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Institutional quality and dark side of product market competition: a cross-country study

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Abstract

Purpose – The authors examine the joint effect of the country-wide legal institutions and product market competition on stock crash risk in a large sample of international firms.

Design/methodology/approach – In the study, the authors examine whether the country-level institutional factors affect product market competition's impact on stock crash risk. Specifically, the authors characterize country-wide institutional quality with individual governance indices developed in earlier studies and also adopt the worldwide board reforms as a proxy for the change in firms' governance environment.

Findings – The authors find that strong institutions mitigate the positive relationship between product market competition and stock crash risk in the international setting. In addition, the authors find that institutional quality moderates the effect of product market competition on stock crash risk via the information channel, i.e. although firms in competitive industries manage and report earnings more aggressively, strong institutions or board reforms, curtail managers' incentive to do so.

Originality/value – The authors' findings lend support to the dark side of product market competition with a broader sample from 35 countries. In light of this, when earlier studies consider firms from competitive (concentrated) industries as having less (more) severe agency problems, future studies should consider the agency costs associated with product market competition for both the US firms and non-US firms. Furthermore, when it is debatable that regulators are self-interested, captured, uninformed and thus the regulations and institutions may not be fully effective as a result, this study demonstrates the

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effectiveness of institutions in ex ante mitigating agency conflicts associated with product market competition.

Keywords Product market competition, Stock crash risk, Information disclosure, Institutional quality
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1. Introduction

The role of product market competition in corporate governance has long been business researchers' interests. Early financial theories have suggested that keen product market competition exposes firms to survival problems, and so it suppresses agency problems by forcing managers to take actions that maximize shareholder value (Alchian, 1950; Hart, 1983; Schmidt, 1997; Stigler, 1958). When examining the effect of product market competition on corporate information disclosure, numerous studies have documented that product market competition mitigates managerial incentive in manipulating earnings (Laksmana & Yang, 2014) and leads to conservative financial reporting (Dhaliwal, Huang, Khurana & Pereira, 2014).

Other studies, however, argue that product market competition could give rise to "unethical problems" (Shleifer, 2004). As product market competition usually erodes profits, managers in competitive industries are under pressure to maintain firms' performance for fear of adverse career outcomes (Dasgupta, Li & Wang, 2018; DeFond & Park, 1999). To reduce the exposure to adverse career outcomes, managers of firms in competitive industries tend to delay or even withhold public disclosure of bad news that leads to investment loss (Datta, Iskandar-Datta & Singh, 2013; Graham, Harvey & Rajgopal, 2005; Kothari, Shu & Wysocki, 2009). And when the accumulated negative information reaches a tipping point and suddenly spills into the stock market all at once, these firms' stock price will crash (Li & Zhan, 2019).

The above conclusions are drawn on the US firms and little is known about how product market competition affects stock crash risk and the underlying information disclosure incentives (bad news hoarding, in particular) in other countries. We aim to fill the void in this study. Specifically, we argue that the relationship between product market competition and stock crash risk depends on the country-level institutional quality, but the direction of impact is theoretically uncertain. On one hand, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) argue that countries with a strong institutional quality not only establish provisions to protect investors (e.g. shareholders, creditors and employees), the *de jure* aspect of rules, but also enforce the provisions effectively, the *de facto* aspect. The institutions in these jurisdictions fairly constrain corporate insiders' opportunistic behaviors and allow corporate outsiders to exploit mis-pricing, if any, at a lower cost. As a result, stronger institutional quality should mitigate managers' incentives to withhold information (especially the bad news) in competitive product markets [1]. On the other hand, some studies argue that stronger enforcement of legal rights may reduce firms' incentives to disclose bad news. Stronger enforcement of creditors' rights, for example, may increase firm liquidation risk (Claessens & Klapper, 2005; Djankov, Hart, Mcliesh & Shleifer, 2008), which reduces firms' incentives to disclose bad news. Besides, while institutional quality generally leads to better financial market development (La Porta *et al.*, 1998), a liquid market with dispersed ownership could reduce blockholders' incentives to monitor managers because liquidity allows some blockholders, such as institutional investors, to sell on bad news before it is realized (Aghion, Bolton & Tirole, 2004; Bhide, 1993; Coffee, 1991). Therefore, better institutional quality may not mitigate, or even exacerbate the impact of product market competition on stock crash risk.

Along the above arguments, we examine the joint effect of product market competition and the country-wide legal institutions on stock crash risk and the managerial information hoarding incentive in an international sample. We conduct our empirical tests using listed firms in 35 countries for the 1990–2012 period. We measure stock crash risk with two commonly used measures: the negative of standardized skewness of weekly stock returns over a year (*NCSKEW*) and the asymmetric volatility between positive and negative firm-

specific weekly returns (*DUVOL*) (Chen, Hong & Stein, 2001; Kim, Li & Zhang, 2011b). We measure product market competition with *Comp*, the negative of Herfindahl-Hirschman index (*HHI*) computed for market shares of sales of all firms in the industry within a country, with a higher *Comp* indicating more product market competition. Our baseline regressions show that the product market competition is positively correlated with stock crash risk in the international sample.

Then we explore how country-level institutional factors affect product market competition's impact on stock crash risk along two dimensions. First, we characterize country-wide institutional quality with ten individual governance indices that fall in three categories: the strength of stakeholders' rights (including the rights for shareholders, creditors and employees), the legal environment corporate fiduciaries face to, and the accounting standards and corporate disclosure requirements. Although each indicator aims to measure a certain dimension of institutional quality, some of them are highly correlated. To address the multi-collinearity issue in regression, we form a composite index of institutional quality (*IQ* hereafter) using the principal component analysis, and interact *IQ* with *Comp* for the regressions of stock crash risk. Our regression analysis indicates that strong *IQ* mitigates the impact of product market competition on stock crash risk. Nevertheless, our results generally hold when individual components of *IQ* are used.

Second, as *IQ* is time-invariant, it is subject to the endogeneity concern that our findings are driven by other institutional factors that are not captured by *IQ*. Thus, we adopt the setting of world-wide board reforms taking place between 1998 and 2007 as our second proxy of institutional quality. The board reforms call for the independence of boards and audit committees (and auditors) and the separation of roles as CEOs and board chairman (i.e. an exogenous shock to the prevailing governance practice), and they are found to enhance firm value (Fauver, Hung, Li & Taboada, 2017), improve disclosure (Hu, Li, Taboada & Zhang, 2020), and reduce information asymmetry in mergers and acquisitions (Kim & Lu, 2013). If board reforms promote information disclosure from corporate insiders by strengthening the independent directors' monitoring and advising functions, the impact of product market competition on stock crash risk should be mitigated after those reforms. The regression results indicate that the positive relationship between product market competition and stock crash risk becomes weaker after the board reforms.

To provide direct evidence that better institutional quality moderates the effect of product market competition on stock crash risk via the information channel, we re-run the above regressions with proxies for information disclosure, i.e. accruals quality and accounting conservatism, respectively, as dependent variables. The result indicates that although firms in competitive industries manage and report earnings more aggressively, strong *IQ*, or board reforms, can curtail managers' incentive to do so. Overall, the findings suggest that there is an agency cost associated with product market competition in the international sample, and the country-wide institutional quality mitigates it.

To conclude our analysis, we explore how *IQ* affects board reforms' impact on bad news hoarding driven by product market competition. This is because Christensen, Hail, and Leuz (2016) and La Porta *et al.* (1998; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2000) argue that existing institutional environment will interact with the new rules to either strengthen or dampen them. Thus, board reforms may have heterogeneous impacts in different countries. Our result indicates that board reforms mitigate the bad news hoarding problem mainly in countries with weak *IQ*.

Our study sheds light on previous studies regarding the governance benefit and agency cost of product market competition. While some studies claim that product market competition plays a governance role on corporate managers, the others suggest that product market competition results in severe agency problems. However, those findings are mainly drawn from a single market, the US, and our findings lend support to the dark side of product

market competition with a broader sample from 35 countries. In light of this, when various studies (Andreou, Antoniou, Horton & Louca, 2016; Hu *et al.*, 2020; Kim *et al.*, 2011b) consider firms from competitive (concentrated) industries as having less (more) severe agency problems, future studies should consider the agency costs associated with product market competition for both the US firms and non-US firms.

Second, our findings also contribute to the studies examining the efficacy of institutions. Hail, Tahoun, and Wang (2018) argue that regulators can be self-interested, captured, uninformed, or ideological, and thus the regulations and institutions are not fully effective as a result [2]. Our results suggest that product market competition and country-wide institutional factors jointly determine managers' information disclosure incentives and the resultant stock crash risk. In particular, strong institutional quality (proxied with commonly used institutional quality indices developed in earlier studies) mitigates the exacerbating effect of product market competition on stock crash risk and the underlying bad-news hoarding propensity; and an improvement in institutional quality (proxied by the board reforms) also mitigates the positive relationship between product market competition and stock crash risk, with its effect being stronger in jurisdictions with weak prevailing institutions. Thus, our study demonstrates the effectiveness of institutions in *ex ante* mitigating agency conflicts between corporate insiders and outsiders and preventing corporate misbehavior from occurring.

The rest of the paper is organized as follows. Section 2 reviews the literature and develops hypotheses. Section 3 presents the methodology and data. Section 4 describes and discusses the empirical findings. Section 5 concludes the study.

2. Literature review

2.1 Product market competition

In an efficient capital market, stock prices should continuously reflect available information correctly. In reality, value-relevant corporate news must be disclosed in a timely manner for investors to correctly assess the stock value. However, opposing forces caused by competitive product markets could affect managers' incentives to disclose information in an accurate and timely manner. Theoretical studies suggest that product market competition is an external monitoring device that alleviates agency problems by reducing managerial slacks and forcing managers to improve firm performance (Alchian, 1950; Hart, 1983; Schmidt, 1997; Stigler, 1958) and Giroud and Mueller (2010, 2011) document empirical evidence consistent with the theoretical conjecture [3]. When product market competition results in less severe agency problems and improves firm productivity, corporate managers have less incentives to withhold (bad) news. Product market competition can even incentivize firms in competitive industries to accelerate the disclosure of negative information, because with timely loss recognition, incumbent firms can signal weak future demand for tricking their rivals and discouraging potential entrants (Darrough & Stoughton, 1990; Li, 2010). In other words, firms in competitive industries may adopt more conservative disclosure practices (Dhaliwal *et al.*, 2014; Laksmana & Yang, 2014).

