default risk and issue characteristics), macroeconomic factors influence the risk premium in a study that covers a number of years. Because the study covers multiple years, the research design must control for changing macroeconomic conditions. Prior studies (Cook & Hendershott, 1978; Jaffee, 1975) show that risk premiums vary with business cycles. Studies (Cook & Hendershott, 1978; Van Horne, 1998) also show that the risk premium varies with the level of interest. When the treasury yields are higher, the spread is also greater. This study uses a combination of the risk-free rate and dummy variables for the different years to control the macroeconomic variability.

4.6. Empirical model

The research model in this study uses each of Merton's (1974) explanatory categories (risk-free rate, issue characteristics, and default risk) to explain risk premiums. The research design compares the adjusted R^2 using reported equity accounting information (legal model) to the adjusted R^2 using proportionate consolidation (implicit model) of the joint venture information. The model is as follows:

$$\begin{aligned}\text{bond risk premium} &= \beta_0 + \beta_1(\text{size}) + \beta_2(\text{ROA}) + \beta_3\left(\frac{D}{E}\right) + \beta_4(\text{TIE}) + \beta_5(\text{CV}) \\ &\quad + \beta_6(\text{sub}) + \beta_7(\text{call}) + \beta_8(\text{win1}) \\ &\quad + \beta_9(\text{win2}) + \beta_{10}(\text{win3}) + \varepsilon.\end{aligned}$$

where bond risk premium is the yield spread, size the log of total assets, ROA the square root of shifted return on assets, D/E the log of debt to market equity, TIE the log of shifted interest coverage ratio, CV the log of absolute value of coefficient of variance of net income, sub the subordination dummy variable, call the call dummy variable, win1, win2, win3 are the dummy variables for Windows 1–3.

Bond risk premiums are a continuous variable, which allows the use of ordinary least squares (OLS) regression. The risk premium model is estimated using ordinary least squares regression. Bond risk premiums are regressed on financial ratios in two separate cross-sectional regressions. The first estimation uses ratios based on equity accounting and the second estimation uses ratios after converting the financial information to conform to proportionate consolidation.

The interpretation of joint venture debt is inferred from the degree of association between bond risk premiums and the default variables. Vuong's (1989) test statistic, which is a

likelihood ratio test for non-nested models, examines whether one model is closer to the "true data generating process" than another model. Hence, the Vuong test allows the comparison of each models association to bond risk premiums and provides a statistical test to discriminate between the two competing models that explain bond risk premiums (Dechow, 1994, see Appendix 2). The models are non-nested because there is no way to constrain the coefficients in one model that results in the model being the same as the competing model. The models represent two different accounting treatments of the same transactions.

5. Results

5.1. Descriptive data and joint venture ratios

Compustat files for 1997 show that 1493 out of 9775 publicly traded companies report investments using equity method accounting. Among these 372 are foreign companies, companies trading in the US markets as American Depository Receipts (ADRs), or companies that did not file a 10K with the SEC. These 372 companies are dropped from the study because the focus of the study is on US companies. The remaining group of companies consists of 1121 US companies with equity investments. Among this group are 555 companies that report investments in joint ventures in which the company identifies the investment as a joint venture. An additional 29 companies have equity investments with the characteristics of a joint venture investment but do not specifically identify the investment as a joint venture. These 29 companies are classified as joint ventures for the purposes of this study. Hence, there are 584 companies with equity investments that represent investments in joint ventures or arrangements similar to joint ventures. Seventeen of the companies consolidate the joint ventures and are dropped from the study because information is not available to change the reporting to comply to equity method accounting. The results show 567 companies with investments in joint ventures or investments similar to joint ventures.

Table 1 summarizes the number of companies with investments in joint ventures. The results show that half of the equity investments in the United States represent investments in joint ventures. The high percentage of joint ventures underscores the need to understand accounting issues related to joint ventures.

