The impact of industry competition on the value relevance of goodwill impairments across different information environments

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ABSTRACT

Building upon prior studies that explore the impact of competition on financial reporting quality, this paper investigates the influence of industry-level competition on the value relevance of goodwill impairments. Additionally, it examines whether this impact is more pronounced for firms operating in countries with rich information environments. We analyze 21,224 firm-year observations from companies in 21 countries that reported under International Financial Reporting Standards (IFRS). We find that companies facing higher product market competition tend to report impairment losses that are relevant to investors' equity valuation decisions. This is consistent with the notion that companies in competitive industries are subject to greater scrutiny and have fewer incentives to manipulate their impairment reporting. We also find that the impact of industry competition on the value relevance of goodwill impairments is more pronounced in the rich information environments of market-based economies than bank-oriented economies. These findings underscore the impact of competition and its interplay with the information environment on the market perception of accounting information that is subject to managerial discretion.

1. Introduction

This paper is situated within the broader and ongoing debate about goodwill accounting, focusing specifically on how industry competition shapes market perception of goodwill impairment, and whether the influence of competition differs across nations with varying informational environments. Goodwill has been subject to vigorous debate since the introduction of the "impairment-only approach" by the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) in the early 2000 s. The 2008/2009 global financial crisis intensified the debate, as a large number of companies failed to write down the goodwill reported on their balance sheets, despite this being deemed necessary in the aftermath of the crisis (Ford, 2018).

More recently, the high-profile failures of corporations such as Carillion (in 2018) and Thomas Cook (in 2019) in the United Kingdom (UK) have reignited the debate, as these companies reported substantial amounts of goodwill over several years, with no recognition of any impairments until the year preceding their liquidation. The debate largely revolves around the accounting treatment of goodwill. Specifically, whether goodwill should be subjected to periodic impairment testing ("impairment-only approach"), annual amortization, or a combination of amortization and periodic impairment testing in the presence of impairment indicators ("hybrid approach"). Given the ongoing discussions surrounding goodwill accounting among academics, practitioners, and regulators (see, for example, Giner and Pardo (2015), IASB (2019), and Amel-Zadeh et al. (2021)), it is unsurprising that this topic continues to be a matter of contention within the accounting community.

In the modern knowledge-based economy, goodwill is an asset that

accounts for a substantial proportion of firms' asset portfolios (Tsala-voutas et al., 2014). A study undertaken by the European Financial Reporting Advisory Group (EFRAG) reveals that goodwill amounted to 1.397 trillion euros across the 307 largest European companies in 2015, accounting for an average of 29.1 % of their net assets in that year (EFRAG, 2016). Both academic and practice-based literature highlight the economic significance of goodwill (Tsalavoutas et al., 2014), its inherent complexity (Huikku et al., 2017), and the challenges associated with its valuation, particularly due to the reliance on management assumptions and estimates in the calculation of its impairment charges (Giner & Pardo, 2015).

Several scholars have argued that accounting for goodwill under an "impairment-only approach" allows managers to supply information for those needing to use financial statements about the economic value of a firm (Al Jifri & Citron, 2009) and provides insights into an anticipated decline in future earnings and cash flows (Li et al., 2011). Conversely, critics have claimed that the ability of goodwill impairments to provide useful information for those using financial statements might be compromised by the inherent measurement error (noise) and managerial induced error (bias) associated with impairment tests (Ramanna & Watts, 2012; Hamberg & Beisland, 2014; Filip et al., 2015).

Furthermore, different views on goodwill reporting are evident in the mixed results of empirical research on the value relevance of goodwill impairments.[1] For example, Lapointe-Antunes et al. (2009) report a significant association between goodwill impairments and stock prices, whereas Hamberg and Beisland (2014) state that goodwill impairment losses are not statistically related to stock returns. Such inconclusive evidence might be driven by industry- and country-level factors that affect managerial incentives and information environments. Therefore, our first research question investigates whether industry competition measured by product market competition influences the value relevance of goodwill impairments.

Product market competition is a corporate governance mechanism that plays a disciplinary role in mitigating the opportunistic behavior of managers (Hart, 1983; Nalebuff & Stiglitz, 1983). In competitive industries, managers have less discretion to manipulate financial information, as their decisions are more observable and comparable with other firms. The fact that investors are able to compare accounting information produced by a company with similar information from rivals encourages managers to report goodwill impairment numbers that truly reflect a firm's economic conditions. In addition, managers are more inclined to provide high-quality financial information in order to access limited funds in competitive settings (Hoberg & Phillips, 2010; Datta et al., 2013). Therefore, we predict that investors in competitive industries perceive goodwill impairments as more reflective of the company's underlying economic fundamentals, and hence are more value relevant.

However, the impact of competition on the value relevance of accounting information may vary across different information environments. An information environment reflects the extent to which investors rely on publicly available accounting information for firm valuation and capital allocation (Fiechter & Novotny-Farkas, 2017). In countries with poor information environments such as those with bank-oriented economies, the information asymmetry between companies and banks is resolved through private communication channels. Thus, decreasing the demand for accounting information published in the public realm. By contrast, in rich information environments such as those in market-oriented economies, there is a strong demand for financial reporting because investors do not have direct access to information and must rely more on public disclosure to reduce information asymmetry (e.g., Ali & Hwang, 2000; Beck & Levine, 2002). Given the lower demand for accounting information, coupled with the smaller number of listed firms that produce comparable information in bank-based economies in comparison with market-based economies (Allen & Gale, 2000), the impact of competition on the value relevance of accounting information is expected to be more pronounced for companies in countries with market-based economies. Therefore, our second research question examines whether the effect of product market competition on the relevance of goodwill impairments depends on the quality of the information environment at the country level.

We investigate the two research questions by analyzing 21,224 firm-year observations taken from companies across 21 countries for the fiscal years 2005–18 that reported under International Financial Reporting Standards (IFRS). We find that firms in highly competitive industries report impairment losses that are negatively and significantly associated with market values, suggesting that industry-level competition does indeed enhance the value relevance of impairment information. This evidence dovetails well with previous evidence on earnings management (e.g., Laksmana & Yang, 2014; El Diri et al., 2020). We also find that industry-level competition is not absorbing the effects of the information environment. Specifically, its impact on the value relevance of goodwill impairments is manifested only in countries with market-oriented economies that are rich information environments. Our main results remain robust after controlling for macroeconomic growth or including additional firm-level controls, such as financial leverage, firm size, and auditor type. Furthermore, our estimated effect of competition remains statistically significant and economically sizable (the coefficient increased somewhat) after we: (i) control for endogeneity using the propensity score matching method; and (ii) use alternative measures of competition.

We also run a series of additional analyses to assess the robustness of our findings with respect to alternative measures and determinants of country-level and firm-level information environments. These reveal that the effect of product market competition on the relevance of goodwill impairments varies across countries in line with other institutional characteristics that determine the extent to which investors can rely on publicly available accounting information, such as culture and the level of social trust. We further find that the negative relationship between competition and goodwill impairments is significant only for companies with high analyst coverage, low insider ownership, and international diversification.

Our study makes three contributions to the literature. First, it contributes to existing work on the informativeness of goodwill reporting (e.g., Lapointe-Antunes et al., 2009; Hamberg & Beisland, 2014; Filip et al., 2015; Iatridis et al., 2022) by investigating the impact of the previously unexplored factors of industry competition and its interaction effect with information environment. Specifically, we measure how these factors affect the value relevance of goodwill impairments using a large sample of firms from disparate settings. Therefore, our paper introduces a new explanation for heterogeneity in the value relevance and timeliness of impairment information reported in prior studies (e.g., Lapointe-Antunes et al., 2009; Hamberg & Beisland, 2014; Glaum et al., 2018).

Our second contribution pertains to the literature on the fair value of non-financial items with no active markets (e.g., Choudhary, 2011; Alhaj-Ismail et al., 2019). Managers largely use their estimated valuation inputs to determine goodwill impairments.[2] We generate evidence suggesting that industry competition plays a significant role in determining the value relevance of non-financial items measured at fair value using the expectations and projections of management as inputs.

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[1] Value relevance tests the association between accounting information and stock price or return. It is a joint test for two fundamental characteristics of useful accounting information under the IASB's conceptual framework: relevance and faithful representation (Barth et al., 2023).

[2] Under International Accounting Standard (IAS) 36, firms are required to test for goodwill impairment by comparing the recoverable amounts of cash generating units with their carrying amounts. In the absence of active markets for most cash generating units, managers largely use their own estimations to measure recoverable amounts (Glaum et al., 2018).

Third, our paper builds upon prior studies that explore the impact of product market competition on financial reporting quality. A substantial amount of existing research has primarily focused on the overall quality of earnings (e.g., Harris, 1998; Nichols & Street, 2007; Laksmana & Yang, 2014; Guo et al., 2019; El Diri et al., 2020). By contrast, we focus on a directly measurable income statement item, goodwill impairment. As suggested by Dechow et al. (2010), empirical studies that investigate the accounting treatment of specific items/transactions help to elucidate the valuation implications of reporting requirements. We believe that focusing on goodwill impairments provides accounting standards setters and other interested parties with insights into the effect of competition on how market participants perceive the impairment information, which is strongly subject to managerial discretion.

