Is there a dark side of competition? Product market competition and auditor-client contracting

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ABSTRACT

This study establishes the informational value of a company's product market competition, derived from qualitative nonfinancial disclosures, in the audit contracting process. Greater product market competition could either serve as means of mitigating agency costs between managers and shareholders or heightening managerial rent-seeking activities and the incentive to distort disclosures. Consequently, greater competition could either increase or decrease audit engagement risk. We find that greater product market competition is associated with greater engagement risk. Auditors respond to the higher risk by assessing greater audit fees. Although auditors respond by charging higher fees and dedicating greater effort to these engagements, we nonetheless find that audit quality is negatively affected by greater competition. Our findings are consistent with the dark side hypothesis of product market competition. Overall, our study provides evidence that company-level competition effects convey valuable information to auditors.

1. Introduction

Companies do not operate in isolation, and constantly compete with other companies to maximize profit in a struggle for customers and market share. While some companies have the benefit of operating in less competitive product markets, others face intense competition. Product market competition can act as a corporate governance mechanism, reducing agency problems such as managerial slack between managers and shareholders (e.g., Hart, 1983; Jensen and Meckling, 1976; Pan, Shroff, and Zhang, 2023; Schmidt, 1997; Stigler, 1958). Accordingly, greater competition could reduce the incentive to engage in earnings management and misreporting (Marciukaityte and Park, 2009). However, competition can also have a "dark" side. To survive in a highly competitive market, companies may resort to undesirable business practices, with managers engaging in rent-seeking activities. Heightened career concerns can lead managers to distort disclosures such that their company is more appealing to stakeholders (Hermalin and Weisbach, 2012).

It remains an empirical question whether auditors consider the role of product market competition in the audit contracting process. Competition plays a significant role in a client's operations, which in turn could affect financial reporting. If greater competition serves as a corporate governance mechanism, then there could be reduced engagement risk. Conversely, if competition does have a dark side, then auditors could be exposed to greater engagement risk. In this study, we examine the role of product market competition in the audit contracting process. How (if at all) do auditors respond to product market competition?

On the one hand, conservative financial reporting and the inclusion of additional disclosures stemming from product market competition could reduce engagement risk. Models examining the threat of potential market entrants generally conclude that companies facing a higher threat of entry will disclose more information to deter entry into the industry (Darrough and Stoughton, 1990; Wagenhofer, 1990). Such disclosures could decrease information asymmetry between managers and shareholders. When entry costs are lower and the threat of entry is higher, the incumbent company will not only disclose more bad news to deter entry, but also announce good news to enhance its capital market valuation (Darrough and Stoughton, 1990). In addition, companies can present more conservative financial reporting when there are increased product market threats from rival companies (Dhaliwal, Huang, Khurana, and Pereira, 2014; Hoberg, Phillips, and Prabhala, 2014).

On the other hand, product market competition could increase engagement risk. Competitive threats aggravate managerial career

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concerns, which are an important consideration in financial reporting (Graham, Harvey, and Rajgopal, 2005; Kothari, Shu, and Wysocki, 2009). Managers withhold bad news due to career concerns, since revealing bad news can result in a reduction in compensation or employment termination (Kothari et al., 2009). In addition, theoretical models generally suggest that competition from existing rivals reduces voluntary disclosures since disclosures could assist active competitors (Clinch and Verrecchia, 1997; Verrecchia, 1983, 1990). Greater competition could create fundamental concerns about the viability of current business strategy and the need to innovate to retain or expand market share. Such actions could increase information asymmetry and reduce financial reporting quality, increasing engagement risk and the possible risk premium assessed by the auditor.

Considering the two competing competition views, we empirically investigate how auditors respond to product market competition using a distinct company-specific product market competition measure, product market fluidity. Lang and Sul (2014) argue that there are significant challenges in convincingly using industry-level competition. Namely, an industry-level competition measure does not take into consideration the differences between public and private companies, how industries are systematically classified and compared, and the substitutability of goods/services within an industry (Lang and Sul, 2014). Nevertheless, prior literature has predominantly relied on the industry-level Herfindahl–Hirschman index (HHI) to capture product market competition (e. g., Hou and Robinson, 2006; Karuna, 2007; Li, 2010). HHI falters from utilizing quantitative industry information, including market share of each company within an industry, which can only reflect whether a company directly recognizes threats from its competitors (e.g., Hou and Robinson, 2006). Ali, Klasa, and Yeung (2014) further note that Compustat-based industry concentration is a poor proxy for competition as only public companies are considered, excluding private companies. Such measures cannot capture dynamism and fluidity within a company's product market space.

Given the limitations of broad industry measures, we use product market fluidity as an alternative measure capturing company-specific competition effects. Developed by Hoberg et al. (2014), fluidity captures the similarity between a company's products and the aggregate changes in the rivals' products using Item 1 qualitative nonfinancial disclosures.[1] Greater fluidity suggests that a company's products are more similar to its rivals' and consequently, there is greater product market competition. By using qualitative information, fluidity directly captures managers' considerations of its competitors while HHI cannot capture, by definition, these threats at the company level. Companies within the same industry could face different levels of product market competition, and industry-based measures, such as HHI and those calculated from the US Census of Manufacturers (Ali et al., 2014), are limited by industry and year. Fluidity is also capable of quickly impounding product market changes resulting from the actions and business descriptions provided by rival companies. Further, fluidity is captured through required narrative business descriptions, which likely cover the opportunities and threats faced from both public and private rivals (Hoberg et al., 2014). While we explicitly control for HHI

industry-level competition in our research design, we argue that fluidity is better suited to examine the impact of company-specific competition across companies, industries, years, and audit engagements.

Using a sample of 29,369 company-year observations from 2005 to 2019, we first examine whether companies with greater product market competition have greater engagement risk (Beneish, 1999; Dechow, Ge, Larson, and Sloan, 2011). We find that companies with greater product market competition have a greater likelihood of manipulating their reported earnings. Further, these companies have a higher probability of a misstatement than companies with less competition. We provide initial evidence that greater product market competition can have a dark side, increasing audit engagement risk. While competition could complement existing corporate governance mechanisms (Dhaliwal et al., 2014; Hoberg et al., 2014), we continue to find a positive association between product market competition and engagement risk after considering a company's corporate governance characteristics.

We next examine whether auditors respond to the higher engagement risk surrounding greater product market competition companies by assessing higher audit fees. We find that auditors recognize the additional engagement risk associated with greater competition clients and charge additional audit fees. Companies with competitive products have higher client business risk (Schmidt, 1997), in turn increasing auditors' assessment of engagement risk and thus audit fees.

Without further examination, it is not clear whether the increase in audit fees is solely attributable to an increase in audit risk premium or also includes a change in audit effort. Auditors must reduce detection risk by increasing audit effort when they perceive high engagement risk (Dusenbury and Reimers, 2000; Hogan and Wilkins, 2008). Thus, we examine ex post audit quality. Although audits of high product competition clients take longer to complete, as evidenced by a larger audit report delay, we do not note higher audit quality. In contrast, high competition clients have greater discretionary accruals and a greater likelihood of reporting an internal control material weakness or a restatement in the subsequent year. Our results suggest that the risk associated with product market competition remains despite a higher audit risk premium and greater effort. Our results are also robust to propensity score matching and entropy balancing to account for competition differences among companies and functional form misspecification, respectively. We provide additional evidence on the dark side of product market competition. Despite auditor acknowledgment of product competition derived risk, it continues to have a significant impact on the audit engagement.

Our study provides several contributions to the product market competition and auditor-client relationship literature. First, we further expand on the impact of product market competition by showing that the company-level attribute can impact the actions of an interested third party, the auditor. Our study sheds light on the overlooked role of qualitative nonfinancial information in the auditing process. Product market competition is associated with information asymmetry, voluntary disclosure, and financial reporting conservatism (Dhaliwal et al., 2014; Hoberg et al., 2014; Li, 2010; Li and Zhan, 2019). However, whether the net effect of product market competition brings more benefits (i.e., reducing information asymmetry between managers and shareholders) or disadvantages (i.e., proprietary costs prohibiting voluntary disclosures) is not clear ex ante. The results support the position that competition has a dark side that fundamentally affects company risk, which then affects the auditor's response to the engagement.

Second, we add to the auditor contracting literature by examining a client factor that alters engagement risk. Prior studies have documented various engagement risk determinants such as CEO characteristics, audit effort, and financial reporting quality (e.g., DeFond and Zhang, 2014; Zhang, 2019). Our study discusses an overlooked determinant of engagement risk, the product market competition environment. Our study's focus is inherently different from the broad examination of the relationship between the industry-level Herfindahl-Hirschman Index and audit fees within the manufacturing industry, as in Wang and Chui

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[1] Regulation S—K Item 101 requires Securities and Exchange Commission (SEC) registrant companies to provide narrative descriptions of their businesses in Item 1 of their 10-K filings. Such disclosures include the "principal products produced and services rendered." Product market fluidity is computed using the entirety of Item 1. While companies are required to discuss their businesses in Item 1, which could result in some boilerplate disclosures, our product competition measure is reliant on the comparability of textual disclosures between a company and its competitors. As such, fluidity reflects product market competition, potential threats, and instabilities arising from competitor activities relative to company activities, not necessarily the company's own product instability. The measure is intended to capture the competitive environment in which a company operates. Appendix A details the computation of fluidity.

(2015). Answering a call from Lang and Sul (2014), we use a company-level competition measure that enables us to examine the impact of fluidity across companies, industries, years, and audit engagements. We note a positive association between product market competition and engagement risk and pricing. Further, we find that product market competition's impact is pervasive through the audit engagement, affecting ex post audit quality.

Practically, we provide evidence on product market competition that can be of use to auditors and regulators. As a credence good, an auditor must consider engagement risk. However, companies with greater product market competition could be viewed as less desirable clients to an auditor, despite the assessment of higher audit fees. The dark side hypothesis of competition and our results suggest that product market competition has a prevalent impact throughout the audit engagement, despite additional auditor effort. While we do not suggest that companies operate in less competitive environments, we do note that auditors and regulators need to consider the auditor-client consequences from this form of additional engagement risk. Beyond industry competition classifications, the Public Company Accounting Oversight Board (PCAOB) and the SEC might consider how textual disclosures can provide additional stakeholder insights into company risks.

2. Theoretical framework

Product market competition can act as a disciplinary mechanism in mitigating agency problems between shareholders and managers (Hart, 1983). Jensen and Meckling (1976, 328) argue that agency costs, including monitoring costs, bonding costs, and residual loss, are an "unavoidable result of the agency relationship." Competition can decrease agency costs by forcing managers to exert more effort and manage the company more efficiently to obtain market share over their rivals (Hart, 1983; Schmidt, 1997). Managerial slack, one possible agency cost, can be reduced in highly competitive industries (Friedman, 1953; Stigler, 1958). Further, companies facing greater competition adopt more conservative financial policies than other companies (Dhaliwal et al., 2014; Hoberg et al., 2014). Overall, competition can improve information environment quality as well as financial reporting on account of increased market scrutiny and oversight (Ali et al., 2014; Marciukaityte and Park, 2009).

However, product market competition can have negative company implications, resulting in a "dark side." Product market competition has significant implications for valuation as competitive forces can deter long-term profits that a company earns (Jacobsen, 1988; Mueller, 1986). Companies in competitive industries operate in opaque information environments in which they bear higher proprietary disclosure costs, since rival companies may use disclosed information against them (Clinch and Verrecchia, 1997). Greater opacity can increase information asymmetry between managers and external stakeholders, reducing the value of disclosures provided. Competitive threats can also aggravate managerial career concerns (Graham et al., 2005; Kothari et al., 2009). Increased managerial concern for their positions can increase agency costs, the likelihood of managers engaging in rent-seeking activities, and shift financial reporting and disclosure considerations toward distortions that benefit managers more than shareholders. Li and Zhan (2019) find that product market competition is positively associated with stock crash risk. Career concerns cause managers to withhold bad news because disclosing bad news can lead to reduced executive compensation and/or job termination (Kothari et al., 2009; Li and Zhan, 2019). Collectively, the above evidence suggests a dark side hypothesis where competition can increase company risks arising from performance pressures and changes to management incentives.

Accounting information quality in a competitive product market setting has been a topic of interest to both theoretical and empirical researchers. Theoretical research (Darrough and Stoughton, 1990; Wagenhofer, 1990) suggests that information quality and product market competition are related. Although extensive theoretical models address the relationship between the nature of competition in product markets and financial reporting and disclosure decisions, the predictions are mixed. On the one hand, Darrough and Stoughton (1990) predict that companies with more competitive products will follow better disclosure policies. On the other hand, Wagenhofer (1990) predicts that information would be restricted in the presence of competitors. Conceptually, product market competition appears to be associated with inherent risk.

Auditors must consider inherent engagement risk for potential and current clients. Engagement risk includes three components: 1) client business risk, the risk associated with the client's continued survival and well-being; 2) audit risk, the risk that the auditor may issue an unqualified opinion on materially misstated financial statements (e.g., PCAOB AS No. 8, 2010a; PCAOB AS No. 12, 2010b); and 3) auditor business risk, the risk that is composed of all risk of associating with a potential client such as litigation cost, loss of reputation, and the inability to recover audit fees. Before considering whether and how product market competition impacts audit engagements, we first need to ascertain whether competition has any impact to engagement risk, as through the likelihood of manipulation or misstatement. Competition could then affect engagement risk through client business risk and audit risk.

