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Cost of capital, audit and earnings quality under financial crisis: A global empirical investigation

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ABSTRACT

This paper investigates the cost of capital and the changes of audit quality and earnings management influencing on it due to financial crisis of 2008. Using linear regression analysis, 137,091 firm-year observations from 18 advanced countries worldwide which are categorized into three clusters as per level investor protection based on country classification of Leuz (2010) are used in the sample. The results show that the global financial crisis of 2008 has had positive impact on the cost of equity capital for all clusters and the cost of debt for clusters 1 and 2. The cost of equity is negatively associated with firms that are audited by Big Four auditors and have an audit committee in all clusters, and with firms that switch auditors in cluster 2. Firms that are audited by Big Four auditors in cluster 1, firms with a modified audit report in cluster 2 and firms that have an audit committee in cluster 3 have a negative association with the cost of debt. This study also shows that the association between earnings quality attributes and cost of capital is significantly negative before and during the crisis. Overall, our findings offer crucial insights to post crisis management, auditors, regulators and accounting standard setters in stabilizing investors' confidence and enhancing firm growth after the 2008 financial crisis.

1. Introduction

The recent financial crisis that started in the USA in 2007 has had severe effects on every aspect of every economy globally regardless of their distance or openness (Bedford, 2008). However, the level and the depth of these effects diversified among markets and countries which were transmitted through different channels. Based on Bedford (2008), international financial leverage is one of the affecting channels that include debt and equity which in turn are the factors that directly affect cost of capital. It is obvious that cost of capital plays an effective role in business decisions and therefore is one of the main factors affected by financial crisis in every market. Hence, this paper offers insights of how the financial crisis of 2008 influence the cost of capital on listed countries of advanced countries worldwide.

The first attempt of exploration the impact of the global financial crisis on the cost of capital come from Mokhova (2011). She indicated that financial crisis that broke out in 2008 has had a big negative influence on the world economy.

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A lot of firms close to bankruptcy and financial performances hardly decreased. Regarding to cost of capital, the main consequences were lower return of investment, less liquidity, reevaluation of risks, difficulty to find long term loans and another financial resources, higher spreads, low availability of credit, new gearing and need of state guarantee. Thus, Mokhova (2011) concluded that the financial crisis of 2008 had great influence on the cost of capital from the side of cost of equity and from the side of cost of debt.

Moreover, in previous literature, several papers have investigated the factors that influence the cost of capital. Particularly, the relationship between earnings quality and cost of capital has been examined thoroughly. Affleck-Graves et al. (2002) found that firms with relatively less predictable earnings have a higher cost of equity capital. Bhattacharya et al. (2003) resulted that an increase in overall earnings opacity has a positive effect in the cost of equity. Although, Francis et al. (2004) found that seven attributes of earnings (accruals quality, persistence, predictability, smoothness, value relevance, timeliness and conservatism) are significantly associated with cost of equity capital, however, McInnis (2010) found no such pattern examining the association between earnings smoothness and cost of equity. In addition, Francis et al. (2005) showed that firms with lower accruals quality have significantly larger earnings-price ratios relative to their industry peers. Chan et al. (2009) supported that ex ante conservatism is associated with lower costs of equity, whereas ex post conservatism is associated with higher costs of equity capital. Moreover, Valipour and Moradbeygi (2011) found a negative and meaningful relationship between debt and earnings quality.

Another factor that influence the cost of capital is audit quality. According to Slovin et al. (1990) and Datar et al. (1991), auditing plays a key role in every organization, since (a) the errors are located and the true and fair information about the business is available, (b) frauds are discovered which increase the moral values of the staff, (c) efficiency improves, (d) the auditing accounts increase the credit standing of any firm and help the sole traders their business is going on properly, (e) the investors' rights are protected, and (f) creditors are protected. Thus, consistent with Khurana and Raman (2004), Mansi et al. (2004) and Pittman and Fortin (2004), there is negative association between audit quality and cost of capital. Particularly, Khurana and Raman (2004) found that firms that are audited by Big 4 is associated with a lower ex ante cost of equity capital in the U.S. but not in Australia, Canada, or the U.K. Similarly, Mansi et al. (2004), Pittman and Fortin (2004) and Causholli and Knechel (2012) suggested that firms that use a Big 4 auditor have a lower cost of debt. The findings of Dhaliwal et al. (2008) show that non-audit fees are directly related to the cost of debt for investment-grade issuers and audit fees has no affect on the cost of debt for non-investment-grade firms. In addition, Fernando et al. (2010) concluded that auditor size, auditor industry specialization and auditor tenure are negatively associated with small client firm's cost of equity capital. Chen et al. (2011) claimed that the effect of Big 8 auditors on cost of equity capital are no consistent across SOEs and NSOEs. Particularly, cost of equity capital is significantly lower for NOSEs audited by Top 8 auditors than for NSOEs audited by non-Top 8 auditors, but not for SOEs audited by Top 8 and non-Top 8 auditors.

Consistent with previous literature, the object of this paper is the cost of capital and the changes of audit quality and earnings management influencing on it due to the financial crisis of 2008 on listed firms of advanced countries worldwide over the period of 2005–2012. Particularly, we expect that the global financial crisis of 2008 increase the cost of capital, and regarding the affect of audit quality on cost of capital, we expect a negative sign. In addition, we expect a statistically negatively reliable association between each earnings quality attribute considered individually and measures of the cost of capital.

The choice of the use of 137,091 firm-year observations from 18 largest economies of the world as a sample has three main advantages. First, we investigate the 55% of global market capitalization which enhance the reliability and authenticity of the findings. Second, according to Filip and Raffournier (2012), the findings of most of cited papers are questionable since they are conducted as a single country level. Thus, we overleap this geographically closeness by using 18 largest economies in our research. Third, it is the first paper that investigate the cost of capital in light of the country categorization as per level investor protection based on country classification of Leuz (2010) (cluster 1 with strong shareholder protection and legal enforcement, cluster 2 with better legal enforcement and cluster 3 with weak shareholder protection and legal enforcement).

The findings of the study indicate that the different characteristics of three clusters lead to differences in the effects of global financial crisis of 2008, audit and earnings quality on cost of capital. In general, we find that global financial crisis of 2008 has positive association with (a) cost of equity capital for all clusters, and (b) cost of debt for clusters 1 and 2. Concerning the cost of equity capital, when it is measured by using the constant growth Gordon model introduced by Palea (2007), is negatively associated with firms that audited by Big Four auditors in clusters 1 and 2, and when it is measured by using the PEG approach introduced by Easton (2004), is negatively associated with firms that audited by Big Four auditors and have an audit committee in all clusters, and firms that switch auditor in cluster 2. Similarly, firms that audited by Big Four auditors and audit fees in cluster 1, firms with a modified audit report in cluster 2 and firms that have an audit committee in cluster 3 have a negative association with cost of debt capital. Regarding the association between earnings quality attributes individually and cost of capital, is significant and with a negative sign in almost all measures of earnings quality and in all clusters in pre- and crisis period.

The remaining paper is organized as follows. Section 2 presents the literature review, Section 3 shows the research hypotheses, Section 4 describes the datasets, Section 5 discusses the empirical findings and Section 6 presents the conclusions and implications of the study.

2. Literature review

2.1. Cost of capital and earnings quality

Conversely, there are papers that examined whether the earnings quality is associated with cost of capital, there are also some literature that examined the effect of financial crisis or economic turmoil or economic recession on earnings quality and cost of capital separately. However, there is a lack of consistent evidence in the accounting literature on the effect of an exogenous shock, like financial crisis of 2008, on the relationship between earnings quality and cost of capital.

DeFond and Jiambalvo (1994) and DeAngelo et al. (1994) addressed whether the debt covenant violation influence earnings management. The results indicated that in the years of debt covenant violation, managers use earnings management to convinced creditors to show a good financial picture of firm.

Affleck-Graves et al. (2002) explored the relation between earnings predictability and bid-ask spread, measure of cost of equity. The findings suggested that firms with relatively less predictable earnings have a higher cost of equity capital than comparable firms with more predictable earnings streams, ceteris paribus.

Similarly with Affleck-Graves et al. (2002) and Jayaraman (2008) investigated the association between cost of equity capital, measured by bid-ask spreads, with earnings quality, measured by earnings smoothness. The results indicated that bid-ask spreads and the probability of informed trading are higher both when earnings are smoother than cash flows and also when earnings are more volatile than cash flows.

Bhattacharya et al. (2003) related three country level dimensions of reported accounting earnings (earnings aggressiveness, loss avoidance and earnings smoothing) to country level cost of capital measures. The results indicated that an increase in overall earnings opacity in a country is linked to an economically significant increase in the cost of equity.

Francis et al. (2004) examined the relation between the cost of equity capital and seven attributes of earnings: accruals quality, persistence, predictability, smoothness, value relevance, timeliness and conservatism. Using cross sectional regression test, cost of equity is significantly associated with each of earnings attributes. However, using conditional tests, ex ante cost of equity is no longer associated with smoothness, timeliness and conservatism; predictability is inversely associated with the cost of equity; and accruals quality, persistence and value relevance continue to be strongly positively associated with the cost of equity. Moreover, from the side of realized returns, they concluded that earnings quality has the largest cost of capital effect of all of the earnings attributes, and persistence has statistically positive but smaller effects.

Francis et al. (2005) investigated the relationship between accruals quality and the costs of debt and equity capital. Using a large sample for 32-year period (1970–2001), they found that firms with poorer accruals quality have higher ratios of interest expense to interest-bearing debt and lower debt ratings than firm with better accruals quality. Similarly, in terms of the cost of equity, they showed that firms with lower accruals quality have significantly larger earnings-price ratios relative to their industry peers.

Chan et al. (2009) supported evidence about the linkage between different dimensions of accounting conservatism (ex ante and ex post conservatism) and the cost of equity capital. Using UK non-financial firms during the period 1987–1999, they found that ex ante conservatism is associated with higher quality of accounting information and lower costs of equity, whereas ex post conservatism is associated with lower quality of accounting information and higher costs of equity capital.

McInnis (2010) examined the link between cost of capital and earnings smoothness. Whilst the projected target prices of Value Line analysts (Brav et al., 2005; Francis et al., 2005) indicated there is a negative relation between imputed cost of capital and earnings smoothness, he found no such pattern. He resulted that there is no relation between earnings smoothness and average stock returns over the period from 01/01/1975 to 31/12/2006. He offered evidence that the inverse relation between earnings smoothness and implied cost of capital results primarily from optimistic bias in analysts' long-term earnings projections.

Using discretionary accruals, Rodriguez-Perez and Van Hemmen (2010) investigated the relationship between debt and earnings management. Consistent with the transparency hypothesis, they found that for less-diversified firms, debt reduces positive discretionary accruals, whereas in relatively more-diversified firms the impact of debt becomes positive. Moreover, the results indicated that marginal increases in debt provide incentives for managers to manipulate earnings, and diversification provides the needed context for this accounting practice to be possible.

Valipour and Moradbeygi (2011) studied the relationship between corporate debt financing and earnings quality and the dominance of positive influence of debt or negative influence of debt on earnings quality. Testing 81 firms listed in Tehran Stock Exchange during the years 2005–2009, they found that there is negative and meaningful relationship between debt and earnings quality.

2.2. Cost of capital and audit quality

It is widely accepted that auditing plays a key role in the presence of moral hazard and information asymmetry by asserting investors that the financial statements prepared by managers are credible and genuinely (Jensen and Meckling, 1976; Titman and Trueman, 1986; Slovin et al., 1990; Datar et al., 1991). Specifically, without auditing, investors will be skeptical of the financial information that are published which, in turn, lead them to refuse to invest or to demand a high rate of return to balance the risk of potential expropriation of their capital by managers. Consequently, the higher the audit quality, the lower the cost of equity (Khurana and Raman, 2004; Mansi et al., 2004; Pittman and Fortin, 2004).

Previous literature, generally examined the association between audit quality and cost of capital. Researchers found that Big 4 audits are of higher quality than non-Big 4 audits. For instance, Teoh and Wong (1993) concluded that clients of Big 4 auditors have higher ERCs than clients of non-Big 4 auditors, whereas Becker et al. (1998) and Francis et al. (1999) claimed that use of Big 4 auditor is associated with smaller discretionary accruals. Based on and expanding these research, Khurana and Raman (2004), Mansi et al. (2004) and Pittman and Fortin (2004) documented that the use of Big 4 auditor (high audit quality) have a lower cost of capital than other firms.

Specifically, utilizing an estimable proxy for financial reporting credibility – the ex ante cost of equity capital – to examine whether Big 4 auditors are perceived as providing higher quality audits (relative to non-Big 4 auditors) in the U.S. and in the less litigious (but economically similar) environments in other Anglo-American countries during the 1990–99 period, Khurana and Raman (2004) found that a Big 4 audit is associated with a lower ex ante cost of equity capital for auditees in the U.S. but not in Australia, Canada, or the U.K. They suggested that it is litigation exposure rather than brand name reputation protection that drives perceived audit quality.

Mansi et al. (2004) examined the relation between auditor quality and the cost of debt financing for firms with a fiscal year ending between January 1974 and March 1998. They concluded that (a) auditor quality and tenure are negatively and significantly related to the cost of debt financing, (b) the relation between auditor characteristics and the cost of debt is most pronounced in firms with debt that is non-investment grade, and (c) both the insurance and information role of audits are economically significant to the cost of debt.

Consistent with Mansi et al. (2004) and Pittman and Fortin (2004) found that firms that use a Big 4 auditor have a lower cost of debt.

