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Earnings quality and managerial access to debt financing: empirical evidence from Iran

Mahdi Salehi
Ferdowsi University of Mashhad, Mashhad, Iran
Maryam Timachi
Islamic Azad University, Mashhad, Iran, and
Shayan Farhangdoust
Imamreza International University of Mashhad, Mashhad, Iran

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Abstract

Purpose – The purpose of this paper is to establish a linkage between two rarely researched areas, i.e. earnings quality (EQ) and access to external and internal debt financing. Specifically, the authors aim to examine whether the quality of a firm's reported earnings is significantly associated with its access to both private and bank debt financing.

Design/methodology/approach – The authors test the hypotheses by employing panel data analysis for a sample of 108 companies listed on the Tehran Stock Exchange (TSE) during 2006-2015. The tests were conducted by using R econometric software.

Findings – After controlling for some firm-specific factors and consistent with the primary expectations, the results reveal a significant and positive relationship between EQ and managerial access to external (bank) debt financing. In addition, the findings indicate that EQ is negatively associated with internal debt financing which is measured as the changes in firm retained earnings.

Research limitations/implications – Although the authors cautiously conducted the present study, there are some limitations that merit further consideration. First, the authors collected the data manually from 14 categories of industries in the TSE and, accordingly, an aggregate analysis across multiple categories of industries might have missed industry-specific and unique issues. Second, the authors used a narrow conceptualization of accruals quality which merely assesses a firm's EQ. The measures can be enhanced by including more actionable proxies. Third, since the data on debt financing were collected from two different sources, this might have caused common method variance in the results procedurally.

Originality/value – Since the fundamental institutional assumptions underpinning the Western and even East Asia debt contracting and EQ models are not valid in the institutional environment of Iran, the findings could provide substantial implications for the understanding of both debt financing and the quality of earnings. These significant institutional and ownership differences are the factors affecting firms' leverage and capital choice decisions. Indeed, the study has laid some groundwork upon which a more detailed evaluation of the Iranian firms' financial structure could be based.

Keywords Iran, Earnings quality, Bank financing, Tehran stock market

Paper type Research paper

1. Introduction

The issues of financing and adequate access to internal and external sources are essential parts of operating any businesses. In this regard, adequate access to debt financing, particularly bank financing, is a crucial factor in maintaining the firm as a going concern and also keeping its potential for growth. However, in reality, firms have unequal or uneven access to capital markets and, consequently, both internal and external funds do not provide perfect substitutes or alternatives for factors such as agency conflicts, tax avoidance, costs of financial distress and information asymmetry. Given the circumstances, it is expected that small- and even medium-sized businesses encounter some difficulties in obtaining loans and other bank services at affordable rates and fair terms, particularly in the wake of corporate collapses like Enron, WorldCom and HIH Insurance Group in Australia in the early 2000s.

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In the present study, we attempt to establish a linkage between two rarely researched areas, i.e. earnings quality (hereafter, EQ) and managerial access to internal and external (bank) financing, where EQ is measured by employing seven different proxies which are developed by recent empirical studies (e.g. Myers *et al.*, 2003; Schipper and Vincent, 2003; Dechow *et al.*, 2010). Our motivation stems from the fact that a firm with limited or no access to external financing may be seriously unable to pursue an optimal investment policy and consequently loses its growth opportunities. This phenomenon is more pronounced in capital markets of developing countries where small- and medium-sized quoted firms are generally more financially constrained compared to their relatively large and unconstrained counterparts in the developed capital markets. Therefore, we aim to test this relationship in the Tehran Stock Exchange (TSE) as a typical example of developing capital markets with more variations in the degree of access to external capital markets. To our knowledge, to date, few studies have empirically examined the relationship between corporate debt financing and the quality of earnings. Pope (2003), for instance, argues that establishing a balance between corporate debt and equity financing brings about an increase in demands for accounting information, which *per se* explains the differences in financial disclosure patterns. Ghosh and Moon (2010) also suggest that firms with higher reliance on debt financing are more likely to incur higher costs of borrowing from lower EQ, primarily owing to the fact that the benefits from avoiding potential debt covenant violations exceed the higher borrowing costs.

It is generally argued that although earnings contain accounting accruals as a key component (the other being cash flows) and could be fruitful predictors for future cash flows (rather than current cash flows), they are prone to manipulation and biases and, accordingly, may be considered as noisy predicators of future cash flows. Moreover, corporate debts and managerial access to bank financing may have some bearings on managerial opportunistic behavior and manipulation incentives (Ghosh and Moon, 2010). Therefore, our conjecture lies in the fact that the linkage between EQ and managerial access to bank financing is primarily dependent on accruals quality. However, in addition to accruals quality and following prior literature, we attempt to employ six other proxies as basis for drawing inferences on EQ, namely, persistence, predictability, smoothness, value relevance, timeliness and conservatism of reported earnings.

The issue of EQ can be viewed from two different standpoints: an information standpoint and an opportunistic earnings management standpoint. The former considers a positive relation between EQ and managerial reporting actions. More specifically, the less noisy or the more accurate reporting actions taken by corporate managers (which discloses more useful information on firm's future earnings and cash flows) is likely to increase EQ. The latter, by contrast, focuses on opportunistic behavior of managers and the way they distort the financial performance of their businesses in an effort to enhance their own utility at the expense of investors and shareholders (Kanagaretnam *et al.*, 2011). In this regard, prior literature provides some evidence regarding the significant country-specific or institutional factors which affect the financial reporting environment and managerial decisions accordingly, such as legal systems, tax compliance and political economy. It is also argued that the presence of legal or political institutions could reduce self-serving behaviors of owners and managers in businesses (Ball *et al.*, 2003; Bushman *et al.*, 2004; Gul, 2006; Dyck and Zingales, 2004; Haw *et al.*, 2004).

Prior literature on the relationship between debt financing and EQ is twofold and holds two contrasting views. On the one hand, corporate debts could positively affect EQ. Specifically, debt holders or creditors demand higher quality information, particularly information on earnings, to estimate solvency, liquidity and bankruptcy risks more accurately and precisely. Furthermore, managers are more willing to provide higher quality information primarily due to cost-benefit considerations regarding debt financing. Therefore, they act in the interests of creditors and use their accounting discretion to provide higher quality

information on future prospects of the firm and consequently reduce the cost of borrowing (Feltham *et al.*, 2007; Ghosh and Moon, 2010). On the other hand, higher levels of debt financing may provide opportunistic managers with an incentive to use their financial reporting discretion and decisions in an effort to reduce the cost of debt covenant violations. Indeed, corporate managers are more likely to behave aggressively with respect to accruals and earnings when the level of debt financing is high. Therefore, it can be implied that debt financing is negatively associated with EQ, and accruals are considered as noisy predictors of firm's future performance (Watts and Zimmerman, 1990; Dichev and Skinner, 2002; Billett *et al.*, 2007; Ghosh and Moon, 2010). Based on the preceding dual role of debt financing, Ghosh and Moon (2010) contend that while firms with lower levels of debt financing are less likely to manipulate their earnings as a result of lower risk of covenant violations, they are more incentivized to take advantage of earnings management as the level of debt financing increases. The foregoing discussion of the findings and inferences in the prior literature motivates the question that we study in this paper: is firms' EQ significantly influenced by their access to bank financing and, if the answer is yes, what is its direction?

Our study contributes to the growing body of finance literature and deviates from existing approach in a number of ways. First, a large body of research already studies the relationship between corporate debt financing and other firm-related factors such as EQ, earnings management and firm growth for statistical samples which have been obtained from financial statement data filed by developed capital markets such as those in the USA or Europe. Since publicly quoted firms in these markets are generally large and less financially constrained in comparison to small- or medium-sized quoted firms operating in the capital markets of developing countries like Iran, the determination of constraints impact on EQ stems mainly from the variations in the degree of access to external capital markets for relatively unconstrained firms. Given potentially more variations across sample firms in terms of their degree of access to the external capital market, the existing literature on financial constraints could be enriched by incorporating this factor into the analysis. Indeed, our study is remarkable in that a specific emerging market like the TSE is investigated in which socio-economic, political and cultural factors such as a high level of concentration (more than 60 percent), the domination of petroleum and petrochemical industries in the TSE and the presence of large religious foundations called Bonyad whose combined budgets represent more than 30 percent of central government spending are considerably different from those of Western or European developed markets, which could provide some unexpected results. Second, instead of the sole accruals quality which is used extensively by the prior literature, we employ six more proxies for EQ to obtain much more robust and accurate results. Third, following Sufi (2009) and Rahaman (2011), we base our measure of external financing constraints upon firm's access to a bank credit facility, primarily because the traditional investment-cash-flow sensitivity measure has shown less statistical significance in comparison to the lack of access to a line of credit. Finally, we employ a dynamic panel data analysis in order to capture the variations in the external sources of financing over time and identify the potential reverse causality problem arising from investment-cash-flow sensitivity measure.