Product market competition could increase client business risk through managers engaging in rent-seeking activities, increasing information asymmetry (Karuna, 2007; Li, 2010). Likewise, Shi, Sun, and Zhang (2018) find a positive association between competition-related keywords frequency in 10-K filings and earnings management. The uncertainty and the struggle for survival in a competitive industry can pressure companies to focus excessively on short-term performance, possibly leading companies to adopt aggressive accounting practices to increase reported earnings. Consistent with this argument, expected returns are negatively related to competition (Bustamante and Donangelo, 2017). Companies in highly competitive industries may resort to misreporting performance in a bid to fool competitors and prevent them from learning about the company's "true" performance (Gertner, Gibbons, and Scharfstein, 1988). In turn, greater managerial myopia and a higher likelihood of misreporting could increase audit risk in evaluating the forgoing of long-term shareholder value for short-term gains (Narayanan, 1985; Stein, 1989; von Thadden, 1995).

However, it is unclear based on prior literature whether competition affects only ex post financial reporting quality in the current year, as through earnings management, or also ex ante audit engagement risk for the subsequent year. The possibility further exists that competition reduces client and audit risks by mitigating agency costs. Hou and Robinson (2006) note that companies in highly competitive industries have higher returns. In a follow-up study, Gu (2016) finds that the relationship exists only if a company is research and development intensive. Nonetheless, companies facing competitive threats adopt more conservative financial policies than other companies (Dhaliwal et al., 2014), decreasing audit risk.

Further, product market competition has largely been considered at an industry level. As a result, there could be fundamental differences when a company-level measure is considered, such as the Hoberg et al. (2014) fluidity measure (Kirk, Piao, and Weng, 2020; Mattei and Platikanova, 2017). While Wang and Chui (2015) begin to explore the association between industry product market competition and audit fees, their examination is limited to the manufacturing industry using HHI. Therefore, it remains unknown whether auditors are affected by company-level competition variation across different industries or over time (e.g., Raghunandan, Rama, and Riccardi, 2019).

Given the conflicting perspectives on the relationship between product market competition and inherent engagement risk, we propose the following nondirectional hypothesis:

H1. Product market competition is associated with inherent engagement risk.

If product market competition affects engagement risk, then the presence of greater product market competition can in turn affect the auditor's reaction through audit pricing. Audit fees capture the expected costs required to cover auditor effort (DeFond and Zhang, 2014; Simunic, 1980). An increase in audit fees could reflect either the provision of additional audit effort leading to a more robust assurance work over controls and financial reporting or a fee premium lessening the potential impact of increased auditor business risk. Thus, audit fees can increase with engagement risk (e.g., Bell, Landsman, and Shackelford, 2001). Within the audit production function, Akono and Stein (2014) note that higher audit risk increases the risk premium that auditors charge, even if the premium is not recovered through the provision of additional audit effort. Industry or company specific risks can also result in changes to audit contracting costs. For instance, Ranasinghe, Yi, and Zhou (2022) find that auditors charge a risk premium in the oil and gas industry, which has unique risks. However, company actions to reduce risk, such as greater derivative hedging, is associated with a reduction in fees despite the need for greater effort (Ranasinghe et al., 2022).

Change in engagement risk from greater product market competition could likewise affect audit pricing. If competition serves in an agency cost mitigating role, then the assessed risk premium should be mitigated by conservative accounting practices and reduced managerial myopia. Despite a potential increase in effort required, use of conservative accounting practices could mitigate an increase in fees due to greater competition, similar to the use of derivative hedging in the oil and gas industry (Ranasinghe et al., 2022). Yet, under the dark side hypothesis of product market competition, there could nonetheless be greater engagement risk, increasing not only the audit risk premium but also the potential amount of auditor effort required to gain further confidence in company financial reporting decisions. Increased engagement risk based on underlying financial reporting quality could raise the amount of risk relating to the engagement, in turn increasing the risk premium assessed by the auditor. Independent of engagement risk, greater product market competition could require additional auditor effort due to greater complexity. Additional competition likely reflects the need to have a more granular understanding of a company's operations relative to competitors. Therefore, our second hypothesis is as follows:

H2. Product market competition is associated with audit fees.

Despite the auditor responding to the estimated level of engagement risk via audit engagement pricing, product market competition could nevertheless affect ex post audit quality. If product market competition truly reflects a corporate governance mechanism, then audit quality should not be negatively affected. That is, audit quality should remain the same or even be improved. Enhanced corporate governance should reduce risk concerns in the engagement and provide greater confidence surrounding the underlying financial reporting, in turn benefiting audit quality. However, the possibility remains that audit quality could be negatively impacted by greater product market competition.

Based on the dark side hypothesis of product market competition, competitive companies could require additional audit effort due to their higher risk. Greater inherent client business risk could persist beyond the level of auditor effort provided on engagement. Beyond the effort required to provide reasonable assurance that financial reporting is free of misstatement, there could be notice of reduced quality through restatements and internal control material weaknesses. That is, despite increased auditor effort in the presence of greater product market competition, there could still be lower audit quality due to managers' rent-seeking activities. Increased risk from information asymmetry behavior (e.g., Clinch and Verrecchia, 1997) could create concerns surrounding the fundamental risk of misstatement and the reliability of internal controls over financial reporting. Reduced audit quality could also stem from auditors utilizing a risk premium, effectively accepting a higher level of risk surrounding the engagement without expending additional effort. While the prior arguments assume that the auditor is aware of a change in the extent of engagement risk, thereby responding

with a change in fees, the alternative exists that the extent of risk derived from product market competition is not entirely understood, possibly due to a poor information environment (e.g., Jonnergård, von Koch, and Nilsson, 2020). As a result, higher than expected risk levels could manifest in lower audit quality if audit effort is not sufficiently allocated. Thus, our third hypothesis is:

H3. Product market competition is associated with audit quality.

3. Research design

3.1. Product market fluidity

In this study, we utilize product market fluidity (*FLUIDITY*), developed by Hoberg et al. (2014) to measure company-specific product market competition. Product market fluidity captures a different dimension of product market competition than industry concentration measures and has recently drawn the interest of researchers across wide range of applications (Billett, Garfinkel, and Yu, 2017; Li and Zhan, 2019; Smith, 2016). *FLUIDITY* focuses on Item 1 qualitative nonfinancial information, capturing the similarity between a company's products and the changes of the products made by rival companies through changes in rivals' product word choices compared to the company's own business description. The measure captures the degree of similarity between a company's own product strategy and changes of other rival companies in the same industry. If a company's products overlap more with the dynamic changes of the rivals' products (i.e., higher *FLUIDITY*), then the company faces greater product market competition. The measure assumes that product markets are dynamic and changes in products can occur while industry concentration is static. Thus, *FLUIDITY* captures competition regardless of rivals' current market shares. A dynamic product market can result from changes either in a company's own product mix or that of rival companies (Hoberg et al., 2014).

Product market fluidity is defined as:

$$\text{Product Market Fluidity} = \left\langle N_{i,t} \cdot \frac{D_{t-1,t}}{\left\| D_{t-1,t} \right\|} \right\rangle$$

$D_{t-1,t}$ is a vector capturing the changes in the overall use of product words, j, from t-1 to t, while $N_{i,t}$ is company i's own normalized j-word vector. The normalized vector reflects the vector $D_{t-1,t}$ divided by its length, $\left\| D_{t-1,t} \right\|$. A company's product market word vector J_{t-1} indicates how many companies have used words j in their 10-K product market descriptions in t-1 while the vector J_t reflects the word choice in year t. The change vector $D_{t-1,t}$ is thus derived from subtracting J_{t-1} from J_t on a word-by-word basis. The change vector captures how an industry has changed dynamically from t-1 to t. The dot product between the normalized change vector and the company's normalized vector produces the measure of product market fluidity (*FLUIDITY*). A company facing greater product market competition would be reflected in a smaller angle between a company's normalized vector and that of other companies, resulting in a higher *FLUIDITY* value (Hoberg et al., 2014).

3.2. Empirical models

We first examine the relationship between product market competition and engagement risk. We use two risk proxies: *MSCORE* and *FSCORE*. Beneish (1999) profiles companies that are likely to manipulate earnings, companies either charged with manipulation by the SEC or have admitted to manipulation in the public press, and develops a statistical model that uses eight financial ratios to identify manipulated earnings in reported financial statements (*MSCORE*). Thus, higher *MSCORE* values imply a greater likelihood that the company manipulates reported earnings. Introduced by Dechow et al. (2011), *FSCORE* captures engagement risk via a discrete probability of a misstatement using certain company characteristics. Notably, these measures are probabilities, in contrast to Shi et al. (2018) examining ex post earnings

management. We first calculate the predicted values necessary for the proxy's computation and then estimate the probability of a misstatement as *Probability* $= e^{p_{i,t}}/(1 + e^{p_{i,t}})$, where e equals 2.71828183. *FSCORE* therefore equals the probability scaled by unconditional probability, where unconditional probability is misstating company-years scaled by the sum of non-misstating company-years and misstating company-years. The unconditional probability for our sample is 10.10%. We provide additional information on the computation of our two risk proxies in Appendix B.

In turn, we estimate the following ordinary least-squares (OLS) regression model to test the relationship between product market competition (*FLUIDITY*) and risk (*IRISK*). *IRISK* reflects either *FSCORE* or *MSCORE*.

$IRISK_{it} = \beta_0 + \beta_1 FLUIDITY_{it-1} + \beta_2 LNASSET_{it-1} + \beta_3 LNSEG_{it-1} + \beta_4 FOREIGN_{it-1} + \beta_5 RESTRUCTURE_{it-1} + \beta_6 MERGER_{it-1} + \beta_7 LEVERAGE_{it-1} + \beta_8 ROA_{it-1} + \beta_9 LOSS_{it-1} + \beta_{10} GROWTH_{it-1} + \beta_{11} OP\_CASH_{it-1} + \beta_{12} CAP\_INTENSITY_{it-1} + \beta_{13} MB_{it-1} + \beta_{14} BIG4_{it-1} + \beta_{15} ICW_{it-1} + \beta_{16} HHI_{it-1} + \beta_{17} LEADER_{it-1} + \beta_{18} FOLLOWER_{it-1} + \beta_{19k} CORP\_GOV_{it-1} + IND + YEAR + \varepsilon$ (1)

We measure *FLUIDITY* and control variables in *t*-1 to capture the risk in existence prior to an auditor beginning an engagement with the client in the current year and prior to any client actions such as earnings management (e.g., Shi et al., 2018). Information on such risk would be available to the auditor while planning the engagement. Therefore, the auditor could use *FLUIDITY* to better understand the client in the risk assessment process, including competitive risks and challenges.[2] Two-digit Standard Industrial Classification (SIC) industry (*IND*) and year (*YEAR*) fixed effects are included but not reported. Standard errors are clustered at the company level.

Following prior studies (Abbott, Parker, and Peters, 2004; Cao, Myers, and Omer, 2012; Czerney, Schmidt, and Thompson, 2014; Libby, Rennekamp, and Seybert, 2015; Lobo and Zhao, 2013), we control for audit risk and financial risk. Company size (*LNASSET*), business and geographic segments (*LNSEG*), foreign transactions (*FOREIGN*), restructuring (*RESTRUCTURE*), and merger (*MERGER*) activity account for complexity. The extant literature suggests that complexity harms financial reporting quality, though large and complex structured companies are likely to have strong internal controls, which could lead to a lower likelihood of accounting misstatements (Doyle, Ge, and McVay, 2007; Ge and McVay, 2005; Kinney and McDaniel, 1989; Krishnan, 2005). We also control for financial strength which could affect the likelihood of earnings manipulation and misstatement through leverage (*LEVERAGE*), return on assets (*ROA*), loss (*LOSS*), sales growth (*GROWTH*), operating cash (*OP_CASH*), and capital intensity (*CAP_INTENSITY*) (Dechow, Sloan, and Sweeney1996; Lee, 2012).

Further, we control for market-to-book ratio (*MB*) as there are mixed results on the association between *MB* and accounting restatements (Abbott et al., 2004; Beasley, 1996; Dechow, Sloan, and Sweeney, 1996; DeFond and Jiambalvo, 1991). The presence of a Big 4 auditor (*BIG4*) and prior Section 404 internal control material weaknesses (*ICW*) could also affect current year risk (Francis, Maydew, and Sparks, 1999; Hogan and Wilkins, 2008). Additionally, we control for industry-level product market concentration and power. *HHI* is the sum of the squares of the percentage of market share, where a larger *HHI* reflects greater industry concentration and less competition. *LEADER* represents companies whose price-cost margin (PCM) are ranked among the top quintile within an industry, and *FOLLOWER* represents companies whose PCM are ranked among the bottom quintile within an industry.

As market competition could be an external disciplinary mechanism that induces companies to enhance corporate governance

(Chhaochharia, Grinstein, Grullon, and Michaely, 2017; Hart, 1983), we further include several corporate governance variables (*CORP_GOV*) in our models. Extensive literature shows a significant relationship between corporate governance mechanisms and audit risk and pricing (Abbott et al., 2004; Krishnan, Wen, and Zhao, 2011). CEO duality (*CEOCHAIR*), where the CEO is also the chairman of the board, is associated with a greater misstatement likelihood (Efendi, Srivastava, and Swanson, 2007) and higher levels of discretionary accruals (Cornett, Marcus, and Tehranian, 2008). We also include *CEOACCT* and *CFOACCT*, reflecting whether a CEO (CFO) has a financial background, which can improve financial reporting quality (Caglio, Dossi, and Van der Stede, 2018). Since the audit committee has a direct impact on financial reporting, we account for the presence of financial backgrounds (*AUFIN*), female directors (*ACF*), and legal expertise (*AC_LAW*) on the audit committee that can benefit financial reporting quality (e.g., Krishnan et al., 2011).