Table 1
Equity investments – summary

Equity investments	Number
Companies with equity investments that are publicly traded	1493
Less foreign companies, ADRs, and companies without 10Ks	372
US companies with equity investments	1121
Companies with equity investments that are not joint ventures	537
Companies with equity investments that are joint ventures	584
Less joint ventures that consolidate joint venture information	17
Companies with investments in joint ventures that use equity accounting	567

Data source: *Compustat* 1997 files and 10Ks.

The financial structure of the joint venture is critical in the current study because the venturer's reported total assets, debt, and equity are the same under equity accounting and proportional consolidation if the joint venture is financed with equity capital. Companies that use debt in their joint ventures, however, can keep the joint venture debt off the balance sheet with the equity method. The presence of joint venture debt causes the venturer's total assets, total debt, and operating income to differ between equity accounting and the proportionate consolidation method.

For the 260 companies that report supplemental information, the average debt to total assets for joint ventures in the current study is 61.6%, which indicates that, on average, the majority of joint venture financing comes from debt. The debt ratio ranges from 1 to 320%. Twenty-one companies (8.5%) of the joint ventures report negative equity, which causes the debt to assets ratio to move above 100% of the assets. Table 2 provides the descriptive statistics for the debt to total assets ratio of joint ventures.

The median return on assets of joint ventures is 3.33%. The median measure removes the effect of large ratios at the extreme ends of the observations. One joint venture reported losses nearly 10 times larger than the assets. Eight joint ventures reported losses larger than the assets and one joint venture reported profits nearly eight times larger than the assets. The large standard deviation of 89% indicates the presence of large extreme values. Eighty-one companies (31.2%) in the study failed to report profits. While 179 or 68.8% of the joint ventures reported a profit, the average ROA is negative 1.89%. Table 2 displays the descriptive data of the return on assets ratio for joint ventures. In summary, joint ventures finance their operations with more debt than equity and most joint ventures (68.8%) report profits. The profits, however, are rather small with a median ROA of 3.33%.

Table 2
Joint venture debt to assets ratio and return on assets

	Debt to assets ratio		Return on assets
Number	260		260
Mean	0.6157		−0.0189
Median	0.6104		0.0333
S.D.	0.3724		0.8924
Minimum	0.01		−9.986
Maximum	3.20		7.933
	Deciles		Deciles
10	0.2117	10	−0.1148
20	0.3317	20	−0.0255
30	0.4481	30	0.0000
40	0.5250	40	0.0165
50	0.6104	50	0.0333
60	0.6645	60	0.0512
70	0.7318	70	0.0688
80	0.8125	80	0.1130
90	0.9693	90	0.2179

Data Source: 1997 *Compustat* files and 10Ks.

5.2. Comparison of equity accounting and proportionate consolidation

Converting from the currently required equity accounting method to proportionate consolidation places off-balance sheet joint venture debt on the balance sheet of the venturers. Hence, total assets (firm size), return on assets, debt to equity ratio, and times interest earned change. The hypothesis in the alternative form is that the explanatory power of the risk premium model improves with the use of proportionate consolidation.

5.3. Descriptive statistics

This study examines 287 companies from four *Compustat* years, 1995 through 1998. Each *Compustat* year is assigned to a corresponding window with the earliest year assigned to Window 1 and the most recent year as Window 4. Foster (1986) suggests that financial ratios, which lack normality, need some form of adjustment. Foster (1986) states that ratio data can be transformed, trimmed, winsorized, and shifted to allow the distribution to approach normality. The current study examines all of Foster's techniques to maximize the adjusted R^2 of the estimation. The final form of the variables in the model includes the log of total assets, square root of the winsorized and shifted ROA, log of the debt to market equity, log of the winsorized and shifted TIE, log of absolute value of the winsorized coefficient of variation, and dummy variables for subordination, call option, and windows.

