



The evolution of financial reporting quality for companies listed on the Tadawul Stock Exchange in Saudi Arabia: New emerging markets' evidence

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ABSTRACT

Motivated by the Saudi Arabian government's objective to diversify its economy away from oil and correct deficiencies associated with the Saudi stock market crash of 2006, a series of significant capital market infrastructure reforms were initiated that began with the 2007 reorganization of the Tadawul Stock Exchange (TSE) and the Capital Market Authority (CMA) as its sole regulator. This paper adds to the growing body of emerging market literature by providing new evidence of the effects of these initiatives on earnings quality for firms listed on the TSE. The results of tests of this study provide robust evidence that earnings quality increased during the 2007 to 2018 reform period. In particular, we document that relative to pre – reform years, reform period R squares, earnings response coefficients (ERCs) increased and discretionary accruals decreased. We rationalize these findings by asserting that improved regulatory oversight in juxtaposition with significant reform period investments into Saudi Arabia's capital markets infrastructure enhanced earnings quality (Jiambalvo et al., 2002; Latif et al., 2017; Zhong et al., 2017).

1. Introduction

This study evaluates systematic changes in earnings quality for firms listed on the Tadawul Stock Exchange (TSE). Motivated by the Saudi Arabian government's objective to diversify its economy away from oil (Nakov and Nuno, 2013; Banafea and Ibnrubbian, 2018) and correct deficiencies associated with the Saudi stock market crash of 2006 (Alkhalidi, 2015), in 2007 a series of major reforms were initiated that began with a reorganization of the Tadawul Stock Exchange (TSE) as a joint-stock company and the Capital Market Authority (CMA) as its sole regulator and manager (CMA, 2019). Currently, the Tadawul has grown to be the major capital market within Northern Africa and the Middle East (Al-Rajhi et al., 2012; Park et al., 2019), and the CMA is perceived to be one of the most robust and fastest developing capital markets regulatory bodies in the world. The CMA continues to provide the Tadawul with a platform for listing and trading various securities, including corporate and government bonds, exchange-traded funds, real estate funds, and equities.

An important outcome of well-functioning equity markets is the timely assimilation of value relevant information from high-quality

Abbreviations: ERC, earnings response coefficients; TSE, Tadawul Stock Exchange.

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financial reports. This study adds to the growing body of emerging capital markets research (Khanna, 2014; Enow and Brijlal, 2016; Al-Barrak, 2011; and others) by evaluating the effect of Saudi Arabia's capital markets reforms on financial reporting quality over the 2008 to 2018 reform period. Reforms initiated during this period included the implementation of exchange-traded-funds, the modernization of operations, the acceptance of increases in foreign investment, streamlined listing requirements and greater institutional ownership (Tadawul, 2018).¹

1.1. The post-2007 reform period: exchange-traded funds, modernized operations, foreign investment, and institutional ownership

Extant research documents that exchange-traded funds (ETFs) promote trading flexibility, portfolio and risk diversification, and lower costs (Al-Yahyaee et al., 2019). Prior studies also show that ETFs reduce information asymmetry. Research by Zhou (2011) concludes that ETFs foster liquidity and quote depth. Thus, when information asymmetry is reduced, the risk of investing in the market abates due to the narrowing of the adverse selection element of the bid-ask spread (Zhou, 2011). Hence, ETFs represent an important investment class alternative for investors, and in 2010 the TSE launched exchange-traded funds (Argaam Investment, 2019). Almodhaf and Alhashel (2020) provide evidence of enhanced pricing efficiency for Saudi exchange-traded funds (ETFs). Recent ETF additions include the 2019 creation of the Morgan Stanley Capital International Index (MSCI Tadawul 30 Index, MT30) and the Nomu-Parallel Market (Nomu) in 2017 (Diaw, 2016). The MT30 consists of 30 stocks diversified over large, mid, and small-cap Tadawul listed firms. The Nomu is intended to stimulate financial capital formation through its less stringent listing requirements for new companies (Tadawul, 2018).

To attract foreign investment and in accordance with the Tadawul's 2015 directive to modernize operations, the Independent Custody Model (ICM) was operationalized. An outcome of the 2015 directive was the improvement of Tadawul's operational infrastructure via the implementation of the X-stream INET trading platform (X-stream Trading, 2015). Among other things, the X-stream INET trading platform increased the credibility, speed and capacity of order execution which provided investors with greater order type (market, limit, and good-till-cancelled orders) flexibility.

The ICM also motivated the inclusion of nonresident direct foreign investment by Qualified Foreign Investors (QFIs) (Argaam Investment, 2019).² Prior to 2015, direct foreign investment was prohibited. While the requirements to be a QFI are detailed, in general, QFIs are limited to financial institutions (Tadawul, 2018).³ Hence, as an investor group, QFIs may be perceived as sophisticated and knowledgeable. Sharif (2019) documents a decline in stock prices in the post-2015 ICM liberalization period and uses these results to assert that greater scrutiny from new financially strong and savvy foreign investors improved price discovery and reduced equity risk.

In a 2018 report, Tadawul reported that institutions currently owned about 70% of the market (Tadawul, 2018). Latif et al. (2017) assert that well-informed institutional owners exert greater shareholder interest and analyses to enhance earnings quality. A study by Jiambalvo et al. (2002) shows that managers of firms held by institutions are less likely to "manage" earnings. Specifically, these authors document a decline in discretionary accruals for institutionally owned companies. In an international study, Zhong et al. (2017) further report that while earnings quality is linked to institutional ownership, this relation is conditional on the monitoring role played by these investors and the level of shareholder protection. Al-Qadasi et al. (2022) utilize a sample of non-financial companies listed on Bursa Malaysia over the 2009 to 2016 period to provide empirical evidence of a positive relation between institutional ownership and financial reporting systems quality. They explain these findings by asserting that institutional investors prefer to invest in firms that have effective financial reporting systems.

Khanagha (2011) conjectures that the economic reforms made after 2008 have elevated the value relevance of Saudi Arabia's financial reporting due to corrective measures that promote financial disclosure and transparency, which have all been crucial to restoring investor confidence in the country's stock exchange. As the area's largest emerging market, Saudi Arabia receives significant foreign equity inflows, with 2019's inflows surpassing those of larger economies, such as China and India (Meredith, 2019).

1.2. Earnings quality

A fundamental objective of efficient capital markets is their ability to identify and assimilate value relevant information from well-composed, relevant, and credible financial reports, and the greater the causative relation between these reports and the value of the firm, the higher their quality. Using returns-earnings empirical frameworks from prior studies (Collins et al., 1997; Kothari, 2001; Gee-Jung, 2009; and others), this study evaluates the efficacy of Saudi Arabia's capital markets reforms and initiatives on financial

¹ Trading on the Tadawul began in 1954 as an informal market. Although the CMA reports directly to the Kingdom's prime minister, it remains organizationally, legally, and financially autonomous. The CMA is led by a board of directors comprising five commissioners who are appointed by royal decree and are employed on a full-time basis. Commissioners are not allowed to take part in any commercial or profitable engagements. All these measures are meant to create trust in a market that is stable and secure.

² The requirements to be a QFI are strict and include that the entity is a financial institution, e.g., banks and insurance companies. For investment funds there is a \$500 million minimum for assets under management.

³ A QFI is a non-Saudi entity that invests in securities on the Saudi Stock Exchange listing, while ICMs are people or entities that subscribe to the Independent Custody Service model that enhances settlement efficiency. The Tadawul only allows QFIs that have maintained at least \$5 billion in assets for at least five years to invest. Individuals with lower assets can invest in Saudi Arabia through ETFs (Tadawul, 2019a, 2019b). For example, individual investors in Europe can access Saudi Arabian equities through listings on the London Stock Exchange.

reporting quality over the 2008 to 2018 reform period. The utilization of earnings as a construct to measure financial performance is widely applied and well-known. We, therefore, empirically evaluate these reforms according to the earnings quality of firms listed on the TSE.

A rich literature documents the association between earnings and stock price (Ball and Brown, 1968; Barth et al., 2001; Easton and Harris, 1991; Francis and Schipper, 1999; Houmes and Chira, 2015; and others). Additional studies that investigate earnings quality for Saudi Arabian companies include Oraby (2017) who utilizes a sample of seventeen banks listed on the TSE, to report that earnings per share is more value relevant than book value. Al Shetwi (2020) examines the earnings management practices of 114 Saudi nonfinancial listed companies to provide empirical evidence that absolute discretionary accruals decrease with size. Since the study's period is for the year 2016, a limitation of this study is its small sample. Al Barrak (2011) documents significant, positive estimates for earnings coefficients for firms listed on the Saudi Arabian Stock Market over the 1993 to 2009 time period. In a recent qualitative study, Alfadhael and Jarraya (2021) conjecture that companies' incentives to engage in earnings management includes company size, industry, and ethical standards. Using a sample of firms listed on the TSE over the 2014 to 2018 period, Al-Shattarat (2021) investigates the relation between earnings management and the relative value relevance of book value from 2014 to 2018 for all firms listed in the TSE and reports that earnings managed through accruals reduces their value relevance.

While the above studies evaluate financial reporting quality across various earnings quality contexts, to the best of our knowledge this study is the first to provide robust empirical evidence across the fifteen-year 2004 to 2018 period regarding the temporal effects of Saudi Arabia's investments into and the implementation of capital market infrastructure reforms on financial reporting quality for firms listed on the TSE.