We next examine the relationship between product market competition and audit fees (*LNAUDITFEE*). We expect that product market competition is associated with the audit fees assessed by the auditor. We estimate the following regression model:

$LNAUDITFEE_{it} = \beta_0 + \beta_1 FLUIDITY_{it-1} + \beta_2 LNASSET_{it-1} + \beta_3 LNSEG_{it-1} + \beta_4 FOREIGN_{it-1} + \beta_5 RESTRUCTURE_{it-1} + \beta_6 MERGER_{it-1} + \beta_7 LEVERAGE_{it-1} + \beta_8 ROA_{it-1} + \beta_9 LOSS_{it-1} + \beta_{10} GROWTH_{it-1} + \beta_{11} OP\_CASH_{it-1} + \beta_{12} CAP\_INTENSITY_{it-1} + \beta_{13} MB_{it-1} + \beta_{14} BIG4_{it-1} + \beta_{15} ICW_{it-1} + \beta_{16} HHI_{it-1} + \beta_{17} LEADER_{it-1} + \beta_{18} FOLLOWER_{it-1} + \beta_{19k} AUDIT\_CHAR_{it-1} + IND + YEAR + \varepsilon$ (2)

We follow Ogneva, Subramanyam, and Raghunandan (2007), Hribar, Kravet, and Wilson (2014), and Donelson, Ege, and McInnis (2017) and include additional client- and auditor-specific characteristics as control variables (*AUDIT_CHAR*), which have been found to impact audit fees. First, age (*LNFIRMAGE*) can affect audit risk with younger companies having lower reporting quality than established companies (Callen, Robb, and Segal, 2008). Second, audit busy season, coinciding with clients with December fiscal year-ends, can result in workload pressure and auditor workload compression. We account for companies with a non-December fiscal year-end (*DEC_YE*) to capture such impact on engagement risk. Third, current year auditor-client contracting could be affected by the presence of a prior modified audit opinion (*AUD_OPIN*) which could increase the risk premium assessed by the auditor. Further, clients in high litigation risk industries (*LITRISK*) are likely to be charged higher audit fees. Finally, we control for companies with a Section 302 internal control material weakness (*SOX302*).

We further examine the relationship between product market competition and audit quality (*AQ*) in Model 3. If there is greater risk surrounding the audit engagement for companies with additional product market competition, then audit quality could also be affected despite adjusting audit fees.

$AQ_{it} = \beta_0 + \beta_1 FLUIDITY_{it-1} + \beta_2 LNASSET_{it-1} + \beta_3 LNSEG_{it-1} + \beta_4 FOREIGN_{it-1} + \beta_5 RESTRUCTURE_{it-1} + \beta_6 MERGER_{it-1} + \beta_7 LEVERAGE_{it-1} + \beta_8 ROA_{it-1} + \beta_9 LOSS_{it-1} + \beta_{10} GROWTH_{it-1} + \beta_{11} OP\_CASH_{it-1} + \beta_{12} CAP\_INTENSITY_{it-1} + \beta_{13} MB_{it-1} + \beta_{14} BIG4_{it-1} + \beta_{15} ICW_{it-1} + \beta_{16} HHI_{it-1} + \beta_{17} LEADER_{it-1} + \beta_{18} FOLLOWER_{it-1} + IND + YEAR + \varepsilon$ (3)

We capture audit quality through four proxies: the presence of a Section 404 internal control material weakness (*ICW*), the presence of a restatement in t or $t + 1$ (*RESTATEMENT*), audit delay (*LNAUDITLAG*), and discretionary accruals using the Kothari, Leone, and Wasley (2005) performance-matched modified Jones model (*ABS_DA*). By using multiple measures, we can more aptly capture ex post audit quality characteristics. The presence of an internal control material weakness or a restatement suggests poorer audit quality. An internal control weakness indicates that there is a reasonable possibility that a company's internal controls will not prevent or detect a material misstatement in financial reporting. Stated otherwise, ineffective internal controls identified by the auditor reduce the reliability of a company's financial reporting, thereby lowering audit quality (Costello and Wittenberg-Moerman, 2011; Naiker and Sharma, 2009) and increasing control risk (Hogan

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[2] We alternatively capture product market competition in the current year by measuring *FLUIDITY* in year *t*. Our results are qualitatively similar, save for no evidence of a significant association between *FLUIDITY* and the presence of an internal control material weakness.

and Wilkins, 2008). Therefore, we control for the presence of a *CIO*, who could assist with internal control development. Likewise, restatements reflect financial reporting that is no longer reliable and the outcome of having weaker controls over financial reporting. While the average number of days between the audit report date and the 10-K filing date has decreased over time following new PCAOB and SEC regulations (Glover, Hansen, and Seidel, 2022), we nonetheless use audit delay as an audit quality measure to capture auditor effort. Audit delay could be affected by a client's reporting requirements and filing history. Thus, in our audit delay model we also control for age (*LNFIRMAGE*) and whether the client is an accelerated (*ACC*) or large accelerated filer (*LARGE_ACC*).[3] We further examine discretionary accruals as Laksmana and Yang (2014) note that earnings management activity can be affected by competition.

3.3. Sample selection

We first obtain the product market competition index for product market fluidity (*FLUIDITY*) from the Hoberg and Phillips Data Library.[4] We then begin the sample construction process with all observations for publicly traded US companies at the intersection of Compustat and Audit Analytics from 2005 to 2019. We examine the post-Sarbanes-Oxley Act (SOX) period to avoid confounding effects. From the initial sample of 56,710 company-year observations we exclude 16,088 observations in the financial (SIC 6000–6999) and utilities industries (SIC 4900–4999). Companies in these two industries have special business structures, which could affect the financial reporting and managerial incentives. We then remove 1391 company-years with missing Compustat data and 9862 company-years with missing Audit Analytics data necessary to construct our control variables. Therefore, our final sample includes 29,369 company-year observations. Table 1, Panel A provides additional information on the sample selection process.

Panel B presents the sample distribution by year. We note that observations are uniformly distributed across our sample period. Panel C presents the sample distribution by Fama-French 12 industry classification. The sample covers a wide range of industries with Computers, Software, and Electronic companies representing the largest industry in the sample at 25.96%, while Telephone and Television industry is the smallest sector representing 3.56% of the sample.

Table 2 presents descriptive statistics for the full sample. In Panel A, all variables are within reasonable ranges and are in line with the statistics reported in the literature.[5] Panel B partitions the sample into high- and low-competitive company groups by average *FLUIDITY* in each three-digit SIC code. Companies with high product market competition, that is, those with product market threats, report greater average likelihood to manipulate reported financial results (*MSCORE*, −2.087) or have a misstatement (*FSCORE*, 0.022) than companies with lower

Table 1
Sample selection and distribution

Panel A: Sample selection	
Number of company-years covered by Hoberg et al. (2014) from 2005 to 2019	56,710
Less: observations from companies in financial industry with SIC code between 6000 and 6999 and in utilities industry with SIC code between 4900 and 4999	(16,088)
Less: company-years with missing Compustat data	(9,862)
Less: company-years with missing Audit Analytics data	(1,391)
Final sample	**29,369**

Panel B: Sample distribution by year		
Year	Frequency	Percent (%)
2005	2,335	7.95
2006	2,281	7.77
2007	2,097	7.14
2008	2,103	7.16
2009	2,011	6.85
2010	1,943	6.62
2011	1,996	6.80
2012	1,879	6.40
2013	1,804	6.14
2014	1,869	6.36
2015	1,848	6.29
2016	1,892	6.44
2017	1,809	6.16
2018	1,759	5.99
2019	1,743	5.93
Total	**29,369**	**100**

Panel C: Sample distribution by Fama-French 12 industries		
Industry	Frequency	Percent (%)
Consumer NonDurables	1493	5.08
Consumer Durables	1109	3.78
Manufacturing	4185	14.25
Energy, Oil, and Gas Products	1985	6.76
Chemicals and Allied Products	1192	4.06
Computers, Software, and Electronic	7625	25.96
Telephone and Television	1047	3.56
Wholesale and Retail Services	2427	8.26
Healthcare, Medical Equipment, and Drugs	3958	13.48
Other	4348	14.80
Total	**29,369**	**100**

competition (*MSCORE*, −2.185; *FSCORE*, 0.017). Thus, we provide initial evidence consistent with our expectation that product market competition is associated with greater pressure on companies to meet financial expectations, increasing auditor risk exposure. Likewise, companies with greater product market competition report higher audit fees and greater discretionary accruals than companies with less competition. Panel C provides pairwise correlation coefficients.[6] We find significant and positive correlations between product market competition and our engagement risk measures and a negative, significant relationship between *HHI* and engagement risk. We also find significant and positive correlations between product market competition and several of our audit quality measures (*RESTATEMENT*, *LNAUDITLAG*, *ABS_DA*).

4. Results

4.1. Main analyses

Table 3 examines the relationship between product market competition and engagement risk. Reported *p*-values are based on robust standard errors that adjust for clustering at the company level to address heteroscedasticity. We find that companies with higher *FLUIDITY* are

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[3] Our sample is not limited to (large) accelerated filers, issuers with a public float of $75 million or more, but less than $700 million ($700 million or more), as of the last business day of issuers' most recently completed second fiscal quarter. Form 10-K is due within 60 days for large accelerated filers and within 75 days for accelerated filers. Nevertheless, our results are robust to excluding all companies that are not accelerated filers.

[4] https://hobergphillips.tuck.dartmouth.edu/

[5] We recognize that company-year observations with a loss (*LOSS*) could potentially impact audit quality distinctly from *FLUIDITY*. Our results are robust to the exclusion of these observations. Further, our sample reflects a variety of auditors, as noted by approximately half of auditors being non-Big 4 audit firms. As such, we examine the impact of auditor type by examining Big 4 and non-Big 4 auditor subsamples. Our results are present in both subsamples, suggesting that auditor type does not appear to be driving the results. Additionally, we note that only some of our observations are from market leaders (*LEADER*). While *FLUIDITY* captures competition distinct from industry concentration (Hoberg et al., 2014), we examine market leaders and followers separately and find that our results persist among both subsamples.

[6] We also examine multicollinearity in our sample and find that the average value of variation inflation factors (VIFs) for the dependent variables is 1.51 and all independent variables are well below 4. Therefore, multicollinearity is not a concern in our setting.

Table 2
Descriptive statistics.

Panel A: Summary statistics (N = 29,369)

Variables	Mean	Std. Dev.	Q1	Median	Q3
FLUIDITY	6.349	3.225	4.015	5.750	7.998
MSCORE	−2.137	1.542	−2.626	−2.376	−2.051
FSCORE	0.019	0.055	0.008	0.010	0.014
LNAUDITFEE	13.864	1.279	13.021	13.918	14.695
ICW	0.081	0.273	0.000	0.000	0.000
RESTATEMENT	0.101	0.301	0.000	0.000	0.000
LNAUDITLAG	4.155	0.252	4.007	4.111	4.304
ABS_DA	0.101	0.137	0.028	0.623	0.123
AUTURNOVER	0.047	0.212	0.000	0.000	0.000
LNASSET	6.281	2.062	4.797	6.266	7.700
LNSEG	2.602	0.614	2.197	2.639	3.045
FOREIGN	0.359	0.480	0.000	0.000	1.000
RESTRUCTURE	0.335	0.472	0.000	0.000	1.000
MERGER	0.431	0.495	0.000	0.000	1.000
LEVERAGE	0.188	0.211	0.001	0.132	0.301
ROA	−0.025	0.253	−0.032	0.034	0.076
LOSS	0.330	0.470	0.000	0.000	1.000
GROWTH	0.163	0.503	−0.018	0.080	0.218
OP_CASH	0.050	0.184	0.024	0.079	0.130
CAP_INTENSITY	0.234	0.229	0.063	0.148	0.327
MB	2.105	1.651	1.186	1.594	2.382
BIG4	0.563	0.496	0.000	1.000	1.000
HHI	0.166	0.151	0.057	0.119	0.210
LEADER	0.210	0.407	0.000	0.000	0.000
FOLLOWER	0.296	0.457	0.000	0.000	1.000
CEOCHAIR	0.427	0.495	0.000	0.000	1.000
CFOACCT	0.513	0.500	0.000	1.000	1.000
AUFIN	0.861	0.346	1.000	1.000	1.000
ACF	0.331	0.471	0.000	0.000	1.000
AC_LAW	0.288	0.453	0.000	0.000	1.000
CEOACCT	0.146	0.353	0.000	0.000	0.000
CIO	0.412	0.492	0.000	0.000	1.000

Panel B: Mean differences of high- and low-competitive companies

Variables	High-competitive companies (N = 14,372)			Low-competitive companies (N = 14,997)			Diff.	p-value
	Mean	Std.	Median	Mean	Std.	Median		
MSCORE	−2.087	1.681	−2.369	−2.185	1.394	−2.381	−0.099***	(0.00)
FSCORE	0.022	0.063	0.010	0.017	0.046	0.010	−0.005***	(0.00)
LNAUDITFEE	13.953	1.202	13.985	13.778	1.342	13.839	−0.175***	(0.00)
ICW	0.081	0.273	0.000	0.081	0.272	0.000	−0.001	(0.84)
LNAUDITLAG	4.147	0.250	4.094	4.163	0.255	4.127	0.016***	(0.00)
RESTATEMENT	0.103	0.304	0.000	0.099	0.298	0.000	−0.005	(0.17)
ABS_DA	0.105	0.146	0.064	0.096	0.127	0.061	−0.009***	(0.00)
AUTURNOVER	0.046	0.209	0.000	0.049	0.216	0.000	0.003	(0.18)
LNASSET	6.396	2.010	6.373	6.171	2.105	6.140	−0.225***	(0.00)
LNSEG	2.574	0.619	2.565	2.629	0.609	2.708	0.055***	(0.00)
FOREIGN	0.353	0.478	0.000	0.365	0.481	0.000	0.012*	(0.03)
RESTRUCTURE	0.331	0.470	0.000	0.340	0.474	0.000	0.009	(0.09)
MERGER	0.439	0.496	0.000	0.424	0.494	0.000	−0.015**	(0.01)
LEVERAGE	0.198	0.217	0.141	0.179	0.204	0.126	−0.019***	(0.00)
ROA	−0.046	0.284	0.027	−0.005	0.218	0.039	0.041***	(0.00)
LOSS	0.370	0.483	0.000	0.292	0.455	0.000	−0.078***	(0.00)
GROWTH	0.201	0.571	0.092	0.128	0.425	0.072	−0.073***	(0.00)
OP_CASH	0.038	0.210	0.077	0.062	0.153	0.081	0.024***	(0.00)

