

Asymmetric Market Risk, Accounting Quality and the Cost of Capital: Evidence from Taiwan Capital Market

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Abstract

Financing decisions have always been regarded as important to company operations. The capital structure of a company has always been an important issue of financial research. This research mainly attempts to answer the previous literature on the inconsistency of the relationship between accounting quality and cost of capital. This study examines the ways in which accounting quality can affect the cost of capital through asymmetric market risk. In order to study the issue, a regression model is used. The dataset consisting of companies listed on the Taiwan Stock Exchange includes 317 companies as a sample, providing a total of 7,731 company-year observations. The findings reveal that the cost of capital has a positive correlation with asymmetric market risk, and that asymmetric market risk is found to have a corresponding positive association with accounting quality. The results provide support for the general view that asymmetric market risk would appear to be a more appropriate measure than symmetric market risk when linking accounting quality to the cost of capital.

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Keywords: Excess risk premium, Financial statement, Downside risk, CAPM.

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1. Introduction

The cost of capital is the basis for evaluating the business performance of a company. When the supply of funds in the market is insufficient and the internal funds of the enterprise are limited, if the enterprise has to face a higher cost of capital, it is not conducive to the performance of net profit. That is to say, in a highly competitive business environment, if a company can have a lower cost of capital, it is also the key to a company's success. Therefore, the decision on the cost of capital has always been an important issue in financial management.

Many recent studies have explored the relationship between the cost of capital and accounting quality, unfortunately, there have been wide variations in the empirical evidence presented in these studies (Francis, LaFond, Ollson & Schipper (2005); Cohen, (2008); Barth, Konchitchki & Landsman, (2011); Ng, (2011)). For example, both Francis et al. (2005) and Barth, Konchitchki and Landsman (2011) documented a negative relationship between the cost of capital and accounting quality, whereas Cohen (2008) could find no discernible relationship; and indeed, Ng (2011) even suggested that the cost of capital was increased with better accounting quality.

Many literatures have studied the relationship between accounting quality and capital cost, but few studies have analyzed the relationship between accounting quality and capital cost and asymmetric risk. This study mainly attempts to answer the previous question about the inconsistency between accounting quality and cost of capital. The paper provides different perspectives of the relationship between accounting quality and cost of capital, that is, the impact of market risk on the relationship between the two, and it is divided into upside risk and downside risk. The uncertainty of the relationship between accounting quality and capital cost through regression model is mainly caused by not considering market upside and downside risks. The results show that the quality of accounting affects the cost of capital through the downside risks.

2. Literature Review

The traditional capital asset pricing theory (CAPM) is based on a perfectly competitive market. The price of assets is equal to the discount of future expected returns. The returns of all investment portfolios are only related to systemic risks. When using CAPM, the investment portfolio should be diversified, that is, include a basket of stocks and/or bonds to eliminate the non-systematic risks of individual securities. The research of Lambert, Leuz, and Verrecchia (2007) pointed out that in the traditional capital asset pricing model (CAPM), when the information quality of the market is good, the company's cost of capital can be reduced through non-dispersible market risk. However, whether heterogeneous risk is related to the future return rate of stocks, there are some recent related studies on the inverse relationship between heterogeneous volatility and future stock returns. Goyal and Santa-Clara (2003) re-examined the predictability of stock market returns and risk measures. Taking the US stock market as the research object, they found that there is a significant positive correlation between the average stock variance and market

returns, that is to say the average variance of US stock returns is an important market combination of value-weighted returns. In order to avoid research bias, the predictive ability of the average variance after correction for small sample deviations remains unchanged and cannot be attributed to business cycle variables. This evidence is clearly inconsistent with asset pricing theory.

Ang, Hodrick, Xing, and Zhang (2006) examined the impact of the inclusion of aggregate volatility risk in stock return pricing, and found that stocks that are more sensitive to aggregate volatility innovation have lower average returns, and this phenomenon cannot be used. The total volatility risk is higher to explain. Taking into account the size, book-to-market value ratio, stock momentum and liquidity effects, it cannot explain the low average return of stocks with high systemic volatility risk, nor can it explain the low average return of stocks with high heterogeneous volatility.

