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Advertising rivalry and discretionary disclosure

Chuchu Liang

The Paul Merage School of Business, University of California, Irvine, United States

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ABSTRACT

Advertising is a critical competitive tool that shapes interactions among firms in the product market. Using third-party tracked data on advertising outlet costs, I find that a nontrivial portion of public firms, even those with intense advertising activities, do not disclose advertising expenses in their financial statements, indicating significant disclosure discretion. I further use product category-level advertising data to develop a firm-specific measure of advertising rivalry. I predict and find that advertising rivalry is negatively associated with the likelihood of disclosing advertising expenses. This negative association is more pronounced when firms advertise on less trackable media outlets or have more mature products. These findings suggest that firms consider their advertising expenses proprietary and that concerns about advertising competition discourage the disclosure of advertising expenses.

1. Introduction

Advertising expenditures represent firms' strategic investments in attracting and retaining customers (Bagwell, 2007). Capital markets demand firms' disclosure of advertising expenses, as the information can be useful in assessing firms' current and future performance.[1] Moreover, advertising expenses are audited and can thus confirm information acquired by investors from other sources (Ball et al., 2012). US Generally Accepted Accounting Principles (GAAP) explicitly mandate that public firms disclose their advertising expenses.[2]

Despite the demand from investors and standard setters, a simple check reveals that nearly 70% of firm-years in Compustat lack advertising expense information. This study uses third-party tracked advertising data to examine the extent to which

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E-mail address: chuchu.liang@uci.edu.

[1] For example, after Apple stopped disclosing its advertising expenses in 2016, financial analysts noted that advertising expense information is useful in their analysis (https://www.businessinsider.com/apple-stopped-disclosing-ad-spend-2016-11). Appendix B also presents a positive association between advertising expenses and one-year-ahead operating income after controlling for third-party tracked advertising outlet costs, consistent with the view that advertising expenses contain incremental information about firm fundamentals.

[2] "The notes to financial statements shall disclose the total amount charged to advertising expense." See Accounting Standards Codification (ASC) 720-35 (FASB, 2010) based on Statement of Position (SOP) 93-7 (FASB, 1993).

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firms exercise discretion in disclosing advertising expenses and whether firms' strategic considerations about advertising rivalry explain this discretion.

This inquiry has two primary motivations. First, advertising expenditures are economically significant,[3] yet accounting research on advertising is limited, possibly due to the prevalence of missing advertising expenses in Compustat. Thus, the study aims to provide a more comprehensive understanding of advertising expense disclosures. Second, the study identifies advertising expenses as a considerable proprietary cost and explores its connection to a specific form of competition — advertising rivalry. By focusing on this dimension of competition, the study seeks to shed light on the link between advertising-related proprietary costs and a closely related form of disclosure — advertising expenses.

I use a proprietary dataset from a leading media-tracking company that estimates *advertising outlet costs* (i.e., costs in media outlets) in major media, including television, print, radio, outdoors, and digital, for the top 50,000 advertisers at the product category level. This dataset has three advantages. First, it enables me to distinguish firms that have advertising expenses but do not disclose them (i.e., nondisclosers) from those that simply do not have advertising expenses. Second, it allows me to proxy the lower bound of advertising materiality using advertising outlet costs, especially for nondisclosers. Third, it can be used to construct firm-level advertising rivalry measures that incorporate information from both public and private firms.

Using this dataset, I find that over 50% of firms with advertising activities do not disclose their advertising expenses, suggesting large disclosure discretion in practice. Furthermore, between 23% and 30% of firms do not disclose advertising expenses even when their tracked advertising outlet costs meet or exceed various common materiality thresholds (1% of sales, 5% of pretax income, or 1% of total assets).[4] This disclosure discretion, despite the explicit GAAP requirement, could be because (i) firms can choose their own materiality threshold and do not need to disclose the advertising information if they deem it immaterial,[5] (ii) penalties for noncompliance with the disclosure requirement may be low, or both.

I then investigate firms' strategic considerations about advertising rivalry to explain their nondisclosure of advertising expenses. Using the product category-level data on advertising outlet costs, I develop a firm-level measure of advertising rivalry. Conceptually, advertising rivalry can be captured by the intensity of a firm's competition with rivals who advertise in at least one overlapping product category. Intuitively, advertising rivalry is more intense when the firm faces a larger number of advertising rivals and competes more closely with them. Consistent with this intuition, I measure advertising rivalry as the weighted average number of a firm's advertising rivals in the economy, with the weight being the pairwise closeness between the focal firm and its advertising rival (see details of this measurement in Section 3.2.2).

I hypothesize that firms with more intense advertising rivalry are less likely to disclose their advertising expenses, as such disclosures could reveal proprietary information to their rivals. Advertising has a combative nature, and advertising rivals are likely to compete head-to-head (Bagwell, 2007). As a result, rivals may respond to a firm's disclosed advertising expenses with reciprocal advertising efforts, which in turn may reduce the disclosing firm's profits. Moreover, advertising expense disclosures could reveal operational-level proprietary information, such as the cost to design and produce an advertisement and discounts received from media outlets, which may harm the disclosing firm's competitiveness. When advertising rivalry is more intense, the potential harm of disclosure is likely to be greater, thus increasing the proprietary costs and decreasing the likelihood of disclosure.

Note that the above prediction may not be supported, as rivals may be able to estimate a firm's advertising expenses by tracking its ads or purchasing data on advertising outlet costs from third parties without relying on the firm's own disclosures. To the extent that rivals accurately estimate a firm's advertising expenses using information from other sources, the firm's disclosure decision becomes less consequential. However, outsiders can only track ads on publicly observable media outlets and estimate advertising outlet costs without considering proprietary information such as volume discounts. Moreover, outsiders do not have access to other advertising cost information, such as costs for designing ads (see detailed discussions in Section 2.3).