The remainder of the paper proceeds as follows. Section 2 discusses the related literature on the relationship between EQ and access to internal and external debt financing. Section 3 details the sample selection procedure and our data sources. Section 4 outlines the research design. Section 5 illustrates the empirical results and their implications. Section 6 concludes the paper.

2. Literature review and hypothesis development

2.1 EQ

To our knowledge, there is no hitherto agreed-upon definition or meaning assigned to the phrase "earnings quality" although it is widely used. Furthermore, there is not a general consensus on

EQ proxies. For instance, several empirical studies have defined and measured EQ in the several contexts of allegedly defective reporting practices, economic sustainability, economic growth, debt covenants, firm growth and earnings management (Harris *et al.*, 2000; Serwer, 2002; Schipper and Vincent, 2003; Dechow *et al.*, 2010; Kanagaretnam *et al.*, 2011). However, these studies provide merely a number of indicators, but not a comprehensive or explicit definition.

Debt covenants or agreements as well as management compensation plans are among the most commonly used domains for EQ and its metrics. Wealth transfers in business enterprises are primarily caused by low-quality or defective earnings. For instance, overstated earnings could provide some misleading information on solvency and consequently lead lenders to keep lending and accordingly defer foreclosure. Low-quality earnings could also cause misallocation of capital or financial resources and thus seem undesirable or inefficient from the viewpoint of investors. In other words, investors or stakeholders are indeed concerned with the way corporate resources are shifted and prefer substantive projects with actual expected payoffs rather than chimerical projects with imaginary expected payoffs (Schipper and Vincent, 2003; Francis *et al.*, 2008).

Prior empirical studies propose two different features about the definition of EQ. First, EQ is regarded as a term which is conditional or dependent on the decision relevance of financial information and thus defined merely in the context of a specific decision model. Second, the quality of a reported earnings number is defined by the ability of a firm's accounting system to measure its financial performance and whether it is an informative representation of firm's financial performance (Dechow *et al.*, 2010). Incorporating the preceding features, Dechow *et al.* (2010) define higher quality earnings as more informative earnings which contain more decision-relevant information concerning the way a business enterprise is financially operating. As it can be implied, their definition of EQ is dependent on decision usefulness in the context of informative representation of financial performance. Nevertheless, there are a number of survey as well as empirical researches on EQ or earnings management which typically define EQ in the context of equity valuation decisions and examine only the relationships related to this definition (e.g. Dechowand Skinner, 2000; Fields *et al.*, 2001; Nelson *et al.*, 2003; Schipper and Vincent, 2003; Francis *et al.* 2008; Lo, 2008). Schipper and Vincent (2003) distinguish between the decision usefulness and Hicksian income perspectives on EQ. Following the Financial Accounting Standards Board's (FASB) conceptual framework, Schipper and Vincent (2003) contend that decision usefulness is the criterion for judging accounting choices which presumably captures the objective of financial reporting standards (i.e. to provide information that is useful for business decisions). The preceding deviation from the long-lasting focus on the stewardship function of accounting stems from concerns about operationality (Beaver, 1998; Schipper and Vincent, 2003). In addition, the idea behind Hicksian income perspective lies in the fact that accounting earnings should faithfully represent changes in wealth.

Since the reported accrual-based earnings are the cornerstone of most proxies used for EQ in prior studies, all of these proxies are influenced significantly by both the firm's fundamental performance and by the measurement of performance. Furthermore, each of these proxies possesses different measurement capability and focuses on different elements of decision usefulness (Dechow *et al.*, 2010). Therefore, the performance and effectiveness of these proxies in all empirical circumstances are not the same. In this regard, Dechow *et al.* (2010) note five underresearched areas of EQ as follows:

(1) How corporate managers choose between multiple objectives and portfolio of accounting choices could considerably affect the reported earnings? Accordingly, the establishment of trade-offs between these objectives should do the trick.

(2) The way equity investors might draw inferences from rational earnings management in order to meet other objectives as well as how the decision usefulness of earnings is

influenced in equity valuations merit further investigation. In addition, factors allowing equity investors to understand financial reporting incentives are also of considerable importance.

(3) The anticipated impact of a firm's earnings-related accounting choices on earnings properties is considered as limited and, accordingly, a firm's incentives across its functional objectives are likely to vary in accordance with its fundamental performance.

(4) Despite several different studies conducted to validate earnings metrics and determine its correlation with other measures and metrics, additional formal analysis on construct validity of earnings metrics is still required, particularly by employing some classical methods.

(5) A two-sided examination of EQ (i.e. both the determinant and consequence of EQ) is still lacking in the literature. More specifically, a large body of empirical research has examined either a determinant of quality or a consequence of quality. Nevertheless, it is believed that the source of EQ is likely to affect its consequences.

Consistent with above-mentioned discussions and arguments about the definition and functional domains of EQ, it is believed that EQ, and more specifically, financial reporting quality are of interest to financial reports users and for contracting purposes as well as investment policies. It is also believed that the quality of financial reports could be an indirect determinant of the quality of financial reporting standards, particularly in the viewpoint of standard setters and policy makers (Schipper and Vincent, 2003; Francis *et al.*, 2008; Dechow *et al.*, 2010).

The Prior literature has taken account of several features or indicators of earnings in empirical relationships. Using a sample of 8,022 US bank loan contracts, Hasan *et al.* (2012), for instance, argue that earnings predictability is a significant factor affecting the design of bank lending contracts and both its price and non-price terms. Their evidence suggests that lower interest rates, longer maturities, and fewer covenants and collateral requirements are the advantages of more predictable earnings. The authors also mention the availability of private information about borrowers, lenders' monitoring incentives, the competition between banks and bond investors and firm size as major factors in the relationship between earnings predictability and bank loan cost. Employing panel data analysis on a sample of 1,281 small and medium-sized Spanish firms, the most recent empirical evidence of García-Teruel *et al.* (2014) indicates that higher accruals quality (as a proxy for EQ or earnings precision) is positively associated with higher ratio of bank debt to total assets (as a proxy for the access of firms to bank debt). Their inference from this result lies in the fact that bank debt financing is partially determined by information asymmetry in private debt markets, primarily because the quality of accounting information is often regarded as an inverse indicator of information asymmetry. The domestic study of Kordestani and Majdi (2007) is indicative of a negative relationship between EQ and the cost of equity. After controlling for some firm-specific factors (namely, firm size, the ratio of book-to-market value of stock and variation coefficient of earnings), their findings provide some evidence that while the EQ constructs derived from time-series properties of earnings(i.e. persistence, predictability, value relevance and timeliness) are negatively associated with the cost of equity of 60 listed firms on the TSE, there is no statistically significant relation between earnings conservatism and the cost of equity.

Employing the regression model developed by Jorgensen *et al.* (2012), Dastgir *et al.* (2015) demonstrated that current earnings dispersion is positively and significantly associated with current stock returns of 285 firms listed on the TSE. However, their finding was inconsistent with their second conjecture with respect to a significant relationship between future earnings dispersion and current stock returns. Consistent with opportunistic

earnings management hypothesis, the findings of Etemadi's *et al.* (2012) study indicated that higher discretionary accruals (as a proxy for earnings management) led to lower EQ measured by four constructs (i.e. accruals quality, earnings persistent, earnings predictability and earnings smoothness). The authors contended that their findings imply that earnings management impairs accounting information content.

2.2 Access to internal and external debt financing

The empirical evidence in the extant literature on finance addresses the fundamental question of whether a firm's investment and debt policy are influenced by its financial structure. It is generally argued that internal and external capitals are imperfect substitutes and, therefore, the costs of internal and external capitals bring about some external financing constraints which, *per se*, restrict firm's investment opportunities and, by contrast, foster economic growth. In this regard, a large body of research has used statistical samples consisting of publicly held companies and also some firm-specific proxies for financial constraints such as firm size, non-dividend paying status and/or poor credit ratings (Schipper and Vincent, 2003; Ghosh and Moon, 2010; Rahaman, 2011).