This study compares three commonly used proxies for earnings quality: earnings response coefficients (ERCs), their R squares, and accruals in the periods before and after the 2007 formalization of the TSE. Results of tests show post-TSE implementation year 2007 increases (decreases) in ERCs and R squares (accruals). We attribute these findings, at least in part, to the maturation of Saudi Arabia's investment infrastructure during the 2008 to 2018 capital markets reform period.

In light of Saudi Arabia's geopolitical significance, the emerging market financial reporting quality focus of this study should be useful to academics, regulators, resident Saudi investors as well as investors from abroad. From an academic perspective, this paper adds to the growing body of emerging market literature by providing new and relevant evidence of the effects of reform period initiatives on earnings quality for firms listed on the TSE. Additionally, the most important source of publicly available investment information for equity investors is a company's financial report. Hence the quality of these reports is salient in attracting and keeping investors, and this should be especially true for influential but young oil-based economies such as Saudi Arabia. Finally, these findings should be useful to Saudi regulators in assessing the efficacy of their efforts. Within these important and unique contexts and in juxtaposition with the country's implementation of significant capital market initiatives, this study provides a temporal evaluation of financial reporting quality for firms listed on the TSE over the pre-reform period years from 2004 to 2007 and the reform period years from 2008 to 2018.

The balance of our paper is organized as follows. The next section includes a discussion of the earnings quality literature relevant to this study. This discussion is followed by a description of the study's sample and empirical models used. We follow this with the results of our tests. Finally, this study concludes with a qualitative discussion of the paper's findings and suggestions for additional research.

2. Earnings quality literature and hypotheses

2.1. Earnings response coefficients (ERCs)

The earnings response coefficient (ERC) is the estimate obtained from the regression of stock returns on earnings and the greater the stock price-earnings relation, the higher the earnings quality. Numerous studies examine earnings according to ERCs (Francis and Schipper, 1999; Lev and Zarowin, 1999; Collins et al., 1997; Keener, 2011; Ball and Brown, 1968; Dechow, 1994; Balsam et al., 2003; MacArthur et al., 2008). Recent emerging markets ERC research includes Enow and Brijjal (2016), who examine companies listed on the Johannesburg stock exchange from 2009 to 2013. They report that earnings are positively correlated with firm value. In addition, Al-Hares et al. (2011) document a similar relation for non-financial firms listed on the Kuwait Exchange for the years 2003–2009. Habib (2002) concludes that earnings per share have shown significant predictive power over the years and firms' emphasis on it implies that relative to other measures, current earnings per share better explains the equity value of firms. Ali and Hwang (2000) assert that country-specific factors may affect earnings quality. Mohammadi (2014) documents a positive relationship between financial reporting quality and investment efficiency for firms listed on the Tehran stock exchange. Al-Baidhani et al. (2017) provide a review of extant ERC literature over the 1968 to 2017 period. Their review documents the relevance of accounting information announcements over short and long windows to stock price formation. In concert with the previously documented findings of these and other studies, we expect ERCs to increase during the post-2007 reform period.

2.2. R squares

An alternative but related empirical measure of earnings quality uses the statistical power of earnings to explain long window returns estimated according to the temporal changes in R squares from returns–earnings regressions (Collins et al., 1997; Brown et al., 1999; Keener, 2011). For example, in their study of U.S. firms, Collins et al. (1997) document declining R squares from long window returns–earnings regressions over the 40 years from 1953 to 1993 and use these findings to assert that the value relevance of earnings decreased due to the increased frequency of one-time items, negative earnings and changes in firm size and intangible assets across

time. Keener (2011) examines R squares across industries over a more recent 1982–2001 period to document increasing R squares. Using both pooled and time-series regressions, Habib (2002) examines Japanese firms and concludes that, relative to other measures, earnings per share have shown increases in its significant predictive power over the years.

In an early emerging markets research study, Enthoven (1985) investigates accounting in developing countries and reports differing earnings quality results. He attributes these differing findings to factors such as economic changes, the business environment and the approach or models used. In a study on Jordan, Shamki (2013) suggests that investor inclinations based on information reported may influence how investors assimilate earnings information. Der et al. (2016) examine systematic changes in the cumulative value relevance of accounting reports for firms listed on the Tehran Stock Exchange to report the persistent incremental value relevance of earnings, noting that it provides useful information to investors regarding firm performance. Kim and Key (2014) examine Korean financial firms between 1982 and 2011 to document an increase in the value relevance of earnings during those years (Kim and Key, 2014). Similar to our ERC prediction, we expect reform period R squares to increase during the post-2007 reform period.

2.3. Accruals

Although numerous techniques may be utilized to manage earnings, accruals represent an especially attractive option for managers since they are an ongoing component of the reporting process, easy to use and difficult to detect. Prior research documents an inverse relation between abnormal accruals and earnings quality (Jones, 1991; Houmes and Skantz, 2010; Becker et al., 1998; and others). Becker et al. (1998) show that audit quality is inversely related to accruals, as large reputable audit firms with superior resources constrain clients' accruals. Houmes and Skantz (2010) assert that overvalued equity provides incentives to report earnings that do not disappoint. Hence managers use income increasing accruals to meet earnings expectations. DeFond and Jiambalvo (1994) provide evidence suggesting that managers manipulate accruals to avoid debt covenant violations. Soroushyar (2022) uses data from the Tehran Stock Exchange to report that client firms' business strategies deviations from industry norms exacerbate the previously documented inverse relation between discretionary accruals. He explains these findings by asserting that financial reporting quality improves as auditors with superior industry-specific expertise and tenure are better able to evaluate firms with non – conforming strategies. Seifzadeh et al. (2022) report a negative relation between management entrenchment and accruals-based earnings management. In the spirit of prior accruals studies, we extend our analysis to examine accruals changes in the post-2007 reform period. Since decreases in abnormal accruals suggest greater earnings quality vis-à-vis prior years, we expect a decrease in the 2008 to 2018 reform period.

Within the context of this study's focus on Saudi Arabia's significant emphasis on capital markets reform, we predict that relative to prior years, earnings quality increased in the post-2007 reform period and test this assertion with the following hypotheses:

- H₁**. Relative to prior years, the earnings response coefficients (ERCs) of firms listed on the Tadawul Stock Exchange increased over the 2008 to 2018 reform period.
- H₂**. Relative to prior years, the R squares of firms listed on the Tadawul Stock Exchange increased over the 2008 to 2018 reform period.
- H₃**. Relative to prior years, the accruals of firms listed on the Tadawul Stock Exchange decreased over the 2008 to 2018 reform period.

3. Sample and methodology

The study design applied in this research enlists panel data analysis with sample data obtained from Bloomberg Terminal. Sample data covers the 15 years between 2004 and 2018 for 191 listed firms with total firm-year observations ranging from 1019 to 1951 in our multivariate ERC and accruals models. These sample sizes correspond to those reported in the Al-Shattarat (2021) study. The beginning of the reform period is chosen to coincide with the 2007 creation of the TSE as a formal exchange under the auspices of the Capital Market Authority, which signaled the implementation of numerous initiatives to improve Saudi Arabia's capital markets infrastructure. To exclude the effects of extreme values, continuously measured variables are winsorized at the 1% and 99% levels.

3.1. Univariate analyses

We begin our empirical analysis with simple univariate tests that show changes in the magnitude of the earnings response coefficients (ERC tests) and related R squares (R square tests) over the 2004 to 2018 years of our study and the years prior to and years during the 2008 to 2018 reform period.

3.1.1. ERCs

For each of the 2004 to 2018 years, end of fiscal year ERCs are obtained from yearly regressions of dependent variables, RET_{it} , (proxied by raw and market-adjusted returns) on earnings per share (Eq. (1)). Raw returns ($RAWRET_{it}$) are the firm i , year t returns with dividends reinvested. Market adjusted returns ($MARET_{it}$) are the firm i year t raw returns less year t median returns. Earnings per share (EPS_{it}) is equal to the year t net income before extraordinary items divided by common shares outstanding for each firm i . We then regress the yearly earnings response coefficients (ERC_t) on an all-years, $TIME$ indicator variable (Eq. (2)) and a post-year 2007 dummy, REF (Eq. (3)), where $TIME$ equals 1, ..., 15 and corresponds to years 2004–2018 and REF is a reform period dummy variable

equal to 1 for years 2008–2018 and 0 otherwise.

The equations may be depicted as follows:

$$RET_{it} = \alpha_0 + \alpha_1 EPS_{it} + \varepsilon_{it} \quad (1)$$

$$ERC_t = \delta_0 + \delta_1 TIME + \varepsilon_{it} \quad (2)$$

$$ERC_t = \varphi_0 + \varphi_1 REF_t + \varepsilon_{it} \quad (3)$$

A positive estimate for the *TIME* variable would suggest an over the years increase in annual *ERCs*. A positive estimate for the *REF* variable would suggest that relative to the prior years, *ERCs* increased over the 2008 to 2018 capital market infrastructure investment reform period.

3.1.2. R squares

To evaluate the temporal changes in the explanatory power of earnings as a descriptor of returns, we regress the yearly R squares from Eq. (1) ($R^2 RETEPS_t$) on our *TIME* (Eq. (4)) and *REF* (Eq. (5)) variables where:

$$R^2 RETEPS_t = \varkappa_0 + \varkappa_1 TIME + \varepsilon_{it} \quad (4)$$

$$R^2 RETEPS_t = \chi_0 + \chi_1 REF_t + \varepsilon_{it} \quad (5)$$

A positive estimate for the *TIME* variable would indicate an over the years increase in the explanatory power of earnings, and a positive estimate for the *REF* dummy would suggest that relative to prior years, the explanatory power of earnings increased over the infrastructure investment reform period.

