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Abstract
For the last three decades, the Capital Asset Pricing Model (CAPM) has been a dominant model to calculate expected return. In early 1990% Fama and French (1992) developed the Fama and French Three Factor model by adding two additional factors to the CAPM. However even with these present models, it has been found that estimates of the expected return are not accurate (Elton, 1999; Fama &French, 1997). Botosan (1997) introduced a new approach to estimate the expected return. This approach employs an equity valuation model to calculate the internal rate of return (IRR) which is often called, 'implied cost of equity capital" as a proxy of the expected return. This approach has been gaining in popularity among researchers. A critical review of the literature will help inform hospitality researchers regarding the issue and encourage them to implement the new approach into their own studies.

A Critical Review of the Implied Cost of Equity: A New Way to Estimate the Expected Return

By Seoki Lee, and Arun Upneja

For the last three decades, the Capital Asset Pricing Model (CAPM) has been a dominant model to calculate expected return. In early 1990's, Fama and French (1992) developed the Fama and French Three Factor Model by adding two additional factors to the CAPM. However, even with these prevalent models, it has been found that estimates of the expected return are not accurate (Elton,1999; Fama & French, 1997). Botosan (1997) introduced a new approach to estimate the expected return. This approach employs an equity valuation model to calculate the internal rate of return (IRR) which is often called, "implied cost of equity capital" as a proxy of the expected return. This approach has been gaining in popularity among researchers. A critical review of the literature will help inform hospitality researchers regarding the issue and encourage them to implement the new approach into their own studies.

Introduction

The importance of equity premium has been well documented in the finance literature. Equity premium, which is the difference between the expected return on risky stocks (expected return, hereafter) and the risk free rate, is considered as one of the most important consepts in finance (Cornell, 1999; Dimson, Marsh & Staunton, 2002). Because the risk free rate is easy to find, even though some arguments still exist, the key factor to compute the equity premium is expected return (or, equivalently, cost of equity). In search for ways to estimate the expected return, Sharpe (1964), Lintner (1965), and Black (1972) made significant contributions by developing the capital asset pricing model (CAPM). CAPM has been the dominant model used to calculate the expected return for the last three decades in the financial community for both academicians and practitioners. However, Fama and French (1992 & 1993) argued that market data alone is not good enough to explain the expected return and included two more factors (size and the book-to-market equity ratio) in the model. This extended model is known as the Fama and French Three Factor model and gained popularity in late 1990's. However, even with these models, it has been found that estimates of the expected return are not accurate (Elton, 1999; Fama & French, 1997).

Botosan (1997) introduced a new approach to estimate the expected return. Her approach employs an equity valuation model to calculate the internal rate of return (IRR) which is often called, "implied cost of equity capital" as a proxy for the expected return. The approach has been investigated extensively by many researchers in recent years. Our study provides a critical review of the literature regarding this newly developed approach. We believe that this critical review will provide valuable knowledge to the hospitality accounting and finance researchers and hopefully encourage them to implement this new approach in their studies.

This paper will discuss the equity premium issue as the first part of the critical review of literature. The CAPM and the Fama and French Three Factor Model will be discussed in the second part and the implied cost of equity capital literature will be extensively reviewed as the final part of the critical review section. Applications to the hospitality literature will be followed and the study will end with our conclusions.

Review of the Literature

I. Equity Premium

Equity premium has been one of the most important numbers in financial literature and community (Dimson, et al., 2002). The term is defined as the difference between expected return and the risk free rate (Cornell, 1999). In other words, equity premium is the additional return, on top of the risk free rate, that investors require in order to invest in risky stocks. Two government securities have often been used as a proxy of the risk free rate, the short-term treasury bills and long-term treasury bonds. Among short-term treasury bills, the 1-month

treasury bill is widely used. Among long-term treasury bonds, the 10-year treasury bond is often used in the academic studies, but the 5-, 20- and 30-year treasury bonds are also used. The 1-month treasury bill is considered the better proxy for the risk free rate because the long-term treasury bonds are exposed to inflation risk and therefore, have additional premiums to compensate this risk (Dimson, et al., 2002). Because it is relatively easy to obtain the reliable risk free rate, the critical estimation process comes down to estimating the expected return, equivalently, the cost of equity.

Equity premium is essential to making sound decisions in regard to investment, financing, and saving. Therefore, accurate estimates of equity premium will work for investors, executives, managers, and financial analysts as a reliable and critical tool while inaccurate estimates will work against them. More specifically, estimates of equity premium are used, among others, in the following situations: 1) making asset allocation decisions, 2) making planning decisions for pension funds and retirees, 3) making corporate investment decisions, and 4) for equity valuation purpose. Every investor has to make a decision on how to allocate his or her investment assets among stock, fixed-income securities, and others. One critical decision making component in the asset allocation procedure is expected returns for the competing asset classes. With reliable and accurate information about expected return, an investor can achieve the maximized asset allocation. Equity premium also plays an important role in planning decisions for pension funds and retirees. People who are planning for retirement must estimate their future funds. For fixed-income securities, future funds computation is not complex because the yields are fixed. For stocks, on the other hand, people have to estimate the equity premium to calculate their future funds correctly. In addition, firms that offer defined-benefit retirement plans, have to estimate equity premium to figure out the amount of expected contribution to pension plans. Another fundamental role equity premium plays arises when a corporation makes an investment decision. Most finance textbooks teach that firms should undertake projects with a positive net present value (NPV). NPV calculation requires the opportunity cost (or the required rate of return) which doubles as the discount rate in the computation. Estimation of this discount rate depends on the equity premium. Lastly, equity premium is a crucial determinant in stock valuation process. The equity premium determines the discount rate in stock valuation. *Ceteris paribus*, if the equity premium falls, the stock value rises because the discount rate falls (Cornell, 1999; Dimson, et al., 2002).