On the other hand, product market competition may trigger information hoarding. In competitive product markets, information disclosure creates a proprietary cost for firms when they give away "company secrets" and harms their competitive position (Verrecchia, 1983, 2001). Thus, corporate managers in competitive industries tend to withhold information. Their incentive to withhold *bad news* can be even stronger. As product market competition erodes profits, managers in competitive industries have to bear greater pressure to maintain firms' performance for fear of adverse career outcomes (DeFond & Park, 1999), particularly the risk of dismissal (Dasgupta *et al.*, 2018) and reduction in compensation due to underperforming peers (Jayaraman, Milbourn, Peters & Seo, 2021) [4]. Out of career concerns (e.g. promotion, employment opportunities within and outside the firm, potential loss of post-retirement benefits and directorships), managers tend to suppress or delay the

revelation of negative information and gamble on subsequent corporate events working out in their favor (Datta *et al.*, 2013; Graham *et al.*, 2005; Kothari *et al.*, 2009). Consistent with this argument, Li and Zhan (2019) find that companies facing more competition from product market have a greater incentive to withhold bad news, leading to a higher stock crash risk.

2.2 Country-level institutional quality

When earlier studies have discussed and examined the competing forces that affect the information disclosure associated with product market competition, they mostly focus on the US firms. It is unclear whether their conclusions can be generalized to an international setting, with different countries being characterized by their respective unique financial infrastructure, industry development or government efficiency. In particular, although corporate managers may have incentives to withhold information (especially the bad news), their ability in so doing depends on internal governance quality of the firms and external legal environment of the countries in which they make business decisions. Studies for the US suggest that internal governance mechanisms can limit the extreme downside risk. For example, more transparent firms (Hutton, Marcus & Tehranian, 2009), firms with more prudent financial reporting (Kim & Zhang, 2016), firms with stronger internal control (Lobo, Wang, Yu & Zhao, 2020), and firms with a smaller divergence in the major shareholder's cash flow right and control right (Hong, Kim & Welker, 2017) are less prone to stock price crash.

Country-level financial infrastructure and legal institutions that strengthen shareholders' rights usually lower the hurdle for corporate fiduciaries to be sued and enlarge the penalties on them when proved guilty (La Porta *et al.*, 1998; La Porta, Lopez-de-Silanes, Shleifer & Vishny, 2002). In addition, strong country-level institutions are often accompanied by explicit accounting standards and financial reporting requirements that increase the timeliness and precision of firm-specific information disclosed at the first place (DeFond, Hung, Li & Li, 2014; Leuz, Nanda & Wysocki, 2003). As a result, if the institutional quality of a country is higher, it would be harder for corporate managers to withhold information (especially the bad news) without being detected and punished. When firm-specific information is impounded into stock prices more efficiently, a lower price crash risk should be observed (Jin & Myers, 2006).

The above prediction could run into two potential problems, however. First, laws and regulations not only protect shareholders but also other corporate stakeholders, whose rights have an uncertain effect on information disclosure. Lenders, for example, mainly concern their principals and interests to be paid in due course, and bad news tends to trigger their incentives to protect capital by liquidating the borrowers. Therefore, when a country's legal system is biased towards creditors vs shareholders, distressed firms could face a higher risk of liquidation (Claessens & Klapper, 2005; Djankov, Hart *et al.*, 2008), with managers exposed to job security risk. If firms in competitive industries are more likely to face financial distress, then their managers will have stronger incentives to hoard bad news when encountering well-protected creditors. Labor unions would also affect managers' incentives to disclose information but in another way. Chung, Lee, Lee, and Sohn (2016) and Bowen, DuCharme, and Shores (1995) show that when facing strong organized labor, managers tend to withhold good news in order to strengthen their bargaining power vs labor unions. When good news is suppressed, firms' crash risk would reduce due to deflated stock prices.

Second, shareholders may have low incentives to engage in costly monitoring if external governance is strong. Countries with stronger legal frameworks generally have larger and deeper capital markets and more dispersed corporate ownership (La Porta *et al.*, 1998). However, a liquid market with dispersed ownership could create free-rider problems in corporate governance (Edmans, 2014; Grossman & Hart, 1988), especially when the cost of trading is low. Instead of spending resources on monitoring managers, some blockholders

such as institutional investors who receive bad signals would sell their shareholders before the bad news is public (Aghion *et al.*, 2004; Bhide, 1993; Kahn & Winton, 1998).

Therefore, whether strong institutional quality mitigates or exacerbates the impact of product market competition on information withholding is an open empirical question in the international setting. To address this empirical question, we gauge country-level institutional quality in following ways. First, we measure institutional quality with general governance indices [5]. We use six indices that evaluate the strength of the provisions on protection of various stakeholders, namely shareholders, creditors, and labors, and two indices on the enforcement quality of the provisions. We also examine two more institutional attributes regarding accounting standards and corporate disclosures, as they are directly relevant to the phenomenon under scrutiny. Although the institutional attributes we employ stress to enhance the governance in different aspects, we do not expect that all ten would equally affect the propensity for managers to manipulate information disclosure, or for firms' stock price to plummet. At the same time, multiple indices can be correlated. We thus construct a composite measure, *IQ*, by applying the principal component analysis on different institutional attributes. Second, we use world-wide board reforms taking place between 1998 and 2007 as exogenous, positive shocks to institutional quality [6]. We expect that strong institutional quality and board reforms should be able to mitigate managers' incentives to hoard bad news, particularly in competitive industries. We provide detailed account of governance indices and board reforms in Section 3.

3. Methodology and sample

3.1 Measures of stock crash risk and information hoarding

3.1.1 Stock crash risk. Our main variable of interest is stock crash risk [7]. We follow Chen *et al.* (2001) and Kim *et al.* (2011b) to measure stock crash risk with two variables: *NCSKEW* and *DUVOL*. For a given firm in a fiscal year, *NCSKEW* is calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year and dividing it by the standard deviation of firm-specific weekly returns raised to the third power. Specifically, we define the firm-specific weekly return, denoted by $W_{i,\tau}$, as the natural logarithm of one plus the residual return from the following market model:

$$r_{i,\tau} = \alpha_i + \beta_{1i} r_{m,\tau-2} + \beta_{2i} r_{m,\tau-1} + \beta_{3i} r_{m,\tau} + \beta_{4i} r_{m,\tau+1} + \beta_{5i} r_{m,\tau+2} + u_{i,\tau} \quad (1)$$

where $r_{i,\tau}$ is the return on stock i in week τ, and $r_{m,\tau}$ is the return on the value-weighted market index in week τ. The firm-specific weekly return for firm i in week τ, $W_{i,\tau}$, is measured by the natural logarithm of one plus the residual return in Equation (1), i.e. $W_{i,\tau} = \log(1 + u_{i,\tau})$.

With firm-specific stock return, we compute *NCSKEW* for each firm i in year t as

$$NCSKEW_{it} = -\left[n(n-1)^{3/2}\sum W_{i\tau}^3\right] \Big/ \left[(n-1)(n-2)\left(\sum W_{i\tau}^2\right)^{3/2}\right]. \quad (2)$$

To compute the down-to-up volatility (*DUVOL*) measure of crash likelihood (Chen *et al.*, 2001), we separate all the weeks (in a fiscal year t) with firm-specific weekly returns below the annual mean (the "down" weeks) from those with firm-specific returns above the annual mean (the "up" weeks) and calculate the standard deviation of weekly returns for each of these subsamples separately. Then, the *DUVOL* measure is the logarithm of the ratio of the standard deviation for the down weeks to that for the up weeks.

3.1.2 Accruals quality. We construct two proxies for accruals quality ($|DACC|^{DD}$ and $|DACC|^{KLW}$) by following Dechow and Dichev (2002) and Kothari, Leone, and Wasley (2005). We estimate the following equations for each of Fama-French 48 industries in each year and compute the absolute value of the residuals from each method as the proxy for accruals

quality. A higher value of $|DACC|^{DD}$ or $|DACC|^{KLW}$ indicates more deviation of accruals from fundamental performance, thus a lower accruals quality.

Specifically, Dechow and Dichev (2002) define accruals in year t as a function of operating cash flows from $t-1$ to $t+1$ using the following specification:

$$\Delta WC_{it} = \beta_0 + \beta_1 CFO_{it-1} + \beta_2 CFO_{it} + \beta_3 CFO_{it+1} + \varepsilon_{it} \quad (3)$$

where ΔWC_{it} is the change in working capital accruals in year t for firm i and CFO_{it} is cash flow from operations, with all the variables scaled by total assets at the beginning of the year.

Kothari *et al.* (2005) define accruals as a function of fundamental variables including sales change, fixed assets and firm performance:

$$TACC_{it} = \lambda_0 + \frac{\lambda_1}{TAST_{it-1}} + \lambda_2 \Delta Sales_{it} + \lambda_3 PPE_{it} + \lambda_4 ROA_{it-1} + \varepsilon_{it} \quad (4)$$

where $TACC_{it}$ is total accruals, defined as the difference between operating income and operating cash flow; $\Delta sales_{it}$ is annual sales growth from year $t-1$ to year t; PPE_{it} is the gross value of fixed assets; and ROA_{it} is operating income. All the variables are deflated by total assets ($TAST_{it}$) at the beginning of the year.