There are also many related studies on the quality of accounting information and the cost of capital. According to the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB), the main purpose of financial statements is to improve the reference of investors and other capital providers to make decisions. If the company can provide more transparent financial statements, the uncertainty about the value of its equity may be lower, and therefore it will be able to enjoy a lower cost of capital. Barth, Konchitchki and Landsman (2011) studied the correlation between income transparency and capital cost and the correlation between income transparency and information asymmetry based on the confirmed positive correlation between information asymmetry and capital cost. Their research found that income transparency. The indicator is significantly negatively correlated with subsequent excess returns and the average return of the investment portfolio, and the return transparency indicator is significantly negatively correlated with our expected cost of capital agency. In short, higher return transparency is consistent with lower cost of capital. The transparency measures are negatively correlated with the information asymmetry measures used in previous studies, which is consistent with the negative correlation between revenue transparency and information asymmetry. Bhattacharya, Daouk & Welker (2003) focused on the relationship between accounting transparency and publicly traded equity. The results of the study found that accounting opacity publicly traded equity capital costs would be higher.

Attempts have therefore been made in several related studies to explain the ways in which accounting quality is linked to the cost of capital, with three possible linkages, market risk (Lambert, Leuz & Verrecchia, (2007); Armstrong, Banerjee & Corona, (2013); Kim & Qi, (2010)), liquidity risk (Hughes, Liu & Liu, (2007); Ng, (2011)) and information asymmetry (Easley & O'Hara, (2004)). Each of these studies is closely connected to the issues examined in the present study, although there are some major differences, as described below.

Firstly, all three prior studies focused only on those firms listed on the NYSE, AMEX or NASDAQ, which institutional investors are the major participants, whereas the present study is on firms listed on the Taiwan Stock Exchange (TSE)

with particular focus being placed on individual investors. Secondly, Lambert et al. (2007) provided only a theoretical argument that accounting quality could reduce the cost of capital for a firm through market risk, with no empirical evidence being presented to support their argument. Thirdly, although Armstrong et al. (2013) argued that the cost of capital was affected by accounting quality through market risk, they provided no discussion on the ways in which this actually occurred. Finally, in contrast to the Ng (2011), this study focusses solely on asymmetric market risk as the linkage between the cost of capital and accounting quality.

Following the intuitive theoretical argument of Lambert et al. (2007), whilst also allowing investors to update firm-specific cash flow betas, Armstrong et al. (2013) subsequently demonstrated that certain differences in the impacts of accounting quality on the cost of capital were attributable to market risk; that is, they found that when the market risk, β , was positive (negative), accounting quality would have the effect of reducing (increasing) the cost of capital. Prospect theory, as proposed by Kahneman and Tversky (1979), suggests that gains and losses are seen differently by economic agents. Low (2004) therefore investigated the relationship between the risk perceptions of option traders and the contemporaneous market conditions based upon a sample of S&P100 firms, with the empirical results showing that the risk-return relationship was asymmetric and non-linear. It would therefore seem that when attempting to explain the relationship between the cost of capital and accounting quality, asymmetric market risk is more appropriate than symmetric risk. This study undertakes with the aim of examining whether the cost of capital is similarly affected by accounting quality with a particular focus on asymmetric market risk using firms listed on the TSE over the periods, January 1995 and December 2009. The prior related studies focus solely on the US market, which institutional investors are the major investors (Francis et al., (2005); Ang, Chen & Xing, (2006); Cohen, (2008); Barth et al., (2011); Ng, (2011)). The institutional investors are usually regarded as the ‘experts,’ in terms of their sound understanding of accounting information, they are, nevertheless, easily deterred from using discretionary accruals to manipulate earnings (Chung, Firth and Kim, (2002)). Generally, individual investors are often considered the least informed users of financial statements. Empirical evidence suggests that individual investors’ perceptions of firm value are influenced by their peers’ beliefs through “word of mouth” and in most cases depend on popular, socially shared models (De Bondt, (1998); Hong et al., (2005); Ng and Wu, (2010)). This study tries to provide evidence on how the cost of capital varies with accounting quality in a market with individual investors being the major parts.

The results of this paper show that accounting quality has a positive correlation with market risk, regardless of whether the risk is symmetric or asymmetric. This paper also explores that the cost of capital has a positive correlation with asymmetric market risk. Finally, the results reveal that the cost of capital based upon accounting quality originates mainly from downside risk.

