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The effect of quality of information on systematic risk

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A B S T R A C T

One of the primary concerns on stock market is the risk associated with securities. There are different attempts devoted to detect and reduce any existing risk and provide necessary action to reduce them as much as possible. In this paper, we study the relationship between quality of earnings and systematic risk as well as cost of capital. The proposed study of this paper uses the information of 150 firms listed on Tehran Stock Exchange and using multiple regression technique examines two hypotheses based on yearly information over the period 2007-2011. The results of our survey indicate that as the quality of earnings increase, the risk as well as the cost of capital decrease.

1. Introduction

During the past few years, there have been tremendous efforts on detecting different factors creating systematic risk in securities such as stocks, bonds, etc. Dechow and Dichev (2002) suggested a new technique for measuring the quality of working capital accruals as well as earnings. One role of accruals is to make changes on the recognition of cash flows over time so that the adjusted earnings better measure firm performance. However, accruals need assumptions and forecast of future cash flows. They argued that the quality of accruals and earnings was decreasing in the magnitude of estimation error in accruals and proposed an empirical measure of accrual quality as the residuals from firm-specific regressions of changes in working capital on past, present, and future operating cash flows. They reported that observable firm characteristics could be implemented as instruments for accrual quality and explained that their measure of accrual quality was positively associated earnings persistence.

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McNichols (2002) explained Dechow and Dichev (2002) model and characterized the innovation and limitations in this approach, and provided empirical evidence of measurement error in their empirical specification. McNichols (2002) adapted their model to evaluate the specification of the Jones' (1991) model and explained that this model could provide estimates of discretionary accruals which were substantially associated with cash flows. Acharya and Pedersen (2005) explicitly solved a simple equilibrium model with liquidity risk. In the proposed model, liquidity-adjusted capital asset pricing model, a security's required return depends on its expected liquidity. Besides, a persistent negative shock to a security's liquidity yields in low contemporaneous returns and high predicted future returns. The model presented a unified framework for understanding the different channels through which liquidity risk may influence asset prices.

Francis et al. (2005) investigated whether investors price accruals quality associated with earnings or not. They measured accruals quality (AQ) as the standard deviation of residuals from regressions associated current accruals to cash flows and reported that poorer AQ was related to larger expenses of debt and equity. Ng (2011) studied whether information quality influences the cost of equity capital through liquidity risk or not. Liquidity risk was the sensitivity of stock returns to unexpected changes in market liquidity. Ng reported that higher information quality was related to lower liquidity risk and that the reduction in expenses of capital due to this association was economically substantial. The study also detected that the negative association between information quality and liquidity risk was stronger in times of large shocks to market liquidity.

Kim and Qi (2010) examined whether and how earnings quality, measured as AQ, influences the cost of equity capital. Using two-stage cross-sectional regression tests, they detected that the AQ risk factor was substantially priced, after controlling for low-priced stocks. This result was robust in tests using individual stocks, different portfolio formations, and various beta estimations. They also showed that AQ and its pricing effect systematically changed with business cycles and macroeconomic variables. More specifically, this pricing effect was prominent in total AQ and innate AQ but not in discretionary AQ. The risk premium associated with AQ was created only in economic expansion but not in recession times. Poorer AQ firms were more vulnerable to macroeconomic shocks. The risk premium and the dispersion of AQ were also associated with future economic activity. Overall, their results suggested that AQ could contribute to the expenses of equity capital and that its pricing effect was associated with fundamental risk.

Lambert et al. (2007) investigated whether and how accounting information about a firm manifests in its expenses of capital, despite the forces of diversification. They built a model, which was consistent with the Capital Asset Pricing Model and explicitly allowed for multiple securities whose cash flows were correlated. They explained that the quality of accounting information could affect the cost of capital. They also demonstrated that this impact could go in either direction, but also derive conditions under which an increase in information quality leads to an unambiguous decline in the cost of capital. Lambert and Verrecchia (2010) analyzed the role of information in pricing and cost of capital in security markets characterized by imperfect competition among investors. They explained that the interaction between illiquid markets and asymmetric information could explain the cost of capital. Lang and Maffett (2011) explained transparency and liquidity uncertainty in crisis periods.

2. The proposed model

The proposed study of this paper considers two hypotheses: The first hypothesis examines the relationship between quality of information and systematic risk and the second hypothesis investigates whether there is any relationship between quality of information and cost of capital. In other words, we state,

