Earnings Manipulation and Leverage Deviation

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ABSTRACT

This study investigates whether the firms' leverage and leverage deviation are influenced by earnings manipulation over the period 2006-2019 in firms listed in Tehran Stock Exchange. Using ordinary least squares (OLS), two-stage least squares (2SLS) and generalized method of moments (GMM) estimators, we find evidence suggesting that real and accrual-based earnings manipulation is positively associated with firms' leverage and leverage deviation. In particular, we find that real activities manipulation and accrual-based earnings manipulation are positively (negatively) associated with positive (negative) leverage deviation. The result derived from the current study should be of interest to board of directors, stockholders and policymakers. The findings are significant because more earnings manipulator firms may be less successful in achieving their optimal leverage. After conducting robustness tests, our main conclusions remain valid to different proxies for real and accrual-based earnings manipulation, different measures of firms' leverage ratio, and different estimation methods. Our results are consistent with the predictions of trade-off theory.

Keywords:

Real activities manipulation, accrual-based earnings manipulation, optimal leverage, leverage deviation.

1. Introduction

One of the key questions in corporate finance is how firms make financing decisions. Since Modigliani and Miller (1958), researchers have made great efforts to understand financing policies, and have developed four major capital structure theories to indicate whether, in the presence of market imperfections and frictions, capital structure affects firm values. These theories include the trade-off theory (Miller, 1977), the agency cost theory (Jensen and Meckling, 1976), the pecking order theory (Myers, 1984; Myers and Majluf, 1984), and the market timing theory (Baker and Wurgler, 2002).

Based on these theories, several empirical researches show that firm, industry, and country specific characteristics play an important role in determining the corporate capital structure. However, some findings show that firms with similar characteristics may have different capital structures (Graham and Leary, 2011). Therefore, additional research is needed to further explore firm-specific characteristics that can explain the changes in the corporate capital structure. In this regard, one of the streams that have attracted the attention of researchers in the recent years is focusing on managers and their authorities (Cronqvist et al., 2012). Managers' authorities can affect the recognition of accounting earnings. Although some studies (e.g., An et al., 2016) have investigated the association between earnings manipulation and capital structure, to the best of our knowledge, the association between earnings manipulation and deviation from the optimal capital structure has not been studied in the previous literature. Understanding the effect of earnings manipulation on capital structure and deviation from its optimal level is important because, as Leuz et al. (2003) mentions, managers use earnings manipulation activities to conceal the firms' actual performance from the external stakeholders (p. 505). Creditors, like banks, rely on the information quality, especially earnings quality to offer loans (Bharath et al., 2008). On the other hand, earnings manipulation will distort the information quality. Ng (2011) and Lang et al. (2012) also argue that shareholders' wealth depends not only on the relationship between earnings manipulation and stock returns but also on the relationship between earnings manipulation and firm values. Earnings manipulation can hide firms' real performance from outsiders and only expose it to the insiders. Earnings manipulation, which reflects agency conflicts, can aggravate information asymmetry and as a result, restrict firms from financing through equity market and force them to move toward debt markets. Earnings manipulation enhances the role of debt in firm capital structures (An et al., 2016), and, increases the deviation (especially the positive deviation) from the optimal capital structure (Synn and Williams, 2015).

In this study, we use real activities manipulation (RAM) and accrual-based earnings manipulation (AEM) as measures for agency conflicts between managers and outsiders. In accounting literature, earnings manipulation is often used as a proxy for information quality (Leuz et al., 2003; Francis et al., 2005; Ng, 2011), informativeness of financial reporting (Gopalan and Jayaraman, 2012) and information asymmetry (Bhattacharya et al., 2003; Lang et al., 2012). We examine whether AEM and RAM affect capital structure and deviations from its optimal level. To this end, we focus on the firms listed in Tehran Stock Exchange (TSE). TSE firms prepare their financial statements in accordance with the Iranian national accounting standards. Since 2002, the Accounting Standards Board of Iran (ASBI), which operates under the supervision of the Audit Organization, has enforced 33 accounting standards. The provisions of the Iranian national accounting standards are mostly similar to the International Financial Reporting Standards (IFRS).

This study focuses on firms listed in TSE for two reasons. First, as an emerging market, Iran is the second largest economy in the Middle East and North Africa (MENA) (Soltani et al., 2015). Second, compared to the financial markets of developed countries, TSE is a young market. Rules and regulations that are implemented in this market have not been able to increase the financial reporting quality to the desired level. In TSE, blockholders, which include pension funds, mutual funds, and insurance firms, own the majority of shares, and minority shareholders cannot effectively monitor the firms' activities. Also, institutional investors still do not play a prominent role in improving the quality of accounting information. TSE suffers from the absence of official financial analysts and professional press, which are effective factors in improving the quality of accounting information (Mashayekhi and Mashayekh, 2008). In this setting, due to the poor transparency and high information asymmetry, firms cannot finance their investment projects through equity market and are forced to use debts, especially bank loans. As a result, debts have a more pronounced role in TSE firms' capital structure. To increase borrowing capacity, these firms may engage in AEM and RAM activities, and as a result, this may exacerbate the information asymmetry and firms' opacity in this market.

Using data collected from TSE listed firms, we show that: AEM and RAM are positively associated with capital structure; an increase in AEM and RAM increases the deviation from the optimal capital structure; and AEM and RAM increases (decreases) the positive (negative) deviation from the optimal capital structure. We show that these results are robust to different proxies for AEM and RAM. To measure AEM, we use the absolute value of discretionary accruals derived from Jones (1991), modified Jones (Dechow et al., 1995), and Kothari et al. (2005) models. To measure RAM, we use three measures of sales manipulation, production manipulation, and reduction of discretionary expenses (Roychowdhury, 2006; Cohen et al., 2008). As proxies for capital structure, following An et al. (2016), we use book leverage and market leverage. We also conduct additional sensitivity tests by employing instrumental-variable approach, including two-stage least squares (2SLS) and generalized method of moments (GMM). One challenge for this paper is the issue of endogeneity and reverse causality. Endogeneity bias occurs when earnings manipulation and capital structure are both affected by some omitted and unobserved variables. Causality problem occurs when the firms' leverage and leverage deviation affect earnings manipulation (see Zamri et al., 2013; Anagnostopoulou and Tsekrekos, 2017; Lazzem and Jilani, 2018). Following the existing literature, we use several control variables in our analysis to take into account the endogeneity problem. For example, as a proxy for growth opportunities, we use the market to book ratio (MTB) that affects both capital structure and earnings manipulation. To consider other unobservable factors over time, we control for year effects in regression models. We also control for industry fixed effects. In our analysis, we employ instrumental variables method (i.e. 2SLS and GMM) and select a set of instrumental variables that are highly correlated with the explanatory variables, and not correlated with regressions' residuals. Regarding the causality issue, it should be noted that this study does not seek to explain a causal relationship between earnings manipulation and leverage/leverage deviation; rather it only examines the association between these variables.

Using magnitude of accruals, two proxies for earnings smoothing, and an overall measure based on the first principal component as different proxies for earnings manipulation, An et al. (2016) suggest a positive association between earnings manipulation and capital structure. In this study, first, using other proxies for real and accrual-based earnings manipulation, we arrived at similar results. Second, we present novel evidence suggesting earnings manipulation is positively associated with deviation from the optimal capital structure. More specifically, our results indicate that AEM and RAM are positively (negatively) associated with the positive (negative) leverage deviation. Our results are consistent with the prediction that debt can alleviate the agency costs (e.g., adverse selection costs). For example, Harvey et al. (2004) argue that debt can be useful for firms that are facing high agency costs and over-investment problems. Also, Synn and Williams (2015) suggest that accruals quality, as a proxy for earnings manipulation, can reduce the leverage deviation. Our results are particularly consistent with the findings of the three above-mentioned studies.

The rest of this paper is organized as follows: In Section 2, we provide theoretical motivation and empirical hypotheses. Section 3 describes the sample selection and research design. Section 4 reports the empirical results, and section 5 concludes the paper.

2. Literature Review

Deciding on the capital structure is one of the main tasks of corporate executives. Two important questions in corporate finance are "which factors affect the firms' capital structure?" and "do firms have an optimal capital structure?" To answer these questions, there are various theories in the field of corporate finance. For example, the trade-off theory predicts that the optimal capital structure is determined by trade-off the costs and benefits of debt. According to this theory, it is believed that capital market imperfections create a relationship between capital structure and firm value. Consequently, firms take corrective actions to remove deviations from the optimal capital structure. However, if the benefits of moving towards an optimal capital structure do not overweight its costs, firms will not take any actions to adjust their capital structure (Flannery and Rangan, 2006). Based on the agency cost theory, information asymmetry between executives and investors worsens the problem of adverse selection, leads to more financing frictions and ultimately restricts firms' ability to finance through equity markets. In other words, information asymmetry affects corporate capital structure decisions (Myers, 1984; Myers and Majluf, 1984; Noe, 1988; Cooney Jr and Kalay, 1993; Nachman and Noe, 1994). Therefore, financing frictions can distort firms' capital structure from its optimal level (Synn and Williams, 2015). The agency costs theory suggest that with increasing level of debt, in the hope of achieving more future cash flows, shareholders will take on riskier plans. Since the decisions on new investments, dividends policy, and issuing bonds is on the shareholders; some conflicts may arise between shareholders and creditors. Shareholders are considered to be the last claimants of firms' cash flows, and they may attempt to increase their wealth even at the cost of creditors. On the other hand, creditors are trying to mitigate this issue by incorporating restrictive provisions on debt contracts (Frydenberg, 2011). Based on the pecking order and market timing theories, the capital structure is irrelevant to the firm value, and thus managers do not attempt to modify it (Welch, 2004). Pecking order theory suggests that firms use a hierarchical financing plan to minimize adverse selection costs (Graham and Leary, 2011, p. 310). This theory suggests that information asymmetry causes the capital market to underprice the firm shares. Thus managers finance their investment projects, first through internally generated funds, then debt, and only raising equity as a last resort. According to this theory, firms do not have any preferences in their capital structure (Flannery and Rangan, 2006). Besides pecking order theory, market timing theory also rejects the concept of optimal capital structure. Based on the market timing theory, Baker and Wurgler (2002) argue that the firm's capital structure reflects its ability to sell its overpriced stocks. This means that stock price is fluctuating around its true value, and managers only tend to issue new shares when the equity market value is greater than its book value. The market timing theory claims that managers use information asymmetry to secure the interests of the current shareholders.