The remainder of this paper is organized as follows. In Section 2 by a description of the data used for the study, along with a description of the variables. The

empirical results are subsequently presented in Section 3. Finally, the conclusions of this research will be described in Section 4.

3. Method And Data

3.1 Data

In support of our analysis in the present study, two sets of data were obtained from the Taiwan Economic Journal (TEJ) database; the data on the daily excess risk premium, excess market risk premium, SMB and HML were collected from the TEJ 'equity database,' whilst the accounting information on our sample of firms was obtained from the TEJ 'public database'. Our sample period runs from January 1995 to December 2009, providing a total of fifteen years of observations.

Following the approach in many of the prior studies, all firms with less than 200 trading days in each year were excluded from the sample, as were those firms whose stock prices or trading volume were less than zero (He & Wu, (2005)); finally, all firms within the financial industry were also excluded. The resultant sample comprised of 317 firms providing a total of 7,731 firm-year observations.

3.2 Variables

Since it is noted that betas are time-varying (Ang and Chen, (2007)) and noisy within a short estimation period (Lewellen and Nagel, (2006)), following Fama and French (2006) to use daily data within an annual horizon for our estimation of market risk. By so doing, our estimations will have greater statistical power in those cases where the betas may be time-varying (Fama and French, (2006)).

3.2.1 Downside and upside risk

The paper follows Ang et al. ((2006)) to decompose market risk into downside and upside risk, with a value of 0 being used as the cut-off point for the determination of the downside and upside risk (Kim & Zumwalt, (1979); Ang et al., (2006)). Further, the common unconditional market risk (β) obtained from the CAPM as a benchmark (Ang et al., (2006)), and then define the asymmetric market risk for stock i ($Asy\beta_i = \beta_i^- - \beta_i^+$) as the difference between the downside and the upside risk (Ang et al., (2006)).

Downside and upside risk are respectively estimated as follows:

$$\beta_i^- = \frac{Cov(r_{i,t} - r_{f,t}, r_{m,t} - r_{f,t} | r_{m,t} < 0)}{Var(r_{m,t})} \quad (1)$$

$$\beta_i^+ = \frac{Cov(r_{i,t} - r_{f,t}, r_{m,t} - r_{f,t} | r_{m,t} > 0)}{Var(r_{m,t})} \quad (2)$$

where β_i^- and β_i^+ respectively represent downside and upside risk; $r_{i,t}$ denotes the return of stock i on day t ; $r_{m,t}$ refers to the market return on day t ; and $r_{f,t}$ is the daily risk-free rate on day t , which is proxied by the one-year time deposit interest rate of the Bank of Taiwan, divided by 365.

3.2.2 Accounting quality

There is no consensus on the definition of accounting quality, but many proxy variables are proposed to measure accounting quality in the current studies (Dechow & Dichev, (2002); Leuz et al., (2003); Francis et al., (2005); Kothari, Leone & Wasley, (2005); Lang, Raedy & Wilson, (2006); Ball, Robin & Sadka, (2008)). The most commonly used measurement variables in these studies are ‘discretionary estimation errors’ (Francis et al., (2005); Core, Guay & Verdi, (2008)), ‘earnings response coefficients’ (Ali & Hwang, (2000)), ‘smoothness’ (Lang et al., (2006)), ‘accruals and discretionary accruals’ (Hung, (2000); Pincus, Rajgopal & Venkatachalam, (2007)), ‘timely loss recognition’ (Ball et al., (2008)), ‘small positive profits’ (Lang et al., (2006)) and scores based upon a ‘combination of quality measures’ (Leuz, Nanda & Wysocki, (2003)).

Based on the data availability and samples size, the paper use “discrete estimation errors” as the proxy variable of accounting quality (Francis et al., (2005); Core et al., (2008)).

