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Earnings Quality and Investment Efficiency: The Role of the Institutional Settings

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Abstract

The current study examines the association between Earnings Quality (*EQ*) and Investment Efficiency (*IE*) using the conditional effect of legal origin. Further, we assess the influence of the Institutional Ownership (*IOW*) on the relationship between *EQ* and IE within different legal environments, using a sample of 22,446 firm-year observations from the US, the UK, Germany and Japan over the period of 2001-2018. In general, the results provide cross-country evidence that a higher *EQ* enhances *IE*. Further, the results indicate that higher *EQ* can mitigate overinvestment and underinvestment problems by ensuring that firms move toward their optimal level of investment. In addition, the findings reveal that a country's legal environment affects *IE* with *EQ* having a stronger association with *IE* in common law countries as compared to code law economies. In terms of the conditional role of *IOW*, the findings illustrate that the effect of *IOW* on the relationship between *EQ* and *IE* varies within different legal origins. The results are robust to alternative measures for the main variables examined. This study provides policy implications for investors, managers, regulators, and theorists about the role of the institutional settings on the relation between certain properties of *EQ* and *IE*.

Keywords: Earnings Quality; Investment Efficiency, Institutional Ownership, US, UK, Germany, and Japan.

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1. Introduction

Exercising optimal investment choices is a fundamental issue in corporate finance and a key mission for senior management within a company. Investment decisions determine a firm's future cash flows as well as its profitability and have a critical influence on long-term continuation and growth of a company (Chung et al., 2015). Corporate financial reporting is critical for the functioning of capital markets through the efficient allocation of resources (Healy and Palepu, 2001). The optimal channeling of savings to profitable investment opportunities depends on the information provided by firms for capital markets. Yet, businesses are more informed about the value of such opportunities than providers of external finance. In addition, companies may have an incentive not to reveal the true value of such investment opportunities if management remuneration is linked to firm size and expected profitability (Healy and Palepu, 2001); management may overstate the value of such investment opportunities in order to increase their remuneration. Alternatively, they may understate the value of their investment opportunities to avoid attracting new entrants to the industry. The extant literature emphasizes that higher levels of Earnings Quality (*EQ*[2]*)* can help mitigate against the consequences of this information asymmetry; economic outcomes may be improved and investment may be more efficient with enhanced *EQ*[3] (Healy and Palepu, 2001; Lambert et al., 2007; Ascioglu et al., 2012; Baker et al., 2019). The literature stresses the importance of having a sound corporate reporting regime to attract external funding for company investment and maintain the confidence of capital markets.

[2] Throughout the present study, the terms Earnings Quality (EQ), enhanced financial reporting, enhanced disclosures, and high-quality financial reporting are used interchangeably to refer to the precision with which financial reporting conveys information about firms' operations.

[3] Verdi (2006. p. 2) defines EQ as "the precision with which financial reporting conveys information about the firm's operations, in particular its expected cash flows, in order to inform equity investors". In addition, FASB (1978)[3] have indicated that "financial reporting should provide information that is useful to present and potential investors and creditors, and other users, in making rational investment, credit, and similar decisions" (para, 34) and "…provide information to help present and potential investors in assessing the amounts, timing, and uncertainty of prospective cash receipts..." (See Statement of Financial Accounting Concepts No. 1. para. 37).

The main purpose of the current paper is threefold. It investigates the impact of *EQ* on *IE* for a sample of non-financial firms listed in the US, the UK, Germany and Japan over the period of 2001-2018. Further, the study examines the impact of a country's legal system on the association between *EQ* and *IE*. In addition, the current paper examines the role of IOW on the association between *EQ* and *IE* within different legal origins. The current paper makes a number of contributions. First, it extends the extant literature (Biddle et al., 2009; Chen et al., 2011; Gomariz and Ballesta, 2014) about the economic consequences of EQ by examining the association between EQ and IE using a large sample of 22,446 firm-year observations over the recent period of 2001-2018. Second, the current paper offers cross-country evidence as compared to previous research which has focused on a single country from among the developed nations and mainly studied data for US firms (e.g., Verdi, 2006; McNichols and Stubben, 2008; Biddle et al., 2009). Third, we provide a significant cross-country insight about the link between EQ and IE for nations with different institutional and legal settings; i.e. those with large equity markets (the US and the UK) and those with a credit-based corporate funding regime (Germany and Japan) in the context of agency conflicts[4]. Indeed, La Porta et al. (2000) have argued that effective legal systems empower shareholders to force insiders to adopt a higher level of EQ practices. Zhong et al. (2017) have noted that country-level institutional settings matter to EQ. For example, earnings are

[4]Palepu et al (2019) observed that many countries in mainland Europe have been moving towards a model whereby investors' rights are becoming more prominent and stock exchanges are growing in importance. In particular, Germany has weakened creditor rights during the period covered by this study (Gonzalez, 2020). However, the work of La Porta et al. from the late 1990s and the early 2000s placed Germany within the Civil Law tradition. The current study believes that the situation has not dramatically changed since there has not been a fundamental shift in the legal system of the country. In addition, we note that in terms of the ratio of Market Capitalization to GDP, Germany is still very different from the US and the UK with a figure of 54.3% in 2019 compared to 107% for the UK and 164.8% for the USA (CEIC data). Further, the number of listed companies in Germany in 2020 (over 450) is much smaller than the number in the UK (over 1800) and the USA (over 4500) (source, World Bank, 2020). We also note that the ratio of bank credit to the private non-financial sector expressed as percent of GDP is very different as between Germany and the USA (79% v 51%) although the percentage for the UK is higher than that of Germany at 86.8% (World Bank, 2020). Further, Noerr (2015) highlights that while creditor rights have been weakened in Germany relative to the protection that was available, creditors now have "an improved possibility to participate in the creditors' committee"; as a result, they are more willing to support the restructuring of distressed firms. Finally, the current study finds out that while the German gearing ratio ranged between 25 and 49 times over the period of the current study, the UK and US gearing ratio ranged between 22 and 37 times over the same period. In addition, as a civil law country, Japan has a credit-based system and concentrated ownership as well as more emphasis on stakeholders as the primary beneficiary of corporate activities (Yonekura et al., 2012).

timelier in common-law countries than in code-law ones (Ball et al., 2000). In keeping with this view, Leuz et al. (2003) documented a positive relationship between EQ and investor protection at the country-level. Hence, we argue that the strength of investor protection regimes (common law) versus credit-based systems gives rise to a different association between EQ and IE. Finally, it examines a conditional hypothesis that proposes that the interaction between EQ and IOW has a different effect on IE according to the country's legal environment; this will shed light on how institutional owners can affect EQ practices as informed shareholders rather than controlling owners. Insights from the current paper may be of interest to a wider group of policy-makers and external users (especially investors) of the financial statements who are seeking to understand how EQ measures can affect a firm's IE in different settings.

The findings indicate that *EQ* is statistically and positively associated with *IE*. Indeed, the study provides strong evidence that *EQ* plays a crucial role in mitigating overinvestment and underinvestment problems where a statistically negative relationship is documented between *EQ* measures and over- and underinvestment variables. In addition, the results indicate the country's legal environment affects *IE* where both *EQ* and *IOW* are associated with a stronger association in common law countries (the US and the UK) as compared to code law economies (Germany and Japan). Further, the findings reveal that *IOW* enhances IE through quality financial reports suggesting that firms with large institutional ownership levels tend to have higher *EQ* levels which in turn, enhances *IE*. However, the findings, illustrate that the effect of IOW on EQ and IE varies within a different legal origin; interestingly, the analysis indicates that the interaction between *EQ* and *IOW* reports a significantly positive association with *IE* for common law countries (the US and the UK), while it fails to document such findings for code law countries like Germany and Japan.

The remainder of this paper is organized as follows. Section 2 outlines the literature review and the development of hypotheses. Research design and methodology are discussed in Section 3, while the results are explained in Section 4. Finally, Section 5 concludes the paper.

2. Literature Review and Hypotheses Development

2.1 Earnings Quality and Investment Efficiency

Extant research indicates that agency problems and asymmetric information are the main theoretical reasons for investment distortions (Modigliani and Miller, 1958; Jensen and Meckling, 1976). Indeed, neo-classical economic theory posits that firms will continue to accept investment opportunities until their marginal benefits equal their marginal costs (Yoshikawa, 1980; Hayashi, 1982; Abel, 1983). However, information asymmetry problems[5] may lead firms to deviate from this optimum resulting in either underinvestment or overinvestment[6] (Myers, 1977). In such circumstances, firms may not accept all positive Net Present Value (NPV) investment opportunities or accept projects where the present values of their cash flows are lower than their initial capital outlays (Verdi, 2006, Biddle et al., 2009; Gomariz and Ballesta, 2014), which in turn might lead to inefficient levels of investment. Agency theory suggests that both underinvestment and overinvestment are caused by information asymmetry among various groups of stakeholders (Gomariz and Ballesta, 2014). There have been several endeavours to develop a framework about the role of information asymmetry to explain why IE problems may arise (e.g. Jensen and Meckling, 1976; Myers, 1977). Information asymmetry could exist between the firm and its investors, referred to as adverse selection problems, or between managers and

[5] Entrepreneurs are better informed than savers and have incentives to overvalue their businesses, leading to information problems and thus savers may encounter difficulties in distinguishing between firms with good and bad business investment opportunities. Consequently, investors would value all firms at an average level; as a result, the capital market may undervalue some firms with good investment ideas. These firms may withdraw from the capital market (Healy and Palepu, 2001).