The importance of the equity premium is due to its central role in many important financial decision making processes, as mentioned above. Because of the importance of the equity premium, CAPM and the Fama and French Three Factor Model have been developed to estimate it. The following section will discuss these two models.

II. Capital Asset Pricing Model and Fama & French Three Factor Model

Sharpe (1964) initially introduced the idea of the capital asset pricing model (CAPM) and later Lintner (1965) and Black (1972) made additional contributions to CAPM. The central idea of the model is that the expected return is positively and proportionally related to market beta (β) which represents systematic or undiversifiable risk. The CAPM equation is as follows:

$$E(R) - R_f = \beta\left[E(R_m) - R_f\right]$$

where,

$E(R)$: expected return on equity

R_f: risk free rate

$E(R_m)$: expected market return

β: systematic risk

The equity premium is defined as the expected return on equity minus the risk free rate, $[E(R) - R_f]$, and the market premium is defined in the same manner as the expected market return minus the risk free rate, $[E(R_m) - R_f]$ (Brealey & Myers, 2003).

Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) empirically examined CAPM and found a positive relation between the average realized stock return (as a proxy for the expected return) and the market beta, as predicted by the asset pricing theory. However, as more studies examined the model with later sample periods, the positive relation between the market beta and the average realized stock returns disappeared (Fama & French, 1992; Lakonishock & Shapiro, 1986; Reinganum, 1981). Fama and French (1992, 1993 & 1995) not only investigated the CAPM for the period of 1963 to 1990 and rejected the model, but also introduced two additional factors, size and book-to-market equity, to the model. This new modified model is called the Fama and French Three Factor (FF, here after) Model. The FF model equation is as follows:

$$R_i - R_f = \beta\left[R_m - R_f\right] + s_i SMB + h_i HML + e_i$$

where,

R_i = expected return on equity;

R_f = risk free rate;

R_m = expected market return;

SMB = size (small minus big based on 2 by 3 portfolios);

HML = book-to-market equity (high minus low based on 2 by 3 portfolios).

The FF model gained its popularity and has been used widely among researchers and practitioners in recent years. It is now considered a better model than the CAPM. However, the FF model is not without problems. One of the major issues with the FF model is its lack of theoretical background. While the CAPM is considered the model with a strong theoretical background, the FF model is considered an empirical model without a strong theoretical background. Also, both FF and CAPM are not without other problems.

Fama and French (1997) examined the accuracy of the cost of equity (equivalently, the expected return) estimates computed by using CAPM and the FF model, and concluded that neither model provided precise or reliable estimates for cost of equity at both firm and industry levels. They advanced two main reasons for the inaccuracy. First, they argued that estimates of risk loadings are not accurate. For the CAPM, there is only the market beta and for the FF model, there are three risk loadings including the beta. For both models, historical time-series data should be used to estimate the risk loadings. They found a significant variation through time in the risk loadings for both models. When they compared the two sets of estimates of the beta using the full sample period of 1963 to 1994 data and only the past three years data, they found no differences between the two estimates. In other words, despite the differences in the risk loadings, there was no difference in equity premium.

The second problem resides in inaccurate estimates of risk factors. For the CAPM, there is one risk factor for market premium and, for the FF model there are three risk factors (i.e., market premium, size, and book-to-market equity). Because the expected market premium is not observable, average realized market premium has been used as a proxy by using historical time series data for the both models. Again, the variation of the estimates was found to be significantly large through time. For the full sample period of 1963 to 1994, the mean value is 5.16% with the standard deviation of 2.71%. If we calculate the traditional plus-and-minus-two-standard-error intervals, the estimates below zero are more than 10%. They concluded that the combination of these two problems results in imprecise estimates of the cost of equity.

In a similar fashion, Elton (1999) criticized the use of the average realized return as a proxy for the expected market return in the asset pricing model. He argued that the use of the average realized return as a proxy is based on a belief that the average realized return is an unbiased estimate of the expected market return because over the period of a study, surprising news in the market are likely canceled out. However, he disagreed with this view and provided two major evidences against the belief as followings: 1) during 1973 to 1984 period, the average realized return of the stock market was lower than the risk free rate, and 2) during 1927 to 1981 period, the average performance of risky long-term bonds was lower than the risk free rate. Elton (1999) argued that using the average realized return rate below the risk free rate as a proxy of the expected market return rate does not make sense because the expectation of the market return on risky stocks cannot be lower than the risk free rate. The study concluded that the average realized return seemed a very poor proxy for the expected market return and asserted the need of developing alternative methods for examining asset pricing theories.