The remainder of the paper is organized as follows. Section 2 outlines the institutional background and related research. Section 3 develops the research hypotheses. Section 4 discusses the data and the empirical research design. Section 5 reports the empirical evidence and presents several robustness checks. Section 6 offers concluding comments.

2. Institutional background and related literature

A distinct phenomenon in the fields of accounting, finance, and economics, information asymmetry refers to the unequal distribution of information between two parties, with one party having access to more information than the other. In the context of financial reporting, the manager of a firm is privy to information about the company's economic fundamentals, while outsiders such as current and potential investors are largely reliant on publicly available information for their firm valuation efforts (Healy & Palepu, 2001). This information asymmetry creates a demand for accounting information that accurately reflects the underlying economic conditions of a company and is useful for valuation purposes (Bushman & Smith, 2001). In response to this demand, firms are incentivized to provide such information as a means of benefiting from lower financing costs and fewer constraints. This is because a more transparent and accurate representation of a firm's financial position and performance is associated with a lower cost of capital and an increase in investor confidence (Diamond & Verrecchia, 1991). However, the agency framework posits that self-interested managers who seek to reap private benefits may be inclined to maintain or even increase information asymmetry with outsiders (Jensen & Meckling, 1976). For instance, managers who use corporate resources for personal gain, such as empire building, perquisite consumption, or management entrenchment (Aggarwal & Samwick, 2006), may exploit the discretion provided by accounting standards to conceal their opportunistic behavior.

Goodwill impairment is an example of accounting information that can be useful to investors for valuation purposes. It can help them verify and modify their previous expectations regarding a firm's future earnings and cash flows (Li et al., 2011). Moreover, goodwill impairment tests can provide capital markets with a more comprehensive understanding of a manager's perspective on past acquisitions. Managers can utilize goodwill impairment reporting to convey private information to investors.

Previous studies have established a statistical relationship between goodwill impairment and share price, implying that goodwill information is indeed value relevant (see Lapointe-Antunes et al., 2009; Oliveira et al., 2010). Most notably, Lapointe-Antunes et al. (2009) report a negative correlation between goodwill impairment losses and the market value of equity for a sample of publicly traded firms in Canada. Similarly, prior studies have assessed the timeliness of goodwill impairments by determining the correlation between stock returns and goodwill impairments (e.g., Glaum et al., 2018).

However, the value relevance of impairment information in reflecting a company's economic conditions is compromised by the discretionary implementation of impairment standards by managers. According to a review of recent empirical literature on goodwill reporting by Amel-Zadeh et al. (2021), managers exploit the flexibility inherent in goodwill accounting for opportunistic purposes. For example, Filip et al. (2015) present evidence to suggest that managers manipulate upward current cash flows to reduce the amount of goodwill impairments. Sevin and Schroeder (2005) state that managers may use goodwill impairments as a means of manipulating earnings reported in financial statements, reducing the perceived value relevance of goodwill impairments. This is supported by studies indicating that investors do not always view impairment losses as value relevant information (Hamberg & Beisland, 2014; Choi & Nam, 2020). Moreover, research on the timeliness of goodwill reporting has consistently found that firms may defer recognizing goodwill impairments. For instance, Albersmann and Quick (2020) report that for a sample of listed firms in Germany, goodwill impairments are not recognized in a timely manner and are delayed by at least one to two years.

The inconclusive results reported by prior research on the value relevance and timeliness of goodwill impairments can be attributed to the discretion available to managers in determining impairments (Amel-Zadeh et al., 2021). This presents an opportunity to assess the impact of different governance mechanisms on managerial incentives in relation to goodwill-related reporting decisions.

Previous studies have investigated the determinants of timely goodwill impairment, such as auditor characteristics (Albersmann & Quick, 2020), corporate narrative disclosure quality (Iatridis et al., 2022), law enforcement (Glaum et al., 2018), and differences between languages in terms of the obligatory marking of future events (Alshehabi et al., 2023). Another area of research more germane to this paper examines how the value relevance of goodwill impairments is influenced by various firm- and country-level factors, including audit committee characteristics (Lapointe-Antunes et al., 2009), analyst following and firm size (Bens et al., 2011), legal protection (Knauer & Wöhrmann, 2016), and institutional quality (Alshehabi et al., 2021). However, despite its significance as an important variable in the accounting and finance literature (e.g., Evans et al., 2002; Nichols & Street, 2007; Li et al., 2010; Datta et al., 2013), product market competition has received limited attention. As an industry-level factor, product market competition can influence managerial judgment over accounting information, ultimately impacting its market valuation. Our paper extends existing research by examining the effect of product market competition - an important external governance mechanism - on the value relevance of goodwill impairment information. We further explore whether the country-level information environment moderates the impact of product market competition.

3. Hypotheses development

3.1. The role of product market competition

Adverse selection and moral hazard models pinpoint potential problems arising from information asymmetry between managers and investors.[3] Information from peer firms can mitigate these issues by reducing information asymmetry and helping investors to effectively monitor managers (Chen et al., 2013). In general, market participants can use peer companies as benchmarks for performance evaluation and firm valuation. For example, information provided by peers helps investors to gain a more comprehensive understanding of a firm's performance and deduce unfavorable aspects about a company, even when

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[3] The information asymmetry between self-interested managers and outsiders can lead to the problems of moral hazard and adverse selection (Mora & Walker, 2015). Moral hazard arises when existing shareholders cannot monitor the actions of managers and assess the extent to which they are working to maximize firm value. Adverse selection arises when managers possess superior information about the firm's true value compared to outsiders, and exploit that information asymmetry to benefit existing shareholders and/or to reap personal gains at the expense of potential investors.

explicit disclosure is lacking. The empirical evidence reported by Hertzel and Officer (2012) and Lang and Stulz (1992) implies that investors consider bad news reported by rivals when entering into a contract with a firm. This reduces the benefits that managers may derive from the practice of bad news hoarding as market participants may have already obtained some of the unreported negative news through an analysis of comparable peer companies (Kim et al., 2016).

In competitive industries in particular, managerial decisions are more observable and comparable with other competitors (Hart, 1983; Nalebuff & Stiglitz, 1983) and market participants rely on the information produced by rival companies in their evaluation of firm performance or market value. Thus, managers of companies in competitive industries are likely to face increased scrutiny and accountability, leaving little or no room for manipulation and concealment of bad news. This accords with the argument that competition intensity acts as an effective monitoring and disciplinary mechanism (Hart, 1983; Isidro & Marques, 2021), thereby creating an environment conducive to producing high-quality financial reporting (Babar & Habib, 2021). Gentzkow and Shapiro (2008) argue that competition in the news market allows consumers to evaluate quality more accurately by comparing the reports of different firms, thereby creating greater incentives for such companies to produce high-quality reports.

In concentrated industries, however, managers might feel less pressure to provide investors with timely and accurate information given the absence of accurate benchmark data - provided by at least one peer - against which to judge the manipulation of firms. El Diri et al. (2020) contend that less competitive markets hinder the capacity of external parties to supervise managerial decisions, subsequently enabling managers to pursue a greater number of non-value-maximizing decisions. Accordingly, one can argue that managers of companies in concentrated industries have more discretion over their firms' accounting and reporting choices. Subsequently, this reduces the value relevance of accounting information. Bae and Jeong (2007) concur with this view and posit that accounting information is less likely to have value relevance when managers have greater discretionary power and behave in an opportunistic manner.

In addition, competition over the limited funds available from capital markets might incentivize managers in competitive industries to produce high-quality accounting information. Diamond and Verrecchia (1991) argue that firms are incentivized to provide more information to reduce the information gap with investors and, therefore, enjoy a lower cost of capital. Such arguments imply that the increase in the number of companies in an industry competing over limited funds will improve overall informational transparency (Datta et al., 2013). Similarly, Hoberg and Phillips (2010) assert that it is more costly for investors to collect firm-specific information in competitive industries, incentivizing firms to reduce information asymmetry in order to obtain financing at more favorable rates.

Several studies provide empirical evidence indicating that both the quantity and quality of information is higher in competitive industries. Harris (1998) and Nichols and Street (2007) document a higher level of segmental disclosure in competitive industries as opposed to concentrated industries. Similarly, Newman and Sansing (1993) and Gigler (1994) report a rise in the level of disclosed information as competition increases. Botosan and Stanford (2005) state that firms in noncompetitive industries publish less information in order to avoid losing their competitive advantage, while Li (2010) claims that product market competition enhances the quality of information provided by companies. Ali et al. (2014) report that the quantity and quality of corporate disclosure is positively associated with industry competition. Along similar lines, several studies reveal that managers are less likely to manipulate financial statements in competitive industries. For example, Laksmana and Yang (2014) and El Diri et al. (2020) document a decrease in earnings management in industries with higher levels of competition intensity.