[6] An IE can be measured as deviations from an expected level of investment using a parsimonious investment model which predicts expected investment as a function of growth opportunities (Tobin, 1982). Thus, overinvestment arises when management invests in negative NPV projects (He and Kyaw, 2018), while underinvestment (negative deviations from predicted investment) refers to the passing up of investment in projects with a positive NPV (Verdi, 2006; Biddle et al., 2009).

shareholders, commonly referred to as moral hazard problems (Jensen and Meckling, 1976). Under adverse selection, managers act in favour of existing shareholders and may reject positive NPV investment projects if funds need to be raised externally for the outlay from debtholders leading to underinvestment (Verdi, 2006; Gomariz and Ballesta, 2014). By contrast, under the moral hazard dilemma, the conflict of interests between managers and shareholders along with the absence of a robust mechanism for monitoring management may lead managers to maximise their personal welfare and choose investments projects that are not in the best interests of owners thus giving rise to overinvestment (Jensen and Meckling, 1976; Verdi, 2006; Gomariz and Ballesta, 2014). Disclosure of high-quality information may mitigate these problems.

Empirical research in this field is fairly limited. One of the earliest studies that investigated the association between EQ and IE was carried out by Verdi (2006) using a sample of US firms between 1980 and 2003. The results revealed that enhanced EQ scores were positively associated with IE; however, they were negatively linked to measures of both underinvestment and overinvestment. Further, the study found that the relationship between EQ and IE was stronger for firms within low-quality information environments[7]. In a subsequent study, Biddle et al. (2009) investigated the association between higher levels of reporting quality and IE using a sample of 34,791 US firm-year observations from 1993-2005. The study documented that: (i) enhanced disclosure was associated with lower over- and under-investment; (ii) firms with higher EQ were less likely to diverge from their predicted level of investment; and (iii) enhanced disclosures were negatively related to investment when the aggregate investment was high and positively associated with the investment when the aggregate investment was low.

[7] The study used the number of analysts following the firm and bid-ask spreads as proxies for the information environment, where low level of analyst following and high bid-ask spreads indicated a poor information environment and vice versa.

A number of studies have investigated this issue in countries outside of the USA (Chen et al., 2011; Hope et al., 2013). For example, Chen et al. (2011) examined the relationship between EQ and IE for a sample of private firms across 21 emerging markets. They reported that all EQ measures were significantly associated with IE and indicated a significantly negative relationship between EQ and both under- and over-investment. The study documented that the association between enhanced financial reporting and IE was weaker for firms facing increased income tax pressures. In Spain, Gomariz and Ballesta (2014) examined the impact of EQ and debt maturity on IE during the period of 1998-2008 and revealed that enhanced scores for EQ mitigated against overinvestment problems. In addition, the findings pointed out that shorter debt maturities played a crucial role in driving IE. Thus, enhanced disclosures and shorter debt maturity were found to be associated with a level of investment predicted from efficiency measures: firms with lower (higher) levels of short-term debt, exhibited a stronger (weaker) association between EQ and IE. Using a sample from Taiwan, Lin et al. (2016) investigated the link between investment decisions and EQ over the period of 1996-2011 and discovered that family firms were more likely to underinvest compared to non-family firms due to a reluctance to seek external financing which might dilute the family's control. Rad et al. (2016) arrived at similar results using a sample of Malaysian firms covering the period of 2001-2011.

The preceding discussions suggest that there is a consensus on the positive association between EQ and IE, while a negative relationship is typically documented between EQ and over/underinvestment (e.g., Biddle et al., 2009; Chen et al., 2011; Gomariz and Ballesta, 2014; Lin et al., 2016 and Rad et al., 2016). Indeed, the current investigation assumes that enhanced EQ could have a positive impact on IE by alleviating any agency problems and reducing information asymmetry both: (i) between the firm and investors thereby lowering the firm's cost of capital;

and (ii) between managers and investors by reducing the cost of monitoring for shareholders. Hence, the first hypothesis is developed:

H1a. Earnings quality is positively associated with firms' investment efficiency.

H1b. Earnings quality is negatively associated with overinvestment.

H1c. Earnings quality is negatively associated with underinvestment.

2.2 The impact of the Legal Origin on Earnings Quality and Investment Efficiency

The extant literature argues that the accounting regime and the legal system are fundamental influences on a country's institutional background (La Porta et al., 1998; Ball, 2006). Indeed, La Porta et al. (1998) indicated that a country's legal system shapes the country's accounting system; they suggested that common-law countries have more transparent accounting systems, stronger investor protection mechanisms, and sound corporate governance practices as compared to code-law countries. Furthermore, Ball et al. (2000) suggested that common-law countries are characterised by active stock exchanges, a diversified base of investors, higher levels of investor protection, higher litigation risk and the primacy of shareholder-oriented markets; while code-law countries typically have less active capital markets, a relatively lower risk of litigation, less transparency and credit-oriented markets. Empirical research shows that lower earnings quality is more prevalent in code-law countries (Daske et al., 2006). Bushman and Piotroski (2006) provide evidence that firms in common-law countries reflect bad news in reported earnings in a timelier fashion as compared to their counterparts in code-law countries. Indeed, Elshandidy et al. (2015) indicated that a country's legal system had significant explanatory power over the observed variations in mandatory risk reporting. Another strand of research has argued that the legal system can affect IE (La Porta et al., 1998; Globerman and Shapiro, 2003; Chan-Lee and Ahn, 2001; Cahan et al., 2009); researchers have argued that a country's legal origin (common vs code law)

affects both IE and the level of economic development in a nation. Indeed, La Porta et al. (2002) have argued that a legal environment that protects investors can be influential for investment decisions. For instance, in common-law countries, managers have less flexibility to manage earnings, hence, IE is more likely to be achieved as the financial statements reflect the underlying economic value of the entity. In addition, common law countries facilitate the development of capital markets and investment opportunities which ultimately enhance IE (Globerman and Shapiro, 2003, Reese and Weisbach, 2002). Based on the discussion above which indicates that EQ (accounting practices) and IE (investment decisions) are higher in investor-oriented countries than in credit-based countries, we argue that a country's legal system matters when making investment decisions. This investigation is motivated by the institutional differences between the US and the UK (common law countries) on the one hand, and Germany and Japan (code law countries) on the other hand. Indeed, equity-oriented markets are thought to prioritise the interests of shareholders, however, credit-oriented economies are thought to prioritise the interests of debtholders. Hence, the second hypothesis is proposed:

H2: The impact of the legal system on earnings quality and investment efficiency varies based on the country legal origin.

2.3 Institutional Ownership, Earnings Quality and Investment Efficiency

The extant literature indicates that agency problems and information asymmetry are the main reasons for inefficient investment decisions. Indeed, ownership forms can influence firms' IE; it has been argued that the separation between ownership and control may lead managers to focus on empire building; they may engage in investment opportunities involving self-serving projects which optimize their own goals rather than maximizing shareholder wealth (Jensen and Meckling, 1976; Shleifer and Vishny, 1997). Therefore, owners want to hold managers accountable for their investment decisions to ensure that managers act in the best interest of shareholders. It is believed that the presence of institutional owners may change the behaviors of their investee firms through

monitoring activities (Velury and Jenkins, 2006). According to the active monitoring hypothesis, it is thought that, as a result of the amount of wealth invested, institutional owners are more likely to actively manage their investment (Velury and Jenkins, 2006). However, different levels of ownership by managers may imply different incentives to monitor managers by outside investors[8]. Indeed, it is believed that the relationship between insider holdings and the alignment of interests between managers and shareholders is not monotonic (Morck et al., 988; McConnell and Servaes, 1990) and such alignment of interests is affected by the levels of insider ownership. In this regard, Hadlock (1998) argues that investment at low levels of insider ownership may be impacted by agency concerns; increased holdings enhance the alignment of shareholder and manager interests; however, at higher levels of insider ownership, the alignment of shareholder and manager interests may decline leading to overinvestment. Cho (1998) indicated that investment levels increase with up to 7% of insider ownership, decrease when insider ownership exceeds 7%, and remain unchanged when insider ownership went beyond 38%. Further, Shen et al. (2016) reported that state-owned firms have higher levels of corporate investment as compared to their counterparts with a more diverse and dispersed equity ownership structure. Instead, Chen et al. (2017) revealed that State (foreign) IOW is negatively (positively) associated with IE. In China, He and Kyaw (2018) pointed out that the percentage of equity owned by management was negatively associated with levels of overinvestment. The study also reported a positive (negative) association between managerial (State) ownership and underinvestment. Further empirical research suggests that institutional investors have more resources, incentives, and power to monitor managers in order to mitigate agency problems due to their control rights (Chung et al., 2015; Zhong et al., 2017; Cao et al., 2018; Ward et al., 2020). Indeed, a large IOW can improve a firm's financial health

[8] For example, minority shareholders may be reluctant to exercise their rights to monitor managers, because any monitoring costs may be greater than the likely benefit which may accrue; this results in a "free rider" problem among investors (Jensen and Meckling, 1976). By contrast, Stiglitz (1985) suggested that concentrated ownership is more likely to be associated with greater control over managerial effort because such monitoring activities are likely to curtail management deviations from the maximization of shareholder wealth.

(Chung et al., 2015), reduce earnings management (Kim et al., 2016) and improve financial reporting practices (Velury and Jenkins, 2006) as well as innovation activities (Aghion et al., 2013). As a result, these changes are more likely to enhance financial performance which in turn strengthens a firm's investment capability (Hartzell and Starks, 2003), and increases the disbursement of dividends which in turns attracts new investors resulting in enhancing investment funding (Crane et al., 2016).

Based on the preceding literature discussion, it can be argued that a greater alignment between managers' behaviors and IE is more likely in the presence of a sizeable IOW stake. Indeed, institutional investors' oversight of managers' decisions will reduce managers' discretion and discipline any inclination to under/over-invest[9]. In this regard, prior studies outline that institutional investors are not all equal; hence, different forms of institutional ownership can impact firms' governance and performance to a varying extent and in different ways (Ferreira and Matos, 2008). However, the role of IOW in capital investment decisions is not well-addressed. Hence, the current study develops Hypothesis 3:

H3: Investment Efficiency is positively associated with the institutional ownership.