Table 2 (*continued*)

CAP_INTENSITY	0.239	0.239	0.144	0.229	0.219	0.151	−0.011***	(0.00)
MB	2.235	1.816	1.648	1.982	1.464	1.545	−0.253***	(0.00)
BIG4	0.601	0.490	1.000	0.527	0.499	1.000	−0.074***	(0.00)
HHI	0.152	0.146	0.101	0.178	0.155	0.134	−0.014***	(0.00)
LEADER	0.223	0.416	0.000	0.198	0.399	0.000	−0.025***	(0.00)
FOLLOWER	0.311	0.463	0.000	0.282	0.450	0.000	−0.029***	(0.00)

Panel C: Pearson correlation metrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
FLUIDITY	(1)	1.000												
MSCORE	(2)	0.081*	1.000											
FSCORE	(3)	0.090*	0.427*	1.000										
LNAUDITFEE	(4)	−0.008	−0.113*	−0.061*	1.000									
ICW	(5)	0.003	0.025*	0.023*	−0.053*	1.000								
RESTATEMENT	(6)	0.011*	0.003	−0.006	−0.053*	0.049*	1.000							
LNAUDITLAG	(7)	0.018*	0.063*	0.055*	−0.450*	0.327*	0.060*	1.000						
ABS_DA	(8)	0.108*	0.145*	0.197*	−0.192*	0.094*	0.007	0.183*	1.000					
AUTURNOVER	(9)	0.008	0.018*	0.014*	−0.092*	0.077*	0.024	0.113*	0.037*	1.000				
LNASSET	(10)	0.012*	−0.142*	−0.105*	0.866*	−0.117*	−0.048*	−0.537*	−0.257*	−0.112*	1.000			
LNSEG	(11)	−0.202*	−0.110*	−0.091*	0.453*	−0.051*	0.012*	−0.215*	−0.145*	−0.021*	0.403*	1.000		
FOREIGN	(12)	−0.100*	−0.053*	−0.037*	0.254*	−0.009	−0.015*	−0.101*	−0.060*	−0.021*	0.172*	0.359*	1.000	
RESTRUCTURE	(13)	−0.089*	−0.083*	−0.042*	0.374*	−0.020*	−0.028*	−0.163*	−0.067*	−0.034*	0.304*	0.257*	0.183*	1.000
MERGER	(14)	−0.050*	−0.092*	−0.061*	0.308*	−0.012*	−0.009	−0.142*	−0.110*	−0.028*	0.291*	0.189*	0.082*	0.144*
LEVERAGE	(15)	0.100*	−0.071*	−0.030*	0.279*	−0.019*	−0.028*	−0.124*	−0.025*	−0.032*	0.352*	0.031*	−0.024*	0.130*
ROA	(16)	−0.183*	−0.114*	−0.138*	0.236*	−0.092*	−0.005	−0.231*	−0.378*	−0.057*	0.344*	0.197*	0.062*	0.008
LOSS	(17)	0.188*	0.057*	0.069*	−0.227*	0.092*	−0.004	0.250*	0.187*	0.052*	−0.319*	−0.186*	−0.044*	0.024*
GROWTH	(18)	0.138*	0.098*	0.067*	−0.073*	0.041*	0.007	0.045*	0.093*	0.019*	−0.079*	−0.140*	−0.055*	−0.134*
OP_CASH	(19)	−0.133*	−0.120*	−0.132*	0.245*	−0.092*	−0.012*	−0.241*	−0.300*	−0.057*	0.356*	0.175*	0.053*	0.034*
CAP_INTENSITY	(20)	0.150*	−0.012*	0.015*	0.033*	−0.022*	−0.008	−0.044*	−0.012*	−0.015*	0.213*	−0.049*	−0.092*	−0.091*
MB	(21)	0.128*	0.133*	0.145*	−0.066*	−0.006	0.006	−0.083*	0.173*	−0.002	−0.162*	−0.143*	−0.017*	−0.147*
BIG4	(22)	0.067*	−0.055*	−0.022*	0.440*	−0.088*	−0.003	−0.290*	−0.113*	−0.058*	0.409*	0.170*	0.094*	0.173*
ICW	(23)	0.006	0.003	−0.008	−0.045*	0.382*	0.042*	0.214*	0.058*	0.066*	−0.102*	−0.036*	0.001	−0.008
HHI	(24)	−0.241*	−0.036*	−0.047*	0.054*	0.006	0.018*	−0.018*	−0.055*	−0.019*	0.065*	0.079*	−0.017*	0.044*
LEADER	(25)	0.071*	−0.021*	−0.002	0.325*	−0.037*	−0.028*	−0.181*	−0.004	−0.036*	0.336*	0.136*	0.070*	0.147*
FOLLOWER	(26)	−0.035*	−0.047*	−0.037*	0.129*	−0.033*	−0.006	−0.137*	−0.085*	−0.038*	0.160*	0.081*	0.062*	0.043*

Panel C: Pearson correlation metrix

		(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
MERGER	(14)	1.000											
LEVERAGE	(15)	0.075*	1.000										
ROA	(16)	0.140*	−0.036*	1.000									
LOSS	(17)	−0.160*	0.044*	−0.554*	1.000								
GROWTH	(18)	0.040*	−0.008	−0.073*	0.034*	1.000							
OP_CASH	(19)	0.136*	0.013*	0.786*	−0.447*	−0.136*	1.000						
CAP_INTENSITY	(20)	−0.144*	0.310*	0.048*	−0.008	−0.013*	0.151*	1.000					
MB	(21)	−0.070*	−0.108*	−0.157*	0.023*	0.207*	−0.143*	−0.178*	1.000				
BIG4	(22)	0.125*	0.125*	0.118*	−0.116*	−0.034*	0.134*	0.035*	0.023*	1.000			
ICW	(23)	−0.027*	−0.019*	−0.093*	0.112*	0.022*	−0.085*	−0.019*	−0.028*	−0.077*	1.000		
HHI	(24)	0.033*	0.031*	0.082*	−0.090*	−0.059*	0.048*	0.006	−0.109*	0.013*	0.006	1.000	
LEADER	(25)	0.085*	0.060*	−0.069*	0.021*	−0.001	−0.056*	−0.025*	0.0330*	0.150*	−0.027*	−0.105*	1.000
FOLLOWER	(26)	0.093*	0.106*	0.189*	−0.215*	−0.020*	0.196*	0.060*	0.000	0.116*	−0.032*	0.136*	−0.335*

Note: All continuous variables are winsorized at the 1% and 99% levels. * represents significance at the 0.1 level (two-tailed).

Table 3
Engagement risk.

Variables	(1) MSCORE		(2) MSCORE		(3) FSCORE		(4) FSCORE	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	−1.683***	(0.00)	−1.647***	(0.00)	0.024***	(0.00)	0.024***	(0.00)
FLUIDITY	0.022***	(0.00)	0.022***	(0.00)	0.001***	(0.00)	0.001***	(0.00)
LNASSET	−0.055***	(0.00)	−0.052***	(0.00)	−0.002***	(0.00)	−0.002***	(0.00)
LNSEG	−0.068***	(0.00)	−0.068***	(0.00)	−0.002***	(0.01)	−0.002***	(0.01)
FOREIGN	−0.040**	(0.03)	−0.042**	(0.02)	0.000	(0.67)	0.000	(0.61)
RESTRUCTURE	−0.040**	(0.03)	−0.038**	(0.04)	0.002***	(0.00)	0.002***	(0.01)
MERGER	−0.115***	(0.00)	−0.114***	(0.00)	−0.001**	(0.03)	−0.001**	(0.03)
LEVERAGE	−0.318***	(0.00)	−0.324***	(0.00)	−0.007***	(0.00)	−0.007***	(0.00)
ROA	−0.262*	(0.07)	−0.266*	(0.06)	−0.013***	(0.00)	−0.013***	(0.00)
LOSS	−0.091***	(0.00)	−0.095***	(0.00)	−0.003***	(0.01)	−0.003***	(0.01)
GROWTH	0.165***	(0.00)	0.161***	(0.00)	0.002	(0.15)	0.002	(0.16)
OP_CASH	−0.256	(0.12)	−0.253	(0.13)	−0.017***	(0.00)	−0.017***	(0.00)
CAP_INTENSITY	−0.023	(0.75)	−0.023	(0.74)	0.008***	(0.00)	0.008***	(0.00)
MB	0.076***	(0.00)	0.076***	(0.00)	0.004***	(0.00)	0.004***	(0.00)
BIG4	−0.015	(0.46)	−0.014	(0.48)	0.001*	(0.09)	0.001	(0.13)
ICW	−0.060	(0.17)	−0.064	(0.14)	−0.004***	(0.00)	−0.004***	(0.00)
HHI	−0.033	(0.62)	−0.028	(0.67)	−0.001	(0.62)	−0.001	(0.65)
LEADER	0.013	(0.63)	0.013	(0.63)	0.000	(0.74)	0.000	(0.75)
FOLLOWER	−0.040**	(0.03)	−0.037**	(0.04)	−0.001	(0.29)	−0.001	(0.30)
CEOCHAIR			−0.049***	(0.01)			−0.001	(0.32)
CEOACCT			−0.025	(0.18)			−0.001	(0.39)
CFOACCT			−0.010	(0.76)			0.002	(0.12)
AUFIN			0.016	(0.40)			0.001	(0.18)
ACF			−0.022	(0.24)			−0.001**	(0.04)
AC_LAW			−0.035	(0.16)			−0.002**	(0.03)
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
Adjusted R²	0.0529		0.0531		0.0503		0.0506	
Observations	29,369		29,369		29,369		29,369	

Notes: Table 3 estimates the relationship between product market competition (*FLUIDITY*) and inherent engagement risk (*MSCORE, FSCORE*). *FLUIDITY*, from the Hoberg and Phillips Data Library, is the cosine similarity between a company's normalized word-use vector and company rivals' aggregate word change vector of word choices from *t*-1 to *t*. Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

associated with a higher likelihood of manipulating their financial statements (*MSCORE, t* = 5.08). Our result suggests that there is a 2.2% increase in the likelihood of manipulation due to product market competition. The inclusion of corporate governance factors does not alter the underlying relationship.[7] That is, our result is robust to controlling for a company's corporate governance characteristics (*t* = 4.88), which could constrain the extent of risky activities. Similarly, we find a positive association between product market competition and misstatement likelihood (*FSCORE, t* = 5.13). Companies with greater product market competition continue to face greater misstatement likelihood after accounting for corporate governance characteristics (*t* = 5.00). Providing support for our first hypothesis, the results suggest that product market competition increases the risk surrounding an audit engagement. One possible explanation is that risk stems from negative repercussions to future earnings, even though this information is not immediately priced by the market (Kirk et al., 2020).

We next examine the relationship between product market competition and audit fees (*LNAUDITFEE*) in Table 4. We find a positive and significant association between *FLUIDITY* and audit fees (*t* = 7.06), providing evidence in support of our second hypothesis. That is, we find evidence that companies with greater product market competition are

assessed higher fees by their auditor. The impact of product market competition reflects approximately a 2% increase in audit fees for high-competition companies.[8] Thus, our result shows that the association between product market competition and audit pricing is economically significant. Among our control variables, we note that larger companies are charged higher audit fees due to their complex business structures. Further, non-profitable companies, companies with internal control weaknesses, and companies in high litigation risk industries pay higher audit fees because of increased engagement risk. Our result is robust to the inclusion of corporate governance characteristics (*t* = 7.20), including CEO and CFO financial experience, expertise on the audit committee, and CEO-chairman duality.

We further investigate the relationship between product market competition and audit quality in Table 5. The association between product market competition and internal control material weakness likelihood (*ICW*) is positive and significant (*z* = 2.23), suggesting that product market competition increases control risk by 2.5% (odds ratio = 1.025). We also note a positive association between product market

[7] As companies are required to discuss their businesses in Item 1, including the principal goods and services provided, *FLUIDITY* does not reflect purely voluntary disclosures. Nevertheless, we conduct a series of untabulated analyses using non-missing advertising expense as a proxy of the extent of voluntary disclosures following Legoria (2005). Advertising expense (*ADV_EXP*) is defined as an indicator variable set equal to one if there is non-missing advertising expense, and zero if missing. We find consistent evidence using *ADV_EXP* as an additional control variable.

[8] The percent increase in fees is calculated as 100*{exp.^(0.019)-1} since our audit fee variable is log transformed. The positive coefficient estimate on *FLUIDITY* (0.019, *p*-value <0.01), results in a 1.918% increase in annual audit fees.

Table 4
Audit pricing.