Table 3 shows the descriptive statistics of the bond risk premium and of the independent variables for both the equity method of accounting and the proportionate consolidation

Table 3
Descriptive statistics – entire sample

Variable ($N = 287$)	Equity method accounting				Proportionate consolidation			
	Mean	S.D.	Minimum	Maximum	Mean	S.D.	Minimum	Maximum
Dependent variables								
Yield spread	158.82	160.32	−121.0	921.0	158.82			
Independent variables								
Log of total assets	22.178	1.296	18.81	24.56	22.270	1.132	18.81	24.67
Square root of shifted ROA	4.339	0.6362	2.000	6.050	4.323	0.4957	2.910	5.680
Log of *D*/*Mkt* equity	4.465	0.9747	1.765	7.716	4.603	0.9427	2.257	7.838
Log of shifted TIE	2.240	0.4295	1.000	3.200	2.185	0.3994	1.000	3.200
Log of absolute value of CV	4.567	1.030	2.315	7.041	4.567	1.030	2.315	7.041

Sample firms with the following	Number	%	Number	%
Subordination	43	15.0	43	15.0
Call option	45	15.7	45	15.7
Sinking fund	4	1.4	4	1.4
Window 1	56	19.5	56	19.5
Window 2	65	22.6	65	22.6
Window 3	84	29.3	84	29.3
Window 4	82	28.6	82	28.6

method of accounting. The bond risk premium using the traditional yield spread ranges from a low of −121.0 basis points to a high of 921.0 basis points. These negative observations represent low risk companies primarily in the oil refining business. The directions of the ratio changes between equity method accounting and proportionate consolidation are consistent with expectations.

Table 4 provides descriptive statistics for the companies after partitioning the sample by guarantee and non-guarantee of joint venture debt. The guarantee can take the form of a general partnership, a credit guarantee, a throughput agreement, a take-or-pay contract, or any deficiency agreement. Of the 287 venturers in the sample, 183 venturers or 63.7% provide a guarantee for the joint venture. The directions of the changes in the ratios are also consistent with expectations.

Panel A of Table 4 shows that the average yield spread is 154.08 for the guarantees and 167.16 for the non-guarantees. One might expect the opposite relationship because the venturers who guarantee the debt of the joint ventures bare the risk of default if the joint venture fails. Companies that guarantee the debt of the joint venture, however, report less use of debt, higher TIE ratios, and better return on assets.

5.4. Estimation for the risk premium model

Panel A of Table 5 provides the estimation results for the risk premium model. All the independent variables are significant at the 0.05 level in both models except the measure for the variation in income with both accounting methods and the ROA measure for proportionate consolidation. The significant independent variables and the adjusted R^2 of 0.657 and 0.656, which are consistent with prior bond research, provide evidence of an adequate risk model.

Panel B of Table 5 shows there is no significant improvement in the explanatory power of the model when changing to proportionate consolidation. The explanatory power of the model decreases by 0.001, which yields a −0.094 Vuong statistic. The data fail to reject the null hypothesis with a *P*-value of 0.522.

The results indicate that proportionate consolidation offers no improvement in the explanatory power of the model when considering the entire sample of firms. The large number of firms that have no financial commitment to the joint ventures beyond the amount recorded in the investment account could prevent the proportionate consolidation from improving the relationship between risk premiums and the default measures in the model.

Consistent with prior research, the risk premium model for the study uses a simple dummy variable to control for the presence of call options. To examine the robustness of the variable, the current study repeats all of the regressions without the call-option dummy variable. A constant difference in the adjusted R^2 between equity accounting and proportionate consolidation indicates that the simpler measure provides an adequate control for the call option. The results show that the difference in adjusted R^2 is −0.001 or a 0.1% change in the explanatory power of the model. The results indicate a very small change between the models and that the dummy variable for the call option does capture the impact of the call option.