In a frictionless market with no information asymmetry, firms' capital structure does not affect their value (Modigliani and Miller, 1958). However, in markets with asymmetric information, adverse selection influences the firms' capital structure (Myers, 1984; Myers and Majluf, 1984; Noe, 1988; Cooney Jr and Kalay, 1993; Nachman and Noe, 1994). In other words, with increasing information asymmetry between internal managers and external investors, firms face with more financing frictions, which affect their capital structure and consequently, their values (Agarwal and O'Hara, 2007; Bharath et al., 2008). van Binsbergen et al. (2010) argue that financing frictions may lead to a capital structure that deviates from its optimal level. The conflicts of interest between shareholders and managers may affect shareholders interest. Since opaque financial reporting can help managers to retain their interests, they tend to manipulate earnings (Gopalan and Jayaraman, 2012). Therefore, earnings manipulation makes information on cash flows private to insiders and facilitates financing sub-optimal investments and tunneling activities (An et al., 2016). Furthermore, by increasing opacity in financial reporting, earnings manipulation exacerbates information asymmetry between corporate insiders and outsiders (Abad et al., 2018), intensifies adverse selection and increases the financing frictions in both debt and equity markets, and finally increases the leverage deviation (Synn and Williams, 2015). In this regard, An et al. (2016) find a positive association between earnings manipulation and firm leverage; and Petacchi (2015) shows that as the information asymmetry rises between managers and investors, debt plays a more important role in the firm capital structure. Aflatooni and Khazaei (2019) find that deviation from target leverage in firms with small positive earnings is higher than that of other firms. In particular, we find that the negative (positive) deviation from target leverage in SPOS is lower (higher) than that of other firms. Hussain et al. (2020) show that established findings in the dynamic trade-off theory does not hold for Shari'ah compliant firms. Shari'ah compliant firms increase their reliance on equity financing at greater levels than non-compliant firms when they are above target levels and equities are overpriced.

We contribute to the literature on the capital structure and financing behavior of firms engaged in earnings manipulation by examining the impact of the real and accrual-based earnings management on firms' leverage and leverage deviation, a subject that has not been investigated in any other emerging markets. We provide evidence that the real activities manipulation and accrual-based earnings manipulation are positively (negatively) associated with positive (negative) leverage deviation. We argue that by increasing information asymmetry, earnings manipulation cause firms to face more difficulties in their financing, especially from equity markets. As a result, to meet their financial needs, firms rely more on debt markets. Therefore, firms that engage in earnings manipulation activities tend to use more debt in their capital structure. Also, by increasing information asymmetry and exacerbating financing frictions, earnings manipulation makes it difficult for firm managers to achieve an optimal capital structure. Finally, we expect that increase in earnings manipulation, leads to an over-levered capital structure. Therefore, we predict that earnings manipulation is positively associated with firms' leverage and leverage deviation. In particular, we predict that earnings manipulation decreases (increases) the firms' negative (positive) deviations from the optimal capital structure. Accordingly, the research hypotheses are as follows:

Hypothesis I: Earnings manipulation is positively associated with firms' leverage, ceteris paribus.

Hypothesis II: Earnings manipulation is positively associated with firms' leverage deviation, ceteris paribus.

Hypothesis III: Earnings manipulation is positively (negatively) associated with positive (negative) leverage deviation, ceteris paribus.

3. Methodology

3.1. Sample

We retrieve financial statements data from CODAL, RDIS[1] and Rahavard Nowin database, and share price data from Tehran Stock Exchange over the period 2006-2019. The initial sample consists of 6,678 observations. We exclude banks, financial firms and regulated utilities from the sample. Delisted firms, industry-years with fewer than ten observations and firm-years with a negative equity book value are omitted from our sample. Finally, to reduce the potential impact of outliers, we winsorize all variables at the 1st and 99th percentiles. This process reduces our sample to 4,508 firm-year observations that are grouped into 15 industries. See Table1 for details.

Table 1. Sample selection procedure and industry distribution

Panel A: Sample selection procedure

	Number of observations
Initial sample during 2006-2019	6678
Delisted firms	(168)
Banks, financial firms and regulated utilities	(826)
Industry-years with fewer than 10 observations	(434)
Firm-years with a negative equity book value	(308)
Firm-years with missing values	(434)
Total observations in the final analysis	4508

Panel B: Industry distribution

Industry classification:	Number of observations	% Distribution
Agriculture and related services	168	3.73
Metal products	448	9.94
Non-metallic mineral	266	5.90
Equipment and machinery	210	4.66
Telecommunications	434	9.63
Automobile and parts	462	10.25
Medical tools and pharmaceutical	294	6.52
Chemical	378	8.39
Information and communication	238	5.28
Textiles	154	3.42
Rubber and plastic	350	7.76
Electrical appliances	196	4.35
Cement	364	8.07
Real estates	238	5.28
Accommodation, Cafes and Restaurants	308	6.83
Total	4508	100

3.2. Model specification

3.2.1. Accrual-based earnings manipulation

To consider the accrual-based earnings manipulation, we use the Jones (1991), Modified Jones by Dechow et al. (1995) and Kothari et al. (2005) specifications as follows, respectively:

$$TACC_{it} = \alpha_0 + \alpha_1 1/A_{it-1} + \alpha_2 \Delta REV_{it} + \alpha_3 PPE_{it} + \varepsilon_{1it} \quad (1)$$

$$TACC_{it} = \beta_0 + \beta_1 1/A_{it-1} + \beta_2 (\Delta REV_{it} - \Delta REC_{it}) + \beta_3 PPE_{it} + \varepsilon_{2it} \quad (2)$$

$$TACC_{it} = \gamma_0 + \gamma_1 1/A_{it-1} + \gamma_2 (\Delta REV_{it} - \Delta REC_{it}) + \gamma_3 PPE_{it} + \gamma_4 ROA_{it} + \varepsilon_{3it} \quad (3)$$

where $TACC_{it}$ is total accruals, REV_{it} (REC_{it}) is sales revenue (receivables), and ΔREV_{it} (ΔREC_{it}) is defined as $REV_{it} - REV_{it-1}$ ($REC_{it} - REC_{it-1}$), PPE_{it} is property, plants and equipment and ROA_{it} is the return on assets for firm i at the end of year t. All these variables (except for ROA_{it}) are scaled by total assets at the end of year t-1 (A_{it-1}). We estimate these cross-sectional regressions for all 210 industry-years. After estimating model (1), to infer discretionary accruals from the Jones (1991) model, we use industry and year specific parameter estimates $\hat{\alpha}_0$, $\hat{\alpha}_1$, $\hat{\alpha}_2$, and $\hat{\alpha}_3$ as follows:

$$DAJ_{it} = |TACC_{it} - \hat{\alpha}_0 - \hat{\alpha}_1 1/A_{it-1} - \hat{\alpha}_2 \Delta REV_{it} - \hat{\alpha}_3 PPE_{it}| = |\varepsilon_{1it}|$$

After estimating model (2), we use the parameter estimates $\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$ to calculate discretionary accruals from Modified Jones model via:

$$DAMJ_{it} = \left|TACC_{it} - \hat{\beta}_0 - \hat{\beta}_1\, 1/A_{it-1} - \hat{\beta}_2(\Delta REV_{it} - \Delta REC_{it}) - \hat{\beta}_3 PPE_{it}\right| = |\varepsilon_{2it}|$$

Following Cohen et al. (2008) and Anagnostopoulou and Tsekrekos (2017), we subtract ΔREC_{it} from ΔREV_{it} before estimating model (2). After estimating model (3), to calculate discretionary accruals from Kothari et al. (2005) model, we use the parameter estimates $\hat{\gamma}_0$, $\hat{\gamma}_1$, $\hat{\gamma}_2$, $\hat{\gamma}_3$, and $\hat{\gamma}_4$ as follows:

$$DAK_{it} = |TACC_{it} - \hat{\gamma}_0 - \hat{\gamma}_1\, 1/A_{it-1} - \hat{\gamma}_2(\Delta REV_{it} - \Delta REC_{it}) - \hat{\gamma}_3 PPE_{it} - \hat{\gamma}_4 ROA_{it}| = |\varepsilon_{3it}|$$

Finally, we define AEM_{it} as the set of accrual-based earnings manipulation measures (i.e., $AEM_{it} = \{DAJ_{it}, DAMJ_{it}, DAK_{it}\}$).