Therefore, it is likely that product market competition has a positive

impact on the value relevance of goodwill impairments. This is primarily due to the propensity of managers to generate high-quality corporate reports in competitive industries, wherein their actions are more discernible and the competition over available funds from capital markets is high. Specifically, the provision of information by peers has the potential to reduce the benefits that managers may obtain from withholding unfavorable news about goodwill. For example, if the return on assets of a company consistently falls below the industry average, this may indicate that goodwill has been impaired (Leblond, 2018), making it more difficult for managers to manipulate such impairments. Thus, managers will be less inclined to hide, postpone, or manipulate goodwill impairments in more competitive settings, allowing investors to incorporate this information into their firm valuation. The recognized goodwill impairment by firms in competitive industries, therefore, is more likely to be value relevant. In line with these arguments, our first hypothesis is formulated as follows:

H1: *The greater the competitive intensity of a firm's industry, the higher the relevance of its goodwill impairments.*

3.2. The role of country-level information environment

Arguments pertaining to the impact of competition on the value relevance of accounting information are mainly based upon curbing the discretionary behavior of managers in competitive settings due to the availability of information provided by competitors. Subsequently, this enables users to compare one company's information with that of another. However, the reliance of capital providers on financial reports to reduce information asymmetry varies as creditors (especially banks) have private access to corporate information, unlike dispersed shareholders who rely more on a firm's financial reports. Therefore, we expect the impact of competition on the value relevance of goodwill impairments to differ according to the level of information environment in which a given country's firms operate.[4]

More specifically, the demand for financial reporting in bank-oriented economies (such as Germany and Poland) is lower than that in market-based economies (such as Australia and the UK) because banks, the main providers of capital, have direct access to firm financial information (Mueller et al., 1994). In support of this argument, Ali and Hwang (2000, pp. 3-4) state that "In bank-oriented systems, businesses generally have very close ties to their banks which supply most of their capital needs; banks have concentrated and long-term debt and equity holdings; and banks have direct access to company information, reducing the demand for published financial statements." Due to insufficient reporting incentives, accounting quality is lower in firms dependent on bank financing (Soderstrom & Sun, 2007). In addition, the number of listed companies in bank-based economies tends to be relatively small and have fewer accounting disclosure requirements(Allen & Gale, 2000). Even after the adoption of IFRS across the world, the financial system of a country still has an impact on the financial reporting quality (see Soderstrom & Sun, 2007). Due to the relatively low demand for publicly published accounting information and the low number of listed companies against which to compare firms' financial information, competition will not have a significant impact on the relevance of accounting information in bank-based economies. Therefore, we do not expect the impact of competition on the value relevance of goodwill impairments to be significant in such economies.

By contrast, firms in market-oriented economies exhibit diffused ownership structures, causing an information gap between investors and

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[4] Following Fiechter and Novotny-Farkas (2017), we categorize countries into market-based and bank-based financial systems based on their information environment. Thus, our measure of country-level information environment reflects the degree to which investors in a particular country rely on the accounting information produced by firms for capital allocation and firm valuation.

company managers (Habib, 2008). Ali and Hwang (2000) explain that in these economies, investors do not have private access to firm information; hence, they tend to rely on accounting information issued by firms for security valuation and monitoring of managers. In general, contracting parties in market-oriented economies transact at arm's length and the information gap between parties is reduced by public disclosure of accounting information (Ali & Hwang, 2000; Beck & Levine, 2002). The large number of listed firms and the extensive disclosure requirements in these economies generate a substantial amount of published information about a company (Allen & Gale, 2000). Because the impact of competition on financial reporting requires more information to be provided by rivals for comparison purposes, product market competition is more likely to have a significant effect on the value relevance of goodwill impairments in market-based economies than in bank-oriented economies.

Several prior studies have empirically investigated the association between share price and financial statement information in market-based economies relative to bank-based economies. For example, Elbakry et al. (2017) document that the value relevance of financial accounting information is higher for firms in the UK than for their counterparts in Germany. Fiechter and Novotny-Farkas (2017) examine the fair value of complex assets and report that the value relevance of fair values for such assets is lower in bank-based markets. Our research does not aim to examine the value relevance of accounting information across countries with different financial systems. Rather, we investigate whether the impact of competition on the value relevance of goodwill impairments varies across different information environments, particularly across bank-based and market-oriented economies. This is important as product market competition alone is not enough to produce high-quality accounting information. Evans and Sridhar (2002) demonstrate that neither the product markets nor capital markets when acting in isolation can prompt firm managers to provide high-quality information.

As such, we expect product market competition not to have an impact on the value relevance of accounting information in the poor information environments found in bank-based economies. This is because the small number of listed firms and low demand for extensive public disclosure absorb the positive impact of product market competition on the value relevance of accounting information. By contrast, in the rich information environments of market-oriented economies, where there is high reliance on accounting information and a large number of listed firms, the impact of product market competition is more prevalent. Thus, a complementary effect may exist between country-level information environment and industry-level competition. Accordingly, we formulate our second hypothesis as follows:

H2: *The impact of product market competition on the value relevance of goodwill impairments is limited only to firms in market-based economies.*

4. Research design

4.1. Empirical model

To estimate the value relevance of accounting information, existing studies (e.g., Alshehabi et al., 2021) have applied Ohlson's (1995) model which links a firm's share price to its book value of equity and net income before taxes. Following the literature on the value relevance of goodwill impairments (e.g., Lapointe-Antunes et al., 2009), we modify Ohlson's (1995) model to develop our baseline model, as follows:

$$MarketValue_{it} = \beta_0 + \beta_1 BookValue_{it} + \beta_2 Earnings_{it} + \beta_3 Goodwill_{it} + \beta_4 Impairment_{it} + fixed effects + \varepsilon_{it} \qquad (1)$$

where $MarketValue_{it}$ denotes the market value per share of equity three months after firm i's fiscal year-end. $BookValue_{it}$ represents the book value of equity recognized on firm i's balance sheet minus the carrying amount of goodwill at the same year-end. $Earnings_{it}$ denotes

earnings before interest and taxes recognized on firm i's income statement plus goodwill impairment amounts recognized for the same financial period. $Goodwill_{it}$ represents the carrying amount of goodwill at firm i's fiscal year-end plus goodwill impairment amounts for the same financial period. $Impairment_{it}$ denotes the amount of goodwill impairments recognized on income statements for firm i's financial period. To mitigate size-related heteroscedasticity, all dependent and independent variables are scaled by the number of common shares outstanding[5] at the fiscal year-end (for example, Lapointe-Antunes et al., 2009). Appendix A provides detailed definitions of each variable.

To estimate Equation (1), we apply ordinary least squares (OLS) after winsorizing all variables at the 1st and 99th percentiles to mitigate the influence of outlier observations and control for country- and year-fixed effects throughout the analyses. To obtain efficient estimates of coefficients, we use robust standard errors clustered by country and year.

To test the impact of product market competition experienced by companies on the value relevance of their goodwill impairments, we first calculate the Herfindahl–Hirschman Index (HHI) by summing the squared market shares of the firms competing in each industry for each country-year combination. A company's market share is computed as the ratio of the firm's sales to total sales in the same country, year, and industry. For example, an industry consisting of two firms with market shares of 70 % and 30 % has an HHI of (0.70)2+(0.30)2, or 0.58. The index ranges from 0 (highly competitive industry) to 1 (monopolistic industry), with higher values indicating lower industry competition. We then perform a cluster analysis of the sample of firms, grouping them by their HHI values. The analysis suggests two subgroups: subgroup 1 consists of firms operating in highly concentrated industries (average HHI value of 0.60), while subgroup 2 consists of companies operating in competitive industries (average HHI value of 0.16). To examine whether there is a systematic difference in the value relevance of goodwill impairments between the two groups, we re-estimate Equation (1) after introducing a dummy variable $CompetitiveIndustry_{it}$ coded 1 if the firm is operating in a competitive industry, and 0 otherwise. The equation is then written as follows:

$$MarketValue_{it} = \beta_0 + \beta_1 BookValue_{it} + \beta_2 Earnings_{it} + \beta_3 Goodwill_{it} + \beta_4 Impairment_{it} + \beta_5 CompetitiveIndustry_{it} + \beta_6 Impairment_{it} \times CompetitiveIndustry_{it} + fixed effects + \varepsilon_{it} \qquad (2)$$

To the extent that product market competition improves the value relevance of goodwill impairments, we expect the coefficient (β_6) on the interaction term ($Impairment_{it} \times CompetitiveIndustry_{it}$) to be negative and statistically significant. This is because a more negative association between goodwill impairments and market value of equity implies more value relevance impairments. However, if it happens that the coefficient on the interaction term is positive and statistically significant, this indicates that competition has partially attenuated the value relevance of goodwill impairments. If the coefficient is not statistically significant, it suggests that competition has no impact on the relevance of goodwill impairments.

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[5] According to Barth and Clinch (2009), the model specification deflated by the number of shares outstanding performs better than size-related deflators such as book value and market value. They explain that the number of shares outstanding is not necessarily related to any economic phenomena. Moreover, number of shares does not reflect transient size variations that impact both book value and market value. For example, book value and market value may reflect changes in size associated with economic factors, including economy-wide factors, that are potentially unrelated to scale effects. For more details, see Barth and Clinch (2009, pp. 281-282). In addition, as a robustness check and to allow comparability with prior literature, we rerun our main model using book value of equity (at the beginning of the period) as an alternative scaler (see Lapointe-Antunes et al., 2009), and find that our results remain the same.