The extant literature on finance also suggests that adverse selection and moral hazard problems such as underinvestment, unprofitable investments and asset substitution, arising from information asymmetry between borrowers (debtors) and lenders (creditors), impose some limits on capital flow to firms facing profitable investment opportunities (Stiglitz and Weiss, 1981; Diamond, 1984; Houston and James, 1996; Bharath *et al.*, 2008; García-Teruel *et al.*, 2014). Under such circumstances, the closer relationship between banks and firms in comparison with other public creditors facilitates better debt contracting, more effective monitoring and, consequently, the greater alignment of interests between management and shareholders. To put it more simply, bank financing is more pronounced in firms with higher information asymmetry, and this is due to the fact that bank financing is likely to reduce asymmetric information with respect to public debt and signal positive information about a firm's credit quality (Hooks, 2003; Denis and Mihov, 2003; García-Teruel *et al.*, 2014).

Based on the international accounting literature, there are two different legal systems prevailing in a given country (i.e. the common-law legal system vs the code-law legal system) which determine the accounting system employed in that country (Nobes, 1983; Berry, 1987; Mashayekhi and Mashayekh, 2008). A common-law legal system focuses on shareholders' rights and offers equity-based financing, whereas the code-law system puts emphasis on debt financing and ignores investor protection policy. Therefore, private debt financing is the major debt financing source in common-law countries as its monitoring advantages, and efficiency of liquidation and renegotiation in financial distress exceeds public debt (Chemmanur and Fulghieri, 1994; García-Teruel *et al.*, 2014). Accordingly, the choice of private debt, in such context, could be positively associated with the likelihood of bankruptcy. However, in the legal system of Iran, the government exerts a significant influence on setting accounting standards in line with the tax laws and, consequently, the financial reporting and disclosure are still of poor quality (Mashayekhi and Mashayekh, 2008).The current condition of Iran's legal system implies a code-law-based country, and the TSE is regarded as a weak equity market as compared to those markets in common-law countries. Further, companies listed on the TSE prefer to meet their financing needs through banks or the government and usually undermine the outsider's equity approach. The preceding argument is consistent with La Porta *et al.* (1999), suggesting the role of a particular type of legal system prevailing in a given country in determining its financing policy.

According to the preceding discussions, listed companies on the TSE are primarily dependent on bank debt financing and unable to issue public debt. Therefore, they are

faced with a choice between internal funds and private debt, and their access to bank debt financing is dependent on solvency, and the relevance of collaterals in reducing moral hazard problems under asymmetric information. Furthermore, based on the bonding and agency theories or arguments, corporate managers have greater incentives to report higher quality earnings when they have higher private debts than public debts. In this case, they are more willing to maximize firm value and avoid misleading stakeholders by reporting lower quality earnings (Warfield *et al.*, 1995; Ghosh and Moon, 2010; García-Teruel *et al.*, 2014).Based on these arguments, we would expect that bank debt financing is negatively associated with firms' profitability as well as internal financing because profitable and leveraged firms are more likely to use internal funds and bank debt financing, respectively.

2.3 EQ vis-à-vis access to debt financing

Higher quality accounting information and financial statements are the major factors in reducing the risks of moral hazard and information asymmetry associated with borrowers. In other words, creditors, particularly banks, use this information so as to estimate the expected future cash flows and repayment capacity of the borrowers. Therefore, the more accurate or precise earnings lead to lower information risk of the borrowing firms, mainly because the creditors can estimate or capture the future cash flows of the borrowing firms more accurately (Berger and Udell, 2006; García-Teruel *et al.*, 2014). Some recent studies suggest that higher accruals quality is a proxy for EQ mitigate the previously mentioned information risks due to its ability to capture future cash flows (Dechow, 1994; Francis *et al.*, 2005; Bharath *et al.*, 2008; García-Teruel *et al.*, 2014).

The extant literature on the relationship between EQ and debt financing provides some mixed results. Indeed, this relationship could be either positive (at low levels of debt) or negative (at high levels of debt). On the one hand, when the level of debt is low, the risk of debt covenant violations is minimum or even non-existent and accordingly corporate managers are more willing to use their accounting discretion in the form of accounting choices, assumptions and estimates in order to report high EQ and keep the cost of debt as lowest as possible. Ceteris paribus, higher EQ or more informative earnings about firm's future economic performance (future cash flows) lowers the credit risk (Francis *et al.*, 2005; Ghosh and Moon, 2010). On the other hand, at substantial levels of debt, the risks of covenant violations are more considerable and, in consequence, the managers are more willing to avoid the costs of covenant violations at the expense of higher EQ (Schipper and Vincent, 2003; Francis *et al.*, 2005; Ghosh and Moon, 2010; García-Teruel *et al.*, 2014). Based on the arguments mentioned in the earlier sections, we posit the following hypotheses in the null form:

H1. There is a significant and positive relationship between EQ and external (bank) financing.

H2. There is a significant and negative relationship between EQ and internal (equity) financing.

3. Research sample and data sources

We obtain our required data manually from the hardcopy of financial statements held in the TSE library (i.e. Codal[1] and its supplementary software known as Rahavard Novin) for the sample period 2006-2015. To construct our sample for the paper's hypotheses, we begin with all client-year observations on the Codal database (the number of all listed companies yielded a potential statistical population of 327 firms). We then exclude firms with non-calendar fiscal year end[2] (11 firms), firms with missing or insufficient variable

data (59 firms) and firms with fiscal year change during 2006-2015 (45 firms).We also exclude firms operating in banking industry as well as financial and investment institutions (22 firms) to calculate the variables used in our equation, primarily because financial institutions and banking industry have different reporting requirements that could influence the figures associated with dependent variables. This leaves us with a primary sample of 108 firms (1,080 firm-year observations). It is also noteworthy that our sample represents 38-46 percent cases for each year and does not indicate any bias regarding missing data except for a greater proportion of missing cases for the beginning and closing year of the series. Table I discusses the breakdown of sample procedure (panel A) as well as the number of firms per industry (panel B).

4. Research design

4.1 Model specification

In the present paper, we use the following regression models (Equations (1) and (2)) to examine the relationship between EQ and debt financing:

$$\begin{aligned}\text{EXDEBT} = {} & \beta_0 + \beta_1 \text{EQ}_{it} + \beta_2 \text{MB}_{it} + \beta_3 \text{LEV}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{FASSET}_{it} \\ & + \beta_6 \text{ROA}_{it} + \beta_7 \text{ZALTMAN}_{it} + \beta_8 \text{AGE}_{it} + \beta_9 \text{CFO}_{it} + \beta_{10} \text{OPCYCLE}_{it} \\ & + \beta_{11} \text{GROWTH}_{it} + \beta_{12} \text{DEBTCOST}_{it} + \beta_{13} \text{SALES}_{it} \end{aligned} \quad (1)$$

$$\begin{aligned}\text{INDEBT} = {} & \beta_0 + \beta_1 \text{EQ}_{it} + \beta_2 \text{MB}_{it} + \beta_3 \text{LEV}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{FASSET}_{it} \\ & + \beta_6 \text{ROA}_{it} + \beta_7 \text{ZALTMAN}_{it} + \beta_8 \text{AGE}_{it} + \beta_9 \text{CFO}_{it} + \beta_{10} \text{OPCYCLE}_{it} \\ & + \beta_{11} \text{GROWTH}_{it} + \beta_{12} \text{DEBTCOST}_{it} + \beta_{13} \text{SALES}_{it} \end{aligned} \quad (2)$$

Table I. Sample selection process

Panel A: sample selection procedure

Initial population of industrial firms with required data for estimating variables derived from the TSE database for the sample period 2006-2015		327
Less:	Firms with non-calendar fiscal year end	52
Less:	Firms with missing or insufficient variable data	59
Less:	Firms with fiscal year change during 2009-2014	45
Less:	Firms operating in banking industry as well as financial and investment institutions	63
Equal:	Total firms in sample	108