As a result of the alignment between EQ and IOW (Bushee, 1998; Chung et al., 2002), firms' IE may improve (Velury and Jenkins, 2006). However, earnings manipulation would damage a firm's reputation among institutional investors with concentrated holdings and lower EQ (Wang, 2006; Cascino et al., 2010). Accordingly, institutional owners have various reasons for monitoring financial reports. First, financial statements may be their most important source of financial information; hence, institutional investors are eager to use and analyze all value-relevant information to plan and assess their investments. Second, institutional investors have the expertise

[9] The global financial crisis of 2008 has pressurized legislators and supervisory authorities worldwide to find ways to improve investor protection. In 2013, Germany implemented the Alternative Investment Fund Managers (AIFM) Directive, aiming at providing more protection to the interests of investors (Hoffmann and Paetzmann, 2018).

and resources to spot any earnings management; this should restrain management's opportunistic behavior and lead to a superior EQ (Bushee, 1998; Velury and Jenkins, 2006). Indeed, Velury and Jenkins (2006) revealed that institutional investors monitored financial reporting and encouraged the publication of high quality of earnings[10]. Lemma et al. (2018) and Zhong et al. (2017) reported a positive association between IOW and firms' EQ. in this regard, Dou et al. (2018) investigated the association between the threat of an exit by block-holders and EQ and indicated that the quality of firms' financial reporting was higher when block-holders' threat to sell their equity stake was convincing.

The current study has drawn on a number of conclusions to build the following hypothesis. First, it can be argued that the association between EQ and IE is well-established (e.g., Verdi, 2006; McNichols and Stubben, 2008; Biddle et al., 2009; Chen et al., 2011, Gomariz and Ballesta, 2014; Rad et al., 2016). Second, the extant literature suggests that firms with diffused ownership give managers the opportunity to engage in self-serving and value-damaging projects, which in turn leads to overinvestment and other agency problems (Velury and Jenkins, 2006; Zhong et al., 2017). In addition, the results of the extant literature indicate that IOW can contribute to a firm's IE by enhancing its financial strength, earnings quality, dividend pay-out and pay-performance sensitivity (Rajgopal and Shevli, 2002; Hartzell and Starks, 2003; Chung et al., 2015; Crane et al., 2016). Indeed, the extant literature indicates that IOW can enhance EQ by mitigating against any incentive to manage earnings as this ownership has a great deal of expertise in monitoring their investee firms – often through the analysis of company financial statements; they can monitor management and ultimately improve IE (Pound, 1988; Rajgopal et al., 2002, Chung et al., 2015).

[10] Wang et al. (2014) examined the association between EQ, ownership concentration and IE in China between 2008 and 2012. The study reported that enhanced EQ was negatively associated with levels of both underinvestment and overinvestment. Further, the results showed that EQ was more strongly associated with overinvestment for firms with low levels of ownership concentration.

Finally, based on the institutional differences between shareholder-oriented markets and credit-oriented ones (La Porta et al., 1998; Ball, 2006), the current study assumes that the conditional effect of IOW varies according to the country legal origin. Consequently, we form our fourth hypothesis:

H4a. Institutional ownership has a positive effect association between earnings quality and investment efficiency.

H4b. The effect of institutional ownership on association between earnings quality and investment efficiency varies based on the legal origin.

3. Research Design

3.1 Data and Sample

The sample firms in the present study consist of companies included in stock exchange indices from four different countries; the S&P 500 (US), the FTSE 350 (UK), the CDAX Open-Composite (Germany), and the JPX-NIKKEI 400 (Japan)[11]. Companies from the financial sector are excluded from the sample because of differences in their reporting requirements and financial regulations. Further, some companies had to be excluded because of incomplete or missing data for various variables. Hence, the final sample was comprised of 1,274 firms with 22,446 firm-year observations; 401 firms listed in the US, 215 firms listed in the UK, 332 firms listed in Germany and 299 firms listed in Japan over the period of 2001-2018. Consistent with many international studies within accounting and finance research (e.g., Beck and Demirguc-Kunt, 2006; Hope et al.,

[11] These were selected because they were the "largest" two common-law and civil-law countries (based on the aggregate rankings of a number measures) from the data presented in La Porta et al. (1998). For example, the US had the biggest GNP per capita (in US$) among common-law countries while the UK was ranked fourth. Japan and Germany were the two largest code-law countries based on GNP per capita (in US$). When countries were ranked by the average market capitalisation of listed firms, the US and the UK were ranked first and second among the common-law countries. From the civil law countries, Japan was raked first and Germany third (just behind France). We decided not to include data for French companies in our analysis because "differences between the French and other legal families are statistically significant" for a number of measures (La Porta et al., 1998, p. 1148). Arguably, the inclusion of data for French companies might have sharpened the differences uncovered between common-law and code-law countries.

2011), data were collected from Thomson-Reuters, DataStream and W/B/E/S. Table 1 details the sample by industry and country.

Insert Table 1

3.2 Model Specification and Measurement of Variables

3.2.1 Investment Efficiency Measurement

The two primary variables of the current study are *IE* (as measured by $InvEff$) and *EQ*. Specifically, the current study examines how EQ in the current year is associated with next year's IE represented by Equation 1:

$$InvEff_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 Controls_{i,t} + \sum Industry + \sum Country + \sum Year + \varepsilon_{i,t} \quad (1)$$

Further, we test how EQ in the current year is related to next year's under- or over-investment ($Under/Overinvestment_{i,t+1}$) as estimated by Equation 2:

$$Under/Overinvestment_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 Controls_{i,t} + \sum Industry + \sum Country + \sum Year + \varepsilon_{i,t} \quad (2)$$

Theoretically, mainstream finance asserts that investment is efficient when all those projects with positive NPVs are undertaken by the firm (Gomariz and Ballesta, 2014). In particular, since $InvEff_{i,t}$ refers to the deviations from expected investment using a model that predicts investment as a function of growth opportunities (Biddle et al., 2009; Chen et al., 2011), theory predicts that $InvEff_{i,t}$ should equal zero when the optimal level of investment is undertaken. Hence, *underinvestment* (negative deviations from expected investment) and *overinvestment* (positive deviations from expected investment) are considered to be evidence of inefficient investment policies (Modigliani and Miller, 1958; Hubbard, 1998). $Under/Overinvestment_{i,t+1}$ represent the dependent variable in Equation 2.

Consistent with prior research, the expected level of investment for firm *i* in year *t*, is identified in the current study using a model that forecasts the level of investment based on growth

opportunities computed by sale growth (Biddle et al., 2009; Chen et al., 2011; Gomariz and Ballesta, 2014):

$$Investment_{i,t} = \beta_0 + \beta_1 SalesGrowth_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Consistent with Biddle et al. (2009) and Gomariz and Ballesta (2014), $Investment_{i,t}$ is measured as the net increase in tangible and intangible assets of firm *i* scaled by its lagged value of total assets, while $SalesGrowth_{i,t-1}$ is defined as the rate of change in sales of firm *i* in year *t*-1. Residuals from Equation 3 represents the deviation from the expected level of investment and these residuals are used as a firm-specific proxy for investment inefficiency. A positive residual means that the firm is making investments at a higher rate than expected based on past sales growth: it is overinvesting. On the other hand, a negative residual assumes that real investment is less than that expected, representing an underinvestment scenario. Accordingly, the dependent variable ($InvEff_{i,t+1}$) is the absolute value of the residuals from Equation 3 multiplied by -1, so a higher value means higher efficiency[12].

3.2.2 Earnings Quality Measures

One common method to alter reported earnings is to manipulate the accounting policies which are related with abnormal accruals. Users of financial reports may be deceived when such manipulation occurs (Fields et al., 2001). On the other hand, accruals can help users to predict the future cash flows which need to be estimated based on assumptions of future cash inflows and outflows. Hence, determining accruals necessitates managerial judgement and prudent accounting allocations. Consistent with prior research (Francis et al., 2005; Boonlert-U-Thaiet al., 2006; Rahman et al., 2010) we use accruals quality to examine the earnings quality assuming that earnings are of higher quality if accruals quality is high. Several accruals quality models have

[12] Overinvestment represents positive residuals from the *IE* model, while underinvestment represents absolute value of the negative residuals from the *IE*.

been developed since Jones (1991) first demonstrated that the quality of accruals information can be important. For example, Rahman et al. (2010) argued that accrual measures can inform shareholders about cash flow potential as they entail assumptions about future cash inflows and outflows. In addition, Callen and Segal (2004) indicated that accruals enhance current stock returns; hence, they are value-relevant. A number of models were developed for the measurement of accruals quality including Jones, (1991), Kasznik (1999), Dechow and Dichev (2002), Kothari et al. (2005) and McNichols and Stubben (2008). Consistent with most prior research, two measures of accruals are used for EQ in the current examination; these are based on the modified versions of the Jones (1991) model of accruals including (i) the Kasznik (1999) model (Equation 4), and (ii) the Kothari et al. (2005) model (Equation 5). Our choice is based on two rationales. First, the current examination covers data from four countries (the US, the UK, Germany and Japan); hence, simple models may lead to better sample sizes since fewer observations have to be omitted because of data unavailability; they may also avoid inconsistencies in the measurement of *EQ*. Second, these variants of the Jones (1991) model of accruals permit the accounting policy and practice choices of a company to be estimated; they are broad enough to capture the impact of institutional influences on accounting practices within a firm (Rahman et al., 2010). Indeed, Haw et al. (2004) have argued that modified Jones' accruals-based models capture the tendency of insiders to either overstate reported earnings in order to conceal resource diversion or understate earning in years of enhanced performance to build up reserves for future years of poor performance.