3.2.2. Real activities manipulation

To consider real earnings manipulation, we focus on sales manipulation, overproduction and abnormal reduction in discretionary expenses. More specifically, following Roychowdhury (2006), Cohen et al. (2008) and Cupertino et al. (2015), we define the abnormal levels of cash from operations, production costs and discretionary expenses as residuals from the following regression models, respectively:

$$CFO_{it} = \delta_0 + \delta_1\, 1/A_{it-1} + \delta_2 REV_{it} + \delta_3 \Delta REV_{it} + \varepsilon_{4it} \quad (4)$$

$$PROD_{it} = \theta_0 + \theta_1\, 1/A_{it-1} + \theta_2 REV_{it} + \theta_3 \Delta REV_{it} + \theta_4 \Delta REV_{it-1} + \varepsilon_{5it} \quad (5)$$

$$DISEXP_{it} = \vartheta_0 + \vartheta_1\, 1/A_{it-1} + \vartheta_2 REV_{it-1} + \varepsilon_{6it} \quad (6)$$

where CFO_{it} is cash from operations, $PROD_{it}$ is production costs, which is defined as the sum of cost of goods sold and change in inventory during the year t, $DISEXP_{it}$ is discretionary expenses, which includes selling, general and administrative expenses, advertising expenses, and R&D expenses. Other variables are defined in the previous section. All these variables are scaled by total assets at the end of year t-1 (A_{it-1}). We first estimate models (4), (5) and (6) for all 210 industry-years, then using the estimated parameters we calculate the abnormal levels of cash from operations ($ACFO_{it}$), abnormal production costs ($APROD_{it}$) and abnormal discretionary expenses ($ADISEXP_{it}$), as follows:

$$ACFO_{it} = -\left(CFO_{it} - \hat{\delta}_0 - \hat{\delta}_1\, 1/A_{it-1} - \hat{\delta}_2 REV_{it} - \hat{\delta}_3 \Delta REV_{it}\right) = -\varepsilon_{4it}$$

$$APROD_{it} = PROD_{it} - \hat{\theta}_0 - \hat{\theta}_1\, 1/A_{it-1} - \hat{\theta}_2 REV_{it} - \hat{\theta}_3 \Delta REV_{it} - \hat{\theta}_4 \Delta REV_{it-1} = \varepsilon_{5it}$$

$$ADISEXP_{it} = -\left(DISEXP_{it} - \hat{\vartheta}_0 - \hat{\vartheta}_1\, 1/A_{it-1} - \hat{\vartheta}_2 REV_{it-1}\right) = -\varepsilon_{6it}$$

For comparability purposes, the first and third measures are multiplied by -1. With these definitions, the higher value of above measures exhibits the greater possibility that a firm is engaged in RAM activities. Finally, we define REM_{it} as the set of real earnings manipulation measures (i.e., $REM_{it} = \{ACFO_{it}, APROD_{it}, ADISEXP_{it}\}$).

3.2.3. Optimal leverage regression

Following Byoun (2008), Uysal (2011) and Zhou et al. (2016), we estimate the optimal levels of capital structure ($\widehat{LEV}_{it+1}$) as the fitted values from the regression of leverage ratio on determinants of capital structure (Z_{it}) specified as follows:

$$LEV_{it+1} = \omega + \psi Z_{it} + \zeta_{it+1} \quad , \quad LEV_{it+1} = \{BL_{it+1}, ML_{it+1}\} \quad (7)$$

We define LEV_{it+1} as the set of firms' leverage ratio: $LEV_{it+1} = \{BL_{it+1}, ML_{it+1}\}$. Following Flannery and Rangan (2006), An et al. (2016) and Zalaghi et al. (2019) book leverage (BL_{it}) is defined as the book value of total debt scaled by book value of total assets and market leverage (ML_{it}) is defined as the book value of total debt scaled by the sum of the book value of debt and market value of equity. Following Flannery and Rangan (2006), Marchica and Mura (2010) and Zhou et al. (2016), we consider some independent variables in estimating regression (7), including earnings before interest and tax scaled by total assets (EBIT), market to book value of equity (MTB), assets' tangibility defined as fixed assets scaled by total assets (TANG), depreciation expenses as a proportion of total assets (DEP), effective tax rate defined as the ratio of current income taxes to income before taxes (TAXR), firm size defined as the logarithm of total revenue (LNREV), asset liquidity defined as the ratio of current assets to current liabilities (LIQ) and median industry book (market) leverage for a given industry-year, IBL (IML). After estimating this cross-sectional regression for every industry-year, total deviation from the optimal capital structure is defined via:

$$DLEV_{it+1} = \left|LEV_{it+1} - \widehat{LEV}_{it+1}\right| = \left|LEV_{it+1} - \hat{\omega} - \hat{\psi} Z_{it}\right| = |\zeta_{it+1}|$$

We define $DLEV_{it+1} = \{DBL_{it+1}, DML_{it+1}\}$ as a set of firms' leverage deviation includes book leverage deviation (DBL_{it+1}) and market leverage deviation (DML_{it+1}). Furthermore, we define $OLEV_{it+1} = \{OBL_{it+1}, OML_{it+1}\}$ ($ULEV_{it+1} = \{UBL_{it+1}, UML_{it+1}\}$) as the set of firms' positive (negative) leverage deviation. More specifically, we define positive residuals from model (7) as the positive deviation from the optimal leverage (i.e.,$OLEV_{it+1} = \zeta_{it+1}\ if\ \zeta_{it+1} \geq 0$); and absolute value of negative residuals from model (7) as the negative deviation from the optimal leverage (i.e.,$ULEV_{it+1} = |\zeta_{it+1}|\ if\ \zeta_{it+1} < 0$).

3.2.4. Earnings manipulation and firms' leverage

To test **Hypothesis I,** we estimate models (8) and (9). More specifically, we use model (8) to examine the association between AEM and firms' leverage; and we estimate model (9) to investigate the association between RAM and firms' leverage:

$$LEV_{it+1} = \omega + \eta_1 AEM_{it} + \psi Z_{it} + \varepsilon_{it+1} \quad (8)$$

$$LEV_{it+1} = \omega + \eta_2 REM_{it} + \psi Z_{it} + \varepsilon_{it+1} \quad (9)$$

We enter eight factors (Z_{it}) affecting the firms' leverage, as control variables in models (8) and (9). We estimate these models using Pooled OLS, 2SLS and GMM estimators and control for industry and year fixed effects. According to Hypothesis I, we expect a positive sign for $\eta_1$and η_2 in models (8) and (9), respectively.

3.2.5. Earnings manipulation and firms' leverage deviation

To examine the association between AEM and firms' leverage deviation, we use model (10) and to investigate the association between RAM and firms' leverage deviation, we estimate model (11), as follows:

$$DLEV_{it+1} = \omega + \phi_1 AEM_{it} + \psi Z_{it} + \varepsilon_{it+1} \quad (10)$$

$$DLEV_{it+1} = \omega + \phi_2 REM_{it} + \psi Z_{it} + \varepsilon_{it+1} \quad (11)$$

Since $DLEV_{it+1}$ in the above models is essentially the absolute value of residuals from model (7), to gain unbiased coefficients and standard errors, following Chen et al. (2018), we enter the firms' leverage determinants from model (7) as control variables into models (10) and (11). We estimate these models using Pooled OLS, 2SLS and GMM estimators and control for industry and year fixed effects. According to **Hypothesis II**, we expect a positive sign for $\phi_1$and ϕ_2 in models (10) and (11), respectively.

3.2.6. Earnings manipulation and firms' positive/negative leverage deviation

To examine the association between the proxies for earnings manipulation (i.e., AEM and RAM) and firms' positive leverage deviation, we estimate model (12). Furthermore, to investigate the association between earnings manipulation measures and firms' negative leverage deviation, we use model (13):

$$OLEV_{it+1} = \omega + \varphi_1 \langle AEM_{it}, REM_{it} \rangle + \psi Z_{it} + \varepsilon_{it+1} \quad (12)$$

$$ULEV_{it+1} = \omega + \varphi_2 \langle AEM_{it}, REM_{it} \rangle + \psi Z_{it} + \varepsilon_{it+1} \quad (13)$$

In estimating models (12) and (13), industry and year effects are controlled by adding industry and year dummies to the regression models. We estimate these models using Pooled OLS, 2SLS and GMM estimators. According to **Hypothesis III**, we expect a positive sign for φ_1 in model (12) and a negative sign for φ_2 in model (13).

4. Results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics (mean, standard deviation, minimum, 25th, 50th, and 75th percentile values and maximum) for the key variables over the period 2006-2019.