As shown in Equation (3), this study regress the ‘total current accruals’ ($TCA_{i,\tau}$) on ‘prior year cash flows’ ($CFO_{i,\tau-1}$), ‘current cash flows’ ($CFO_{i,\tau}$), ‘cash flows next year’ ($CFO_{i,\tau+1}$), ‘change in revenue’ ($\Delta Rev_{i,\tau}$) and the gross value of the ‘sum of property, plant and equipment’ ($PPE_{i,\tau}$). All of these variables are scaled by ‘total assets’ ($Asset_{i,\tau}$). Using annual financial statement data based upon a nine-year rolling estimation window, we obtain the annual residuals for each company by estimating the regression. The standard deviation of the residuals obtained by regression will be used as a proxy variable for accounting quality. The higher the standard deviation, the worse the accounting quality (i.e., the standard deviation during the nine-year period from 1989 to 1997 is used as the proxy for accounting quality in the year 1997).

$$TCA_{i,\tau} = \alpha_{i0} + \alpha_{i1}CFO_{i,\tau-1} + \alpha_{i2}CFO_{i,\tau} + \alpha_{i3}CFO_{i,\tau+1} + \alpha_{i4}\Delta REV_{i,\tau} + \alpha_{i5}PPE_{i,\tau} + \varepsilon_{i,\tau} \quad (3)$$

4. Results

4.1 Univariate Results

Table 1 presents the descriptive statistics of the research variables used in this study, from which one can see that the excess risk premium has a mean value of 0.0349 (S.D.=0.2049), whereas the mean value of of excess market risk premium is -0.0247 (S.D.=0.3422). The mean value for accounting quality is 0.0345, which is slightly higher than the mean of 0.0332 reported by Ng (2010) relating to stocks listed on the NYSE, AMEX and NASDAQ.

Table 2: Average risk of ten portfolios, by firm characteristics

Variables	Portfolios										Diff
	0	1	2	3	4	5	6	7	8	9	
Panel A: Market Value (Size)											
<i>Downside Risk</i>	0.9533	1.0628	1.1543	1.1779	1.2162	1.2924	1.2952	1.3787	1.4532	1.3459	0.3926***
<i>Upside Risk</i>	0.8912	0.9464	1.0245	1.0634	1.1013	1.1776	1.2079	1.2685	1.4080	1.4304	0.5392***
<i>Asymmetric Risk</i>	0.0621	0.1164	0.1298	0.1145	0.1148	0.1148	0.0873	0.1102	0.0452	-0.0845	-0.1466***
<i>Market Risk</i>	0.6762	0.7375	0.7975	0.8201	0.8478	0.9026	0.9152	0.9679	1.0430	1.0096	0.3334***
Panel B: Operating Leverage (OL)											
<i>Downside Risk</i>	1.2677	1.2707	1.2551	1.2901	1.1795	1.1931	1.2091	1.2569	1.2385	1.1690	-0.0987
<i>Upside Risk</i>	1.1448	1.2021	1.1727	1.2314	1.1171	1.1258	1.1433	1.1575	1.1455	1.0780	-0.0668
<i>Asymmetric Risk</i>	0.1229	0.0686	0.0824	0.0588	0.0624	0.0673	0.0658	0.0994	0.0930	0.0910	-0.0319
<i>Market Risk</i>	0.8819	0.9037	0.8871	0.9213	0.8390	0.8473	0.8598	0.8826	0.8719	0.8224	-0.0595

Panel C: Financial Leverage (FL)											
<i>Downside Risk</i>	1.2234	1.2633	1.2205	1.2043	1.2282	1.2349	1.2647	1.2089	1.2353	1.2465	0.0231
<i>Upside Risk</i>	1.1069	1.1822	1.1199	1.1593	1.1835	1.1416	1.1676	1.1422	1.1601	1.1539	0.0471
<i>Asymmetric Risk</i>	0.1166	0.0812	0.1006	0.0450	0.0447	0.0932	0.0971	0.0667	0.0752	0.0926	-0.0240
<i>Market Risk</i>	0.8527	0.8937	0.8573	0.8621	0.8799	0.8696	0.8887	0.8599	0.8752	0.8780	0.0253
Panel D: Accounting Quality (AQ)											
<i>Downside Risk</i>	1.0606	1.1074	1.1477	1.1585	1.2455	1.3171	1.2823	1.3042	1.3727	1.3328	0.2722***
<i>Upside Risk</i>	1.0051	1.0555	1.1013	1.0776	1.1658	1.2111	1.1785	1.2155	1.2780	1.2293	0.2242**
<i>Asymmetric Risk</i>	0.0555	0.0519	0.0464	0.0809	0.0797	0.1060	0.1038	0.0886	0.0947	0.1035	0.0480
<i>Market Risk</i>	0.7571	0.7898	0.8221	0.8171	0.8806	0.9251	0.8999	0.9197	0.9690	0.9361	0.1790**