Using a sample of 29,869 firm-years with underlying advertising, I find a negative association between advertising rivalry and the likelihood of disclosing advertising expenses, after controlling for other disclosure costs and benefits documented in prior studies. In contrast, general product market competition measures are insignificant after controlling for industry effects, suggesting that advertising rivalry captures a distinct dimension of competition. The negative coefficient on advertising rivalry is economically meaningful. Notably, firms in the highest decile of advertising rivalry are 20.6% less likely to disclose advertising expenses than those in the lowest decile, which is 44.7% of the average likelihood of disclosure in the sample.

I further find that the negative association between advertising rivalry and disclosure is less pronounced when firms advertise on more trackable media outlets, consistent with the prediction that the proprietary cost is lower when outsiders

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[3] For example, public companies in the US spent an estimated $366 billion on advertising in 2019, comparable to the $429 billion invested in research and development (R&D) (IHS Markit, 2021; Wolfe, 2021).

[4] According to auditing standards, common materiality benchmarks include measures such as pretax income, sales, and assets (AU-C Section 320, AICPA, 2012). To gather further evidence on these benchmarks, I randomly selected 100 UK firms and reviewed their recent annual reports, as UK firms have been required to disclose materiality thresholds since 2013. I found that 50% of the UK firms used pretax income (usually 5% of pretax income) as their materiality benchmark, 20% used total assets (usually 1% of total assets), 10% used sales (usually 1% of sales), and the remaining 20% used other benchmarks such as net assets, EBITDA, or gross investments.

[5] Although the accounting standard on advertising (ASC 720-35) does not mention materiality, the FASB's Conceptual Framework implies that firms should consider materiality when making disclosure decisions (FASB, 2018).

(i.e., rivals or third-party companies) can more easily track firms' advertising. I also find that the negative association is more pronounced when firms have more mature products, consistent with the prediction that the proprietary cost is larger when advertising has a stronger business-stealing effect.

The negative association between advertising rivalry and disclosure is robust and consistent across a variety of additional tests. Specifically, the association remains negative after controlling for additional competition measures or alternative proxies for materiality. The results also hold when using variants of the advertising rivalry measure and an entropy balancing matched sample. Moreover, I find that advertising rivalry is negatively associated with advertising-related narrative disclosures, which corroborates the primary findings.

This study contributes to the literature on proprietary costs of disclosure by identifying advertising expenses as a novel source of proprietary information resulting from advertising rivalry. To accomplish this, I develop a measure of advertising rivalry that links advertising-related proprietary costs to advertising expenses, a closely related form of disclosure. Early studies often use industry competition measures to proxy for proprietary costs, but these measures have limitations that yield mixed results (e.g., Berger, 2011; Ali et al., 2014). Recent studies use more direct measures of proprietary costs, such as discussions of trade secrecy in 10-Ks, product disclosures, customer disclosures, redacted disclosures, or various regulatory shocks to the proprietary costs of disclosure, which largely overcome the limitations of industry-wide measures (e.g., Ellis et al., 2012; Cao et al., 2018; Glaeser, 2018; Li et al., 2018; Heinle et al., 2022). Adding to this literature, the measure of advertising rivalry does not suffer from the limitations of industry-wide competition measures or measurement error due to the omission of private firms. The findings indicate that the advertising rivalry measure, but not other competition measures based on similar revenue sources or products, explains firms' advertising expense disclosures after controlling for industry effects. This highlights the importance of aligning the dimension of competition with the disclosure outcome of interest.

The study also contributes to the literature on firms' discretion in *mandatory* disclosures that are subject to materiality judgments (e.g., Gleason and Mills, 2002; Rice and Weber, 2012; Ayers et al., 2015; Koh and Reeb, 2015). The finding that firms' concerns about advertising rivalry discourage the disclosure of advertising expenses is important, as these expenses can be material. Despite the GAAP disclosure requirement, I document widespread missing advertising expenses among firms with underlying advertising activities. Using third-party tracked advertising data, I find that the number of nondisclosers is nontrivial even when they have advertising outlet costs that meet or exceed conventional materiality thresholds. This disclosure discretion might introduce measurement errors, which has potential implications for investors and researchers when using firm-disclosed advertising data.

2. Literature review and hypothesis development

2.1. Literature on advertising expense disclosures

Despite the economic importance of advertising, there is limited research on firms' advertising in the accounting literature, perhaps due to data limitations.[6] Previous studies tend to use the Securities and Exchange Commission (SEC)'s Financial Reporting Release 44 (FRR 44) as a setting to examine the determinants of advertising expense disclosures. FRR 44 removed the bright-line materiality threshold for advertising expenses (i.e., 1% of sales) in 1994 (SEC, 1994). However, advertising expense disclosures are still considered mandatory after FRR 44, as they are required by US GAAP (Heitzman et al., 2010). The main change resulting from FRR 44 is that firms now have the discretion to determine their own materiality threshold for advertising expenses, whereas previously they had a universal threshold.

Heitzman et al. (2010) use advertising expense disclosures as a setting to draw general conclusions about the role of materiality in disclosure decisions. They proxy materiality using the advertising-to-sales ratio in the year before FRR 44 and show that firms with higher materiality were more likely to continue disclosure in the year after FRR 44. Simpson (2008) treats the post-FRR 44 period as a voluntary disclosure regime and finds that the likelihood of disclosing advertising expenses is positively associated with proxies for capital market benefits and negatively associated with proxies for proprietary costs arising from industry peers' free riding. Similarly, Shi et al. (2021) treat the disclosure of advertising expenses after FRR 44 as voluntary and find a herding effect, where firms' disclosure decisions are positively associated with their industry peers' disclosures. Using third-party tracked advertising data, my study complements prior studies by documenting the extent of missing advertising expenses at various materiality levels and identifying advertising expenses as a source of proprietary information related to competition with advertising rivals, rather than industry peers.