The mean for BL (0.6027) shows that about 60% of firms' financial resources are financed from debts. The mean for ML (0.4288) indicates that the market value of equity is on average 1.32 times that of debt. The mean (median) values for DBL and DML are between 10% (8%) and 12% (10%). Earnings before interest and tax, assets' tangibility, and depreciation expenses represent 18.37%, 26.22% and 11.80% of total assets, respectively. The mean for MTB (3.4659) indicates that the market value of equity is on average 3.47 times that of its book value. The mean for LIQ (1.4047) shows that current assets are on average 1.40 times of current liabilities. All accrual-based earnings manipulation measures exhibit mean values between 8% and 11% of total assets; and all proxies for real earnings manipulation show mean values between -0.19% and 0.03% of total assets. In Table 3, Panel A reports the correlation coefficients between leverage/leverage deviations and earnings manipulation measures. The results show that the proxies for real and accrual-based earnings manipulation measures are in general positively correlated with leverage and leverage deviation measures. Correlations between real and accrual-based earnings manipulation measures are generally positive and significant. These results are mainly consistent with Anagnostopoulou and Tsekrekos (2017). In Table 3, Panel B represents the correlation coefficients among the determinants of firms' leverage.

Table 2. Descriptive statistics for the main variables

Variables	N	Mean	SD	Min.	Q1	Median	Q3	Max
BL_{it+1}	4508	0.6027	0.2121	0.0501	0.4687	0.6337	0.7618	0.9730
ML_{it+1}	4508	0.4288	0.2299	0.0333	0.2364	0.4149	0.6080	0.9047
DBL_{it+1}	4186	0.1060	0.0853	0.0000	0.0408	0.0881	0.1516	0.6550
DML_{it+1}	4186	0.1156	0.0906	0.0000	0.0452	0.0967	0.1666	0.5864
$EBIT_{it}$	4508	0.1837	0.1517	-0.2691	0.0932	0.1707	0.2691	0.6045
MTB_{it}	4508	3.4659	4.0052	0.4094	1.2933	2.2476	3.9828	26.7180
$TANG_{it}$	4508	0.2622	0.2130	0.0005	0.0996	0.2064	0.3737	0.9078
DEP_{it}	4508	0.1180	0.0502	0.0039	0.0813	0.1137	0.1489	0.2690
$TAXR_{it}$	4508	0.1021	0.0928	0.0000	0.0074	0.0946	0.1941	0.2918
$LNREV_{it}$	4508	5.5552	0.7984	3.4607	5.0470	5.5224	6.0198	7.7451
LIQ_{it}	4508	1.4047	1.3044	0.1022	0.8250	1.1242	1.4967	9.9485
IBL_{it}	4508	0.6181	0.0960	0.2858	0.5620	0.6395	0.6912	0.8151
IML_{it}	4508	0.4328	0.1553	0.0705	0.3170	0.4174	0.5636	0.8002
AEM measures:								
DAJ_{it}	4508	0.0994	0.1056	0.0000	0.0233	0.0688	0.1391	0.8123
$DAMJ_{it}$	4508	0.1011	0.1085	0.0000	0.0236	0.0685	0.1412	0.7940
DAK_{it}	4508	0.0879	0.0963	0.0000	0.0187	0.0596	0.1257	0.7690
RAM measures:								
$ACFO_{it}$	4508	-0.0018	0.1325	-0.6446	-0.0639	0.0005	0.0663	0.6325
$APROD_{it}$	4508	0.0002	0.1358	-1.9224	-0.0603	0.0000	0.0574	1.2265
$ADISEXP_{it}$	4508	-0.0013	0.0391	-0.2419	-0.0109	0.0021	0.0181	0.1459

Table 3. Correlation coefficients

Panel A: Correlations coefficients between leverage/leverage deviation and earnings manipulation measures

	BL_{it+1}	ML_{it+1}	DBL_{it+1}	DML_{it+1}	DAJ_{it}	$DAMJ_{it}$	DAK_{it}	$ACFO_{it}$	$APROD_{it}$
ML_{it+1}	0.7124***	-							
DBL_{it+1}	0.1125***	0.0340*	-						
DML_{it+1}	0.0344*	0.1138***	0.4849***	-					
DAJ_{it}	0.0183***	0.0355**	0.0561***	0.0224**	-				
$DAMJ_{it}$	0.0153**	0.0418**	0.0507**	0.0221**	0.9048***	-			
DAK_{it}	-0.0046	0.0297*	0.0287*	0.0010	0.7507***	0.7930***	-		
$ACFO_{it}$	0.1537***	0.2234***	0.0094	0.0359*	0.0765***	0.0885***	0.0556***	-	
$APROD_{it}$	0.2069***	0.2471***	-0.0085	0.0474**	0.0496***	0.0320*	0.0281***	0.4243***	-
$ADISEXP_{it}$	0.0706***	-0.0012	0.0519**	0.0481**	0.0286*	0.0497**	0.0395	-0.0049	0.2146***

Panel B: Correlations coefficients of firms' leverage determinants

	$EBIT_{it}$	MTB_{it}	$TANG_{it}$	DEP_{it}	$TAXR_{it}$	$LNREV_{it}$	LIQ_{it}	IBL_{it}
MTB_{it}	0.2546***	-						
$TANG_{it}$	-0.0810***	0.0255*	-					
DEP_{it}	-0.0552***	0.0231	0.3962***	-				
$TAXR_{it}$	0.3890***	-0.0167	0.0219	0.0317**	-			
$LNREV_{it}$	0.3018***	-0.0374**	0.0387***	0.0286**	0.1724***	-		
LIQ_{it}	0.1090***	-0.1230***	-0.2315***	-0.1827***	-0.0589***	-0.0282**	-	
IBL_{it}	-0.0621***	0.0664***	0.0015	-0.0011	0.0528***	-0.1246***	-0.2001***	-
IML_{it}	-0.2009***	-0.3364***	-0.0270**	-0.0175	0.0415***	-0.0934***	-0.1436***	0.5012***

*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.

4.2. Model estimation

4.2.1. AEM and RAM model estimations

In table 4, Panel A reports the regression results for Jones, Modified Jones and Kothari models, and Panel B represents the regression results for real earnings manipulation models. The models are estimated for all 210 industry-years over the period 2006-2019. More specifically, this table reports the mean coefficient estimates, associated t-statistics (enclosed in parentheses), and the mean adjusted R^2s across industry-years for each of the regression models. The sign of regression coefficients for accrual models are consistent with previous literature (e.g., Jones, 1991; Dechow et al., 1995; Kothari et al., 2005) and the sign of coefficient estimates for real earnings manipulation models are largely consistent with the findings of Roychowdhury (2006) and Cohen et al. (2008).

4.2.2. Optimal leverage estimation

In table 5, Panels A and B report the estimated results for book and market leverage regressions, respectively. The first column of each panel shows the predicted sign for regression coefficient according to the literature, and the second column represents the mean coefficient estimates, associated t-statistics (in parentheses), and the mean adjusted R^2s across industry-years for each of the regression models. The sign for coefficient estimates (except for TANG) are consistent with previous literature (e.g., Flannery and Rangan, 2006; Öztekin and Flannery, 2012; Zhou et al., 2016).

Table 4. The estimation results of real and accrual-based earnings manipulation models

Variable	Panel A			Panel B		
	Jones	Modified Jones	Kothari	CFO	PROD	DISEXP
Intercept	0.0137*** (3.59)	0.0277*** (7.84)	-0.0323*** (-9.73)	0.0695*** (17.88)	-0.0907*** (-21.32)	0.0264*** (5.98)
$1/A_{it-1}$	-0.9751** (-2.30)	-0.9477*** (-11.28)	-0.2195 (-0.85)	-1.4983*** (-6.11)	1.2710*** (5.40)	2.5933*** (6.43)
REV_{it}				0.0482*** (14.16)	0.9301*** (5.46)	
REV_{it-1}						0.0269*** (6.34)
ΔREV_{it}	0.1148*** (15.00)			0.0338*** (4.95)	-0.0830** (-2.42)	
ΔREV_{it}-ΔREC_{it}		0.0231** (2.04)	-0.0531*** (-9.97)			
ΔREV_{it-1}					-0.0535*** (-9.06)	
PPE_{it}	-0.0986* (-1.88)	-0.0986*** (-15.80)	-0.1030** (-2.10)			
ROA_{it}			0.4271*** (24.10)			
Adjusted R^2	0.22	0.26	0.35	0.41	0.87	0.38

Table 5. Book/market leverage regression

Variable	Panel A Book leverage (BL) regression		Panel B Market leverage (ML) regression	
	Sign in the literature	Estimated coefficient	Sign in the literature	Estimated coefficient
Intercept		0.4521*** (13.37)		0.4352*** (19.15)
$EBIT_{it}$	-	-0.3339*** (-17.15)	-	-0.4581*** (-17.79)
MTB_{it}	-	0.0036* (1.84)	-	-0.0088*** (-13.13)
$TANG_{it}$	+	-0.1533*** (-7.38)	+	-0.1996*** (-9.45)
DEP_{it}	-	-0.1389** (-2.39)	-	0.0284 (0.43)
$TAXR_{it}$	+	0.1653*** (6.36)	+	0.1122*** (3.02)
$LNREV_{it}$	+	0.0185*** (4.66)	+	0.0180*** (4.70)
LIQ_{it}	-	-0.1119*** (-22.26)	-	-0.0911** (-2.42)

Variable	Panel A Book leverage (BL) regression: Sign in the literature	Panel A: Estimated coefficient	Panel B Market leverage (ML) regression: Sign in the literature	Panel B: Estimated coefficient
IBL_{it}	+	0.4940*** (21.19)		
IML_{it}			+	0.4409*** (21.87)
Adjusted R^2		0.57		0.61

4.2.3. Earnings manipulation and firms' leverage: portfolio analysis

Panel A (Panel B) of Table 6, reports the mean of AEM and RAM measures for five, annually rebalanced portfolios based on the levels of book (market) leverage.