Causholli and Knechel (2012) extended previous research by Pittman and Fortin (2004) by considering how auditor quality relates to the capital cycle and industry of the firm. Using a sample of U.S. initial public offerings (IPOs) from 1986 to 1998, they observed that firms that are young at the time of an IPO pay higher interest rates and auditor quality plays a significant role in lowering the cost of debt financing.

Using a sample of 560 new debt issues from 2001 to 2003, Dhaliwal et al. (2008) examined the relation between audit, non-audit, and total auditor fees and firms' cost of debt. They found evidence that non-audit fees are directly related to the cost of debt for investment-grade issuers. On contrary, they found no evidence that auditors fees directly affect the cost of debt for non-investment-grade firms.

Fernando et al. (2010) investigated the impact of certain audit quality attributes, namely auditor size, auditor industry specialization and auditor tenure on client firm's cost of equity capital. Using data from 1990 to 2004, they claimed that whilst auditor size, auditor industry specialization and auditor tenure are negatively associated with the client firm's cost of equity capital, this effect is limited only to small client firms.

Chen et al. (2011) examined the effect of audit quality on cost of equity capital for two groups of Chinese firms: state-owned enterprises (SOEs) and non-state-owned enterprises (NSOEs). They indicated that this effect is not uniform across SOEs and NSOEs. Particularly, cost of equity capital is significantly lower for NOSEs audited by Top 8 auditors than for NSOEs audited by non-Top 8 auditors, but not for SOEs audited by Top 8 and non-Top 8 auditors.

Karjalainen (2011) investigated the value relevance of the perceived audit quality in terms of who audits in the pricing of debt capital for privately-held firms by examining a large sample of privately-held Finnish firms from 1999 to 2006. The results showed that privately-held firms audited by Big 4 auditors and those audited by more than one responsible auditor have a lower cost of debt capital than other firms.

3. Research hypotheses

3.1. Cost of equity capital and audit quality under financial crisis of 2008

Dimson et al. (2003) and Palliam (2005) claimed that the equity risk premium is the incremental return that shareholders require from holding risky equities rather than risk-free-securities. Thus, equity risk premium drives future equity returns and is the key determinant of the cost of equity capital. In the same notion, King (2009) stated that equity risk premium is important for understanding changes in cost of equity capital estimates.

As equity risk premium varies with time, depending on the information available at the moment, financial crisis had a great effect on it. The fall of markets in 2008 led to decreasing of firms' equities therefore their market capitalization which in turn increased equity risk premium caused by instability and as a result the cost of equity capital (Mokhova, 2011).

In parallel, King (2009) found that the onset of financial crisis has rise equity beta which led to the increase of equity risk premium and therefore an increase of cost of equity capital.

Consequently, based on previous literature, we test the following hypothesis:

H_{1a}. Firms are likely to exhibit higher cost of equity in years of GFC.

Wallace (1980) stated that auditing lessen the extent of investors price-protect their investments resulting in a reduced stock price which implies a higher cost of equity capital by playing three roles – monitoring, information and insurance.

The first role of auditing suggests that auditing ensures better use of resources entrusted to the agent by the principal (Wallace, 1980). Thus, more effective monitoring should reflect a lower cost of equity capital.

The second role of auditing based on information asymmetries. It is commonly accepted that higher audit quality results in better information quality (Teoh and Wong, 1993; Balsam et al., 2003; Dunn and Mayhew, 2004; Fernando et al., 2010) which in turn implies lower cost of equity capital (Botosan et al., 2004; Francis et al., 2004).

Lastly, the effect of audit quality on cost of equity capital also varies with the insurance role played by audit firms (Wallace, 1980). The information risk is reduced because the audit firm provides another source of compensation in the event of failure of the firm (Menon and Williams, 1994).

Based on Easley and O'Hara (2004), Fernando et al. (2010) and Chen et al. (2011) we state the following hypothesis:

H_{1b}. There is negative association between cost of equity capital and audit quality.

Based on previous literature, the research hypotheses (H_{1a}, H_{1b}) that are presented above are examined using the regression Eq. (1). This model uses the same variables as Chow and Rice (1982), Krishnan (2003), Easton (2004), Francis et al. (2005), Naser et al. (2006), Palea (2007), Johl et al. (2007), Fernando et al. (2010), McInnis (2010), Chen et al. (2011) and Hassan and Naser (2013). We run regression model (1) two times for each dimension of $Cost\ of\ equity_{k,it}$ representing by constant growth model specified by Palea (2007) and PEG approach specified by Easton (2004), respectively.

$$Cost\ of\ equity_{k,it} = \beta_0 + \beta 1 EG_{it} + B_2 DPO_{it} + \beta_3 Debt_{it} + \beta_4 LnMV_{it} + \beta_5 BM_{it} + \beta_6 Volume_{it} + \beta_7 Beta_{it} + \beta_8 CFO_{it} + \beta_9 LnLEV_{it} + \beta_{10} LnBM_{it} + \beta_{11} Size_{it} + \beta_{12} Firm_{it} + \beta_{13} Sicode_{it} + \beta_{14-18} AQ_{k,it} + \beta_{19} Crisis_{it} + \varepsilon_{it} \quad (1)$$

wherein: $Cost\ of\ equity_{k,it}$ is a dimension of cost of equity ($k = 1, 2$); $Cost\ of\ equity_{1,it}$ is measured by using the constant growth Gordon model introduced by Palea (2007, p. 17) and takes the following form:

$$Costofequity_{1,it} = \frac{E(EPS_{t+1})}{P_t}$$

wherein: $E(EPS_{t+1})$ is the median of the expected earnings per share given by financial analysts for period $t+1$; P_t is the share price in period t and is computed as an average of prices ported 15 days before and one month after the end of the period; $Cost\ of\ equity_{2,it}$ is measured by using the PEG approach introduced by Eton (2004, p. 81) and takes the following form:

$$Cost\ of\ equity_{2,it} = \sqrt{\frac{EPS_2 - EPS_1}{P_0}}$$

wherein: EPS_2 two year ahead mean analyst forecast per share; EPS_1 is one year ahead mean analyst forecast per share; P_0 is fiscal year end price per share; EG_{it} is corporate annual earnings growth per share; DPO_{it} is corporate dividends announced for the year scaled by earnings for the year available for dividends; $Debt_{it}$ is corporate total debt scaled by total assets; $LnMV_{it}$ is corporate natural log of market value of equity; BM_{it} is book-to-market ratio estimated as book value of equity divided by market value of equity; $Volume_{it}$ is trading volume divided by total shares outstanding; $Beta_{it}$ is systematic risk measured by stock beta; CFO_{it} is cash flow from operations divided by total assets; $LnLEV_{it}$ is natural log of debt to assets ratio; $LnBM_{it}$ is natural log of book to market ratio; $Size_{it}$ is corporate size estimated as natural logarithm of total assets; $Firm_{it}$ is a dummy variable that takes 1 if the firm is classified as small (market value of equity of firm is lower than the median market value of equity) and 0 if t firm is classified as large (market value of equity of firm is larger than the median market value of equity); $Sicode_{it}$ is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise; $AQ_{k,it}$ is a dimension of audit quality ($k = 1, 2, 3, 4, 5$); $Audit_{1,it}$ is a dummy variable that takes 1 if the firm is a Big Four (Deloitte Touche Tohmatsu, PriceWaterHouseCooper, Ernst & Young, KPMG) and 0 otherwise; $Afees_{2,it}$ is audit fees; $Switch_{3,it}$ is auditor switch that takes 1 if firm switch auditor and 0 otherwise; $Qual_{4,it}$ is modified audit report opinion that takes 1 if the audit opinion is qualified and 0 otherwise; $Audexist_{5,it}$ is the existence of audit committee that takes 1 if the firm has an audit committee and 0 otherwise; *Crisis* is a dummy variable that takes 0 if an observation falls in the pre crisis period (2005–2007) and 1 if it falls in crisis period (2008–2012); ε_{it} is the error term.

3.2. Cost of equity capital and earnings quality under financial crisis of 2008

Francis et al. (2004) examined extensively the association between earnings quality attributes and implied cost of equity. They found a statistically reliable association between each earnings quality attribute considered individually and measures of the cost of equity capital. Moreover, they claimed that accounting-based earnings attributes (accruals quality, persistence, predictability and smoothness) have a greater effect on costs of equity capital than do market-based earnings attributes (value relevance, timeliness and conservatism).

In the same notion, Bhattacharya et al. (2003) found evidence of an association between country-level earnings quality measures including earnings aggressiveness, loss avoidance, and earnings smoothing, and country-level measures of total cost of equity capital.

Bhattacharya et al. (2003) and Francis et al's (2004) results are supported from Francis et al. (2005) and Chan et al. (2009).

Specifically, Francis et al. (2005) indicated that as the quality of accruals decrease, so too does the amount investors are willing to pay for a dollar of earnings, implying a higher cost of equity capital for firms with lower accruals quality.

Chan et al. (2009) claimed that ex ante (ex post) conservatism is associated with higher (lower) earnings quality and lower (higher) costs of equity capital. In other words, a more ex ante conservative firm is likely to provide more reliable

information to equity investors for investment decisions which in turn lead to firm having lower cost of equity capital. On contrary, a more ex post conservative firm is likely to provide more susceptible to opportunistic management discretion which in turn lead to firm having higher cost of equity capital.

In contrast to the results of Francis et al. (2004) and McInnis (2010) documented that there is no negative association between imputed cost of capital and earnings smoothness in U.S. stock market. He offered evidence that the inverse relation between earnings smoothness and implied cost of equity capital results primarily from optimistic bias in analysts' long-term earnings projections.

Consequently, based on the findings of Francis et al. (2004), we develop the following hypothesis:

H_2. There is a meaningful negative association between earnings quality and cost of equity.

To test the research hypotheses (H_2), regression Eq. (2) is used. The variables that are used in this model are the same as Kormedi and Lipe (1987), Ohlson (1995), Dechow et al. (1995), Basu (1997), Wald (1999), McNichols (2002), Leuz et al. (2003), Francis et al. (2004), Easton (2004), Francis et al. (2005), Burgstahler et al. (2006), Kothari et al. (2005), Palea (2007), Roychowdhury and Watts (2007), Chan et al. (2009), Fernando et al. (2010), McInnis (2010) and Chen et al. (2011). Likewise, testing the Eq. (1), we run regression Eq. (2) two times for each period of time and simultaneously two times for each dimension of $Cost\ of\ equity_{k,it}$ representing by constant growth model specified by Palea (2007) and PEG approach specified by Easton (2004), respectively.

$$\begin{aligned} Costofequity_{\kappa,it} &= \beta_0 + \beta_1 Beta_{it} + \beta_2 Size_{it} + \beta_3 BM_{it} + \beta_4 Leverage_{it} + \beta_5 CFOV_{it} + \beta_6 SV_{it} + \beta_7 NER_{it} + \beta_8 Collateral_{it} \\ &+ \beta_9 Non-debt_{it} + \beta_{10} Growth_{it} + \beta_{11} Uniqueness_{it} + \beta_{12} Sicode_{it} + \beta_{13} Profitability_{it} + \beta_{14} Liquidity_{it} \\ &+ \beta_{15-24} EQ_{k,it} + \varepsilon_{it} \end{aligned} \tag{2}$$

wherein: $Cost\ of\ equity_{k,it}$ is a dimension of cost of equity ($k = 1, 2$); $Cost\ of\ equity_{1,it}$ is measured by using the constant growth Gordon model introduced by Palea (2007) as shown in Eq. (1); $Cost\ of\ equity_{2,it}$ is measured by using the PEG approach introduced by Easton (2004) as shown in Eq. (1); $Beta_{it}$ is systematic risk measured by stock beta; $Size_{it}$ is corporate size estimated as natural logarithm of total assets; BM_{it} is book-to-market ratio estimated as book value of equity divided by market value of equity; $Leverage_{it}$ is financial leverage estimated as total debt divided by total assets; $CFOV_{it}$ is cash flow from operations volatility estimated as standard deviation of cash flow from operations scaled by total assets; SV_{it} is sales volatility estimated as standard deviation of sales revenues scaled by total assets; NER_{it} is negative earnings realization estimated as a dummy variable that takes 1 if firm reports negative income before extraordinary items and 0 otherwise; $Collateral_{it}$ is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets; $Non\text{-}debt_{it}$ is non-debt tax shields estimated as the ratio of depreciation divided by total assets; $Growth_{it}$ is growth estimated as the ratio of capital expenditures divided by total assets; $Uniqueness_{it}$ is uniqueness estimated as the ratio of R&D divided by sales; $Sicode_{it}$ is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise; $Profitability_{it}$ is profitability estimated by using the return on assets; $Liquidity_{it}$ is liquidity estimated by using the quick ratio; $EQ_{k,it}$ is a dimension of earnings quality attributes ($k = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10$); $EQ_{1,it}$ is ex post conservatism estimated by Basu (1997). The study uses the value of slope coefficient β_3 of the following regression model which reflects the incremental sensitivity of earnings to bad news compared to good news, commonly referred as asymmetric timeliness or ex post conservatism:

$$X_{it}/P_{it-1} = \beta_0 + \beta_1 R_{it} + \beta_2 DR_{it} + \beta_3 R_{it} * DR_{it} + \varepsilon_{it}$$

wherein: X_{it} is the earnings per share; P_{it-1} is the lagged price per share; R_{it} is the contemporaneous annual returns; DR_{it} is a dummy variable which takes 1 if R_{it} is negative and 0 otherwise; ε_{it} is the error term; $EQ_{2,it}$ is ex ante conservatism measured by the opening ratio of book value of equity to market of equity (book-to-market ratio) that estimated by Beaver and Ryan (2000) and takes the following form:

$$Book\ to\ market_{it} = \frac{Book\ value\ of\ firm_{it}}{Market\ value\ of\ firm_{it}}$$