Variables	(1) LNAUDITFEE Coef.	p-value	(2) LNAUDITFEE Coef.	p-value
CONSTANT	9.896***	(0.00)	9.909***	(0.00)
FLUIDITY	0.019***	(0.00)	0.019***	(0.00)
LNASSET	0.494***	(0.00)	0.485***	(0.00)
LNSEG	0.186***	(0.00)	0.187***	(0.00)
FOREIGN	0.118***	(0.00)	0.120***	(0.00)
RESTRUCTURE	0.160***	(0.00)	0.151***	(0.00)
MERGER	0.103***	(0.00)	0.101***	(0.00)
LEVERAGE	0.179***	(0.00)	0.181***	(0.00)
ROA	−0.013	(0.70)	−0.007	(0.82)
LOSS	0.107***	(0.00)	0.106***	(0.00)
GROWTH	0.045***	(0.00)	0.047***	(0.00)
OP_CASH	−0.593***	(0.00)	−0.588***	(0.00)
CAP_INTENSITY	−0.285***	(0.00)	−0.289***	(0.00)
MB	0.029***	(0.00)	0.028***	(0.00)
BIG4	0.274***	(0.00)	0.265***	(0.00)
ICW	0.076***	(0.00)	0.082***	(0.00)
HHI	0.120*	(0.07)	0.108	(0.10)
LEADER	0.092***	(0.00)	0.087***	(0.00)
FOLLOWER	0.031**	(0.03)	0.030**	(0.04)
LNFIRMAGE	−0.033***	(0.00)	−0.044***	(0.00)
DEC_YE	−0.049***	(0.01)	−0.047**	(0.01)
AUD_OPIN	0.088***	(0.00)	0.086***	(0.00)
LITRISK	0.086***	(0.00)	0.088***	(0.00)
SOX302	0.118***	(0.00)	0.123***	(0.00)
CEOCHAIR			0.033**	(0.02)
CEOACCT			−0.032**	(0.01)
CFOACCT			0.102***	(0.00)
AUFIN			0.069***	(0.00)
ACF			0.017	(0.27)
AC_LAW			−0.023	(0.24)
Year FE	Yes		Yes	
Industry FE	Yes		Yes	
Adjusted R^2	0.8041		0.8058	
Observations	29,369		29,369	

Notes: Table 4 estimates the relationship between product market fluidity (*FLUIDITY*) and the natural logarithm of audit fees (*LNAUDITFEE*). Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

competition (z = 2.61) and restatement likelihood (*RESTATEMENT*).[9] Our results suggest that companies are more likely to report internal control material weaknesses and restatements if faced with greater product market competition. Further, we find that companies with greater product market competition report additional audit delays (*LNAUDITLAG*, t = 2.36). In an untabulated analysis, we find that our audit delay result is attributable to below median length delays. That is, fluidity has a positive impact on delay length as audit delay initially begins to grow.

Auditors appear to devote more attention to clients facing additional product market competition, suggesting that the increase in audit fees can be attributable to both a risk premium and the provision of

additional audit effort.[10] One possible explanation is that inherent engagement risk permeates despite auditor oversight. We also find that companies with greater product market competition report higher discretionary accruals, reflecting of a greater probability of earnings management (*ABS_DA*, t = 3.12). While audit firms respond rationally to increased engagement risk by charging higher audit fees and spending additional effort on the engagements, audit quality is nonetheless negatively affected. Notably, our results are incremental to industry-level product market competition as captured through HHI, suggesting that the company-specific qualitative measure contains incremental information about competition. *FLUIDITY* directly captures managers' considerations of its competitors while *HHI* cannot capture, by definition, these threats at the company level.

4.2. Financial constraints

Our results could be attributable to financial constraints capturing a company's sensitivity to rivals' aggressive competitive behavior (Bolton and Scharfstein, 1990). Bolton and Scharfstein (1990) argue that cash-rich and less-leveraged companies can drive their financially constrained competitors out of the market by taking actions to undercut market prices. Companies facing high product market competition and greater financial constraints have more incentive to manipulate their earnings, thus increasing the likelihood of restatement and the possible audit fee premium assessed. However, the cost of earnings manipulation is high and might not outweigh the external financing benefits. As such, we use the SA index to proxy for financial constraints (Hadlock and Pierce, 2010), with higher values reflecting greater financial constraints.

In Table 6, we continue to find a positive relationship between *FLUIDITY*, engagement risk, and audit fees. We also find that companies with greater financial constraints and competition (*FLUIDITY*SA*) are associated with higher levels of engagement risk. Specifically, we find a greater likelihood of altering financial results (t = 2.17) and a greater misstatement likelihood (t = 2.01). Financial constraints appear to aggravate the positive association between product market competition and the risk surrounding an audit engagement. Likewise, we find that auditors assess higher audit fees if the client faces greater product market competition and additional financial constraints (t = 7.13). Our results indicate that auditors account for the risk imposed by a client's financial constraints in addition to product market competition, as evidenced by higher audit fees.

4.3. Propensity score matching and entropy balancing

To reduce concerns regarding functional form misspecification whereby the treatment of companies with greater product market competition is dissimilar to the treatment of companies with low competition, we use propensity score matching (PSM) to provide stronger controls for the effects of various company characteristics that are separate from the variables of interest. Shipman, Swanquist, and Whited (2017) advise that PSM can improve result reliability. Using a one-to-one matching procedure without replacement and a caliper distance of 1%, we match companies that are considered as facing high product market competition in any given year with companies that are considered as facing low product market competition during the sample period using the control variables from Model (1). A high-competition company is a company with a product market competition value above the average value in the three-digit SIC code. We use a narrow industry construction to find appropriate company-level competition

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[9] Restatements can stem from fraud and non-fraud sources, and we include both in the analysis, especially since the managerial intention is unobservable and companies generally do not disclose intention, making it difficult to distinguish between the two (Hennes, Leone, and Miller, 2008). Perhaps reflecting this difficulty, PCAOB AS 2110 requires an integrated assessment of the risks of material misstatement that includes both fraud and non-fraud risks because of similar underlying factors. We include restatements in t and t + 1.

[10] We also alternatively examine the likelihood of receiving a first-time going concern opinion. We find a positive association between fluidity and going concern likelihood (p = 0.02), suggesting that product market competition does relate to business risk (e.g., Louwers, Bagley, Blay, Strawser, and Thibodeau, 2022).

Table 5
Audit quality.

Variables	(1) ICW		(2) RESTATEMENT		(3) LNAUDITLAG		(4) ABS_DA	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	0.911***	(0.00)	1.730***	(0.00)	4.580***	(0.00)	0.131***	(0.00)
FLUIDITY	0.025**	(0.03)	0.026***	(0.01)	0.002**	(0.02)	0.001***	(0.00)
LNASSET	−0.250***	(0.00)	−0.078***	(0.00)	−0.056***	(0.00)	−0.012***	(0.00)
LNSEG	0.010	(0.88)	0.176***	(0.00)	0.006	(0.11)	−0.001	(0.52)
FOREIGN	0.128*	(0.06)	−0.052	(0.35)	0.007*	(0.10)	−0.001	(0.41)
RESTRUCTURE	0.095	(0.12)	−0.098*	(0.08)	−0.012***	(0.00)	0.005***	(0.01)
MERGER	0.287***	(0.00)	0.018	(0.72)	0.017***	(0.00)	−0.003*	(0.07)
LEVERAGE	−0.006	(0.97)	−0.199	(0.15)	−0.002	(0.84)	0.011*	(0.06)
ROA	−0.124	(0.35)	−0.040	(0.78)	0.005	(0.64)	−0.182***	(0.00)
LOSS	0.231***	(0.00)	−0.096	(0.10)	0.008*	(0.06)	−0.020***	(0.00)
GROWTH	0.164***	(0.00)	−0.012	(0.77)	0.008***	(0.00)	0.009***	(0.00)
OP_CASH	−0.110	(0.53)	−0.022	(0.91)	−0.052***	(0.00)	0.015	(0.37)
CAP_INTENSITY	−0.043	(0.82)	−0.071	(0.64)	0.011	(0.32)	0.026***	(0.00)
MB	0.016	(0.39)	−0.003	(0.83)	−0.001	(0.45)	0.008***	(0.00)
BIG4	−0.218***	(0.00)	0.103*	(0.07)	−0.024***	(0.00)	−0.005***	(0.00)
ICW			0.413***	(0.00)	0.118***	(0.00)	0.010***	(0.00)
HHI	0.277	(0.23)	0.339*	(0.09)	0.017	(0.30)	0.006	(0.36)
LEADER	0.012	(0.88)	−0.150**	(0.04)	−0.001	(0.83)	0.010***	(0.00)
FOLLOWER	0.073	(0.30)	−0.069	(0.24)	−0.014***	(0.00)	−0.000	(0.98)
CIO	−0.201***	(0.00)						
LNFIRMAGE					−0.001	(0.66)		
LARGE_ACC					−0.092***	(0.00)		
ACC					−0.043***	(0.00)		
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
Pseudo/Adjusted R^2	0.0579		0.0265		0.3957		0.1932	
Observations	29,369		29,369		29,369		29,369	

Notes: Table 5 examines the association between product market fluidity (*FLUIDITY*) and audit quality, proxied by the presence of a Section 404 internal control material weakness (*ICW*), the presence of a restatement in $t + 1$ (*RESTATEMENT*), the natural logarithm of audit report delay (*LNAUDITLAG*), and performance-matched modified Jones model discretionary accruals (*ABS_DA*). Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

comparisons. This procedure produces a subsample of companies that do not differ based on preexisting company characteristics but have a different treatment effect. Therefore, the difference between the two subsamples is whether a company faces a high competition or not and provides robust findings in testing the impact on risk and audit pricing.

Table 7, Panel A presents descriptive statistics for the PSM sample. We do not find any significant differences in the means of the independent variables after the matching process, indicating that the procedure is successful. In Panels B and C, we continue to find consistent results. *FLUIDITY* remains positively associated with engagement risk (*MSCORE*, $t = 4.32$; *FSCORE*, $t = 5.04$), audit fees ($t = 5.81$), and reduced audit quality (*ICW*, z = 1.98; *RESTATEMENT*, z = 2.08; *LNAUDITLAG*, $t = 1.96$; *ABS_DA*, t = 4.32). Our results suggest that product market competition can have a negative impact on the audit contracting process, with greater competition clients having additional inherent financial reporting risks that are reflected in higher audit fees.

Following Hainmueller (2012), we also perform entropy balancing of companies in the high-competitive product market and companies in the low-competitive product market to substantiate the primary findings and ensure that the main results are not biased due to functional form misspecification. An advantage of entropy balancing is that, instead of assigning a weight of one or zero as in PSM, where observations are either included or excluded, entropy balancing weights observations on a continuous scale. This allows for an optimal weighted match with treatment observations and achievement of covariate balance, while retaining the original sample size and improving efficiency. We use entropy balancing at the first and second moments. Results are qualitatively similar as with our PSM sample and are reported in Panels D and E.

4.4. Alternative measures

A key distinction of our study is the use of a product competition measure that is company-specific using qualitative information (*FLUIDITY*) rather than an industry-level measure using quantitative information (*HHI*). Nevertheless, in Table 8 we use three alternative product competition measures to triangulate our results. First, we use *HHI*, where higher values reflect less competition. We find that *HHI* is negatively associated with engagement risk (*MSCORE* and *FSCORE*) and audit fees suggesting that companies with greater product market competition face greater risk and have higher audit fees, consistent with our first and second hypotheses. However, we do not find evidence that *HHI* is consistently associated with audit quality. One possible explanation is that the full extent of product market competition cannot be captured using only quantitative information.

Second, using Hoberg and Phillip's Data Library we examine the impact of a total similarity score based on the text-based network industry classification (*TNIC_SIM*). Higher similarity implies stronger competition, thus similar to *FLUIDITY*. *TNIC_SIM* is based on product descriptions from annual 10-K filings with the SEC, offering an alternative to more traditional fixed industry classification such as SIC codes and the North American Industry Classification System (NAICS), and tailoring each measure to individual companies. We find confirmatory results, with *TNIC_SIM* positively associated with engagement risk and audit fees. Third, we use a measure of HHI computed from product descriptions also using the text-based network industry classification (*TNIC_HHI*). Higher *TNIC_HHI* implies less competition. We continue to find that greater competition is associated with increased engagement risk and audit fees.

We also alternatively examine the impact of change in *FLUIDITY* on audit fees and audit quality in Table 9. Specifically, we capture the change in *FLUIDITY* between *t*-1 and *t*. We also include the change in our

Table 6
Financial constraints.