In each column, portfolio 1 (5) consists of firms with the lowest (highest) leverage in every year. This table reports t-statistics (in parenthesis) to test the significance of differences in means of AEM and RAM measures in portfolios 1 and 5. The results show that, for all measures of earnings manipulation, the mean of AEM and RAM measures in portfolio 5 is significantly higher than that of portfolio 1. These findings provide the primary evidence in support of **Hypothesis I**.

4.2.4. The association between earnings manipulation and firms' leverage

In Table 7, Panel A (Panel B) reports the regression results of model (8) when BL (ML) is the dependent variable. Sub-panels A.1, A.2, and A.3 (and also B.1, B.2, and B.3) report the regression results when DAJ, DAMJ and DAK are used as AEM measures, respectively. In Table 8, Panel A (Panel B) reports the regression results of model (9) when BL (ML) is the dependent variable. Sub-panels A.1, A.2, and A.3 (and also B.1, B.2, and B.3) report the regression results when ACFO, APROD and ADISEXP are used as RAM measures, respectively. In each sub-panel of tables 7 and 8, the first (second) column presents the regression results using Pooled OLS (2SLS) estimator.

The Sargan over-identification test does not reject the validity of our instruments. Industry and year effects are controlled by adding industry and year dummies to the regression models. The robust t-statistics (presented in parentheses) are calculated using standard errors corrected for firm-level clustering. The adjusted R^2s and mean value of variance inflation factor (VIF) are also reported in the tables. The shaded rows highlight the main findings. **Hypothesis I** predicts a positive and significant association between earnings manipulation and leverage measures. Consistent with this, the estimated results for model (8) show that AEM measures (except for DAK using Pooled OLS) are positively associated with BL. Also, when the dependent variable is ML, the coefficients of AEM measures (except for DAK using Pooled OLS) are positive and significant. The estimation results for model (9) show that RAM measures (except for DAK using Pooled OLS) are positively associated with BL. The results also show that all RAM measures are positively associated with ML

Table 6. AEM and RAM measures in different portfolios of leverage

Panel A: Levels of book leverage	AEM: DAJ_{it}	AEM: $DAMJ_{it}$	AEM: DAK_{it}	RAM: $ACFO_{it}$	RAM: $APROD_{it}$	RAM: $ADISEXP_{it}$
Portfolios: BL_{it+1}						
1-Lowest	0.0615	0.0801	0.0791	-0.0357	-0.0573	-0.0446
2	0.0899	0.0905	0.0813	-0.0269	-0.0202	-0.0121
3	0.0828	0.0842	0.0829	0.0305	0.0048	-0.0258
4	0.0915	0.0930	0.0847	0.0596	0.0922	0.0073
5-Highest	0.1033	0.1049	0.0916	0.0731	0.0318	0.0405
Diff. Highest-Lowest	0.0418*** (7.61)	0.0247*** (4.42)	0.0125** (2.53)	0.1088*** (15.53)	0.0891*** (10.89)	0.0851*** (38.32)
Panel B: Levels of market leverage	AEM: DAJ_{it}	AEM: $DAMJ_{it}$	AEM: DAK_{it}	RAM: $ACFO_{it}$	RAM: $APROD_{it}$	RAM: $ADISEXP_{it}$
Portfolios: ML_{it+1}						
1-Lowest	0.0910	0.0911	0.0807	-0.0512	-0.0750	-0.0155
2	0.0913	0.0915	0.0839	-0.0264	-0.0227	-0.0120
3	0.0920	0.0912	0.0809	-0.0026	-0.0055	-0.0121
4	0.0929	0.0932	0.0849	0.0170	0.0105	0.0054
5-Highest	0.1092	0.1093	0.0911	0.0358	0.0299	0.0115
Diff. Highest-Lowest	0.0181***	0.0183***	0.0103**	0.0870***	0.1049***	0.0270***

Portfolios: BL_{it+1}	Panel A: Levels of book leverage AEM$_{it}$ DAJ$_{it}$	DAMJ$_{it}$	DAK$_{it}$	RAM$_{it}$ ACFO$_{it}$	APROD$_{it}$	ADISEXP$_{it}$
	(3.30)	(3.22)	(2.02)	(11.48)	(12.33)	(11.26)

*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.

Table 7. Accrual-based earnings manipulation and book/market leverage

Variable	Panel A: Book leverage (BL_{it+1}) Panel A.1 OLS	 Panel A.1 2SLS	 Panel A.2 OLS	 Panel A.2 2SLS	 Panel A.3 OLS	 Panel A.3 2SLS	Panel B: Market leverage (ML_{it+1}) Panel B.1 OLS	 Panel B.1 2SLS	 Panel B.2 OLS	 Panel B.2 2SLS	 Panel B.3 OLS	 Panel B.3 2SLS
Intercept	0.5539*** (11.82)	0.4702*** (7.24)	0.5564*** (11.99)	0.4618*** (7.90)	0.5597*** (13.54)	0.5091*** (6.62)	0.2986*** (7.53)	0.1583** (2.58)	0.3031*** (5.64)	0.1439 (0.98)	0.3040*** (5.62)	0.1861** (2.27)
DAJ$_{it}$	0.0264* (1.78)	0.0554** (1.98)					0.0629*** (2.67)	0.0276*** (13.97)				
DAMJ$_{it}$			0.0259* (1.68)	0.0623*** (2.89)					0.0555** (2.56)	0.0398** (2.35)		
DAK$_{it}$					-0.0138 (-0.08)	0.0111* (1.73)					0.0347 (1.48)	0.0342*** (3.25)
EBIT$_{it}$	-0.4053*** (-15.55)	-0.4188*** (-13.35)	-0.4087*** (-15.52)	-0.4372*** (-15.58)	-0.4042*** (-20.05)	-0.4899*** (-6.31)	-0.4942*** (-17.92)	-0.5529*** (-12.80)	-0.4968*** (-17.96)	-0.6214*** (-6.00)	-0.4875*** (-17.46)	-0.6031*** (-8.93)
MTB$_{it}$	0.0032*** (3.91)	0.0023* (1.93)	0.0032*** (3.95)	0.0028*** (4.24)	0.0032*** (4.56)	0.0022* (1.95)	-0.0111*** (-10.60)	-0.0138*** (-6.98)	-0.0132*** (-13.03)	-0.0150*** (-5.70)	-0.0133*** (-12.90)	-0.0135*** (-7.14)
TANG$_{it}$	-0.1511*** (-6.37)	-0.1294*** (-4.58)	-0.1530*** (-6.42)	-0.1313*** (-5.02)	-0.1549*** (-8.38)	-0.1161*** (-2.94)	-0.1781*** (-8.00)	-0.0733* (-1.92)	-0.1774*** (-7.56)	-0.0822 (-1.16)	-0.1790*** (-7.55)	-0.0951** (-2.13)
DEP$_{it}$	-0.0363 (-0.66)	-0.0141 (-0.22)	-0.0297 (-0.53)	0.0256 (0.43)	-0.0433 (-0.71)	-0.1355 (-0.97)	0.0848 (1.29)	0.0607 (0.47)	0.1177* (1.82)	0.1777 (0.82)	0.1138* (1.72)	0.0083 (0.05)
TAXR$_{it}$	0.2846*** (8.15)	0.3213*** (7.89)	0.2867*** (8.24)	0.3217*** (8.16)	0.2770*** (10.07)	0.3523*** (5.28)	0.2170*** (5.57)	0.3720*** (5.83)	0.2294*** (5.71)	0.2427*** (2.62)	0.2179*** (5.35)	0.3140*** (4.71)
LNREV$_{it}$	0.0387*** (7.99)	0.0346*** (6.09)	0.0389*** (8.11)	0.0335*** (6.17)	0.0387*** (11.54)	0.0323*** (5.32)	0.0494*** (7.86)	0.0401*** (5.41)	0.0486*** (7.39)	0.0333*** (2.61)	0.0495*** (7.50)	0.0408*** (3.94)
LIQ$_{it}$	-0.1204*** (-19.46)	-0.1229*** (-18.23)	-0.1201*** (-19.45)	-0.1219*** (-18.54)	-0.1219*** (-26.57)	-0.1185*** (-13.20)	-0.0924*** (-15.50)	-0.1115*** (-13.02)	-0.0932*** (-15.43)	-0.1170*** (-8.23)	-0.0952*** (-15.64)	-0.1234*** (-10.69)
IBL$_{it}$	0.2646*** (5.83)	0.3437*** (6.15)	0.2573*** (5.73)	0.3393*** (6.81)	0.2642*** (5.86)	0.2625*** (2.86)						
IML$_{it}$							0.3204*** (8.41)	0.4726*** (7.09)	0.1470*** (2.81)	0.4185*** (4.42)	0.1456*** (2.77)	0.4313*** (5.67)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.60	0.51	0.59	0.52	0.59	0.42	0.78	0.74	0.72	0.70	0.81	0.75
Mean VIF	1.67		1.78		1.75		1.88		1.91		1.87	
Sargan test		1.10		1.23		1.59		2.47		2.72		2.07
N	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186