3.1.3 Accounting conservatism. In addition to test managers' propensity in manipulating accounting information with accruals quality proxies, we also test managers' bad news hoarding incentive with the conditional and unconditional accounting conservatism measures. Ahmed and Duellman (2007) and Givoly and Hayn (2000) gauge reporting conservatism as the three-year average of the negative of non-operating accruals (*NONOPACCR*), which is defined as the minus of total accruals minus operating accruals, scaled by lagged total assets. Total accruals is equal to net income before extraordinary items plus depreciation minus cash flow from operations, and operating accruals is equal to ΔAccounts Receivable + ΔInventory + ΔPrepaid Expense − ΔAccounts Payable − ΔTaxes Payable as given by the statement of cash flow. *NONOPACCR* is the unconditional accounting conservatism measure because it is mainly consisted of loss provisions, restructuring charges, asset write-downs, etc., whose value does not depends on the information received in future periods. A lower value of non-operating accruals suggests more conservatism in those loss provisions. We take the negative value of non-operating accruals so that a higher value of *NONOPACCR* suggests a higher level of conservatism.

We follow Khan and Watts (2009) to define a conditional conservatism measure of reporting conservatism, i.e. *C_Score*. We run the following annual cross-sectional regression for *Earnings*, defined as net income before extraordinary items scaled by lagged market value of equity:

$$\begin{aligned} Earnings_i = {} & \beta_0 + \beta_1 D_i + R_i * (\mu_1 + \mu_2 LnMCap_i + \mu_3 MTB_i + \mu_4 Lev_i) \\ & + D_i * R_i * (\gamma_1 + \gamma_2 LnMCap_i + \gamma_3 MTB_i + \gamma_4 Lev_i) + \delta_1 LnMCap_i \\ & + \delta_2 MTB_i + \delta_3 Lev_i + \delta_4 D_i * LnMCap_i + \delta_5 D_i * MTB_i + \delta_6 D_i * Lev_i + \varepsilon_{it} \end{aligned} \quad (5)$$

where R is stock returns, D is a dummy variable equal to one when R is negative, *LnMCap* is the natural log of market value of equity, *MTB* is the market-to-book ratio of equity, and *Lev* is long-term debt plus short-term debt scaled by the market value of equity. Khan and Watts (2009) extends Basu's (1997) cross-sectional regression by including firm specific variables, i.e. *LnMCap*, *MTB*, and *Lev*. Firm-level accounting conservatism, *C_Score*, is thus defined as $\gamma_1 + \gamma_2 LnMCap_i + \gamma_3 MTB_i + \gamma_4 Lev_i$. A higher *C_Score* suggests more timely incorporation of bad news, i.e. more conservative in financial reporting.

3.2 Measure of product market competition

We measure product market competition using the Herfindahl–Hirschman index (*HHI*), defined as

$$HHI_{nt} = \sum_{i=1}^{I_n} S_{int}^2 \tag{6}$$

where S_{int}^2 is the market share of firm i in industry n in year t for a country. Market shares are computed based on sales. For each country, we compute *HHI* for each of the 48 Fama-French industries annually, and assign the industry-level *HHI* index to all firms in the industry. To ease exposition, we define *Comp* as negative *HHI*. Thus a high value of *Comp* indicates high product market competition.

3.3 Measures of institutional quality

3.3.1 Institutional quality (IQ) index. We identify three sets of country-level institutional factors that are related to investor protection and legal enforcement from previous studies. The first set is related to stakeholders' rights and includes (1) anti-director rights index and (2) anti-self dealing index from Djankov, La Porta, López-de-Silanes, and Shleifer (2008), (3) investor protection strength and (4) easiness in accessing external financing by firms from La Porta, López-de-Silanes, and Shleifer (2006), (5) creditor rights from La Porta, López-de-Silanes, and Shleifer (2008), and (6) union density from Botero, Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2004). The second set is related to enforcement quality of laws and includes (7) rule of law from La Porta, Lopez-De-Silanes, and Shleifer (2002) and (8) efficiency of jurisdictions from La Porta *et al.* (2006). The third set is related to accounting standards and information disclosure, which is especially related with our research question, and includes (9) accounting standards from La Porta *et al.* (2000) and (10) corporate disclosure from La Porta *et al.* (2006).

Each of the above indices captures a certain dimension of institutional quality of a country and we do not expect that all ten would equally affect the propensity for managers to manipulate information disclosure and stock price crash risk. At the same time, some of the indices are closely correlated with each other. Thus, we use principal composite analysis (PCA) to form a composite index of institutional quality (*IQ*) and use the composite index in our tests. A higher *IQ* suggests stronger institutional quality. When a governance index is missing for the country, we replace it with the sample average of the particular index when constructing the composite measure of *IQ*. As a robustness check, we re-run our main tests with *IQ* replaced by each of individual indices.

3.3.2 Worldwide board reforms. A caveat of *IQ* is that it is time-invariant. As a result, it is possible that our findings are driven by other institutional factors that are not captured by *IQ*. To mitigate such concern, we consider the event of world-wide board reforms, a change in governance practice, in our tests. Between 1998 and 2007, many countries have implemented board reforms calling for independence of boards and audit committees (and auditors) [8] and the separation of the CEO and board chairperson roles. To implement our test, we follow Kim and Lu (2013) and Fauver *et al.* (2017) in identifying the board reform year for each country [9].

3.4 Empirical model

We estimate the effect of product market competition on stock crash risk, conditional on country-level institutional quality proxies, with the following specification:

$$\begin{aligned} Crash_{it} = {} & \alpha_0 + \alpha_1 Comp_{it-1} + \alpha_2 (IQ \ or \ Post) + \alpha_3 (IQ \ or \ Post) * Comp_{it-1} \\ & + Firm\ controls + Country\ \ controls + Firm/Year\ F.E. + \varepsilon_{it} \end{aligned} \tag{7}$$

The dependent variable is one of *NCSKEW* and *DUVOL*. *IQ* is the composite institutional quality index, and *Post* is a dummy variable that equals one for the post-reform period and zero otherwise. Firm-fixed effects are included in the regression to control for time-invariant firm-specific factors that may affect crash risk. Year-fixed effects are also included to capture potential omitted variables that may drive changes in crash risk over time. The effect of product market competition on crash risk is captured by α_1; a positive α_1 suggests that product market competition leads to higher crash risk. α_3 captures the effect of product market competition on crash risk, conditional on institutional quality. A negative α_3 suggests that stronger institutional quality mitigates the impact of product market competition on crash risk.

To provide direct evidence that stock crash risk in competitive industries is attributed to managerial incentive in withholding information (especially the bad news), and that institutional quality can mitigate such incentive, we estimate the following specification,

$$\begin{aligned} Accruals\ quality_{it}\ (Accounting\ conservatism_{it}) = {} & \alpha_0 + \alpha_1 Comp_{it-1} + \alpha_2 (IQ\ or\ Post_t) \\ & + \alpha_3 (IQ\ or\ Post_t) * Comp_{it-1} + Firm\ controls + Country\ controls \\ & + Firm/Year\ F.E. + \varepsilon_{it} \end{aligned} \tag{8}$$

Following prior literature, we include both firm-level and country-level control variables in the regression. For ease of exposition, we discuss the control variables used in the models in a later part.

3.5 Sample

We retrieve data on firm-level financial variables and stock information from Datastream and Worldscope. Following most studies in the literature, we drop financial firms (firms with SIC code between 6000 and 6999) and utility firms (firms with SIC code between 4900 and 4949) because they are heavily regulated. We require a country to have at least 10 observations to enter the sample. We also drop firm-year observations with negative sales, negative book value of equity, or total assets below 10 million US dollars.

Table 1 displays sample distribution, board reform year, and the value of *IQ* by country. Columns (1) and (2) report the distribution of 31,206 firms and 222,032 firm-years for the main sample, with which we perform our baseline regressions. We note that Japan and the US account for more than 50% of all firm-years [10]. Column (3) shows that the first board reform took place in the U.K. in 1998 while the last one took place in Indonesia in 2007. Column (4) displays the value of *IQ*. A glance of result indicates that more developed markets, as indicated by the number of firm-years, generally have higher *IQ* and common-law countries generally have higher *IQ* than civil-law countries.

We report the summary statistics for our main variables in Panel A of Table 2, and Pearson's pairwise correlations of key explanatory variables in Panel B. A few correlation coefficients are relatively large, say between *Size* and *Ret* (0.35), *Size* and *Std* (−0.399), *ROA* and *Ret* (0.281). We also note that the correlation coefficient between *Ret* and *Std* is −0.956. However, the signs and magnitudes of these correlation coefficients are comparable to the ones reported in earlier studies (Kim, Li & Zhang, 2011a).

4. Empirical results

4.1 Institutional quality and effect of product market competition on stock crash risk

Table 3 reports the baseline results from OLS regressions testing the impacts of product market competition, institutional quality, and their interactions on stock crash risk, together with other control variables. As the results based on *NCSKEW* and *DUVOL* are