As discussed above, Fama and French (1997) and Elton (1999) established a strong sentiment for the need for an alternative way to test the asset pricing theories in the financial economics field and the "implied cost of equity capital" approach was introduced to the finance and accounting literature as a response to the need.

III. Implied Cost of Equity Capital

The implied cost of equity capital (in short, implied cost of equity or ICE, hereafter) approach is not new to academic literature. Financial analysts have been using the method for a while and typical finance textbooks explain internal rate of return (IRR) concept which is equivalent to the ICE approach. However, in past, mainstream accounting and finance literature concentrated on using the average realized return as a proxy for the expected market return to test the asset pricing theory until Botosan (1997) introduced the ICE approach to the literature. Soon after Botosan's study, more financial economists started to use the ICE approach and as the approach became more popular in the literature, more comprehensive research on the approach was motivated and conducted.

The ICE approach, as described above, is equivalent to calculating the internal rate of return (IRR). First, an equity valuation model (e.g., residual income model or dividend model) is assumed. Second, current stock price and analysts' short- and long-term earnings forecasts as proxies for all expected future cash flows are introduced into the valuation model. Finally, the internal rate of return that equates the present value of all expected future cash flows to the current stock price is solved. In other words, this internal rate of return is the discount factor that the market implicitly uses for the valuation purpose of the equity.

Financial economists postulated that the ICE approach may be beneficial in testing the asset pricing theory because with this approach, researchers no longer need to use the average realized return, which has been widely criticized for its inaccuracy (Elton, 1999; Fama & French, 1997), as a proxy for the expected market return. On the other hand, the ICE approach may be deficient because the approach uses the analysts' forecasting data. The use of analysts' forecasting data has been investigated by several studies and it is generally concluded that the analysts' forecasting data tend to be overly optimistic and slowly updated (Dechow & Sloan, 1997; Lys & Sohn, 1990). These possible problems may have a negative impact on calculating the accurate estimates of the cost of equity. Guay, Kothari and Shu (2004) examined this timing issue and found that the forecasting data were sluggish in updating. They suggested a remedy for this "sluggishness" and more details about this issue will be discussed in the following section.

The major valuation models described in the following section are further explained in the appendix in a more detailed manner.

Study-by-Study Review

Because of the short history of the ICE literature, the amount of the literature is limited. Therefore, we will provide extensive and comprehensive discussion of relevant studies in this section.

Botosan (1997) introduced the ICE approach to the financial economics literature by utilizing the approach in examining the impact of the disclosure level on the cost of equity. First, she described three ways to estimate the cost of equity at the firm level: 1) average realized return, 2) the CAPM estimate, and 3) the earnings-to-price ratio adjusted for growth and dividend payout estimate. After she provided general pitfalls and improperness of the three methods for her study purpose, she finally adopted the accounting based valuation model developed by Edwards and Bell (1961), Ohlson (1995) and Feltham and Ohlson (1995), and calculated the internal rate of return as estimates of the expected cost of equity. The study attempted to confirm the validity of the estimates by investigating the relations of the estimates with market beta and size. As theoretically expected, the estimates showed a positive relation with market beta and a negative relation with firm size.

While Botosan (1997) made an important introduction of the ICE approach to the financial economics literature, the reliability of the new estimate had not been comprehensively examined. After Botosan (1997), one group of researchers started implementing the approach as a tool for their studies and the other group started extensively investigating the reliability of the estimate derived from the approach. We focus our review on the literature of the second group because until the reliability of the ICE approach is verified, the use of the approach as a tool may have little meaning.

Claus and Thomas (2001), and Gebhardt, Lee and Swaminathan (2001) explored the ICE approach further with more comprehensive analyses. Claus and Thomas (2001) argued that the Ibbotson Associate estimate for the equity premium (on average eight percent) is too high for recent years even though it has been widely accepted and used in the academic literature. The study used the dividend and the residual income valuation (RIV) models to estimate the implied equity risk premium as a proxy for the unobservable expected equity risk premium for the period of 1985 to 1998 and found that the implied equity premium estimates, especially computed by the RIV model, are considerably lower than the Ibbotson Associate rate. They examined the data from five other countries and found similar outcomes. The overall results showed that the equity premium calculated by the RIV model was as low as three percent while the estimate calculated by the dividend model was closer to the Ibbotson Associate rate. The authors argued that the RIV model provides more accurate estimates than the dividend model for three reasons. First, while the RIV model requires a growth rate assumption for a limited number of valuation components (e.g., components for terminal value calculation) with some fixed components (e.g., current book value and abnormal earnings for years before the terminal period), the dividend model requires a growth rate assumption for all valuation components. In other words, the portion of the equity value computed by assumed growth rates is smaller when employing the RIV model and therefore, the estimates of the risk premium are consequently more reliable than when using the dividend model. Second, the growth rate used in calculating the terminal value in perpetuity is less abstract and easier to measure using economic intuition when employing the RIV model. Lastly, under the RIV model, several value relevant indicators, for example, price-to-book ratios, price-to-earnings ratios, and return on equity, can be derived. Therefore, better understandings of the future financial picture can be obtained under implementations of different growth rates. While Claus and Thomas (2001) provided one of the first detailed examinations on the ICE approach, the study did not conduct any empirical analyses to compare the relative reliability of two sets of estimates from the dividend and RIV models. Superiority of the estimate from the RIV model was assumed logically, but not empirically.