$EQ_{3,it}$ is value relevance estimated by Ohlson (1995). The study uses the value relevance as the explanatory power ($R^2_{i,t}$ of the following regression model:

$$P_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 BV_{it} + \varepsilon_{it}$$

wherein: P_{it} is stock price; E_{it} is earnings per share; BV_{it} is book value per share; ε_{it} is the error term; $EQ_{4,it}$ is accruals quality estimated by Dechow et al. (1995). The study uses the residuals of the following regression model as accruals quality:

$$TA_{it} = \beta_0 + \beta_1 \left(\frac{1}{A_{it-1}}\right) + \beta_2(\Delta REV_{it} - \Delta REC_{it}) + \beta_3 GPPE_{it} + \varepsilon_t$$

wherein: TA_{it} is the accruals, scaled by lagged total assets, where accruals equal the year-to-year change in non-cash current assets minus current liabilities (excluding short-term debt and income taxes payable) minus depreciation; A_{it-1} is lagged total assets; ΔREV_{it} is annual change in revenues, scaled by lagged total assets; ΔREC_{it} is account receivables, scaled by

lagged total assets; $GPPE_{it}$ is gross property, plant and equipment, scaled by lagged total assets; ε_{it} is the error term; $EQ_{5,it}$ is accruals quality estimated by McNichols (2002). The study uses the standard deviation of estimated residual ($\sigma(\hat{\varepsilon}_{it})$) of the following regression model as accruals quality:

$$\frac{TCA_{it}}{TotalAsset_{it-1}} = \beta_0 + \beta_1 \frac{CFO_{it-1}}{TotalAsset_{it-1}} + \beta_2 \frac{CFO_{it}}{TotalAsset_{it-1}} + \beta_3 \frac{CFO_{it+1}}{TotalAsset_{it-1}} + \beta_4 \frac{\Delta REV_{it}}{TotalAsset_{it-1}} + \beta_5 \frac{PPE_{it}}{TotalAsset_{it-1}} + \varepsilon_{it}$$

wherein; TCA_{it} is total current accruals. Total current accruals compromise of annual change in current assets minus annual change in current liabilities minus annual change in cash plus annual change in debt in current liabilities plus annual change in taxes payable; $TotalAsset_{it-1}$ is lagged total assets; CFO_{it} is cash flow from operations. Cash flow from operations compromise the net income before extraordinary items minus total accruals; ΔREV_{it} is annual change in revenues, scaled by lagged total assets; PPE_{it} is property, plant, and equipment; ε_{it} is the error term; $EQ_{6,it}$ is accruals quality estimated by Kothari et al. (2005). Like Dechow's et al. (1995) model, the study uses the residuals of the following regression model as accruals quality:

$$TA_{it} = \beta_0 + \beta_1 \left(\frac{1}{A_{it-1}}\right) + \beta_2(\Delta REV_{it} - \Delta REC_{it}) + \beta_3 GPPE_{it} + \beta_3 ROA_{it-1} + \varepsilon_{it}$$

wherein: TA_{it} is accruals, scaled by lagged total assets, where accruals equal the year-to-year change in non-cash current assets minus current liabilities (excluding short-term debt and income taxes payable) minus depreciation; A_{it-1} is lagged total assets; ΔREV_{it} is annual change in revenues, scaled by lagged total assets; ΔREC_{it} is account receivables, scaled by lagged total assets; $GPPE_{it}$ is gross property, plant and equipment, scaled by lagged total assets; ROA_{it-1} is lagged return on assets; ε_{it} is the error term; $EQ_{7,it}$ is earnings persistence estimated by Kormedi and Lipe (1987). This study uses firm-level regressions of current earnings on last year's earnings to estimate the slope coefficient (β_1 estimates of earnings persistence as follows:

$$\frac{Earn_{it}}{TotalAssets_{it}} = \beta_0 + \beta_1 \frac{Earn_{i(t-1)}}{TotalAsset_{i(t-1)}} + \varepsilon_{it}$$

wherein; $Earn_{it}$ is net income before extraordinary items; $Earn_{i(t-1)}$ is lagged net income before extraordinary items; ε_{it} is the error term; $EQ_{8,it}$ is earnings predictability estimated by Francis et al. (2004). This study uses the square root of the error variance $\sigma^2(\hat{\varepsilon}_{it})$ from Kormedi and Lipe's (1987) model of earnings persistence as earnings predictability as follows:

$$\sqrt{\sigma^2(\hat{\varepsilon}_{it})}$$

wherein: $\sigma^2(\hat{\varepsilon}_{it})$ is estimated error variance, calculated from Kormedi and Lipe's (1987) model of earnings persistence; $EQ_{9,it}$ is loss avoidance analysis estimated by Burgstahler et al. (2006). This study uses the frequency of small profits compared to small losses to measure loss avoidance. Thus, higher (lower) value of frequency of small profits compared to small losses the greater (lesser) is loss avoidance.

$$\frac{SPNI_{it}}{SNNI_{it}}$$

wherein; $SPNI_{it}$ is small positive income, defined as NI_{it}/A_{it-1} between 0% and 1%; $SNNI_{it}$ is small negative income, defined as NI_{it}/A_{it-1} between 0% and −1%; $EQ_{10,it}$ is earnings smoothness estimated by Leuz et al. (2003) and takes the following form:

$$\frac{\sigma(CFO_{it}/TotalAssets_{it-1})}{\sigma(Earn_{it}/TotalAssets_{it-1})}$$

wherein: σ is standard deviation; CFO_{it} is cash flow from operations. Cash flow from operations compromise the net income before extraordinary items minus total accruals; $TotalAsset_{it-1}$ is lagged total assets; $Earn_{it}$ is net income before extraordinary items; ε_{it} is the error term.

3.3. Cost of debt and audit quality under financial crisis of 2008

Except from the cost of equity, the cost of debt is the second component of the cost of capital (Francis et al., 2004). Likewise, the cost of debt was expected to increase in periods of financial crisis considering the increase in absolute rates on corporate bonds and the spread between Treasury and corporate bonds. Mokhova (2011) claimed that the recent world recession have impact on the availability of credit and as a result on the cost of debt capital.

Consequently, based on previous literature, we assume the following hypothesis:

H_{3a}. Firms are likely to exhibit higher cost of debt in years of GFC.

There is a debate how audit quality and cost of debt are associated. Fortin and Pittman (2007) were unable to find support for the value relevance of Big Four in the context of pricing of public debt issues of privately-held US firms. However, Pittman

and Fortin (2004) stated that choosing a Big Six auditor which can reduce debt-related monitoring costs by enhancing the credibility of financial statements enables young firms to lower their interest rates. Moreover, Blackwell et al. (1998) showed that auditing is relevant in decreasing the cost on bank debt of privately-held US firms. Likewise, Kim et al. (2011) showed that auditing and Big Four are associated with decreased borrowing costs. Recently, Causholli and Knechel (2012) suggested that firms that are young at the time of an IPO pay higher interest rates and auditor quality plays a significant role in lowering the cost of debt financing. Additionally, Karjalainen (2011) found that the interest rate of debt capital for privately-held companies is inversely associated with perceived audit quality. On contrary, Dhaliwal et al. (2008) provided support that non-audit fees are positively related to firms' cost of debt, but only for investment-grade firms.

Therefore, based on previous literature, we hypothesize as follows:

H_{3b}. There is negative association between cost of debt and audit quality.

The research hypotheses (H_{3a}, H_{3b}) that are presented above are examined using the regression Eq. (3). This model uses the same variables as Chow and Rice (1982), Krishnan (2003), Fortin and Pittman (2007), Francis et al. (2005), Dhaliwal et al. (2008), Karjalainen (2011) and Causholli and Knechel (2012).

$$\begin{aligned} Costofdebt_{it} = {} & \beta_0 + \beta_1 Profitability_{it} + \beta_2 BM_{it} + \beta_3 Leverage_{it} + \beta_4 Size_{it} + \beta_5 IntCov_{it} + \beta_6 \mathrm{Ln}NIBE_{it} + \beta_7 LnMVE_{it} \\ & + \beta_8 Collateral_{it} + \beta_9 NEGEQ_{it} + \beta_{10} Sicode_{it} + \beta_{11} Risk_{it} + \beta_{12-16} AQ_{k,it} + \beta_{17} Crisis_{it} + \varepsilon_{it} \end{aligned} \quad (3)$$

wherein: $Cost\ of\ debt_{it}$ is cost of debt measured by the ratio of interest expense in year $t+1$ to average interest bearing debt outstanding during years t and $t+1$ (see Francis et al., 2005, p. 308); $Profitability_{it}$ is profitability estimated by using the return on assets; BM_{it} is book-to-market ratio estimated as book value of equity divided by market value of equity; $Leverage_{it}$ is financial leverage estimated as total debt divided by total assets; $Size_{it}$ is corporate size estimated as natural logarithm of total assets; $IntCov_{it}$ is interest coverage estimated as the ratio of earnings before interest and taxes (EBIT) divided by the interest expenses; $LnNIBE_{it}$ is the natural log of net income before extraordinary items; $LnMVE_{it}$ is the natural log of market value of equity; $Collateral_{it}$ is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets; $NEGEQ_{it}$ is the negative book equity which takes the value of 1 if the book value of equity is negative and 0 otherwise; $Sicode_{it}$ is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise; $Risk_{it}$ is the credit risk measured as the ratio of standard deviation of cash flow from operations to average of total assets during years $t-1$ and t; $AQ_{k,it}$ is a dimension of audit quality ($k = 1, 2, 3, 4, 5$); $Audit_{1,it}$ is a dummy variable that takes 1 if the firm is a Big Four (Deloitte Touche Tohmatsu, PriceWaterHouseCooper, Ernst & Young, KPMG) and 0 otherwise; $Afees_{2,it}$ is audit fees; $Switch_{3,it}$ is auditor switch that takes 1 if firm switch auditor and 0 otherwise; $Qual_{4,it}$ is modified audit report opinion that takes 1 if the audit opinion is qualified and 0 otherwise; $Audexist_{5,it}$ is the existence of audit committee that takes 1 if the firm has an audit committee and 0 otherwise; $Crisis$ is a dummy variable that takes 0 if an observation falls in the pre crisis period (2005–2007) and 1 if it falls in crisis period (2008–2012); ε_{it} is the error term.

3.4. Cost of debt and earnings quality under financial crisis of 2008

There is previous evidence that cost of debt has positive and negative effect on earnings quality. Even though there is negative relationship between earnings quality and cost of debt, Valipour and Moradbeygi (2011) showed that the relationship was positive (negative) at low (high) levels of debt.

Moreover, consistent with Valipour and Moradbeygi (2011) and Francis et al. (2005) showed that poorer accruals quality is associated with larger cost of debt.

On contrary, Fung and Goodwin (2013) found that short-term debt is positively associated with earnings management. In similar manner, Rodriguez-Perez and Van Hemmen (2010) concluded that marginal increase in debt provide incentives for managers to manipulate earnings, and diversification provides the needed context for this accounting practice to be possible.

Thus, based on previous literature, we expect that managers have incentives to hold information with high quality to reduce cost of debt:

H_4. There is a meaningful relationship between cost of debt and earnings quality.

We use the following regression Eq. (4) to examine the hypothesis 4 (H_4). The variables that are used in this model are the same as Kormedi and Lipe (1987), Dechow et al. (1995), Ohlson (1995), Basu (1997), McNichols (2002), Leuz et al. (2003), Francis et al. (2004,2005), Burgstahler et al. (2006), Kothari et al. (2005), Roychowdhury and Watts (2007), Jiang (2008). We run regression Eq. (4) two times for each research period.

$$\begin{aligned} Costofdebt_{it} = {} & \beta_0 + \beta_1 Leverage_{it} + \beta_2 Size_{it} + \beta_3 Profitability_{it} + \beta_4 IntCov_{it} + \beta_5 LnNIBE_{it} + \beta_6 EPS_{it} + \beta_7 \Delta EPS_{it} \\ & + \beta_8 Profit_{it} + \beta_9 Incr_{it} + \beta_{10} CFO_{it} + \beta_{11} RND_{it} + \beta_{12-21} EQ_{k,it} + \varepsilon_{it} \end{aligned} \quad (4)$$

wherein: $Costofdebt_{it}$ is cost of debt measured as shown in Eq. (3); $Leverage_{it}$ is financial leverage estimated as total debt divided by total assets; $Size_{it}$ is corporate size estimated as natural logarithm of total assets; $Profitability_{it}$ is profitability estimated by using the return on assets; $IntCov_{it}$ is interest coverage estimated as the ratio of earnings before interest and

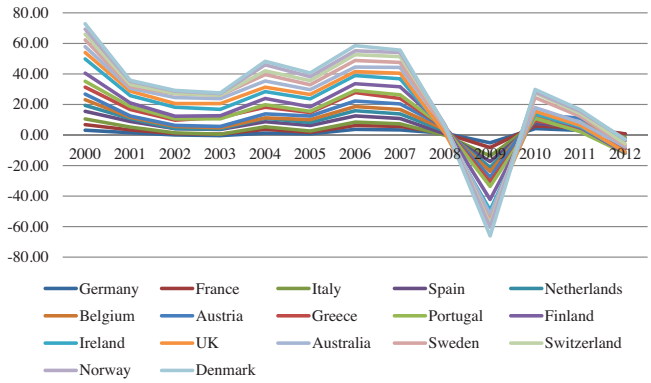

Fig. 1. Effect of the financial crisis of 2008 on real GDP(%). *Note*: This figure shows the annual percentage growth rate of GDP at market prices based on constant local currency of examining developed countries in our dataset.
Source: Worldbank.

taxes (EBIT) divided by the interest expenses; $LnNIBE_{it}$ is the natural log of net income before extraordinary items; EPS_{it} earnings per share before extraordinary items; ΔEPS_{it} is the change in earnings per share before extraordinary items been year t and $t-1$; $Profit_{it}$ is a dummy variable that takes 1 if firm's earnings per share before extraordinary items is greater than or equal to 0 and 0 otherwise; $Incr_{it}$ is a dummy variable that takes 1 if firm's earnings per share before extraordinary items in year t is greater than or equal to that of year $t-1$ and 0 otherwise; CFO_{it} is cash flow from operations divided by total assets; RND_{it} is R&D expense deflated by total assets; $EQ_{k,it}$ is a dimension of earnings quality attributes (k = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10); $EQ_{1,it}$ is ex post conservatism estimated by Basu (1997) as shown in Eq. (3); $EQ_{2,it}$ is ex ante conservatism estimated by Roychowdhury and Watts (2007) as shown in Eq. (3); $EQ_{3,it}$ is value relevance estimated by Ohlson (1995) as shown in Eq. (3); $EQ_{4,it}$ is accruals quality estimated by Dechow et al. (1995) as shown in Eq. (3); $EQ_{5,it}$ is accruals quality estimated by McNichols (2002) as shown in Eq. (3); $EQ_{6,it}$ is accruals quality estimated by Kothari et al. (2005) as shown in Eq. (3); $EQ_{7,it}$ is earnings persistence estimated by Kormedi and Lipe (1987) as shown in Eq. (3); $EQ_{8,it}$ is earnings predictability estimated by Francis et al. (2004) as shown in Eq. (3); $EQ_{9,it}$ is loss avoidance analysis estimated by Burgstahler et al. (2006) as shown in Eq. (3); $EQ_{10,it}$ is earnings smoothness estimated by Leuz et al. (2003) as shown in Eq. (3); ε_{it} is the error term.