2.2. Literature on proprietary costs of disclosure

My study also relates to the literature on proprietary costs of disclosure. Early studies often use industry competition measures, such as industry concentration, to proxy for proprietary costs, but yield mixed results (Beyer et al., 2010; Berger, 2011). For example, Harris (1998) and Botosan and Stanford (2005) find support for the proprietary cost motive to

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[6] Early studies on the value relevance of advertising expenses have shown mixed results, perhaps due to the use of third-party versus firm-disclosed advertising data. The latter often has a high number of missing values (e.g., Hirschey, 1982; Hirschey and Weygandt, 1985; Bublitz and Ettredge, 1989; Lev and Sougiannis, 1996; Core et al., 2003).

withhold segment information, while Berger and Hann (2007) report mixed evidence. Bamber and Cheon (1998) find that firms in more concentrated industries provide less specific earnings forecasts, while Verrecchia and Weber (2006) show that firms in more concentrated industries are less likely to redact information in 10-Ks. One limitation of industry competition measures is measurement error due to the omission of private firms (Ali et al., 2009). Recent studies use census data to construct proxies for proprietary costs to overcome this limitation (e.g., Ali et al., 2014; Bens et al., 2011). Another limitation is that industry concentration neglects the multifaceted nature of competition and thus can be associated with either high or low competition (e.g., Sutton, 1991; Raith, 2003). To mitigate this limitation, Karuna (2007, 2010) use three industry-level variables (i.e., product substitutability, market size, and entry costs) to captures price competition, and Li (2010) constructs multiple industry-level measures to capture competition from both existing rivals and potential entrants.

Industry competition measures also lack the variation to capture disclosure-specific proprietary costs or explain within-industry patterns in firms' disclosure decisions (Heinle et al., 2022). Recent studies use more direct measures of proprietary costs that largely overcome these limitations. For example, Dedman and Lennox (2009) use a survey-based competition measure and find that managers withhold sales and cost information when competition is perceived to be high. Ellis et al. (2012) show that firms are more likely to conceal the identities of major customers when proxies for proprietary costs (e.g., R&D intensity) are high. Using the inevitable disclosure doctrine as a shock to proprietary costs, Li et al. (2018) find that firms in states with the doctrine are more likely to withhold their customers' identities. Glaeser (2018) finds that firms relying more on trade secrecy, as captured by references in 10-Ks and a regulatory shock to trade secret protection, are more likely to redact information in 10-Ks but increase earnings forecasts. Heinle et al. (2022) find that firms redacting disaggregated information in mandatory disclosures are more likely to increase voluntary disclosures of aggregated information such as earnings forecasts.

Several recent studies develop new measures of competition in specific dimensions, such as product market competition based on product similarity (Hoberg et al., 2014; Hoberg and Phillips, 2016), and technological competition based on patent similarity (Bloom et al., 2013; Ettredge et al., 2017; Cao et al., 2018). For example, Cao et al. (2018) develop a measure to capture peer pressure in technological competition and find a negative association between this measure and product-related disclosures. My study adds to the literature by developing a firm-level measure of advertising rivalry to link advertising-related proprietary costs and advertising cost disclosures.

2.3. Hypothesis development

Although, in theory, firms must disclose mandated information, a growing body of literature suggests that, in practice, they do not always disclose. For example, Gleason and Mills (2002) find that large industrial firms often fail to disclose Internal Revenue Service claims for tax deficiencies that exceed a conventional materiality threshold. Rice and Weber (2012) document that most restating firms do not report control weaknesses as required by Section 404 of the Sarbanes-Oxley Act. Ellis et al. (2012) find that many firms do not disclose identities of their major customers as mandated by the SEC. Ayers et al. (2015) document that a nontrivial portion of firms do not disclose permanently reinvested earnings as required by US GAAP. Koh and Reeb (2015) find that 42% of firms do not report R&D expenses, though over 10% of them receive patents.

Discretion in mandatory disclosures could be due to ambiguities in determining materiality. Like voluntary disclosures, managers trade off various benefits and costs of mandatory disclosures that are subject to materiality. For advertising expense disclosures, materiality judgments and potentially low noncompliance costs may make the disclosure decision *discretionary*, despite the explicit disclosure requirement.

Specifically, a clear-cut and enforceable materiality threshold is unlikely to exist for all firms due to several reasons.[7] (i) Regulators and standard setters have not defined a bright-line materiality threshold for advertising expenses since 1994. (ii) Determining materiality thresholds requires professional judgments from managers and auditors (Acito et al., 2009, 2019; FASB, 2018). (iii) Firms have discretion in classifying or aggregating financial statement items when complying with US GAAP (e.g., McVay, 2006). Therefore, outsiders cannot completely rule out the immateriality reason for nondisclosure. Even if advertising expenses are material, firms may choose not to disclose the information if potential costs of disclosure outweigh potential penalties for noncompliance. In addition, auditors may be less concerned about nondisclosure of advertising expenses, as it does not directly affect a firm's bottom line. A search of the SEC's comment letters reveals very few cases that require firms to provide advertising expenses, consistent with the possibility that regulators are largely unaware of or unconcerned about firms' noncompliance with this disclosure requirement.[8]

In this study, I examine whether firms' strategic considerations of advertising rivalry impact their disclosure of advertising expenses. The proprietary cost stemming from product market competition is arguably an important factor contributing to

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[7] Untabulated tests suggest that there is no materiality threshold above which *all* firms disclose advertising expenses in my sample. For example, even among firm-years in the top 1% of materiality proxies (*Kantar/Sales*, *Kantar/PI*, or *Kantar/AT*), the percentage of nondisclosers is still around 30%.