Panel B: no. of firms by industry

Industry	Frequency	Percentage
Telecommunications	8	7.40
Construction	8	7.40
Automotive	8	7.40
Electronics and computer	5	4.62
Mining and metal products	8	7.40
Non-metallic minerals	9	8.33
Cement and plaster	9	8.33
Metals	9	8.33
Agriculture and animal husbandry	6	5.55
Rubber and plastic	6	5.55
Machine tools	8	7.40
Oil, gas and petrochemicals	8	7.40
Food	8	7.40
Pharmaceuticals and healthcare	8	7.40
Total	108	100

where EXDEBT and INDEBT represent the proxies for a firm's access to the external private credit market and internal sources of financing, respectively; EQ is the proxy for earnings quality; MB is the ratio of market to book value of stock; LEV is the proxy for firm's financial leverage; SIZE represents the natural logarithm of the average of the beginning and ending total assets; FASSET is the firm's fixed assets scaled by its total assets as a proxy for collateral; ROA calculates the return on assets; ZALTMAN is the firm's Altman *Z*-score as a proxy for company's likelihood of bankruptcy; AGE is a proxy for firm's age or the number of years since its inception; CFO represents the standard deviation of firm's operating cash flows; OPCYCLE is the logarithmic transformation of the sum of days accounts receivable and days inventory outstanding; GROWTH is calculated as the annual change in firm's total sale income; DEBTCOST represents the cost of debts; and SALE is the standard deviation of total sale income.

4.2 Description of variables

4.2.1 External and internal financing. To measure a firm's access to internal sources of financing, we use the changes of its retained earnings over the period $t-1$ to t as follows:

$$\text{INDEBT} = \text{Log (Owner's Equity}_{it}) - \text{Log (Owner's Equity}_{it-1}) \tag{3}$$

The above equation estimates the growth in a firm's internal funds or the amount of retained earnings that the firm accumulated to finance its growth. Additionally, we employed the economic performance of the firm as an alternative proxy for internal financing in order to test the robustness of our results. In this regard, we used two performance measures of a firm as follows:

$$\text{INDEBT} = \text{Net Income/Sales} \tag{4}$$

$$\text{INDEBT} = \text{Net Income/Total Owner'sEquity} \tag{5}$$

The above equations represent the profit margin and return to shareholders' fund, respectively. The extant literature on corporate finance suggests that these measures have less inherent limitations than other measures and thus provide a more reliable image of a firms' economic performance (Bosworth *et al.*, 1997; Bosworth and Kells, 1998).

Following Sufi (2009) and Rahaman (2011), we preferred to use a bank credit facility proxy to measure a firm's access to the external private financing, primarily due to the fact that this measure provides more accurate measure of a firm's external financing constraints than the traditional investment-cash-flow sensitivity measure. This proxy basically captures the external financing and cash-generating abilities of a firm. The construct is shown in the following equation:

$$\text{EXDEBT} = \text{Short} - \text{termBank Loans plus Over} - \text{drafts/Total Liabilities} \tag{6}$$

4.2.2 Constructs for EQ. We employ several extensively used accruals models as proxies for EQ. Each of these accrual models could represent varying levels of misclassification errors including type 1 errors (i.e. classifying accruals as abnormal when they represent a fundamental or positive performance) and type 2 ones (i.e. classifying accruals as normal when they are not). Indeed, each of them has a specific ability to separately identify the normal and abnormal components of accruals.

First, we use the seminal work of Jones (1991) to measure accruals. Based on his model, accruals are calculated as a function of sales growth and plant, property and equipment (PPE).

Specifically, accruals are a function of revenue growth (working capital accruals) and depreciation is a function of PPE. All of the variables are scaled by total assets. Jones (1991) presents the following equation:

$$\mathrm{ACC}_t(\mathrm{EQ1}) = a + b_1\mathrm{DRev}_t + b_2\mathrm{PPE}_t + e_t \tag{7}$$

The prior empirical literature notes two primary weaknesses of the Jones model including the low explanatory power (approximately 10 percent of the variation in accruals) and predictive ability of its residuals for year-ahead earnings than the non-discretionary or normal accruals (Xie, 2001; Dechow *et al.*, 2010). Collectively, the Jones model contains a high degree of Type 1 error and a lower rate of Type 2 error, particularly when detecting earnings management in SEC enforcement releases (Dechow *et al.*, 2011).

Second, we employ the modified Jones model (Dechow *et al.*, 1995) as another proxy for EQ. Attempting to mitigate the type 2 error of the Jones model, Dechow *et al.* (1995) modified the Jones model by excluding growth in credit sales in years leading up to management manipulation. The modified Jones model is presented in the following equation:

$$\mathrm{ACC}_t(\mathrm{EQ2}) = a + b_1(\mathrm{DRev}_t\mathrm{DRec}_t) + b_2\mathrm{PPE}_t + e_t \tag{8}$$

Although their modification increases the power of the Jones model to yield a residual that is uncorrelated with expected (i.e. normal) revenue accruals and consequently better reflects revenue manipulation, it still suffers from type 1 errors, even more than the original Jones model (Dechow *et al.*, 2010).

Third, we use the Dechow and Dichev (2002) matching accruals model which matches the accruals as a function of past, present and future cash flows. More specifically, they focus on short-term working capital accruals rather than long-term ones. The comparative study of Dechow *et al.* (2010) indicates that the R^2 obtained from the Dechow and Dichev (2002) model is significantly higher than those of Jones and modified Jones models (i.e. 47 percent at the firm level, 34 percent at the industry level and 29 percent at the pooled level). We measure EQ as the standard deviation of the residuals obtained from estimating this model as follows:

$$\mathrm{DWC}(\mathrm{EQ3}) = a + b_1\mathrm{CFO}_{t1} + b_2\mathrm{CFO}_t + b_3\mathrm{CFO}_{t+1} + e_t \tag{9}$$

Finally, we use the extended version of Dechow and Dechiv's model developed by Francis *et al.* (2005) and also modified by McNichols (2002). Francis *et al.* (2005) modified the Dechow and Dechiv model in two ways: first, by adding revenue changes as proxy for performance and PPE to include depreciation; and second, by decomposing the standard deviation of the residual from the accruals model into an innate component that reflects the firm's operating environment and a discretionary component that reflects managerial choice. The following equations present the Francis *et al.* (2005) model:

$$\mathrm{TCA}_t = a + b_1\mathrm{CFO}_{t1} + b_2\mathrm{CFO}_t + b_3\mathrm{CFO}_{t+1} + b_4\Delta\mathrm{Rev}_t + b_5\mathrm{PPE}_t + e_t \tag{10}$$

$$s(e_t)(\mathrm{EQ4}) = a + b_1\mathrm{Size}_t + b_2s(\mathrm{CFO})_t + b_3s(\mathrm{Rev})_t + b_4\ \log\ (\mathrm{OperCycle})_t + b_5\mathrm{NegEarn}_t + e_t \tag{11}$$

4.2.3 Alternative constructs for EQ. In addition to accruals proxies for EQ, we attempt to use some alternative measures for EQ in order to test the robustness of our results. Following

Schipper and Vincent (2003), we consider EQ constructs derived from the time-series properties of earnings, selected qualitative characteristics in the FASB's conceptual framework and the relations among income, cash and accruals. These measures are listed as follows.

4.2.3.1 Earnings persistence. A large body of research on persistence has focused on the usefulness of earnings to equity investors for valuation and suggested that more persistent earnings give rise to equity value, and hence more persistent earnings are of higher quality as compared to less persistent earnings (e.g. Kormendi and Lipe, 1987; Easton and Zmijewski, 1989; Collins and Kothari, 1989; Schipper and Vincent, 2003). Nevertheless, this stream of research is limited in that it fails to evaluate whether persistence earnings are more decision useful for equity valuation. Following Sloan (1996) and Dechow *et al.* (2010), we use the extended model of earnings persistence which decomposes total earnings into the cash flow component and total accruals:

$$\text{Earnings}_{t+1}(\text{EQ5}) = a + \beta_1 \text{CF}_t + \beta_2 \text{ACC}_t + e_t \tag{12}$$

In the equation above, earnings is scaled by total assets and the coefficient on ACC is less than the coefficient on CF (i.e. $\beta_2 < \beta_1$), implying that the cash flow component of earnings is more persistent than the accrual one.