Gebhardt, et al. (2001) performed comprehensive analyses on the ICE approach, but used only the residual income valuation model to calculate the estimates. After estimating the ICE, the study investigated the relation between ICE and 14 firm characteristics representing five risk categories: market volatility, leverage, liquidity and information environment, variability and predictability of earnings, and pricing anomalies. The analyses on the relation were performed first to verify the validity of the estimate as a reliable proxy for the expected return and secondly to identify key variables for the additional forecasting regression tests. Overall results showed that the estimates are valid according to the asset pricing theory with the book-to-market equity being the single most important variable. One of the surprising results was that the relation between the ICE estimate and beta appeared to be negative in a univariate test, but became positive in a multivariate test. However, the positive relation became statistically insignificant when an industry measure was included in the model, which suggests a limited role of the beta in a multivariate test and in an industry specific setting, such as, the hospitality setting. However, this is an empirical question that remains unexamined under the hospitality setting and therefore, it is a possible future study. In performing forecasting regression tests in Gebhardt, et al. (2001), four significant firm characteristics were included: book-to-market equity, dispersion in analysts' forecasts, long-term consensus analyst growth forecast, and industry mean risk premium from the prior year. The study first carried out an yearly regression analysis and found that the four firm characteristics explain from 38% to 70% of the cross-sectional variation in the current year's ICE. Next, the study used the coefficients of the four-variable regression model from the previous year along with inserting the data of the four current firm characteristics into the model to estimate a predicted implied cost of equity. Finally, the study performed a regression analysis by setting the next year's ICE as dependent variable and the implied cost of equity predicted from current year's regression as the independent variable. The results generally indicated that the regression showed a reasonable predictability. This is a good signal for developing a viable cost of equity prediction model and the hospitality researchers are certainly encouraged to make an attempt to develop an industry specific cost of equity prediction model.

While Claus and Thomas (2001) and Gebhardt et al. (2001) made more exclusive and comprehensive evaluation on the ICE approach, no empirical comparisons between the estimates derived from different equity valuation models were examined. There are several well-known and widely used equity valuation models (e.g., dividend, residual income valuation, and Ohlson-Juettner models), and the estimates calculated from using these models differ from each other because the assumptions made in implementing each model differ from each other. Therefore, it is an open empirical question to determine which specific model provides the most reliable estimates among the competing models. Following studies particularly investigated this issue.

Botosan and Plumlee (2002) assessed the construct validity of four alternative proxies for the expected cost of equity capital (r). The four alternative proxies were estimated by using the classic dividend discount model, the Gordon dividend model, Ohlson-Juettner model (Ohlson & Juettner-Nauroth, 2003), and the price-earnings-growth (PEG) model. The study used these four models to estimate the ICE with the data for 1979 to 1993 obtained from the financial publication *Value Line*. They examined the theoretically suggested relationship between the estimates and two risk factors (i.e., market beta by the CAPM and firm size). Based on the CAPM, cost of equity capital is expected to increase as the market beta increases – a positive relationship. Therefore this positive association was examined between the four proxies and the market beta. Berk (1995) suggested that if some unknown risk factors were omitted from the empirical model, there will be a negative relationship between cost of equity capital and size. This argument is dependent on the common notion of a negative association between the firm size and the risk in general. Therefore, if the model does not include all necessary risk factors, some unknown risk factors excluded from this incomplete model will be captured by the firm size variable. This inverse relationship was also examined between the four proxies and the firm

size. Based on these two and some additional tests (i.e., relationship with earnings growth leverage, book-to-price, and price momentum), the study concluded that two alternative proxies estimated by the classic dividend discount model and the price-earnings-growth (PEG) model performed better in representing cost-of-equity capital than the Gordon dividend and Ohlson-Juettner model. This study is slightly different from other studies in using the *Value Line* forecasting data while others usually use I/B/E/S data. In addition, this study did not evaluate the residual income valuation model which has been empirically suggested as the best model to calculate the ICE by the majority of other studies. For the hospitality accounting and finance literature, limited data is one of the major problems. It is not clear that which database, in this case I/B/E/S or *Value Line*, provides more and better information for the hospitality industry and it will be worthwhile to investigate the issue.