Variables	(1) MSCORE		(2) FSCORE		(3) LNAUDITFEE	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	−1.919***	(0.00)	0.013	(0.12)	8.725***	(0.00)
FLUIDITY	0.105***	(0.01)	0.003**	(0.01)	0.123***	(0.00)
SA	−0.020	(0.79)	−0.002	(0.38)	−0.467***	(0.00)
FLUIDITY*SA	0.024**	(0.03)	0.001**	(0.04)	0.031***	(0.00)
LNASSET	−0.036***	(0.00)	−0.001***	(0.00)	0.456***	(0.00)
LNSEG	−0.063***	(0.00)	−0.002***	(0.01)	0.171***	(0.00)
FOREIGN	−0.040**	(0.03)	0.000	(0.64)	0.110***	(0.00)
RESTRUCTURE	−0.040**	(0.03)	0.002***	(0.01)	0.153***	(0.00)
MERGER	−0.111***	(0.00)	−0.001**	(0.04)	0.086***	(0.00)
LEVERAGE	−0.306***	(0.00)	−0.006***	(0.01)	0.148***	(0.00)
ROA	−0.222	(0.12)	−0.012***	(0.00)	−0.053*	(0.10)
LOSS	−0.087***	(0.00)	−0.003**	(0.01)	0.112***	(0.00)
GROWTH	0.161***	(0.00)	0.002	(0.17)	0.036***	(0.00)
OP_CASH	−0.182	(0.28)	−0.015***	(0.01)	−0.577***	(0.00)
CAP_INTENSITY	−0.013	(0.86)	0.009***	(0.00)	−0.303***	(0.00)
MB	0.073***	(0.00)	0.004***	(0.00)	0.029***	(0.00)
BIG4	−0.007	(0.74)	0.001*	(0.06)	0.242***	(0.00)
ICW	−0.056	(0.19)	−0.004***	(0.00)	0.072***	(0.00)
HHI	−0.038	(0.56)	−0.001	(0.58)	0.125*	(0.06)
LEADER	0.018	(0.51)	0.001	(0.63)	0.090***	(0.00)
FOLLOWER	−0.023	(0.22)	0.000	(0.56)	−0.008	(0.59)
LNFIRMAGE					−0.056***	(0.00)
DEC_YE					−0.051***	(0.01)
AUD_OPIN					0.084***	(0.00)
LITRISK					0.092***	(0.00)
SOX302					0.128***	(0.00)
Year FE	Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes	
Adjusted R^2	0.0538		0.0508		0.8088	
Observations	29,369		29,369		29,369	

Notes: Table 6 reports the association between product market fluidity (*FLUIDITY*), financial constraints (*SA*), risk (*MSCORE* and *FSCORE*), and audit pricing (*LNAUDITFEE*). Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

control variables. We use the change in our continuous dependent measures (*LNAUDITFEE*, *LNAUDITLAG*, and *ABS_DA*) and retain our two indicator measures (*ICW* and *RESTATEMENT*). We find that an increase in *FLUIDITY* is positively associated with audit fees ($t = 3.23$) and audit delay ($t = 2.07$). That is, greater product market competition appears to have an incremental impact on audit fees and effort. However, we do not note a significant relationship between a change in product market competition and internal control material weaknesses, restatements, or discretionary accruals suggesting that the relative level of *FLUIDITY* has a greater effect than incremental change for these measures.

In an untabulated analysis, we further examine whether the relationship between product market competition and engagement risk persists when focusing only on companies with the highest risk levels. We create a *HIGH_RISK* dependent variable set equal to one if *FSCORE* or *MSCORE* is at the top quintile for a given client company-year, and zero otherwise. We continue to note a positive and significant coefficient on *FLUIDITY* ($t = 7.58$). We provide further evidence that product market competition is associated with greater risk that could affect how an auditor responds to the engagement.

5. Conclusion

Product market competition can substitute for formal governance mechanisms in mitigating agency conflicts (Chhaochharia et al., 2017; Hart, 1983), increasing the accuracy of financial reporting. The related benefit of product market competition could decrease auditors' assessment of inherent engagement risk and in turn audit fees. However, product market competition can have a dark side (e.g., Hermalin and Weisbach, 2012), with greater product market competition increasing uncertainty and managers' career concerns and potentially contributing

to distorted financial disclosures, in turn impairing financial reporting quality. As a result, auditors could assess greater engagement risk and charge higher audit fees. In this study, we investigate how auditors respond to product market competition. Using product market fluidity (Hoberg and Phillips, 2016), we find evidence that companies with highly competitive products face higher engagement risk and audit fees, consistent with the dark side hypothesis of product market competition. Greater product market competition is also economically significant, with a 1% increase in competition associated with a 2% increase in audit fees. Our results are robust to propensity score matching, entropy balancing, and the consideration of traditional corporate governance mechanisms.

While auditors assign higher risk to clients with greater product market competition, and spend greater time on these engagements, we nonetheless note greater discretionary accruals and a greater likelihood of clients reporting an internal control material weakness or a restatement. The inherent incentives of high competition companies to misstate the financial statements appear to persist through the audit engagement. That is, audit quality remains impacted by product market competition. Likewise, we note that the positive relationship between product market competition, audit risk, and audit pricing is more pronounced in companies with greater financial constraints.

Our study contributes to the product competition literature and the broader auditing literature. Although prior research has begun to examine the impact of product market competition at an industry-wide level, we uniquely leverage Hoberg and Phillips's (2016) product market fluidity measure to capture individual company competition. By providing evidence on product market competition across industries and companies, we distinguish the role of competition in the audit contracting process. Further, we are able to partition the impact of product

Table 7
Propensity score matching and entropy balancing.

Panel A: Propensity score matched (PSM) sample mean differences

	High-competition companies (N = 12,368)			Low-competition companies (N = 12,368)				
Variables	Mean	Std.	Median	Mean	Std.	Median	Diff.	p-value
LNASSET	6.386	1.969	6.351	6.406	2.101	6.422	0.020	(0.45)
LNSEG	2.626	0.602	2.639	2.619	0.613	2.708	−0.007	(0.37)
FOREIGN	0.368	0.482	0.000	0.367	0.482	0.000	−0.001	(0.92)
RESTRUCTURE	0.345	0.475	0.000	0.346	0.476	0.000	0.001	(0.83)
MERGER	0.445	0.497	0.000	0.445	0.497	0.000	0.001	(0.91)
LEVERAGE	0.190	0.210	0.135	0.192	0.209	0.145	0.002	(0.50)
ROA	−0.014	0.216	0.034	−0.014	0.232	0.037	0.000	(0.97)
LOSS	0.313	0.464	0.000	0.323	0.467	0.000	0.009	(0.13)
GROWTH	0.147	0.421	0.085	0.143	0.453	0.076	−0.004	(0.43)
OP_CASH	0.059	0.162	0.082	0.058	0.162	0.080	−0.001	(0.74)
CAP_INTENSITY	0.236	0.234	0.144	0.236	0.224	0.156	0.000	(0.89)
MB	2.064	1.504	1.620	2.052	1.540	1.577	−0.011	(0.57)
BIG4	0.578	0.494	1.000	0.584	0.493	1.000	0.006	(0.30)
ICW	0.080	0.272	0.000	0.079	0.270	0.000	−0.001	(0.83)
HHI	0.164	0.148	0.120	0.166	0.145	0.122	0.002	(0.33)
LEADER	0.214	0.410	0.000	0.217	0.412	0.000	0.003	(0.62)
FOLLOWER	0.302	0.459	0.000	0.306	0.461	0.000	0.004	(0.52)

Panel B: Propensity score matching analysis

	(1) MSCORE		(2) FSCORE		(3) LNAUDITFEE	
Variables	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	−1.693***	(0.00)	0.026***	(0.00)	9.938***	(0.00)
FLUIDITY	0.020***	(0.00)	0.001***	(0.00)	0.016***	(0.00)
LNASSET	−0.062***	(0.00)	−0.002***	(0.00)	0.498***	(0.00)
LNSEG	−0.061***	(0.00)	−0.002**	(0.04)	0.189***	(0.00)
FOREIGN	−0.055***	(0.00)	−0.001	(0.20)	0.112***	(0.00)
RESTRUCTURE	−0.027	(0.16)	0.002***	(0.01)	0.155***	(0.00)
MERGER	−0.097***	(0.00)	−0.001	(0.16)	0.095***	(0.00)
LEVERAGE	−0.287***	(0.00)	−0.007***	(0.00)	0.201***	(0.00)
ROA	−0.276*	(0.09)	−0.011***	(0.01)	−0.031	(0.38)
LOSS	−0.122***	(0.00)	−0.003**	(0.02)	0.077***	(0.00)
GROWTH	0.163***	(0.00)	0.001	(0.74)	0.025**	(0.02)
OP_CASH	−0.300	(0.11)	−0.012**	(0.03)	−0.606***	(0.00)
CAP_INTENSITY	−0.006	(0.94)	0.008***	(0.00)	−0.284***	(0.00)
MB	0.077***	(0.00)	0.003***	(0.00)	0.027***	(0.00)
BIG4	−0.027	(0.20)	0.001*	(0.08)	0.258***	(0.00)
ICW	−0.020	(0.68)	−0.003**	(0.03)	0.086***	(0.00)
HHI	−0.004	(0.96)	−0.002	(0.22)	0.064	(0.35)
LEADER	0.031	(0.27)	0.001	(0.62)	0.072***	(0.00)
FOLLOWER	−0.023	(0.24)	−0.001	(0.38)	0.018	(0.23)
LNFIRMAGE					−0.033***	(0.01)
DEC_YE					−0.038**	(0.04)
AUD_OPIN					0.085***	(0.00)
LITRISK					0.105***	(0.00)
SOX302					0.123***	(0.00)
Year FE	Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes	
Adjusted R²	0.0500		0.0370		0.8050	
Observations	24,736		24,736		24,736	

Panel C: Propensity score matching continued

	(1) ICW		(2) RESTATEMENT		(3) LNAUDITLAG		(4) ABS_DA	
Variables	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	1.664***	(0.01)	1.720***	(0.00)	4.590***	(0.00)	0.146***	(0.00)
FLUIDITY	0.030**	(0.01)	0.028**	(0.04)	0.002**	(0.03)	0.002***	(0.00)
LNASSET	−0.264***	(0.00)	−0.080***	(0.00)	−0.056***	(0.00)	−0.009***	(0.00)
LNSEG	0.022	(0.73)	0.176***	(0.00)	0.006	(0.19)	−0.005***	(0.01)
FOREIGN	0.131*	(0.07)	−0.046	(0.44)	0.007	(0.10)	−0.002	(0.38)
RESTRUCTURE	0.095	(0.14)	−0.092	(0.12)	−0.012***	(0.00)	0.000	(0.81)
MERGER	0.269***	(0.00)	0.003	(0.95)	0.016***	(0.00)	−0.007***	(0.00)
LEVERAGE	0.011	(0.94)	−0.205	(0.17)	−0.008	(0.42)	0.027***	(0.00)
ROA	−0.186	(0.24)	−0.083	(0.62)	0.016	(0.14)	−0.205***	(0.00)
LOSS	0.300***	(0.00)	−0.118*	(0.07)	0.011**	(0.02)	−0.012***	(0.00)
GROWTH	0.191***	(0.00)	0.036	(0.48)	0.010***	(0.00)	0.015***	(0.00)
OP_CASH	0.001	(0.99)	0.085	(0.68)	−0.055***	(0.00)	0.045*	(0.09)
CAP_INTENSITY	−0.002	(0.99)	−0.087	(0.59)	0.018	(0.15)	0.021***	(0.00)
MB	0.015	(0.50)	−0.018	(0.33)	−0.002	(0.13)	0.000**	(0.04)
BIG4	−0.155**	(0.02)	0.087	(0.16)	−0.024***	(0.00)	−0.005***	(0.01)
ICW			0.377***	(0.00)	0.119***	(0.00)	0.010	(0.15)
HHI	0.426	(0.13)	0.360	(0.11)	0.013	(0.45)	0.010	(0.49)
LEADER	0.041	(0.64)	−0.151*	(0.06)	−0.002	(0.74)	0.006**	(0.02)
FOLLOWER	0.090	(0.24)	−0.095	(0.13)	−0.014***	(0.00)	0.000	(0.24)

(continued on next page)

Table 7 (*continued*)

CIO	−0.190***	(0.01)					
LNFIRMAGE					−0.003	(0.43)	
LARGE_ACC					−0.085***	(0.00)	
ACC					−0.039***	(0.00)	
Year FE	Yes		Yes		Yes		Yes
Industry FE	Yes		Yes		Yes		Yes
Pseudo/Adjusted R²	0.0671		0.0261		0.3964		0.1447
Observations	24,766		24,736		22,840		24,736

Panel D: Entropy balancing analysis

	(1) MSCORE		*(2) FSCORE*		*(3) LNAUDITFEE*	
Variables	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	−1.630***	(0.00)	0.024***	(0.00)	10.029***	(0.00)
FLUIDITY	0.024***	(0.00)	0.001***	(0.00)	0.016***	(0.00)
LNASSET	−0.058***	(0.00)	−0.002***	(0.00)	0.478***	(0.00)
LNSEG	−0.067***	(0.01)	−0.002*	(0.05)	0.190***	(0.00)
FOREIGN	−0.050**	(0.01)	−0.001	(0.37)	0.115***	(0.00)
RESTRUCTURE	−0.036*	(0.08)	0.002***	(0.00)	0.151***	(0.00)
MERGER	−0.116***	(0.00)	−0.001	(0.14)	0.100***	(0.00)
LEVERAGE	−0.292***	(0.00)	−0.007***	(0.01)	0.194***	(0.00)
ROA	−0.285*	(0.06)	−0.010**	(0.04)	0.014	(0.63)
LOSS	−0.067**	(0.03)	−0.002*	(0.06)	0.111***	(0.00)
GROWTH	0.186***	(0.00)	0.002	(0.14)	0.055***	(0.00)
OP_CASH	−0.067	(0.73)	−0.011*	(0.07)	−0.508***	(0.00)
CAP_INTENSITY	−0.055	(0.45)	0.009***	(0.00)	−0.299***	(0.00)
MB	0.065***	(0.00)	0.003***	(0.00)	0.023***	(0.00)
BIG4	−0.035	(0.12)	0.001	(0.18)	0.282***	(0.00)
ICW	−0.083*	(0.07)	−0.004***	(0.00)	0.073***	(0.00)
HHI	−0.076	(0.29)	−0.001	(0.73)	0.106***	(0.00)
LEADER	−0.004	(0.91)	0.000	(0.96)	0.087***	(0.00)
FOLLOWER	−0.049**	(0.01)	−0.001*	(0.07)	0.010	(0.25)
LNFIRMAGE					−0.037***	(0.00)
DEC_YE					−0.044***	(0.00)
AUD_OPIN					0.085***	(0.00)
LITRISK					0.084***	(0.00)
SOX302					0.120***	(0.00)
Year FE	Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes	
Adjusted R²	0.0602		0.0519		0.7896	
Observations	29,369		29,369		29,369	