4. Datasets

Our empirical tests are based on a sample of firms that are publicly listed from 2005 to 2012 in all advanced countries[1] as are classified by International Monetary Fund (IMF). The data are extracted from DataStream, WorldBank and Osiris database.

Like Barth et al. (2008), from the initial sample of 652,512 firm-years observations, we excluded all firms that have no applied International Accounting Standards (IAS) until 2005, which is the first year of examining period. Particularly, the sample is reduced by 260,936 firm-year observations.

Further, we dropped all financial institutions such as banks, insurance and real estate companies and other financial institutions reducing the sample to 282,776 firm-year observations (see Leuz et al., 2003; Boonlert-U-Thai et al., 2006; Francis and Wang, 2008; Houque et al., 2012).

Firm-years observations for which data are missing need to be excluded. Thus, the sample is further reduced by 146,396 firm-year observations.

The countries of the sample are classified into three clusters defined by Leuz (2010) and categorized into outsider economies with strong outsider protection and legal enforcement (cluster 1),[2] insider economies with better legal enforcement systems (cluster 2)[3] and insider economies with weaker legal enforcement systems (cluster 3).[4] However, Cyprus, Czech Republic, Estonia, Iceland, Luxemburg, Malta, Slovak Republic and Slovenia is be excluded from the sample since they were not classified by Leuz (2010). Consequently, our final sample consists of 137,091 firm-year observations.

Concerning previous literature, the pre financial crisis period refers to the financial years 2005–2007 and the financial crisis period refers to the financial years 2008–2012.

According to Ranciere et al. (2006), there is negative impact of financial crisis on GDP growth. In fact, examining Fig. 1, it can be stated that year 2008 can be considered as the first year of the crisis since it is appeared a decline of annual GDP growth of seventeen examining countries in 2008. France (−0.10%), Italy (−1.20%), Greece (−0.20%), Ireland (−3.00%), UK

[1] Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Luxemburg, Malta, The Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom and United States.
[2] *Cluster 1*: Australia, Ireland, United Kingdom.
[3] *Cluster 2*: Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Spain, Sweden, Switzerland.
[4] *Cluster 3*: Greece, Italy, Portugal.

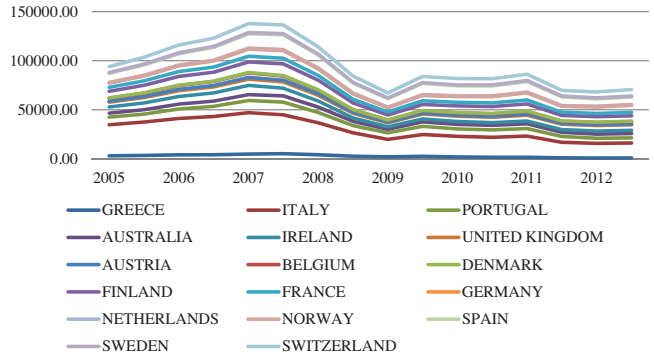

Fig. 2. Effect of the financial crisis of 2008 on Stock Exchange Indexes. *Note*: This figure shows the annual change of stock exchange indexes of examining developed countries in our dataset.
Source: www.worldtrading.com.

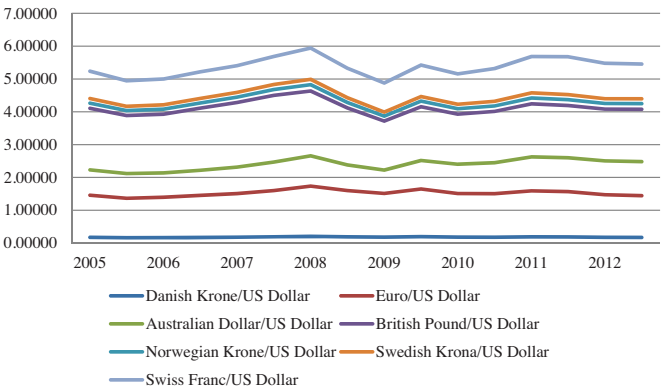

Fig. 3. Effect of the financial crisis of 2008 on foreign currencies. *Note*: This figure shows the annual change of foreign currencies of examining developed countries in our dataset.
Source: www.worldtrading.com.

(−1.00%), Sweden (−0.60%), and Denmark (−0.80%) presents negative GDP growth rate in 2008 except from Australia which presents negative GDP growth rate in 2009.

Chowdhry and Goyal (2000) claimed that the two most visible defining characteristics of a country that experiences a financial crisis are a large drop in the value of its currency and a large drop in its traded equity prices. In fact, based on Figs. 2 and 3, year 2008 can be considered as the first year of the crisis since all countries of the sample appeared a currency devaluation and a decline in stock market exchange indexes. Particularly, Danish krone was devaluated by 7.73%, Euro by 7.73%, Australian dollar by 15.43%, British pound by 12.13%, Norwegian krone by 13.08%, Swedish krona by 11.84%, and Swiss franc by 5.67%. Furthermore, the stock markets in all examining countries plunged as the global financial crisis was transmitted from U.S. in all over the world. Consequently, stock exchanges in Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom was decreased by 20.72%, 36.14%, 33.35%, 24.90%, 30.38%, 20.61%, 18.22%, 37.05%, 44.93%, 26.79%, 29.77%, 30.06%, 29.98%, 21.89%, 22.14%, 13.25%, and 17.55%, respectively.

The research hypotheses are tested using the OLS regression analysis. However, before employing regression analysis, the data should be tested for normality, linearity, homoscedasticity and multicollinearity (Fox, 1997; Harrel, 2001; Cohen et al., 2003). The datasets that are used in this paper met all above requirements for each cluster.

5. Empirical findings

5.1. Descriptive statistics

Descriptive statistics for the variables used in our analysis are given in Table 1. Table 1a compares the continues variables among three clusters during pre- and crisis period. Consistent with King (2009) and Mokhova (2011), the mean of the cost of equity capital under constant growth model introduced by Palea (2007) (hereafter *Cost of equity*$_1$), the mean of cost of equity capital under PEG ratio method introduced by Easton (2004) (hereafter *Cost of equity*$_2$) and the mean of cost of debt (hereafter *Cost of debt*) were increased during the crisis period for all clusters. However, the increase of cost of capital was

Table 1a
Descriptives statistics.

Variable (s)	CLUSTER 1	
	Pre-crisis period (2005–2007) $N = 12,390$	Crisis period (2008–2012) $N = 21,410$
$Costofequity_1$	−1.87481 (162.56313)	−0.52436 (25.70534)
$Costofequity_2$	0.17239 (0.52555)	0.18398 (0.64631)
Costofdebt	0.47487 (49.74353)	0.50014 (0.00369)
EG	10567.40464 (1137686.16743)	55.22456 (2261.58408)
DPO	−0.85418 (68.72426)	−5.92867 (870.63728)
Debt	0.18171 (0.47320)	0.88402 (50.39115)
LnMV	10.20606 (5.02279)	9.38127 (5.30120)
BM	0.30644 (5.55192)	0.38220 (14.41335)
Volume	17.82673 (415.20934)	8.65882 (90.66876)
Beta	0.54720 (0.54062)	0.59177 (0.51268)
CFO	−0.08162 (4.67890)	−2.50837 (340.54630)
LnLEV	−1.37359 (1.61861)	−1.16633 (1.61388)
LnBM	−0.76019 (0.86648)	−0.34815 (0.89073)
Size	4.50698 (2.02029)	4.19305 (2.30732)
Afees	20734.65916 (1134574.47745)	9056.81467 (158385.13877)
Leverage	0.18171 (0.47320)	0.88402 (50.39115)
CFOV	2.07190 (4.19526)	97.49202 (326.29953)
SV	4.78684 (10.48824)	8.54860 (19.60734)
Collateral	0.42216 (0.28983)	0.36304 (0.29403)
Non-debt	0.03910 (0.12552)	0.03627 (0.40570)
Growth	0.06271 (0.11428)	0.12942 (8.09853)
Uniqueness	11.27077 (215.33137)	23.51380 (465.81727)
Profitability	378.09607 (42549.49852)	−12.54456 (293.28788)
Liquidity	3.09581 (13.54184)	3.34898 (13.25813)
IntCov	10.40589 (909.48639)	−0.14412 (11.68408)
LnNIBE	5.29430 (5.53341)	4.34640 (5.49077)
LnMVE	0.42885 (2.08088)	−0.23086 (2.28710)
Risk	−0.03842 (0.40992)	−0.05879 (0.84259)
EPS	−3.64029 (290.55099)	−3.42023 (278.40231)
ΔEPS	0.02480 (301.37957)	0.26804 (337.97890)
RND	0.24550 (0.26229)	0.23650 (0.27511)
EQ_1	0.06526 (0.27200)	1.52752 (2.03959)
EQ_2	−0.00896 (0.78357)	−0.00027 (0.05346)
EQ_3	0.98406 (0.27897)	0.93111 (0.36641)
EQ_4	4.80592 (4.25499)	1.84581 (1.48268)
EQ_5	4.05460 (3.16579)	1.76553 (1.32841)
EQ_6	1.95610 (1.22312)	1.68369 (0.66995)
EQ_7	0.13481 (0.73938)	0.07507 (1.19639)
EQ_8	0.61437 (53.36920)	1.13903 (2.96714)
EQ_9	−0.28699 (6.55433)	−0.71969 (45.98632)
EQ_{10}	2.48379 (0.31461)	2.39597 (1.82404)

Variable (s)	CLUSTER 2	
	Pre-crisis period (2005–2007) $N = 35,004$	Crisis period (2008–2012) $N = 62,595$
$Costofequity_1$	−4.55275 (420.01292)	−1.94485 (372.23817)
$Costofequity_2$	0.18669 (0.86378)	0.19549 (1.14327)
Costofdebt	0.00070 (1.31658)	0.00094 (0.09459)
EG	7815.38887 (958009.04701)	847.11731 (85266.61796)
DPO	0.96989 (77.76151)	0.99434 (101.03503)
Debt	0.81415 (65.93634)	8.04714 (4.85607)
LnMV	2.45912 (2.23901)	1.75475 (2.39302)
BM	0.27096 (13.12886)	3.61345 (6.28408)
Volume	189.11333 (3969.28895)	90.59559 (1611.22006)
Beta	0.23106 (0.38718)	0.21583 (0.37301)
CFO	−0.09219 (6.00118)	−0.91617 (199.29393)
LnLEV	−1.52023 (1.59706)	−1.31931 (1.57836)
LnBM	−0.81168 (0.88675)	−0.38547 (0.93312)
Size	5.36687 (2.03850)	5.06704 (2.37773)
Afees	50931.66192 (5893825.16176)	37331.20995 (1399095.20763)
Leverage	0.81415 (65.93634)	1.02373 (56.46808)

Table 1a (*Continued*)