Gode and Mohanram (2003) used three equity valuation models, Ohlson-Juettner (OJ) and two versions of residual income valuation (RIV) models, to estimate the implied risk premium (RP) as a proxy for the expected risk premium. The first version of RIV (hence forth RIV1) is as implemented in Gebhardt et al. (2001) and the second version (hence forth RIV2) is as in Liu et al. (2002). The study conducted three relation tests to perform their comparison: 1) relation between the implied RP and several risk factors, 2) relation between the implied RP and predicted implied RP by using the prior year's regression coefficients, and 3) relation between the implied RP and realized subsequent RP. The risk factors examined were beta, unsystematic risk, earnings variability, leverage, and size, and the both OJ and RIV1 models appeared to have valid relationships with these risk factors. In the second relation test, the RIV1 model outperformed the OJ model by relatively big difference. However, the study still argued that the OJ model presented its usefulness in forecasting regression setting. The results of the third test showed that the RIV1 model performed better in predicting one- and two-year realized RP than the OJ model and the both models performed well in predicting three-year realized RP. The study generally concluded that the OJ model performed relatively well when we consider possible limitations of the model assumptions, such as, in the OJ model, book values and industry profitability are not assumed. Additionally, the study suggested that we should exclude loss firms when calculating the industry median ROE to make improvements on the RIV estimates although further investigation is necessary. In spite of the general conclusions made by the study, the overall results presented that the RIV1 model outperformed the OJ model and therefore the RIV1 model should be implemented whenever possible. The study also exhibited comprehensive relation tests to evaluate the relative reliability of the ICE estimates and these three methods, at least, should be considered and implemented when evaluating the estimates in future studies.

Easton and Monahan (2003) employed a different method to evaluate the relative reliability of the ICE estimates. Vuolteenaho (2002) proposed a model that the realized return consists of three components; expected return, cash flow news and return news. Cash flow news represent changes in expectations about future cash flows and return news represent changes in expectations about future return rates. Subtraction of the return news from the sum of expected return and cash flow news results in realized return. In performing a regression analysis based on this model, if the estimated coefficients are different from one, the difference represents measurement error in the components. By applying the econometric methods presented by Garber and Klepper (1980) and Barth (1991), these differences can be used to compute the measurement error variances. The study subsequently used the measurement error variances to evaluate the relative reliability of the ICE estimates. Six equity valuation models were applied to estimate the ICE and those six estimates were empirically compared for superiority in representing the expected cost of equity. General results revealed that the estimate by the simplest price-to-forward earnings (PFE) model performed at least as good as the other more complicated valuation models. Residual income model as implemented in Gebhardt, et al. (2001) performed the best among the more complicated models. Although this study differed from

other studies in the method it adopted to evaluate the estimates, the conclusions were no different. Even though the study concluded that the simplest model, the PFE model, performed at least as good as the other more complicated valuation models, the residual income valuation model performed as good as or sometimes better than the PFE model. The study seemed to make an emphasis on the PFE model in its conclusion because it is the simplest model, but in overall the results suggested that the residual income model is still one of the best models.

There are two studies that expanded the examination of the ICE estimates to the international setting (Shröder, 2004; Chen, Jorgensen, & Yoo, 2004). Schröder (2004) adopted two different versions for each of two leading equity valuation models (i.e., dividend model and residual income valuation model) to estimate the ICE. The study was conducted with a sample of European companies for 2003. The two versions differ in how many stages the model assumes. The study used "two-stage" and "three-stage" formula. The two-stage formula consists of growth period and stable growth period, while the three-stage formula includes an additional transition period. These two different versions applied to each of the two equity valuation models and as a result, the four different sets of ICE were estimated. To determine the relative reliability of the estimates, the study examined relation between each of the four estimates and several factors including market beta, standard deviation of monthly stock returns over the last 60 months, book-to-market equity, firm size, dividend yield, and price-earnings ratio. In general, the study results suggested that the dividend models performed better than the residual income valuation models. In addition to the relation test, the estimates were regressed on actual subsequent realized stock returns of each of following four quarters to investigate the predicting power. Again, the dividend models performed better than the residual income models in forecasting regressions. This result is inconsistent with most other study results concluding the residual income valuation model as the best model (Claus & Thomas, 2001; Guay et al., 2004; Easton & Monahan, 2003; Chen et al., 2004). However, two things should be mentioned. First, the study sample was European companies, not U.S. companies. Therefore, the results may not be generalizable to U.S. companies. Second, the study used the data collected as of 18 March 2003 reflecting only one point of time. This is a big limitation of the study because with the limited sample period, the study suffers from the generalizability problem not only to U.S. companies in general, but also even to European samples for other times.

Chen et al. (2004) is the other international study evaluating the relative reliability of the ICE estimates calculated by using two different valuation models – residual income valuation (RIV) model and Ohlson-Juettner (OJ) model – in seven developed countries. The study proposed that the RIV model would provide better estimates in the countries where the clean surplus relation holds well while the OJ model would provide better estimates in the countries where the clean surplus relation does not hold well. This proposal was made because the clean surplus is the required assumption to convert the dividend model into the RIV model while the OJ model relaxed this assumption. First, the study measured the ex post deviations for each country by the difference between the comprehensive income and the net income scaled by the book value of equity to determine the level of the clean surplus relation. The analyses suggested that the clean surplus relation held better in U.S., Japan, Australia and Canada and less in the European countries (i.e., U.K., France and Germany). The study performed the relation test between the ICE estimates and five risk factors (market beta, market value of equity, debt-to-market ratio, dispersion of analyst earnings forecasts, and idiosyncratic risk) to evaluate the relative reliability of the estimates. The study concluded that the results supported its proposal by showing that the estimates by the RIV model in general worked better in the countries where the clean surplus held well and the estimates by the OJ model in general worked better than or equally well with the estimates by the RIV model in the countries where the clean surplus held less well. However, the residual income model again in this study presented its ability to provide the reliable estimates by showing that its estimates were often as good as the OJ model estimates even in the European samples.