*, ** and *** represent significance at the 10%, 5% and 1% level, respectively

Table 8. Real earnings manipulation and book/market leverage

Variable	Panel A: Book leverage (BL_{it+1}) Panel A.1 OLS	 Panel A.1 2SLS	 Panel A.2 OLS	 Panel A.2 2SLS	 Panel A.3 OLS	 Panel A.3 2SLS	Panel B: Market leverage (ML_{it+1}) Panel B.1 OLS	 Panel B.1 2SLS	 Panel B.2 OLS	 Panel B.2 2SLS	 Panel B.3 OLS	 Panel B.3 2SLS
Intercept	0.5305*** (11.35)	0.3878*** (5.00)	0.6212*** (15.22)	0.4901*** (8.64)	0.5579*** (12.52)	0.5822*** (9.80)	0.2796*** (6.96)	0.2305*** (4.16)	0.4396*** (10.99)	0.4261*** (10.03)	0.4076*** (10.50)	0.4733*** (12.33)
ACFO$_{it}$	0.1234*** (6.99)	0.0885*** (5.41)					0.0172*** (8.64)	0.0104*** (5.67)				
APROD$_{it}$			0.0947*** (5.31)	0.0975*** (5.31)					0.0163*** (7.78)	0.0388*** (10.08)		
ADISEXP$_{it}$					-0.0976 (-1.47)	0.1895** (2.32)					0.0151* (1.94)	0.0183*** (6.30)
EBIT$_{it}$	-0.3509*** (-12.98)	-0.0620 (-0.67)	-0.3220*** (-11.96)	0.1780* (1.73)	-0.3991*** (-15.40)	-0.3504*** (-11.49)	-0.4174*** (-14.27)	-0.0087 (-0.10)	-0.3892*** (-14.04)	-0.2586*** (-8.18)	-0.5184*** (-19.51)	-0.4451*** (-14.26)
MTB$_{it}$	0.0033*** (4.00)	0.0046*** (4.60)	0.0021** (2.24)	0.0006 (0.55)	0.0015** (2.43)	0.0033*** (3.67)	-0.0108*** (-10.38)	-0.0104*** (-8.13)	-0.0136*** (-13.36)	-0.0131*** (-10.12)	-0.0120*** (-11.17)	-0.0127*** (-13.27)
TANG$_{it}$	-	0.0022	-	-0.0565	-	-	-	0.0641	-	-	-	-

Variable	Panel A: Book leverage (BL_{it+1})						Panel B: Market leverage (ML_{it+1})					
	Panel A.1		Panel A.2		Panel A.3		Panel B.1		Panel B.2		Panel B.3	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	0.1313*** (-5.15)	(0.04)	0.1733*** (-7.21)	(-1.49)	0.1424*** (-5.85)	0.1635*** (-5.28)	0.1545*** (-6.49)	(1.44)	0.1661*** (-7.84)	0.1106*** (-4.73)	0.1420*** (-5.86)	0.2101*** (-7.73)
DEP_{it}	-0.0452 (-0.81)	-0.0365 (-0.47)	-0.0399 (-0.69)	-0.0844 (-0.99)	-0.0233 (-0.37)	-0.0445 (-0.63)	0.1078 (1.62)	0.0459 (0.40)	-0.0219 (-0.33)	-0.0198 (-0.25)	0.0713 (0.92)	0.0164 (0.20)
$TAXR_{it}$	0.2817*** (8.09)	0.2909*** (6.38)	0.2036*** (6.08)	0.0973** (2.13)	0.3220*** (8.65)	0.3170*** (6.48)	0.1880*** (4.67)	0.0850* (1.82)	0.1576*** (4.43)	0.1370*** (3.07)	0.2457*** (6.82)	0.1970*** (5.65)
$LNREV_{it}$	0.0367*** (7.03)	0.0262*** (3.87)	0.0283*** (5.65)	0.0082 (1.23)	0.0379*** (8.55)	0.0304*** (3.60)	0.0472*** (7.68)	0.0348*** (5.79)	0.0415*** (7.03)	0.0428*** (6.94)	0.0501*** (8.48)	0.0409*** (7.00)
LIQ_{it}	-0.1184*** (-19.56)	-0.1008*** (-14.29)	-0.1300*** (-23.74)	-0.1125*** (-17.62)	-0.1162*** (-21.75)	-0.1160*** (-19.30)	-0.0889*** (-14.39)	-0.0745*** (-11.00)	-0.1025*** (-16.47)	-0.0957*** (-18.61)	-0.0853*** (-20.79)	-0.1011*** (-22.25)
IBL_{it}	0.2823*** (6.32)	0.3380*** (5.65)	0.2662*** (6.94)	0.3893*** (6.51)	0.2960*** (7.37)	0.2675*** (4.21)						
IML_{it}							0.3204*** (8.49)	0.3898*** (7.78)	0.3431*** (9.38)	0.3061*** (7.24)	0.3248*** (7.70)	0.3545*** (8.42)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.59	0.72	0.65	0.56	0.78	0.71	0.69	0.80	0.74	0.73	0.76	0.71
Mean VIF	1.73		1.68		1.61		1.94		2.03		1.55	
Sargan test		1.46		1.94		3.28		4.21		1.20		1.53
N	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186
*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.												

4.2.5. Earnings manipulation and leverage deviation: portfolio analysis

Panel A (Panel B) of Table 9, represents the mean of AEM and RAM measures for five, annually rebalanced portfolios based on the levels of book (market) leverage deviation. In each column, portfolio 1 (5) consists of firms with the lowest (highest) leverage deviation in every year. The results show that, for each measure of earnings manipulation (except for DAJ and ADISEXP in Panel A and ADISEXP in Panel B), the mean of AEM and RAM measures in portfolio 5 is significantly higher than that of portfolio 1. These results provide the primary evidence in support of **Hypothesis II**.

4.2.6. The association between earnings manipulation and firms' leverage deviation

In Table 10, Panel A (Panel B) reports the regression results of model (10) when DBL (DML) is the dependent variable. Sub-panels A.1, A.2 and A.3 (and also B.1, B.2 and B.3) report the regression results when DAJ, DAMJ and DAK are used as AEM measures, respectively. In Table 11, Panel A (Panel B) reports the regression results of model (11) when DBL (DML) is the dependent variable. Sub-panels A.1, A.2 and A.3 (and also B.1, B.2 and B.3) report the regression results when ACFO, APROD and ADISEXP are used as RAM measures, respectively.

In each sub-panel of tables 10 and 11, the first (second) column reports the regression results using Pooled OLS (2SLS) estimator. The Sargan over-identification test does not reject the validity of our instruments. Industry and year fixed effects are controlled in each regression model. The robust t-statistics (enclosed in parentheses) are calculated using standard errors corrected for firm-level clustering. We also report the adjusted R^2s and mean value of variance inflation factor (VIF). The shaded rows highlight our main findings. **Hypothesis II** predicts a positive and significant association between earnings manipulation and leverage deviation measures. Consistent with this, the estimated results for model (10) show that all AEM measures are positively associated with DBL. Also, when the dependent variable is DML, the coefficients of AEM measures (except for DAK using Pooled OLS) are positive and significant. The estimated results for model (11) show that RAM measures (except for ACFO using Pooled OLS) are positively associated with DBL and DML.

Table 9. AEM and RAM measures in different portfolios of leverage deviation

Panel A: Levels of book leverage deviation						
	AEM_{it}			RAM_{it}		
Portfolios: DBL_{it+1}	DAJ_{it}	$DAMJ_{it}$	DAK_{it}	$ACFO_{it}$	$APROD_{it}$	$ADISEXP_{it}$
1-Lowest	0.0887	0.0947	0.0810	-0.0260	-0.0110	-0.0022
2	0.0919	0.0889	0.0814	-0.0128	-0.0145	-0.0177
3	0.0922	0.0950	0.0886	-0.0140	0.0140	-0.0142
4	0.0973	0.0983	0.0859	0.0032	0.0195	0.0056
5-Highest	0.0981	0.1098	0.0971	0.0175	0.0266	0.0018
Diff. Highest-Lowest	0.0094 (1.39)	0.0151** (2.14)	0.0162** (2.48)	0.0435*** (4.79)	0.0377*** (4.02)	0.0041 (1.34)
Panel B: Levels of market leverage deviation						
	AEM_{it}			RAM_{it}		
Portfolios: DML_{it+1}	DAJ_{it}	$DAMJ_{it}$	DAK_{it}	$ACFO_{it}$	$APROD_{it}$	$ADISEXP_{it}$
1-Lowest	0.0849	0.0880	0.0914	-0.0365	-0.0257	-0.0014
2	0.0965	0.0986	0.0825	-0.0148	-0.0233	-0.0052
3	0.0966	0.0977	0.0917	-0.0025	-0.0209	-0.0027
4	0.0883	0.0890	0.0933	0.0161	-0.0160	0.0031
5-Highest	0.1008	0.1035	0.0989	0.0169	0.0119	0.0025
Diff. Highest-Lowest	0.0159** (2.36)	0.0155** (2.18)	0.0076* (1.85)	0.0535*** (5.94)	0.0376*** (4.12)	0.0039 (1.25)
*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.						