3.2. Multivariate analyses

3.2.1. ERC models

Since additional factors may confound univariate tests, to provide further insight into our earnings quality analyses, our main tests utilize pooled cross-sectional generalized least squares (GLS) regressions across all firm years with and without controls. The pooling of cross-sectional and time series data may induce autocorrelation in the regression residuals and violate the OLS assumption of independence. Hence, we report results using generalized least squares (GLS) regression methodology. (For robustness, we also report results using OLS in Tables A.3 and A.4). A description of our variables of interest and controls is as follows. Please see Appendix Table A.1 for detailed variables definitions.

3.2.1.1. Variables of interest. To further investigate the post-2007 reform period's effects on earnings quality, we interact the post-2007 investment infrastructure reform period dummy variable with earnings per share ($REF \times EPS_{it}$). To facilitate the interpretation of our interaction term, we also include the previously defined variables REF_t and EPS_{it} . A positive estimate for the $REF \times EPS_{it}$ interaction term would provide evidence that the returns–earnings relation increased during the post-2007 period, which would support the assertion that financial reporting quality increased with the kingdom's investments into its capital market infrastructure.

3.2.1.2. ERC model's controls. It is well known that relative to larger companies, smaller firms with greater idiosyncratic risk require higher returns (Fama and French, 2002). Additionally, highly visible large firms with more developed and sophisticated financial reporting are associated with greater earnings quality (Becker et al., 1998). To control for size effects, we include a size control, $SIZE_{it}$ (Bowen et al., 1992).

Hou and Robinson (2006) document that firms in concentrated industries earn lower returns, and explain these findings by asserting that firms in more competitive and innovative industries report higher returns relative to firms in more concentrated industries that are more insulated from financial distress due to high barriers to entry. Datta et al. (2011) report that high pricing power firms in highly concentrated industries enjoy better earnings forecast accuracy. Marciukaityte and Park (2009) provide findings that suggest market competition reduces agency costs, resulting in less earnings management. To control for industry concentration effects on our results, we include the Herfindahl-Hirschman Index (HHI_{it}). A lower (higher) *HHI* signifies a more (less) competitive and less (more) concentrated industry.

Accrual-based accounting overcomes the limitations of more primitive free cash flow by capitalizing the costs of long-term assets and allocating their expenses over the periods they are being used, and prior studies document their financial reporting efficacy (Becker et al., 1998; Dechow, 1994; Dechow et al., 2010). Francis and Schipper (1999) assert that earnings of firms with greater endogenous accruals-generating power are more uncertain due to the difficulty in assessing accruals. To control for firms' accruals generating potential (Becker et al., 1998), we include a control for total accruals (TAC_{it}).

Financial leverage increases the effect that changes in sales have on income. Hence the magnitude of earnings changes are, at least in part, a function of a firm's cost structure, and the greater the leverage, the greater the change. To control for the potential effect of debt level on the returns–earnings relation, we include the variable LEV_{it} (DeFond and Jiambalvo, 1994).

Numerous studies consider the value relevancy of dividends, with mixed results. In their well-known study, Modigliani and Miller (1958) propose that, ceteris paribus, equity investors should be indifferent to dividend policy as high (low) dividend-paying firms are

associated with lower (higher) stock price appreciation. However, Blume (1980), Lewellen (2004) and others report positive relations between returns and dividends, while Miller and Scholes (1982) and Lanne (2002) find no relation. The firm lifecycle of dividend theory asserts that, relative to a firm's early years of growth when cash is scarce, older, more mature and profitable firms with greater cash and fewer investment opportunities tend to distribute more cash dividends. Bulan et al. (2007) report that mature firms initiate dividends. Lee and Lee (2019) provide evidence of an inverse relation between research and development intensity and dividend payouts. Hence companies with growth prospects may eschew dividends and instead retain cash to invest in value-increasing projects. To control for dividends, we include a dummy variable equal to one if the firm paid a cash dividend to common shareholders and zero otherwise (DIV_{it}).

Prior studies document the tendency of high (low) market to book companies to earn lower (higher) returns (Campbell and Shiller, 2001; Capaul et al., 1993). These findings may be explained by the assertion that since highly valued firms are less risky, investors require lower returns (Fama and French, 2002). In addition, high market-to-book firms with attractive growth prospects may attract less risk-averse investors with excessively high expectations for future earnings. To control for the potential effects of market-to-book on our findings, we include market-to-book, MB_{it} .

Saudi Arabia owns one-quarter of the world's oil reserve and generates around a tenth of the world's oil. Their economy, therefore, is heavily dependent on oil exports (OPEC, 2020). To control for the potential effect that changes in oil price may have on temporal variations in our models' ERCs, we include the West Texas Intermediate price of crude oil for each sample year t (WTI_t).

The overall model is specified as follows:

$$RET_{it} = \beta_0 + \beta_1 REF_t + \beta_2 EPS_{it} + \beta_3 REF \times EPS_{it} + \beta_4 SIZE_{it} + \beta_5 HHI_{it} + \beta_6 TAC_{it} + \beta_7 LEV_{it} + \beta_8 DIV_{it} + \beta_9 MB_{it} + \beta_{10} WTI_t + \varepsilon_{it} \quad (6)$$

Where, RET_{it} are market-adjust and ($MARET_{it}$) and raw returns ($RAWRET_{it}$). To provide additional insight into our initial $REF \times EPS_{it}$ tests, we separate our overall sample into two subsamples: a 2004 to 2007 pre-reform group and a post-year 2007 to 2018 reform period group. Using seemingly unrelated regression (SUR) methodology, we then compare the returns earnings relation for each group using the following model:

$$RET_{it} = \beta_{sur0} + \beta_{sur1} EPS_{it} + \beta_{sur2} SIZE_{it} + \beta_{sur3} HHI_{it} + \beta_{sur4} TAC_{it} + \beta_{sur5} LEV_{it} + \beta_{sur6} DIV_{it} + \beta_{sur7} MB_{it} + \beta_{sur8} WTI_t + \varepsilon_{it} \quad (7)$$

3.2.2. Accruals models

In addition to our earnings quality ERC tests, we also compare pre-reform period and reform period accruals across all firm years with and without controls. Although several of the controls are also included in our ERC model, we briefly discuss them again since the theoretical motivations for their inclusions differ.

3.2.2.1. Variables of interest. For our accruals models, we estimate the dependent variable $ACCR_{it}$ using unadjusted total accruals (TAC_{it}), abnormal accruals ($AACCR_{ijt}$) (Jones, 1991) and industry-adjusted accruals ($IACCR_{it}$). Please see Table A.2 for accruals models' specifications. To evaluate the temporal changes of accruals over the reform period, we then regress our accruals measures on the post-2007 indicator variable of interest, REF_t . A negative REF_t estimate would connote a post-year 2007 decline in accruals and hence higher earnings quality. Prior studies have identified additional factors that affect accruals. The following section provides a discussion of these controls and reasons for their inclusion.

3.2.2.2. Accruals models' controls. Land and Lundholm (1993) assert that larger high visibility companies with more developed and sophisticated reporting regimes are less likely to manage earnings. Dechow and Dichev (2002) further report that larger companies have better accruals quality. To control for size effects, we include the previously described variable, $SIZE_{it}$. As per our previous ERC models, we also control for the potential effects of industry competitiveness on accruals-based earnings management by including our HHI variable. Prior research documents an inverse relation between accruals and operating cash flow (Dechow, 1994), suggesting that

Table 1
Summary statistics.

Variables	High	Low	Mean	Median	Std. Dev.
$RAWRET_{it}$	3.335	-0.754	0.116	-0.003	0.620
$MARET_{it}$	2.035	-0.844	-0.001	-0.065	0.403
TAC_{it}	0.282	-0.325	-0.016	-0.016	0.089
$IACCR_{it}$	0.249	-0.274	-0.001	0	0.076
EPS_{it}	9.10	-6.92	1.308	1.123	2.334
REF_t	1	0	0.733	1	0.443
$SIZE_{it}$	5.245	2.349	4.025	3.280	4.406
HHI_{it}	76.862	0	1.553	0.569	8.183
OCF_{it}	0.353	-0.275	0.070	0.059	0.107
LEV_{it}	0.540	0	0.068	0	0.123
DIV_{it}	1	0	0.372	0	0.484
MB_{it}	18.200	0.701	3.100	2.100	2.928
WTI_t	119	41	79	79	26.455

Notes: This table shows model variables' summary statistics that includes their highs, lows, means, medians and standard deviations. Detailed descriptions of variables are provided in Table A.1 of the appendix.

the need to manage earnings may decrease for firms with greater operating cash flow. To control for the potential effects of operating cash flow on results, we include OCF_{it} . Leverage may constrain accruals as debt holders monitor firms. Conversely, DeFond and Jiambalvo (1994) report higher accruals for firms nearing debt covenant violations. We therefore include LEV_{it} . Houmes and Skantz (2010) provide evidence that managers of highly valued firms use income increasing accruals to manage earnings higher, and the authors explain these results by asserting that incentives related to overvalued equity induce managers to report increased earnings. To control for the tendency of highly valued firms to report higher accruals, we include MB_{it} in our accruals model. Finally, to control for the effects of additional over the years factors that our models may not capture, we include market-adjusted returns ($MARET_{it}$). The following equation describes our accruals models.

$$ACCR_{it} = q_0 + q_1REF_t + q_2SIZE_{it} + q_3HHI_{it} + q_4OCF_{it} + q_5LEV_{it} + q_6MB_{it} + q_7MARET_{it} + \epsilon_{it} \quad (8)$$

4. Empirical results

4.1. Preliminary findings

Descriptive statistics are provided in Tables 1, 2, and 3. Summary statistics in Table 1 show that over the 2004 to 2018 period of our study, yearly mean raw returns are 11.6%. As expected and by construction, the mean market-adjusted returns are near zero. 73 % of firm-year observations are from the post-2007 reform period. The mean (median) operating cash flow scaled by assets is 7% (5.9%). Of our firm-year observations, 37% pay cash dividends, and the market-to-book ratio is 3.1. (The market-to-book ratio for U.S. S&P 500 firms over the 2004 to 2018 period of our study is 2.6). The average price per barrel of West Texas Intermediate crude (*WTI*) is \$79 per barrel with the highest and lowest prices equal to \$119 and \$41 over the 15-year period of this study. The standard deviation for *WTI* is 26.46, which suggests that oil prices have been volatile.