This table shows the average risk of ten portfolios in terms of firm characteristics, including market value, operating leverage, financial leverage and accounting quality. Portfolio 0 (9) is the portfolio with the lowest (highest) level of firm characteristic indicated. *Diff* refers to the difference between portfolios 0 and 9, with a two-sample *t*-test being undertaken to determine whether the difference between portfolios 0 and 9 is significantly different from zero.

Note: ** indicates statistical significance at the 5% level; and *** indicates statistical significance at the 1% level.

The downside risk in the present study is found to have a mean value of 1.2337 (S.D. = 0.3336), whereas the upside risk is found to have a mean value of 1.1271 (S.D. = 0.3287). Given that the mean value of downside risk is higher than that of upside risk, this clearly indicates that investors accept a discount when holding stocks with higher upside risk.

Table 1: Descriptive statistics

Variables	Mean	S.D	Q ₁	Median	Q ₃
$R_i - R_f$	0.0349	0.2049	-0.0569	0.0138	0.0885
$R_m - R_f$	-0.0247	0.3422	-0.2989	0.0572	0.2248
<i>HML</i>	-0.0322	0.1995	-0.6187	-0.0133	0.0857
<i>SMB</i>	-0.0111	0.1880	-0.0765	-0.0276	0.0279
<i>AQ</i>	0.0345	0.0388	0.0179	0.0272	0.0405
β^-	1.2337	0.3336	0.9894	1.2623	1.4983
β^+	1.1271	0.3287	0.8883	1.1434	1.3758
β	0.8567	0.2358	0.6828	0.8721	0.0361
$\beta^- - \beta^+$	0.1066***	0.1084	0.0489	0.1016***	0.1553

This table reports the descriptive statistics of the variables, including 'cost of capital' ($R_i - R_f$), 'excess market return' ($R_m - R_f$), the Fama-French 'three factors' (*HML* and *SMB*), 'accounting quality' (*AQ*), 'downside risk' (β^-), 'upside risk' (β^+), 'market risk' (β) and 'asymmetric risk' ($\beta^- - \beta^+$). Q₁ (Q₃) denotes the first (third) quartile.

Note: *** indicates statistical significance at the 1% level.

Another interesting finding from our analysis is that the standard deviations of both the upside risk and the downside risk are found to be higher than the standard deviation of market risk, thereby implying that market risk may be offset when ignoring asymmetric effect. The mean value of asymmetric market risk is found to be 0.1066 with a median value of 0.1016, significantly different from 0 at the 1 per cent level using the *t*-test (Wilcoxon signed-rank test) and clearly indicating the existence of an asymmetric effect.

Ten portfolios was formed to analyze whether there were differences in the level of risk between stocks with diverse characteristics. The portfolios (0 to 9) were equally distributed such that each contained 10 per cent of the total sample of firms, ranked according to their stock characteristics, with the first '0' (last '9') portfolio containing those firms with the lowest (highest) level of focal stock characteristics.

The difference between portfolio 9 and portfolio 0 is used to determine whether there are differences in the level of risk across stocks with diverse characteristics, and if so, whether there are linear changes in such risk. The results are reported in Table 2, which shows that the risk does indeed vary linearly with stock characteristics, and that such risk may be affected only by market size and accounting quality.

4.2 Two-Stage Analysis

4.2.1 The effects of accounting quality on risk

The examine of the effect of accounting quality on risk, with the regression model being specified as follows:

$$Y_{i,\tau} = \delta_0 + \delta_1 AQ_{i,\tau-1} + \delta_2 FL_{i,\tau-1} + \delta_3 OP_{i,\tau-1} + \delta_4 \ln(Size_{i,\tau-1}) + \varepsilon_{i,\tau}, \quad (4)$$

where $Y_{i,\tau}$ denotes the risk; and $AQ_{i,\tau}$ is the accounting quality for firm i in year τ . Drawing on the prior literature, financial leverage (FL), operating leverage (OL) and market value ($Size$) is used as the control variables. The ratio of the difference between financial liabilities and assets to market equity at the end of year τ is used as the proxy for financial leverage; the book value of assets divided by the market value of assets at the end of year τ is used as the proxy for operating leverage; and the total market value at the end of year τ is used as the proxy for firm size. In order to ensure that all investors have access to information at any time to enable them to assess risk, the explanatory variables are lagged by one year (Ng, (2011)).