4.2.3.2 Earnings smoothness. The relative invariable income, which is regarded as income smoothness, is in direct association with EQ. Accordingly, testing income smoothness is considered as a measure for EQ, primarily because the reporting environment and business model are stable. Following Leuz *et al.* (2003) and Schipper and Vincent (2003), we use the ratio of the standard deviation of operating earnings to the standard deviation of cash flow from operations (smaller ratios imply more income smoothing) as our measure of smoothing interventions (EQ6).

4.2.3.3 Earnings predictability. According to the FASB's Concepts Statement No. 2, predictive earnings are the type of earnings that improve users' abilities to forecast items of interest. From this viewpoint, predictable earnings are linked to decision usefulness (Schipper and Vincent, 2003). We calculate the earnings predictability as the square root of residuals of Schipper and Vincent's (2003) model over the period t to $t-4$ as follows:

$$\text{Pred}_{j,t}(\text{EQ7}) = \sqrt{\sigma^2(Vj,t)} \tag{13}$$

where lower figures of $= \sqrt{\sigma^2(Vj,t)}$ are indicative of higher predictive earnings.

4.2.3.4 Value-relevant earnings. Earnings, which are more correlated with value, better reflect fundamental performance because investors better respond to information that has value implications (Dechow *et al.*, 2010). Value relevance of earnings is assessed by regressing returns on earnings and its changes:

$$\text{RET}_t(\text{EQ8}) = a + \beta_1 E_t + \beta_2 \Delta E_t + e_t \tag{14}$$

where higher β represents more informative component of earnings. Further, more value-relevant earnings will have a higher R^2.

4.2.3.5 Timely loss recognition (TLR). We use the most frequently used measure of TLR developed by Basu (1997) entitled "reverse earnings-returns" as follows:

$$\text{Earnings}_{t+1}(\text{EQ9}) = a_0 + a_1 D_t + \beta_0 \text{RET}_t + \beta_1 D_t \times \text{RET}_t + e_t \tag{15}$$

where $D_t = 1$ if $\text{RET}_t < 0$. The model shown in the above equation assumes that markets efficiently reflect losses in returns (RET) when such losses are incurred. A higher β_1 implies more timely recognition of the incurred losses in earnings.

4.2.3.6 Conditional conservatism. A more timely recognition of losses is often regarded as a conservative accounting system, and there are two different types of conservatism, namely, conditional conservatism (i.e. more timely recognition of bad news than good news in earnings) and unconditional conservatism (describing an *ex ante* policy that results in lower book values of assets or higher book values of liabilities) in the initial stages of an asset or liability life cycle (Basu, 1997). Since there is no general consensus on whether unconditional conservatism negatively or positively affects the decision usefulness of earnings and it is still a controversial issue, we merely measure conditional conservatism to capture EQ. In this regard, the present paper employs Basu's (1997) earning-return model along with Beaver and Ryan (2005) book-to-market model to measure conditional conservatism. Basu's (1997) model regresses earnings on positive (negative) stock returns (i.e. the sign of the return coefficient could be either positive or negative) to capture good or bad economic news as follows:

$$\mathrm{NI}_{jt}(\mathrm{EQ10}) = \beta_0 + \beta_1 \mathrm{NEG}_{JT} + \beta_2 \mathrm{RET}_{JT} + \beta_3 \mathrm{NEG}_{JT} \times \mathrm{RET}_{JT} + \varepsilon \tag{16}$$

where NI_{jt} is the annual income before extraordinary items of firm j in year t scaled by the market value of stockholders' equity; $\mathrm{RET}_{JT}$is the buy-and-hold stock return of firm j over year t; and NEG_{JT} is the binary variable equal to 1 if $\mathrm{RE}T_{JT}$ is negative, and 0 otherwise.

4.2.4 Control variables. Following prior studies (e.g. Dechow and Dichev, 2002; Francis *et al.*, 2005; Ghosh and Moon, 2010;García-Teruel *et al.*, 2014), we include several control variables to capture the innate or non-discretionary components of EQ and the impact of operating environment and business model on EQ as follows: MB which is calculated as the ratio of market to book value of stock as a proxy for growth opportunities affecting both EQ and debt financing; LEV as a proxy for firm's financial leverage calculated as the ratio of firm's total debts to its total assets; SIZE as a proxy for firm's size which is measured as the natural logarithm of the average of the beginning and ending total assets; FASSET is a proxy for collateral and calculated as the firm's fixed assets scaled by its total assets; ROA is the proxy for the return on assets and measured as the net income divided by total assets; ZALTMAN is the firm's Altman *Z*-score as a proxy for company's likelihood of bankruptcy, primarily because debt financing might be correlated with financial distress; AGE is a proxy for firm's age and calculated as the natural logarithm of the number of years since the firm has been listed on the TSE; CFO is the firm's free cash flows and measured as the standard deviation of firm's operating cash flows; OPCYCLE represents the firm's operating cycle as the sum of days accounts receivable and days inventory outstanding; GROWTH shows the firm's performance growth as the annual change in firm's total sale income; and SALE is the standard deviation of total sale income.

5. Empirical results

5.1 Descriptive statistics and Pearson correlation matrix

Table II reports the descriptive statistics of the variables used in our regression models. Consistent with prior studies (Ghosh and Moon, 2010; Rahaman, 2011; García-Teruel *et al.*, 2014), the average values of bank (EXDEBT) and private (INDEBT) debt financing are approximately 36 and 10 percent, respectively. These figures highlight the significance of bank debt financing for the companies listed on the TSE (i.e. 36 percent of total assets). In addition, the average values of firm's size (SIZE) and firm's age (AGE) transformed in logarithmic values are 13.395 and 2.717, implying that the average value of total assets and the average age of firms listed on the TSE are $5.6 million and 28 years old, respectively.

The mean values of the EQ proxies are indicative of plausible frequencies and are also consistent with the prior literature (e.g. Jones, 1991; Dechow *et al.*, 1995; Xie, 2001; Dechow and Dichev, 2002; Leuz *et al.*, 2003; Schipper and Vincent, 2003; Francis *et al.*, 2005; Rahaman, 2011).

Variable	Mean	SD	Min.	Lower quartile (25th)	Median	Upper quartile (75th)	Max.
EXDEBT	0.362	0.264	0.271	0.302	0.374	0.432	0.458
INDEBT	0.096	0.116	0.031	0.069	0.089	0.116	0.148
EQ1 (Jones)	0.089	0.116	−0.120	0.059	0.070	0.142	1.041
EQ2 (modified Jones)	0.006	0.245	−0.316	0.083	0.031	0.155	0.899
EQ3 (DWC)	−0.055	0.098	−0.012	−0.021	−0.032	−0.028	−0.016
EQ4 (σ)	−0.108	0.085	−0.145	−0.123	−0.089	−0.062	−0.031
EQ5 (persistence)	0.026	0.089	−0.019	0.023	0.082	0.108	0.124
EQ6 (smoothness)	0.031	0.011	0.020	0.025	0.030	0.041	0.052
EQ7 (pred.)	0.012	0.016	0.001	0.011	0.014	0.018	0.061
EQ8 (RET)	0.057	0.041	0.182	0.025	0.044	0.072	0.086
EQ9 (TLR)	0.041	0.011	0.021	0.031	0.039	0.042	0.048
EQ10 (NI)	0.097	0.412	−3.306	−1.203	1.038	1.237	1.827
MB	0.089	0.034	0.002	0.031	0.076	0.087	0.116
LEV	0.691	0.352	0.406	0.598	0.662	0.997	1.620
SIZE	13.395	1.469	9.797	11.216	13.238	16.661	18.459
FASSET	0.235	0.171	0.101	0.162	0.192	0.452	0.888
ROA	0.012	0.132	–1.005	–0.014	0.010	0.075	0.116
ZALTMAN	1.636	1.154	–1.844	–0.850	1.604	2.063	2.896
AGE	2.717	0.503	0.693	1.667	2.708	3.036	3.784
CFO	0.988	0.617	0.134	0.849	1.241	2.036	2.634
OPCYCLE	3.762	1.025	3.542	3.779	3.905	3.914	4.025
GROWTH	0.335	0.261	0.002	0.216	0.316	0.559	0.886
DEBTCOST	0.061	0.013	0.000	0.012	0.052	0.061	0.093
SALES	0.154	0.091	0.112	0.134	0.149	0.179	0.221