[8] I searched the comment letters (including companies' Correspondence) in the EDGAR database from 2003 to 2021, where 2003 was the first year comment letters became available on EDGAR. Of these letters, approximately 0.3% mention the keyword "advertising expense" or "advertising cost." In most cases, the SEC asked the firms to disclose advertising expenses without specifying the reasons. For example, the SEC asked Regal Entertainment Group in a comment letter: "Please disclose the total amount of advertising expense recognized for each reporting period for which you have provided a consolidated statement of income."

the high proportion of nondisclosure. As competition is multifaceted, I focus on advertising rivalry, particularly because it aligns with the disclosure of interest.

Disclosing advertising expenses could have proprietary costs, as advertising rivals may use the disclosed information to compete against the disclosing firm. First, rivals may respond to a firm's advertising expenses with more aggressive advertising of their own. Prior findings in economics and marketing suggest that, on average, advertising imposes net negative externalities on rivals as advertising has a business-stealing effect, that is, it redistributes the market share by attracting customers from rivals (e.g., Lambin, 1976; Netter, 1982; Erickson, 1985; Eckard, 1987; Dekimpe and Hanssens, 1995). Therefore, rivals have an incentive to respond to a firm's advertising with reciprocal advertising, which in turn reduces the firm's profits. Second, the deterrence effect of using advertising to deter rivals is rather limited. Unlike other strategic investments, such as R&D, it is relatively easy for rivals to adjust their advertising. Therefore, on average, advertising has a combative nature and advertising rivals are likely to compete head-to-head (Bagwell, 2007). Third, disclosure could reveal proprietary operational information, such as the cost to design and produce ads and discounts received from media outlets, which may harm the disclosing firm's competitive position. Proprietary costs of disclosing advertising expenses could be broader than the revelation of advertising expenses per se, as the revealed information could be used by competitors to work out other important financial statement items.[9]

I posit that proprietary costs increase with advertising rivalry. When a firm faces greater advertising rivalry, it has a larger number of advertising rivals and competes more closely with them. As a result, the disclosure of advertising expenses may impose greater harm on the disclosing firm's competitiveness. Holding other disclosure costs and benefits constant, I predict that firms facing more intense advertising rivalry are less likely to disclose advertising expenses in their financial statements. This prediction is in line with previous analytical models that examine the relationship between discretionary disclosure and competition (e.g., Verrecchia, 1983; Darrough, 1993; Clinch and Verrecchia, 1997).

Based on the above discussion, I develop the following hypothesis (in alternative form).

H1: Firms with more intense advertising rivalry are less likely to disclose advertising expenses in their financial statements.

This prediction may not be supported because, to the extent that rivals can accurately estimate a firm's advertising expenses using information from other sources (including the data used in this study), the firm's disclosure decision becomes less consequential. However, there are two key differences between advertising data tracked by outsiders (e.g., rivals or media-tracking companies) and advertising expenses disclosed by firms. First, outsiders can only track advertising outlet costs. They can track ads on publicly observable media outlets, but others, such as direct mail (where ads are directly sent to targeted customers) or cooperative advertising (where ads are placed by other parties with whom the firm has cooperative agreements), are too expensive to track.[10] Estimating advertising outlet costs is also difficult because media-tracking companies usually track firms' ad volume on media outlets and multiply the volume with a standard rate, without considering firms' volume discounts or sales commissions.[11] Moreover, the estimated advertising outlet costs are just a subset of firms' advertising expenses, as advertising production costs (e.g., costs for designing ads) are unknown. Second, firm-disclosed advertising expenses are audited and considered credible, providing confirmation for rivals' information from other sources (Ball et al., 2012).

To further test the proprietary cost hypothesis, I examine the heterogeneity in the effect of advertising rivalry when the proprietary cost arising from this rivalry is expected to vary. First, I posit that the proprietary costs of disclosing advertising expenses are lower when firms advertise on more trackable media outlets. Specifically, when firms advertise on fewer or less-diversified media outlets, it tends to be less costly for their rivals to estimate their advertising expenses, either by tracking the ads directly or purchasing the data. Additionally, a national media outlet is easier to track than a local one because the former allows a wider audience, including geographically distant rivals, to follow the ads (e.g., Gentzkow and Shapiro, 2008; Gurun and Butler, 2012). Thus, I expect firms to be less concerned about proprietary costs from advertising rivalry when they advertise on more trackable media outlets.

H2: The negative association between advertising rivalry and the likelihood of disclosing advertising expenses is less pronounced when firms advertise on more trackable media outlets (as proxied by fewer, less-diversified, or national media outlets).

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[9] For example, in response to the SEC's request to disclose advertising expenses, Regal Entertainment Group argued that doing so would allow its competitors to figure out film costs, which could harm its competitiveness. These proprietary cost concerns are not directly relevant to advertising rivalry and are outside the scope of this study, for which I try to control by including other competition measures in the analyses.

[10] Gow et al. (2018) argue that frictions, such as search costs, prevent capital and labor markets from fully obtaining information about directors' past directorships from sources other than SEC filings, even though directors' information is available through other sources, such as third-party data vendors. In a similar way, my study argues that search costs prevent product market participants from fully obtaining advertising-related information.

[11] For example, the manual of Kantar Media notes: "Expenditures are the dollars attributed to the given amount of advertising. Expenditures do not take into account volume discounts or sales commissions" (http://products.kantarmediana.com/documents/AdSpenderManual.pdf, p. 10).

Research in economics and marketing suggests that the impact of advertising on rivals varies across the product life cycle. Specifically, when a product is new, advertising is more likely to attract new customers, expanding market-wide demand and mitigating the business-stealing effect (e.g., Roberts and Samuelson, 1988; Tremblay and Tremblay, 2005). On the other hand, when a product is mature and well-known to customers, advertising primarily "steals" rivals' customers and has little impact on market-wide demand (e.g., Dekimpe and Hanssens, 1995). Thus, I expect firms to be more concerned about proprietary costs from advertising rivalry when they have more mature products.