Table 1.
Sample distribution

Country	Firms (1)	Firm-years (2)	Reform year (3)	Anti-director rights index (4)	Anti-self dealing index (5)	Investor protection index (6)	Easiness in accessing external finance (7)	Creditor's right index (8)	Union density (9)	Rule of law (10)	Efficiency of jurisdiction index (11)	Accounting standards (12)	Corporate disclosure index (13)	IQ (14)
Australia	1,158	5,256	2004	4	0.76	0.78	6	3	0.26	6	10	75	0.75	1
Belgium	19	88	2005	3	0.54	0.07	5.7	2	0.6	6	9.5	61	0.42	0.71
Brazil	157	808	2002	5	0.27	0.44	4.05	1	0.25	3.79	5.75	54	0.25	−0.89
Canada	1,424	6,815	2004	4	0.64	0.96	6.39	1	0.3	6	9.25	74	0.92	0.89
Chile	40	88	2001	4	0.63	0.61	4.8	2	0.12	4.21	7.25	52	0.58	−0.43
China	2,390	14,422	2001	1	0.76	NA	NA	2	0.14	3.58	NA	NA	NA	−0.23
Denmark	45	177	2001	4	0.46	0.36	5.87	3	0.8	6	10	62	0.58	1.12
Egypt	17	44	2002	3	0.2	0.2	5.2	2	0.27	2.5	6.5	24	0.5	−1.01
Finland	26	217	2004	3.5	0.46	0.47	6.37	1	0.84	6	10	77	0.5	1.27
France	685	4,623	2003	3.5	0.38	0.47	5.75	0	0.09	5.39	8	69	0.75	0.11
Germany	634	4,500	2002	3.5	0.28	0	5.93	3	0.38	5.54	9	62	0.42	0.58
Greece	186	1,091	2002	2	0.22	0.32	5.28	1	0.35	3.71	7	55	0.33	−0.4
Hong Kong	804	5,435	2005	5	0.96	0.85	5.5	4	0.22	4.93	10	69	0.92	0.77
India	1,476	7,103	2002	5	0.58	0.77	5.3	2	0.03	2.5	8	57	0.92	−0.39
Indonesia	219	923	2007	4	0.66	0.51	4.53	2	0.01	2.39	2.5	NA	0.5	−1.21
Israel	181	612	2000	4	0.73	0.59	5.35	3	0.3	2.89	10	64	0.67	0.21
Italy	104	490	2006	2	0.42	0.2	4.41	2	0.4	5	6.75	62	0.67	−0.12
Japan	3,902	35,028	2002	4.5	0.5	0.42	4.92	2	0.24	5.39	10	65	0.75	0.38
Korea (South)	1,660	10,635	1999	4.5	0.47	0.36	5.02	3	0.14	3.21	6	62	0.75	−0.36
Malaysia	831	5,957	2001	5	0.95	0.73	5.11	3	0.1	4.07	9	76	0.92	0.35
Mexico	76	391	2001	3	0.17	0.1	3.9	0	0.4	3.21	6	60	0.58	−0.83
Netherlands	89	634	2004	2.5	0.2	0.54	6.43	3	0.28	6	10	64	0.5	0.84
Norway	113	598	2005	3.5	0.42	0.44	5.57	2	0.8	6	10	74	0.58	1.12
Pakistan	87	331	2002	4	0.41	0.63	NA	1	0.1	1.82	5	NA	0.58	−0.91
Peru	7	18	2005	3.5	0.45	0.66	3.84	0	0.05	1.5	6.75	38	0.33	−1.65
Philippines	21	89	2002	4	0.22	0.81	4.62	1	0.12	1.64	4.75	65	0.83	−0.97
Poland	162	587	2002	2	0.29	NA	NA	1	0.13	4.63	NA	NA	NA	−0.19

(*continued*)

Table 1.

Country	Firms (1)	Firm-years (2)	Reform year (3)	Anti-director rights index (4)	Anti-self dealing index (5)	Investor protection index (6)	Easiness in accessing external finance (7)	Creditor's right index (8)	Union density (9)	Rule of law (10)	Efficiency of jurisdiction index (11)	Accounting standards (12)	Corporate disclosure index (13)	IQ (14)
Singapore	196	1,261	2003	5	1	0.77	5.5	3	0.24	5.14	10	78	1	0.87
Spain	30	226	2006	5	0.37	0.55	5.09	2	0.13	4.68	6.25	64	0.5	−0.23
Sweden	217	1,239	2006	3.5	0.33	0.39	6.15	1	0.9	6	10	83	0.58	1.36
Switzerland	105	728	2002	3	0.27	0.3	6.07	1	0.25	6	10	68	0.67	0.65
Thailand	282	1,842	2002	4	0.81	0.37	4.24	2	0.1	3.75	3.25	64	0.92	−0.78
Turkey	125	859	2002	3	0.43	0.34	5.03	2	0.12	3.11	4	51	0.5	−0.93
United Kingdom	1,801	10,530	1998	5	0.95	0.78	6.26	4	0.3	5.14	10	78	0.83	1.15
United States	11,937	98,387	2003	3	0.65	1	6.74	1	0.14	6	10	71	1	0.9
Total	31,206	222,032												
Mean				3.67	0.51	0.51	5.34	1.89	0.28	4.39	7.89	63.81	0.65	0.08
SD				1.01	0.24	0.25	0.78	1.05	0.24	1.47	2.30	12.06	0.21	0.84
P25				3.00	0.31	0.36	4.89	1.00	0.12	3.21	6.25	60.50	0.50	−0.61
Median				4.00	0.46	0.47	5.33	2.00	0.24	4.68	9.00	64.00	0.58	0.11
P75				4.25	0.66	0.73	5.95	3.00	0.33	6.00	10.00	72.50	0.83	0.86

Note(s): This table reports the country distribution for sample firms. Column (1) and column (2) report the distribution of the sample firms (firm-years) meeting data requirement from 1990 to 2012 from Worldscope. Column (3) reports the board reform year in each country. Column (4) – (13) report the individual institutional attribute for each country, including column (4) on anti-director rights index (Djankov, La Porta, *et al.*, 2008), column (5) on anti-self dealing index (La Porta *et al.*, 2008), column (6) on investor protection index (La Porta *et al.*, 2006), column (7) easiness in accessing external financing (La Porta *et al.*, 2006), column (8) on creditors' rights (La Porta *et al.*, 2008), column (9) on union density (Botero *et al.*, 2004), column (10) on rule of law index (La Porta, Lopez-De-Silanes & Shleifer, 2002), column (11) on efficiency of jurisdiction index (La Porta *et al.*, 2006), column (12) on accounting standards index (La Porta *et al.*, 2000), column (13) on corporate disclosure (La Porta *et al.*, 2006). Column (14) is the composite institutional quality measure

Table 2.
Summary statistics

Panel A: Descriptive statistics

	N	Mean	SD	p25	Median	p75
Main variables						
$NCSKEW_{it}$	222,032	−0.113	0.765	−0.529	−0.109	0.293
$DUVOL_{it}$	222,032	−0.078	0.551	−0.436	−0.083	0.27
$Comp_{it-1}$	222,032	−0.121	0.108	−0.149	−0.082	−0.049
$\lvert DACC\rvert^{KLW}{}_{it}$	222,032	0.066	0.087	0.014	0.035	0.082
$\lvert DACC\rvert^{DD}{}_{it}$	179,483	0.071	0.070	0.030	0.053	0.087
$NONOPACCR_{it}$	186,545	0.019	0.049	−0.004	0.013	0.038
C_Score_{it}	210,758	0.106	1.161	−0.152	0.099	0.424
Control variables						
$Dturn_{it-1}$	222,032	−0.013	0.92	−0.08	0	0.071
Ret_{it-1} (%)	222,032	−0.118	0.137	−0.153	−0.071	−0.03
Std_{it-1}	222,032	0.043	0.024	0.025	0.038	0.056
$Size_{it-1}$	222,032	5.596	1.959	4.204	5.439	6.815
MTB_{it-1}	222,032	2.464	3.011	0.877	1.573	2.828
$Leverage_{it-1}$	222,032	0.21	0.191	0.033	0.176	0.337
ROA_{it-1}	222,032	−0.004	0.166	−0.008	0.028	0.066
$Coverage_{it-1}$	222,032	0.792	1.003	0	0	1.609
$IFRS_{it-1}$	192,811	0.129	0.335	0	0	0
$Inside\_Director\_Ownership_{it-1}$	192,811	0.276	0.279	0	0.211	0.492
$StdROA_{it-1}$	192,811	0.077	0.138	0.015	0.032	0.073
CFO_{it-1}	192,811	0.076	0.123	0.028	0.076	0.134
$\Delta sale_{it-1}$	192,811	0.158	0.514	−0.038	0.065	0.21
RND_{it-1}	192,811	0.044	0.183	0	0	0.015
$LogGDP_{jt-1}$	521	9.576	1.24	8.882	10.075	10.495
$LogMKT_{jt-1}$	521	6.045	1.407	5.02	5.951	7.066
FDI_{jt-1}	521	0.11	0.34	0.014	0.029	0.053
ITL	521	0.967	0.178	1	1	1
Takeover	521	0.56	0.497	0	1	1

(*continued*)

Table 2.

Panel B: Pearson correlation coefficients among main explanatory variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)$Comp_{it}$	1															
(2)$Dturn_{it-1}$	*−0.004*	1														
(3)Ret_{it-1}	*0.115*	*−0.012*	1													
(4)Std_{it-1}	*−0.139*	*0.011*	*−0.956*	1												
(5)$Size_{it-1}$	*0.069*	*0.016*	*0.35*	*−0.399*	1											
(6)MTB_{it-1}	*0.013*	*0.061*	*0.019*	*−0.025*	*−0.067*	1										
(7)$Leverage_{it-1}$	*0.011*	*0.013*	*0.009*	*−0.017*	*0.163*	*−0.018*	1									
(8)ROA_{it-1}	*−0.03*	*0.037*	*0.281*	*−0.286*	*0.281*	*−0.09*	*−0.052*	1								
(9)$\|DACC\|^{KLW}_{it-1}$	*0.079*	−0.003	*−0.067*	*0.056*	*−0.221*	*0.17*	*−0.038*	*−0.273*	1							
(10)$Coverage_{it-1}$	*0.108*	0.001	*0.292*	*−0.364*	*0.482*	*0.13*	*0.017*	*0.109*	*0.052*	1						
(11) Inside_Director_ Ownership	*−0.238*	*0.007*	*−0.08*	*0.138*	*0.052*	*−0.075*	*−0.045*	*0.119*	*−0.218*	*−0.198*	1					
(12)StdROA	*−0.005*	*−0.002*	*−0.237*	*0.235*	*−0.314*	*0.156*	*−0.062*	*−0.416*	*0.282*	*−0.075*	*−0.107*	1				
(13)CFO	*−0.039*	*0.012*	*0.193*	*−0.202*	*0.255*	*−0.042*	*0.01*	*0.624*	*−0.207*	*0.123*	*0.109*	*−0.363*	1			
(14)Δsales	*−0.052*	*0.021*	*−0.057*	*0.057*	*−0.078*	*0.13*	*−0.017*	*0.007*	*0.038*	*−0.035*	*0.029*	*0.06*	*0.161*	1		
(15)RND	*0.027*	*−0.005*	*−0.081*	*0.105*	*−0.056*	*−0.008*	*−0.079*	*−0.118*	*−0.013*	*−0.088*	*0.014*	*0.063*	*−0.126*	*−0.029*	1	
(16)IFRS	*−0.25*	0.003	*−0.111*	*0.139*	*−0.014*	*−0.026*	*−0.051*	*0.016*	*−0.069*	*−0.069*	*0.19*	*0.026*	*0.021*	*0.05*	*0.033*	1