Table 10. Accrual-based earnings manipulation and book/market leverage deviation

Variable	Panel A: Book leverage deviation (DBL_{it+1})						Panel B: Market leverage deviation (DML_{it+1})					
	Panel A.1		Panel A.2		Panel A.3		Panel B.1		Panel B.2		Panel B.3	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Intercept	0.0671*** (2.87)	0.0284 (0.57)	0.0685*** (3.02)	-0.0662** (-2.04)	0.0600*** (2.74)	-0.0202 (-0.57)	0.1170*** (4.21)	0.0825*** (5.24)	0.1162*** (4.18)	0.0528*** (3.16)	0.1240*** (5.60)	0.0452** (2.14)
DAJ_{it}	0.0262** (2.03)	0.0696*** (5.96)					0.0026* (1.77)	0.0223** (2.23)				
$DAMJ_{it}$			0.0285** (2.31)	0.0906*** (4.37)					0.0025* (1.82)	0.0389*** (6.46)		
DAK_{it}					0.0264*** (3.08)	0.0416*** (2.68)					-0.0104 (-0.54)	0.0442** (2.06)
$EBIT_{it}$	-0.0160 (-1.23)	-0.0583*** (-4.04)	-0.0150 (-1.15)	-0.0533*** (-3.38)	-0.0181 (-1.38)	-0.0718** (-2.05)	-0.0613** (-2.41)	-0.0683*** (-4.54)	-0.0604** (-2.38)	-0.0891*** (-6.26)	-0.0609*** (-3.56)	-0.0913*** (-5.50)
MTB_{it}	0.0007 (1.44)	0.0096* (1.67)	0.0007 (1.49)	0.0011** (2.01)	0.0007 (1.48)	0.0069** (1.97)	0.0013 (1.63)	0.0164*** (2.92)	0.0013 (1.61)	0.0245*** (3.71)	0.0012** (1.99)	0.0237*** (3.53)
$TANG_{it}$	-0.0370*** (-3.21)	-0.0025 (-0.18)	-0.0364*** (-3.14)	-0.0071 (-0.37)	-0.0352*** (-3.05)	-0.0364*** (-2.65)	-0.0403** (-2.04)	-0.0238* (-1.77)	-0.0407** (-2.07)	-0.0111 (-0.86)	-0.0390** (-2.38)	-0.0199 (-1.30)
DEP_{it}	0.0469 (1.20)	0.1429*** (3.26)	0.0452 (1.16)	0.1196** (2.46)	0.0395 (1.01)	0.1134* (1.71)	0.0079 (0.14)	0.0105 (0.24)	0.0111 (0.19)	-0.0235 (-0.45)	-0.0089 (-0.15)	-0.0120 (-0.24)
$TAXR_{it}$	-0.1259*** (-7.32)	-0.0870*** (-4.02)	-0.1204*** (-6.98)	-0.0854*** (-3.69)	-0.1218*** (-7.35)	-0.0842** (-2.36)	-0.1030*** (-2.72)	-0.0754*** (-3.87)	-0.1028*** (-2.73)	-0.0485** (-2.48)	-0.1064*** (-4.28)	-0.0687*** (-3.21)
$LNREV_{it}$	-0.0030 (-1.21)	-0.0052* (-1.66)	-0.0031 (-1.22)	-0.0036 (-1.06)	-0.0029 (-1.13)	0.0015 (0.55)	-0.0029 (-0.68)	-0.0024 (-0.84)	-0.0030 (-0.70)	-0.0006 (-0.24)	-0.0032 (-1.01)	0.0013 (0.43)
LIQ_{it}	-0.0012 (-0.49)	-0.0016 (-0.56)	-0.0013 (-0.51)	-0.0012 (-0.38)	-0.0008 (-0.35)	-0.0028 (-0.81)	-0.0031 (-0.80)	-0.0033 (-1.46)	-0.0031 (-0.81)	-0.0038* (-1.92)	-0.0032 (-1.28)	-0.0041* (-1.77)
IBL_{it}	0.0467 (1.58)	0.0211 (0.42)	0.0429 (1.51)	0.1143*** (3.17)	0.0575** (2.09)	0.0821** (2.42)						
IML_{it}							0.0824*** (2.82)	0.0834*** (4.00)	0.0822*** (2.82)	0.0972*** (5.40)	0.0719*** (2.79)	0.0947*** (3.99)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.23	0.45	0.23	0.36	0.27	0.54	0.15	0.28	0.15	0.50	0.15	0.46
Mean VIF	1.67		1.88		1.71		1.77		1.53		1.84	
Sargan test		1.88		0.52		2.31		2.56		2.55		0.39
N	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186
*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.												

Table 11. Real earnings manipulation and book/market leverage deviation

Variable	Panel A: Book leverage deviation (DBL_{it+1})						Panel B: Market leverage deviation (DML_{it+1})					
	Panel A.1		Panel A.2		Panel A.3		Panel B.1		Panel B.2		Panel B.3	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Intercept	0.0706*** (3.01)	0.1380*** (3.32)	0.0782*** (3.00)	0.1388*** (4.38)	0.0904*** (3.18)	0.0905** (2.41)	0.1012*** (6.18)	0.1770*** (7.05)	0.1300*** (7.62)	0.1618*** (7.08)	0.0998*** (5.50)	0.0983*** (4.34)
$ACFO_{it}$	-0.0105 (-1.03)	0.0364* (1.74)					0.0004 (1.11)	0.0388** (2.32)				
$APROD_{it}$			0.0220** (2.04)	0.0302*** (6.10)					0.0193** (2.10)	0.0560*** (6.40)		
$ADISEXP_{it}$					0.0646** (2.08)	0.0266*** (3.98)					0.0837*** (2.98)	0.0193*** (7.01)
$EBIT_{it}$	-0.0094 (-0.66)	-0.1626*** (-2.94)	-0.0263* (-1.90)	-0.1742*** (-4.77)	-0.0181 (-1.33)	-0.0233 (-1.09)	-0.0503*** (-3.21)	-0.2477*** (-4.37)	-0.0698*** (-5.30)	-0.3525*** (-9.30)	-0.0867*** (-6.13)	-0.0636*** (-3.36)
MTB_{it}	0.0007 (1.45)	-0.0003 (-0.04)	0.0013*** (3.03)	0.0014** (2.44)	0.0004 (0.91)	-0.0011 (-1.42)	0.0014** (2.48)	0.0002 (0.02)	0.0014*** (2.91)	0.0018*** (2.60)	0.0018*** (3.61)	0.0030*** (4.26)
$TANG_{it}$	-0.0361*** (-3.09)	-0.1007*** (-4.04)	-0.0385*** (-3.75)	-0.0838*** (-5.74)	-0.0476*** (-3.96)	-0.0058 (-0.25)	-0.0363*** (-2.92)	-0.1151*** (-3.29)	-0.0424*** (-3.56)	-0.1103*** (-6.28)	-0.0544*** (-4.44)	-0.0819*** (-4.53)
DEP_{it}	0.0480 (1.22)	0.0299 (0.68)	0.0774* (1.95)	0.1547*** (3.68)	0.0733 (1.59)	0.0568 (0.79)	0.0139 (0.36)	0.1196* (1.78)	0.0054 (0.14)	0.1163** (2.34)	0.0006 (0.01)	-0.0087 (-0.15)
$TAXR_{it}$	-0.1253*** (-7.19)	-0.0695*** (-3.02)	-0.0968*** (-5.27)	-0.0744*** (-3.78)	-0.1345*** (-6.84)	-0.2186*** (-5.24)	-0.1047*** (-5.67)	-0.0625* (-1.78)	-0.1026*** (-5.57)	-0.0145 (-0.47)	-0.1068*** (-5.30)	-0.1009*** (-3.60)
$LNREV_{it}$	-0.0031 (-1.20)	0.0050 (1.35)	-0.0046** (-1.97)	-0.0022 (-0.70)	-0.0024 (-0.82)	-0.0001 (-0.02)	-0.0022 (-0.92)	-0.0008 (-0.15)	-0.0031 (-1.28)	0.0054 (1.21)	0.0030 (1.18)	0.0005 (0.13)
LIQ_{it}	-0.0007 (-0.28)	-0.0039 (-1.64)	-0.0051* (-1.80)	-0.0082*** (-2.63)	-0.0025 (-1.00)	0.0002 (0.13)	-0.0033 (-1.34)	-0.0061* (-1.95)	-0.0056*** (-2.73)	-0.0117*** (-4.74)	-0.0015 (-1.01)	-0.0060** (-2.32)
IBL_{it}	0.0408 (1.38)	-0.0232 (-0.74)	0.0597* (1.95)	0.0247 (0.65)	0.0340 (1.04)	0.0586 (1.44)						
IML_{it}							0.0848*** (4.17)	0.0726*** (2.88)	0.0741*** (3.72)	0.0390 (1.63)	0.0658*** (3.29)	0.0186 (0.62)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.21	0.44	0.31	0.47	0.19	0.27	0.33	0.45	0.27	0.42	0.29	0.45
Mean VIF	1.45		1.63		1.74		1.55		1.59		1.73	
Sargan test		2.12		3.22		1.31		1.24		2.13		2.26
N	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186	4186

*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.