H3: The negative association between advertising rivalry and the likelihood of disclosing advertising expenses is more pronounced when firms have more mature products.

3. Sample data and variable measurement

3.1. Advertising data

I use third-party estimated advertising outlet costs to proxy for firms' advertising expenses. The advertising data are provided by Kantar Media (hereinafter Kantar), an industry-leading media-tracking company.[12] Kantar estimates advertising outlet costs in two steps: it tracks firms' advertisement occurrences in major media outlets, including TV, print, radio, outdoors, and digital, and then multiplies each advertisement occurrence by its related rate provided by media outlets to obtain an estimated dollar amount. Kantar has been used as a standard data source for advertising outlet costs in the economics and marketing literature for more than two decades.[13,14]

I obtained data from Kantar at the firm-product category-quarter level for the top 50,000 advertisers. This comprehensive coverage allows me to capture firms' advertising rivalry, including both public and private rivals. To use the Kantar data at the firm-year level, I aggregate Kantar-tracked advertising outlet costs across product categories for each firm-quarter, and then sum up the outlet costs for four quarters preceding the fiscal year-end for a given firm-year.

Kantar-tracked advertising costs differ from firm-disclosed advertising expenses in that Kantar only tracks and estimates advertising outlet costs. Untabulated results show that, in the subset of firms that disclose advertising expenses, Kantar-tracked costs average 47.0% of firm-disclosed advertising expenses. The difference is mainly due to (i) costs for designing and producing ads, (ii) costs of advertising unobservable to the public, and (iii) volume discounts or sales commissions in advertising outlet costs.[15] I use Kantar-tracked advertising outlet costs to proxy for firms' advertising expenses, assuming they are highly correlated.[16] One caveat is that, like other media-tracking companies, Kantar does not cover all media outlets. I acknowledge that my results may not be generalizable to firms that primarily engage in non-trackable advertising activities.

3.2. Research design

3.2.1. Model specification

I examine whether firms with greater advertising rivalry are less likely to disclose advertising expenses. Specifically, I estimate the following linear probability model[17]

$$Disclosure_{ijt} = \alpha + \beta_1 AdRivalry_{it} + \boldsymbol{X}_{ijt} + \lambda_{jt} + \varepsilon_{ijt} \tag{1}$$

where *Disclosure* is the disclosure decision for firm i in industry j at the end of year t, *AdRivalry* is the advertising rivalry measure for firm i in year t, and $\boldsymbol{X}$ is a vector of control variables. *Industry* (at the two-digit SIC level) $\times$ *Year* fixed effects (i.e., λ)

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[12] Kantar Media belongs to Kantar Group, a leading market research company. Kantar Group is a private company that was sold by WPP to Bain Capital in 2019, and generates revenues by providing data and services to clients (https://www.kantarmedia.com/us/about). My advertising dataset is obtained from its main product *Ad$pender* (http://products.kantarmediana.com/documents/AdSpenderManual.pdf).

[13] Kantar Media was known as TNS Media from 2000 to 2008, before it was acquired by Kantar. Before 2000, it was known in the literature as Competitive Media Reporting (CMR) or Leading National Advertisers (LNA).

[14] The marketing literature has realized the limitations of firm-disclosed advertising expenses and thus uses third-party tracked advertising data to proxy for advertising expenses (e.g., Rogers and Tokle, 1995; Rao et al., 2004; Luo and Donthu, 2006; Hanssens et al., 2009; Kim and McAlister, 2011). One common misunderstanding in marketing studies is that they view the disclosure of advertising expenses as purely voluntary after FRR 44.

[15] Kantar estimates advertising outlet costs without factoring in volume discounts or sales commissions, which may introduce measurement errors, especially for firms with stronger bargaining power with media outlets. To mitigate this concern, I conduct robustness tests and find that results are robust for firms with higher-than-median bargaining power (proxied by firm size and Kantar-tracked advertising outlet costs) (untabulated).

[16] The assumption is reasonable, as Kantar-tracked advertising outlet costs and firm-disclosed advertising expenses are highly correlated at 0.8 in the subset of firms that disclose advertising expenses.

[17] Consistent with prior research (e.g., Law and Zuo, 2021; Gul et al., 2013), I use an ordinary least squares (OLS) model to avoid the "quasi-complete separation" issue that can arise in a logistic or probit model with fixed effects. Specifically, this issue occurs when *Disclosure* does not vary within certain industry-years due to a low number of observations, which prevents the logistic or probit model from estimating coefficients. In addition, OLS coefficient estimates remain unbiased for binary dependent variables, especially in large samples (Wooldridge, 2010). Nevertheless, I rerun the tests using the probit model and find robust results.

are included in the regressions to control for industry-year factors that may affect firms' advertising expense disclosures.[18] All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered by firm (Petersen, 2009).[19] My first hypothesis predicts a negative coefficient on *AdRivalry* ($\beta_1 < 0$).

3.2.2. Variables of advertising rivalry

Many prior studies have used the number of industry peers to capture the intensity of industry competition. I adopt a similar approach and construct a measure of advertising rivalry as *the weighted average number of advertising rivals* in the following three steps.

First, I identify a firm's advertising rivals as those firms that advertise in at least one common product category with the focal firm. Kantar classifies 924 product categories, which is more granular than the four-digit SIC (there are about 454 four-digit SIC industries in Compustat). Advertising rivals can differ from rivals in other dimensions. For example, Apple, Inc. is mainly a manufacturer, with an SIC of 3571, while Amazon.com, Inc. is mainly an online retailer, with an SIC of 5961. Apple and Amazon are not considered industry rivals because they are from different economic sectors, but they are advertising rivals because they advertise in at least one common product category, such as tablet computers.