Table 2 reports model variables' differences in means in the 2004 to 2007 pre - reform period and 2008 to 2018 reform period. Reform period returns, market value of equity and the market-to-book ratio declined. Accruals also decreased in the reform period. In addition, industries became more concentrated, more firms paid dividends, and leverage increased in the post-2007 reform period. Table 3 provides Pearson Correlations. Regarding the ERC models, univariate estimates show positive correlations between returns and: earnings, market value of equity, accruals, and market to book. Firms in highly concentrated industries hold less long-term debt and are less likely to pay dividends. In addition, results show that cash flow from operations is inversely related to accruals and decreases in the reform period.

Regarding our preliminary tests, results of our yearly ERC models using raw and market adjusted returns shown in Table 4, Panel A, (Eq. (2)) report positive estimates for our *TIME* variable. Hence earnings response coefficients (*ERCs*) have increased over the 2004 to 2018 years of this study. Results of Eq. (3) show a significantly positive coefficient for the *REF_t* post-2007 dummy variable. Hence relative to the prior, pre-reform years, *ERCs* increased during the 2008 to 2018 capital markets infrastructure investment reform period (support H_1). Results are similar for the R square models. Results provided in Table 4, Panel B show that while the yearly R squares from Eq. (1) ($R^2RETEPS_t$) increase over all the years, relative to the pre-reform period, $R^2RETEPS_t$ are greater in the 2008 to 2018 period (support H_2). (Adjusted R squares over all the years are similar to those reported by Oraby (2017).

4.2. ERC models multivariate tests

Table 5 provides the findings of our ERC multivariate models using generalized least squares (GLS) regression with and without controls.

4.2.1. Variable of interest

Regarding our post-year 2007–earnings per share interaction term variable of interest ($REF \times EPS_{it}$), the estimates for both market-adjusted (Models 2–3) and raw returns (Models 5–6) ERC models are significantly positive with and without controls, which supports

Table 2
Difference in means.

Variables	Pre- Reform Means	Reform Means	Difference	t statistics
$RAWRET_{it}$	0.594	0.024	0.570	9.776
$MARET_{it}$	0.018	-0.004	0.022	0.634
TAC_{it}	-0.003	-0.019	0.016	3.271
$IACCR_{it}$	0.006	-0.002	0.008	1.943
EPS_{it}	1.651	1.241	0.410	3.142
$SIZE_{it}$	8.460	7.769	0.691	7.141
HHI_{it}	0.667	1.875	-1.208	-5.802
OCF_{it}	0.086	0.067	0.019	3.101
LEV_{it}	0.030	0.082	-0.052	-12.962
DIV_{it}	0.240	0.420	-0.180	-9.596
MB_{it}	5.578	2.633	2.945	12.969

Notes: Table 2 reports the difference in means for model variables in the 2004 to 2007 pre-reform and 2008 to 2018 reform periods. Detailed descriptions of variables are provided in Table A.1 of the appendix.

Table 3

Pearson correlations matrix.

Variables	IACCR _{it}	TAC _{it}	MARET _{it}	RAWRET _{it}	EPS _{it}	REF _t	SIZE _{it}	HHI _{it}	OCF _{it}	LEV _{it}	DIV _{it}	MB _{it}
IACCR _{it}	1											
TAC _{it}	0.881 (0.000)	1										
MARET _{it}	0.070 (0.002)	0.086 (0.000)	1									
RAWRET _{it}	0.057 (0.011)	0.083 (0.000)	0.725 (0.000)	1								
EPS _{it}	0.236 (0.000)	0.248 (0.000)	0.077 (0.001)	0.052 (0.021)	1							
REF _t	-0.040 (0.064)	-0.069 (0.001)	-0.020 (0.355)	-0.340 (0.000)	-0.065 (0.003)	1						
SIZE _{it}	0.012 (0.600)	-0.025 (0.264)	0.065 (0.004)	0.146 (0.000)	0.407 (0.000)	-0.164 (0.000)	1					
HHI _{it}	-0.033 (0.133)	-0.020 (0.364)	-0.064 (0.004)	-0.007 (0.767)	-0.127 (0.000)	0.065 (0.001)	-0.092 (0.000)	1				
OCF _{it}	-0.409 (0.000)	-0.492 (0.000)	-0.001 (0.987)	0.015 (0.515)	0.515 (0.000)	-0.070 (0.001)	0.250 (0.000)	-0.108 (0.000)	1			
LEV _{it}	-0.024 (0.262)	-0.114 (0.000)	0.014 (0.542)	-0.027 (0.224)	-0.057 (0.009)	0.188 (0.000)	0.298 (0.000)	-0.067 (0.000)	0.007 (0.755)	1		
DIV _{it}	0.028 (0.200)	-0.021 (0.322)	-0.034 (0.123)	-0.019 (0.384)	0.462 (0.000)	0.165 (0.000)	0.410 (0.000)	-0.089 (0.000)	0.364 (0.000)	0.109 (0.000)	1	
MB _{it}	-0.029 (0.200)	0.018 (0.431)	0.213 (0.000)	0.456 (0.000)	0.016 (0.489)	-0.368 (0.000)	0.079 (0.001)	0.155 (0.000)	0.019 (0.411)	-0.155 (0.000)	-0.093 (0.000)	1

Notes: This table provides Pearson correlations coefficients for the variables included in both our ERC and accruals models and their p values (p) used in the parentheses. P values are two – tailed. Detailed descriptions of variables are provided in [Table A.1](#) of the appendix.

Table 4
Regressions of Earnings Response Coefficients and R Squares on Time Trend and Reform Period Variables

Panel A: Earnings Response Coefficients				
	Market Adjusted Ret. (1)	Raw Ret. (2)	Market Adjusted Ret. (3)	Raw Ret. (4)
<i>Constant</i>	−0.043 (0.015)	−0.049 (0.014)	−0.033 (0.059)	−0.039 (0.039)
<i>TIME</i>	0.006 (0.004)	0.006 (0.005)		
<i>REF_t</i>			0.051 (0.017)	0.056 (0.014)
<i>N</i>	15	15	15	15
<i>Adj. R²</i>	0.486	0.426	0.319	0.332
<i>F</i>	12.27	11.40	7.54	7.96

Notes: This table uses ordinary least squares regression (OLS) to report temporal changes in ERCs over the 2004 to 2018 (*TIME*, Eq. (2)) and 2008 to 2018 reform periods (*REF_t*, Eq. (3)). *TIME* equals 1, ..., 15 and corresponds to years 2004–2018 and *REF_t* is a reform period dummy variable equal to 1 for years 2008–2018 and 0 otherwise. *P* values are in parentheses and are two – tailed. Detailed description of variables is provided in Table A.1 (Appendix)

Panel B: R Squares				
	Market Adjusted Ret.(1)	Raw Ret. (2)	Market Adjusted Ret. (3)	Raw Ret. (4)
<i>Constant</i>	0.010 (0.677)	0.001 (0.972)	0.015 (0.496)	0.008 (0.734)
<i>TIME</i>	0.006 (0.050)	0.006 (0.048)		
<i>REF_t</i>			0.054 (0.053)	0.054 (0.063)
<i>N</i>	15	15	15	15
<i>Adj. R²</i>	0.265	0.268	0.258	0.241
<i>F</i>	4.68	4.76	4.52	4.13

Notes: This table uses ordinary least squares regression (OLS) to report temporal changes in R squares over the 2004 to 2018 (*TIME*, Eq. (4)) and 2008 to 2018 reform periods (*REF_t*, Eq. (5)). *TIME* equals 1, ..., 15 and corresponds to years 2004–2018 and *REF_t* is a reform period dummy variable equal to 1 for years 2008–2018 and 0 otherwise. *P* values are in parentheses and are two – tailed. Detailed description of variables is provided in Table A.1 (Appendix).

the notion that the returns–earnings relation improved in the reform period. With controls, the estimate for $REF \times EPS_{it}$ using market-adjusted (Model 3) and raw returns (Model 6) are both significantly positive at the $p = .000$ levels. These findings provide further support for H_1 that earnings quality increased during the reform period.

4.2.2. Controls

Results of controls show that as expected returns increase with firm size. The negative estimates for *HHI* suggest an inverse relation between industry concentration and stock returns. Hence as per prior U.S. studies, TSE firms in highly concentrated industries earn lower returns (Hou and Robinson, 2006). Accruals are positively related to returns, which reflects the tendency for firms with increasing sales to report correspondingly higher accruals and higher returns.

In addition, returns increase with leverage. For market-adjusted returns the coefficient for *LEV* is positive and significant. The estimates for dividend-paying companies are negative and higher market-to-book companies earn higher returns, suggesting perhaps that TSE investors may favor low dividend-paying firms with high growth prospects. Finally, the estimates for our oil price control are negative for the market-adjusted return model and positive for raw returns. A possible explanation for this conflicting result is the differing effect that changes in oil prices may have on different industries, which is reflected in our industry-adjusted returns dependent variable measure.