We further test whether the effect of competition on the relevance of goodwill impairments is attenuated or accentuated depending on the quality of the information environment. To do so we incorporate Fiechter and Novotny-Farkas's (2017) variable *Competitive Industry*, which is a dichotomous classification of countries into market-based versus bank-based. We then re-estimate Equation (2) separately for the two groups, depending on their financial structure (see Appendix A for definition and further explanation). The financial structure captures the information environment in a given country, which shows how much investors in that country rely on public accounting information for making economic decisions, including their firm valuation. To the extent that a high-quality information environment as proxied by a market-based economy fosters the impact of competition on the relevance of goodwill impairments, we expect the coefficient on the interaction term ($Impairment_{it} \times CompetitiveIndustry_{it}$) to be more negative for firms in market-based countries.

4.2. Data and sample

Our initial sample consists of all observations with available data in Datastream for domestically listed firms in 21 countries for the fiscal years 2005–2018 that reported under IFRS.[6] We exclude companies in the financial industry, firm-year observations with missing data, those with a negative book value of equity, and those with negative or zero goodwill. Our final sample comprises 21,224 firm-year observations from 21 IFRS-adopting countries over a 14-year period (2005–2018).

Panel A of Table 1 presents a breakdown of the sample by industry. The sample consists of nine industries defined according to the Thomson Reuters Business Classification (TRBC) industry group. The largest portion is from 'Consumer Cyclicals' (24.16 %), followed by 'Industrials' (23.88 %), 'Technology' (14.93 %), and 'Basic Materials' (10.59 %).

Panel B of Table 1 displays the sample of firms by country. France, Germany, and the UK have the largest numbers of observations with 3,069, 2,986, and 2,980, respectively. Ireland, Portugal, and Greece have the lowest number of observations with 112, 190, and 227, respectively. Appendix B categorizes countries into clusters based on a range of characteristics: financial structure, secrecy, social trust, law enforcement, enforcement of accounting standards, and competition.

5. Results

5.1. Descriptive statistics

Table 2 presents descriptive statistics for the variables used in the analysis. The average market value per share is €16.876. The average values for pre-goodwill book value per share and earnings per share are €6.626 and €1.740, respectively. The average values of goodwill per share and goodwill impairments per share are €4.429 and €0.025, respectively. Appendix C provides further descriptive statistics for the variables in the regression analysis by country-and firm-level clusters (see Panel A for country clusters and Panel B for firm clusters).

Table 3 provides the correlation coefficients and their statistical significance for the variables included in the regression models. The highest correlation coefficient is 0.704 between $MarketValue_{it}$ and $Earnings_{it}$. As a rule of thumb, if a correlation coefficient between two variables is less than 0.8, multicollinearity is not considered a serious problem (see Hair et al., 2010). To check this, we performed the Variation Inflation Factor (VIF) test. It reveals that the means of VIF values (untabulated) are below the conventional threshold of 10, confirming

Table 1
Panel A: Sample description by industry.

	Number	Ratio%
Basic Materials	2,247	10.59
Consumer Cyclicals	5,128	24.16
Consumer Non-Cyclicals	2,010	9.47
Energy	890	4.19
Healthcare	1,512	7.12
Industrials	5,069	23.88
Technology	3,169	14.93
Telecommunication Services	607	2.86
Utilities	592	2.79
Total	21,224	100

Panel B: Sample distribution by country

Country	Number	Ratio%
Australia	1,598	7.53
Austria	341	1.61
Belgium	459	2.16
Denmark	551	2.60
Finland	712	3.35
France	3,069	14.46
Germany	2,986	14.07
Greece	227	1.07
Hong Kong	2,111	9.95
Ireland	112	0.53
Israel	601	2.83
Italy	646	3.04
Netherlands	590	2.78
New Zealand	248	1.17
Norway	568	2.68
Poland	775	3.65
Portugal	190	0.90
South Africa	683	3.22
Spain	386	1.82
Sweden	1,391	6.55
United Kingdom	2,980	14.04
Total	21,224	100

that multicollinearity is not a cause for concern in our study.

5.2. Main results

Table 4 presents the results of the effect of industry-level competition on the value relevance of goodwill impairments. As indicated, F-tests are statistically significant at a 1 % level across all the models, indicating that all coefficients provide a good overall fit to the data.

Column 1 reveals that the coefficients on $BookValue_{it}$ and $Earnings_{it}$ are positive and statistically significant ($BookValue_{it}$, β = 0.008, p-value = 0.000; $Earnings_{it}$, β = 0.020, p-value = 0.000). For $Goodwill_{it}$, the results show a positive and significant relationship between goodwill amounts and market values (β = 0.010, p-value = 0.000). This implies that goodwill carrying amounts are value relevant and, hence, predictive of the firm's market valuation. According to Amel-Zadeh et al. (2021), the positive relation between goodwill from acquisition and market values implies that "goodwill book values embody future economic benefits" (p. 3).

Regarding the main variable of interest, goodwill impairments, $Impairment_{it}$, the coefficient is negative and statistically significant (β = –0.068, p-value = 0.016). This implies that investors perceive goodwill impairments as a reliable/accurate measure of the decline in the value of goodwill, and therefore, include them in their security valuation. This is consistent with prior research (e.g., Lapointe-Antunes et al., 2009), which reports that investors consider goodwill impairment losses when determining the market valuation of a firm's equity.

Our fully interacted model in column 2 reveals that the coefficient on $Impairment_{it}$ is not statistically significant (β = 0.037). This indicates that the goodwill impairments reported by companies in concentrated industries where product market competition is low do not significantly affect their market values (i.e., uninformative to investors). However,

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[6] Following prior research, if the number of firms with goodwill in a country is less than 30, the firms of that country are dropped from the empirical analysis. We apply this restriction to avoid any lopsided representation of countries in our study, and to enhance the homogeneity of our sample and the comparability of our results across countries (Hung, 2000).

Table 2

Descriptive statistics of all variables.

Variables	Observations	Mean	Standard Deviation	Minimum	Median	Maximum
Market Value	21,224	16.876	37.485	0.002	4.291	261.569
Book Value	21,224	6.626	19.977	–21.333	1.170	148.252
Earnings	21,224	1.740	4.519	–8.592	0.408	28.320
Goodwill	21,224	4.429	12.081	0.000	0.842	94.856
Impairment	21,224	0.025	0.110	0.000	0.000	0.724
Competitive Industry	21,224	0.826	0.380	0.000	1.000	1.000

Note: This table presents descriptive statistics for the variables in the empirical model. *Market Value* represents the market value per share of the firm's equity, measured three months after fiscal year-end. *Book Value* is the book value of the firm's equity at the end of the year wherein goodwill is tested for impairment, minus the goodwill carrying amount at the same year-end. *Earnings* are defined as earnings before interest and tax at the end of the year wherein goodwill is tested for impairment, plus the amount of goodwill impairments reported at the same year-end. *Goodwill* includes the carrying amount of goodwill at the end of the year wherein goodwill is tested for impairment, plus the amount of goodwill impairments reported at the same year-end. *Impairment* refers to goodwill impairments reported at the end of the year. *Competitive Industry* categorizes firms based on their Herfindahl-Hirschman Index (HHI) values, generating a dummy variable coded as 1 if the firm operates in a competitive industry and 0 if it operates in a highly concentrated industry. HHI is defined as the sum of the squared sales ratios, where the sales ratio is the firm's sales divided by the total sales in the same country-industry-year. All numbers are in Euros. See Appendix A for further details on all variable definitions.

Table 3

Pearson correlation matrix of main variables.

Variables	Market Value	Book Value	Earnings	Goodwill	Impairment	Competitive Industry
Market Value	1.000					
Book Value	0.682*	1.000				
Earnings	0.704*	0.682*	1.000			
Goodwill	0.592*	0.316*	0.549*	1.000		
Impairment	0.100*	0.043*	0.126*	0.222*	1.000	
Competitive Industry	–0.014*	–0.025*	–0.001	0.001	0.001	1.000

Notes: See Appendix A for variables definitions. * Indicates statistical significance at p < 0.05 using two-sided t-statistics.

the coefficient on the interaction term between $Impairment_{it}$ and $CompetitiveIndustry_{it}$ is negative and statistically significant ($\beta = –0.129$, p-value = 0.019).[7] This suggests that firms in highly competitive industries report impairment losses that negatively and significantly affect their market values.

We also run separate regressions (untabulated) for the concentrated and competitive groups and find that the value relevance of goodwill impairments is only significant for firms in the competitive group. These results indicate that product market competition does indeed enhance the value relevance of goodwill impairments, supporting our first hypothesis that product market competition has a positive impact on the value relevance of goodwill impairments.[8]

Thus, our findings indicate that investors (i) are sensitive to the levels of product market competition when forming perceptions about the relevance of goodwill impairments; and (ii) are more likely to trust the impairment information reported by firms in competitive industries. This is particularly the case for managers in competitive industries who are subject to greater scrutiny, as their managerial decisions are more observable and comparable with other competitors (Hart, 1983; Nalebuff & Stiglitz, 1983). The higher probability of being compared with others in such markets makes it more difficult for managers to misreport their financial results without being detected. In other words, the information provided by rivals in such markets represents informative benchmarks for a manager's effort and performance, curbing managerial manipulation and slacks (Guo et al., 2019). Therefore, managers of firms in competitive industries are expected to have minimal or no incentives to falsify or misrepresent their financial statements.