Panel E: Entropy balancing analysis continued

	(1) ICW		*(2) RESTATEMENT*		*(3) LNAUDITLAG*		*(4) ABS_DA*	
Variables	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
CONSTANT	−0.841***	(0.00)	−1.818***	(0.00)	4.564***	(0.00)	0.116***	(0.00)
FLUIDITY	0.020**	(0.03)	0.025***	(0.00)	0.002***	(0.00)	0.002***	(0.00)
LNASSET	−0.254***	(0.00)	−0.076***	(0.00)	−0.057***	(0.00)	−0.011***	(0.00)
LNSEG	0.010	(0.90)	0.176***	(0.00)	0.006**	(0.02)	0.001	(0.76)
FOREIGN	0.154***	(0.00)	−0.060	(0.21)	0.007***	(0.01)	−0.002	(0.15)
RESTRUCTURE	0.098*	(0.07)	−0.104**	(0.04)	−0.009***	(0.00)	0.005***	(0.01)
MERGER	0.286***	(0.00)	0.030	(0.48)	0.017***	(0.00)	−0.002	(0.20)
LEVERAGE	0.090	(0.47)	−0.137	(0.26)	−0.005	(0.46)	0.013*	(0.06)
ROA	−0.260*	(0.07)	−0.028	(0.85)	0.000	(0.70)	−0.202***	(0.00)
LOSS	0.270***	(0.00)	−0.070	(0.23)	0.008**	(0.03)	−0.022***	(0.00)
GROWTH	0.143***	(0.00)	−0.033	(0.49)	0.008***	(0.00)	0.010***	(0.01)
OP_CASH	0.230	(0.21)	0.090	(0.63)	−0.041***	(0.00)	0.039*	(0.05)
CAP_INTENSITY	−0.142	(0.29)	−0.045	(0.71)	0.010	(0.33)	0.025***	(0.00)
MB	0.020	(0.19)	0.010	(0.47)	0.000	(0.86)	0.008***	(0.00)
BIG4	−0.205***	(0.00)	0.080	(0.11)	−0.028***	(0.00)	−0.006***	(0.00)
ICW			0.415***	(0.00)	0.117***	(0.00)	0.006	(0.12)
HHI	0.302*	(0.08)	0.312**	(0.05)	0.026***	(0.00)	0.016**	(0.02)
LEADER	−0.012	(0.87)	−0.109*	(0.09)	−0.002	(0.52)	0.010***	(0.00)
FOLLOWER	0.060	(0.30)	−0.060	(0.25)	−0.013***	(0.00)	−0.000	(0.91)
CIO	−0.190***	(0.00)						
LNFIRMAGE					0.000	(0.63)		
LARGE_ACC					−0.088***	(0.00)		
ACC					−0.043***	(0.00)		
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
Pseudo/Adjusted R²	0.0579		0.0265		0.3950		0.2275	
Observations	29,369		29,369		29,369		29,369	

Notes: Table 7 reports the results of a one-to-one without replacement propensity score matching process in Panels A, B, and C. Panels D and E present the results of entropy balancing at the first and second moments. Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

Table 8

Alternative measures.

Panel A: HHI

Variables	(1) MSCORE Coef.	p-value	(2) FSCORE Coef.	p-value	(3) LNAUDITFEE Coef.	p-value	(4) ICW Coef.	p-value	(5) RESTATEMENT Coef.	p-value	(6) LNAUDITLAG Coef.	p-value	(7) ABS_DA Coef.	p-value
CONSTANT	−1.325***	(0.00)	0.038***	(0.00)	9.909***	(0.00)	0.831***	(0.00)	1.649***	(0.00)	4.654***	(0.00)	0.193***	(0.00)
HHI	−0.118**	(0.05)	−0.005**	(0.01)	−0.206***	(0.00)	0.250	(0.27)	0.310	(0.12)	−0.008	(0.66)	−0.088***	(0.00)
LNASSET	−0.049***	(0.00)	−0.002***	(0.00)	0.469***	(0.00)	−0.244***	(0.00)	−0.072***	(0.00)	−0.056***	(0.00)	−0.013***	(0.00)
LNSEG	−0.086***	(0.00)	−0.003***	(0.00)	0.207***	(0.00)	−0.001	(0.99)	0.163***	(0.00)	0.010	(0.14)	−0.002	(0.41)
FOREIGN	−0.038**	(0.04)	0.000	(0.71)	0.144***	(0.00)	0.125*	(0.06)	−0.056	(0.31)	0.010	(0.14)	−0.002	(0.18)
RESTRUCTURE	−0.077***	(0.00)	0.000	(0.75)	0.189***	(0.00)	0.090	(0.14)	−0.104*	(0.06)	−0.011***	(0.00)	0.004*	(0.05)
MERGER	−0.146***	(0.00)	−0.002***	(0.00)	0.109***	(0.00)	0.287***	(0.00)	0.020	(0.73)	0.015***	(0.00)	−0.003**	(0.05)
LEVERAGE	−0.318***	(0.00)	−0.006***	(0.00)	0.224***	(0.00)	0.010	(0.96)	−0.190	(0.17)	−0.005	(0.61)	0.029***	(0.00)
ROA	−0.306**	(0.02)	−0.018***	(0.00)	−0.029	(0.38)	−0.140	(0.29)	−0.059	(0.68)	0.010	(0.68)	−0.193***	(0.00)
LOSS	−0.091***	(0.00)	−0.004***	(0.00)	0.129***	(0.00)	0.250***	(0.00)	−0.076	(0.19)	0.009**	(0.03)	−0.011***	(0.00)
GROWTH	0.215***	(0.00)	0.004***	(0.00)	0.056***	(0.00)	0.168***	(0.00)	−0.005	(0.90)	0.009***	(0.00)	0.012***	(0.00)
OP_CASH	−0.320**	(0.04)	−0.016***	(0.01)	−0.505***	(0.00)	−0.121	(0.49)	−0.034	(0.85)	−0.051***	(0.00)	0.020	(0.41)
CAP_INTENSITY	−0.054	(0.38)	0.007***	(0.00)	−0.178***	(0.00)	−0.024	(0.89)	−0.052	(0.73)	−0.007	(0.60)	0.010*	(0.09)
MB	0.003*	(0.10)	0.000*	(0.08)	0.040***	(0.00)	0.020	(0.39)	0.000	(0.99)	0.000	(0.70)	0.000	(0.48)
BIG4	0.010	(0.64)	0.002***	(0.00)	0.291***	(0.00)	−0.211***	(0.00)	0.110*	(0.06)	−0.024***	(0.00)	−0.003*	(0.10)
ICW	−0.075*	(0.08)	−0.005***	(0.00)	0.073***	(0.00)			0.415***	(0.00)	0.117***	(0.00)	0.009***	(0.01)
LEADER	0.030	(0.36)	0.000	(0.21)	0.127***	(0.00)	0.010	(0.87)	−0.150**	(0.04)	−0.001	(0.91)	0.014***	(0.00)
FOLLOWER	−0.020	(0.25)	0.000	(0.69)	0.046***	(0.00)	0.070	(0.29)	−0.067	(0.26)	−0.012***	(0.00)	0.006***	(0.00)
CIO							−0.203***	(0.00)						
LNFIRMAGE					−0.039***	(0.00)					−0.002	(0.45)		
DEC_YE					−0.067***	(0.00)								
AUD_OPIN					0.103***	(0.00)								
LITRISK					0.085***	(0.00)								
SOX302					0.119***	(0.00)								
LARGE_ACC											−0.090***	(0.00)		
ACC											−0.043***	(0.00)		
Year FE	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Pseudo/Adjusted R²	0.0450		0.0395		0.7891		0.0574		0.0260		0.4006		0.1585	
Observations	29,369		29,369		29,369		29,369		29,369		29,369		29,369	

Panel B: Text-based similarity and text-based HHI

Variables	(1) MSCORE Coef.	p-value	(2) MSCORE Coef.	p-value	(3) FSCORE Coef.	p-value	(4) FSCORE Coef.	p-value	(5) LNAUDITFEE Coef.	p-value	(6) LNAUDITFEE Coef.	p-value
CONSTANT	−1.626***	(0.00)	−1.480***	(0.00)	0.026***	(0.00)	0.030***	(0.00)	9.986***	(0.00)	10.128***	(0.00)
TNIC_SIM	0.013***	(0.00)			0.000***	(0.00)			0.006***	(0.00)		
TNIC_HHI			−0.124***	(0.00)			−0.004***	(0.00)			−0.192***	(0.00)
Control Variables	Yes		Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes		Yes		Yes	
Adjusted R²	0.0533		0.0520		0.0505		0.0496		80.58%		80.66%	
Observations	29,369		29,369		29,369		29,369		29,369		29,369	

Notes: Table 8 reports the results of using alternative measures of product market competition: *HHI*, *TNIC_SIM,* and *TNIC_HHI*. *HHI* is the Herfindahl-Hirschman Index, an industry-level measure of competition based on quantitative information. *TNIC_SIM* is the total similarity score based on the text-based network industry classification (TNIC) developed by Hoberg and Phillips (2016). *TNIC_HHI* is the Herfindahl-Hirschman Index based on the TNIC (Hoberg and Phillips, 2016). Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

Table 9
Change in FLUIDITY.

Variables	(1) LNAUDITFEE_change Coef.	p-value	(2) LNAUDITLAG_change Coef.	p-value	(3) ICW Coef.	p-value	(4) RESTATEMENT Coef.	p-value	(5) ABS_DA_change Coef.	p-value
CONSTANT	0.224***	(0.00)	0.037***	(0.00)	−3.267***	(0.00)	−2.752***	(0.00)	−0.004	(0.38)
FLUIDITY_change	0.006***	(0.00)	0.002**	(0.04)	0.009	(0.53)	−0.003	(0.79)	0.000	(0.59)
LNASSET_change	0.269***	(0.00)	−0.027***	(0.00)	0.049	(0.39)	0.065	(0.33)	0.036***	(0.00)
LNSEG_change	0.032**	(0.02)	−0.002	(0.69)	0.104	(0.33)	0.556***	(0.00)	−0.016***	(0.00)
FOREIGN_change	0.029**	(0.03)	0.015**	(0.02)	0.136	(0.18)	−0.047	(0.57)	0.000	(0.98)
RESTRUCTURE_change	0.017**	(0.01)	−0.003	(0.32)	−0.028	(0.62)	0.025	(0.61)	0.005**	(0.04)
MERGER_change	0.022***	(0.00)	0.010***	(0.00)	0.039	(0.43)	0.056	(0.19)	0.006***	(0.01)
LEVERAGE_change	0.024	(0.41)	−0.059***	(0.00)	−0.120	(0.61)	−0.144	(0.44)	−0.037**	(0.04)
ROA_change	−0.107***	(0.00)	−0.055***	(0.00)	−0.283*	(0.08)	0.086	(0.47)	−0.090***	(0.00)
LOSS_change	0.023***	(0.00)	0.011***	(0.00)	0.170***	(0.01)	0.030	(0.57)	0.009**	(0.02)
GROWTH_change	0.011*	(0.07)	0.004	(0.16)	0.014	(0.80)	−0.037	(0.28)	0.031***	(0.00)
OP_CASH_change	−0.030	(0.31)	0.016	(0.22)	−0.210	(0.37)	−0.282*	(0.10)	0.078***	(0.00)
CAP_INTENSITY_change	0.073	(0.23)	−0.021	(0.49)	−0.191	(0.70)	0.348	(0.31)	−0.088**	(0.02)
MB_change	−0.001	(0.85)	0.001	(0.35)	−0.095***	(0.00)	0.044**	(0.03)	−0.002	(0.34)
BIG4_change	0.338***	(0.00)	0.000	(0.98)	0.326*	(0.06)	−0.039	(0.76)	−0.006	(0.39)
ICW_change	0.097***	(0.00)	0.126***	(0.00)			0.218***	(0.00)	0.016***	(0.00)
HHI_change	0.068	(0.47)	−0.011	(0.79)	0.041	(0.96)	−0.293	(0.65)	0.036	(0.27)
LEADER_change	0.007	(0.47)	0.004	(0.41)	0.030	(0.72)	0.039	(0.59)	0.003	(0.56)
FOLLOWER_change	0.001	(0.93)	−0.002	(0.71)	−0.037	(0.64)	0.071	(0.31)	−0.003	(0.38)
CIO_change					−0.005	(0.95)				
LNFIRMAGE_change	−0.165***	(0.00)	0.004	(0.84)						
Large_ACC_change			−0.037***	(0.00)						
ACC_change			−0.004	(0.41)						
DEC_YE_change	−0.102	(0.11)								
AUD_OPIN_change	0.017***	(0.01)								
LITRISK_change	0.000	(0.00)								
SOX302_change	0.079***	(0.00)								
Year Fixed Effect	Yes		Yes		Yes		Yes		Yes	
Industry Fixed Effect	Yes		Yes		Yes		Yes		Yes	
Adjusted R²	0.0777		0.0633		0.0058		0.0061		0.0267	
Observations	28,898		23,724		28,903		28,903		23,724	

Notes: Table 9 reports the results of using change models capturing the association between a change in *FLUIDITY* between *t*-1 and *t* and audit fees and audit effort. We use change measure dependent variables for our continuous measures and retain our indicator variables. Standard errors are clustered at the company level. All continuous variables are winsorized at levels of 1% and 99%. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. Appendix C presents variable definitions.

market competition on risks, audit pricing, and audit quality. As a changing company-level characteristic product market competition has the potential to either reduce or increase financial reporting risk. We provide evidence that there is a dark side to competition, resulting in greater risk, higher audit fees, and reduced audit quality. Practically, our findings provide guidance on the role of an agency theory factor, competition, that can have positive and negative consequences for a company and their auditor.