Shröder (2004) and Chen, et al. (2004) provided possible issues we should consider regarding the ICE approach in an international setting. Because of increasing internationalization of business, it is important to study the cost of capital issues in an international setting. However data limitation will be a major issue especially for the hospitality industry.

Guay, et al. (2004), one of the most recent studies, compared the estimates of the cost of equity from five different models. Four of these five estimates were calculated by the ICE approaches and the last estimate was by the Fama and French three factor (FF) model. Four equity valuation models for the ICE approach are: 1) residual income valuation model as implemented in Gebhardt, et al. (2001), 2) residual income valuation model as implemented in Claus and Thomas (2001), 3) finite horizon Gordon model, and 4) Ohlson-Juettner (OJ) model as implemented in Gode and Mohanram (2003). Inconsistent with most other studies, Guay, et al. (2004) employed the method that analyzed the relation between the ICE estimates and the subsequent realized return as their main and sole methodology to evaluate the relative reliability of the estimates because according to a theory, the current cost of equity should have a positive relation with the subsequent realized return. The study results on both firm and industry levels indicated that all five estimates did not appear to have any significant relation with the subsequent realized return. The study made arguments on why the ICE estimates could be imprecise by providing three possible reasons. First, because the study had to use the forecasting data from I/B/E/S, the only available sample period was for 19 years from 1982 to 2000. The period was relatively short and therefore provided only limited power with a small sample size. Second, several assumptions are necessary in implementing an equity valuation model to estimate the ICE, for example, the growth rates applying to several different stages. These assumptions inevitably contain errors and subsequently the estimates calculated by the valuation models are imprecise. Third, forecasting data used in estimation process may not be updated on a timely basis. This possible "sluggishness" could result in a biased estimate. The first two potential problems could not be examined further by the study because the nature of the problems precludes easy solutions. However, the last problem, the "sluggishness" in analysts' forecasting data, was further investigated and the study proposed a remedy for this problem. Additional analysis revealed that the bias resulted from the sluggishness was associated with recent stock performance. Therefore, the study included the recent stock performance in the regression analysis to control for the bias and found that the overall performance of the ICE estimates improved. Among the estimates from the four valuation models, the RIV model estimate performed the best. The results also showed that the FF model estimates are imprecise as suggested by Fama and French (1997). The error in analysts' forecasting data is one of the major bias sources in implementation of the ICE approach. Future studies in this field should therefore consider the remedy suggested by Guay, et al. (2004) to deal with this bias, if not developing additional alternative methods.

Applications to the Hospitality Industry

All of the studies discussed in the preceding review section are from the mainstream accounting and finance literature. The ICE approach has never been introduced to the hospitality literature. Our critical review of the ICE approach is to not only provide information to the hospitality researchers but also to encourage researchers to implement the approach in their own studies in the hospitality field. We believe that the ICE approach will open a new research topic area to hospitality academicians and we propose two main applications here.

First, the hospitality research can explore which equity valuation model estimate works best in the hospitality setting. The hospitality industry includes several subset industries, such as, lodging, restaurants, airline, and recreation. It would be clearly beneficial to investigate each subset industry individually, given data availability, because each subset industries presents unique characteristics from each other. In evaluating the relative reliability of the different ICE

estimates, the comprehensive methods used by other researchers and described in the critical review section of this paper should be employed. Three main methodologies that have been performed and are widely accepted. They are: 1) relation test between the ICE estimates and risk factors, 2) relation test between the ICE estimates and the subsequent realized stock return, and 3) relation test between the ICE estimates and the predicted implied cost of equity estimates by using the prior year's implied cost of equity regression coefficients. In addition to these three main methods, we should always attempt to reduce any bias rooted from the error in the analysts' forecasting data as discussed in reviewing the Guay, et al. (2004) study.

Second, if we identify which model provides the best estimate for the hospitality industry, then we can use that particular model to estimate the ICE as a proxy for the expected cost of equity and use it as one of our studies' main variables like some studies in financial economics literature (Botosan, 1997; Cheng, Collins, & Huang, 2003; Dhaliwal, Krull, Li, & Moser, 2004; Hail, & Leuz, 2004; Hribar, & Jenkins, 2004; Lee, & Ng, 2003; Mikhail, Walther, & Willis, 2004; Wang, & Jagannathan, 2004). For example, Botosan (1997) examined the relation between the disclosure level and the cost of equity. The study used the ICE approach to estimate the cost of equity, one of the main variables for the investigation.

If the proxy we have used for the expected cost of equity in past is imprecise, the results derived from the previous studies may not be valid either. Consequently, more research regarding the cost of equity issue is encouraged. This new research might be conducted by implementing the ICE approach. Possible topics can be explored in areas, such as, capital structure, budgeting, disclosure level, multi-national issue, corporate investment decision, and equity valuation.