Hence, the first proxy for *EQ* used is the performance-adjusted discretionary accruals model (JTA) developed by Kasznik (1999) which is based on Jones (1991):

$$Accr1_{i,t=}\beta_0 + \beta_1 \Delta Sales_{i,t} + \beta_2 PPE_{i,t} + \beta_3 \Delta CFO_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where total accruals ($Accr1_{i,t}$) is measured as the change in non-cash current assets less the change in current liabilities plus the change in the short-term bank debt, minus depreciation and amortization; $\Delta Sales_{i,t}$ is measured as the change in sales/revenues; $PPE_{i,t}$ is computed as the amount of property, plant, and equipment in the statement of financial position, and $\Delta CFO_{i,t}$ is the change in the cash flow from operations. All variables are scaled by the lagged total assets. The absolute value of residuals from Equation 4 are multiplied by *-1;* hence the higher value of discretionary accruals, the higher earnings quality.

The second measure of *EQ* employed is the performance-adjusted measure of discretionary accruals (KTA) developed by Kothari et al. (2005) based on Jones (1991):

$$Accr2_{i,t=}\beta_0 + \beta_1(\frac{1}{Assets_{i,t-1}})+\beta_2\Delta Sales_{i,t} + \beta_3 PPE_{i,t} + \beta_4\Delta CFO_{i,t} + \beta_5 ROA_{i,t} + \varepsilon_{i,t} \quad (5)$$

where $Accr2_{i,t}$ is total accruals, measured as the change in non-cash current assets minus the change in current non-interest-bearing liabilities, minus the depreciation and amortization expense for firm i in year t, scaled by lagged total assets. $ROA_{i,t}$ is the returns on assets computed as the net income divided by the lagged value of total assets. The absolute value of residuals from Equation 5 are multiplied by *-1;* hence the higher the value of discretionary accruals, the higher the earnings quality.

Finally, to reduce any measurement error within each individual proxy for *EQ*, the two measures of EQ are aggregated into one composite score. Following prior research (Biddle et al., 2009; Chen et al., 2011, Hope et al., 2013), all proxies are normalized and the average of the two normalized measures is used as the summary aggregate measure of *EQ* ($Aggregate_{i,t}$)

3.2.3 Institutional Variables

The legal system is given a value of 1 for common law countries and 0 otherwise. In terms of Institutional Ownership (IOW), the current study follows Sun et al. (2016) in measuring IOW as the percentage of equity held by institutional investors (investment banks or institutions) who own more than 5% of the firms' outstanding shares; firms are classified on the basis of IOW using data from Thomson-One-Banker.

3.2.4 Control Variables

Consistent with previous studies that have examined earnings quality (Biddle et al., 2009; Chen et al., 2011), we use a set of control variables across all regressions conducted in this paper including firm size (LTA) measured as the logarithm of total assets, asset tangibility (TANG) estimated as the ratio of property, plant and equipment (PPE) to total assets, financial slack (SLACK) computed as the ratio of cash to total assets, liquidity (LIQ) calculated as the current assets divided by current liabilities, cash flows from operations (CFO) computed as the ratio of operating cash from operating activities to lagged assets, and the short-term debt ratio (STD/TD) measured as the short-term debt to total debt. The study also employs a fixed effects regression approach, which is a common technique to control for country-specific, industry-specific, and year-specific effects and to address any omitted variable problems (Doidge et al., 2007). Table 2 defines all variables used in the current paper.

Insert Table 2

4. Results

4.1 Descriptive Statistics

Table 3 provides descriptive statistics (mean, 25th percentile, 50th percentile, 75th percentile, and the SD) for the current study's measures of IE ($InvEff_{i,t}$) and EQ; statistics for the other variables employed are also studied. An analysis of Table 3 reveals that all firms reported EQ values that

are consistent with prior research (McNichols and Stubben, 2008; Biddle and Hilary, 2006; Biddle et al. 2009; Rahman et al., 2010; Chen et al., 2011, Hope et al., 2013; Gomariz and Ballesta, 2014, He et al., 2017; Dou et al., 2018). In particular, measures of earnings quality, JTA and KTA, had means of -0.071 and -0.0116, respectively. Further, Table 3 illustrates that *IE* ($InvEff_{i,t+1}$) has a mean of 0.275, while overinvestment *(Over-Invest)* and underinvestment *(Under-invest)* have means of 0.53 and -0.21 respectively. Moreover, Table 3 reveals that IOW has a mean of 0.055. Finally, Table 3 reports statistics for the control variables used in the current study (see Table 3). Table 4 reports the Pearson correlation matrix. The two measures of EQ are negatively associated with the *IE* proxy. In addition, all EQ values are statistically and positively correlated with each other. These results are consistent with the findings of Chen et al. (2011) and Hope et al. (2013). In terms of IOW, it has a significant positive association with *IE* indicating that high levels of IOW within the ownership structure are associated with high values for *IE*. Regarding the EQ proxies, they are negatively correlated with both *IE* and *IOW* which is consistent with Bharath et al. (2008), Lara et al. (2016), and Dou et al. (2018). Other independent variables (see Table 4) are not highly correlated suggesting that the problem of collinearity is not present.

Insert Tables 3 and 4 here

4.2 Investment Efficiency and Earnings Quality

This section describes the relationship between *EQ* and *IE*. Specifically, Table 5 reports the results of this examination using three measures for EQ including the JTA, KTA, and Aggregate measure. An analysis of Table 5 reveals that EQ and IE are statistically and positively associated at the 1% level of significance with coefficients of 2.675 (JTA), 2.310 (KTA), and 2.542 (Aggregate) suggesting that as EQ increases, the IE increases. These results are consistent with findings from previous research (Biddle et al., 2009; Chen et al., 2011; Hope et al., 2013; Gomariz and Ballesta, 2014). Hence, *H1a* is supported. Further, Table 5 reports Adjusted-R^2 values ranging from 0.70

to 0.72 suggesting that models of past years' EQ explain differences in future *IE*. Finally, Table 5 reports F-statistics which are significant at the 1% level rejecting the null hypothesis about the model specifications. The results are consistent with previous research findings (Biddle et al., 2009; Chen et al., 2011, Gomariz and Ballesta, 2014). The current findings reaffirm results from the literature which indicates that EQ enhances firms' investment decisions.

In terms of the control variables used, the findings show consistent associations across the different models examined (see Table 5). As with Biddle et al. (2009), financial slack and liquidity have significantly negative associations with *IE* indicating that monetary assets tend to decrease as capital expenditure increases towards its optimum level. Assets tangibility has a significant positive relationship with *IE* implying that the higher proportion of assets held as PPE, the more positive the NPV investments undertaken. Further, cash flow from operations shows a significant and positive association with *IE* suggesting that a higher volume of CFO can enhance *IE*. In addition, the logarithm of total assets (LTA) has a statistically significant positive association with IE. Finally, Table 5 reveals that short term debt to total debt (STD/TD) has a significant negative association with *IE* which implies that current commitments may hinder a firm's ability to make long-term investments in positive NPV projects which is consistent with the findings.

Table 6 examines whether EQ can mitigate overinvestment (H1b) and underinvestment (H1c) problems. Panel A of Table 6 reveals that all EQ coefficients are significantly and negatively associated with overinvestment at the 1% level. Similarly, Panel B of Table 6 documents that all EQ coefficients are significant and negatively associated with underinvestment. These results are consistent with the Pearson correlation coefficients reported in Table 4 and robust to the inclusion of 6 firm-level characteristics (control variables) as well as country, industry, and year fixed effects. In addition, Table 6 illustrates that the explanatory power of the model specification is quite high with an Adjusted-R^2 values ranged between 0.81 and 0.87 for overinvestment models

and between 0.50 and 0.61 for underinvestment models. Thus, the Adjusted-R^2 values suggest that EQ is able to explain a high proportion of the differences in over- than under-investment. Overall, the results reported in Table 6 suggest that higher levels of EQ can reduce any overinvestment and underinvestment problems. Accordingly, H1b and H1c are accepted. Such results are consistent with prior research (Biddle and Hilary, 2006; Biddle et al. 2009; Rahman et al., 2010; Chen et al., 2011, Hope et al., 2013) which documents a significantly negative relationship between all EQ measures and both overinvestment and underinvestment. Indeed, the results confirm that higher EQ can enhance *IE* by avoiding large positive or negative deviations from the expected level of investment, hence, helping firms to move towards their optimal level of investment. However, the findings slightly contradict the evidence of Childs et al. (2005) and Gomariz and Ballesta (2014) who reported a statistically positive association between EQ and underinvestment suggesting that for those firms with a lower than expected level of investment, EQ may not be effective in shifting investment towards its optimal level.

Insert Tables 5 and 6 here

4.4 The Effect of the Legal Origin on the association between Earnings Quality and Investment Efficiency

This section examines the effect of the legal system of a country on the association between EQ and IE. Hence, a country-level analysis is provided. This is motivated by a recognition of the institutional differences between the US and the UK as common law countries with Germany and Japan as code law nations. Accordingly, we first provide One-Way ANOVA (parametric) and Kruskal-Wallis (non-parametric) tests for the main variables employed including EQ measures (JTA, KTA, and the Aggregate), *IE* ($InvEff_{i,t+1}$) and IOW. Table 7 outlines the results of examining whether the means of such variables are statistically different across and within countries. A visual inspection of Panel A in Table 7 reports the cross-country analysis and indicates that all variables are significantly different, using both One-Way ANOVA and Kruskal-

Wallis tests. This was not the case for the within-country analysis using Bonferroni test. Indeed, Panel B of Table 7 outlines that the means of EQ and *IE* measures for the UK and the US (common law) in one hand, that for Germany and Japan (code law) on the other hand, are not significantly different at 1% level. However, Table 7 reveals that the means of *EQ* and *IE* proxies for the US vs Germany, US vs Japan, UK vs Germany and UK vs Japan (common vs code) are statistically different suggesting that legal origin of a country can affect the behavior of earnings quality and investment decisions.