Notes: $n = 1{,}080$. EXDEBT is calculated as short-term bank loans plus over-drafts/total liabilities; INDEBT is measured as the changes of firm's retained earnings over the period *t*-1 to *t*; EQ1 is the accruals calculated by Jones (1991) model; EQ2 is the accruals by Jones modified model (Dechow *et al.*, 1995); EQ3 is the accruals calculated by Dechow and Dichev (2002) matching accruals model; EQ4 is the accruals measured as the extended version of Dechow and Dechiv model developed by Francis *et al.* (2005); EQ5 is the proxy for persistent earnings; EQ6 is the proxy for earnings smoothness calculated as the ratio of the standard deviation of operating earnings to the standard deviation of cash from operations; EQ7 is the proxy for earnings predictability calculated as the square root of residuals of Schipper and Vincent (2003)'s model over the period *t* to *t*-4; EQ8 is the proxy for value-relevant earnings calculated by regressing returns on earnings and its changes; EQ9 is the proxy for timely loss recognition (TLR) calculated by reverse earnings-returns (Basu, 1997); EQ10 is the conditional conservatism calculated by book-to-market model (Basu, 1997; Beaver and Ryan, 2005); MB is the ratio of market to book value of stock; LEV is a proxy for firm's financial leverage calculated as the ratio of firm's total debts to its total assets; SIZE is a proxy for firm's size which is measured as the natural logarithm of the average of the beginning and ending total assets; FASSET is calculated as the firm's fixed assets scaled by its total assets; ROA is the proxy for the return on assets and measured as the net income divided by total assets; ZALTMAN is the firm's Altman Z-score; AGE is the natural logarithm of the number of years since inception; CFO is the standard deviation of firm's operating cash flows; OPCYCLE represents the sum of days accounts receivable and days inventory outstanding; GROWTH is the annual change in firm's total sale income; SALE is the standard deviation of total sale income

Table II.
Descriptive statistics of variables used in regression models

With respect to the mean value of returns on assets (ROA), it can be concluded that the sample firms are, on average, profitable (1.2 percent). The mean (median) cost of debt is 6.1 percent (5.2 percent). The mean (median) value of ZALTMAN is 1.636 (1.604) which suggests the sample firms tend to be financially unhealthy or distressed. The mean (median) market to book ratio (MB) is 8.9 percent (8.7 percent), whereas the mean (median) fixed assets relative to total assets (FASSET) is 23.5 percent (19.2 percent). It is noteworthy that we winsorized our sample data at 5 percent to reduce the effect of possibly spurious outliers and limit extreme values.

Table III presents the Pearson correlation matrix for dependent and independent variables used in our regression models. Consistent with our primary expectations and

Table III.
Pearson's correlation coefficients for variables used in regression models

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. EXDEBT	*1*											
Prob.	–											
2. INDEBT	−0.005	*1*										
Prob.	0.888	–										
3. EQ1	0.224	−0.097	*1*									
Prob.	0.000***	0.012**	–									
4. EQ2	0.044	0.006	0.040	*1*								
Prob.	0.005***	0.000***	0.009***	–								
5. EQ3	0.001	−0.006	0.120	−0.002	*1*							
Prob.	0.072*	0.004***	0.002***	0.051*	–							
6. EQ4	−0.291	−0.080	0.087	−0.043	0.057	*1*						
Prob.	0.000***	0.039**	0.026**	0.266	0.143	–						
7. EQ5	−0.087	0.011	−0.110	−0.008	−0.083	−0.322	*1*					
Prob.	0.024**	0.770	0.004***	0.841	0.033**	0.000***	–					
8. EQ6	0.130	−0.422	0.113	0.022	0.082	0.086	−0.118	*1*				
Prob.	0.000***	0.000***	0.003***	0.569	0.036**	0.026**	0.002***	–				
9. EQ7	−0.041	−0.071	−0.064	−0.039	−0.106	−0.014	0.042	−0.027	*1*			
Prob.	0.293	0.069*	0.098*	0.314	0.006***	0.717	0.000***	0.000***	–			
10. EQ8	0.109	−0.077	0.019	0.160	0.058	0.033	0.052	0.123	0.257	*1*		
Prob.	0.001***	0.119	0.352	0/072*	0.179	0.235	0.056*	0.019**	0.162	–		
11. EQ9	−0.31	0.013	0.052	−0.441	0.184	0.223	0.030	−0.315	0.050	0.031	*1*	
Prob.	0.129	0.324	0.049*	0.155	0.055*	0.005***	0.057*	0.091*	0.038**	0/661	–	
12. EQ10	0.024	0.019	0.003	0.071	−0.056	0.030	0.048	0.050	0.013	0.059	0.235	*1*
Prob.	0.008***	0.377	0.019***	0.160	0.058*	0.033**	0.052*	0.123	0.030**	0.109	0.371	–

Notes: $n = 1{,}080$. EXDEBT is calculated as short-term bank loans plus over-drafts/total liabilities; INDEBT is measured as the changes of firm's retained earnings over the period *t*-1 to t; EQ1 is the accruals calculated by Jones (1991) model; EQ2 is the accruals calculated by Jones modified model (Dechow *et al.*, 1995); EQ3 is the accruals calculated by Dechow and Dichev (2002) matching accruals model; EQ4 is the accruals measured as the extended version of Dechow and Dechiv model developed by Francis *et al.* (2005); EQ5 is the proxy for persistent earnings; EQ6 is the proxy for earnings smoothness calculated as the ratio of the standard deviation of operating earnings to the standard deviation of cash from operations; EQ7 is the proxy for earnings predictability calculated as the square root of residuals of Schipper and Vincent (2003) model over the period t to *t*-4; EQ8 is the proxy for value-relevant earnings calculated by regressing returns on earnings and its changes; EQ9 is the proxy for timely loss recognition (TLR) calculated by reverse earnings-returns (Basu, 1997); EQ10 is the conditional conservatism calculated by book-to-market model (Basu, 1997; Beaver and Ryan, 2005)

arguments, most of the EQ proxies indicate positive and significant correlations with external debt financing (six out of ten cases) as well as negative and significant correlations with internal debt financing (five out of ten cases). In other words, these results provide consistent evidence with the fact that higher quality earnings lead to higher bank debt financing and, by contrast, lower internal debt financing. The variables with the highest correlation with external and internal debt financing are EQ1, EQ4 and EQ6 (i.e. 0.224, −0.291 and −0.422, respectively). Among the other variables, EQ2 has a high correlation with EQ9 (−0.441). Correlations across most other variables are relatively low. Based on the results reported in Table III, we removed uncorrelated independent variables from our regression models. In this regard, the variables EQ7 and EQ9 and the variables EQ5, EQ8, EQ9 and EQ10 were removed from the first and second regression models, respectively. Taken together, multi-collinearity does not seem to be sever and of concern.

5.2 Specification, unit root and stationary tests in panel data analysis

The present study employs the panel data technique to estimate the regression models. In statistics and econometrics, the term "panel data" refers to multi-dimensional data frequently involving measurements over time. Panel data contain observations of multiple phenomena obtained over multiple time periods for the same firms or individuals. Thus, we conduct F-limer specification test using R statistical software to specify the appropriate model between panel data model and ordinary least square(OLS) model. The null hypothesis of this test is the preference of the OLS model. As shown in Table IV, the probability values for both models are less than the significance level of 0.05, thus the panel data model is chosen. The next step is to choose the appropriate model between fixed effects model and random effects model. In this regard, we conduct Hausman test. The results of this test are also shown in Table IV. Again, the *p*-values for both models imply the appropriateness of fixed effects estimator because it is less than the margin error of 0.05. Overall, both regression models in the present research are fitted using the panel data and fixed effects estimators.