To conclude our ERC earnings quality tests, we use seemingly unrelated regressions (SUR) to compare ERCs from 2004 to 2007, pre–reform period group (Models 1 & 3) and ERCs from the 2008 to 2018 reform period group (Models 2 & 4). As reported in Table 6, the overall findings for the pre–reform period differ from those in the reform period ($Prob > Chi^2 = 0.000$). More importantly, the ERC reform period estimates are $EPS_{it} = 0.105$ ($p = .000$) and 0.031 ($p = .006$) for the market adjusted (Model 2) and raw returns (Model 4) models respectively while the estimates for the pre–reform periods are -0.015 ($p = .362$) and -0.058 ($p = .000$) once again suggesting that the returns – earnings relation improved during the reform period.

4.3. Accruals models

Table 7 provides GLS results for accruals models (Eq. (8)). In both models with (Models 4–6) and without controls (Models 1–3), the coefficient for the *REF_t* reform period variable is negative and significant across all three accruals measures (Total unadjusted accruals *TAC*, Abnormal accruals of Modified Jones *AACCR*, and industry-adjusted accruals *IACCR*). Hence earnings quality as proxied for by

Table 5

Pooled cross-sectional generalized least squares regressions of market adjusted and raw returns on pre- and reform-period earnings.

	Market Adjusted Ret. ($MARET_{it}$)			Raw Ret. ($RAWRET_{it}$)		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Constant</i>	-0.060 (0.119)	-0.039 (0.336)	-0.286 (0.001)	0.774 (0.000)	0.796 (0.000)	0.420 (0.000)
REF_t	-0.023 (0.537)	-0.044 (0.270)	0.031 (0.408)	-0.926 (0.000)	-0.947 (0.000)	-0.856 (0.000)
EPS_{it}	0.021 (0.000)	-0.005 (0.594)	-0.018 (0.063)	0.020 (0.000)	-0.011 (0.267)	-0.023 (0.016)
$REF \times EPS_{it}$		0.029 (0.004)	0.037 (0.000)		0.033 (0.001)	0.042 (0.000)
$SIZE_{it}$			0.0022 (0.001)			0.024 (0.001)
HHI_{it}			-0.006 (0.000)			-0.007 (0.000)
TAC_{it}			0.188 (0.019)			0.0194 (0.017)
LEV_{it}			0.133 (0.008)			0.133 (0.007)
DIV_{it}			-0.042 (0.003)			-0.043 (0.002)
MB_{it}			0.035 (0.000)			0.080 (0.000)
WTI_t			-0.001 (0.831)			0.002 (0.057)
<i>Year Fixed Effects</i>	YES	YES	YES	YES	YES	YES
<i>Industry Fixed Effects</i>	YES	YES	YES	YES	YES	YES
<i>N</i>	1994	1994	1951	1994	1994	1951
<i>Wald Chi²</i>	198.30	210.94	494.99	5266.77	5115.12	6721.09
<i>Prob > Chi²</i>	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table presents the estimation results for **H1** and Eq. (6) applying generalized least squares (GLS) to report temporal changes in RET_{it} during the 2008 to 2018 reform period with (Models 3 & 6) and without control variables (Models 1–2 and 4–5). Dependent variables, RET_{it} , are proxied by the market-adjust return ($MARET_{it}$) and raw return ($RAWRET_{it}$). Our key variable of interest is the post-year 2007 (REF_t)–earnings per share (EPS_{it}) interaction term ($REF \times EPS_{it}$). P values are in parentheses and are two-tailed. Standard errors are clustered at the firm level. Detailed description of variables is provided in [Table A.1](#) (Appendix).

accruals improves in the 2008 to 2018 reform period, lending additional support to our overall assertion (support **H₃**) regarding the favorable earnings quality effects of the post-2007 Saudi investment into the nation's capital markets infrastructure. Controls show that larger firms report higher accruals. As expected, there is an inverse relation between cash flows from operating activities and accruals. Leverage is inversely related to returns, which may be attributable to the monitoring effect of long-term debt holders ([DeFond and Jiambalvo, 1994](#)). High market-to-book companies also report higher accruals, and as expected, returns increase with accruals.

4.4. Robustness test

To evaluate the robustness of our main findings to alternative specifications, we include additional tests. In an earlier study, [Petersen \(2009\)](#) reports that 42% of studies using panel data do not adjust standard errors, potentially inflating t-statistics. To control for the potential effects of interfirm correlations on our results, we rerun our ERC and accruals models reported in [Tables 5 and 7](#) using OLS models with robust standard errors clustered around the firm. The results of these tests are provided in [Tables A.3 and A.4](#) of the appendix. As reported in [Table A.3](#), ERC results are quantitatively similar to those reported in [Table 5](#). Interaction terms, $REF \times EPS_{it}$, are significantly positive with and without controls across all models. In accord with [Table 7](#), reform period accruals results in [Table A.4](#) also document reform period decreases in accruals.

5. Conclusions

Beginning with the 2007 formation of the Tadawul Stock Exchange as a joint stock company and the CMA as its regulator, a series of significant initiatives and investments changed Saudi Arabia's capital markets infrastructure. This study investigates the efficacy of these initiatives according to temporal changes in earnings quality for TSE listed firms. Using several well-known earnings quality measures over the 15-year period from 2004 to 2018, the results of this study show reform period increases in earnings quality. In particular, earnings response coefficients, R squares, and (accruals) increase (decrease) during the 2008 to 2018 reform period vis-à-vis the 2004 to 2007 pre-reform period. ERC and r square findings are robust across raw and market-adjusted returns models. Accruals models are robust across raw, industry adjusted and abnormal accruals models. All models are quantitatively similar with and without controls.

A key implication from this study is that credible and well-functioning capital market infrastructures play an important role in the

Table 6

Pooled cross-sectional seemingly unrelated regressions of market adjusted and raw returns on pre- and reform-period earnings.

	Market Adjusted Ret. ($MARET_{it}$)		Raw Ret. ($RAWRET_{it}$).	
	(1)	(2)	(3)	(4)
<i>Constant</i>	0.575 (0.243)	-0.244 (0.006)	0.716 (0.522)	-0.696 (0.000)
EPS_{it}	-0.015 (0.362)	0.105 (0.000)	-0.058 (0.000)	0.031 (0.006)
$SIZE_{it}$	-0.064 (0.293)	0.025 (0.007)	-0.062 (0.317)	0.033 (0.002)
HHI_{it}	-0.184 (0.322)	-0.005 (0.000)	-0.137 (0.504)	-0.005 (0.000)
TAC_{it}	1.528 (0.096)	0.089 (0.588)	1.925 (0.012)	0.050 (0.782)
LEV_{it}	0.938 (0.005)	0.016 (0.847)	0.852 (0.102)	0.011 (0.900)
DIV_{it}	-0.148 (0.006)	-0.039 (0.154)	-0.045 (0.548)	-0.053 (0.054)
MB_{it}	0.041 (0.000)	0.034 (0.000)	0.154 (0.000)	0.042 (0.000)
WTI_t	-0.001 (0.125)	-0.004 (0.119)	-0.004 (0.418)	0.005 (0.002)
<i>N</i>	314	1637	314	1637
<i>Adj. R</i> ²	0.139	0.100	0.338	0.200
<i>F</i>	7.31	23.89	20.95	52.26
<i>Chi</i> ²	74.18		727.99	
<i>Prob > Chi</i> ²	0.000		0.000	

Notes: This table presents the estimation results for H1 and Eq. (7) applying seemingly unrelated regression (SUR) to report temporal changes in RET_{it} during the 2008 to 2018 reform period with control variables. We separate our overall sample into two subsamples: a 2004 to 2007 pre-reform group (Models 1 & 3) and a post-year 2007 to 2018 reform period group (Models 2 & 4). The dependent variables, RET_{it} , are proxied by the market-adjusted return ($MARET_{it}$) and raw return ($RAWRET_{it}$). Our key variable of interest is EPS_{it} , earnings per share. P values are in parentheses and are two-tailed. Standard errors are clustered at the firm level. Detailed description of variables is provided in Table A.1 (Appendix).

Table 7

Pooled cross-sectional generalized least squares regressions showing the post-2007 reform period effect on accruals.