The results reported in Table 7 entail further analysis to examine whether the legal system can affect the association between EQ and *IE*. An analysis of Table 8 confirms that *IE* has a statistically positive association with EQ measures across all countries examined (the US, the UK, Germany and Japan). However, a closer look at the results indicates that this association is stronger for the US and the UK (significant at 1% level) as compared to Germany and Japan (significant at 10% level with lower coefficient values, respectively). In addition, Table 8 reveals that the explanatory power of regression models are greater for the US and the UK (ranged between 0.84 and 0.90) as compared to Germany and Japan[13] (ranged between 0.64 and 0.40) indicating that the effect of the legal system is quite evident on the association between EQ and IE. Thus, the results provide support for H2.

Insert Tables 7 and 8

4.5 The Conditional Effect of the Institutional Ownership on the Relationship between Investment Efficiency and Earnings Quality

[13] Previous research used Clogg et al's (1995) model to examine whether differences between coefficients are significant. Accordingly, the current study uses this model and finds (un-tabulated) that coefficients (reported in Table 8) of Germany and Japan are statistically different from that of the UK and the US confirming the study conclusion about the effect of the legal origin.

This section investigates the association between *IE* and IOW before testing whether the interaction between EQ and IOW can enhance *IE*. Interestingly, the results reported in Table 9 confirm the findings discussed in Tables 5 and 6 about the association between IE and EQ even after adding the new variable of IOW to the regression model. A visual inspection of Table 9 reveals that *IE* has a positive and statistically significant association with IOW across all measures of EQ with coefficients of 0.025 (JTA), 0.05 (KTA) and 0.095 (Aggregate) and p-values of less than 0.05 suggesting that firms with a sizable level of institutional ownership take more efficient investments decisions. Closer analysis of Table 9 illustrates that IOW has a statistically negative relationship with both overinvestment and underinvestment; the coefficients are –0.01 (JTA), -0.01 (KTA) and -0.015 (Aggregate) with p-values of less than 0.05 for overinvestment and coefficients of -0.08 (JTA), -0.075 (KTA) and -0.02 (Aggregate) with p-values ranged between 0.05 and 0.10 for underinvestment. The findings indicate that IOW can reduce firms' overinvestment and underinvestment by getting firms to move towards their optimal investment positions. These results are consistent with He and Kyaw (2018) who suggested that institutional shareholders are more effective at getting management to maximizing shareholder wealth. Hence, H3 is supported.

As indicated, the study examines the conditional effect of IOW on the association between EQ and IE; an interaction term (EQ*IOW) is included in the regression model. The results reported in Table 10 suggest that IOW plays a positive role to enhance IE through improving EQ. An analysis of Table 10 reveals that the EQ measures are negatively and significantly associated with both overinvestment and underinvestment. A visual inspection of Table 10 reveals that the sign and significance of the EQ measures do not change once the conditional effect of IOW is included in the model; the coefficients in Table 10 are similar to those reported in Table 6 suggesting that EQ is significantly and negatively associated with both overinvestment (Panel A) and

underinvestment (Panel B) for a given level of the IOW. It is also interesting to note that the explanatory power of the model reported in Table 10 is slightly greater than that reported in Table 6 especially for the underinvestment model. Overall, the results of Table 10 underscore the importance of the presence of IOW to enhance the association between EQ and IE; such a finding is consistent with institutional stockholders acting in their own interest to improve a firm's IE by requiring greater EQ. Overall, the results reported in Table 10 reveal that IOW can positively enhance IE and firms with a sizeable institutional ownership stake publishing higher-quality financial reports to make more efficient investment decisions. Hence, H4a and H4b are accepted.

In order to provide insightful analysis, the current study examines whether the legal origin affects the conditional role of IOW in mediating the association between EQ and IE. Table 11 reports the results of this analysis. It shows the effect of IOW through a country-level analysis. In particular, Table 11 indicates that while the interaction between IOW and EQ has a significantly positive association with the *IE* for the US and the UK, this was not the case for Germany and Japan where the IOW*EQ co-efficient is negative, although not significant. Thus, the results suggest that IOW can enhance IE through the adoption of quality financial reports in shareholder-oriented markets (common law countries such as the US and the UK), while institutional investors in credit-oriented markets, represented by the governments and banks, may not provide such enhancement for EQ ultimately weakening the IE[14].

Insert Tables 9, 10 and 11 here

4.6 Robustness Analysis - Alternative Model Specifications

4.6.1 Alternative Measures of investment

[14] The IOW variable was also individually included while examining the results of Tables 10 and 11 and the results remain consistent (un-tabulated).

The current study employs three alternative measures for the investment variable in order to ensure that any results arrived at are not biased and to avoid possible measurement errors associated with one particular measure of investment. First, $Investment_{i,t}(InvEff2)$ is also measured as the net assets from acquisitions scaled by lagged total assets. Second, $Investment_{i,t}(InvEff3)$ is measured as capital expenditure scaled by lagged total assets. Third, $Investment_{i,t}(InvEff4)$ is computed as the sum of research and development, capital expenditure, and acquisition expenditure, less cash receipts from the sale of property, plant and equipment, scaled by the lagged total assets. Table 12 reports the results of this investigation and shows consistent results with that reported in Tables 5, 8, and 9. Specifically, all alternative investment measures have statistically significant negative associations with the various proxies for EQ indicating that the quality of a firm's reports can enhance *IE* by reducing overinvestment and underinvestment problems (see Table 12). In addition, Table 12 reaffirms that IOW appears to play a crucial role in enhancing the relationship between *IE* and EQ.

Insert Table 12 here

In addition to the set of control variables used to uncover any financing constraints faced by a firm, other controls are also tested; these controls might influence *IE* and their omission might lead to incorrect inferences about EQ. Consistent with McNichols and Stubben (2008), therefore, sales growth is replaced by asset growth as a measure for investment opportunities. The results of this estimation are similar to those of the main test specifications[15].

4.5.2 Further Tests Associated with Cash Constraints

Following Jensen (1986), Biddle et al. (2009) and Chen et al. (2011), the study examines the effect of EQ for companies that are either above or below the median for cash constraints (where cash is deflated by the total assets). The results of this test are consistent with the findings reported in

[15] Results are not tabulated but available upon request

the current study and prior research, the results indicate that EQ is positively associated with *IE* for both sets of firms[16].

4.5.3 Alternative Measures for Institutional Ownership

The current study uses an alternative measure which is the ownership of institutions computed as the percentage of strategic shareholdings of 5% or more of the company's stock. Then, we retest all regression models after replacing the IWO measure. The conclusions arrived at remain unchanged.

4.5.4 Control for Endogeneity

Based on prior research findings, the current study assumes that EQ affects IE; hence, we are assuming a specific direction of causality which tends to be employed within this field of research. Nevertheless, our study does recognize that the causality may operate in the opposite direction; we construct a research design that mitigates such endogeneity concerns. First, the present study is based on economic theory that underpins the positive association between EQ and IE. Second, we examine the impact of the current period's EQ on the next period's IE. Third, our regression models include control variables employed in previous research as well as using a further set of controls. Fourth, the interaction between EQ and IOW enhances the credibility of the findings arrived at as it might be difficult to assume an opposite causality when IOW is included in the analysis (e.g., Rajan and Zingales 1998, Chen et al., 2011). Finally, following prior research (Biddle et al., 2009, Chen et al., 2011, Gomariz and Ballesta, 2014), we re-estimate the investment function by adding a new independent dummy variable (NEG) which recognizes that the association between investment and sales growth could vary depending on whether the growth is positive or negative, as follows:

$$\text{Investment}_{i,t} = \beta_0 + \beta_1 \text{SalesGrowth}_{i,t-1} + \beta_2 \text{NEG}_{i,t-1} + \beta_3 \text{SalesGrowth}_{i,t-1} * \text{NEG}_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

[16] Results are not tabulated but available upon request

where $NEG_{i,t-1}$ is a dummy variable that takes value 1 for negative sales growth, and 0 otherwise. The results of this re-estimation are not different from those reported in the main model specification whereas the aggregate measure of EQ has a statistically positive association with *IE* reiterating the findings of prior research that higher EQ enhances IE. With respect to overinvestment and underinvestment, the results are also similar to those reported in this paper reaffirming that EQ and IOW can mitigate overinvestment and underinvestment problems[17].

5. Conclusion and Policy Implications

This paper primarily examines the association between EQ and IE using data from a cross-country sample (the US, UK, Germany and Japan) for the period 2001-2018. The objective of the current study is twofold. First, it investigates the effect of the legal environment on the association between EQ and *IE*. Second, it examines the effect of IOW on the relationship between EQ and IE within a different legal environment. The findings indicate that EQ is statistically and positively associated with IE; indeed, we provide strong evidence that EQ plays a crucial role in mitigating overinvestment and underinvestment problems where a statistically negative relationship is documented between EQ measures and over- and under-investment. In terms of the legal system effect, the results indicate the country's legal environment affects *IE* where both EQ and IOW are associated with a stronger association between *EQ* and *IE* in common law countries (the US and the UK) as compared to code law economies (Germany and Japan). In addition, the results reveal that IOW enhances *IE* through quality financial reports suggesting that firms with large institutional ownership levels tend to have higher *EQ* scores which in turn, enhances IE. Further, the results indicate that higher *EQ* and IOW levels can mitigate against overinvestment and underinvestment problems by ensuring that firms move toward their optimal level of investment. However, the findings, illustrate that the effect of IOW on EQ and IE varies within different legal

[17]The results are not tabulated but available based on request.

origins; interestingly, the results indicate that the interaction between EQ and IOW reports a significantly positive association with *IE* for common law countries (the US and the UK), while the current study fails to document such findings for code law countries like Germany and Japan. These findings provide great insights into the business community about the role of earnings quality in improving corporate investment efficiency considering the effect of the institutional settings such as the legal environment and the ownership structure on this association through mitigating information asymmetry. Further, the results imply a strong link between financial and managerial accounting information suggesting that the former (accruals) is being used for later (investment decisions). Obviously, this study provides insights for creditors, investors, managers, and researchers about the economic value-added of corporate financial accounting policies in promoting IE.