Note(s): This table reports the descriptive statistics and correlation coefficients of main variables. Panel A presents summary statistics and Panel B presents Pearson correlation coefficients. The numbers in italic face indicate a significant correlation at least at 10%. See Table A1 for variable definitions

Table 3. Impact of institutional quality on price crash risk

	$NCSKEW_{it}$ (1)	$DUVOL_{it}$ (2)	$NCSKEW_{it}$ (3)	$DUVOL_{it}$ (4)	$NCSKEW_{it}$ (5)	$DUVOL_{it}$ (6)
INTERCEPT	0.755 (1.18)	0.568 (1.10)	0.775 (1.25)	0.519 (0.99)	0.888 (1.50)	0.586 (1.13)
$Comp_{it-1}$	0.110*** (2.61)	0.060* (1.81)	0.036*** (3.07)	0.029*** (2.96)	0.109*** (3.02)	0.072* (1.89)
$Comp_{it-1} \times IQ$			−0.038*** (−2.89)	−0.037*** (−3.77)		
Post					−0.072*** (−4.05)	−0.042** (−2.14)
$Comp_{it-1} \times Post$					−0.276*** (−3.04)	−0.218*** (−3.77)
$NCSKEW_{it-1}$	−0.102*** (−15.62)	−0.065*** (−10.27)	−0.102*** (−15.61)	−0.064*** (−10.16)	−0.102*** (−15.70)	−0.064*** (−10.27)
$Dturn_{it-1}$	0.006*** (7.66)	0.003*** (4.11)	0.006*** (7.38)	0.003*** (4.64)	0.006*** (8.57)	0.004*** (5.34)
Ret_{it-1}	−0.253*** (−3.19)	−0.121** (−2.40)	−0.252*** (−3.19)	−0.170** (−2.54)	−0.248*** (−3.14)	−0.167** (−2.48)
Std_{it-1}	−1.792*** (−2.83)	−1.001* (−1.78)	−1.788*** (−2.85)	−1.295* (−1.96)	−1.755*** (−2.82)	−1.267* (−1.93)
$Size_{it-1}$	0.073*** (4.33)	0.051*** (3.26)	0.073*** (4.32)	0.052*** (3.33)	0.072*** (4.31)	0.051*** (3.37)
MTB_{it-1}	0.009*** (3.65)	0.009*** (2.83)	0.009*** (3.66)	0.006** (2.57)	0.009*** (3.62)	0.006** (2.55)
$Leverage_{it-1}$	−0.082*** (−5.06)	−0.069*** (−4.56)	−0.082*** (−5.06)	−0.065*** (−4.30)	−0.081*** (−5.12)	−0.064*** (−4.48)
ROA_{it-1}	0.124*** (7.42)	0.068*** (6.73)	0.125*** (7.38)	0.074*** (7.64)	0.126*** (7.50)	0.074*** (7.95)
$\lvert DACC\rvert^{KLW}_{it-1}$	0.034*** (2.93)	0.028*** (2.71)	0.034*** (2.95)	0.027*** (2.96)	0.029** (2.52)	0.024** (2.54)
$Coverage_{it-1}$	0.015 (1.65)	0.011** (2.06)	0.015 (1.66)	0.012** (2.07)	0.015* (1.78)	0.012** (2.23)
$IFRS_j$	0.028 (1.63)	0.028** (2.19)	0.029 (1.66)	0.030** (2.11)	0.028 (1.45)	0.029* (2.02)
$LogGDP_{jt-1}$	−0.040 (−0.45)	−0.027 (−0.38)	−0.047 (−0.53)	−0.020 (−0.27)	−0.061 (−0.72)	−0.028 (−0.39)
$LogMKT_{jt-1}$	−0.113*** (−4.37)	−0.089*** (−4.86)	−0.107*** (−4.21)	−0.088*** (−4.60)	−0.106*** (−4.34)	−0.087*** (−4.77)
FDI_{jt-1}	−0.020* (−1.94)	−0.015* (−1.81)	−0.019* (−1.89)	−0.014 (−1.69)	−0.019* (−1.86)	−0.015* (−1.78)
ITL_j	−0.044 (−0.83)	−0.038 (−0.83)	−0.042 (−0.81)	−0.039 (−0.83)	−0.038 (−0.72)	−0.036 (−0.78)
$Takeover_j$	0.008 (0.45)	0.004 (0.31)	0.010 (0.58)	0.005 (0.36)	0.004 (0.27)	0.002 (0.18)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by country	Yes	Yes	Yes	Yes	Yes	Yes
N	222,032	222,032	222,032	222,032	222,032	222,032
Adj. R^2	0.182	0.183	0.182	0.183	0.182	0.183

Note(s): This table reports the regression results on how industry competition affects stock crash risk, conditional on institutional quality. The dependent variable is crash risk measures. Two institutional quality proxies are used: (1) the prevailing institutional quality level, *IQ*; (2) the change in institutional quality, captured by board reforms between 1998 and 2007. *Post* is a dummy variable that is equal to one if it is post-reform years and otherwise 0. *Comp* is the proxy of product market competition. The sample period spans from 1990 to 2012. *t*-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level. ***, **, and * indicate significance levels of 1, 5, and 10%, respectively

qualitatively the same, we only discuss the ones based on *NCSKEW* (i.e. results reported in columns (1), (3) and (5)).

In column (1), the key independent variable is the proxy for product market competition (*Comp*). The result indicates that on average, firms in more competitive industries exhibit a higher stock crash risk, as indicated by the positive and significant (1% level) coefficient of *Comp*. Therefore, Li and Zhan's (2019) finding that firms facing greater product market threats are more prone to stock crash is not unique to the US firms.

More importantly, column (3) shows a significant moderating impact of institutional quality on the relationship between product market competition and stock crash risk. The coefficient of $IQ \times Comp$ is negative and significant at the 1% level, suggesting that a weaker relationship between product market competition and crash risk in countries with stronger *IQ*. Column (5) indicates that stock crash risk drops by 0.072 after board reforms, equivalent to a 0.094 (=0.072/0.765) standard deviation of *NCSKEW*, and the result is significant at the 1% level. Moreover, the impact of product market competition on stock crash risk is also weaker after board reforms as indicated by the negative and significant (at the 1% level) coefficient of $Post \times Comp$.

Following prior literature, we control for firm and country characteristics that may affect stock crash risk. We include *Dturn*, the year-to-year change in average monthly share turnover, where monthly share turnover is the monthly trading volume divided by the total number of shares outstanding during the month. The trading volume is a proxy for differences in opinions that may cause stock crashes (Chen *et al.*, 2001). In addition, as return skewness may be serially correlated, we include lagged skewness in all of the regressions. We also include *Sigma*, the standard deviation of firm-specific weekly returns during the fiscal year to account for the fact that skewness is correlated with volatility. *Ret*, average firm-specific weekly returns (in percentage) over the fiscal year period, is included because positive returns generally predict negative skewness (Chen *et al.*, 2001). We then control for various firm characteristics: firm *Size* (natural logarithm of total assets), *MB* (market-to-book ratio, defined as the market value of equity divided by the book value of equity), *Lev* (leverage, equal to total debt divided by the market value of assets), *ROA* (profitability, measured as income before extraordinary items divided by lagged total assets) and *IFRS* (the adoption of International Financial Reporting Standards by firms). These variables are associated with firm performance and thus firm-specific crash risk. We also include in the regressions two proxies for financial opacity, namely absolute value of abnormal accruals ($|DACC|^{KLW}$) and analyst coverage (*Coverage*), because more opaque firms are expected to have a higher propensity for stock price crash.

The coefficients for lagged *NCSKEW* are all negative and significant at the 1% level, suggesting that the crash risk is negatively serially correlated. The finding is not surprising because the crash risk in the current period should be lower after a crash in the last period. Firm size (*Size*), market-to-book ratio (*MTB*), and return on assets (*ROA*) are all positively and significantly (at the 1% level) related to crash risk, consistent with Kim *et al.* (2011a). $|DACC|^{KLW}$ also has a positive relation with stock crash risk, suggesting that firms manage earnings more aggressively are also more prone to stock crash.

Besides firm-level characteristics, we include five country-level variables to control for institutional differences across economies: the natural logarithm of GDP per capita (*LogGDP*), natural logarithm of stock market capitalization (*LogMKT*), and foreign direct investment (*FDI*). To mitigate the confounding effects of other legislations, we also include dummy variables to control for the initial enforcement of insider trading laws (*ITL*) and the passage of merger and acquisition laws (*Takeover*) (Fauver *et al.*, 2017). Country-level variables, except equity market capitalization (*LogMKT*), generally have statistically insignificant impact on stock crash risk. The negative and significant (1% level) coefficient of *LogMKT* suggests that more developed markets generally have a lower crash risk.

4.2 Institutional quality and alternative measures of accruals quality and financial reporting conservatism

The above results show that product market competition is positively associated with stock crash risk and at the same time, strong institutional quality for investor protection mitigates the problem. To further confirm that the positive relation between product market competition and stock crash risk is, at least partly, due to bad news hoarding in competitive industries, we test how information disclosure (reflected by accruals quality and financial reporting conservatism) is related with product market competition, and how institutional quality moderates the relationship.

We construct two earnings management proxies ($|DACC|^{DD}$ and $|DACC|^{KLW}$) by following Dechow and Dichev (2002) and Kothari *et al.* (2005) and use them for our regressions. A higher absolute value of discretional accruals suggests more severe earnings management. Earnings management is a common way for corporate managers to conceal negative information by recognizing sales early, delaying the realization of expenses, etc. Although some earnings management methods are within legal limits, earnings management nevertheless creates a distorted picture of the firm's fundamental performance and is generally considered an abuse of the accounting rules. We expect if strong institutional quality can successfully enhance disclosure by curbing bad news hoarding, firms facing tough competitive in strong-*IQ* countries would exhibit less earnings management than their counterparts in weak-*IQ* countries.