4.2.7. The association between earnings manipulation and positive/negative leverage deviation

Table 12 reports the estimation results of models (12) and (13). Panels A and B report the estimation results of model (12) for positive book leverage deviation (OBL) and positive market leverage deviation (OML) as the dependent variable, respectively. Panel C and Panel D report the estimation results of model (13) when the dependent variable is negative book leverage deviation (UBL) and negative market leverage deviation (UML), respectively. In estimating models (12), (13), industry and year fixed effects are controlled by adding industry and year dummies to the regression models. To save space, this table only reports the estimated coefficients of AEM and RAM using Pooled OLS and 2SLS estimators. The robust t-statistics (in parentheses) are calculated using standard errors corrected for firm-level clustering.

Hypothesis III predicts that earnings manipulation is positively (negatively) associated with positive (negative) leverage deviation. Panel A reports that, when OBL is the dependent variable, the estimated coefficients of model (12) (except for all AEM measures and ADISEXP using Pooled OLS) are positive and significant. Panel B reports that, when OML is the dependent variable; the estimated coefficients of model (12) (except for DAK using Pooled OLS) are positive and significant. Panel C reports that, when UBL is dependent variable; the estimated coefficients of model (13) (except for all AEM measures and ADISEXP using Pooled OLS) are significantly negative. Finally, Panel D reports that, when UML is the dependent variable; the estimated coefficients of model (13) (except for ADISEXP using Pooled OLS) are negative and significant. These results are mainly consistent with our prediction in **Hypothesis III.**

4.2.8. Additional robustness checks

Table 13 reports the coefficient of AEM and RAM measures, extracted from the corresponding estimated models using GMM estimator. In model estimations, industry and year effects are controlled by adding industry and year dummies to the regression models. The robust t-statistics (presented in parentheses) are calculated using standard errors corrected for firm-level clustering. To save space, this table only reports the estimated coefficients of AEM and RAM measures. Panel A reports the estimated coefficients for AEM and RAM measures using models (8) and (9), respectively. The results show that all coefficients are significantly positive, and provide evidence in support of **Hypothesis I**. Panel B reports the estimated coefficients for AEM and RAM measures using models (10) and (11), respectively. Consistent with **Hypothesis II**, the results show that all coefficients are positive and significant.

The first two columns of Panel C report the estimated coefficients for AEM and RAM measures using models (12). The third and the fourth columns of Panel C report the estimation results for AEM and RAM measures using models (13). Consistent with **Hypothesis III**, the presented results in the first two columns show that all coefficients are positive and significant, and the third and the fourth columns show that all AEM and RAM measures are negatively associated with negative leverage deviations.

Table 12. Real/accrual-based earnings manipulation and over/under leverage capital structure

Variable	Panel A. Positive book leverage deviation (OBL_{it+1})		Panel B. Positive market leverage deviation (OML_{it+1})		Panel C. Negative book leverage deviation (UBL_{it+1})		Panel D. Negative market leverage deviation (UML_{it+1})	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
AEM:								
DAJ_{it}	0.0128 (1.40)	0.0400*** (3.03)	0.0245* (1.79)	0.0113*** (4.80)	-0.0087 (-0.78)	-0.0932*** (-2.70)	-0.0282*** (-2.62)	-0.0110*** (-6.87)
$DAMJ_{it}$	0.0102 (1.16)	0.0401*** (3.76)	0.0236* (1.71)	0.0524* (1.95)	-0.0108 (-1.01)	-0.0112** (-2.22)	-0.0381*** (-3.67)	-0.0108*** (-4.53)
DAK_{it}	0.0128 (0.17)	0.0125** (2.54)	-0.0095 (-0.68)	0.0152*** (9.23)	-0.0213 (-0.18)	-0.0190* (-1.70)	-0.0315*** (-3.01)	-0.0223** (-2.27)
RAM:								
$ACFO_{it}$	0.0641*** (7.87)	0.0181** (2.20)	0.0684*** (7.33)	0.0109*** (3.44)	-0.0625*** (-6.94)	-0.0753*** (-5.88)	-0.0749*** (-7.42)	-0.0285** (-2.23)
$APROD_{it}$	0.0447*** (5.98)	0.0165* (1.70)	0.0839*** (6.82)	0.0216*** (5.74)	-0.0508*** (-4.95)	-0.0466* (-1.74)	-0.0560*** (-6.06)	-0.0195*** (-4.83)
$ADISEXP_{it}$	-0.0029 (-0.08)	0.0275*** (3.87)	0.0129*** (3.53)	0.0857*** (3.79)	0.0354 (1.14)	-0.0450** (-2.51)	-0.0046 (-0.14)	-0.0964*** (-5.18)
*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.								

Table 13. Additional robustness test – (GMM)

Variable	Panel A: Hypothesis I		Panel B: Hypothesis II		Panel C: Hypothesis III			
	BL_{it+1}	ML_{it+1}	DBL_{it+1}	DML_{it+1}	OBL_{it+1}	OML_{it+1}	UBL_{it+1}	UML_{it+1}
AEM:								
DAJ_{it}	0.0564** (2.04)	0.0276*** (13.78)	0.0701*** (5.68)	0.0222* (1.87)	0.0414*** (2.69)	0.0104*** (4.58)	-0.0942** (-2.47)	-0.0110*** (-7.63)
$DAMJ_{it}$	0.0630*** (2.63)	0.0405** (2.39)	0.0908*** (3.98)	0.0386*** (6.30)	0.0413*** (3.52)	0.0513* (1.86)	-0.1119*** (-3.18)	-0.0109*** (-4.89)
DAK_{it}	0.0116* (1.67)	0.0331*** (4.20)	0.0402*** (2.79)	0.0442** (2.11)	0.0110** (2.15)	0.0142*** (11.37)	-0.0197* (-1.76)	-0.0270** (-2.20)
RAM:								
$ACFO_{it}$	0.0906*** (5.30)	0.0111*** (5.13)	0.0375* (1.87)	0.0390** (2.44)	0.0165** (2.50)	0.0105*** (3.31)	-0.0756*** (-6.01)	-0.0314** (-2.08)
$APROD_{it}$	0.0981*** (5.28)	0.0384*** (10.80)	0.0302*** (5.85)	0.0549*** (6.21)	0.0166* (1.71)	0.0206*** (6.01)	-0.0495* (-1.77)	-0.0205*** (-5.66)
$ADISEXP_{it}$	0.0194** (2.52)	0.0182*** (6.40)	0.0268*** (3.35)	0.0193*** (7.35)	0.0269*** (3.51)	0.0859*** (4.07)	-0.0449** (-2.43)	-0.0963*** (-4.72)
*, ** and *** represent significance at the 10%, 5% and 1% level, respectively.								

5. Discussion and Conclusions

In this paper, we examine whether RAM and AEM measures are associated with leverage and leverage deviations. We also investigate the association between earnings manipulation and positive/negative leverage deviations. Using data collected from firms listed in Tehran Stock Exchange (TSE), we find that AEM and RAM are positively associated with firms' leverage. Also, we show that an increase in AEM and RAM increases the leverage deviation. Finally, we find that AEM and RAM increases (decreases) the positive (negative) leverage deviation. We show that these results are robust to different proxies for AEM and RAM. Furthermore, we find that firms with higher levels of earnings manipulation have a higher leverage ratio. Consistent with the findings of An et al. (2016), our results support the disciplining role of debt in reducing agency costs. Moreover, the results of this study suggest two novel findings. First, we provide evidence suggesting that firms with higher levels of real and accrual-based earnings manipulation have more leverage deviations. Second, we indicate that earnings manipulation decreases (increases) the negative (positive) leverage deviation. This could be explained by the higher levels of information asymmetry, adverse selection and financing frictions in firms engaged in AEM and RAM activities. To confirm our analysis, we conduct some robustness checks. Our findings are robust to a variety of different proxies for AEM and RAM, two measures of capital structure and different approaches in model estimation.

Based on the research results, managers are advised to reduce profit management to enjoy the benefits of the target lever. Similar to most studies, this study has several limitations. One major limitation of the study is our measures for earnings manipulation. Although these measures are widely used in past literature, they are approximate measures, and may not completely reflect all of the earnings manipulation. Thus, readers need to exercise caution when interpreting the findings. In addition, since the current study only used data from Iranian firms, we are not able to account for any cross-country variations that may affect the relationship between our variables.

Our research provides valuable avenues for future researchers. They can examine the effect of the real and accrual-based earnings manipulation on leverage speed of adjustment. They can also investigate the impact of the real and accrual-based earnings manipulation on cash holdings ratio as well as cash holdings speed of adjustment. Moreover, future studies can follow the approaches used in this study to examine the effect of earnings manipulation on working capital management and their adjustment speed toward the target.

intensifying economic sanctions against Iran on other characteristics of Iranian firms (e.g., cash holdings speed of adjustment toward the target) while taking into account the role of political connections since Ghasseminejad and Jahan-Parvar (2021) find that international financial sanctions force firms to hold more cash to manage future risks. This may affect cash holdings speed of adjustment. The models used in this study can be applied to other sanctioned countries that have a different economic structure, are subject to different sanctions, and/or have different political connections. Furthermore, similar to Ghasseminejad and Jahan-Parvar (2021), this research can be replicated by defining political connec-tions as military- and deep-state-owned firms.

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Note

[1] www.rdis.ir/CompaniesReports.asp