	TAC_{it} (1)	$AACCR_{ijt}$ (2)	$IACCR_{it}$ (3)	TAC_{it} (4)	$AACCR_{ijt}$ (5)	$IACCR_{it}$ (6)
<i>Constant</i>	-0.018 (0.020)	-0.023 (0.015)	-0.002 (0.135)	-0.067 (0.000)	-0.015 (0.561)	-0.033 (0.001)
REF_t	-0.010 (0.080)	-0.025 (0.002)	-0.008 (0.063)	-0.029 (0.000)	-0.129 (0.000)	-0.020 (0.000)
$SIZE_{it}$				0.016 (0.001)	0.018 (0.000)	0.012 (0.000)
HHI_{it}				-0.001 (0.000)	-0.001 (0.002)	-0.001 (0.078)
OCF_t				-0.682 (0.000)	-0.473 (0.000)	-0.460 (0.000)
LEV_{it}				-0.137 (0.000)	-0.143 (0.000)	-0.110 (0.000)
MB_{it}				-0.002 (0.114)	-0.005 (0.000)	-0.001 (0.036)
$MARET_{it}$				0.007 (0.001)	0.023 (0.000)	0.005 (0.029)
<i>Year Fixed Effects</i>	YES	YES	YES	YES	YES	YES
<i>Industry Fixed Effects</i>	YES	YES	YES	YES	YES	YES
<i>N</i>	1951	1994	1994	1951	1994	1994
<i>Wald Chi</i> ²	505.17	370.30	210.94	4084.08	1356.39	1489.11
<i>Prob > Chi</i> ²	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table presents the estimation results for H3 and Eq. (8) using generalized least squares regression (GLS) to report temporal changes in accruals ($ACCR_{it}$) during the 2008 to 2018 reform period with (Models 4–6) and without controls (Models 1–3). The dependent variables, $ACCR_{it}$, are estimated as unadjusted total accruals (TAC_{it}), abnormal accruals by Modified Jones, 1991 Model ($AACCR_{ijt}$), and industry adjusted accruals ($IACCR_{it}$). Our key variable of interest is REF_{it} , a reform period indicator variable equal to one for the years from 2008 to 2018 and zero otherwise. P values are in parentheses and are two-tailed. Detailed accruals estimates and a description of variables are provided in Tables A.2 and A.1 (Appendix).

assimilation of financial reports in the equity valuation process. This may be especially true for young and growing emerging markets. Indeed, a major impetus for Saudi Arabia's post-2007 investments into its capital markets infrastructure was the destruction of investor trust following the 2006 stock market crash. Baamir (2008) asserts that market manipulation and pricing inefficiency was one of the main reasons behind the 2006 collapse. Empirical findings of this study document that the causative relation between firm value and earnings increased with the Kingdom's investment into its capital markets infrastructure.

As is the case for emerging market studies in general, areas for future empirical analysis of Saudi Arabia's capital markets are numerous. In a recent study, Velte (2022) suggests examining earnings quality before and after restatement events in juxtaposition with changes in F-Scores (Dechow et al., 2011) and M-Scores (Beneish, 1999). Currently, there is no income tax for individual's earnings if they are derived solely from employment in Saudi Arabia. Hence, additional topics for further study might include the valuation effect of dividends and how current and potential changes in corporate and individual taxes may affect that relationship. Within the context of Sharia law, future research could also evaluate how cost structure affects returns for both high and low-liquidity firms. In addition, the past interventions by the Saudi government to support markets and reassure investors in times of crisis could reduce market risk. Hence, relative to other capital markets, the adverse valuation effect associated with bear markets, in general, could be mitigated for TSE investors.

Recent studies have investigated the effects of the COVID pandemic on financial reporting quality. Using data from UK-listed companies, Hsu and Yang (2022) report that financial reporting quality decreased during the 2020 pandemic period. Future emerging market studies could also add to the growing body of research on the effects of non-financial sustainability reporting. In their study of Tehran Stock Exchange listed firms, Zimon et al. (2022) conjecture that improving non-financial sustainability financial reporting is especially important for young emerging markets attempting to improve the corporate reputations of listed firms.

Salehi et al. (2021), use a sample of 245 firm-year companies listed on the Iraqi Stock Exchange over the 2012 to 2018 period to examine the mediating effect that ISIS may have on the relations between board interlocks, political connections, and financial reporting quality. In a follow-up study, Salehi et al. (2022) further report among other things that ISIS has had a significant impact on the relation between the board of directors' independence and remunerations with financial reporting transparency. Additional pre and post ISIS financial reporting quality - governance studies across other political regimes could enhance the generalizability of these interesting findings.

As with most studies, our paper is not without limitations. For example, while this study utilizes several accruals measures, ongoing and contending studies continue to argue the empirical benefits of alternative accruals models. In addition, prior studies eschew the long window returns in our study since many other factors can influence returns as the event window increases. Also, as is the case with most emerging market studies, our sample size is relatively small, which may limit our models' statistical power to detect other significant findings. Since the sample sizes for these studies should increase with the passage of time, future studies should be able to expand their empirical analyses accordingly. These and other potential shortcomings notwithstanding, however, the results of this analysis over the 15-year 2004–2018 period are compelling, as this study provides robust evidence that earnings quality for TSE firms improved during the post-2007 reform period.

CRedit authorship contribution statement

Waleed Alsuhaibani: Conceptualization, Data curation, Writing – original draft, Software. **Robert Houmes:** Conceptualization, Methodology, Supervision, Software, Writing – review & editing. **Daphne Wang:** Methodology, Visualization, Writing – review & editing.

Data availability

Data will be made available on request.

Appendix A

Table A.1

Variable definitions.

Variables	Description
<i>TIME</i>	Equals 1 through 15 correspond to the years 2004 to 2018.
<i>ERC_t</i>	Earnings response coefficient. The yearly (year <i>t</i>) coefficients from regressions of returns on earnings.
<i>R²RETEPS_t</i>	The yearly (year <i>t</i>) R squares from regressions of returns on earnings.
<i>MARET_{it}</i>	At the end of fiscal year <i>t</i> , firm <i>i</i> raw returns with dividends reinvested less the year <i>t</i> median returns.
<i>RAWRET_{it}</i>	The end of fiscal year <i>t</i> raw returns with dividends reinvested for firm <i>i</i> .
<i>TAC_{it}</i>	Total unadjusted accruals, equal to net income less operating cash flow scaled by total assets.
<i>AACCR_{it}</i>	Abnormal accruals are estimated as the difference between each firm <i>i</i> 's year <i>t</i> actual accruals and the expected accruals estimated according to the Modified Jones model (Jones, 1991).
<i>IACCR_{it}</i>	Industry adjusted accruals equal to firm <i>i</i> 's year <i>t</i> accruals less the year <i>t</i> industry median accruals.
<i>REF_t</i>	A reform period indicator variable equal to one for the years from 2008 to 2018 and zero otherwise.

(continued on next page)

Table A.1 (continued)

Variables	Description
EPS_{it}	Firm i 's end of fiscal year t net income less extraordinary items divided by common shares outstanding.
$REF \times EPS_{it}$	The interaction term between REF_t and EPS_{it}
$SIZE_{it}$	Firm i 's end of fiscal year t log of the market value of equity.
HHI_{it}	The Herfindahl-Hirschman Index (HHI_{it}) is calculated as the sum of each firm's percentage of sales (percentage of market share) within each year and the two-digit SIC code squared.
OCF_{it}	Firm i 's end of fiscal year t cash flow from operating activities divided by total assets.
LEV_{it}	Firm i 's year t long-term debt divided by total assets
DIV_{it}	For each firm i at the end of fiscal year t , a dummy variable equal to one if the firm paid a cash dividend to common shareholders and zero otherwise.
MB_{it}	The firm i year t market value of common equity divided by book value.
WTI_t	The West Texas Intermediate price of crude oil for each sample year t

Table A.2
Accruals estimates.

Unadjusted Total Accruals:

1. Unadjusted total accruals (TAC_{it}) equal the firm i , year t net income less cash flow from operating activities divided by total assets.

$$TAC_{it} = (NI_{it} - OCF_{it}) / TA_{it} \tag{Eq. A.1}$$

Abnormal Accruals (Jones, 1991):

1. To estimate abnormal accruals, we use a variant of the Jones model and form industry clusters of our sample firms. Then for each industry-year cluster (j, t) with at least eight firms, we estimate the following firm-level regression for all firms i in industry j for year t where TAC_{ijt} equals net income less operating cash flow scaled by total assets, and where $DELREV_{ijt} / TA_{ijt}$ equals the change in revenue divided by assets:

$$TAC_{ijt} = \gamma_0 + \gamma_1 (DELREV_{ijt} / TA_{ijt}) + \epsilon_{it} \tag{Eq. A.2}$$

2. For each firm i in year t and industry j , we then use the coefficient from the above equation to estimate expected accruals ($EXPACR_{ijt}$). Abnormal accruals ($AACCR_{ijt}$) are the difference between firm i 's year t actual total accruals and expected accruals within industry j .

$$AACCR_{ijt} = TAC_{ijt} - EXPACR_{ijt} \tag{Eq. A.3}$$

Industry Adjusted Accruals:

1. Industry adjusted accruals ($IACCR_{it}$) equal the firm i , year t total accruals (TAC_{it}) less the year t industry median accruals ($MEDTAC_{jt}$).

$$IACCR_{it} = TAC_{it} - MEDTAC_{jt} \tag{Eq. A.4}$$

Table A.3

Pooled cross-sectional OLS regressions of market adjusted and raw returns on pre- and reform-period earnings (robustness test for Table 5).

	Market Adjusted Ret. ($MARET_{it}$)			Raw Ret. ($RAWRET_{it}$)		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Constant</i>	-0.009 (0.787)	0.065 (0.157)	-0.127 (0.074)	0.576 (0.000)	0.694 (0.000)	-0.229 (0.021)
REF_t	-0.012 (0.736)	-0.094 (0.045)	-0.006 (0.904)	-0.564 (0.000)	-0.693 (0.000)	-0.426 (0.000)
EPS_{it}	0.013 (0.002)	-0.036 (0.071)	-0.040 (0.045)	0.008 (0.098)	-0.069 (0.006)	-0.085 (0.000)
$REF \times EPS_{it}$						

(continued on next page)

Table A.3 (continued)

	Market Adjusted Ret. ($MARET_{it}$)			Raw Ret. ($RAWRET_{it}$)		
	(1)	(2)	(3)	(4)	(5)	(6)
		0.056 (0.006)	0.060 (0.004)		0.088 (0.001)	0.095 (0.000)
$SIZE_{it}$			0.011 (0.081)			0.030 (0.001)
HHI_{it}			-0.005 (0.000)			-0.006 (0.000)
TAC_{it}			0.279 (0.045)			0.468 (0.028)
LEV_{it}			0.108 (0.036)			0.117 (0.084)
DIV_{it}			-0.058 (0.008)			-0.041 (0.163)
MB_{it}			0.035 (0.000)			0.080 (0.000)
WTI_t			-0.001 (0.000)			0.003 (0.000)
N	1994	1994	1951	1994	1994	1951
$Adj. R^2$	0.006	0.017	0.097	0.120	0.132	0.300
F	4.84	12.55	12.25	112.58	85.98	45.97

Notes: This table presents the estimation results for H1 and Eq. (6) applying ordinary least squares regression (OLS) to report temporal changes in RET_{it} during the 2008 to 2018 reform period with (Models 3 & 6) and without control variables (Models 1–2 and 4–5). Dependent variables, RET_{it} are proxied by the market-adjust return ($MARET_{it}$) and raw return ($RAWRET_{it}$). Our key variable of interest is the post-year 2007 (REF_t)–earnings per share (EPS_{it}) interaction term ($REF \times EPS_{it}$). P values are in parentheses and are two – tailed. Standard errors are clustered at the firm level. Detailed description of variables is provided in Table A.1 (Appendix).