In the specifications, both on accruals quality and reporting conservatism, we include the commonly used control variables following Chen, Li, and Zou (2016) and Ahmed and Duellman (2007). Specifically, we control *Size* (natural logarithm of total assets), *MTB* (market value of equity scaled by book value of equity), *Leverage* (total debt over total assets), *StdROA* (standard deviation of return on assets over previous five years), *CFO* (operating cash flow scaled by average total assets), Δ*sales* (the sales growth scaled by total assets), *RND* (research and development expenses to sales) and *IFRS* (an indicator for IFRS uses). We also control *Inside_Director_Ownership*, the common shares held by inside directors divided by total common shares outstanding, as Ahmed and Duellman (2007) find it negatively correlated with accounting conservatism. We also include the country-level variables to control for institutional differences across economies: *LogGDP*, *LogMKT*, and *FDI*. To mitigate the confounding effects of other legislations, we include dummy variables to control for the initial enforcement of insider trading laws (*ITL*) and the passage of merger and acquisition laws (*Takeover*).

Table 4 reports the regression results. Column (1)–(3) report results of regressions for $|DACC|^{DD}$ and column (4)–(6) report those for $|DACC|^{KLW}$. Columns (1) and (4) suggest that firms in more competitive industries manage earnings more aggressively, as indicated by the positive and significant (at the 1% level in column (1) and the 5% level in column (4)) of *Comp*. Columns (2) and (5) further suggest that the impact of product market competition on earnings management varies with institutional quality. Particularly, firms facing tough competition in high-*IQ* countries manage earnings less aggressive than their counterparts in low-*IQ* countries, as indicated by the negative and significant (at the 1% level) coefficient of $IQ \times Comp$. Finally, columns (3) and (6) indicate that after board reforms, competitive industries experience a larger reduction in earnings management than concentrated industries, as indicated by the negative and significant (at the 5% level in column (3) and the 10% level in column (6)) coefficient of $Post \times Comp$.

Table 5 reports the regression results regarding the impacts of product market competition and institutional quality on financial reporting conservatism, namely *NONOPACCR* by Ahmed and Duellman (2007) and Givoly and Hayn (2000) and *C_Score* by Khan and Watts (2009). Reporting conservatism refers to the tendency to understate

Table 4.
Impact of institutional quality on accruals quality

	$\lvert DACC\rvert^{DD}_{it}$			$\lvert DACC\rvert^{KLW}_{it}$		
	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	0.072** (2.57)	0.070** (2.06)	0.074** (2.14)	0.018 (1.57)	0.014 (1.08)	0.030* (1.90)
$Comp_{it-1z}$	0.013*** (3.19)	0.014*** (2.62)	0.008* (1.84)	0.008** (2.19)	0.006* (1.85)	0.024** (2.30)
$Comp_{it-1} \times IQ$		−0.020*** (−4.31)			−0.008*** (−3.10)	
Post			−0.015** (−2.20)			−0.004 (−1.49)
$Comp_{it-1} \times Post$			−0.023** (−2.06)			−0.021* (−1.74)
$Inside\_Director\_Ownership_{it-1}$	0.000 (0.10)	0.001 (0.33)	0.001 (0.37)	−0.000 (−0.11)	0.000 (0.01)	−0.000 (−0.17)
$Size_{it-1}$	−0.005*** (−8.61)	−0.007*** (−6.09)	−0.007*** (−6.92)	−0.003*** (−8.15)	−0.004*** (−9.23)	−0.003*** (−7.91)
MTB_{it-1}	0.001*** (3.45)	0.001*** (4.09)	0.001** (2.31)	0.001*** (5.81)	0.001*** (5.31)	0.001*** (5.71)
$Leverage_{it-1}$	0.036*** (10.41)	0.046*** (10.11)	0.052*** (11.47)	0.005*** (5.68)	0.012*** (7.76)	0.005*** (5.57)
$StdROA_{it-1}$	−0.020* (−1.78)	−0.033*** (−4.32)	−0.034*** (−4.36)	−0.015** (−2.46)	−0.023*** (−5.12)	−0.015** (−2.49)
CFO_{it-1}	0.084*** (5.40)	0.092*** (4.78)	0.144*** (6.73)	−0.033*** (−11.25)	−0.024*** (−5.50)	−0.033*** (−11.32)
$\Delta sales_{it-1}$	0.008*** (7.14)	0.011*** (9.33)	0.010*** (8.58)	0.004*** (3.41)	0.004*** (5.17)	0.004*** (3.44)
RND_{it-1}	0.086*** (7.58)	0.013*** (3.57)	0.012*** (3.95)	0.004 (0.48)	0.000 (0.13)	0.004 (0.49)
$IFRS_{it-1}$	−0.009*** (−4.63)	−0.010*** (−4.24)	−0.010*** (−4.65)	−0.002 (−1.65)	−0.003 (−1.43)	−0.003** (−2.16)
$LogGDP_{jt-1}$	0.002 (0.61)	0.003 (0.67)	0.002 (0.44)	0.001 (0.80)	0.002 (0.80)	0.001 (0.23)
$LogMKT_{jt-1}$	−0.002* (−1.77)	−0.002 (−1.42)	−0.001 (−0.81)	0.002 (1.33)	0.002 (1.58)	0.002 (1.37)
FDI_{jt-1}	0.012*** (2.81)	0.022*** (3.47)	0.028*** (3.31)	0.021*** (4.01)	0.025*** (3.71)	0.022*** (3.96)
ITL_j	−0.010 (−1.51)	−0.011 (−1.38)	−0.010 (−1.35)	0.001 (0.23)	0.001 (0.32)	−0.000 (−0.09)
$Takeover_j$	−0.000 (−0.04)	−0.001 (−0.34)	−0.001 (−0.46)	0.001 (0.50)	0.000 (0.01)	0.000 (0.42)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by country	Yes	Yes	Yes	Yes	Yes	Yes
N	179,483	179,483	179,483	192,811	192,811	192,811
Adj. R^2	0.048	0.046	0.060	0.021	0.019	0.022

Note(s): This table reports the regression results on how industry competition affects accruals quality, conditional on institutional quality. The dependent variable is accruals quality measures. Two institutional quality proxies are used: (1) the prevailing institutional quality level, *IQ*; (2) the change in institutional quality, captured by board reforms between 1998 and 2007. *Post* is a dummy variable that is equal to one if it is post-reform years and otherwise 0. *Comp* is the proxy of product market competition. The sample period spans from 1990 to 2012. *t*-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level. ***, **, and * indicate significance levels of 1, 5, and 10%, respectively

Table 5. Impact of institutional quality on accounting conservatism

	NONOPACCR			*C_Score*		
	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	0.020 (0.60)	0.008 (0.25)	0.015 (0.47)	1.793*** (3.61)	1.530** (2.27)	2.880* (1.81)
$Comp_{it-1}$	−0.005** (−2.23)	−0.009*** (−2.67)	−0.007*** (−2.67)	−0.010* (−1.71)	−0.032** (−2.48)	0.035 (0.17)
$Comp_{it-1} \times IQ$		0.009* (1.83)			0.028* (1.87)	0.097 (0.60)
Post			0.001 (0.91)			
$Comp_{it-1} \times Post$			0.005** (2.15)			0.208*** (3.48)
$Inside\_Director\_Ownership_{it-1}$	0.001 (0.80)	0.001 (0.75)	0.001 (0.89)	−0.018 (−0.63)	−0.033 (−0.94)	0.028 (0.44)
$Size_{it-1}$	0.000 (0.16)	0.001 (0.74)	0.000 (0.13)	−0.043*** (−3.05)	−0.059*** (−3.09)	−0.036 (−0.96)
MTB_{it-1}	0.001*** (10.48)	0.001*** (8.63)	0.001*** (10.51)	−0.010** (−2.60)	−0.021*** (−4.20)	0.020* (2.05)
$Leverage_{it-1}$	0.024*** (3.04)	0.030*** (3.67)	0.024*** (3.05)	0.018 (1.41)	−0.014 (−0.69)	0.107*** (4.45)
$StdROA_{it-1}$	−0.002 (−0.59)	−0.007 (−1.62)	−0.002 (−0.59)	0.040 (1.04)	0.030 (0.57)	0.100 (1.26)
CFO_{it-1}	0.174** (2.58)	0.209*** (2.65)	0.174** (2.58)	−1.184*** (−5.37)	−1.378*** (−4.59)	−2.171*** (−3.81)
$\Delta sales_{it-1}$	0.012*** (9.04)	0.012*** (8.39)	0.012*** (9.05)	−0.005 (−0.82)	−0.006 (−0.84)	0.006 (0.43)
RND_{it-1}	0.032*** (9.03)	0.036*** (8.56)	0.032*** (9.07)	−0.037 (−1.22)	−0.042 (−1.02)	−0.107 (−1.43)
$IFRS_j$	−0.001 (−0.70)	−0.001 (−0.45)	−0.001 (−0.45)	0.049 (0.97)	0.055 (0.82)	0.181 (1.15)
$LogGDP_{jt-1}$	0.002 (0.47)	0.002 (0.58)	0.002 (0.63)	−0.103 (−1.24)	−0.084 (−0.77)	−0.059 (−0.25)
$LogMKT_{jt-1}$	−0.003** (−1.98)	−0.003** (−2.12)	−0.003* (−1.94)	−0.014 (−0.28)	0.017 (0.28)	−0.180 (−1.29)
FDI_{jt-1}	−0.006 (−0.52)	−0.010 (−0.76)	−0.006 (−0.51)	−0.245 (−0.52)	0.141 (0.24)	−2.242*** (−3.41)
ITL_j	−0.007*** (−2.93)	−0.007*** (−3.19)	−0.007*** (−2.83)	0.040 (0.46)	0.032 (0.23)	0.175 (0.93)
$Takeover_j$	−0.001 (−0.56)	−0.001 (−0.52)	−0.001 (−0.51)	−0.059 (−1.08)	−0.085 (−1.06)	−0.230** (−2.08)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by country	Yes	Yes	Yes	Yes	Yes	Yes
N	186,545	186,545	186,545	210,758	210,758	210,758
Adj. R^2	0.034	0.031	0.034	0.004	0.004	0.006

Note(s): This table reports the regression results on how industry competition affects accounting conservatism, conditional on institutional quality. The dependent variable is accounting conservatism, proxied by *NONOPACCR* (non-operating accruals) and *C_Score,* respectively. Two institutional quality proxies are used: (1) the prevailing institutional quality level, *IQ*; (2) the change in institutional quality, captured by board reforms between 1998 and 2007. *Post* is a dummy variable that is equal to one if it is post-reform years and otherwise 0. *Comp* is the proxy of product market competition. The sample period spans from 1990 to 2012. *t*-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level. ***, **, and * indicate significance levels of 1, 5, and 10%, respectively

earnings and accelerate the disclosure of negative information in a timelier manner to avoid potential litigations. It is expected that firms in competitive industries are likely to withhold bad news, so their financial reporting should be less conservative. In addition, reporting conservatism should be higher when firms face a higher litigation risk, which is the case when institutional quality is stronger.