Variable (s)	CLUSTER 2	
	Pre-crisis period (2005–2007) *N* = 35,004	Crisis period (2008–2012) *N* = 62,595
CFOV	4.23362 (4.25239)	77.54710 (183.58835)
SV	1.53326 (1.30569)	6.69628 (10.57870)
Collateral	0.46614 (0.27638)	0.42507 (4.60523)
Non-debt	0.03989 (0.08246)	0.04249 (0.32194)
Growth	0.07533 (2.39147)	0.08396 (4.89553)
Uniqueness	3.78024 (136.49393)	8.01891 (312.65593)
Profitability	−82.74952 (7062.06122)	2291.75379 (508111.82962)
Liquidity	3.51975 (197.05728)	3.10182 (106.71092)
IntCov	0.08296 (118.92356)	0.69796 (82.65696)
LnNIBE	7.50321 (5.91370)	6.21970 (6.14999)
LnMVE	2.45912 (2.23901)	1.75475 (2.39302)
Risk	−0.09076 (8.30296)	−0.05990 (7.10137)
EPS	−63.58824 (9097.39406)	−0.78805 (745.29085)
ΔEPS	19.69606 (2131.27075)	4.88898 (950.79099)
RND	0.25959 (2.44253)	0.25579 (0.42256)
EQ_1	1.20480 (1.79400)	1.94221 (0.23383)
EQ_2	1.98117 (366.13579)	2.15694 (3.62458)
EQ_3	0.69830 (0.12550)	0.062887 (0.24588)
EQ_4	189.04120 (294.67424)	37.06603 (63.75815)
EQ_5	189.05010 (294.66818)	14.91213 (13.74274)
EQ_6	42.72452 (34.18607)	11.56243 (19.58890)
EQ_7	9.07381 (17.73054)	0.46587 (1.21752)
EQ_8	0.72947 (362.15035)	1.64340 (0.12208)
EQ_9	−0.19944 (107.55657)	−0.27808 (106.88760)
EQ_{10}	0.57332 (0.46190)	0.56297 (0.76872)

Variable (s)	CLUSTER 3	
	Pre-crisis period (2005–2007) *N* = 2232	Crisis period (2008–2012) *N* = 3460
$Costofequity_1$	−30.47627 (0.14711)	−15.72832 (887.71247)
$Costofequity_2$	24.50089 (0.33654)	30.18324 (0.42556)
Costofdebt	0.00039 (0.00552)	0.00047 (0.00549)
EG	64.92345 (581.09952)	30.05844 (661.70716)
DPO	2.05389 (63.39625)	0.92619 (29.21749)
Debt	0.28193 (0.29762)	0.34494 (1.12881)
LnMV	10.59599 (4.58488)	10.00623 (4.42277)
BM	0.57091 (1.39613)	1.05934 (7.74974)
Volume	5.23308 (36.63784)	2.49146 (6.20867)
Beta	0.62248 (0.39571)	0.59286 (0.38858)
CFO	0.03726 (0.11587)	0.03463 (0.12510)
LnLEV	−1.28069 (1.01709)	−1.10143 (1.01078)
LnBM	−0.45312 (0.73443)	0.13996 (0.86856)
Size	5.03811 (1.77750)	4.90369 (2.02437)
Afees	16334.14023 (35857.68002)	14963.75347 (305149.25599)
Leverage	0.28193 (0.29762)	0.34494 (1.12881)
CFOV	0.11181 (0.02848)	0.10970 (0.02679)
SV	0.56908 (0.12963)	0.58360 (0.14247)
Collateral	0.45116 (0.24150)	0.40221 (0.24799)
Non-debt	0.03377 (0.03185)	0.03456 (0.03385)
Growth	0.04285 (0.05771)	0.03371 (0.05092)
Uniqueness	0.79320 (2.75549)	1.55076 (27.45551)
Profitability	2.95363 (10.21219)	−0.36699 (11.91367)
Liquidity	1.11804 (3.75996)	158.71792 (3222.84557)
IntCov	0.02327 (3.82871)	80.18846 (3652.26538)
LnNIBE	6.46701 (4.92801)	4.66094 (5.19500)
LnMVE	1.21306 (1.32240)	0.44763 (1.47560)
Risk	0.03998 (0.10020)	0.03526 (0.10913)
EPS	3.67835 (163.62847)	−25.98813 (1172.18447)
ΔEPS	−1.76424 (69.72024)	−0.49253 (1365.96069)
RND	0.29892 (0.22139)	0.27465 (0.22733)
EQ_1	1.00224 (0.86711)	1.81918 (1.22759)
EQ_2	0.00124 (0.03245)	0.00141 (0.11605)
EQ_3	0.79142 (0.25238)	0.71751 (0.24811)

Table 1a (*Continued*)

Variable (s)	CLUSTER 3	
	Pre-crisis period (2005–2007) $N = 2232$	Crisis period (2008–2012) $N = 3460$
EQ_4	5.33738 (0.06318)	2.27862 (0.10122)
EQ_5	5.33112 (0.06247)	2.27062 (0.09517)
EQ_6	2.32850 (0.16726)	1.14606 (0.06326)
EQ_7	1.35409 (0.30865)	1.17300 (1.42998)
EQ_8	0.99962 (0.01807)	1.14289 (1.99891)
EQ_9	0.01183 (0.30431)	−0.17650 (7.94656)
EQ_{10}	1.19262 (0.27774)	1.09653 (0.52522)

Note: This table presents the means of examining continuous variables in pre- and crisis period for all clusters. $Costofequity_1$ is cost of equity measured by using the constant growth Gordon model introduced by Palea (2007), $Costofequity_2$ is cost of equity measured by using the PEG approach introduced by Easton (2004), *Costofdebt* is cost of debt measured by the ratio of interest expense in year $t+1$ to average interest bearing debt outstanding during years t and $t+1$, *EG* is corporate annual earnings growth per share, *DPO* is corporate dividends announced for the year scaled by earnings for the year available for dividends, *Debt* is corporate total debt scaled by total assets, *LnMV* is corporate natural log of market value of equity, *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Volume* is trading volume divided by total shares outstanding, *Beta* is systematic risk measured by stock beta, *CFO* is cash flow from operations divided by total assets, *LnLEV* is trading volume divided by total shares outstanding, *LnBM* is natural log of book to market ratio, *Size* is corporate size estimated as natural logarithm of total assets, *Afees* is audit fees, *Leverage* is financial leverage estimated as total debt divided by total assets, *CFOV* is dash flow from operations volatility estimated as standard deviation of cash flow from operations scaled by total assets, *SV* is sales volatility estimated as standard deviation of sales revenues scaled by total assets, *Collateral* is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets, *Non-debt* is non-debt tax shields estimated as the ratio of depreciation divided by total assets, *Growth* is growth estimated as the ratio of capital expenditures divided by total assets, *Uniqueness* is uniqueness measured as the ratio of R&D divided by sales, *Profitability* is profitability measured by using the return on assets, *Liquidity* is liquidity measured by using the quick ratio, *IntCov* is interest coverage estimated as the ratio of earnings before interest and taxes (EBIT) divided by the interest expenses, *LnNIBE* is natural log of net income before extraordinary items, *LnMVE* is natural log of market value of equity, *Risk* is credit risk estimated as the ratio of standard deviation of cash flow from operations to average of total assets during years $t-1$ and t, *EPS* is earnings per share before extraordinary items, ΔEPS is change in earnings per share before extraordinary items between year t and $t-1$, *RND* is R&D expense deflated by total assets, EQ_1 is ex post conservatism which is estimated based on Basu (1997), EQ_2 is ex ante conservatism which is estimated based on Beaver and Ryan (2000), EQ_3 is value relevance which is estimated based on Ohlson (1995), EQ_4 is accruals quality which is estimated based on Dechow et al. (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_6 is accruals quality which is estimated based on Kothari et al. (2005), EQ_7 is earnings persistence which is estimated based on Kormedi and Lipe (1987), EQ_8 is earnings predictability which is estimated based on Francis et al. (2004), EQ_9 is loss avoidance analysis which is estimated based on Burgstahler et al. (2006), EQ_{10} is earnings smoothness which is estimated based on Leuz et al. (2003). Standard deviation appears in the parentheses.

more severe for countries in cluster 3, which are characterized by low level of investor protection. Particularly, for cluster 1 the mean of $Costofequity_1$ was increased from −1.87481 to −0.52436, the mean of $Cost\ of\ equity_2$ was increased from 0.17239 to 0.18398 and the mean of *Cost of debt* was increased from 0.47487 to 0.50014. In parallel, the mean of $Cost\ of\ equity_1$ was increased from −4.55275 to −1.94485, the mean of $Cost\ of\ equity_2$ was increased from 0.18669 to 0.19549 and the mean of *Cost of debt* was increased from 0.00070 to 0.00094 for cluster 2. For cluster 3 the mean of $Cost\ of\ equity_1$ was increased from −30.47657 to −15.72832, the mean of $Cost\ of\ equity_2$ was increased from 24.50089 to 30.18324 and the mean of *Cost of debt* was increased from 0.00039 to 0.00047.

The results of Table 1a reveal an increase in conservatism (ex post and ex ante) (hereafter EQ_1 and EQ_2, respectively), accruals quality (measured by Dechow et al. (1995), McNichols (2002) and Kothari et al. (2005)) (hereafter EQ_4, EQ_5 and EQ_6, respectively), earnings predictability (hereafter EQ_8), loss avoidance (hereafter EQ_9), and a decrease in earnings persistence (hereafter EQ_7), value relevance (hereafter EQ_3), and earnings smoothness (hereafter EQ_{10}). However, the fluctuations in earnings quality attributes in pre- and crisis period differentiate due to the level of investor protection. Consistent with Burgstahler et al. (2006) and Boonlert-U-Thai et al. (2006), we find that cluster 1, which is characterized by high level of investor protection, appears lower EQ_1, EQ_2, EQ_4, EQ_5, EQ_6, EQ_8 and EQ_9, and higher EQ_3, EQ_7 and EQ_{10} in contrast with clusters 2 and 3 in both of research periods.

Moreover, Table 1a exhibits that all clusters appear higher *Debt*, *BM*, *LnBM*, *Leverage* and *Uniqueness* in crisis period. In the same period of time, all clusters, in contrast, appear lower *EG*, *LnMV*, *Volume*, *LnLEV*, *Size*, *Afees*, *SV*, *Collateral*, *LnNIBE*, *LnMVE* and *RND*.

Table 1b compares the discrete variables among three clusters during pre- and crisis period. The results suggest that all clusters present an increase of the existence of audit committee in crisis period. Furthermore, more firms reports negative income before extraordinary items in crisis period. On contrary, the frequency of firm's earnings per share before extraordinary items which was greater than or equal to 0 or to that of year $t-1$, decreased in crisis period.

It is trustworthy to mention that Table 1b appears an increase of the use of Big Four auditors from 7980 to 12,505 in cluster 1, from 26,307 to 44,564 in cluster 2, and from 1221 to 1955 in cluster 3. Additionally, we identify an increase of the appearance of a qualified audit opinion for all clusters (from 665 to 5808 in cluster 1, from 1130 to 1832 in cluster 2, and from 18 to 34 in cluster 3). Finally, the results of Table 1b shows an increase of the firms that switch auditors from pre- to crisis period (from 534 to 1710 in cluster 1, from 693 to 8610 in cluster 2, and from 510 to 650 in cluster 3).

Table 1b
Descriptives statistics.

Variable (s)	CLUSTER 1	
	Pre-crisis period (2005–2007) *N* = 12,390	Crisis period (2008–2012) N = 21,410
Firm (=1)	6199 (50.03%)	10,708 (50.01%)
Sicode (=1)	1314 (10.61%)	2485 (11.61%)
Audit (=1)	7980 (64.41%)	12,505 (58.41%)
Switch (=1)	534 (4.31%)	1710 (7.99%)
Qual (=1)	665 (5.37%)	5808 (27.13%)
Audexist (=1)	2463 (19.88%)	4796 (22.40%)
NER (=1)	4603 (37.15%)	8687 (40.57%)
NEGEQ (=1)	605 (4.88%)	910 (4.25%)
Profit (=1)	7862 (63.45%)	12,906 (60.28%)
Incr (=1)	8296 (66.96%)	13,720 (64.08%)
Variable (s)	CLUSTER 2	
	Pre-crisis period (2005–2007) *N* = 35,004	Crisis period (2008–2012) *N* = 62,595
Firm (=1)	17,503 (50.01%)	31,300 (50.01%)
Sicode (=1)	2931 (8.37%)	4985 (7.96%)
Audit (=1)	26,307 (75.15%)	44,564 (71.19%)
Switch (=1)	693 (1.98%)	8610 (13.76%)
Qual (=1)	1130 (3.23%)	1832 (2.93%)
Audexist (=1)	7314 (20.89%)	16,067 (25.67%)
NER (=1)	9278 (26.51%)	20,826 (33.27%)
NEGEQ (=1)	1459 (4.17%)	2577 (4.12%)
Profit (=1)	25,879 (73.93%)	42,055 (67.19%)
Incr (=1)	23,543 (67.26%)	37,844 (60.46%)
Variable (s)	CLUSTER 3	
	Pre-crisis period (2005–2007) *N* = 2232	Crisis period (2008–2012) *N* = 3460
Firm (=1)	1116 (50.00%)	1730 (50.00%)
Sicode (=1)	108 (4.84%)	175 (5.06%)
Audit (=1)	1221 (54.70%)	1955 (56.50%)
Switch (=1)	510 (22.85%)	650 (18.79%)
Qual (=1)	18 (0.81%)	34 (0.98%)
Audexist (=1)	269 (12.05%)	535 (15.46%)
NER (=1)	520 (23.30%)	1388 (40.12%)
NEGEQ (=1)	67 (3%)	188 (5.43%)
Profit (=1)	1712 (76.70%)	2076 (60.00%)
Incr (=1)	1496 (67.03%)	1714 (49.54%)

Note: This table presents the firm-year observations of each examining discrete variable that takes 1 in pre- and crisis period for all clusters. *Firm* is a dummy variable that takes 1 if the firm is classified as small (market value of equity of firm is lower than the median market value of equity) and 0 if the firm is classified as large (market value of equity of firm is larger than the median market value of equity), *Sicode* is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise, *Audit* is a dummy variable that takes 1 if the firm is a Big Four (Deloitte Touche Tohmatsu, PriceWaterHouseCooper, Ernst & Young, KPMG) and 0 otherwise, *Switch* is auditor switch that takes 1 if firm switch auditor and 0 otherwise, *Qual* is modified audit report opinion that takes 1 if the audit opinion is qualified and 0 otherwise, *Audexist* is the existence of audit committee that takes 1 if the firm has an audit committee and 0 otherwise, *NER* is negative earnings realization estimated as a dummy variable that takes 1 if firm reports negative income before extraordinary items and 0 otherwise, *NEGEQ* is negative book equity which takes the value of 1 if the book value of equity is negative and 0 otherwise, *Profit* is a dummy variable that takes 1 if firm's earnings per share before extraordinary items is greater than or equal to 0 and 0 otherwise, *Incr* is a dummy variable that takes 1 if firm's earnings per share before extraordinary items in year t is greater than or equal to that of year $t-1$ and 0 otherwise.