Second, I measure how closely two firms compete in advertising by calculating the pairwise cosine similarity between firm i and firm j's vectors in year t: $S_{it} = (S_{it,1}, S_{it,2}, ..., S_{it,k}, ..., S_{it,924})$ and $S_{jt} = (S_{jt,1}, S_{jt,2}, ..., S_{jt,k}, ..., S_{jt,924})$, where the kth element of each vector ($S_{it,k}$ or $S_{jt,k}$) equals the firm's *ratio* of its Kantar-tracked advertising outlet costs in product category k to its total Kantar-tracked advertising outlet costs[20]

$$w_{ijt} \equiv \cos(\theta_{ijt}) = \frac{S_{it}S'_{jt}}{\sqrt{S_{it}S'_{it} \times S_{jt}S'_{jt}}} = \frac{\sum_{k=1}^{K} S_{it,k}S_{jt,k}}{\sqrt{\sum_{k=1}^{K} S_{it,k}^2}\sqrt{\sum_{k=1}^{K} S_{jt,k}^2}}.$$

Third, I calculate the sum of pairwise similarities between firm i and all J other firms in year t, where the economy comprises all firms covered by Kantar (i.e., the top 50,000 advertisers in year t, including both public and private firms). I then take the natural logarithm to arrive at a firm-year level measure (a numerical example is provided in Appendix C):

$$AdRivalry_{it} = \log\left(1 + \sum_{j=1}^{J} w_{ijt}\right).$$

In addition, I construct several variants of *AdRivalry* based on different sets of rivals. $AdRivalry_{it}^{public}$ is the total advertising similarity summed over public rival firms. $AdRivalry_{it}^{[x,y]}$ is the total advertising similarity summed over the set of public rivals with pairwise similarity scores in the percentile range of [x, y]. For example, $AdRivalry_i^{[0,2]}$ is measured as the sum of pairwise similarity scores between firm i and its top 2% closest public rivals. I examine $AdRivalry_{it}^{[x,y]}$ for peers in the percentile ranges of [0,2], [3,5], and [6100], following Hoberg and Phillips (2016), who find that their product text-based competitive measure has the most significant explanatory power when the measure includes peers in the percentile range of [0,2] or [3,5]. Hoberg and Phillips (2016)also indicate that approximately 2% of firm pairs belong to the same three-digit SIC classification. Therefore, $AdRivalry_i^{[0,2]}$ considers the focal firm's closest 2% advertising rivals that have a degree of similarity comparable to the three-digit SIC industry peers.

3.2.3. Other variables

The dependent variable *Disclosure* is a dummy variable that equals one if a given firm discloses its advertising expenses in financial statements (either on the face or in the footnotes) for a given year. Empirically, *Disclosure* = 1 if the value of firm-disclosed advertising expenses (*xad*) is nonmissing in Compustat for a given firm-year, and = 0 otherwise.[21,22]

To control for the materiality of advertising expenses, I use two proxies following Heitzman et al. (2010): (i) advertising-to-sales ratio (*Kantar/Sales*), which is estimated using Kantar-tracked advertising outlet costs to proxy for advertising expenses, and (ii) informativeness of advertising expenses, which is proxied by earnings response coefficients (*ERC*). I also use two alternative proxies in additional analyses: advertising-to-pretax income (*Kantar/PI*) and advertising-to-total assets (*Kantar/AT*).

To separate the effect of advertising rivalry from general product market competition, I follow Li (2010) to construct three competition measures at the four-digit SIC industry-year level: competition from existing rivals (*ExistComp*), competition from potential entrants (*EntrantComp*), and industry profitability (*IndProfitability*). In additional analyses, I further control for other competition measures, including: (i) sales similarity (*SalesSimilarity*), which captures similarities in revenue sources

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[18] Results are robust to using other industry classifications, like Fama-French 48 or four-digit SIC level industries.

[19] Results are robust to clustering standard errors by industry or by firm and year (untabulated).

[20] I assume the distribution of a firm's Kantar-tracked advertising outlet costs across product categories is the same as the distribution of its underlying advertising expenses across product categories.

[21] A manual check of a random sample of 150 firms' 10-Ks suggests a high accuracy rate (>95%) for firms' advertising expenses recorded in Compustat.

[22] 24 firm-years (0.08% of my sample) have *xad* = 0, for which *Disclosure* is coded 0. Results are almost identical if coding *Disclosure* = 1 for these cases.

between firms; (ii) product similarity (*ProductSimilarity*), which captures similarities in firms' product descriptions in 10-Ks (Hoberg and Phillips, 2016); and (iii) product fluidity (*ProductFluidity*), which captures similarities between a firm's product descriptions and the changes in its rivals' product descriptions (Hoberg et al., 2014).[23]

The agency costs explanation can be an important alternative explanation to the proprietary cost hypothesis. Agency costs arise when return on advertising falls below investors' expectations. Since profits derived from advertising are not directly observable, I use return on sales as a proxy for return on advertising, as sales and advertising expenses are positively related.[24] Following prior studies (e.g., Berger and Hann, 2007), I use abnormal return on sales (*AbROS*) as a proxy for agency costs. *AbROS* is calculated as a firm's return on sales minus the industry median for a given year. A higher *AbROS* indicates lower agency costs.