We acknowledge some limitations. First, *EQ* measures are subjected to measurement errors, however, we did our best when estimating all proxies to provide accurate evidence. Second, the role of *EQ* and *IOW* may vary based on the legal origin in which firms operate within a country; thus, the results may not be generalizable to other countries which in turn provides opportunities for future research. In this regard, the economic implications for *IE* for accounting and financial policies should be tested in various settings with different forms of ownership (including family versus non-family firms and state-ownership versus foreign ownership), different levels of economic development, different funding contexts (equity-markets versus credit-based oriented economies), where different levels of investor protection are present in order to arrive at interesting and useful conclusions about the effect of *EQ* on *IE*. Third, we are attributing differences in results between the two groups of countries to legal origin. However, any such difference between the two groups of countries might be due to other factors such as the development each pair of nations' capital markets. Further research might want to consider other

explanations for the current findings and examine whether they apply more widely than Germany, Japan, the UK and the USA. Fourth, the current paper employs discretionary accrual measures for earnings quality, hence, future studies may use real earnings management proxies. Finally, future research is encouraged to examine the role of corporate governance attributes (including board size and independence, CEO-duality, audit committee) on the association between EQ and IE.

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Table 1: Sample's Industry and Country Analysis

Sector	Country				Total
	US	UK	Germany	Japan	
Information Technology	49	18	70	39	176
Utilities	26	8	11	15	60
Health care	50	14	37	35	136
Telecommunications	4	5	7	5	21
Manufacturing	75	42	73	50	240
Services	113	98	98	75	384
Material	2	4	26	30	62
Food and beverage	52	20	8	41	121
Energy	30	6	2	9	47
Total firms	401	215	332	299	1247
Total observations	7218	3870	5976	5382	22446

Note: This table provides the industry and country allocation of the sample firm which using a sample of 22,446 firm-year observations from the US, the UK, Germany and Japan over the period of 2001-2018

Table 2: Measurement of Variables Employed

Variables	Definitions
$Investment$	It is measured as the net increase in tangible and intangible assets of firm *i* scaled by its lagged value of total assets
$SalesGrowth$	It is defined as the rate of change in sales of firm *i* in year *t*-1.
$\Delta Sales$	It is measured as the change in sales/revenues scaled by lagged total assets
PPE	It is computed as the amount of property, plant and equipment in the statement of financial position, scaled by lagged total assets
ΔCFO	It is the change in the cash flow from operations, scaled by lagged total assets
ROA	It is the returns on assets computed as the net income divided by the lagged total assets.
JTA	JTA the performance-adjusted discretionary accruals model (Equation 4) developed by Kasznik (1999) based on Jones (1991). The absolute value of residuals from equation 3 multiplied by -1 is used as the EQ measure of Jones' (1991) adjusted model.
Accr1	Discretionary accruals are measured as the change in non-cash current assets less the change in current liabilities plus the change in the short-term bank debt, minus depreciation and amortization.
KTA	KTA is the performance-adjusted measure of discretionary accruals model (Equation 5) developed by Kothari et al. (2005) based on Jones (1991). The absolute value of residuals from equation 4 multiplied by -1 is used as the EQ measure of Kothari et al. (2005).
Accr2	Discretionary accruals which is measured as the change in non-cash current assets minus the change in current non-interest-bearing liabilities, minus the depreciation and amortization expense for firm i in year t, scaled by lagged total assets.
Aggregate	The standard average of KTA and KTA is used as the aggregate measure of EQ.
INVEFF1	The residuals from the regression of investment over sales growth (equation 2) reflect the deviation from the expected investment level, hence, these residuals are used as a firm-specific proxy for investment inefficiency.
Overinvestment	The absolute value of positive residuals from the Investment Efficiency model of equation 2.
Underinvestment	The absolute value of negative residuals from the Investment Efficiency of equation 2 multiplied by -1.
LTA	Logarithm of total assets
TANG	Asset Tangibility estimated as the ratio of PPE to total assets.
SLACK	The ratio of cash to total assets.
CFO	Cash flows from operation scaled by lagged assets.
LIQ	Current assets to current liabilities.
STD/TD	Short-term debt to total debt.
IOW	Percentage of equity held by institutional holders (investment banks or institutions) who own more than 5% of the firms' outstanding shares; as classified by Thomson-One-Banker.

Note: This table defines all variables examined in the current study.

Table 3: Descriptive Statistics

Variables	*Mean*	*SD*	*25th P*	*50th P*	*75th P*
JTA	-0.071	19.2	-0.043	-0.0152	0.089
KTA	-0.116	5.1	-0.540	-0.420	-0.250
Aggregate	0.022	4.12	-0.19	-0.155	-0.078
InvEff1	0.275	4.9	-0.046	0.050	0.166
Overinvestment	0.53	6.9	0.055	0.12	0.26
Underinvestment	-0.21	0.29	-0.20	-0.093	-0.038
LTA	13.9	2.1	12.8	14.6	16.0
Tang	4.45	9.52	0.049	0.17	0.41
Slack	1.0	2.43	0.005	0.0042	0.124
CFO	1.05	16.7	0.05	0.096	0.145
LIQ	0.005	0.012	8.6	5.0	2.3
STD/TD	2.65	7.3	0.035	0.12	0.33
IOW	0.055	0.081	0	0	0.09

Note: This table reports the descriptive statistics of the variables examined in the current study. All variables are defined in Table 2.

Table 4: Pearson Correlation Matrix

Variables	JTA	KTA	Aggrega	Inv1	LTA	Tan	Slack	CFO	Liq	IOW	STD/TD
JTA	1.0										
KTA	0.96***	1.0									
Aggregate Index	0.420***	0.53***	1.0								
InvEff1	-0.520***	-0.39***	-0.31***	1.0							
LTA	-0.110***	-0.05***	-0.09***	0.062***	1.0						
Tang	0.340***	0.32***	0.235***	-0.05***	-0.08***	1.0					
Slack	0.190***	0.19***	0.195***	-0.034***	-0.01***	0.56***	1.0				
CFO	0.08***	0.09***	-0.015	-0.09***	-0.03***	0.82***	0.59***	1.0			
LIQ	0.11***	0.11***	0.145***	-0.021***	-0.025***	0.015	0.05***	-0.012	1.0		
IOW	-0.09***	-0.08***	-0.052***	0.054***	0.34***	-0.018	-0.042***	-0.018	-0.06***	1.0	
STD/TD	0.24***	0.32***	0.27***	-0.035***	-0.03	0.11***	0.05***	0.415***	0.011	0.002	1.0

Note: This table reports the correlation test between variables used in the current study. All variables are defined at the bottom of Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 5: Regression of Investment Efficiency and Earnings Quality

$$InvEff_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Country + \sum Year + \varepsilon_{i,t}$$

Predictors	***JTA***	***KTA***	***Aggregate***
EQ	2.675 *** (56.6)	2.310*** (18.8)	2.542*** (41.9)
Slack	-0.767*** (-3.1)	-0.519*** (-5.3)	-0.635*** (-17.5)
Tang	0.473*** (41.2)	0.211*** (3.6)	0.314*** (5.22)
LIQ	-13.2*** (-2.32)	-17.9*** (-4.15)	-20.5*** (-6.15)
CFO	0.163*** (2.85)	0.109*** (1.87)	0.110*** (4.78)
LTA	0.767*** (5.50)	0.911*** (3.34)	1.2*** (12.3)
STD/TD	-0.015*** (-1.45)	-0.02*** (-8.2)	-0.102*** (-10.4)
Intercept	1.5*** (8.45)	1.78*** (21.6)	1.8*** (30.4)
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	yes	yes
Adjusted-R^2	0.72	0.71	0.70
F-statistics	4.49***	2.55***	3.55***

Note: this table report the regression test between corporate IE and EQ measures. All variables are defined in Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 6: Regression of Over/Underinvestment and Earnings Quality

$$\text{Overinvest}_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_3 \text{Controls}_{i,t} + \sum \text{Industry} + \sum \text{Country} + \sum \text{Year} + \varepsilon_{i,t}$$

$$\text{Underinvest}_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_3 \text{Controls}_{i,t} + \sum \text{Industry} + \sum \text{Country} + \sum \text{Year} + \varepsilon_{i,t}$$