Table A.4

Pooled cross-sectional OLS regression showing the post-2007 reform period effect on accruals (robustness test for Table 7).

	TAC_{it} (1)	$AACCR_{ijt}$ (2)	$IACCR_{it}$ (3)	TAC_{it} (4)	$AACCR_{ijt}$ (5)	$IACCR_{it}$ (6)
<i>Constant</i>	-0.003 (0.563)	-0.007 (0.370)	0.006 (0.135)	-0.020 (0.263)	-0.015 (0.561)	-0.010 (0.496)
REF_t	-0.016 (0.001)	-0.015 (0.100)	-0.008 (0.064)	-0.017 (0.002)	-0.034 (0.000)	-0.012 (0.031)
$SIZE_{it}$				0.007 (0.000)	0.009 (0.001)	0.006 (0.001)
HHI_{it}				-0.001 (0.108)	0.01 (0.793)	-0.001 (0.168)
OCF_{it}				-0.391 (0.000)	-0.341 (0.000)	-0.287 (0.000)
LEV_{it}				-0.099 (0.000)	-0.106 (0.000)	-0.038 (0.004)
MB_{it}				-0.002 (0.203)	-0.004 (0.059)	-0.002 (0.068)
$MARET_{it}$				0.020 (0.002)	0.030 (0.000)	0.015 (0.004)
N	1951	1019	1951	1951	1019	1951
$Adj. R^2$	0.004	0.003	0.001	0.283	0.267	0.200
F	10.25	2.75	3.45	27.63	19.44	16.20

Notes: This table presents the estimation results for H3 and Eq. (8) using ordinary least squares regression (OLS) to report temporal changes in accruals ($ACCR_{it}$) during the 2008 to 2018 reform period with (Models 4–6) and without controls (Models 1–3). The dependent variables, $ACCR_{it}$ are estimated as unadjusted total accruals (TAC_{it}), abnormal accruals by Modified Jones, 1991 Model ($AACCR_{ijt}$), and industry adjusted accruals ($IACCR_{it}$). Our key variable of interest is REF_{it} , a reform period indicator variable equal to one for the years from 2008 to 2018 and zero otherwise. P values are in parentheses and are two – tailed. Detailed accruals estimates and a description of variables are provided in Tables A.2 and A.1 (Appendix).

References

- Al Barrak, T., 2011. Value relevance and predictive ability of financial statement information: the case of Saudi Arabia. Doctoral dissertation. University of Portsmouth. https://pure.port.ac.uk/ws/portalfiles/portal/5777731/Thamir_Thesis.pdf.
- Al Shetwi, M., 2020. Earnings management in Saudi nonfinancial listed companies. *Int. J. Bus. Soc. Sci.* 1 (1), 18–26. <https://doi.org/10.30845/ijbss>.
- Al-Baidhani, A.M., Abdullah, M., Ariff, F.F., Karbhari, Y., 2017. Review of earnings response coefficient studies. *Corp. Ownersh. Control.* 14 (3), 299–308.
- Alfadhel, S.A., Jarraya, B., 2021. Earnings management and its applications in Saudi Arabia context: conceptual framework and literature review. *Accounting* 7, 993–1008. <https://doi.org/10.5267/j.ac.2021.3.009>.
- Al-Hares, O.M., AbuGhazaleh, N.M., Haddad, A.E., 2011. The effect of other information on equity valuation: Kuwait evidence. *J. Appl. Business Res.* 27 (6).