I further control for the following variables related to disclosure costs and benefits documented in prior studies (e.g., Li, 2010; Ali et al., 2014; Merkley, 2014; Cao et al., 2018): (i) direct costs of financial reporting due to operating complexity, proxied by the number of business segments (*NumSegment*); (ii) capital market incentives for disclosure, including firm size (*LogMV*), leverage (*Leverage*), market-to-book (*MB*), profitability (*ROA*), volatility of stock returns (*StdRet*), volatility of earnings (*StdEarn*), new issuance of equity or debt (*NewIssue*), analyst following (*Analyst*), percentage of institutional ownership (*InstOwnership*), Big Four auditor (*Auditor*), and an indicator of industries with high litigation risk (*Litigation*); (iii) reporting and disclosure quality, including firms' overall disclosure quality proxied by the logarithm of the number of nonmissing items in Compustat (*LogNonMissing*) (Chen et al., 2015) and firms' accruals quality proxied by performance-matched discretionary accruals (*PMDAccruals*) (Kothari et al., 2005); and (iv) industry peer effects on disclosure, proxied by the proportion of industry peers that disclose advertising expenses (e.g., Koh and Reeb, 2015) (*PeerDisclosure*).

To test and H3, I construct variables to capture media trackability and product maturity. Specifically, media trackability is measured by three proxies using the Kantar data[25]: the number of media outlets (*MediaNumber*), the concentration of media outlets based on the Herfindahl-Hirschman Index (*MediaHHI*), and an indicator for whether a firm advertises on national media (*National*). I use product life cycle to measure product maturity, as a product is considered more mature when it reaches a later stage of the cycle. Since a firm can operate in multiple product markets, I construct three proxies for product life cycle at the firm-year level by aggregating industry-segment life cycle measures. (i) *ProdMaturity1* is a composite measure based on three firm-specific life cycle indicators: firm age, sales growth, and dividend payout ratio, following Anthony and Ramesh (1992). (ii) *ProdMaturity2* is a composite measure based on two industry-level life cycle indicators: industry sales growth and industry new entry rate, following Parsons (1975). (iii) *ProdMaturity3* is based on the signs of cash flows, following Dickinson (2011). Please see for detailed descriptions of these variables.

3.3. Sample

Panel A of Table 1 presents the sample selection. I begin with firm-years covered by the Compustat/CRSP population (with positive sales and total assets) over 26 years, 1995−2020.[26] I then merge firms from Compustat/CRSP with those covered by Kantar via firm names.[27] This distinguishes nondisclosers in my sample from firms that simply do not have advertising. This results in an initial sample of 42,056 firm-years for 5296 distinct firms. Following prior studies (e.g., Simpson, 2008; Koh and Reeb, 2015; Hoberg and Phillips, 2016), I exclude firms from financial industries because of their different reporting environments.[28] I then drop observations with missing values for key variables, resulting in a final sample of 29,869 firm-years for 3955 distinct firms. My main sample represents 21% of firm-years in the Compustat/CRSP population (= 29,869/145,297).[29]

Panel B of Table 1 reports the sample distribution by disclosure choice. Column (1) reports the percentage of firm-years that do not disclose advertising expenses. Columns (2) and (3) report the percentage of firm-years with disclosed advertising expenses (*xad*)$\geq$1% of sales and <1% of sales, respectively. 1% of sales is used as the cutoff because this was the bright-line materiality threshold for advertising expenses required by the SEC before FRR 44. As shown in Row (1), 66.62% of firm-years in the Compustat/CRSP population have missing values in advertising expenses, and 20.34% (13.04%) have disclosed advertising expenses $\geq$ (<) 1% of sales. As shown in Row (2), over half (53.92%) of firm-years in my main sample (i.e., firms

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[23] Hoberg and Phillips generously share *ProductSimilarity* and *ProductFluidity* at www.hobergphillips.usc.edu.

[24] We might also estimate return on advertising as the coefficient from rolling regressions of profits on advertising, controlling for other profit drivers, but this measure is noisy and has many missing values. Nevertheless, my results are robust to using return on advertising estimated from seven-year rolling regressions (untabulated).

[25] Advertising media outlets are classified by Kantar into 18 types, namely network television, spot television, cable television networks, syndicated television, Spanish-language network television, local radio, national spot radio, network radio, magazine, Sunday magazine, local magazine, Spanish-language magazine, business publication, newspaper, national newspaper, Spanish-language newspaper, outdoor, and internet display.

[26] The sample starts in 1995 because SOP 93-7, the first universal accounting standard on advertising expenses, became effective in June 1994. Before this, advertising data were less comparable as firms had significant flexibility in choosing to capitalize or expense the costs (see Item 21, SOP 93-7).

[27] For each firm in Compustat/CRSP, I use a fuzzy matching algorithm in SAS to identify potential name matches from Kantar. Then, I manually verify the candidate matches and retain the accurate ones. Additionally, for each unmatched firm in Compustat/CRSP, I manually search for the firm name keyword in Kantar and retain the accurate ones. If the Compustat firm is a parent or subsidiary of a Kantar-tracked firm, I discard it to ensure that Kantar-tracked advertising data and firm-disclosed advertising expenses correspond to the same level of firms.

[28] Results are robust to including firms from financial industries (see Appendix D for details).

[29] The total market value (total assets, or total sales) of the final sample firms represents 60% (56%, or 56%) of that of the Compustat/CRSP population, excluding financial industries (untabulated).

Table 1

Sample selection and description.

This table reports the sample selection and description. Panel A reports the sample selection. Panel B reports the sample distribution by disclosure type for five samples: (1) Compustat/CRSP population (excluding financial industries, with positive sales and total assets), (2) the main sample, (3) a subsample of firms with a materiality benchmark of *Kantar/Sales*≥1%, (4) a subsample of firms with a materiality benchmark of *Kantar/PI*≥5%, and (5) a subsample of firms with a materiality benchmark of *Kantar/AT*≥1%. Panel C reports the sample distribution by industry sector defined by two-digit SIC and the percentage of disclosers within each sector. Panel D reports the sample distribution by fiscal year, the percentage of disclosers and the percentage change in disclosure from year to year. The percentage of firms with a change in disclosure (*ΔDisclosure*≠0) is the proportion of firms that changed their advertising disclosure decision from one year to the next, either from non-disclosure to disclosure, or vice versa. Please see Appendix A for variable definitions.