Column (1)–(3) report results of regressions for *NONOPACCR*. Columns (1) suggests that firms in more competitive industries report their earnings less conservatively, as indicated by the negative and significant (at the 5% level) of *Comp*. Columns (2) further shows that the impact of product market competition on reporting conservatism is mitigated by strong institutional quality, as indicated as indicated by the positive and significant (at the 10% level) coefficient of *IQ* × *Comp*. Finally, column (3) indicates that after board reforms, competitive industries experience a larger increase in reporting conservatism than concentrated industries after reforms, as indicated by the positive and significant (at the 5% level) coefficient of *Post* × *Comp*.

Column (4)–(6) report regression results for *C_Score*. Column (4) suggests that firms in competitive industries report losses less timely than those in concentrated industries, as indicated by the negative and significant (at the 10% level) coefficient of *Comp*. Column (5) further shows that strong institutional quality mitigates the above effect, as suggested by the positive and significant (at the 10% level) coefficient of *IQ* × *Comp*. The importance of institutional quality for mitigating the effect of product market competition on loss disclosure is confirmed by the result in column (6), where board reforms are found to improve timeliness of loss disclosure for firms in competitive industries, as indicated by the positive and significant (at the 1% level) coefficient of *Post* × *Comp*.

In sum, results in Tables 4 and 5 confirm that product market competition leads to higher incentives to hoard bad news, as reflected by lower accruals quality, and lower conservatism in financial reporting. On the other hand, stronger institutional quality mitigates the problem [11].

4.3 Robustness checks and further analysis

We perform several additional checks for our main results above. First, we re-run our main regressions with additional interaction terms involving *IQ* and *Post*. Christensen *et al.* (2016) argue that the effects of the new regulations, such as board reforms, can be larger in countries where prior regulations have been weak, effectively reducing differences in institutional quality across countries. Thus, if board reforms are duly enforced, then they should have a more prominent effect in countries with weaker pre-reform institutions thus generate a "catching-up" effect, *ceteris paribus*. Or, on the contrary, existing institutional forces such as legal enforcement could strengthen new rules and therefore create a "reinforcement effect" that widens governance gap across countries.

To examine the effectiveness of board reforms conditional on existing institutional conditions, we interact *IQ* with *Post*. We also further interact *Post* × *IQ* with *Comp* to test if board reforms are particularly effective in curbing bad news hoarding of competitive firms when *IQ* is weak. Table 6 reports the results. The results indicate that board reforms lead to a larger reduction in stock crash risk when *IQ* is weak, as indicated by positive and significant (at the 1% level) coefficients of *Post* × *IQ* in columns (1) and (2). This suggests that a country's need for board reforms is less urgent when its *IQ* is strong. In other words, board reforms help remedy poor investor protection and ultimately reduce stock crash risk in weak-*IQ* countries. On the other hand, the coefficients of *Post* × *IQ* are statistically insignificant in regressions for earnings management proxies.

More importantly, while board reforms reduce stock crash risk more in more competitive industries, the effect occurs mainly in weaker-*IQ* countries as indicated by positive and

Table 6. The joint effect of institutional quality and board reforms

	$NCSKEW_{it}$ (1)	$DUVOL_{it}$ (2)	$\|DACC\|^{DD}_{it}$ (3)	$\|DACC\|^{KLW}_{it}$ (4)	*NONOPACCR* (5)	*C_Score* (6)
INTERCEPT	1.328** (2.37)	0.940* (1.90)	0.068** (2.19)	0.016 (1.59)	0.031 (0.88)	−0.492 (−0.32)
$Comp_{it-1}$	0.622*** (4.32)	0.458*** (3.90)	0.005 (1.59)	−0.005 (−1.57)	−0.009* (−1.90)	−0.411 (−0.81)
Post	−0.251*** (−5.78)	−0.180*** (−4.83)	−0.003 (−0.92)	0.000 (0.09)	−0.001 (−0.21)	0.375* (1.87)
$Post \times IQ$	0.246*** (4.87)	0.197*** (4.72)	0.004 (0.89)	−0.001 (−0.86)	0.001 (0.31)	−0.759*** (−4.44)
$Comp_{it-1} \times IQ$	−0.622*** (−3.64)	−0.516*** (−3.79)	−0.008** (−2.62)	0.004 (1.21)	0.008 (1.30)	0.873 (1.45)
$Comp_{it-1} \times Post$	−0.563*** (−5.22)	−0.378*** (−4.34)	−0.003* (−1.70)	−0.008** (−2.31)	0.004 (0.81)	0.156 (1.35)
$Comp_{it-1} \times Post \times IQ$	0.683*** (5.41)	0.486*** (4.92)	0.005** (2.18)	0.011*** (2.86)	−0.008* (−1.73)	−0.278* (−1.73)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by country	Yes	Yes	Yes	Yes	Yes	Yes
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.184	0.043	0.020	0.036	0.015

Note(s): This table reports the joint effect of prevailing institutional quality level and board reforms on stock price crash risk (column (1) and (2)), accruals quality (column (3) and (4)) and accounting conservatism (column (5) and (6)). *IQ* is the composite investor protection index. *Post* is a dummy variable that is equal to one if it is post-reform years and otherwise 0. *Comp* is the proxy of product market competition. *t*-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level. ***, **, and * indicate significance levels of 1, 5, and 10%, respectively

significant (at the 1% level in columns) coefficients of *Post* × *IQ* × *Comp* in columns (1) and (2). Moreover, board reforms restrict managers in competitive industries to engage in earnings management and pursue aggressive financial reporting mainly for weak-*IQ* countries, as indicated by positive and significant coefficients of *Post* × *IQ* × *Comp* in columns (3) and (4) and negative and significant coefficients of *Post* × *IQ* × *Comp* in columns (5) and (6). The findings are consistent with our baseline finding that board reforms are particularly effective at reducing stock crash risk in competitive industries where managers have strong incentives to hoard bad news. It further indicates that the restraining effect of board reforms on managers in competitive industries is more prominent in weaker-*IQ* countries where investors are less protected.

Second, we replace *IQ* by its individual components for regressions. For the analyses above, we use *IQ* as a proxy for institutional quality. The benefit of a composite index is that it reflects different dimensions of institutional quality that could affect investor protection, while it may lack clear economic meaning. Besides, among all ten components, there may be only few of them driving the results. To address these concerns, we re-run our regressions in Tables 3 and 4 using individual components of *IQ*. We report the results in Table 7. For brevity, we only report the key variable, i.e. the interaction term between *Comp* and an individual governance index. Overall, most coefficients (53 out of 60) are significant at 10% level or higher and in expected signs, suggesting that stronger institutional quality alleviates bad news hoarding in competitive industries. Therefore, our main results are unlikely to be driven by few particular indices.

Third, we re-run our baseline regressions for stock crash risk with Japan and US firms excluded. As shown on Table 1, Japan and US firms represent more than 50% of our sample. There is a concern that our main finding reflects a country-specific phenomenon rather than a general one to most countries. The results (unreported and available upon request) indicate that our main finding is robust after we remove Japan and US firms from regressions.

Fourth, we also test if our results are robust to alternative measures of product market competition. When product market competition proxies are constructed according to Karuna (2007) as the product substitutability (*DIFF*), market size (*MKTSIZE*) and entry cost (*ENTCOST*), the results do not change qualitatively [12].

5. Conclusions

This study analyses the impact of product market competition on stock crash risk and how the impact varies across countries with different institutional quality. More competitive product markets generally result in larger stock crash risk. The finding is consistent with recent literature for the dark side of product market competition; that is, competition erodes profits, which induces managers to hoard bad news for their career concerns. On the other hand, stronger institutional quality alleviates agency problems due to product market competition, suggesting that strong governance does improve disclosure of value-relevant information particularly bad news. Our baseline result survives when we replace stock crash risk by various measures of financial reporting quality and accounting conservatism that are widely used in the accounting literature. Our result also passes a battery of robustness checks.

Overall, our study contributes to the literature by showing how product market competition affects stock crash risk in an international setting and how the impact is conditional on country-level institutional quality. The findings can be of interest to policy makers who are concerned of the dramatic swings in equity market, and to shareholders and fund managers who are concerned of the investment values. Down the road, it is worthwhile to identify alternative contexts in which the dark side of product market competition is limited.