- Ali, A., Hwang, S., 2000. Country-specific factors related to financial reporting and the value relevance of accounting data. *J. Account. Res.* 38 (2), 1–21. <https://doi.org/10.2307/2672920>.
- Alkhalidi, B., 2015. The Saudi capital market: the crash of 2006 and lessons to be learned. *Int. J. Business Econ. Law* 8 (4), 135–146.
- Almudhaf, F., Alhashel, B., 2020. Pricing efficiency of Saudi exchange-traded funds (ETFs). *J. Islamic Account. Business Res.* 11 (3), 793–809.
- Al-Qadasi, A.A., Al-Jaifi, H.A., Al-Rassas, A.H., Al-Qubiani, A.A., 2022. The financial reporting systems quality (FRSQ) and institutional investors: the case of an emerging market. *Cogent Business Manag.* 9 (1), 1–21.
- Al-Rajhi, A., Al Salamah, A., Malik, M., Wilson, R., 2012. *Economic Development in Saudi Arabia*. Routledge, London.
- Al-Shattarat, B., 2021. The consequence of earnings management through discretionary accruals on the value relevance in Saudi Arabia. *Cogent Business Manag.* 8 (1), 1–16.
- Al-Yahyaee, H., Mensi, W., Al-Jarrah, W., Hamdi, A., Kang, H., 2019. Volatility forecasting, downside risk, and diversification benefits of bitcoin and oil and international commodity markets: a comparative analysis with yellow metal. *North Am. J. Econ. Financ.* 49 (2), 104–120.
- Argaam Investment, 2019. Here's a look at Tadawul's key market reforms since 2010. Argaam. Retrieved from: <https://www.argaam.com/en/article/articledetail/id/602546>. Accessed May 29, 2020.
- Baamir, A.Y., 2008. Issues of transparency and disclosure in the Saudi stock market. *Arab Law Q.* 22 (1), 63–87.
- Ball, R., Brown, P., 1968. An empirical evaluation of accounting income numbers. *J. Account. Res.* 6 (2), 159–178.
- Balsam, S., Krishnan, J., Yang, J.S., 2003. Auditor industry specialization and earnings quality. *Auditing* 22 (2), 71–97.
- Banafea, W., Ibnrubbian, A., 2018. Assessment of economic diversification in Saudi Arabia through nine development plans. *OPEC Energ. Rev.* 42 (2), 42–54.
- Barth, E., Beaver, W., Landsman, W., 2001. The relevance of the value relevance literature for financial accounting standard setting: another view. *J. Account. Econ.* 31 (2), 77–104.
- Becker, C.L., DeFond, M.L., Jiambalvo, J., Subramanyam, K.R., 1998. The effect of audit quality on earnings management. *Contemp. Account. Res.* 15 (1), 1–24.
- Beneish, M.D., 1999. The detection of earnings manipulation. *Financ. Anal. J.* 55 (5), 24–36.
- Blume, M., 1980. Stock returns and dividend yields: some more evidence. *Rev. Econ. Stat.* 62 (4), 567–577.
- Bowen, R.M., Johnson, M.F., Shevlin, T., Shores, D., 1992. Determinants of auditors: the timing of quarterly earnings announcements. *J. Acc. Audit. Financ.* 7 (4), 395–422.
- Brown, S., Lo, K., Lys, T., 1999. Use of R² in accounting research: measuring changes in value relevance over the last four decades. *J. Account. Econ.* 28 (2), 83–115.
- Bulan, L.T., Subramanian, N., Tanlu, L., 2007. On the timing of dividend initiations. *Financ. Manag.* 36 (4), 31–65.
- Campbell, J.Y., Shiller, R.J., 2001. Valuation Ratios and the Long-Run Stock Market Outlook: An Update (NBER Working Paper No. 8221). National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w8221/w8221.pdf.
- Capaul, C., Rowley, I., Sharpe, W.F., 1993. International value of growth stock returns. *Financ. Anal. J.* 49 (1), 27–36.
- CMA, 2019. Capital Market Authority. Retrieved from: <https://cma.org.sa/en/AboutCMA/Pages/AboutCMA.aspx>. Accessed November 12, 2019.
- Collins, W., Maydew, L., Weiss, S., 1997. Changes in the value-relevance of earnings and book values over the past forty years. *J. Account. Econ.* 24 (1), 39–67.
- Datta, S., Iskandar-Datta, M., Sharma, V., 2011. Product market pricing power, industry concentration and analysts' earnings forecasts. *J. Bank. Financ.* 35 (6), 1352–1366.
- Dechow, P.M., 1994. Accounting earnings and cash flow as measures of firm performance: the role of accounting accruals. *J. Account. Econ.* 18 (1), 3–42.
- Dechow, P.M., Dichev, I.D., 2002. The quality of accruals and earnings: the role of accrual estimation errors. *Account. Rev.* 7 (1), 35–59.
- Dechow, P.M., Ge, W., Schrand, C., 2010. Understanding earnings quality: a review of the proxies, their determinants and their consequences. *J. Account. Econ.* 50 (2–3), 344–351.
- Dechow, P.M., Ge, W., Larson, C.R., Sloan, R.G., 2011. Predicting material accounting misstatements. *Contemp. Account. Res.* 28 (1), 17–82.
- DeFond, M.L., Jiambalvo, J., 1994. Debt covenant violations and manipulation of accruals. *J. Account. Econ.* 17 (1–2), 145–176.
- Der, B.A., Polak, P., Masairo, M., 2016. Investigation on the value relevance of accounting information: evidence from incorporated companies in the Singapore capital market. *Invest. Manage. Financ. Innov.* 13 (3), 9–21.
- Diaw, A., 2016. The exchange-traded funds: focus on Saudi Arabia. *Aljuf Univ. Soc. Sci. J.* 2 (1), 201–214.
- Easton, P., Harris, T., 1991. Earnings as an explanatory variable for returns. *J. Account. Res.* 29 (1), 19–36.
- Enow, S., Brijlal, P., 2016. Determinants of share prices: the case of listed firms on the Johannesburg stock exchange. *J. Account. Manag.* 6 (1), 85–92.
- Enthoven, J., 1985. Accounting in developing countries. *Comparat. Int. Account.* 189, 214.
- Fama, E.F., French, K.R., 2002. Value versus growth: the international evidence. *J. Financ.* 53 (6), 1975–1999.
- Francis, J., Schipper, K., 1999. Have financial statements lost their relevance? *J. Account. Res.* 37 (2), 319–352.
- Gee-Jung, K., 2009. The value relevance of book values, earnings and cash flows: evidence from Korea. *Int. J. Business Manage.* 4 (10), 28–42.
- Habib, A., 2002. Changes in the value relevance of accounting book values and earnings: empirical evidence from Japan. *Hitotsubashi J. Commerce Manag.* 37 (1), 55–82.
- Hou, K., Robinson, D.T., 2006. Industry concentration and average stock returns. *J. Financ.* 6 (1), 1927–1956.
- Houmes, R., Chira, I., 2015. The effect of ownership structure on the price earnings ratio – returns anomaly. *Int. Rev. Financ. Anal.* 37, 140–147.
- Houmes, R., Skantz, T., 2010. Highly valued equity and discretionary accruals. *J. Bus. Financ. Acc.* 37 (1), 60–92.
- Hsu, Yu-Lin, Yang, Ya-Chih, 2022. Corporate governance and financial reporting quality during the COVID-19 pandemic. *Financ. Res. Lett.* 46, 1–13.
- Jiambalvo, J., Rajgopal, S., Venkatachalam, M., 2002. Institutional ownership and the extent to which stock prices reflect future earnings. *Contemp. Account. Res.* 19 (1), 117–145.
- Jones, J., 1991. Earnings management during import relief investigations. *J. Account. Res.* 29 (2), 193–228.
- Keener, H., 2011. The relative value relevance of earnings and book value across industries. *J. Financ. Account.* 6, 1–19.
- Khanagha, J., 2011. Reform in accounting standards: evidence from Saudi Arabia. *Int. J. Business Resour.* 1 (3), 113–124.
- Khanna, M., 2014. Value relevance of accounting information: an empirical study of selected Indian firms. *Int. J. Sci. Res. Publ.* 4 (10), 1–6.
- Kim, Y., Key, G., 2014. Changes in accounting information value relevance and cash flow prediction: evidence from Korea. *Int. J. Bus. Soc. Sci.* 5 (9), 35–76.
- Kothari, S.P., 2001. Capital markets research in accounting. *J. Account. Econ.* 31 (1–3), 105–231.
- Land, M., Lundholm, R., 1993. Cross-sectional determinants of analyst ratings of corporate disclosures. *J. Account. Res.* 31 (2), 246–271.
- Lanne, M., 2002. Testing the predictability of stock returns. *Rev. Econ. Stat.* 84 (3), 407–415.
- Latif, W., Latif, S., Abdullah, F., 2017. Influence of institutional ownership on earnings quality: evidence for firms listed on the Pakistan stock exchange. *Pakistan Business Rev.* 19 (3), 668.
- Lee, N., Lee, J., 2019. R & D intensity and dividend policy. *Sustainability* 11, 1–21.
- Lev, B., Zarowin, P., 1999. The boundaries of financial reporting and how to extend them. *J. Account. Res.* 37 (2), 353–385.
- Lewellen, J., 2004. Predicting returns with financial ratios. *J. Financ. Econ.* 74 (2), 209–235.
- MacArthur, J.B., Houmes, R., Stranahan, H.A., 2008. A study of the relationship between strategic cost structure choice and stock return behavior in the transportation industry: preliminary results. *ASBBS eJ.* 4 (1), 124–131.
- Marcinkaityte, D., Park, J.C., 2009. Market competition and earnings management. Available at SSRN 1361905. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1361905&download=yes.
- Meredit, S., August 2019. Saudi Arabia's stock exchange completes full inclusion on MSCI emerging markets index. In: CNBC. Retrieved from: <https://www.cnbc.com/2019/08/29/saudi-arabia-tadawul-completes-full-inclusion-on-msci-index.html>. Accessed September 10, 2021.
- Miller, M., Scholes, M., 1982. Dividends and taxes: some empirical evidence. *J. Polit. Acad.* 90 (6), 1118–1142.
- Modigliani, F., Miller, M.H., 1958. The cost of capital, corporation finance and the theory of investment. *Am. Econ. Rev.* 48 (3), 261–297.
- Mohammadi, M., 2014. The relationship between financial reporting quality and investment efficiency in the Tehran stock exchange. *Int. J. Acad. Res. Business Soc. Sci.* 4 (6), 104–113.

- Nakov, A., Nuno, G., 2013. Saudi Arabia and the oil market. *Econ. J.* 123 (573), 1333–1362.
- OPEC, 2020. Organization of the Petroleum Exporting Countries Annual Report. https://www.opec.org/opec_web/static_files_project/media/downloads/publications/AR%202020.pdf. Accessed September 10, 2021.
- Oraby, S.A., 2017. IFRS and accounting information relevance: the case of Saudi Arabia. *J. Business Econ. Policy* 4 (1), 145–155.
- Park, E., Allui, A., AlSelaimi, R., 2019. Determinants of entry modes choice for MNEs: Exploring major challenges and implications for Saudi Arabia. In: Mateev, M., Poutziouris, P. (Eds.), *Creative Business and Social Innovations for a Sustainable Future*. Springer, Cham, pp. 107–115.
- Petersen, A., 2009. Estimating standard errors in finance panel data sets: comparing approaches. *Rev. Financ. Stud.* 22 (1), 435–480.
- Salehi, M., Maalah, A.Z., Nazaridavaji, H., 2021. The ISIS impacts on the political connections, board interlock, and quality of financial reporting. *Contemp. Rev. Middle East* 8 (4), 460–476.
- Salehi, M., Ajel, R.A., Zimon, G., 2022. The relationship between corporate governance and financial reporting transparency. *J. Financ. Report. Account.* In Press <https://doi.org/10.1108/JFRA-04-2021-0102>.
- Seifzadeh, M., Salehi, M., Khanmohammadi, M., Abedini, B., 2022. The relationship between management attributes and accounting comparability. *J. Facil. Manag.* 20 (1), 1–18.
- Shamki, D., 2013. The influence of economic factors on the value relevance of accounting information in Jordan. *Int. J. Business Manage.* 8 (6), 89–104.
- Sharif, S., 2019. How foreign markets influence stock markets? The Saudi Arabian experience. *Middle East Dev. J.* 11 (1), 105–123.
- Soroushyar, A., 2022. Auditor characteristics and the financial reporting quality: the moderating role of the client business strategy. *Asian. J. Account. Res.* <https://doi.org/10.1108/AJAR-01-2022-0020>. Vol. ahead-of-print No. ahead-of-print.
- Tadawul, 2018. Saudi Stock Exchange. Retrieved from. <https://www.tadawul.com.sa/wps/wcm/connect/35c3621a-37de-465f-ba00-9e9fb372e242/Saudi+Stock+Exchange+%28Tadawul%29%2CStatistical+Report+%E2%80%93+2018++English.pdf?MOD=AJPERES&CVID=>. Accessed November 12, 2019.
- Tadawul, 2019a. Listing Guide 2019: Saudi Stock Exchange. Retrieved from. <https://mci.gov.sa/DOC/Listing-Guide-en2019.pdf>. Accessed November 12, 2019.
- Tadawul, 2019b. Saudi Capital Market Overview: Information Memorandum for Qualified Foreign Investors. Retrieved from. <https://www.tadawul.com.sa/wps/wcm/connect/f8c9da36-6b77-45b1-84a8-595ef54dda7f/QFI%2BMemo%2BOct%2B2019.pdf?MOD=AJPERES&CVID=mULM4s->. Accessed May 28, 2020.
- Velte, P., 2022. The impact of external auditors on firms' financial restatements: a review of archival studies and implications for future research. *Manage. Rev. Q.* <https://doi.org/10.1007/s11301-022-00264-x>.
- X-stream Trading, 2015. Scalable, high-performance trading technology that serves today's wide variety of marketplaces. Retrieved from. https://www.celent.com/system/media_documents/documents/212/040/026/original/97288_x-stream-trading.pdf?1464883678. Accessed October 13, 2020.
- Zhong, L., Chourou, L., Ni, Y., 2017. On the association between strategic institutional ownership and earnings quality: does investor protection strength matter? *J. Account. Public Policy* 36 (6), 429–450.
- Zhou, D., 2011. Exchange-traded funds and information asymmetry. *J. Financ. Account.* 5, 1–6.
- Zimon, G., Arianporr, A., Salehi, M., 2022. Sustainability reporting and corporate reputation: the moderating effect of CEO opportunistic behavior. *Sustainability* 14, 1–28.