5.2. Correlation analysis

Pearson correlation coefficients among all independent regression variables for each examining regression equation show a diversity among the clusters. However, for brevity, we only outline the correlations among test variables.

Examining the test variables in regression Eqs. (1) and (3), we report that in all clusters *Audit* is negatively correlated with *Switch*, *Qual* and positively correlated with *Afees* and *Audexist*; *Afees* is positively correlated with *Audexist*; *Switch* is negatively correlated with *Audexist* and positively correlated with *Crisis*; and *Audexist* is positively correlated with *Crisis*.

In addition, examining the test variables in regression Eqs. (2) and (4), we find that in crisis period, in all clusters, EQ_1 is correlated with EQ_3, EQ_4, EQ_5, EQ_6, EQ_7 and EQ_{10}; EQ_3 is correlated with EQ_4, EQ_5, EQ_6, EQ_7, EQ_8 and EQ_{10}; EQ_4 is correlated with EQ_5, EQ_7 and EQ_8; EQ_5 is correlated with EQ_7, EQ_8 and EQ_{10}; EQ_6 is correlated with EQ_8 and EQ_{10}; EQ_7 is correlated with EQ_8 and EQ_{10}; and EQ_8 is correlated with EQ_{10}. In parallel, in pre-crisis period, all clusters show a correlation among

Table 2a
Test of H_{1a} and H_{1b} ($Costofequity_1$ under financial crisis of 2008).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
BM	−0.259*** (0.046)	LnMV	−0.658* (0.624)	DPO	0.003* (0.201)
Size	1.735** (0.783)	LnLEV	0.872* (0.833)	LnLEV	7.222* (10.263)
Beta	0.399** (1.067)	Size	2.327** (1.422)	Size	3.569* (0.059)
Audit	−1.475* (1.301)	Audit	−0.740** (3.515)	Afees	0.0000* (0.0000)
Qual	2.030* (1.805)	Audexist	0.297** (3.475)	Qual	4.140* (97.733)
R^2	0.001	Crisis	2.563* (2.754)	R^2	0.001
F test	2.463***	R^2	0.0000	*F* test	0.251*
		F test	0.644*		

Note: This table shows the results of OLS regression analysis to test H_{1a} and H_{1b}, using $Costofequity_1$, for all clusters in pre- and crisis period. $Costofequity_1$ is cost of equity measured by using the constant growth Gordon model introduced by Palea (2007), *Crisis* is a dummy variable that takes 0 if an observation falls in the pre crisis period (2005–2007) and 1 if it falls in crisis period (2008–2012), *Audit* is a dummy variable that takes 1 if the firm is a Big Four (Deloitte Touche Tohmatsu, PriceWaterHouseCooper, Ernst & Young, KPMG) and 0 otherwise, *Afees* is audit fees, *Qual* is modified audit report opinion that takes 1 if the audit opinion is qualified and 0 otherwise, *Audexist* is the existence of audit committee that takes 1 if the firm has an audit committee and 0 otherwise, *DPO* is corporate dividends announced for the year scaled by earnings for the year available for dividends, *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Beta* is systematic risk measured by stock beta, *LnLEV* is trading volume divided by total shares outstanding, *Size* is corporate size estimated as natural logarithm of total assets, *LnMV* is corporate natural log of market value of equity. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

Table 2b
Test of H1a and H1b (Costofequity2 under financial crisis of 2008).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
LnMV	0.019*** (0.002)	BM	−0.0000* (0.0000)	Debt	0.027*** (0.006)
BM	−0.022*** (0.0000)	Volume	−0.0000* (0.0000)	BM	−0.003*** (0.001)
Volume	−0.0000*** (0.0000)	Beta	0.029** (0.009)	Beta	0.034** (0.013)
Beta	0.013** (0.006)	LnLEV	0.012*** (0.002)	CFO	−0.387*** (0.044)
LnLEV	0.005** (0.002)	LnBM	0.031*** (0.004)	LnLEV	0.026*** (0.006)
LnBM	0.060*** (0.004)	Size	0.047*** (0.004)	LnBM	0.021** (0.007)
Size	0.019*** (0.004)	Firm	0.143*** (0.009)	Size	0.050*** (0.006)
Firm	0.144*** (0.008)	Audit	−0.024** (0.009)	Firm	0.085*** (0.013)
Audit	−0.062*** (0.007)	Switch	−0.034** (0.014)	Audit	−0.025* (0.013)
Qual	0.033*** (0.010)	Qual	0.255*** (0.020)	Audexist	−0.083*** (0.017)
Audexist	−0.113*** (0.009)	Audexist	−0.083*** (0.009)	Crisis	0.028** (0.011)
Crisis	0.022** (0.007)	Crisis	0.008** (0.007)	R^2	0.071
R^2	0.220	R^2	0.009	*F* test	22.901***
F test	502.907***	*F* test	48.522***		

Note: This table shows the results of OLS regression analysis to test H_{1a} and H_{1b}, using $Costofequity_2$, for all clusters in pre- and crisis period. $Costofequity_2$ is cost of equity measured by using the PEG approach introduced by Easton (2004), *Crisis* is a dummy variable that takes 0 if an observation falls in the pre crisis period (2005–2007) and 1 if it falls in crisis period (2008–2012), *Audit* is a dummy variable that takes 1 if the firm is a Big Four (Deloitte Touche Tohmatsu, PriceWaterHouseCooper, Ernst & Young, KPMG) and 0 otherwise, *Switch* is auditor switch that takes 1 if firm switch auditor and 0 otherwise, *Qual* is modified audit report opinion that takes 1 if the audit opinion is qualified and 0 otherwise, *Audexist* is the existence of audit committee that takes 1 if the firm has an audit committee and 0 otherwise, *Debt* is corporate total debt scaled by total assets, *LnMV* is corporate natural log of market value of equity, *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Volume* is trading volume divided by total shares outstanding, *Beta* is systematic risk measured by stock beta, *CFO* is cash flow from operations divided by total assets, *LnLEV* is trading volume divided by total shares outstanding, *LnBM* is natural log of book to market ratio, *Size* is corporate size estimated as natural logarithm of total assets, *Firm* is a dummy variable that takes 1 if the firm is classified as small (market value of equity of firm is lower than the median market value of equity) and 0 if the firm is classified as large (market value of equity of firm is larger than the median market value of equity). The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

EQ_1 and EQ_3, EQ_4, EQ_5, EQ_6, EQ_7, EQ_8, and EQ_{10}; EQ_3 and EQ_4, EQ_5, EQ_6, EQ_7, EQ_8, and EQ_{10}; EQ_4 and EQ_5, EQ_6, EQ_7, EQ_8, and EQ_{10}; EQ_5 and EQ_6, EQ_7, EQ_8, and EQ_{10}; EQ_6 and EQ_8, and EQ_{10}; EQ_7 and EQ_8, and EQ_{10}; EQ_8 and EQ_{10}.

5.3. Cost of equity capital and audit quality under financial crisis of 2008

Table 2a shows that H_{1a} holds only for countries of Cluster 2, implying that financial crisis of 2008 (hereafter *Crisis*) has positive association with $Cost\ of\ equity_1$. Moreover, from Table 2b, the results show that the *Crisis* coefficients for all clusters are significant and has positive values. It means that consistent with H_{1a}, $Cost\ of\ equity_2$ is significantly higher in years of GFC. All these results support the findings of Mokhova (2011) which implies that the fall of global financial market at the end of October of 2008, the decrease of firm's stocks therefore their market capitalization and the rapidly increasing risks caused by instability lead to higher cost of equity capital.

Table 2c
Test of H_2 (Costofequity$_1$ and earnings quality under pre-crisis period).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
Size	1.366* (0.791)	Size	2.637** (1.165)	NER	−2.987** (1.451)
EQ_1	0.047* (17.601)	BM	−0.290* (0.171)	Collateral	−5.433** (0.031)
EQ_3	12.132** (35.678)	CFOV	−2.447* (1.478)	EQ_1	1.688** (16.045)
EQ_5	1.389*** (5.734)	EQ_1	−0.719** (9.190)	EQ_6	0.522** (14.889)
EQ_{10}	1.060* (56.725)	EQ_3	7.092** (19.938)	EQ_7	−5.062*** (3.154)
R^2	0.001	EQ_5	0.030* (0.182)	R^2	0.008
F test	0.595*	EQ10	−0.657** (8.378)	*F* test	0.773**
		R^2	0.0000		
		F test	1.647*		

Note: This table shows the results of OLS regression analysis to test H_2, using *Costofequity*$_1$, for all clusters in pre-crisis period. *Costofequity*$_1$ is cost of equity measured by using the constant growth Gordon model introduced by Palea (2007), EQ_1 is ex post conservatism which is estimated based on Basu (1997), EQ_3 is value relevance which is estimated based on Ohlson (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_6 is accruals quality which is estimated based on Kothari et al. (2005), EQ_7 is earnings persistence which is estimated based on Kormedi and Lipe (1987), EQ_{10} is earnings smoothness which is estimated based on Leuz et al. (2003), *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Size* is corporate size estimated as natural logarithm of total assets, *CFOV* is dash flow from operations volatility estimated as standard deviation of cash flow from operations scaled by total assets, *Collateral* is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets, *NER* is negative earnings realization estimated as a dummy variable that takes 1 if firm reports negative income before extraordinary items and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

Table 2d
Test of H_2 (Costofequity$_1$ and earnings quality under crisis period).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
Beta	0.831** (0.370)	SV	0.468** (0.236)	Sicode	19.375* (71.198)
Size	0.275*** (0.082)	Non-debt	−34.887*** (4.639)	EQ_4	−2155.287** (2301.786)
BM	−0.297*** (0.012)	EQ_3	34.433*** (12.686)	EQ_8	−37.134** (48.741)
EQ_1	16.944*** (3.319)	EQ_9	−0.001** (0.014)	R^2	0.003
EQ_3	−2.066** (0.859)	R^2	0.001	*F* test	0.391*
EQ_5	−0.811* (0.439)	*F* test	3.311***		
EQ_8	2.323*** (2.772)				
R^2	0.028				
F test	25.786***				

Note: This table shows the results of OLS regression analysis to test H_2, using *Costofequity*$_1$, for all clusters in crisis period. *Costofequity*$_1$ is cost of equity measured by using the constant growth Gordon model introduced by Palea (2007), EQ_1 is ex post conservatism which is estimated based on Basu (1997), EQ_3 is value relevance which is estimated based on Ohlson (1995), EQ_4 is accruals quality which is estimated based on Dechow et al. (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_8 is earnings predictability which is estimated based on Francis et al. (2004), EQ_9 is loss avoidance analysis which is estimated based on Burgstahler et al. (2006), *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Beta* is systematic risk measured by stock beta, *Size* is corporate size estimated as natural logarithm of total assets, *SV* is sales volatility estimated as standard deviation of sales revenues scaled by total assets, *Non-debt* is non-debt tax shields estimated as the ratio of depreciation divided by total assets, *Sicode* is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

The study has also found that there is controversial relationship between cost of equity capital and audit quality. Consistent with H_{1b}, Table 2a reports that *Audit* for clusters 1 and 2 is negatively associated with *Cost of equity*$_1$. In parallel, Table 2b shows that *Switch* for cluster 2 and *Audit* and *Audexist* for all clusters are negatively associated with *Cost of equity*$_2$ therefore H_{1b} is accepted. Thus, these results support the findings of Easley and O'Hara (2004), Fernando et al. (2010) and Chen et al. (2011) which implies that the less of audit quality the higher of cost of equity capital in crisis period.

However, unlike the previous findings, *Qual* for all clusters, *Audexist* for cluster 2 and *Afees* for cluster 3 are positively associated with cost of equity capital. Consequently, H_{1b} is rejected.

Examining control variables, consistent with previous literature, Table 2a shows that *Size* for all clusters, *BM* and *Beta* for cluster 1, *LnMV* for cluster 2, *LnLEV* for clusters 2 and 3 and *DPO* for cluster 3 are statistically significant with *Costofequity*$_1$, and based on results of Table 2b, *BM*, *Beta*, *LnLev*, *LnBM*, *Size* and *Firm* for all clusters, *LnMV* for cluster 1, *Volume* for clusters 1 and 2, *Debt* and *CFO* for cluster 3 are statistically significant with *Costofequity*$_2$. However, the results are shown more severe in countries in Clusters 2 and 3 since they are characterized by low shareholder protection.