In addition, as reported by Diamond and Verrecchia (1991), the high level of competition over sources of financing in competitive industries

increases the need for companies to disclose more information to reduce information asymmetry and, thus, lower the cost of capital. Hence, it is more costly for investors to collect information about firms in such industries, thereby impelling companies to reduce information asymmetry to obtain funds at more favorable rates (Hoberg & Phillips, 2010). Such managers tend to provide high-quality accounting disclosure in competitive industries, which explains why managers report amounts of goodwill impairment that truly reflect a firm's economic conditions.

The results in columns 3 and 4 of Table 4 show that the coefficient on the interaction term between $Impairment_{it}$ and $CompetitiveIndustry_{it}$ is negative, but only significant for market-based economies ($\beta = –0.160$, p-value = 0.044), which supports our second hypothesis. In a subsequent untabulated analysis, we examine the relevance of goodwill impairments (Equation (1) for market- and bank-based economies separately and find that goodwill impairments are only relevant for market-based economies. Taken together, these results indicate that the impact of industry competition is more pronounced in market-based economies, suggesting a complementary effect of industry competition and country-level information environment on the value relevance of goodwill impairments.[9]

Overall, our results indicate that both product market competition and capital markets are important in maintaining conditions conducive to providing investors with relevant impairment information. Therefore, they suggest that neither capital markets nor product markets alone can incentivize managers to provide truthful disclosures (Evans & Sridhar, 2002), denoting a complementary effect between the two sets of markets.

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[7] We also re-estimate Equation (2) after the inclusion of industry fixed-effects indicators, the results of which are essentially the same as those tabulated.

[8] To check the robustness of our results, we re-estimate the main model for impairing firms only (n = 3,591) and find that the estimated coefficient on the interaction term ($Impairment_{it} \times CompetitiveIndustry_{it}$) is negative and statistically significant.

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[9] A notable observation is that the coefficient on $Competitive\,Industry_{it}$ is negative in market-based economies, but positive in bank-based ones. However, this is consistent with previous studies reporting mixed results on the impact of competition on the market value of equity, such as Gaspar and Massa (2006) and Li and Zhan (2019). Because our study focuses on a specific context, it is beyond the scope of this paper to explore the varying effects of competition intensity on market price across different types of economies. This discovery opens up an intriguing avenue for future research.

Table 4

Main regression results of the effect of industry-level competition on the value relevance of goodwill impairments.

Variables	(1)	(2)	(3)	(4)
			Financial structure	
	Baseline	Competition effect	Market-based	Bank-based
Book Value	0.008***	0.008***	0.008***	0.007***
	(15.727)	(15.651)	(13.912)	(7.448)
Earnings	0.020***	0.020***	0.017***	0.025***
	(8.574)	(8.622)	(6.358)	(5.987)
Goodwill	0.010***	0.010***	0.011***	0.010***
	(13.134)	(13.079)	(11.149)	(12.328)
Impairment	−0.068**	0.037	0.062	0.032
	(−2.412)	(0.702)	(0.787)	(0.614)
Competitive Industry		0.002	−0.011**	0.017**
		(0.391)	(−2.226)	(2.351)
Impairment × Competitive Industry		−0.129**	−0.160**	−0.104
		(−2.367)	(−2.029)	(−1.545)
Constant	−0.013	0.018	0.060***	0.015*
	(−0.836)	(1.197)	(4.042)	(1.742)
Number of observations	21,224	21,224	14,922	6,302
Adjusted R-squared	0.657	0.657	0.663	0.628
F-statistic	121.71***	137.31***	89.26***	149.89***
Industry fixed effects	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Notes: This table also presents our main results regarding the interaction effects of competition and country-level information environment on the value relevance of goodwill impairments. See Appendix A for all variables definitions. Heteroskedasticity-robust t-statistics are in parentheses under the coefficient estimates and are clustered by year-country. *, **, and *** indicate significance at the $p < 0.10$, 0.05, and 0.01 level, respectively.

5.3. Further analyses and robustness checks

5.3.1. Alternative measures of country-level information environment

To assess whether our main results are robust to alternative measures and determinants of country-level information environment, we replace the market-based variable with secrecy as an alternative measure of the country-level information environment. Secrecy is a combination of three variables: uncertainty avoidance plus power distance minus individualism (see Hope et al., 2008). Gray (1988) defines secrecy as a prevailing inclination within businesses that prioritizes confidentiality and imposes restrictions on the disclosure of pertinent information. High levels of secrecy are associated with low levels of corporate disclosure (Gray, 1988), which can weaken the impact of product market competition on the value relevance of goodwill impairments. Using the k-median cluster analysis, we divide the sample into two groups based on their secrecy scores (*Less secretive* and *More secretive*). The findings in columns 1 and 2 of Table 5 reveal that product market competition impacts the value relevance of goodwill impairments in less secretive countries (β = −0.161, p-value = 0.018), but is non-significant in countries ranked high on the accounting value of secrecy. This suggests that product market competition alone is not sufficient to produce value relevant accounting information.

Given the importance of informal institutions in determining the quality of accounting information (see Halabi et al., 2019), we further test whether the influence of competition on the relevance of impairment information hinges on the level of social trust that investors have in the information. As highlighted by Guiso et al. (2008), social trust captures an individual's personal assessment of the likelihood of being deceived by others. In societies characterized by a higher level of social trust, investors are less inclined to suspect that managers engage in financial manipulation, engendering a more favorable perception of the credibility of financial reporting. As such, social trust also reflects the

Table 5

Regression results on how the country level factors of secrecy and social trust affects the market competition impacts on the value relevance of goodwill impairments.

Variables	(1)	(2)	(3)	(4)
	Secrecy culture		Social trust	
	Less secretive	More secretive	High	Low
Book Value	0.008***	0.006***	0.008***	0.007***
	(12.947)	(9.5)	−12.556	−10.879
Earnings	0.019***	0.024***	0.019***	0.022***
	(7.013)	)6.075(	−6.313	−6.287
Goodwill	0.013***	0.007***	0.013***	0.009***
	(15.723)	(7.019)	−14.978	−8.46
Impairment	0.071	−0.164**	0.105	−0.086
	(1.184)	(−2.239)	−1.583	(−1.133)
Competitive Industry	0.006	−0.003	0.000	−0.005
	(1.176)	(−0.420)	(−0.027)	(−0.785)
Impairment × Competitive Industry	−0.161**	−0.004	−0.199**	−0.02
	(−2.332)	(−0.053)	(−2.569)	(−0.290)
Constant	0.002	0.041***	0.018**	0.066***
	(0.108)	(2.846)	−2.078	−4.021
Number of observations	13,361	7,863	11,398	9,826
Adjusted R-squared	0.669	0.665	0.649	0.664
F-statistic	150.57***	98.62***	95.83***	119.04***
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Notes: See Appendix A for all variable definitions. Heteroskedasticity-robust t-statistics are in parentheses under the coefficient estimates and are clustered by year-country. *, **, and *** indicate significance at the $p < 0.10$, 0.05, and 0.01 level, respectively.

extent to which investors rely on publicly available information reported by firms.

To measure social trust, we adopt a country-level approach and utilize the average response of citizens to a specific question in the World Values Survey (WVS): "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" We compute the value of trust in a country by calculating the ratio of respondents who answered "most people can be trusted" to the total number of survey participants (see Brockman et al., 2022). The cluster analysis (the k-median procedure) partitions countries into two groups (*High* and *Low*), based on their trust values. The results reported in columns 3 and 4 of Table 5 reveal that the effect of product market competition on the relevance of goodwill impairments is only significant for companies in countries with high social trust (β = −0.199, p-value = 0.011). These findings indicate a complementary relationship between competition and the level of trust within a country, further highlighting the importance of the information environment in the interplay between competition and the value relevance of accounting information.

We also replace the market-based variable with alternative measures of institutional characteristics that determine the extent to which investors can rely on publicly available accounting information. We use the first factor identified by the principal component analysis of the four worldwide governance indicators (control of corruption, government effectiveness, regulatory quality, and rule of law), capturing the country's law enforcement. We then perform cluster analysis, grouping the countries into two subgroups (*Weak* and *Strong*) based on their respective scores on the law enforcement index. The untabulated results indicate that the interaction between *Impairment*$_{it}$ and *CompetitiveIndustry*$_{it}$ is significant only for firms in strong enforcement countries (β = −0.150, p-value = 0.021).

Nonetheless, Brown et al. (2014) suggest that legal proxies are limited in their ability to explicitly address the factors that affect the promotion of compliance with financial reporting standards through external audits and the actions of independent enforcement bodies. Therefore, we use the strength of enforcement of accounting and

auditing standards, as developed by Brown et al. (2014). Using k-median cluster analysis, we partition countries into two groups according to their enforcement scores for accounting standards (*Weak* and *Strong*). These untabulated results are unchanged as the interaction term between *Impairment$_{it}$* and *Competitive Industry$_{it}$* is significant only for firms in countries with strong enforcement of accounting and audit standards (β = –0.151, p-value = 0.019).