Table 4
Descriptive statistics – by guarantee/non-guarantee

Panel A – guarantee ($N = 183$)

Variable	Equity method accounting				Proportionate consolidation			
	Mean	S.D.	Minimum	Maximum	Mean	S.D.	Minimum	Maximum
Dependent variables								
Yield spread	154.08	157.23	−121.0	822.0	Same			
Independent variables								
Log of total assets	22.424	1.211	18.81	24.56	22.531	1.231	18.81	24.67
Square root of shifted ROA	4.295	0.6198	2.000	6.050	4.272	0.4509	2.910	5.680
Log of *D*/*Mkt* equity	4.500	0.9475	1.765	7.716	4.662	0.8786	2.494	7.838
Log of shifted TIE	2.200	0.4013	1.000	3.200	2.125	0.3436	1.000	3.200
Log of absolute value of CV	4.644	1.078	2.413	7.041	4.644	1.078	2.413	7.041
Sample firms with the following								
	Number	%			Number	%		
Subordination	30	16.4			30	16.4		
Call option	32	17.5			32	17.5		
Window 1	35	19.1			35	19.1		
Window 2	41	22.4			41	22.4		
Window 3	58	31.7			58	31.7		
Window 4	49	26.8			49	26.8		

Panel B – non-guarantee ($N = 104$)

Variable	Equity method accounting				Proportionate consolidation			
	Mean	S.D.	Minimum	Maximum	Mean	S.D.	Minimum	Maximum
Dependent variables								
Yield spread	167.16	166.05	−8.00	921.0	Same			
Independent variables								
Log of total assets	21.745	1.332	18.96	24.18	21.809	1.330	19.06	24.24
Square root of shifted ROA	4.417	0.6601	2.166	5.739	4.412	0.5573	3.060	5.680
Log of *D*/*Mkt* equity	4.403	1.023	2.176	7.649	4.499	1.042	2.257	7.772
Log of shifted TIE	2.310	0.4691	1.268	3.200	2.291	0.4655	1.228	3.200
Log of absolute value of CV	4.431	0.9283	2.315	7.000	4.431	0.9283	2.315	7.000
Sample firms with the following								
	Number	%			Number	%		
Subordination	13	12.5			13	12.5		
Call option	13	12.5			13	12.5		
Window 1	21	20.2			21	20.2		
Window 2	24	23.1			24	23.1		
Window 3	26	25.0			26	25.0		
Window 4	33	31.7			33	31.7		

Table 5
Regression results for the entire sample

Panel A – estimation results for the risk premium model ($N = 287$)

Variable	Legal model		Implicit model	
	Equity method		Proportionate consolidation	
	Coefficient estimate	T for H_0 $\beta_i = 0$	Coefficient estimate	T for H_0 $\beta_I = 0$
Intercept	1054.44	7.973**	1004.49	7.005**
Log of total assets	−35.626	−7.616**	−36.517	−7.937**
Square root of shifted ROA	−29.212	−2.117*	−4.569	−0.236
Log of *D*/*Mkt* equity	32.769	3.930**	38.416	4.444**
Log of shifted TIE	−42.855	−2.076*	−73.651	−3.309**
Log of absolute value of CV	−1.561	−0.274	−1.328	−0.232
Sub	105.796	6.106**	103.935	6.032**
Call	108.256	6.348**	105.870	6.201**
Win 1	−54.300	−3.299**	−55.206	−3.354**
Win 2	−115.480	−7.328**	−115.147	−7.299**
Win 3	−61.563	−4.177**	−60.899	−4.133**

Panel B – adjusted R^2 and Vuong statistic

Adjusted R^2				
Equity method	Proportionate consolidation	Improve with PC	Vuong's *Z*-stat.	*P*-value (one-tail)
0.657	0.656	−0.001	−0.094	0.522

Bond risk premium = $\beta_0 + \beta_1$(size) + β_2(ROA) + β_3(*D*/*E*) + β_4(TIE) + β_5(CV) + β_6(sub) + β_7(call) + β_8(win1) + β_9(win2) + β_{10}(win3) + ε, where size is the log of total assets, ROA the square root of shifted and winsorized ROA ratio, *D*/*E* the log of the debt to market equity ratio, TIE the log of the shifted and winsorized TIE ratio, CV the log of the absolute value of the winsorized coefficient of variation, sub the subordination dummy, call the call option dummy, win1–win3 are the Windows 1–3 dummy variables.

* Significant at <0.05.