Table 2e
Test of H_2 (Costofequity2 and earnings quality under pre crisis period).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
BM	−0.003** (0.001)	Beta	−0.036*** (0.012)	Size	0.021*** (0.005)
Leverage	0.047*** (0.010)	Size	0.019*** (0.002)	BM	0.027*** (0.006)
NER	0.270*** (0.010)	BM	−0.017*** (0.0000)	CFOV	2.233** (1.000)
Collateral	0.073*** (0.017)	CFOV	−0.014*** (0.003)	SV	0.517*** (0.126)
Non-debt	0.104*** (0.040)	NER	0.227*** (0.010)	NER	0.117*** (0.018)
Liquidity	−0.001** (0.0000)	Non-debt	0.405*** (0.054)	Profitability	−0.006*** (0.001)
EQ_1	−0.119** (0.055)	Growth	−0.005*** (0.002)	EQ_1	−0.055** (0.022)
EQ_2	−0.011* (0.006)	Sicode	0.031** (0.015)	EQ_3	−0.102* (0.054)
EQ_3	−0.215* (0.111)	EQ_1	−0.048*** (0.017)	EQ_4	5.828*** (2.085)
EQ_5	−0.056*** (0.018)	EQ_2	−0.001*** (0.0000)	EQ_6	−6.235** (2.562)
EQ_8	−0.001*** (0.0000)	EQ_3	0.528*** (0.037)	EQ_7	0.178*** (0.040)
EQ_9	−0.002*** (0.001)	EQ_4	−0.005*** (0.001)	EQ_9	−0.147*** (0.031)
R^2	0.080	EQ_5	−0.001** (0.0000)	R^2	0.156
F test	51.316***	EQ_7	0.030*** (0.010)	*F* test	18.576***
		EQ_8	0.005*** (0.001)		
		R^2	0.176		
		F test	325.891***		

Note: This table shows the reults of OLS regression analysis to test H_2, using $Costofequity_2$, for all clusters in pre-crisis period. $Costofequity_2$ is cost of equity measured by using the PEG approach introduced by Easton (2004), EQ_1 is ex post conservatism which is estimated based on Basu (1997), EQ_2 is ex ante conservatism which is estimated based on Beaver and Ryan (2000), EQ_3 is value relevance which is estimated based on Ohlson (1995), EQ_4 is accruals quality which is estimated based on Dechow et al. (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_6 is accruals quality which is estimated based on Kothari et al. (2005), EQ_7 is earnings persistence which is estimated based on Kormedi and Lipe (1987), EQ_8 is earnings predictability which is estimated based on Francis et al. (2004), EQ_9 is loss avoidance analysis which is estimated based on Burgstahler et al. (2006), *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Beta* is systematic risk measured by stock beta, *Size* is corporate size estimated as natural logarithm of total assets, *Leverage* is financial leverage estimated as total debt divided by total assets, *CFOV* is dash flow from operations volatility estimated as standard deviation of cash flow from operations scaled by total assets, *SV* is sales volatility estimated as standard deviation of sales revenues scaled by total assets, *Collateral* is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets, *Non-debt* is non-debt tax shields estimated as the ratio of depreciation divided by total assets, *Growth* is growth estimated as the ratio of capital expenditures divided by total assets, *Profitability* is profitability measured by using the return on assets, *Liquidity* is liquidity measured by using the quick ratio, *Sicode* is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise, *NER* is negative earnings realization estimated as a dummy variable that takes 1 if firm reports negative income before extraordinary items and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

5.4. Cost of equity capital and earnings quality under financial crisis of 2008

As shown by the linear regression results in Tables 2c and 2d, the coefficients on EQ_1 and EQ_{10} for cluster 2, EQ_7 for cluster 3, and EQ_3 and EQ_5 for cluster 1, EQ_9 for cluster 2, EQ_4 and EQ_8 for cluster 3 are statistically significant and with a negative sign in pre- and crisis period, respectively. Therefore, consistent with Bhattacharya et al. (2003), Francis et al. (2004, 2005), Chan et al. (2009) and McInnis (2010), the significant coefficients obtained for EQ_1, EQ_{10} and EQ_7, and EQ_3, EQ_5, EQ_9, EQ_4 and EQ_8 in pre- and crisis period, respectively, are consistent with H_2 and imply that $Costofequity_1$ is negatively associated with earnings quality. However, earnings quality, measured by EQ_1 for clusters 1 and 3, EQ_3 and EQ_5 for clusters 1 and 2, EQ_{10} for cluster 1 and EQ_6 for cluster 3 in pre-crisis period, and EQ_1 and EQ_8 for cluster 1 and EQ_3 for cluster 2 in crisis period, is positively associated with $Costofequity_1$ and therefore H_2 is rejected.

Regarding the control variables, the results in Tables 2c and 2d indicate that $Costofequity_1$ is inversely associated with *BM* and *CFOV* for cluster 2, *NER* and *Collateral* for cluster 3 in pre-crisis period, and with *BM* for cluster 1 and *Non-debt* for cluster 2 in crisis period. On contrary, $Costofequity_1$ is positively associated with *Size* for clusters 1 and 2 in pre-crisis period, and with *Beta* and *Size* for cluster 1, *SV* for cluster 2 and *Sicode* for cluster 3 in crisis period.

In Tables 2e and 2f, we report the results of estimating the regression of earnings quality attributes on the $Costofequity_2$ and the control variables described in Eq. (2). Consistent with H_2, EQ_1 for all clusters, EQ_2 and EQ_5 for clusters 1 and 2, EQ_3 and EQ_9 for clusters 1 and 3, EQ_4 for cluster 2, EQ_6 for cluster 3, EQ_8 for cluster 1 in pre-crisis period, and EQ_3 and EQ_7 for cluster 3, EQ_4 and EQ_{10} for cluster 1, EQ_5 for cluster 2 and EQ_6 for clusters 2 and 3 in crisis period are negatively associated with $Costofequity_2$. These results enhance the findings of Bhattacharya et al. (2003), Francis et al. (2004, 2005), Chan et al. (2009) and McInnis (2010) which implies that earnings quality attributes individually have negative effect on cost of equity capital. Contrariwise, the results in Tables 2e and 2f show an inconsistency with H_2 for EQ_3 and EQ_8 for cluster 2, EQ_4 for cluster 3 and EQ_7 for clusters 2 and 3 in pre-crisis period, and EQ_2, EQ_6 and EQ_7 for cluster 1, EQ_4 for clusters 2 and 3, EQ_5 and EQ_9 for clusters 1 and 3, and EQ_8 for all clusters in crisis period which are positively associated with $Costofequity_2$.

Moreover, examining the control variables, consistent with previous literature, Tables 2e and 2f indicate that coefficients of *BM* for all clusters, *Leverage*, *Collateral* and *Liquidity* for cluster 1, *NER* for all clusters, *Non-debt* for clusters 1 and 2, *Beta*, *Growth* and *Sicode* for cluster 2, *Size* and *CFOV* for clusters 2 and 3, *SV* and *Profitability* for cluster 3 in pre-crisis period, and *BM*, *Leverage* and *Collateral* for clusters 1 and 3, *Size* and *NER* for all clusters, *Non-debt* for clusters 1 and 2, *Sicode* and *Liquidity*

Table 2f
Test of H_2 (Costofequity$_2$ and earnings quality under crisis period).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
Size	0.011*** (0.002)	Size	0.012*** (0.002)	Beta	0.047*** (0.017)
BM	−0.025*** (0.0000)	SV	0.002** (0.001)	Size	0.024*** (0.004)
Leverage	0.0000** (0.0000)	NER	0.331*** (0.010)	BM	0.001* (0.001)
NER	0.317*** (0.008)	Non-debt	0.041*** (0.014)	Leverage	0.023*** (0.008)
Collateral	0.046*** (0.008)	EQ_4	0.004*** (0.001)	SV	−0.338** (0.157)
Non-debt	0.042*** (0.009)	EQ_5	−0.009*** (0.003)	NER	0.136*** (0.016)
Sicode	−0.067*** (0.012)	EQ_6	−0.003*** (0.001)	Collateral	0.055* (0.029)
Liquidity	−0.002*** (0.0000)	EQ_8	0.037** (0.058)	Growth	−0.405*** (0.135)
EQ_2	1.355*** (0.068)	R^2	0.021	Profitability	−0.014*** (0.001)
EQ_4	−0.075*** (0.016)	*F* test	55.386***	EQ_3	−0.168** (0.081)
EQ_5	0.046*** (0.011)			EQ_4	2.531*** (0.949)
EQ_6	0.065*** (0.017)			EQ_5	0.549*** (0.183)
EQ_7	0.034*** (0.012)			EQ_6	−2.470*** (0.924)
EQ_8	0.019*** (0.004)			EQ_7	−0.083*** (0.024)
EQ_9	0.0000*** (0.0000)			EQ_8	0.083*** (0.020)
EQ_{10}	−0.008** (0.003)			EQ_9	0.008*** (0.001)
R^2	0.357			R^2	0.262
F test	495.518***			*F* test	50.752***

Note: This table shows the reults of OLS regression analysis to test H_2, using *Costofequity*$_2$, for all clusters in crisis period. *Costofequity*$_2$ is cost of equity measured by using the PEG approach introduced by Easton (2004), EQ_2 is ex ante conservatism which is estimated based on Beaver and Ryan (2000), EQ_3 is value relevance which is estimated based on Ohlson (1995), EQ_4 is accruals quality which is estimated based on Dechow et al. (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_6 is accruals quality which is estimated based on Kothari et al. (2005), EQ_7 is earnings persistence which is estimated based on Kormedi and Lipe (1987), EQ_8 is earnings predictability which is estimated based on Francis et al. (2004), EQ_9 is loss avoidance analysis which is estimated based on Burgstahler et al. (2006), EQ_{10} is earnings smoothness which is estimated based on Leuz et al. (2003), *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Beta* is systematic risk measured by stock beta, *Size* is corporate size estimated as natural logarithm of total assets, *Leverage* is financial leverage estimated as total debt divided by total assets, *SV* is sales volatility estimated as standard deviation of sales revenues scaled by total assets, *Collateral* is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets, *Non-debt* is non-debt tax shields estimated as the ratio of depreciation divided by total assets, *Growth* is growth estimated as the ratio of capital expenditures divided by total assets, *Profitability* is profitability measured by using the return on assets, *Liquidity* is liquidity measured by using the quick ratio, *Sicode* is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise, *NER* is negative earnings realization estimated as a dummy variable that takes 1 if firm reports negative income before extraordinary items and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

for cluster 1, *SV* for clusters 2 and 3, *Beta*, *Growth* and *Profitability* for cluster 3 in crisis period are statistically significant with *Costofequity*$_2$.

5.5. Cost of debt and audit quality under financial crisis of 2008

Table 2g reports multiple regressions between cost of debt, crisis period dummy variable and audit quality metrics. First, the impact of the *Crisis* on *Costofdebt* can be assessed through the statistically significant coefficients of 0.527 for cluster 1 and 0.011 for cluster 2. Thus, consistent with Mokhova (2011), these results confirm the research hypothesis H_{3a} which indicate that the total eventual losses in most economies led to the world recession which in turn have an impact on the availability of credit and as a result on the cost of debt capital.

Second, Table 2g shows that the association between *Costofdebt* and audit quality measures can be extracted through the negative statistically significant coefficients of *Audit* and *Afees* for cluster 1, *Qual* for cluster 2 and *Audexist* for cluster 3. Consequently, consistent with findings from Blackwell et al. (1998), Pittman and Fortin (2004), Kim et al. (2011), Karjalainen (2011) and Causholli and Knechel (2012), the results provides support for H_{3b} which show that there is negative association between audit quality and cost of debt. On contrary, based on the findings of Dhaliwal et al. (2008), there is inconsistency with H_{3b} for *Qual* for clusters 1 and 3, *Switch* for cluster 2 and *Audit* for cluster 3 as a result of positive association between *Costofdebt* and audit quality (expressed by *Qual*, *Switch* and *Audit*).

Third, examining control variables, consistent with Chow and Rice (1982), Krishnan (2003), Fortin and Pittman (2007), Francis et al. (2005), Dhaliwal et al. (2008), Karjalainen (2011) and Causholli and Knechel (2012), Table 2g shows that coefficients of *BM* for cluster 1, *Size* for all clusters, *LnMVE* for clusters 2 and 3, *Sicode* for cluster 2, *LnNIBE* and *Collateral* for cluster 3 are statistically significant with *Costofdebt*.