1. Higher quality of information reduces the cost of capital.

2. Higher quality of information reduces the market risk.

We use accruals quality (AQ) as a good replacement of quality of information and adopts the method provided by Dechow and Dichev (2002) as follows,

$$\mathrm{TCA_{i,t}} = \alpha + \beta_1 \mathrm{CFO_{i,t-1}} + \beta_2 \mathrm{CFO_{i,t}} + \beta_3 \mathrm{CFO_{i,t+1}} + \beta_4(\Delta \mathrm{Sales_{i,t}} - \Delta \mathrm{AR_{i,t}}) + \beta_5 \mathrm{PPE_{i,t}} + \varepsilon_{i,t}, \quad (1)$$

where $\mathrm{TCA_{i,t}}$ is total accrual, which is calculated as follows,

$$\mathrm{TCA_{i,t}} = \frac{\Delta \mathrm{CA_{i,t}} - \Delta \mathrm{CL_{i,t}} - \Delta \mathrm{CASH_{i,t}} + \Delta \mathrm{STDEBT_{i,t}}}{\text{Average total assets between } t-1 \text{ and } t},$$

and here $\Delta \mathrm{CA_{i,t}}$ is the change in current assets between $t-1$ and t, $\Delta \mathrm{LA_{i,t}}$ is the change in current liabilities between $t-1$ and t, $\Delta \mathrm{CASH_{i,t}}$ is the change in cash holding between $t-1$ and t, $\Delta \mathrm{STDEBT_{i,t}}$ is current portion of loans received, $\Delta \mathrm{Sales_{i,t}}$ is the change in sales figures between $t-1$ and t, $\Delta \mathrm{AR_{i,t}}$ is the change in receivable accounts between $t-1$ and t, $\mathrm{PPE_{i,t}}$ is the net fix assets divided by average total assets between $t-1$ and t and finally $\varepsilon_{i,t}$ is the residuals. The cost of capital is calculated based on the method developed by Fama and French (1993) as follows,

$$R_{i,t} = \alpha_\circ + \alpha_1 MKT_{i,t} + \alpha_2 SMB_{i,t} + \alpha_3 HML_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where $R_{i,t}$ is the return and it calculated as follows,

$$R_{\mathrm{i,t}} = \frac{(P_{i,t} - P_{i,t-1}) + D_{i,t}}{P_{i,t-1}}, \quad (3)$$

where $P_{i,t-1}$ and $P_{i,t}$ are closing prices of asset i in two consecutive periods of $t-1$ and t and $D_{i,t}$ is total benefits given to shareholder including dividend. In this study we cluster different firms based on their book values (B) and market values (M) and their sizes of small (S) and big (B). Table 1 shows details of our clustering system,

Table 1
The summary of different clustering

	High (H)	Medium (M)	Large (L)
S	$S/_H$	$S/_M$	$S/_L$
B	$B/_H$	$B/_M$	$B/_L$

In Eq. (2) SMB represents the difference of returns between small and big firms and it is calculated as follows,

$$SMB = \frac{(S/_L + S/_M + S/_H)}{3} - \frac{(B/_L + B/_M + B/_H)}{3}. \quad (4)$$

High book to market minus low book to market (HML) is another ratio used in Eq. (2), which is calculated as follows,

$$HML = \frac{(S/_H + B/_H)}{2} - \frac{(S/_L + B/_L)}{2}. \quad (5)$$

Finally, Market (MKT) is the last variable used in Eq. (2) and we use market risk premium (β) used in capital asset pricing model (CAPM), (see Fama and French (1993) for more details). The proposed study of this paper uses the following to estimate it,

$$\varepsilon_{i,t+1}= \alpha_0 + \alpha_1 AQ_{i,t} + \alpha_2 BTM_{i,t} + \alpha_3 Capital\ intensy_{i,t} + \alpha_4 Sales\ groth_{i,t} + \alpha_5 Cash\ ratio_{i,t} + \alpha_6 Operating\ cycle_{i,t} + \alpha_7 Size_{i,t} + \alpha_8 Turnover_{i,t} + \nu_{i,t} \quad (6)$$

$$\beta_{i,t}^{M}= \alpha_0 + \alpha_1 AQ_{i,t} + \alpha_2 BTM_{i,t} + \alpha_3 Capital\ intensy_{i,t} + \alpha_4 Sales\ groth_{i,t} + \alpha_5 Cash\ ratio_{i,t} + \alpha_6 Operating\ cycle_{i,t} + \alpha_7 Size_{i,t} + \alpha_8 Turnover_{i,t} + \varepsilon_{i,t} \quad (7)$$

where $BTM_{i,t}$ is the ratio of book value to market value, $Capital\ intensy$ is the ratio of fixed assets to total assets, $Sales\ groth_{i,t}$is the sales growth, $Cash\ ratio$ is the difference between cash value from short term investment divided by total liabilities. $Operating\ cycle$ is calculated as follows,

$$Opcycle = [\frac{(AR_t+AR_{t-1})/2}{Sales/360}] + [\frac{(Inv_t+Inv_{t-1})/2}{COGS/360}] \quad (8)$$

where *AR, Inv* and *COGS* are receivable accounts, average inventory and cost of goods, respectively. In our survey, Size is calculated by multiplying the number of outstanding shares by closing price of the year. Finally, $Turnover$ is calculated as a ratio of total number of shares traded per day divided by total floating shares. The proposed study of this paper uses the information of 150 firms listed on Tehran Stock Exchange and using multiple regression technique examines two hypotheses on yearly information over the period 2007-2011.