In addition to above-mentioned specification tests, we conducted ADF, DFGLS and KPSS unit root tests which assume cross-sectional independence, and ADFD and CADF tests which allow for different types of cross-sectional dependence. Table V indicates the statistics and probability values of these tests. The null and alternative hypotheses of all

Model	*n*	Test	Statistic	Value	DF	Sig.
1	1,080	F Chow	F	9.1836	−69.194	0.0002***
		Hausman	χ^2	20.4893	10	0.0001***
2	1,080	F Chow	F	1.596	−69.194	< 0.001***
		Hausman	χ^2	30.618	10	0.0029***

Table IV. Results of specification tests in panel data models

Panel test	Test statistic	Prob. only if ~ *n* (0, 1)	1% sig. value	5% sig. value	10% sig. value
IPS	−1.942	–	−1.85	−1.72	−1.65
LLC	−30.85	< 0.001	–	–	–
HA	99.8	< 0.001	–	–	–
IPSD	−2.066	–	−1.85	−1.75	−1.68
CIPS	−2.554	–	−2.05	−2.01	−1.89

Notes: IPS *et al.* (2003); LLC, Levin *et al.* (2002); HA, Hadri (2000); IPSD, demeaned data IPS; CIPS, Pesaran (2005)

Table V. Panel unit root and stationarity test results

tests (excluding KPSS) are $\pi_i = 0$ (i.e. the debt-ratio stochastic process for the ith firm has a unit root) and $\pi_i < 0$ (i.e. the ith company leverage is mean reverting). As it can be concluded from individual company test results, a large number of Iranian-listed companies do not seem to be driven by a constant debt-ratio target. Indeed, they behave consistent with the pecking order theory. This fact is robust to a number of alternative unit root/stationarity tests and error cross-correlation assumptions.

5.3 Estimation results

The estimation results of the first regression model using fixed effects estimator are shown in Table VI. As it is evident, the coefficient on all accruals quality measures are positive and significant at the significance level of 0.05, except for EQ4 (C: 0.26; P: 0.54). This provides supporting evidence for *H1*. In other words, higher accruals quality gives rise to bank debt financing through reducing asymmetric information. This finding is consistent with prior studies (e.g. Ghosh and Moon, 2010; Rahaman, 2011; García-Teruel *et al.*, 2014). In addition, the coefficients on our control variables, including higher market to book ratio, more profitable firms, larger firms (less information asymmetry), higher fixed assets (more collateral) and higher Altman *Z*-score indicate positive impacts on bank debt financing. However, our findings demonstrate that higher ROA, costs of debt and operating cash flows reduce the use of bank debt financing.

Table VII reports the estimation results of the second regression model using fixed effects estimator. As expected, the coefficients on EQ proxies are negatively significant, suggesting a negative relationship between EQ and internal debt financing. Accordingly, *H2* is confirmed as well. Nevertheless, the first two proxies of EQ indicate a positive relation with INDEBT, possibly owing to the innate factors determining the value of accruals quality such as the firm's business model and its operating environment (Dechow and Dichev, 2002; Francis *et al.*, 2005).

Except for ROA and OPCYCLE, the control variables of the second regression model indicate similar signs and coefficients to those obtained from the first regression model. Collectively, the results for the control variables are consistent with findings in prior studies (e.g. Ghosh and Moon, 2010; Rahaman, 2011; García-Teruel *et al.*, 2014) and with our primary expectations.

Table VI. Estimation results of first regression model

Variables	Dependent variable = EXDEBT 1	2	3	4
EQ1 (Jones)	1.19 (< 0.01)***			
EQ2 (modified Jones)		0.83 (< 0.01)***		
EQ3 (DWC)			0.01 (0.06)*	
EQ4 (σ)				0.26 (0.05)*
MB	3.18 (0.09)*	3.15 (0.11)	3.13 (0.08)*	3.58 (0.07)*
LEV	0.44 (0.09)*	0.46 (0.09)*	0.49 (0.08)*	0.47 (0.09)*
SIZE	3.15 (0.07)*	3.14 (0.09)*	3.32 (0.07)*	3.38 (0.07)*
FASSET	4.18 (0.04)**	4.15 (0.06)*	4.13 (0.05)**	4.86 (0.07)*
ROA	−2.11 (0.04)**	−2.16 (0.03)**	−2.78 (< 0.01)***	−3.16 (0.04)**
ZALTMAN	4.68 (0.04)**	4.62 (0.03)**	5.01 (< 0.01)***	5.15 (0.00)***
AGE	4.12 (0.21)	4.16 (0.26)	4.24 (0.24)	4.25 (0.27)
CFO	−0.24 (0.06)*	−0.31 (0.06)*	−0.39 (0.07)*	−0.28 (0.05)*
OPCYCLE	−3.18 (0.09)*	−3.09 (0.01)**	−3.11 (0.06)*	−3.16 (0.08)*
GROWTH	0.31 (0.12)	0.26 (0.14)	0.28 (0.12)	0.29 (0.12)
DEBTCOST	−3.13 (0.15)	−3.16 (0.18)	−3.14 (0.17)	−3.20 (0.11)
SALES	5.10 (< 0.01)***	5.14 (0.002)***	5.16 (0.001)***	5.19 (0.001)***
INTERCEPT	5.98 (< 0.01)***	5.85 (0.001)***	5.81 (0.002)***	6.01 (0.001)***

Notes: $n = 1080$. *,**,***Significant at the 10, 5 and 1 percent levels, respectively (two-tailed)

Variables	Dependent variable = INDEBT 1	2	3	4
EQ1 (Jones)	2.015 (0.044)**			
EQ2 (modified Jones)		2.264 (< 0.001)***		
EQ3 (DWC)			−2.479 (< 0.001)***	
EQ4 (σ)				−3.566 (< 0.001)***
MB	3.14 (0.07)*	3.12 (0.09)*	3.16 (0.07)*	3.18 (0.07)*
LEV	3.18 (0.04)**	3.15 (0.06)*	3.13 (0.05)**	3.86 (0.07)*
SIZE	2.11 (0.04)**	2.16 (0.03)**	2.78 (< 0.01)***	3.12 (0.04)**
FASSET	0.41 (0.09)*	0.42 (0.09)*	0.43 (0.08)*	0.46 (0.09)*
ROA	3.11 (0.09)*	3.15 (0.11)	3.13 (0.08)*	3.48 (0.07)*
ZALTMAN	2.12 (0.16)	2.16 (0.20)	2.18 (0.19)	2.15 (0.22)
AGE	3.16 (0.15)	3.12 (0.16)	3.16 (0.19)	3.15 (0.22)
CFO	−3.13 (0.15)	−3.16 (0.18)	−3.14 (0.17)	−3.20 (0.11)
OPCYCLE	4.10 (< 0.01)***	4.14 (0.002)***	4.16 (0.001)***	4.19 (0.001)***
GROWTH	3.98 (< 0.01)***	3.85 (0.001)***	3.81 (0.002)***	4.03 (0.001)***
DEBTCOST	−0.24 (0.06)*	−0.31 (0.06)*	−0.39 (0.07)*	−0.28 (0.05)*
SALES	3.15 (0.07)*	3.15 (0.09)*	3.32 (0.07)*	3.35 (0.07)*
INTERCEPT	1.68 (0.04)**	1.62 (0.03)**	2.01 (< 0.01)***	2.15 (0.00)***

Notes: $n = 1080$. *,**,***Significant at the 10, 5 and 1 percent levels, respectively (two-tailed)

Table VII. Estimation results of second regression model

5.4 Alternative measures of EQ

Table VIII reports the estimated coefficients of the first regression model using our alternative metrics for EQ. As it is obvious, the first four rows of the table are indicative of a significant and positive relation between EQ and bank debt financing. Again, *H1* is confirmed.

The estimation results of the second regression model using alternative measures of EQ are shown in Table IX. The coefficients on EQ alternative constructs provide supporting evidence for *H2* since both of them are negatively and significantly associated with internal debt financing. It is also noteworthy that the results obtained for the control variables indicate plausible frequencies and are consistent with our expectations.