The downside risk per unit of accounting quality, with a coefficient of 28.03 per cent, is larger than the market risk per unit of accounting quality, with a coefficient of 24.81 per cent, thereby providing support for our supposition that the effects of accounting quality on risk will be undervalued when ignoring the asymmetric effect in market risk.

Table 3: Effects of accounting quality on risk

Variables	Intercept	Accounting Quality	Financial Leverage	Operating Leverage	Size
<i>Downside Risk</i>	0.0599	0.2803***	-0.1571	-0.1357	-0.0904
<i>Upside Risk</i>	-0.0249	0.1163	-0.1779	-0.0211	-0.0531
<i>Asymmetric Risk</i>	-0.0537	0.1663**	0.0824	-0.0388	-0.7492
<i>Market Risk</i>	0.1303	0.2481***	-0.3608	-0.0896	0.4220

This table presents the results of the first stage of the two-stage analysis, which is the effect of accounting quality on risk, with the estimation procedure being as follows. The OLS regression is first of all used to obtain the regression coefficients for each stock, with the t-test then being used to examine whether the mean coefficient is significantly different from zero.

Note: ** indicates significance at the 5% level; and *** indicates significance at the 1% level

Furthermore, asymmetric market risk is found to have a significantly positive correlation with accounting quality, with a coefficient of 16.63 per cent, thereby indicating that the primary effect of total market risk on accounting quality may originate from downside risk; this also suggests that it plays a crucial role in the financial reporting decisions of managers. Although all of the control variables are found to be insignificantly different from 0, their signs are consistent with the prior studies (Mandelker & Rhee, (1984); Mandelbrot & Hudson, (2004); Penman et al., (2007)).

4.2.2 The effects of accounting quality on the cost of capital

Following Fama and French (1993), we examine the influence of risk on the cost of capital using the following regression:

$$r_{i,\tau} - r_{f,\tau} = \mu_0 + \mu_1 Risk_{i,\tau} + \mu_2 SMB_{i,\tau} + \mu_3 HML_{i,\tau} + u_{i,\tau}, \quad (5)$$

where $r_{i,t}$ is the stock return for firm i in year τ ; $r_{f,t}$ denotes the annual risk-free rate in year τ , proxied by the one-year time deposit interest rate of the Bank of Taiwan; and $Risk$ is the market risk, which comprises of upside market risk (β_i^+), downside market risk (β_i^-), systematic market risk (β) and asymmetric market risk ($Asy\beta$). The Fama-French factors of market size (SMB) and book-to-market value (HML) are included as the control variables, with their definitions being consistent with those described in Fama and French (1993).

The coefficients, which are reported in Table 4, are found to be 31.03 per cent for downside risk, -29.71 per cent for upside risk, 27.65 per cent for asymmetric risk and 6.68 per cent for market risk. With the exception of upside risk, which is found to be significantly negative, all of the remaining coefficients are found to be significantly and positively different from zero. These results are consistent with the findings of Ang et al. (2006), in which it was suggested that investors will tend to trade at a discount when holding stocks with higher upside risk, whilst demanding a greater risk premium when faced with higher downside risk.

Table 4: Effects of risk on the cost of capital

Variables	Model (1)	Model (2)	Model (3)
Intercept	-0.0878***	-0.0583***	-0.0813*
<i>Downside Risk</i>	0.3103***	—	—
<i>Upside Risk</i>	-0.2971***	—	—
<i>Asymmetric Risk</i>	—	0.2765***	—
<i>Market Risk</i>	—	—	0.0668
<i>SMB</i>	0.1197***	0.1531***	0.1108*
<i>HML</i>	0.7379***	0.8029***	0.7695***

This table presents the results of the second stage of the two-stage analysis, which is the effect of risk on the cost of capital, with the estimation procedure being as follows. The OLS regression is first of all used to obtain the regression coefficients for each stock, with the t-test then being used to examine whether the mean coefficient is significantly different from zero.