** Significant at <0.01.

5.5. Results with sample partitioned by venturers that guarantee joint venture debt

The study further examines the association between bond risk premiums and measures of default risk by companies that guarantee and do not guarantee the joint venture debt. The guarantees include actual guarantees of debt, joint ventures organized as general partnerships, throughput agreements, take or pay contracts, and deficiency agreements.

The results in Table 6 show a clear difference between the companies that provide guarantees and companies that do not provide guarantees of joint venture debt. For companies that do not provide guarantees, the data fail to reject the null hypothesis of no improvement in the explanatory power of the model using proportionate consolidation with *P*-values of 0.920. The results are consistent with the results of the entire sample.

The results of the companies that guarantee the joint venture debt indicate that proportionate consolidation does significantly increase the explanatory power of the model. The *P*-values of the risk premium of 0.035 provide evidence that the data reject the null hypothesis in favor of the alternative hypothesis at the 5% level. This finding suggests that creditors should consider guarantees in their assessment of default risk of guarantor com-

Table 6
Adjusted R^2 and Vuong statistic – by guarantees/non-guarantees

Panel A – estimation results for the risk premium model (by guarantee/non-guarantee)

Variable	Guarantee ($N = 183$)				Non-guarantee ($N = 104$)			
	Legal model		Implicit model		Legal model		Implicit model	
	Equity method		Proportionate consolidation		Equity method		Proportionate consolidation	
	Coefficient estimate	T for H_0 $\beta_i = 0$	Coefficient estimate	T for H_0 $\beta_i = 0$	Coefficient estimate	T for H_0 $\beta_i = 0$	Coefficient estimate	T for H_0 $\beta_i = 0$
Intercept	1017.609	5.978**	957.658	5.347**	1239.849	5.045**	1175.546	4.194**
Log of total assets	−36.786	−5.839**	−36.143	−5.944**	−36.629	−4.187**	−37.105	−4.120**
Square roots of shifted ROA	−12.565	−0.728	9.707	0.396	−67.051	−2.633**	−29.929	−0.865
Log of *D*/*Mkt* equity	39.798	3.822**	48.870	4.555**	26.139	1.701*	25.459	1.608
Log of shifted TIE	−60.225	−2.245*	−103.988	−3.498**	−4.461	−0.114	−51.906	−1.256*
Log of absolute value of CV	−3.635	−0.500	−5.557	−0.785	−12.012	−1.037	−6.505	−0.528
Sub	93.537	4.425**	92.282	4.533**	134.300	4.074**	131.605	3.862**
Call	121.845	5.988**	121.188	6.066**	62.211	1.642*	68.787	1.770*
Win 1	48.247	−2.257**	−44.044	−2.100*	−62.848	−2.325*	−67.615	−2.422**
Win 2	−107.062	−5.211**	−103.139	−5.127**	−124.717	−4.919**	−128.887	−4.927**
Win 3	−56.179	−2.939**	−52.020	−2.792**	−58.819	−2.362**	−62.352	−2.427**

Panel B –adjusted R^2 and Vuong statistic (guarantee)

Adjusted R^2				
Equity method	Proportionate consolidation	Improve with PC	Vuong's *Z*-stat	*P*-value (one-tail)
0.634	0.649	0.015	1.815	0.035

Panel B – adjusted R^2 and Vuong statistic (non-guarantee)

Adjusted R^2				
Equity method	Proportionate consolidation	Improve with PC	Vuong's *Z*-stat	*P*-value (one-tail)
0.682	0.661	−0.21	−1.405	0.920

Bond risk premium = $\beta_0 + \beta_1(\text{size}) + \beta_2(\text{ROA}) + \beta_3(D/E) + \beta_4(\text{TIE}) + \beta_5(\text{CV}) + \beta_6(\text{sub}) + \beta_7(\text{call}) + \beta_8(\text{win1}) + \beta_9(\text{win2}) + \beta_{10}(\text{win3}) + \varepsilon$, where size is the log of total assets, ROA the square root of shifted and winsorized ROA ratio, *D*/*E* the log of the debt to market equity ratio, TIE the log of the shifted and winsorized TIE ratio, CV the log of the absolute value of the winsorized coefficient of variation, sub the subordination dummy, call the call option dummy, win1–win3 are the Windows 1–3 dummy variables.