Conclusion

The implied cost of equity (ICE) approach is a relatively new method and has never been introduced to the hospitality literature. In this paper, we provide the critical review of the literature of the ICE approach along with relevant comments and possible applications for the hospitality industry. We believe that the approach will provide a good way to estimate the expected return (or cost of equity) and encourage the hospitality researchers to implement the approach for their studies. There are many opportunities in this area and we hope that this approach will enrich the hospitality literature.

Appendix

Valuation Models

The Residual Income Valuation Model [as implemented in Gebhardt, et al. (2001)]:

$$P_0 = B_0 + \sum_{t=1}^{3} \frac{FROE_t - r_e}{(1+r_e)^t} B_{t-1} + TV,$$

$$TV = \sum_{t=4}^{11} \frac{FROE_t - r_e}{(1+r_e)^t} B_{t-1} + \frac{FROE_{12} - r_e}{r_e (1+r_e)^{11}} B_{11}$$

where,

P_0 = current share price at year 0

B_0 = book value from the most recent financial statement divided by the number of shares outstanding in the current month

r_e = cost of equity or, equivalently, shareholders' expected rate of return

$FROE_t$ = forecasted return on equity (*ROE*) at time t. For the first three years, I compute this variable as $FEPS_t / B_{t-1}$, where $FEPS_t$ is the I/B/E/S mean forecasted *EPS* for year t and B_{t-1} is the book value per share for year $t-1$. Beyond the third year, I forecast *FROE* using a linear interpolation to the industry median *ROE*.

$B_t = B_{t-1} + FEPS_t - FDPS_t$, where $FDPS_t$ is the forecasted dividend per share at time t, estimated using the current dividend payout ratio (k_{DIV}). Specifically, it is assumed that $FDPS_t = FEPS_t * k_{DIV}$.

The Residual Income Valuation Model [as implemented in Claus and Thomas (2001)]:

$$P_0 = B_0 + \sum_{t=1}^{5} \frac{ae_t}{(1+r_e)^t} + TV, \quad TV = \frac{ae_5 (1 + g_{\text{inf}lation})}{(r_e - g_{\text{inf}lation})(1+r_e)^5}$$

where,

P_0 = current share price at year 0

e_t = earnings forecast at year t

B_0 = book value from the most recent financial statement divided by the number of shares outstanding in the current month

$ae_t = e_t - r_e(B_{t-1})$ = expected abnormal earnings at year t, or forecast accounting earnings less a charge for the cost of equity

r_e = cost of equity or, equivalently, shareholders' expected rate of return

$g_{\text{inf}lation}$ = perpetual growth rate beyond year 5, equal to the inflation rate, (= $r_f - 3\%$)

r_f = risk free rate (10-year Treasury bond rate)

The Two-Stage Dividend Model [as implemented in Shröder (2004)]:

$$P_0 = \sum_{t=1}^{5} \frac{FDPS_t}{(1+r_e)^t} + \frac{EDPS_5(1+g_{GDP})}{(r_e - g_{GDP})(1+r_e)^5}$$

The Three-Stage Dividend Model [as implemented in Shröder (2004)]:

$$P_0 = \sum_{t=1}^{5} \frac{FDPS_t}{(1+r_e)^t} + \sum_{t=6}^{20} \frac{FDPS_t}{(1+r_e)^t} + \frac{FDPS_{20}(1+g_{GDP})}{(r_e - g_{GDP})(1+r_e)^5}$$

where,

P_0 = current share price at year 0

$FDPS_t$ = forecasted dividends per share at the end of year t

r_e = cost of equity or, equivalently, shareholders' expected rate of return

g_{GDP} = perpetual growth rate beyond year 5, equal to long-term GDP growth rate

The Ohlson-Juettner (OJ) Model [as implemented in Gode & Mohanram (2003)]:

$$P_0 = \frac{FEPS_1}{r_e} + \frac{[FEPS_2 - FEPS_1 - r_e(FEPS_1 - FDPS_1)]}{r_e(r_e - g_{\text{inf}lation})}$$

where,

P_0 = current share price at year 0

$FEPS_t$ = forecasted *EPS* at year t

$FDPS_1$ = forecasted dividends per share, at the end of year 1

r_e = cost of equity or, equivalently, shareholders' expected rate of return

$g_{\text{inf}lation}$ = perpetual growth rate beyond year 5, equal to the inflation rate, (= $r_f - 3\%$)

References

Barth, M. (1991). "Relative Measurement Errors Among Alternative Pension Asset and Liability Measures." *The Accounting Review, 66*, 433-463.

Berk, J. (1995). "A Critique of Size-Related Anomalies." *Review of Financial Studies (Summer)*, 275-286.

Black, F. (1972). "Capital Market Equilibrium with Restricted Borrowing." *Journal of Business, 45*, 444-455.

Black, F., Jensen, M., & Scholes, M. (1972). "The Capital Asset Pricing Model: Some Empirical Tests," in Jensen, M. ed.: *Studies in the Theory of Capital Markets* (Praeger).

Botosan, C. (1997). "Disclosure Level and the Cost of Equity Capital." *The Accounting Review, 72*, 323-349.