5.3.2. The impact of firm-level information environment

Investors' reliance on accounting information for firm valuation and capital allocation decisions also depends on the information environment at the firm level. Therefore, we test whether the effect of product market competition on the value relevance of goodwill impairments varies with the firm-level information environment. We employ three proxies of the firm-level information environment: analyst following, insider ownership, and international diversification.

We code an indicator variable as 1 if a company's number of analysts following and its market value of equity[10] are above the sample median, and 0 otherwise (see Fiechter & Novotny-Farkas, 2017). To the extent that the presence of a rich firm-level information environment reinforces the competition effect on the relevance of impairment information, we expect the coefficient on the interaction term (*Impairment$_{it}$* × *CompetitiveIndustry$_{it}$*) to be negative and statistically significant for a high-quality firm-level information environment. Given the subjectivity and complexity inherent in the estimation of goodwill impairments (e.g., Ramanna & Watts, 2012), we expect that the availability of professional information intermediaries, such as financial analysts and the financial industry press, improves investors' ability to process impairment information and incorporate this into their firm valuation. Financial analysts play a substantive and essential role in disseminating firm information through their earnings forecasts and share recommendations, reducing the information asymmetry between the company and its investors. For example, Li et al. (2011) report that analysts are likely to revise their earnings forecasts subsequent to impairment announcements. Such revisions can help investors to understand the impact of goodwill impairments on future performance.

To that end, we estimate Equation (2) for two groups based on the firm-level information environment, namely *High_Info* and *Low_Info,* in line with Fiechter and Novotny-Farkas (2017). Companies above the sample median for analysts following and above the market value of equity are classified under the *High_Info* group, while other firms are classified under the *Low_Info* group (i.e., companies below the sample median for analysts following and below the sample median market value of equity). The results in columns 1 and 2 of Table 6 reveal that the coefficient for the interaction term between *Impairment$_{it}$* and *CompetitiveIndustry$_{it}$* is significant only for the *High_Info* group (β = –0.166, p-value = 0.046), suggesting that the effect of competition on the value relevance of goodwill impairments is more pronounced for firms with a high-quality information environment. As country-level information, the firm-level information environment also seems to influence how investors process the impairment information and incorporate this into firm valuation.

Previous literature suggests that managerial ownership impacts managers' opportunistic behavior. For example, Morck et al. (1988) argue that more ownership by managers would facilitate deeper entrenchment and, therefore, offer greater scope for opportunistic behavior. In line with this argument, Gabrielsen et al. (2002) document that managerial ownership is inversely related to the information content of earnings. Therefore, we test whether insider ownership influences the relationship between product market competition and the value relevance of goodwill impairments.

We estimate Equation (2) after dividing the sample based on the level of insider ownership. We consider a firm to have *High* (*Low*) insider ownership if insider shareholding is above (below) the sample median. The results in columns 3 and 4 of Table 6 reveal that the interaction term between *Impairment$_{it}$* and *CompetitiveIndustry$_{it}$* is only significant for firms with low insider ownership (β = –0.226, p-value = 0.031). Thus, managerial ownership seems to weaken the effect of product market competition on the value relevance of goodwill impairments. This explains the insignificant impact of competition on the value relevance of accounting information for companies with high insider ownership.

We further test whether international diversification influences the relationship between product market competition and the value relevance of goodwill impairments. The underlying rationale is that geographically diversified firms tend to have a lower degree of abnormal accruals, that is, lower earnings management (see Jiraporn et al., 2008). In support of this argument, Isidro and Raonic (2012) suggest that there is a positive association between interactions with global markets and the quality of financial information. Therefore, we run Equation (2) separately for *Exporting* firms and *Non-exporting* firms. Firms with foreign sales are categorized as *Exporting* firms, while those without foreign sales are considered *Non-exporting* firms (Halabi et al., 2021). The findings in columns 5 and 6 of Table 6 show that the interaction term between *Impairment$_{it}$* and *CompetitiveIndustry$_{it}$* is only significant for exporting companies (β = –0.140, p-value = 0.024). This suggests that product market competition and firm-level information environment do not work in isolation to produce value relevant accounting information.

5.3.3. Alternative measures of competition intensity

While the HHI is a widely used measure of industry concentration, it exhibits several limitations that warrant the consideration of alternative measures of competition. One such limitation is the ambiguity in the interpretation of HHI values (Raith, 2003), which may arise because HHI captures the concentration of market shares without considering factors such as product substitutability, market size, and barriers to entry. In scenarios where markets exhibit varying levels of product substitutability, a high concentration can suggest fierce competition. Conversely, in situations where markets differ in size or entry costs, a lower concentration might signal intense competition. These limitations underscore the need to employ alternative measures of competition to assess whether our results hold.

To that end, we utilize firm-specific proxies of competition using the price–cost margin (PCM) (the Lerner's Index) which is computed as sales divided by operating costs. Following prior research (e.g., Gaspar & Massa, 2006; Haw et al., 2015), we calculate the excess price–cost margin (EPCM), measured as the difference between the firm's PCM and the industry median PCM. This not only captures the pricing power specific to each firm, but also the intra-industry pricing power (Haw et al., 2015). The results reported in column 1 of Table 7 reveal that the interaction term between *Impairment$_{it}$* and *EPCM$_{it}$* remains negative and statistically significant (β = –0.423, p-value = 0.015). We also re-calculate HHI values for companies based on their foreign sales. The results in column 2 of Table 7 show that the coefficient for the interaction term between *Impairment$_{it}$* and *HHI_Foreignsales$_{it}$* is negative and statistically significant (β = –0.128, p-value = 0.044).

To test the sensitivity of our results to competition intensity at the country level, using the k-median cluster analysis, we split the sample of firms into two groups based on the HHI value of their country of domicile (see Rakestraw, 2022). A firm is allocated to the *High* (*Low*) competition group if the HHI value of its country of domicile is below (above) the sample median. We then re-estimate Equation (2) using the country-level classification of competition intensity instead of industry-level competition. The results in column 3 of Table 7 show that the coefficient of the interaction term between *Impairment$_{it}$* and *Country_levelcompetition$_{it}$* remains negative and statistically significant (β = –0.136, p-value = 0.026). Overall, this indicates that our main

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[10] It is suggested that firms with larger market value tend to exhibit more disclosure and a stronger information environment as the disclosure cost is expected to decrease with firm size (Bamber & Cheon, 1998).

Table 6
Regression results on how the firm-level factors of analyst coverage, insider ownership, and international diversification affects the market competition impacts on the value relevance of goodwill impairments.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Analyst coverage		Insider ownership		International diversification	
	Low_Info	High_Info	Low	High	Non-exporting	Exporting
Book Value	0.008***	0.007***	0.007***	0.008***	0.009***	0.007***
	(12.774)	(11.725)	(11.268)	(12.055)	(8.791)	(15.582)
Earnings	0.013***	0.023***	0.025***	0.019***	0.017***	0.021***
	(3.944)	(7.850)	(7.116)	(7.373)	(3.65)	(8.559)
Goodwill	0.012***	0.009***	0.007***	0.013***	0.011***	0.010***
	(10.693)	(9.251)	(6.332)	(16.922)	(6.712)	(13.434)
Impairment	0.021	−0.007	0.160	−0.083	−0.014	0.049
	(0.315)	(−0.089)	(1.627)	(−1.424)	(−0.109)	(0.835)
Competitive Industry	0.001	0.011	−0.003	0.011**	−0.017*	0.007
	(0.357)	(1.163)	(−0.626)	(2.344)	(−1.964)	(1.594)
Impairment × Competitive Industry	−0.092	−0.166**	−0.226**	−0.052	−0.074	−0.140**
	(−1.250)	(−1.999)	(−2.173)	(−0.761)	(−0.524)	(−2.271)
Constant	−0.001	0.099***	0.028	−0.003	0.036	0.019
	(−0.207)	(7.480)	(1.230)	(−0.184)	(1.434)	(1.376)
Number of observations	14,282	6,942	10,384	10,064	5,157	16,067
Adjusted R-squared	0.630	0.631	0.670	0.688	0.64	0.664
F-statistic	107.03***	102.64***	113.85***	96.97***	48.64***	123.80***
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country- fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: See Appendix A for all variable definitions. Heteroskedasticity-robust t-statistics are in parentheses under the coefficient estimates and are clustered by year-country. *, **, and *** indicate significance at the $p < 0.10$, 0.05, and 0.01 level, respectively.

Table 7
Results when using the alternative competition intensity measures of EPCM, HH1 foreign sales, and country-level.