Variables	Dependent variable = EXDEBT 1	2	3	4
EQ5	0.17 (0.01)**			
EQ6		0.71 (0.02)**		
EQ8			1.20 (0.02)**	
EQ10				1.96 (0.078)*
MB	0.73 (0.06)*	0.65 (0.06)*	1.09 (0.03)**	0.68 (0.09)*
LEV	2.13 (0.09)*	2.21 (0.09)*	2.33 (0.13)	1.92 (0.15)
SIZE	0.68 (0.04)**	0.66 (0.03)**	0.49 (0.00)***	0.61 (0.001)***
FASSET	2.15 (0.02)**	2.12 (0.03)**	2.24 (0.04)**	2.41 (0.06)*
ROA	−1.10 (0.05)**	−1.11 (0.06)*	−1.18 (0.11)	−1.60 (0.20)
ZALTMAN	1.10 (< 0.01)***	1.14 (0.002)***	2.32 (0.001)***	3.41 (0.001)***
AGE	1.83 (< 0.01)***	1.75 (0.001)***	0.98 (< 0.001)***	1.78 (< 0.001)***
CFO	2.20 (0.09)*	2.14 (0.11)	2.43 (0.07)*	1.45 (0.11)
OPCYCLE	2.12 (0.002)***	2.22 (0.01)***	1.65 (0.01)**	1.96 (0.01)**
GROWTH	0.43 (0.08)*	0.31 (0.07)*	0.79 (0.07)*	0.25 (0.19)
DEBTCOST	2.15 (0.04)**	2.20 (0.06)*	2.70 (0.07)*	1.90 (0.07)*
SALES	1.11 (0.04)**	1.16 (0.03)**	1.13 (0.04)**	1.24 (0.04)**
INTERCEPT	2.14 (0.07)*	2.10 (0.09)*	2.18 (0.07)*	2.81 (0.10)

Notes: $n = 1080$. *,**,***Significant at the 10, 5 and 1 percent levels, respectively (two-tailed)

Table VIII. Estimation results of first regression model using alternative measures of EQ

Variables	Dependent variable = EXDEBT 2	3
EQ6	−1.78 (0.06)*	
EQ7		−0.92 (0.05)*
MB	1.19 (0.002)***	1.10 (0.001)***
LEV	0.85 (0.001)***	1.98 (0.001)***
SIZE	0.20 (0.06)*	0.26 (0.05)**
FASSET	1.14 (0.02)**	1.70 (< 0.01)***
ROA	1.15 (0.10)	1.16 (0.07)*
ZALTMAN	3.12 (0.03)**	3.16(0.03)**
AGE	0.09 (0.06)*	0.14 (0.09)*
CFO	0.75 (0.06)*	0.82 (0.07)*
OPCYCLE	1.30 (0.09)*	1.32 (0.10)
GROWTH	1.69 (0.03)**	1.58 (< 0.01)***
DEBTCOST	1.35 (0.07)*	1.55 (0.12)
SALES	1.20 (0.07)*	1.13 (0.05)**
INTERCEPT	1.26 (0.09)*	1.88 (0.08)*
Note: $n = 1080$		

Table IX. Estimation results of second regression model using alternative measures of EQ

5.5 *Sensitivity analysis*

We examined the assumptions of standard linear regression models by using different extensions in order to relax the effects of their violation (e.g. biased or misleading forecasts or confidence intervals yielded by a regression model). We used the Jarque-Bera test to examine the normality of the error distribution and examine whether model coefficients are significantly different from zero (i.e. the error distribution is normal and is not influenced by the presence of a few large outliers). In statistics, the Jarque-Bera test is a goodness-of-fit test of whether sample data have the skewness and kurtosis matching a normal distribution. The null hypothesis of this test is normality of the error distribution. After conducting the test, the obtained test statistic (1.737) and p-value (0.185) indicated that the distribution of errors at 0.05 margin of error is normal.

Furthermore, we used White (1980) test to diagnose the possible heteroscedasticity of errors which usually results in confidence intervals that are too wide or too narrow. The White test is a statistical test that establishes whether the residual variance of a variable in a regression model is constant (homoscedasticity). To test for constant variance, one undertakes an auxiliary regression analysis. This regresses the squared residuals from the original regression model onto a set of regressors that contain the original regressors along with their squares and cross-products. One then inspects the R^2. The Lagrange multiplier (LM) test statistic is the product of the R^2 value and sample size (i.e. $\text{LM} = n \times R^{2)}$. The null hypothesis of this test is the constant variance of the errors. According to the results of the White test shown in Table X, the probability value of our model is more than 0.05 significance level, indicating the homoscedasticity of the errors.

6. Concluding remarks

The present study attempts to establish a linkage between EQ and managerial access to both external (bank) and internal (retained earnings and firm performance) debt financing.

Statistic	Statistic value	p-value	Test result
F	0.852	0.357	Homoscedasticity of the errors
LM	28.013	0.421	Homoscedasticity of the errors

Table X. Results of the White test

Our primary conjecture lies in the fact that higher quality accounting information, in general, and higher quality earnings, in particular, reduce the risks of moral hazard and information asymmetry with respect to borrowers. More informative accounting accruals as the key component of earnings are regarded as the increased monitoring in the capital market and through private lenders. Our measure of EQ is based on accruals quality metrics developed by prior seminal works (e.g. Jones, 1991; Dechow *et al.*, 1995; Dechow and Dichev, 2002; Francis *et al.*, 2005). Moreover, we use six more constructs for EQ (derived from the time-series properties of earnings, selected qualitative characteristics in the FASB's conceptual framework and the relations among income, cash and accruals) as alternative measures. Employing panel data analysis on a sample of 108 companies listed on the TSE, we find consistent evidence with our primary expectations and the prior literature on finance. Specifically, our results suggest a positive relationship between EQ (all metrics) and managerial access to bank debt financing and, by contrast, a negative relationship between EQ (all metrics) and managerial access to internal debt financing.

Our findings could provide new insights into the way creditors play the role of a monitoring leverage necessary to keep the quality of corporate financial reports at plausible levels. However, their monitoring role may not be effective in terms of internal financing, probably because corporate managers have more tendency to avoid costly debt covenant violations rather than report earnings of higher quality or earnings which are more informative about firm's future cash flows. Furthermore, our study uses a sample of small -or medium-sized and financially constrained quoted firms operating in a developing capital market. Accordingly, the variations in the degree of access to external capital markets for relatively unconstrained firms could be considered as another factor in reporting higher quality earnings by the managers. More specifically, constrained firms (with relatively limited access to bank credit facilities) overcome their external financing constraints by accumulating more internal funds to finance higher growth. However, as the external financing constraint is alleviated for a firm (i.e. greater access to bank credit facility), the degree of internal financing decreases. As a result, the firm relies less on internal funds and switches to external financing as its primary source of financing for its growth. This pattern of transition between internal and external financing sources is particularly pronounced in the TSE where small- and medium-sized firms operate with relatively limited access to bank credit facilities. These firms, on average, report disproportionately higher quality earnings than their large counterparts in the developed markets by accumulating more internal funds even though they have relatively less access to external financing. Finally, the balance between the costs of internal and external capital gives rise to an external financing constraint that may potentially limit a firm's EQ, especially for firms facing information asymmetry problems. The degree of access to internal sources of financing could either be a signal for the quality of earnings or internal financing capacity which, in turn, reduces the external financing constraints.

Since the fundamental institutional assumptions underpinning the Western and even East Asia debt contracting and EQ models are not valid in the institutional environment of Iran, our findings could provide substantial implications for our understanding of both debt financing and the quality of earnings. These significant institutional and ownership differences are the factors affecting firms' leverage and capital choice decisions. Indeed, our study has laid some groundwork upon which a more detailed evaluation of the Iranian firms' financial structure could be based. In addition, the examination of such relations may provide the ground for sound decision making by various interested users of financial and accounting information.

There are certain limitations of the study that ought to be acknowledged. First, we collected our data manually from 14 categories of industries in the TSE and accordingly an aggregate analysis across multiple categories of industries might have missed

industry-specific and unique issues. Second, we used a narrow conceptualization of accruals quality which merely assesses a firm's EQ. The measures can be enhanced by including more actionable proxies. Third, since the data on debt financing were collected from two different sources, this might have caused common method variance in the results procedurally.

Notes

1. www.codal.ir
2. To observe comparability of our sample data and also the fact that the fiscal year is identical to the solar calendar year (i.e. March 20 or its equivalent, Esfand 29) for about 90 percent of publicly traded companies in the TSE, we have excluded firms with fiscal year not ending on March 20.

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About the authors

Dr Mahdi Salehi is an Associate Professor at the Ferdowsi University of Mashhad, Mashhad, Iran. His research interests include auditing, audit expectation gap, financial reporting and finance. He has several publications in various scholarly and professional journals. Dr Mahdi Salehi is the corresponding author and can be contacted at: mehdi.salehi@um.ac.ir

Maryam Timachi holds a Master's Degree in Accounting.

Shayan Farhangdoust holds a Master's Degree in Auditing. He is a young scholar cooperating chiefly with Dr Mahdi Salehi in different research areas such as accounting, auditing and financial reporting.