* Significant at <0.05.

** Significant at <0.01.

panies because of the increased risk. The higher association between bond risk premiums and measures of default risk provides evidence that creditors do consider commitments that are off the balance sheet in their risk assessment.

6. Discussion and conclusions

The present study examines how creditors of companies with investments in joint ventures interpret the off-balance sheet debts of the joint venture. The interpretation of joint venture obligations depends on how creditors view the joint venture relationship. The current study posits that creditors take one of two views of joint venture debt. The legal view holds that the potential loss on the investment is limited to the amount of the investment. Alternatively, the implicit view suggests that the operations of the venturer and the joint venture are so closely related that the joint venture liabilities implicitly belong to the venturer. The current study determines creditors' interpretation of joint venture debt by examining the degree of association between bond risk premiums and accounting information in the financial statements.

Over half of the equity investments reported in *Compustat* with year endings from May 1, 1997 to April 30, 1998 represent investments in joint ventures. The high percentage of companies that use joint ventures and the average joint venture debt ratio indicates that joint venture relationships appear to offer an attractive alternative for companies looking to expand and keep the debt off the balance sheet. The combination of the frequency of joint ventures and the use of debt suggests that policy makers may want to pay more attention to this method of keeping debt off the balance sheet.

The study examines the association between risk premiums and accounting numbers that proxy for default risk. Findings that show a higher correlation to the equity method of accounting provide indirect evidence of the legal model. The data do not support the implicit view of joint venture debts when using the entire sample. There is no improvement in the association between bond premiums and accounting information due to converting from equity accounting to the proportionate consolidation method.

From a policy perspective, the results suggest that there is no need to recognize additional joint venture information in the reports of the venturer. On average, creditors do not get better information with accounting data based on proportionate consolidation. This finding calls into question the current reporting of supplemental joint venture information when the joint venture meets certain size requirements.

When the study partitions the sample into companies that guarantee the debt of their joint ventures, the findings change. The results suggest that proportionate consolidation numbers and relationships provide more value-relevance than the currently used equity method. Accounting numbers based on proportionate consolidation provide a stronger association to risk premiums than accounting numbers from the equity method for companies that provide some form of guarantee of the joint venture debt. The results indicate that creditors would receive more value-relevant information from proportionate consolidation of the joint venture information.

From a policy perspective, the size of the investment, which triggers supplemental disclosures, is not as important as the presence of guarantees and other agreements such as

throughput agreements and take or pay contracts. The results indicate that proportionate consolidation yields the highest association between bond prices and reported financial information for companies that provide guarantees of joint venture debt. The findings fail to support the legal view. Most importantly, the findings indicate a third factor, the presence of guarantees or deficiency agreements, determines how creditors view joint venture debt. Thus, the results of the study suggest that standard setters should require proportionate consolidation when there is evidence of guarantees and other agreements because the financial statements numbers provide more value-relevance for creditors. In essence, there is a strong association between market information and accounting numbers and this association would be more strongly revealed when proportionate consolidation is used in debt financing of joint ventures. In summary, IASC specifies proportionate consolidation for joint ventures to be its benchmark, but it permits the use of the equity method as an allowed alternative. The pending Australian standard, AASB 131, eliminates the use of proportionate consolidation accounting of joint ventures and permits the equity method only. The results of this study support IASB's view of using proportionate consolidation accounting for joint ventures, especially if the joint ventures are financed with guaranteed debt. The results suggest that for joint ventures where the venturers guarantee the debt, the decision to use the equity method instead of proportionate consolidation would not be in the best interests of users of financial statements. These results are consistent with the findings of Kothavala (2003), which suggest that different market participants use financial statement information differently and that equity method accounting is more risk relevant than proportionate consolidation accounting for explaining bond rating. The failure to disclose disaggregated joint venture accounting amounts, as in the case of the equity method, masks information that could help market participants more accurately assess risk.

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