Variables	(1)	(2)	(3)
	Alternative measures of competition intensity		
	EPCM	HHI foreign sales	Country-level
Book Value	0.008***	0.008***	0.008***
	(15.448)	(15.969)	(15.640)
Earnings	0.020***	0.020***	0.020***
	(8.443)	(8.695)	(8.619)
Goodwill	0.010***	0.010***	0.010***
	(12.821)	(13.427)	(12.992)
Impairment	−0.089***	0.029	0.007
	(−3.289)	(0.495)	(0.164)
EPCM	0.026***		
	(3.167)		
Impairment × EPCM	−0.423**		
	(−2.445)		
HHI_Foreign sales		0.001	
		(0.313)	
Impairment × HHI_Foreign sales		−0.128**	
		(−2.024)	
Country_level competition			0.023***
			(4.171)
Impairment × Country_level competition			−0.136**
			(−2.235)
Constant	0.018	0.040***	0.016
	(1.323)	(3.962)	(1.173)
Number of observations	21,224	21,224	21,224
Adjusted R-squared	0.659	0.651	0.657
F-statistic	135.67***	145.28***	134.58***
Year-fixed effects	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes

Notes: See Appendix A for all variable definitions. Heteroskedasticity-robust t-statistics are in parentheses under the coefficient estimates and are clustered by year-country. *, **, and *** indicate significance at the $p < 0.10$, 0.05, and 0.01 level, respectively.

results hold when using alternative measures of competition intensity.

5.3.4. Additional robustness checks

In a subsequent analysis, we re-estimate Equation (2) after controlling for macroeconomic conditions using the percentage change in gross domestic product (*GDP Growth*) as well as the firm-specific characteristics of leverage (*Leverage*), firm size (*Firm Size*), and type of auditor (*Big 4*). We also include an interaction term between $Earnings_{it}$ and $LOSS_{it}$, a binary variable coded 1 if earnings are negative, and 0 otherwise. The results in columns 1, 2, and 3 of Table 8 reveal that goodwill impairments and their interaction with competition are qualitatively the same as those reported in column 2 of Table 4, suggesting that our results are unaffected.[11]

Prior studies provide empirical evidence suggesting that the value relevance of accounting numbers varies with the business cycle and the state of the economy (Adwan et al., 2020). Barth and Landsman (2010) argue that accounting information in times of financial crisis lacks sufficient quality to be useful to investors and other users of financial statements. Therefore, we test whether the effect of product market competition on the value relevance of goodwill impairments differs between the 2008–2009 financial crisis and non-crisis periods. The results in columns 4 and 5 of Table 8 reveal that the interaction term between $Impairments_{it}$ and $CompetitiveIndustry_{it}$ is only significant in normal periods. Therefore, the effect of product market competition is more pronounced during a non-crisis period as the financial crisis absorbs the impact of product market competition.

5.3.5. Propensity score matching

To address potential sample selection and endogeneity concerns, we apply propensity score matching (PSM) which controls for sample selection based on observed differences between firms operating in low versus highly competitive industries. Because we have more observations for firms in highly competitive industries, we consider these firms to be the treated group and companies in low competitive industries to

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[11] In an alternative specification, we replace earnings with pre-impairment net income and our results are qualitatively similar to those tabulated. In particular, the point estimate on the interaction term (*Impairment* × *Competitive Industry*) remain negative and statistically significant.

Table 8
Robustness checks by using additional controls, checking crisis vs non-crisis periods, and using PSM.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Additional controls			Crisis	Normal	PSM
Book Value	0.006***	0.008***	0.006***	0.009***	0.007***	0.008***
	(12.15)	(15.465)	(11.791)	(9.349)	(13.389)	(10.488)
Earnings	0.030***	0.019***	0.030***	0.012**	0.022***	0.018***
	(10.722)	(8.393)	(10.512)	(2.614)	(8.809)	(5.823)
Loss	−0.006		0.002			
	(−0.982)		(0.278)			
Earnings × Loss	−0.060***		−0.059***			
	(−5.923)		(−5.826)			
Goodwill	0.008***	0.010***	0.008***	0.010***	0.010***	0.008***
	(9.56)	(12.991)	(9.467)	(5.728)	(11.581)	(7.28)
Impairment	0.049	0.034	0.047	−0.062	0.068	0.056
	(0.782)	(0.652)	(0.755)	(−0.455)	(1.195)	(1.065)
Competitive Industry	0.002	0.003	0.004	−0.020*	0.005	0.022***
	(0.385)	(0.681)	(0.965)	(−1.715)	(1.148)	(3.443)
Impairment × Competitive Industry	−0.134**	−0.127**	−0.131**	−0.080	−0.131**	−0.149**
	(−2.071)	(−2.323)	(−2.028)	(−0.681)	(−2.124)	(−2.198)
GDP Growth		0.002*	0.002*			
		(1.734)	(1.711)			
Leverage		0.006	−0.016*			
		(0.645)	(−1.671)			
Big 4		0.011***	0.012***			
		(2.656)	(2.925)			
Firm Size		0.003**	0.003***			
		(2.423)	(2.805)			
Constant	0.009	−0.036*	−0.043**	0.011	0.017***	0.024
	(0.581)	(−1.717)	(−2.052)	(0.757)	(3.434)	(1.292)
Number of observations	21,224	21,222	21,222	2,757	18,467	7,404
Adjusted R-squared	0.671	0.657	0.671	0.655	0.656	0.685
F-statistic	128.97***	142.91***	132.44***	183.25***	182.65***	138.24***
Year-fixed effects	Yes	Yes	Yes	No	No	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents robustness checks by adding more control variables in columns 1, 2 and 3, comparing crisis and non-crisis periods in columns 4 and 5, and using propensity scores matching (PSM) in column 6. See Appendix A for all variable definitions. Heteroskedasticity-robust t-statistics are in parentheses under the coefficient estimates and are clustered by year-country. *, **, and *** indicate significance at the p < 0.10, 0.05, and 0.01 level, respectively.

be the control group. The propensity scores are estimated using a probit regression based on the financial leverage of a firm and its size. The final column of Table 8 presents the results of the re-estimation of Equation (2) using the matched sample, confirming our earlier findings that product market competition increases the value relevance of impairment information.

6. Conclusion

This paper investigates whether industry-level competition influences the value relevance of goodwill impairments and considers the effect of the country-level information environment. We find that competition at the industry level has a positive impact on the value relevance of goodwill impairments. Specifically, compared with their counterparts in a less competitive industry, firms facing intense industry competition report goodwill impairments that are negatively associated with share price (i.e., value relevant). This is because managers are less able and less motivated to manipulate accounting information, as the outcomes of managerial decisions in these competitive markets are more observable and comparable with other competitors.

Our evidence also suggests that the positive impact of industry competition is more pronounced for firms headquartered in countries with a less secretive culture and those with high levels of social trust. This supports the view that a country-level information environment complements the role of industry competition in improving the value relevance of goodwill impairments. Investors in countries with rich information environments enjoy high-quality publicly available information which they can utilize for firm valuation and other economic decisions. We further investigate the competition effect on the value relevance of goodwill impairments conditional on a set of determinants in the firm-level information environment. We find that the negative relationship between competition and goodwill impairments is significant only for companies with high analyst coverage, low insider ownership, and higher international diversification.

Our results provide useful insights for various stakeholders wishing to understand the factors driving the quality of financial reporting. For example, they can help policymakers and standard setters evaluate the impact of industry competition on the usefulness of accounting information. The findings also offer valuable insights to auditors who may consider industry characteristics when evaluating audit risk.

Acknowledging the lack of a complete consensus on how to measure competition, we validate our results using various proxies for competition calculated at the country-, industry-, and firm-level. Future studies can extend our findings by investigating the impact of other industry characteristics, such as labor union density and auditors' industry expertise, on the value relevance of goodwill impairments. Future studies can also examine the impact of industry-level competition on other aspects of financial reporting such as predictability.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. . Variable definitions

Dependent variable	
MarketValue$_{it}$	Market value per share of firm's equity measured three months after fiscal year-end (Datastream item identifier: MPC).
Main variables	
BookValue$_{it}$	Book value of firm's equity at the end of the year wherein goodwill is tested for impairment (Datastream item identifier: WC03501), minus goodwill's carrying amount at the same year-end (Datastream item identifier: WC02502).
Earnings$_{it}$	Earnings before interest and tax at the end of the year wherein goodwill is tested for impairment (Datastream item identifier: DWEB), plus the amount of goodwill impairments reported at the same year-end (Datastream item identifier: WC18225).
Goodwill$_{it}$	Goodwill's carrying amount at the end of the year wherein goodwill is tested for impairment, plus the amount of goodwill impairments reported at the same year-end (Datastream item identifier: WC02502).
Impairment$_{it}$	Goodwill impairments reported at the end of the year (Datastream item identifier: WC18225).
Competitive Industry	We cluster-analyze the sample of firms, grouping them by their Herfindahl–Hirschman Index (HHI) values, generating a dummy variable, *Competitive Industry,* coded 1 if the firm operates in a competitive industry, and 0 if it operates in a highly concentrated industry. HHI is defined as the sum of the squared sales ratios. Sales ratio is defined as firm sales divided by the sum of all sales in the same country-industry-year.
Country-level information environment	
Financial_Structure	We use the indicator variable *Financial_Structure* (as developed by Fiechter and Novotny-Farkas, 2017) to distinguish between market- and bank-based economies. Using World Bank date from 1995 to 2004, Fiechter and Novotny-Farkas (2017) employ a principal component analysis to compute an aggregate proxy (*Structure_Aggregate*), which captures the importance of stock markets relative to the banking sector in a country. This proxy is computed as the first principal component of two variables that capture the comparative activity (*Structure_Activity*) and size of stock markets relative to banks in the economy (*Structure_Size*). *Structure_Activity* is the log of the ratio of value traded to bank credit. *Structure_Size* is the log of the ratio of market capitalization to bank credit. *Financial_Structure* equals to 1 (i.e., market-based) if the average aggregate score for a country is above the sample median, and 0 (i.e., bank-based) otherwise.
Secrecy	Following Hope et al. (2008), we measure secrecy based on Hofstede's (1980) three dimensions of national culture: uncertainty avoidance, power distance and individualism. In linking national culture attributes to accounting values, Gray (1988) argues that the higher a country ranks in terms of uncertainty avoidance and power distance and the lower it ranks in terms of individualism, the more likely it is to rank highly in terms of secrecy. Following Gray's (1988) framework, we compute our measure of secrecy as: $UncertaintyAvoidance_j + PowerDistance_j - Individualism_j$
Social trust	We measure trust at a country level based on the citizens' average response to this World Values Survey (WVS) question: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" We calculate the value of trust in a country as the ratio of people who responded to the survey with the answer "most people can be trusted" over the total people who participated in the survey (see Brockman et al., 2022).