Botosan, C., & Plumlee, M. (2002). "Assessing the Construct Validity of Alternative Proxies for Expected Cost of Equity Capital." *Working Paper.*

Brealey, R., & Myers, S. (2003). *Principles of Corporate Finance.* New York: McGraw-Hill/Irwin.

Cheng, A., Collins, D., & Huang, H. (2003). "Disclosure and the Implied Cost of Equity Capital: The Case of the S&P Transparency & Disclosure Rankings." *Working Paper.*

Claus, J., & Thomas, J. (2001). "Equity Premia as Low as Three Percent? Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets." *The Journal of Finance 56*, 1629-1666.

Cornell, B. (1999). *The Equity Risk Premium.* New York: John Wiley & Sons.

Dechow, P., & Sloan, R. (1997). "Returns to Contrarian Investment Strategies: Tests of Naïve Expectation Hypotheses." *Journal of Financial Economics, 43*, 3-27.

Dhaliwal, D., Krull, L., Li, O. Z., & Moser, W. (2004). "Dividend Taxes and Implied Cost of Equity Capital." *Working Paper.*

Dimson, E., Marsh, P., & Staunton, M. (2002). *Triumph of the Optimists: 101 Years of Global Investment Returns.* Princeton, New Jersey: Princeton University Press.

Edwards, E., & Bell, P. (1961). *The Theory and Measurement of Business Income.* Berkeley, CA: University of California Press.

Elton, E. (1999). "Expected Return, Realized Return, and Asset Pricing Tests." *Journal of Finance, 54*, 1199-1220.

Fama, E. F., & MacBeth, J. (1973). "Risk, Return and Equilibrium: Empirical Tests." *Journal of Political Economy, 81*, 607-636.

Fama, E.F., & French, K.R. (1992). "The Cross-Section of Expected Stock Returns." *Journal of Finance, 47*, 427-465.

Fama, E.F., & French, K.R. (1993). "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics, 33*, 3-56.

Fama, E.F., & French, K.R. (1995). "Size and Book-to-Market Factors in Earnings and Returns." *Journal of Finance, 50*, 131-155.

Fama, E.F., & French, K.R. (1997). "Industry Costs of Equity." *Journal of Financial Economics 43*, 153-193.

Feltham, G., & Ohlson, J. (1995). "Valuation and Clean Surplus Accounting for Operating and Financial Activities." *Contemporary Accounting Research (Spring)*, 689-731.

Garber, S., & Klepper, S. (1980). "'Administrative Pricing' or Competition Coupled with Errors of Measurement?" *International Economic Review, 21*, 413-435.

Gebhardt, W.R., Lee, C.M., & Swaminathan, B. (2001). "Toward an Implied Cost of Capital." *Journal of Accounting Research 39*, 135-176.

Guay, W., Kothari, S.P., & Shu, S. (2004). "Properties of Implied Cost of Capital Using Analysts' Forecasts." *Working Paper.*

Hail, L., & Leuz, C. (2004). "International Differences in the Cost of Equity Capital: Do Legal Institutions and Securities Regulation Matter?" *Working Paper.*

Hribar, P., & Jenkins, N. T. (2004). "The Effect of Accounting Restatements on Earnings Revisions and the Estimated Cost of Capital." *Review of Accounting Studies, 9*, 337-356.
Lakonishock, J., & Shapiro, A. C. (1986). "Systematic Risk, Total Risk and Size as Determinants of Stock Market Returns." *Journal of Banking and Finance, 10*, 115-132.
Lee, C., & Ng, D. (2003). "International Asset Pricing: Evidence from the Cross Section of Implied Cost of Capital." *Working Paper.*
Lintner, J. (1965). "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets." *Review of Economics and Statistics, 47*, 13-37.
Liu, J., Nissim, D., & Thomas, J. (2002). "Equity Valuation Using Multiples." *Journal of Accounting Research, 40(1)*, 135-172.
Lys, T., & Sohn, S. (1990). "The Association Between Revisions of Financial Analysts' Earnings Forecasts and Security Price Changes." *Journal of Accounting and Economics, 13*, 341-363.
Mikhail, M. B., Walther, B. R., & Willis, R. H. (2004). "Earnings Surprises and the Cot of Equity Capital." *Journal of Accounting, Auditing, and Finance, 19*, 491-513.
Ohlson, J. (1995). "Earnings, Book Value, and Dividends in Security Valuation." *Contemporary Accounting Research (Spring)*, 661-687.
Ohlson, J., & Juettner-Nauroth, B. (2003). "Expected EPS and EPS Growth as Determinants of Value." *Working Paper.*
Reinganum, M. R. (1981). "A New Empirical Perspective on the CAPM." *Journal of Financial and Quantitative Analysis, 16*, 439-462.
Sharpe, W. F. (1964). "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk." *Journal of Finance, 19*, 425-442.
Shröder, D. (2004). "The Implied Equity Risk Premium – An Evaluation of Empirical Methods." *Working Paper.*
Vuolteenaho, T. (2002). "What Drives Firm-Level Stock Returns?" *Journal of Finance, 57*, 233-264.
Wang, Y., & Jagannathan, R. (2004). "Consumption Risk and the Cost of Equity Capital." *Working Paper.*

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