5.6. Cost of debt and earnings quality under financial crisis of 2008

The results from Tables 2h and 2i indicate that there is ambiguity about the relationship between cost of debt and earnings quality. Consistent with Francis et al. (2005) and Valipour and Moradbeygi (2011), the results from Tables 2h and 2i support H_4 for EQ_1 and EQ_7 for cluster 2, EQ_2, EQ_5 and EQ_8 for cluster 1, EQ_{10} for clusters 1 and 3 in pre crisis period, and EQ_1

Table 2g
Test of H_{3a} of H_{3b} (Costofdebt under GFC period of 2008).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
BM	0.002* (0.014)	Size	0.001** (0.002)	Size	0.0000*** (0.0000)
Size	0.110* (0.128)	LnMVE	−0.003* (0.001)	LnNIBE	−0.000* (0000)
Audit	−1.173** (0.509)	Sicode	−0.003** (0.009)	LnMVE	0.0000*** (0000)
Afees	−0.0000** (0.0000)	Switch	0.015** (0.010)	Collateral	−0.004*** (0.0000)
Qual	1.733** (0.596)	Qual	−0.004* (0.016)	Audit	0.001*** (0.0000)
Crisis	0.527** (0.364)	Crisis	0.011** (0.006)	Audexist	−0.002*** (0.0000)
R^2	0.001	R^2	0.001	Qual	0.0000** (0.001)
F test	2.895***	*F* test	18.939***	R^2	0.034
				F test	11.681***

Note: This table shows the reults of OLS regression analysis to test H_{3a} and H_{3b}, using *Costofdebt*, for all clusters in pre- and crisis period. *Costofdebt* is cost of debt measured by the ratio of interest expense in year $t+1$ to average interest bearing debt outstanding during years t and $t+1$, *Crisis* is a dummy variable that takes 0 if an observation falls in the pre crisis period (2005–2007) and 1 if it falls in crisis period (2008–2012), *Audit* is a dummy variable that takes 1 if the firm is a Big Four (Deloitte Touche Tohmatsu, PriceWaterHouseCooper, Ernst & Young, KPMG) and 0 otherwise, *Afees* is audit fees, *Switch* is auditor switch that takes 1 if firm switch auditor and 0 otherwise, *Qual* is modified audit report opinion that takes 1 if the audit opinion is qualified and 0 otherwise, *Audexist* is the existence of audit committee that takes 1 if the firm has an audit committee and 0 otherwise, *BM* is book-to-market ratio estimated as book value of equity divided by market value of equity, *Size* is corporate size estimated as natural logarithm of total assets, *Collateral* is collateral value or asset structure of assets estimated as the ratio of intangible assets divided by total assets, *LnNIBE* is natural log of net income before extraordinary items, *LnMVE* is natural log of market value of equity, *Sicode* is a dummy variable that takes 1 for the most frequent four digit SIC industrial code for each cluster and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

Table 2h
Test of H_4 (Costofdebt under pre crisis period).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
Leverage	−0.352** (0.988)	Leverage	0.0000* (0.0000)	Leverage	0.0000** (0.0000)
LnNIBE	−0.269* (0.299)	Profitability	0.0000* (0.0000)	Size	−0.0000* (0.0000)
ΔEPS	1.016*** (0.005)	EPS	0.0000* (0.0000)	IntCov	0.0000*** (0.0000)
CFO	−0.001* (0.100)	Profit	−0.002* (0.040)	Profit	0.0000* (0.001)
EQ_2	−0.055* (1.026)	Incr	0.014** (0.016)	EQ_2	0.001* (0.015)
EQ_5	−0.635** (3.346)	EQ_1	−0.0000* (0.0000)	EQ_7	0.001* (0.001)
EQ_8	−0.025* (0.026)	EQ_4	0.0000* (0.001)	EQ_9	0.0000** (0.001)
EQ_{10}	−2.465*** (9.820)	EQ_7	−0.0000* (0.014)	EQ_{10}	−0.0000* (0.004)
R^2	0.001	EQ_9	0.0000* (0.0000)	R^2	0.014
F test	0.640***	R^2	0.0000	*F* test	1.514***
		F test	0.342*		

Note: This table shows the reults of OLS regression analysis to test H_4, using *Costofdebt*, for all clusters in pre-crisis period. *Costofdebt* is cost of debt measured by the ratio of interest expense in year $t+1$ to average interest bearing debt outstanding during years t and $t+1$, EQ_1 is ex post conservatism which is estimated based on Basu (1997), EQ_2 is ex ante conservatism which is estimated based on Beaver and Ryan (2000), EQ_4 is accruals quality which is estimated based on Dechow et al. (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_7 is earnings persistence which is estimated based on Kormedi and Lipe (1987), EQ_8 is earnings predictability which is estimated based on Francis et al. (2004), EQ_9 is loss avoidance analysis which is estimated based on Burgstahler et al. (2006), EQ_{10} is earnings smoothness which is estimated based on Leuz et al. (2003), *CFO* is cash flow from operations divided by total assets, *Size* is corporate size estimated as natural logarithm of total assets, *Leverage* is financial leverage estimated as total debt divided by total assets, *Profitability* is profitability measured by using the return on assets, *IntCov* is interest coverage estimated as the ratio of earnings before interest and taxes (EBIT) divided by the interest expenses, *LnNIBE* is natural log of net income before extraordinary items, *EPS* is earnings per share before extraordinary items, ΔEPS is change in earnings per share before extraordinary items between year t and $t-1$, *Profit* is a dummy variable that takes 1 if firm's earnings per share before extraordinary items is greater than or equal to 0 and 0 otherwise, *Incr* is a dummy variable that takes 1 if firm's earnings per share before extraordinary items in year t is greater than or equal to that of year $t-1$ and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

for cluster 1, EQ_4 for cluster 3, EQ_8 and EQ_{10} for cluster 2 in crisis period. It means that lower (higher) earnings quality is associated with higher (lower) cost of debt. On contrary, consistent with Fung and Goodwin (2013) and Rodriguez-Perez and Van Hemmen (2010), the coefficients of EQ_2 and EQ_7 for cluster 3, EQ_4 for cluster 2, and EQ_9 for clusters 2 and 3 in pre-crisis period, and EQ_4 and EQ_5 for cluster 2, EQ_6 and EQ_8 for clusters 1 and 3, and EQ_7 for cluster 3 in crisis period are positively associated with *Costofdebt* as a result of denial of H_4.

The coefficients on the control variables are consistent with previous literature (see Kormedi and Lipe, 1987; Dechow et al., 1995; Ohlson, 1995; Basu, 1997; McNichols, 2002; Leuz et al., 2003; Francis et al., 2004, 2005; Burgstahler et al., 2006; Kothari et al., 2005; Roychowdhury and Watts, 2007; Jiang, 2008). Tables 2h and 2i show that there is significant association between *Costofdebt* and *Leverage* for all clusters, *LnNIBE*, ΔEPS and *CFO* for cluster 1, *Profitability*, *EPS* and *Incr* for cluster 2,

Table 2i
Test of H_4 (Costofdebt and earnings quality under crisis period).

Variable(s)	Cluster 1	Variable(s)	Cluster 2	Variable(s)	Cluster 3
Size	0.0000*** (0.0000)	LnNIBE	0.0000** (0.0000)	△EPS	0.001** (0.001)
IntCov	−0.0000*** (0.0000)	Profit	−0.003** (0.002)	Profit	−0.001** (0.001)
LnNIBE	−00000*** (0.0000)	Incr	−0.002* (0.001)	Incr	0.0000** (0.0000)
Profit	0.0000*** (0.0000)	EQ_4	0.0000** (0.0000)	CFO	0.0000* (0.001)
EQ_1	−0.0000** (0.0000)	EQ_5	0.0000** (0.0000)	RND	0.002*** (0.0000)
EQ_6	0.0000** (0.0000)	EQ_8	−0.002* (0.005)	EQ_4	−0.023** (0.010)
EQ_8	0.0000* (0.0000)	EQ_{10}	−0.0000* (0.001)	EQ_6	0.022** (0.011)
R^2	0.005	R^2	0.0000	EQ_7	0.0000* (0.0000)
F test	5.507***	*F* test	0.662*	EQ_8	0.0000** (0.0000)
				R^2	0.014
				F test	2.294***

Note: This table shows the reults of OLS regression analysis to test H_4, using *Costofdebt*, for all clusters in crisis period. *Costofdebt* is cost of debt measured by the ratio of interest expense in year $t+1$ to average interest bearing debt outstanding during years t and $t+1$, EQ_1 is ex post conservatism which is estimated based on Basu (1997), EQ_4 is accruals quality which is estimated based on Dechow et al. (1995), EQ_5 is accruals quality which is estimated based on McNichols (2002), EQ_6 is accruals quality which is estimated based on Kothari et al. (2005), EQ_7 is earnings persistence which is estimated based on Kormedi and Lipe (1987), EQ_8 is earnings predictability which is estimated based on Francis et al. (2004), EQ_{10} is earnings smoothness which is estimated based on Leuz et al. (2003), *CFO* is cash flow from operations divided by total assets, *Size* is corporate size estimated as natural logarithm of total assets, *IntCov* is interest coverage estimated as the ratio of earnings before interest and taxes (EBIT) divided by the interest expenses, *LnNIBE* is natural log of net income before extraordinary items, ΔEPS is change in earnings per share before extraordinary items between year t and $t-1$, *RND* is R&D expense deflated by total assets, *Profit* is a dummy variable that takes 1 if firm's earnings per share before extraordinary items is greater than or equal to 0 and 0 otherwise, *Incr* is a dummy variable that takes 1 if firm's earnings per share before extraordinary items in year t is greater than or equal to that of year $t-1$ and 0 otherwise. The standard errors may be found in the parentheses.

* Statistical significance at 10% level (two-tailed).
** Statistical significance at 5% level (two-tailed).
*** Statistical significance at 1% level (two-tailed).

Profit for clusters 2 and 3, *Size* and *IntCov* for cluster 3 in pre-crisis period, and *Size* and *IntCov* for cluster 1, *LnNIBE* for clusters 1 and 2, *Profit* for all clusters, *Incr* for clusters 2 and 3, and ΔEPS, *CFO* and RND for cluster 3 in crisis period.

6. Conclusions

The purpose of this paper is to examine how global financial crisis of 2008 and the differences in audit quality and earnings management in pre- and crisis period affect cost of capital for three clusters based on country classification of Leuz (2010). The different characteristics of three clusters lead to differences in the effects of global financial crisis of 2008, audit and earnings quality on cost of capital: cost of equity capital and cost of debt capital.

We set four hypotheses regarding cost of capital in the context of global financial crisis of 2008, audit and earnings quality. First, we expect that the global financial crisis of 2008 has rise equity beta which led to the increase of equity risk premium and therefore an increase of cost of equity capital. Moreover, regarding the affect of audit quality on cost of equity capital, we expect a negative association. Second, we hypothesize that there is statistically negatively reliable association between each earnings quality attribute considered individually and measures of the cost of equity capital. Third, we expect that the total losses in most economies led to the world recession have an impact on the availability of credit as a result on the cost of debt capital. In addition, we expect a negative association between audit quality and cost of debt. Fourth, we hypothesize that poorer earnings quality is associated with larger cost of debt.

We test these hypotheses by using a sample of 137,091 firm-year observations from 18 developed countries which are categorized into three clusters based on Leuz (2010) corresponding to the period 2005–2012.

Our results are consistent with the hypotheses. First, we support the findings of Mokhova (2011) which implies that the global of financial crisis of 2008 lead in a fall of global financial markets, a decrease of firm's stocks and an increase of financial risks which in turn increase the cost of equity capital.

Furthermore, examining the relationship between audit quality and cost of equity capital, the results are mixed among clusters. However, in general, we find that cost of equity capital is negatively associated with firms that audited by Big Four auditors, and firms that switch auditor and positively associated with firms with a modified audit report, and audit fees. Consequently, consistent with Easley and O'Hara (2004), Fernando et al. (2010) and Chen et al. (2011), these negative associations implies that the less of audit quality the higher of cost of equity capital in crisis period and vice versa.

Second, the results show a controversial relationship between earnings quality and cost of equity capital among clusters, but, in general, consistent with the findings of Bhattacharya et al. (2003), Francis et al. (2004, 2005), Chan et al. (2009) and McInnis (2010), we find that ex post conservatism and value relevance in pre crisis period and value relevance and accruals quality in crisis period are negatively associated with cost of equity.

Third, we observe a negative impact of global financial crisis of 2008 on cost of debt. With other words, consistent with expectation, the total losses in most economies led to the world recession have an impact on the availability of credit as a result on the cost of debt capital.

In addition, consistent with the findings from Blackwell et al. (1998), Pittman and Fortin (2004), Kim et al. (2011), Karjalainen (2011) and Causholli and Knechel (2012), firms that audited by Big Four auditors, audit fees, firms with a modified audit report and firms that have an audit committee have a negative association with cost of debt capital, as expected.

Fourth, the results indicate that the association between cost of debt and earnings quality are mixed among clusters. Consistent with previous literature (Francis et al., 2005; Valipour and Moradbeygi, 2011), ex post conservatism, accruals quality, earnings predictability and earnings smoothness in pre- and crisis period is shown to be inversely associated with cost of debt as hypothesized.

In the light of the above findings, our paper contributes to the accounting, finance and auditing research literature in several areas. First, it is the first study that uses a large number of firms as a sample which is counted on 137,091 firm-year observations from 18 largest economies of the world and cover the 55% of the global market capitalization. Thus, this representative sample makes the findings stronger. Second, this paper enhance the limited previous literature concerning the effect of financial crisis on cost of debt and cost of equity capital. Although, only Mokhova (2011) provides evidence of how the cost of capital is affected from the recent global financial crisis, the results are limited at earliest stage. Third, there is no previous literature of how a bad economic condition, like the financial crisis of 2008, influence the relationship between cost of capital, audit quality and earnings management. Thus, our paper gives circumstantial analysis and gives insights in accounting, economic, financial and auditing literature of how individual earnings quality attribute and audit quality characteristics affect cost of capital. Fourth, it is the first attempt to analyze the association between cost of capital with audit quality and earnings management by categorizing the sample into three clusters as per level investor protection based on country classification of Leuz (2010).

Moreover, findings of the study may be contribute to managers, stock market authorities, accounting standard setters and auditors. Particularly, the negative effect of financial crisis of 2008 on cost of capital shows that investors' required rate of return decreases in order to save their firms or to get rid of their firms even at lower rate of return. Thus, the results may be of interest to post-crisis financial management and auditors to define the impact of the crisis on cost of equity capital and cost of debt determining the factors which influence the cost of capital and how they have changed due to the financial crisis and by the means of that knowledge make the optimal financial decision to develop the firm and to make the appropriate auditing due to reduce the likelihood of opportunism and earnings manipulation and to report number's validity. Moreover, examining several aspects of audit quality due to financial crisis, the findings will help auditors to reestimate how auditing is developed in order to increase the audit quality which in turn will lower risks and as a result decrease cost of capital.

After examining the effect of financial crisis on cost of capital and on the relationship between cost of capital and earnings and audit quality in pre- and crisis period, it would be interesting to examine these associations after the firms have recovered from the financial crisis. Moreover, future research should give insights that have received relatively little attention, how audit quality affect earnings quality in pre and crisis period.

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