Declaration of Competing Interest

None.

Data availability

Data are available from the public sources identified in the paper.

Appendix A. Fluidity

We provide an example how self-fluidity and product market fluidity are calculated in the section. Suppose there are three companies operating in the consumer goods industry. The product market space in which the three companies operate encompasses the following product market words in their 10-K Item 1 business descriptions: luggage, handbags, jewelry, cosmetics, perfumes, watches. The three companies use the following tabulated subset of the overall vocabulary in year *t*-1 and *t*, respectively.

	Company X		Company Y		Company Z	
	t-1	*t*	*t*-1	*t*	*t*-1	*t*
Luggage	Yes	Yes	Yes	Yes	Yes	Yes
Handbags	Yes	Yes	Yes	Yes	Yes	Yes
Jewelry	Yes	Yes	No	Yes	Yes	Yes

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(*continued*)

	Company X		Company Y		Company Z	
	t-1	*t*	*t*-1	*t*	*t*-1	*t*
Cosmetics	No	No	No	No	Yes	Yes
Perfumes	No	No	No	Yes	No	Yes
Watches	Yes	Yes	Yes	Yes	Yes	Yes

We code "Yes" as 1 and "No" as 0 for each word. Company X has a strategy focusing on consumer accessories. We first calculate Company X's year *t*-1 and year *t* normalized Boolean word vector ($N_{i,t}$).

$$\frac{(1,1,1,0,0,1)}{|(1,1,1,0,0,1)|} = (0.5, 0.5, 0.5, 0, 0, 0.5)$$

Next, the self-fluidity in year *t* is calculated as 1 minus the cosine similarity of Company X's year *t*-1 and year *t* normalized word vectors.
1-(0.5,0.5,0.5,0,0,0.5)•(0.5,0.5,0.5,0,0,0.5) = 0.

Since the product vocabularies have not changed from year *t*-1 to year *t*, Company X has no self-fluidity. Second, we calculate Company Y's fluidity using the above method.

Year *t*-1:

$$\frac{(1,1,0,0,0,1)}{|(1,1,0,0,0,1)|} = (0.577, 0.577, 0, 0, 0, 0.577)$$

Year *t*:

$$\frac{(1,1,1,0,1,1)}{|(1,1,1,0,1,1)|} = (0.447, 0.447, 0.447, 0, 0.447, 0.447)$$

Fluidity:
1-(0.577,0.577,0,0,0,0.577)•(0.447,0.447,0.447,0,0.447, 0.447) = 0.226.
Therefore, Company Y has a nontrivial self-fluidity.

To calculate Company X's product market fluidity, we must first count the aggregate words to compute the aggregate word vector ($W_{j,t}$) and then compute the overall word change ($D_{t-1,t}$). *Fluidity* is the dot product between $N_{i,t}$ and $||D_{t-1,t}||$, the normalized version of the word change vector. This example illustrates that product competition can be affected by not only a company's actions but those of rival companies, where an increase in competitive threats can occur even if a company's strategy remains stable.

	Company X		Word change ($D_{t-1,t}$)
	Aggregate word vector ($W_{j,t}$)		
	t-1	*t*	*t*-(*t*-1)
Luggage	3	3	0
Handbags	3	3	0
Jewelry	2	3	1
Cosmetics	1	1	0
Perfumes	0	2	2
Watches	3	3	0

$D_{t-1,t} = |(3,3,2,1,0,3) - (3,3,3,1,2,3)| = (0,0,1,0,2,0)$

Product market fluidity = $(0.25, 0.25, 0.25, 0, 0, 0.25) \bullet \frac{(0,0,1,0,2,0)}{\sqrt{5}} = 0.112$.

Appendix B. *MSCORE* and *FSCORE* measurement

We use two measures to capture the inherent risk in a client engagement that can be observed by auditors: *MSCORE* and *FSCORE*. The calculation of Beneish's (1999) *MSCORE* is based on the following eight ratios. *DSRI* is the ratio of days' sales in receivables in the first year in which earnings manipulation was uncovered in year *t* to the corresponding measure in *t*-1. *GMI* is the ratio of the gross margin in *t*-1 to the gross margin in year *t*. *AQI* is the ratio of asset quality in year *t* to asset quality in *t*-1. *SGI* is the ratio of sales in year *t* to sales in *t*-1. *DEPI* is the ratio of the rate of depreciation in year *t*-1 to the corresponding rate in *t*. *SGAI* is the ratio of sales, general, and administrative expenses to sales in *t* relative to the corresponding measure in year *t*-1. *TATA* is the ratio of total accruals to total assets. *LVGI* is the ratio of total debt to total assets in year *t* relative to the corresponding ratio in *t*-1.

$DSRI = (\text{Receivables}_t/\text{Sales}_t)/(\text{Receivables}_{t-1}/\text{Sales}_{t-1})$

$GMI = ((\text{Sales}_{t-1} - \text{Cost of Goods Sold}_{t-1})/\text{Sales}_{t-1})/((\text{Sales}_t - \text{Cost of Goods Sold}_t)/\text{Sales}_t)$

$AQI = (1 - (\text{Current Assets}_t + \text{PP\&E}_t)/\text{Total Assets}_t)/(1 - (\text{Current Assets}_{t-1} + \text{PP\&E}_{t-1})/\text{Total Assets}_{t-1})$

$SGI = \text{Sales}_t/\text{Sales}_{t-1}$

$DEPI = (\text{Depreciation}_{t-1}/(\text{Depreciation}_{t-1} + \text{PP\&E}_{t-1}))/(\text{Depreciation}_t/(\text{Depreciation}_t + \text{PP\&E}_t))$

$SGAI = (\text{Sales, General, and Administrative Expense}_t/\text{Sales}_t)/(\text{Sales, General, and Administrative Expense}_{t-1}/\text{Sales}_{t-1})$

$TATA = (\Delta\text{Current Assets}_t - \Delta\text{Cash} - (\Delta\text{Current Liabilities}_t - \Delta\text{Current Maturities of LTD}_t - \Delta\text{Income Tax Payable}_t) - \Delta\text{Depreciation and Amortization}_t)/\text{Total Assets}_t$

$LVGI = ((\text{LTD}_t + \text{Current Liabilities}_t)/\text{Total Assets}_t)/((\text{LTD}_{t-1} + \text{Current Liabilities}_{t-1})/\text{Total Assets}_{t-1})$

MSCORE is thus the derived figure from the following model:

$$MSCORE = -4.840 + 0.920*DSRI + 0.528*GMI + 0.404*AQI + 0.892*SGI + 0.115*DEPI - 0.172*SGAI + 4.679*TATA - 0.327*LVGI \quad (A1)$$

FSCORE is calculated following Dechow et al. (2011), where we first calculate the predicted values, *p*, using the following model:

$$P_{it} = -7.893 + 0.790*RSST\_ACC_{it} + 2.518*\Delta REC_{it} + 1.191*\Delta INV_{it} + 1.979*SOFT_{it} + 0.171*\Delta CSALE_{it} + (-0.932)*\Delta ROA_{it} + 1.209*ISSUE_{it} \quad (A2)$$

Where *RSST_ACC* is Richardson, Sloan, Soliman, and Tuna (2005) measure of accruals, which is the sum of the change in non-cash working capital, the change in net non-current operating assets, and the change in net financial assets, scaled by average total assets. *ΔREC* is the change in receivables, scaled by average total assets. *ΔINV* is the change in inventory, scaled by average total assets. *SOFT* is the percentage of soft assets, which equals to total assets minus property, plant, and equipment and cash, scaled by average total assets. *ΔCSALE* is the percent change in cash sales. *ΔROA* is the change in return on assets. *ISSUE* is an indicator variable that equals one if the company has issued new debt or equity, and zero otherwise. The probability of a misstatement is calculated as $Probability = e^{p_{it}}/(1 + e^{p_{i,\,t}})$, where *e* equals 2.71828183.

Appendix C. Variable definitions

Variable	Definition	Source
FLUIDITY	The cosine similarity between a company's normalized word-use vector and rivals' aggregate word change vector of word choices from *t*-1 to *t*.	Hoberg et al. (2014)
MSCORE	A measure of the likelihood that a company has manipulated its reported financial statements calculated following Beneish (1999). A higher value of MSCORE indicates a higher likelihood of manipulation.	Compustat
FSCORE	A continuous probability of a misstatement using certain company characteristics constructed by Dechow et al. (2011).	Compustat
LNAUDITFEE	Natural logarithm of audit fee.	Audit Analytics
ICW	An indicator variable coded one if there is a Section 404 internal control weakness, and zero otherwise.	Audit Analytics
RESTATEMENT	An indicator variable coded one if the company subsequently restates the accounting statement in *t* or *t* + 1, and zero otherwise.	Audit Analytics
LNAUDITLAG	Natural logarithm of the difference between the audit report signature date and fiscal year-end date.	Audit Analytics/ Compustat
ABS_DA	Performance-matched discretionary accruals (Kothari et al., 2005).	Compustat
LNASSET	The natural logarithm of the total assets.	Compustat
LNSEG	The natural logarithm of the sum of the number of business and geographic segments.	Compustat
FOREIGN	An indicator variable set equal to one if the company has a non-zero foreign currency transaction, and zero otherwise.	Compustat
RESTRUCTURE	An indicator variable set equal to one if the company is involved in a restructuring, and zero otherwise.	Compustat
MERGER	An indicator variable set equal to one if the company is involved in a merger and acquisition, and zero otherwise.	Compustat
LEVERAGE	The ratio of total liabilities to total assets.	Compustat
ROA	The ratio of income before extraordinary items to total assets.	Compustat
LOSS	An indicator variable set equal to one if operating income after depreciation is negative, and zero otherwise.	Compustat
GROWTH	The ratio of the difference between total sales in year *t*-1 and total sales in year *t*-2 to total sales in year *t*-2.	Compustat
OP_CASH	The ratio of cash flow from operations to total assets.	Compustat
CAP_INTENSITY	The ratio of property, plant, and equipment to total assets.	Compustat
MB	Market value of equity divided by book value of common equity.	Compustat
BIG4	An indicator variable set equal to one if the company's audit firm is one of the four accounting firms, and zero otherwise.	Compustat
HHI	The sum of squared market shares. The market share of an individual company is calculated by using the company's net sales divided by the total sales value of the entire three-digit SIC industry.	Compustat
LEADER	An indicator variable set equal to one if the company is located in the top quintile of the industry adjusted price-cost margin for each industry and year, and zero otherwise.	Compustat
FOLLOWER	An indicator variable set equal to one if the company is located in the bottom quintile of the industry adjusted price-cost margin for each industry and year, and zero otherwise.	Compustat
LNFIRMAGE	The natural logarithm of the number of years since the company first appeared.	Compustat
DEC_YE	An indicator variable set equal to one if the fiscal year-end does not end in December and zero otherwise.	Compustat
AUD_OPIN	An indicator variable set equal to one if the company receives a modified audit opinion and zero otherwise, where a modified opinion is defined as anything other than a standard unqualified audit opinion coded as one by Compustat.	Compustat
LITRISK	An indicator variable set equal to one for high litigation risk industries and zero otherwise, as defined in Francis et al. (1999).	Compustat
SOX302	An indicator variable set equal to one if there is a Section 302 internal control material weakness, and zero otherwise.	Audit Analytics
SA	Following Hadlock and Pierce (2010), the *SA* index is defined as $[-0.73*\log(TOTAL\_ASSETS)] + [0.043*\log(TOTAL\_ASSETS)2]- (0.040*AGE)$, where *AGE* is the number of years the company is listed with a non-missing stock price on Compustat.	Compustat
CEOCHAIR	An indicator variable set equal to one if the CEO is a chairman of the board, and zero otherwise.	BoardEx
CEOACCT	An indicator variable set equal to one if the CEO is a financial expert based on education or work experience, and zero otherwise.	BoardEx
CFOACCT	An indicator variable set equal to one if the CFO is a financial expert based on education or work experience, and zero otherwise.	BoardEx
CIO	An indicator variable set equal to one if the company has a CIO, and zero otherwise.	BoardEx/ExecuComp
AUFIN	An indicator variable set equal to one if there is at least one financial expert on the audit committee, and zero otherwise.	BoardEx
ACF	An indicator variable set equal to one if there is at least one female director on the audit committee, and zero otherwise.	BoardEx
AC_LAW	An indicator variable set equal to one if there is at least one legal expert on the audit committee, and zero otherwise.	BoardEx
LARGE_ACC	An indicator variable set equal to one if the company is a large accelerated filer, and zero otherwise.	Audit Analytics
ACC	An indicator variable set equal to one if the company is an accelerated filer, and zero otherwise.	Audit Analytics
TNIC_SIM	Total similarity score based on the text-based network industry classification (TNIC).	Hoberg and Phillips (2016)
TNIC_HHI	Herfindahl-Hirschman Index based on the text-based network industry classification (TNIC).	Hoberg and Phillips (2016)
HIGH_RISK	An indicator variable set equal to one if FSCORE or MSCORE is above the 75th percentile.	Compustat
AU_TURNOVER	An indicator variable set equal to one if the company changes audit firms in year *t*-1, *t*, or *t* + 1, and zero otherwise.	Compustat

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