(*continued*)

Dependent variable

Firm-level information environment

Analyst coverage	*High_Info* refers to firms that have both above sample median analyst following and above sample median market value of equity.*Low_Info* refers firms that have both below sample median analyst following and below the sample median market value of equity (see Fiechter and Novotny-Farkas, 2017).
Insider ownership	*Low insider ownership* refers to firms that have a percentage of shares held by insiders below the sample median.*High insider ownership* refers to firms that have a percentage of shares held by insiders above the sample median.
International Diversification	*Exporting* are internationally diversified firms with foreign sales.*Non-exporting* are non-diversified firms with no foreign sales.

Alternative measures of competition

EPCM	Excess price–cost margin (EPCM) is the firm's price–cost margin less the industry median price–cost margin.
HHI_Foreign sales	The sum of the squared foreign sales ratios. *Foreign sales* ratio is defined as foreign sales divided by the sum of all foreign sales in the same country-industry-year.
Country_level competition	High refers to firms domiciled in a country whose HHI value is below the sample median.Low refers to firms domiciled in a country whose HHI value is above the sample median (see Rakestraw, 2022).

Additional control variables

Law enforcement	We control for legal enforcement in a country using the first factor identified by the principal component analysis of four governance variables taken from the World Bank's World Governance Indicators database: control of corruption, government effectiveness, regulatory quality, and the rule of law.
Enforcement of accounting standards	To control for national accounting and auditing enforcement, we use the average score of Brown et al.'s (2014) aggregate index for the years 2005 and 2008. This index is calculated as the sum of two indices that capture the quality of the public company auditors' working environment (*AUDIT*) and the degree of accounting enforcement activity (*ENFORCE*) by independent enforcement bodies. These indices, compiled for 51 countries and relating to practices in 2002, 2005 and 2008, are based on publicly available data provided by the International Federation of Accountants (IFAC), the World Bank, and the national securities regulators.
LOSS	A dummy variable coded 1 if earnings negative, and 0 otherwise.
GDP Growth	The percentage change in gross domestic product (Source: World Bank).
Leverage	Firm's long-term debt-to-assets ratio
Big 4	A dummy variable coded 1 if firm's auditor is one of the Big 4 Auditors (i.e., Deloitte, EY, KPMG, and PwC), and 0 otherwise.
Firm Size	The natural logarithm of total assets at the end of t-1.
Crisis	A dummy variable coded 1 for the years 2008 and 2009, and 0 otherwise.

Appendix B. . Country clusters

Country		Secrecy	Social Trust	Law Enforcement	Enforcement of Accounting Standards	Competition
Australia	Market-based	Less secretive	High	High	Strong	High
Austria	Bank-based	Less secretive	High	High	Weak	Low
Belgium	Bank-based	More secretive	Low	Low	Strong	Low
Denmark	Market-based	Less secretive	High	High	Strong	Low
Finland	Market-based	Less secretive	High	High	Weak	Low
France	Market-based	More secretive	Low	Low	Strong	Low
Germany	Bank-based	Less secretive	High	High	Strong	High
Greece	Market-based	More secretive	Low	Low	Weak	Low
Hong Kong	Market-based	More secretive	High	High	Strong	Low
Ireland	Bank-based	Less secretive	High	High	Weak	Low
Israel	Bank-based	Less secretive	Low	Low	Strong	High
Italy	Market-based	More secretive	Low	Low	Strong	Low
Netherlands	Bank-based	Less secretive	High	High	Weak	Low
New Zealand	Bank-based	Less secretive	High	High	Weak	Low
Norway	Market-based	Less secretive	High	High	Strong	Low
Poland	Bank-based	More secretive	Low	Low	Weak	Low
Portugal	Bank-based	More secretive	High	Low	Weak	Low
South Africa	Market-based	Less secretive	Low	Low	Weak	High
Spain	Market-based	More secretive	Low	Low	Weak	High
Sweden	Market-based	Less secretive	High	High	Weak	Low
United Kingdom	Market-based	Less secretive	Low	High	Strong	High

Appendix C. . Descriptive statistics by country- and firm-level clusters

Panel A: Country-level clusters

	Financial Structure						Secrecy						Social Trust					
	Market-based			Bank-based			Less secretive			More secretive			High			Low		
Variable	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD	Obs.	Mean	SD.
Market value	14,922	14.25	35.02	6,302	23.09	42.12	13,361	15.89	36.34	7,863	18.56	39.30	11,398	15.66	36.50	9,826	18.29	38.55
Book Value	14,922	5.09	18.38	6,302	10.27	22.92	13,361	5.89	18.48	7,863	7.88	22.24	11,398	6.19	19.19	9,826	7.13	20.85
Earnings	14,922	1.36	4.14	6,302	2.64	5.19	13,361	1.52	4.16	7,863	2.11	5.05	11,398	1.53	4.18	9,826	1.99	4.87
Goodwill	14,922	4.21	12.62	6,302	4.96	10.67	13,361	3.56	10.11	7,863	5.91	14.73	11,398	3.45	9.62	9,826	5.56	14.34
Impairment	14,922	0.02	0.11	6,302	0.03	0.12	13,361	0.03	0.11	7,863	0.02	0.10	11,398	0.03	0.11	9,826	0.03	0.11
Competitive Industry	14,922	0.84	0.37	6,302	0.80	0.40	13,361	0.83	0.38	7,863	0.82	0.38	11,398	0.80	0.40	9,826	0.86	0.35
	Law enforcement						Enforcement of accounting standards						Country- level competition					
	Weak			Strong			Weak			Strong			Low			High		
Variable	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.
Market value	4,992	18.39	38.08	14,417	16.21	37.14	4,795	10.19	21.37	16,429	18.83	40.81	11,990	18.53	38.89	9,234	14.73	35.46
Book Value	4,992	8.29	21.61	14,417	6.12	19.57	4,795	3.85	8.96	16,429	7.44	22.12	11,990	7.60	21.24	9,234	5.36	18.14
Earnings	4,992	2.24	5.01	14,417	1.58	4.38	4,795	1.03	2.43	16,429	1.95	4.95	11,990	1.94	4.74	9,234	1.48	4.20
Goodwill	4,992	5.48	13.57	14,417	4.14	11.75	4,795	2.01	5.70	16,429	5.14	13.30	11,990	5.28	13.42	9,234	3.33	9.97
Impairment	4,992	0.02	0.10	14,417	0.03	0.11	4,795	0.02	0.09	16,429	0.03	0.12	11,990	0.03	0.11	9,234	0.03	0.11
Competitive Industry	4,992	0.84	0.37	14,417	0.82	0.39	4,795	0.77	0.42	16,429	0.84	0.36	11,990	0.75	0.43	9,234	0.92	0.27

Panel B: Firm-level clusters

	Analyst Coverage						Insider Ownership						International Diversification					
	Low_Info			High_Info			Low			High			Non-Exporting			Exporting		
Variable	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.	Obs.	Mean	SD.
Market Value	14,282	8.29	26.43	6,942	34.54	48.94	10,384	18.01	40.61	10,064	15.40	32.81	5,157	13.71	38.12	16,067	17.89	37.22
Book Value	14,282	3.98	15.08	6,942	12.08	26.61	10,384	8.05	22.22	10,064	4.90	16.18	5,157	5.29	19.52	16,067	7.06	20.10
Earnings	14,282	0.92	3.43	6,942	3.42	5.84	10,384	2.02	4.95	10,064	1.37	3.70	5,157	1.27	4.29	16,067	1.89	4.58
Goodwill	14,282	2.59	8.73	6,942	8.21	16.37	10,384	4.45	12.39	10,064	4.27	11.22	5,157	3.47	11.72	16,067	4.74	12.18
Impairment	14,282	0.02	0.10	6,942	0.04	0.13	10,384	0.02	0.10	10,064	0.03	0.12	5,157	0.02	0.09	16,067	0.03	0.12
Competitive Industry	14,282	0.83	0.37	6,942	0.80	0.40	10,384	0.83	0.37	10,064	0.82	0.39	5,157	0.83	0.37	16,067	0.82	0.38

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