Predictors	**Panel A: Dependent variable = Over-Investment**			**Panel B: Dependent variable = Under-Investment**		
	JTA	***KTA***	***Aggregate***	***JTA***	***KTA***	***Aggregate***
EQ	-0.98*** (-210.6)	-0.87*** (-195.2)	-1.48*** (-181.3)	-0.71*** (-91.9)	-0.69*** (-79.4)	-1.6*** (-69.5)
Slack	-0.048*** (-45.8)	-0.052*** (-43.3)	-0.061*** (48.1)	-0.049*** (-33.4)	-0.043*** (-26.7)	-0.025*** (-15.6)
Tang	0.051*** (89.2)	0.047*** (86.9)	0.05*** (78.4)	-.018*** (40.4)	0.021*** (31.4)	0.012*** (20.5)
LIQ	-25.4*** (-4.42)	-43.1*** (-2.6)	-42.3*** (-3.9)	-112.5*** (3.1)	-98.8** (-1.35)	-111.4*** (-4.32)
CFO	-0.063*** (-18.2)	-0.065*** (-15.7)	-0.05*** (-14.5)	0.02*** (9.5)	0.0175*** (7.4)	0.025*** (8.5)
LTA	-0.01** (-3.15)	-0.05 (-1.2)	-0.035*** (-9.3)	-0.005 (-0.03)	0.03*** (4.9)	0.018*** (3.4)
STD/TD	0.01*** (3.4)	0.02*** (5.15)	2.45 (1.1)	6.74 (0.4)	-3.55 (-1.2)	-0.011 (-2.1)
Intercept	-1.2*** (-21.1)	-1.35*** (-17.2)	-2.45*** (-3.75)	-1.33*** (-25.4)	-1.18*** (-15.56)	-1.95*** (-11.22)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.86	0.87	0.81	0.61	0.52	0.50
F-statistics	4.82***	6.3***	3.9***	5.1***	10.5***	8.75***

Note: this table shows the regression of corporate overinvestment and underinvestment on EQ proxies. All variables are defined in Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 7: Country-Level Analysis of Earnings Quality, Investment Efficiency and Institutional Ownership

Variables of Interest	Panel A: Cross-country Analysis						Panel B: Within-country Analysis (Bonferroni)					
	Means				One-Way ANOVA	Kruskal-Wallis	US/UK	US/Ger	US/Jap	UK/Ger	UK/Jap	Ger/Jap
	US	UK	Ger	Jap								
JTA	0.19	0.17	0.078	0.082	15.2***	39.05***	-0.05	-0.55***	0.36***	-0.48***	0.83***	0.01
KTA	-0.34	-0.27	-0.13	0.15	10.5***	66.8***	-0.07	-0.5***	0.11***	-0.43***	0.59***	0.025
EQ (Aggregate)	-0.12	-0.09	-0.20	0.21	9.45***	133.6***	-0.045	-0.35***	0.17***	-0.34***	0.71***	0.018
InvEff1	0.42	0.46	0.53	0.51	4.65*	81.9***	0.025	0.12***	0.27***	0.09***	0.69***	0.02
IOW	0.086	0.069	0.055	0.07	162.8***	209.3***	0.03**	0.073**	0.23***	0.044***	0.67**	0.23*

Note: this table shows the results of One-Way ANOVA, Kruskal-Wallis and Boneferroni tests. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 8: Country-Level Regression Analysis of Investment Efficiency and Earnings Quality

$$InvEff_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Year + \varepsilon_{i,t}$$

Predictors	*US*			*UK*			*Germany*			*Japan*		
	JTA	***KTA***	***Aggregate***	***JTA***	***KTA***	***Aggregate***	***JTA***	***KTA***	***Aggregate***	***JTA***	***KTA***	***Aggregate***
EQ	1.3*** (6016)	1.28*** (1028.7)	2.58*** (829.4)	1.2*** (3728)	1.27*** (926)	2.6*** (731.5)	0.747* (73.5)	0.702* (69.5)	0.695* (65.5)	0.425* (23.1)	0.390* (19.6)	0.405* (20.4)
Slack	-0.097*** (-3.2)	0.0138 (0.76)	0.023 (1.05)	-0.0305 (-0.59)	0.029 (1.43)	0.032 (1.22)	0.089*** (8.14)	0.084*** (7.47)	0.081*** (6.7)	-0.023 (-2.3)	-0.031 (-3.2)	-0.028 (-1.2)
Tang	-0.037*** (-33.47)	-0.0027 (-0.42)	0.012 (1.59)	-0.033*** (-18.55)	-0.003 (-0.41)	0.064 (0.71)	-0.074*** (-20.2)	-0.084*** (-18.3)	-0.077*** (-19.5)	-0.015* (-10.2)	-0.02* (-8.05)	-0.18* (-5.75)
LIQ	50.78*** (3.43)	156.2* (1.81)	34.67 (0.32)	51.01*** (2.68)	-70.7 (-0.91)	-301.5*** (-3.11)	62.1*** (3.17)	68.15*** (3.4)	77.87*** (3.73)	33.8** (5.77)	43.4** (7.22)	39.5** (4.67)
CFO	0.199*** (133.5)	-0.017** (-1.96)	-0.095*** (-8.81)	0.103*** (25.2)	-0.41*** (-25.1)	-0.59*** (-28.4)	-0.052*** (-27.9)	-0.05*** (-26.4	-0.046*** (-23.2)	-0.035** (-13.45)	-0.0285** (-9.12)	-0.033** (-11.8)
LTA	0.0027 (0.85)	-0.005*** (-4.58)	-0.001 (-0.82)	0.006** (2.26)	0.004*** (3.1)	0.011*** (7.65)	-0.021** (-2.0)	-0.038*** (-3.47)	-0.086 (-0.76)	-0.044* (-1.3)	-0.51* (-1.57)	-0.049* (-2.4)
STD/TD	-0.005*** (-4.18)	-0.038*** (-5.36)	-0.055*** (-6.33)	-0.013 (-0.91)	-.0164*** (-2.67)	-0.026*** (-3.37)	0.002*** (35.1)	0.00189*** (34.9)	0.002*** (33.7)	0.01** (17.3)	0.015 (12.8)	0.002 (5.5)
Intercept	0.797*** (238.7)	0.966*** (49.65)	0.793*** (32.89)	0.801*** (181.8)	0.855*** (48.4)	0.645*** (28.8)	0.973*** (6.84)	1.26*** (8.58)	0.74*** (4.89)	0.52** (3.0)	0.610** (4.6)	0.55** (5.3)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.90	0.89	0.87	0.87	0.845	0.85	0.68	0.66	0.64	0.48	0.44	0.40
F-statistics	2.4***	15.9***	9.84***	1.54***	5.56***	5.2***	1.61***	1.49***	1.0***	1.12***	1.05***	1.02***

Notes: this table report the results of regression tests between corporate IE and EQ measures at a country level. All variables are defined in Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 9: The Effect of Institutional Ownership and Earnings Quality on Investment Efficiency

$$InvEff_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 IOW_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Country + \sum Year + \varepsilon_{i,t}$$

$$Overinvest_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 IOW_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Country + \sum Year + \varepsilon_{i,t}$$

$$Underinvest_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 IOW_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Country + \sum Year + \varepsilon_{i,t}$$

	InvEff1			**Overinvestment**			**Underinvestment**		
Predictors	**JTA**	**KTA**	**Aggregate**	**JTA**	**KTA**	**Aggregate**	**JTA**	**KTA**	**Aggregate**
EQ	1.15*** (177.3)	0.94*** (155.2)	1.56*** (171.5)	-0.91*** (-199.8)	-0.87*** (-205.1)	-1.75*** (-189.15)	-0.62*** (-74.0)	-0.77*** (-67.4)	-0.93*** (-76.35)
IOW	0.025** (1.0)	0.05** (0.56)	0.095** (1.75)	-0.01** (-1.1)	-0.1** (-1.3)	-0.15* (-1.8)	-0.08* (-0.7)	-0.075 (-0.6)	-0.02*** (-0.72)
Slack	-0.018*** (-16.25)	-0.012*** (-16.12)	-0.02*** (-15.76)	-0.04*** (-55.18)	-0.043*** (-61.9)	-0.048*** (-50.4)	-0.045*** (-32.65)	-0.044*** (-22.55)	-0.022*** (-9.33)
Tang	0.14*** (-44.4)	0.09*** (-33.67)	0.016** (37.1)	0.05*** (90.5)	0.045*** (89.77)	0.052*** (71.57)	0.016*** (38.32)	0.01*** (30.26)	0.098*** (21.73)
LIQ	-43.5*** (-5.84)	-62.3*** (-5.93)	-65.2*** (-4.95)	-27.7** (-1.78)	-31.25*** (-2.86)	-41.34*** (-3.66)	-115.58*** (-3.0)	-136.74*** (-3.28	-141.95*** (-3.05)
CFO	0.075*** (60.1)	0.07*** (56.7)	0.065*** (50.7)	-0.062*** (-29.7)	-0.068*** (-30.1)	-0.057*** (-25.1)	0.018*** (8.48)	0.02*** (7.39)	0.025*** (9.33)
LTA	0.027*** (6.48)	0.033*** (7.94)	0.015*** (4.86)	-1.72** (-1.0)	-5.88** (-0.95)	1.25*** (5.67)	1.47** (1.1)	4.35** (1.6)	1.9** (1.3)
STD/TD	-0.08*** (-13.2)	-0.005*** (-25.16)	-0.002*** (-23.4)	0.002*** (8.78)	0.0017*** (7.11)	3.23 (3.3)	4.69 (0.68)	-8.38 (-0.75)	-0.002 (-0.85)
Intercept	-0.84*** (-24.5)	-0.76*** (-19.7)	-0.65*** (-29.45)	-0.78*** (-30.4)	-0.83*** (-22.36)	-0.67*** (-41.1)	-0.73*** (-41.6)	-0.76*** (-42.37)	-0.84*** (-29.53)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.734	0.712	0.70.5	0.836	0.857	0.81	0.62	0.47	0.475
F-statistics	3.47***	4.88***	3.77***	3.78***	4.22***	3.45***	4.87***	8.95***	7.05***

Note: this table reports the association between corporate IE and institutional ownership. All variables are defined in Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 10: The Conditional Effect of the Institutional Ownership and Earnings Quality on Investment Efficiency

$$Overinvest_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 EQ * IOW_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Country + \sum year + \varepsilon_{i,t}$$

$$Underinvest_{i,t+1} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 EQ * IOW_{i,t} + \beta_3 Controls_{i,t} + \sum Industry + \sum Country + \sum year + \varepsilon_{i,t}$$