Note: * indicates significance at the 10% level; and *** indicates significance at the 1% level.

The results confirm the general supposition that the downside element of risk may well be regarded by investors as the only ‘real’ risk, essentially because most ‘normal’ investors are not punished when faced with potential upside risk. Both SMB and HML are also found to have positive correlations with the cost of capital, which is consistent with the findings of Fama and French (1993).

4.3 The Effects of Accounting Quality on the Cost of Capital through Risk

The regression coefficient on $AQ(\delta_1)$ for each firm is used to evaluate the risk per unit of accounting quality, with the results having been shown earlier in Table 4. Similarly, the regression coefficient, μ_1 , is used to evaluate the cost of capital per unit of risk, as shown earlier in Table 5. The average risk per unit of accounting quality is found to be 28.03 per cent for downside risk, 11.63 per cent for upside risk, 16.63 per cent for asymmetric risk and 24.81 per cent for market risk.

Furthermore, the annual average cost of capital is found to be 31.03 per cent for downside risk, -29.71 per cent for upside risk, 27.65 per cent for asymmetric market risk and 6.68 per cent for market risk. Following Ng (2011), the cost of capital for firm i , based upon accounting quality through risk, is defined as the product of the risk per unit of accounting quality, δ_1 in Equation (4), multiplied by the cost of capital per unit of risk, μ_1 in Equation (5), in each firm; this is obtained from a two-stage analysis, the results of which are reported in Table 5.

Table 5: Effects of accounting quality on the cost of capital through risk

Variables	<i>Risk Per Unit of Accounting Quality</i> (δ_1)	<i>Cost of Capital Per Unit of Risk</i> (μ_1)	<i>Cost of Capital</i> ($\delta_1 \times \mu_1$)
<i>Downside Risk</i>	0.2803	0.3103	0.0869
<i>Upside Risk</i>	0.1163	-0.2971	-0.0345
<i>Asymmetric Risk</i>	0.1663	0.2765	0.0459
<i>Market Risk</i>	0.2481	0.0668	0.0165

This table describes the impact of accounting quality on the cost of capital through risk, where total risk includes upside risk, downside risk, asymmetric risk and market risk. The cost of capital is defined as the product of the risk per unit of accounting quality, δ_1 in Equation (4), multiplied by the cost of capital per unit of risk, μ_1 in Equation (5).

As shown in Table 5, the values are found to be 8.69 per cent for downside risk, -3.45 per cent for upside risk, 4.59 per cent for asymmetric risk and 1.65 per cent for market risk. These findings provide further evidence that when the impact of asymmetric risk is ignored, the effects of accounting quality on the cost of capital through risk will be underestimated.

5. Conclusion

The theoretical studies of Lambert et al. (2007) and Armstrong et al. (2013) indicate that an asymmetric effect may exist in the linkage between accounting quality and the cost of capital. Using data on firms listed on the TSE, this study suggest that accounting quality has a positive association with asymmetric market risk, whilst asymmetric market risk is, in turn, found to be positively related to the cost of capital. This effectively verifies the prior supposition that the effects of accounting quality on the cost of capital through risk will be undervalued when ignoring the asymmetric effects.

The findings have the following implications for both investors and academic

researchers alike. Firstly, in wealth and portfolio management, asymmetric market risk is an important concept for investors with symmetrical beliefs; based upon asymmetric considerations, when investors are faced with risk, they should consider switching their securities holdings accord to their attitude to such risk. Secondly, for academic researchers, the paper provides early evidence to show that the effect of risk on accounting quality is likely to originate from downside risk, rather than upside risk, with asymmetric market risk potentially playing an important role in terms of shaping the financial reporting behavior of managers.

One of the limitations of this research is that market risk is only one of many potential linkages between accounting quality and cost of capital; thus, as noted by Ng (2011), no attempt should be made to generalize the results to the relationship between accounting quality and the overall cost of capital, because there are many other factors that may affect the cost of capital. Finally, if appropriate data are available, the use of other proxies for accounting quality is strongly encouraged in order to strengthen the empirical results reported in this study.

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