3. The results

Table 2 demonstrates the summary of applying regression technique on Eq. (1).

Table 2
The summary of regression analysis

variable	coefficient	t-student	P-value
Intercept	0.086	7.26	0.000*
$CFO_{i,t-1}$	0.092	3.44	0.001*
$CFO_{i,t}$	-0.827	-35.19	0.000*
$CFO_{i,t+1}$	0.099	3.82	0.000*
$\Delta Rev_{i,t}$	0.156	11.2	0.000*
$PPE_{i,t}$	-0.047	-1.28	0.202

Chaw F-value = 2.55*(P<0.01), Fisher F-value = 13.28*(P<0.01), Husman statistics = 104.92*(P<0.01), R^2=71.92, Approach= fixed effect

As we can observe from the results of Table 2, independent variables can approximately describe 72% of the changes of dependent variable and the method we should use fixed effect. We have also looked at the co-variance among independent variables. Our investigation did not provide any evidence to believe there was a strong correlation among them. In addition, Kolmogorov-Smirnov has been performed to make sure whether the dependent variable is normally distributed or not. The statistics for total current accruals, return, the capital cost and β are 1.013(P-value=0.141), 1.485 (0.062), 0.491(0.697) and 0.784(0.324), respectively. Therefore, we can conclude that all data are normally distributed when the level of significance is five percent.

3.1. The first hypothesis

To examine the first hypothesis, we need to calculate the cost of capital and this task is accomplished by applying a linear regression on Eq. (2) as follows,

Table 3
The summary of regression analysis on cost of capital

variable	coefficient	t-student	P-value
Intercept	0.156	42.98	0.000*
$MKT_{i,t}$	0.004	1.48	0.139
$SMB_{i,t}$	0.0026	23.04	0.000*
$HML_{i,t}$	-0.0002	-0.454	0.649

Chaw F-value = 1.046(P=0.357), Fisher F-value = 3.423*(P<0.01), R^2=0.058, Approach= Pooled

We may use (ε) from the results of Table 3 to measure the cost of capital and we now use Eq. (3) to examine the first hypothesis.

Table 4
The summary of regression analysis for testing the first hypothesis

variable	coefficient	t-student	P-value
Intercept	-0.154	-2.7	0.007
$AQ_{i,t}$	-0.465	-6.51	0.000
$BTM_{i,t}$	0.044	1.95	0.051
$CapitalIntensy_{i,t}$	0.099	8.14	0.000
$Growth_{i,t}$	0.022	1.64	0.101
$Cash\ ratio_{i,t}$	0.086	2.054	0.04
$OpCycle_{i,t}$	-0.0002	-0.518	0.604
$Size_{i,t}$	0.007	1.44	0.149
$Turnover_{i,t}$	-2.86	-1.99	0.047

Chaw F-value = 0.99(P=0.519), Fisher F-value = 3.84*(P<0.01), R^2=0.399, Approach= Pooled

As we can observe from the results of Table 4, the regression analysis represent 40% of the changes on dependent variable. In addition, AQ is statistically meaningful, which means we can confirm the first hypothesis and conclude that there is a negative relationship between cost of capital and quality of earnings. In other words, when the quality of earnings increases, the cost of capital will decrease.

3.2. The second hypothesis

In order to test the second hypothesis of this paper we estimate Eq. (4) using regression technique and Table 5 summarizes the results of our survey,

Table 5
The summary of regression analysis on Eq. (4) for testing the second hypothesis

variable	coefficient	t-student	P-value
Intercept	-4.44	-2.98	0.003
$AQ_{i,t}$	-2.74	-4.11	0.000
$BTM_{i,t}$	0.235	0.989	0.323
$CapitalIntensy_{i,t}$	1.49	4.34	0.000
$Growth_{i,t}$	-0.038	-0.17	0.865
$Cash\ ratio_{i,t}$	1.49	2.57	0.01
$OpCycle_{i,t}$	-0.0002	-0.35	0.715
$Size_{i,t}$	0.336	3.55	0.000
$Turnover_{i,t}$	-4.54	0.431	0.666

Chaw F-value = 1.67(P=0.519), Fisher F-value = 3.65*(P<0.01), R^2=0.27, Approach= Fixed effect

The results of Table 5 clearly show that the regression analysis represent 27% of the changes on dependent variable. In addition, *AQ* is statistically meaningful, which means we can confirm the second hypothesis and conclude that there is a negative relationship between systematic risk and quality of earnings. In other words, when the quality of earnings increases, the systematic risk will decrease.

4. Conclusion

In this paper, we have presented an empirical investigation to study the effect of earnings quality of cost of capital as well as systematic risk. The proposed model of this paper has been implemented among some 150 stocks listed on Tehran Stock Exchange over the period 2007-2011. Our investigation have confirmed that as the quality of earnings increases we may expect lower cost of capital and lower systematic risk. The results are consistent with earlier reported by Dechow and Dichev (2002) and McNichols (2002).

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