Predictors	Panel A: Dependent variable = Over-Investment			Panel B: Dependent variable = Under-Investment		
	JTA	***KTA***	***Aggregate***	***JTA***	***KTA***	***Aggregate***
EQ	-1.1*** (-216.2)	-1.2*** (-198.5)	-2.0*** (-167.52)	-1.15*** (-58.13)	-0.6*** (-60.4)	-1.2*** (-59.5)
EQ*IOW	-0.01*** (-17.5)	-0.009*** (-18.8)	-0.021*** (-16.7)	-0.04*** (-22.55)	-0.02*** (-31.23)	-0.04*** (-37.8)
SLACK	-0.045*** (-23.43)	-0.04*** (-19.4)	-0.05*** (-33.64)	-0.025*** (-11.9)	-0.038*** (-17.2)	-0.022*** (-10.56)
TANG	0.05*** (88.1)	0.052*** (90.3)	0.055*** (90.8)	0.01*** (21.43)	0.015*** (24.25)	0.01*** (21.6)
LIQ	-28.45*** (-2.17)	-37.74*** (-3.26)	-42.4*** (-5.47)	-87.7** (-1.98)	-63.7 (-1.55)	-81.42** (-1.94)
CFO	-0.06*** (-33.53)	-0.06*** (-26.62)	-0.058*** (-23.58)	0.025*** (10.04)	0.02*** (9.86)	0.024*** (10.5)
LTA	-0.01*** (-2.53)	-0.008** (-2.0)	-0.04*** (-7.77)	0.011** (2.25)	0.025*** (4.37)	0.01 (1.92)
STD/TD	0.001*** (3.27)	0.001*** (3.7)	-1.85 (-0.2)	-9.1 (-0.45)	2.6 (0.19)	-9.1 (-0.41)
Intercept	-0.6*** (-9.06)	-0.67*** (-10.18)	-0.18*** (-2.14)	-0.74*** (-9.8)	-0.1*** (11.95)	-0.75*** (10.8)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.862	0.861	0.828	0.597	0.61	0.59
F-statistics	4.05***	3.84***	3.59***	7.29***	9.41***	7.29***

Note: this table outlines the association between corporate IE, EQ and EQ*IOW. All variables are defined in Table 2.***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 11: The Conditional Effect of the Institutional Ownership and Earnings Quality on Investment Efficiency According to the Legal Origin.

$$\text{InvEff}_{i,t+1} = \beta_0 + \beta_1 \text{EQ}_{i,t} + \beta_2 \text{IOW} * \text{EQ}_{i,t} + \beta_3 \text{Controls}_{i,t} + \sum \text{Industry} + \sum \text{Year} + \varepsilon_{i,t}$$

	US			UK			Germany			Japan		
Predictors	**JTA**	**KTA**	**Aggregate**	**JTA**	**KTA**	**Aggregate**	**JTA**	**KTA**	**Aggregate**	**JTA**	**KTA**	**Aggregate**
EQ	1.29*** (602.3)	1.28*** (102.8)	2.6*** (830)	1.3*** (372.7)	1.28*** (925.9)	2.5*** (731)	0.747* (73.4)	0.71* (69.4)	0.723* (65.5)	0.615* (10.4)	0.635* (11.4)	0.605* (9.5)
IOW*EQ	0.013*** (4.44)	0.047*** (2.65)	0.085*** (3.85)	0.017* (0.35)	0.026* (1.34)	0.06*** (2.45)	-0.025 (-0.59)	-0.02 (-0.33)	-0.022 (-0.6)	-0.01 (-0.9)	-0.013 (-0.4)	-0.011 (-0.15)
Slack	0.097*** (-3.21)	0.013 (0.75)	0.022 (1.05)	-0.03 (-0.59)	0.029 (1.41)	0.031 (1.2)	0.089*** (8.13)	0.084*** (7.46)	0.08*** (6.98)	0.032** (2.7)	0.031** (3.3)	0.03** (2.9)
Tang	-0.037*** (-33.5)	-0.026 (-0.4)	0.013* (1.63)	-0.033*** (-18.5)	-0.025 (-0.35)	0.075 (0.82)	-0.074*** (-20.2)	-0.068*** (-18.02)	-0.077*** (-19.52)	-0.09** (-8.1)	-0.085** (-6.8)	-0.0745** (-7.18)
LIQ	52.6*** (3.56)	162.4* (1.88)	45.8 (0.43)	50.6*** (2.65)	-64.7 (-0.84)	-289.3*** (-2.98)	61.9*** (3.16)	68.1*** (3.37)	77.8*** (3.73)	21.45** (5.2)	20.3*** (4.9)	19.5*** (5.1)
CFO	0.2*** (133.8)	-0.016* (-1.82)	-0.094*** (-8.67)	0.103*** (25.2)	-0.42*** (-25.1)	-0.59*** (-28.4)	-0.052*** (-27.9)	-0.051*** (-26.3)	-0.045*** (-23.25)	-0.014** (-16.7)	-0.012** (-15.8)	-0.011** (-17.7)
LTA	0.048** (2.1)	-0.046*** (-2.63)	0.043 (0.3)	0.062** (2.21)	0.036*** (3.23)	0.011*** (7.87)	-0.21** (-2.0)	-0.038*** (-3.47)	-0.086 (-0.76)	-0.02** (-0.975)	-0.019** (-0.76)	-0.021 (-0.82)
STD/TD	-.0048*** (-4.0)	-.037*** (-5.25)	-0.054*** (-6.18)	-.014 (-0.92)	-0.016*** (-2.62)	-0.0205*** (3.28)	0.017*** (35.1)	0.018*** (34.9)	0.018*** (33.68)	0.01** (10.4)	0.01** (10.4)	0.01** (10.4)
Intercept	0.79*** (221.3)	0.94*** (45.35)	0.757*** (29.3)	0.8*** (178.6)	0.85*** (47.3)	0.635*** (27.9)	0.97*** (6.86)	1.25*** (8.56)	0.714*** (4.89)	0.56** (3.56)	0.62** (3.85)	0.65** (4.06)
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.88	0.87	0.885	0.885	86	0.88	0.68	0.665	0.645	0.42	0.41	0.39
F-statistics	2.97***	16.3***	10.5***	1.5***	5.6***	5.2***	1.55***	1.45***	1.1***	0.83***	0.945***	0.91***

Note: this table reports the association between EQ, corporate IE and institutional ownership at a country level. All variables are defined in Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.

Table 12: The Effect of Earnings Quality and Institutional Ownership on Investment Efficiency using Alternative Measures of Investment Efficiency

$$\text{Overinvest}_{i,t+1} = \beta_0 + \beta_1 \text{EQ}_{i,t} + \beta_2 \text{EQ} * \text{IOW}_{i,t} + \beta_3 \text{Controls}_{i,t} + \sum \text{Industry} + \sum \text{Country} + \sum \text{year} + \varepsilon_{i,t}$$

$$\text{Overinvest}_{i,t+1} = \beta_0 + \beta_1 \text{EQ}_{i,t} + \beta_2 \text{EQ} * \text{IOW}_{i,t} + \beta_3 \text{Controls}_{i,t} + \sum \text{Industry} + \sum \text{Country} + \sum \text{year} + \varepsilon_{i,t}$$

Predictors	Panel A: Dependent variable = Over-Investment			Panel B: Dependent variable = Under-Investment		
	$InvEff2$	$InvEff3$	$InvEff4$	$InvEff2$	$InvEff3$	$InvEff4$
EQ (*Aggregate*)	-0.01*** (-38.4)	-0.02*** (-37.7)	-1.5*** (-40.2)	-0.02*** (-36.5)	-0.04*** (-83.1)	-1.85*** (-30.45)
EQ (*Aggregate*)*IOW	-6.3*** (-13.2)	-0.025*** (-18.3)	-0.044*** (-20.5)	-8.14*** (-32.4)	-0.02*** (-31.7)	-0.055*** (-28.9)
Slack	-8.25*** (-22.5)	-0.011*** (-22.8)	-0.035*** (-22.4)	-7.2*** (-18.5)	-0.015 *** (-19.0)	-0.04*** (-18.7)
Tang	6.8*** (34.5)	0.015*** (35.6)	0.047*** (34.2)	2.45*** (25.7)	0.045*** (24.8)	0.02*** (25.6)
LIQ	-0.02*** (-4.8)	-0.18*** (-5.2)	-65.5*** (-5.35)	-0.03** (-2.5)	-0.45** (-2.9)	-145.8** (-2.7)
CFO	-2.6*** (-4.5)	-0.05*** (-5.4)	-0.02*** (-5.2)	4.5*** (12.1)	0.01*** (12.5)	0.035*** (12.8)
LTA	-4.7*** (-6.13)	-0.05*** (-5.85)	-0.034*** (-6.25)	2.6** (2.9)	0.035** (2.15)	0.015** (2.26)
STD/TD	-1.2*** (-10.5)	-1.6*** (-11.32)	-0.01*** (-11.7)	-1.1 (-0.48)	-1.8 (-0.45)	-7.1 (-0.4)
Intercept	-0.06*** (-41.6)	0.12*** (43.1)	4.7*** (45.0)	-0.05*** (-32.5)	0.1*** (35.9)	4.0*** (-30.8)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.84	0.835	0.836	0.60	0.59.5	0.60.2
F-statistics	2.85***	2.75***	2.92***	7.38***	7.2***	8.1

Note: this table illustrates the relationship between IE, EQ and EQ*IOW using alternative measures for IE other than those used in the context of the main model specifications as robust test. All variables are defined in Table 2. ***, **, * indicate the level of significance at 1%, 5% & 10% respectively.