Table 7. Impact of institutional quality: individual index

	$NCSKEW_{it}$ (1)	$DUVOL_{it}$ (2)	$\|DACC\|^{DD}{}_{it}$ (3)	$\|DACC\|^{KLW}{}_{it}$ (4)	$NONOPACCR_{it}$ (5)	C_Score_{it} (6)
$Comp_{it-1}$ × *Anti-director rights index*	−0.995** (−2.48)	−0.793** (−2.28)	−0.006*** (−4.76)	−0.025** (−2.24)	0.004** (2.56)	0.024* (1.83)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.046	0.030	0.031	0.005
$Comp_{it-1}$ × *Anti-self dealing index*	−0.212** (−2.58)	−0.181** (−2.51)	−0.009*** (−3.01)	−0.001* (−1.76)	0.011* (1.71)	0.194*** (6.58)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.046	0.030	0.030	0.005
$Comp_{it-1}$ × *Investor protection index*	−0.227*** (−2.90)	−0.163** (−2.25)	−0.009*** (−3.40)	−0.003* (−1.91)	0.017** (2.54)	0.054* (1.82)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.046	0.030	0.031	0.005
$Comp_{it-1}$ × *Easiness in accessing external finance*	0.146 (1.25)	0.057 (0.71)	−0.002** (−2.05)	−0.001** (−2.12)	0.005* (1.70)	0.013** (2.27)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.046	0.030	0.030	0.004
$Comp_{it-1}$ × *Creditors' rights index*	−1.487** (−2.12)	−1.169* (−1.93)	−0.001* (−1.91)	−0.004*** (−4.06)	0.013* (1.88)	0.025** (2.25)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.184	0.191	0.044	0.030	0.031	0.005
$Comp_{it-1}$ × *Union density*	−0.063*** (−3.03)	−0.059*** (−3.25)	−0.051** (−2.25)	−0.051** (−2.34)	0.002 (0.11)	0.241 (1.44)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.050	0.030	0.036	0.005
$Comp_{it-1}$ × *Efficiency of jurisdiction index*	0.041 (1.09)	0.022 (0.76)	−0.001** (−2.06)	−0.003* (−1.82)	0.003* (1.69)	0.051* (1.78)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.046	0.030	0.027	0.003
$Comp_{it-1}$ × *Rule of law index*	−0.024** (−2.38)	−0.018** (−2.33)	−0.004 (−0.73)	−0.005*** (−3.13)	0.005* (1.76)	0.295** (2.33)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.050	0.030	0.036	0.003
$Comp_{it-1}$ × *Accounting standards*	−0.023*** (−2.84)	−0.017*** (−2.67)	−0.000*** (−4.37)	−0.001* (−1.70)	0.000* (1.87)	0.004*** (3.55)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.183	0.183	0.046	0.031	0.031	0.005
$Comp_{it-1}$ × *Corporate disclosure index*	−0.322** (−2.21)	−0.214* (−1.78)	−0.011** (−2.22)	−0.007*** (−5.76)	0.025** (2.29)	0.160** (2.14)
N	222,032	222,032	179,483	192,811	186,545	210,758
Adj. R^2	0.182	0.183	0.046	0.031	0.031	0.004

Note(s): This table reports the joint effect of prevailing institutional quality level and product market competition on stock price crash risk (column (1) and (2)), accruals quality (column (3) and (4)) and accounting conservatism (column (5) and (6)). Institutional quality is proxied by individual governance index, where missing values are replaced by the sample average of the index. When a governance index is missing for a country, the country is dropped from the sample. *Comp* is the proxy of product market competition. *t*-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level. ***, **, and * indicate significance levels of 1, 5, and 10%, respectively

Notes

1. A series of accounting scandals in 2010s involving household names such as Fuji Xerox, Olympus and Toshiba in Japan provide a clear illustration how a poor regulatory environment reinforces managerial incentives to conceal bad information in a competitive product market. For example, in 2015, Toshiba's CEO and president Hisao Tanaka resigned after Toshiba was found to overstate its earnings for six years. The company's stock price plunged more than 15% upon media reporting of the scandal. A BBC article suggests that product market competition, in addition to Fukushima disaster, exerts pressure on Toshiba's profits, which tempts executives to take shortcuts (https://www.bbc.com/news/business-33605638).
2. For example, the enforcement of corporate governance in Japan is widely considered weak, and big companies are identified to inflate reported earnings, which eventually cause stock price crash. However, Japanese regulators are still reluctant to impose strong reforms on audit rules and corporate governance because of the concern on compliance cost (https://news.bloombergtax.com/financial-accounting/japan-resists-audit-reforms-despite-toshiba-olympus-scandals).
3. For example, Giroud and Mueller (2010) find that only firms in concentrated industries experience a significant decline in operating performance after the passage of business combination laws, which weakens the governance from the corporate control market by reducing the threat of a hostile takeover. Giroud and Mueller (2011) find that firms with weaker governance have worse stock and firm performance (lower labor productivity, higher costs and more value-destroying acquisitions); however, the result is mainly driven by firms in concentrated industries.
4. Specifically, Dasgupta *et al.* (2018) find that CEOs experience more turnovers and their compensations are more sensitive to performance when market competition intensifies (i.e. after large industry-level tariff cuts). Similarly, Jayaraman *et al.* (2021) find that CEOs in competitive industries are punished (in term of compensation and turnover rate) for underperforming their peers.
5. Zhu (2014) documents that the firms from countries with better governance quality, measured with the indices on legal systems, government quality and disclosure practices, indeed have lower cost of equity and/or cost of debt.
6. While some studies have shown that board reforms may protect the interests of both the shareholders (Fauver *et al.*, 2017) and the stakeholders (Liao, San, Tsang & Yu, 2021) and thus enhance firm value, Lin, Wei, and Zhao (2020) show that board reforms cause an increase in firms' bank loan spread, possibly because board reforms intensify the interest conflicts between shareholders and debtholders.
7. All the variables are defined in Table A1.
8. A director is regarded as independent when he/she does not have a material relationship with the company directly, or when he/she is not a partner, shareholder or officer of a related company. A board is considered independent when the majority (i.e. more than 50%) of its directors is independent.
9. Some countries have undertaken more than one corporate governance reform. Fauver *et al.* (2017) identify the board reforms as "first reforms" when certain corporate governance regulations were published and as "major reforms" when large-scale corporate governance regulations were enacted. We focus on the major board reforms in this study as they are comprehensive and have a substantial impact on corporate governance practices.
10. To mitigate the concern that our main findings are driven by these two countries, we exclude these two countries from our regressions in one of our robustness checks and the main results are qualitatively unchanged.
11. In addition to the two accounting conservatism measures, *NONOPACCR* and *C_Score*, we adopt Ball and Shivakumar's (2006) model to examine the asymmetric timeliness of earnings in competitive (vs concentrated) industries, conditional on institutional quality. Our results are qualitatively unchanged with this modification. The results are available upon request.

12. *DIFF* is the price-cost margin, equal to the ratio of sales to operating costs for each FF48 industry with operating costs being the costs of goods sold, selling, general and administrative expenses, and depreciation, depletion and amortization. *MKTSIZE* is the natural logarithm of industry sales, computed as the sum of sales for firms operating in each FF48 industry. *ENTCOST* is the natural logarithm of the weighted average of the gross value of the cost of property, plant and equipment for firms in an FF48 industry, weighted by each firm's market share of sales in the industry. The results are available upon request.

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Appendix

	Definitions	Source
Variables used in tests on crash risk		
NCSKEW	A proxy for stock price crash risk in year *t*, calculated as the negative skewness of firm-specific weekly returns over the fiscal year period, where the firm-specific weekly return is equal to ln (1 + *residual*), with the residual estimated from an expanded market model regression	Datastream
DUVOL	A proxy for stock price crash risk in year *t*, calculated as the natural logarithm of the ratio of the standard deviations of down-week to up-week firm-specific returns	Datastream
Post	An indicator variable that equals one for and after the year in which the main board reform became effective in the country and zero otherwise	Worldscope
Comp	Negative of HHI	Worldscope
IQ	A composite index that captures the institutional quality in a country	
Ret	Mean of firm-specific weekly returns over the fiscal year	Datastream
Std	Standard deviation of firm-specific weekly returns over the fiscal year	Datastream
Dturn	Average monthly share turnover over the current fiscal year period minus the average monthly share turnover over the previous fiscal year period, where monthly share turnover is calculated as the monthly trading volume divided by the total number of shares outstanding during the month	Datastream
Size	The natural logarithm of total assets (in millions of US dollars) in the year	Worldscope
MTB	Market value of equity scaled by book value of equity	Worldscope
Leverage	Total debt divided by total assets	Worldscope
ROA	Net income before extraordinary items divided by assets	Worldscope
$\|DACC\|^{KLW}$	Absolute value of discretionary accruals in year $t-1$, where discretionary accruals are estimated following Kothari *et al.* (2005)	
IFRS	Accounting standards adopted in a country is IFRS	Worldscope
LogGDP	Natural logarithm of the real gross domestic product per capita (in US dollars)	World Bank
LogMKT	Natural logarithm of the stock market capitalization of a country for a year (in billions of US dollars)	World Bank
FDI	Net flows of foreign direct investment as a percentage of GDP	World Bank
ITL	An indicator variable that is equal to one following the year in which insider trading laws were first enforced in the country and zero otherwise	Bhattacharya and Daouk (2002)
Takeover	An indicator variable that is equal to one for the period after M&A law enactment in the country and zero otherwise	Lel and Miller (2015)

Table A1.
Variable definitions

(*continued*)

	Definitions	Source
Variables used in tests on accruals quality and accounting conservatism		
$\|DACC\|^{DD}$ ($\|DACC\|^{KLW}$)	Absolute value of discretionary accruals, where discretionary accruals are estimated following Dechow and Dichev (2002) (or Kothari *et al.*, 2005)	Worldscope
StdROA	Standard deviation of return on assets over the previous five years	Worldscope
CFO	Operating cash flows in year *t*, scaled by the average total assets over years *t* and *t* – 1	Worldscope
Δsales	Annual sales growth in year *t*, scaled by total assets in prior year	Worldscope
RND	Ratio of research and development expenses to sales	Worldscope
Inside_Director_Ownership	Common shares held by inside directors divided by total common shares outstanding	Worldscope
NONOPACCR	(Negative of) non-operating accruals averaged over past three years	Worldscope
C_Score	Accounting conservatism score as estimated by Khan and Watts (2009)	Worldscope

Table A1.

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