Panel A: Sample Selection

Selection Criteria	#Firms	#Firm-years
Observations that are covered by Compustat/CRSP during fiscal years 1995−2020 (with positive sales and total assets)	16,032	145,297
Less: Observations with non-missing Kantar	(10,736)	(103,241)
Less: Observations from financial industries (SIC4: 6000−6799)	(822)	(8005)
Less: Observations with missing data on key variables	(519)	(4182)
Final Sample	3955	29,869

Panel B: Sample Distribution by Disclosure Decision

		% of Firms with *Disclosure = 0*	% of Firms with *Disclosure = 1*	
		(1)	(2) Adv/Sale≥1%	(3) Adv/Sale <1%
(1)	Compustat/CRSP Population	66.62	20.34	13.04
(2)	My main sample (29,869 firm-years)	53.92	31.27	14.81
(3)	Subsample with *Kantar/Sales* ≥ 1%	25.61	71.56	2.83
(4)	Subsample with *Kantar/PI* ≥ 5%	28.32	62.92	8.76
(5)	Subsample with *Kantar/AT* ≥ 1%	23.67	72.75	3.58

Panel C: Sample Distribution by Industry Sectors

Two-digit SIC	N	%	% in Compustat/CRSP	*Disclosure* (%)
	(1)	(2)	(3)	(4)
Agriculture and Forestry (01−09)	83	0.28	0.41	36.14
Mining (10−14)	595	1.99	5.85	2.86
Construction (15−17)	583	1.95	1.36	43.40
Manufacturing (20−39)	14,119	47.27	48.44	43.61
Transportation and Communications (40−49)	3503	11.73	11.48	28.69
Wholesale (50−51)	1054	3.53	3.94	29.98
Retail (52−59)	3428	11.47	7.02	80.66
Services (70−88)	6421	21.50	21.31	49.99
Other	83	0.28	0.19	12.05
Full Sample	29,869	100.00	100.00	46.08

Panel D: Sample Distribution by Fiscal Year

Year	N	*Disclosure* (%)		% of Firms with Δ*Disclosure*≠0	
		My Sample	Compustat/CRSP	My Sample	Compustat/CRSP
	(1)	(2)	(3)	(4)	(5)
1995	791	26.42	15.81	11.13	9.07
1996	836	30.02	18.63	5.74	4.00
1997	921	31.49	20.05	3.37	3.23
1998	1513	26.24	21.07	3.04	2.79
1999	1483	29.94	25.08	3.57	4.09
2000	1476	33.20	28.76	3.79	4.88
2001	1431	38.85	31.10	5.59	4.73
2002	1342	42.10	33.53	4.25	4.90
2003	1276	45.77	36.24	5.33	5.26
2004	1237	51.25	39.02	5.17	4.81
2005	1209	52.11	39.78	2.73	3.57
2006	1175	53.19	40.66	2.72	2.95
2007	1132	52.74	40.95	2.39	3.08
2008	1108	53.97	41.68	1.35	2.36
2009	1054	54.36	41.19	1.90	2.11
2010	1063	51.46	40.73	2.45	2.77
2011	1048	51.43	40.42	1.91	2.34
2012	1068	50.75	39.70	1.59	1.84
2013	1075	52.09	39.58	1.86	2.16
2014	1097	52.42	39.96	1.82	2.68
2015	1113	54.00	40.19	1.71	2.25
2016	1081	54.58	39.44	1.94	2.34
2017	1062	54.43	39.31	0.94	1.86

Table 1 (*continued*)

Panel D: Sample Distribution by Fiscal Year					
Year		*Disclosure* (%)		% of Firms with Δ*Disclosure* ≠ 0	
	N	My Sample	Compustat/CRSP	My Sample	Compustat/CRSP
	(1)	(2)	(3)	(4)	(5)
2018	1091	54.63	38.87	1.10	1.92
2019	1097	53.78	39.12	1.55	2.07
2020	1090	55.23	39.33	1.93	1.90
Full Sample	29,869	46.08	33.38	3.08	3.52

with tracked advertising) do not disclose advertising expenses, and 31.27% (14.81%) have disclosed advertising expenses ≥ (<) 1% of sales.[30] Rows (3) to (5) show that the percentage of nondisclosers remains between 23.67% and 28.32% for firm-years with Kantar-tracked advertising outlet costs equal to or greater than common materiality thresholds (1% of sales, 5% of pretax income, and 1% of total assets). Overall, missing advertising expenses are prevalent among firms listed in the US and the percentage of nondisclosers is nontrivial, even among firms with tracked advertising outlet costs that meet or exceed conventional materiality thresholds.

Panel C of Table 1 presents the sample distribution by industry sector defined at the two-digit SIC level. Column (1) shows that manufacturing has the highest representation (47.27%), followed by services (21.50%) and transportation and communications (11.73%). Columns (2) and (3) show that the distribution by industry is comparable to that of the Compustat/CRSP universe. Column (4) shows that retail has the highest disclosure proportion, while mining has the lowest proportion.

Panel D of Table 1 presents the sample distribution by fiscal year. Column (1) shows the number of firms in each year. Columns (2) to (3) indicate that the percentage of firms disclosing their advertising expenses slightly increases over time in both my sample and the Compustat/CRSP universe. Columns (4) and (5) report the percentage of firms that changed their disclosure decisions from the previous year (either from nondisclosure to disclosure or vice versa). A relatively high percentage of firms changed their disclosure from 1994 to 1995, which is likely due to FRR 44's removal of the bright-line materiality threshold.[31] In my sample, 3.08% of firm-years have non-zero changes in *Disclosure*, which is comparable to that in the Compustat/CRSP universe.

4. Empirical results

4.1. Descriptive statistics

Panel A of Table 2 presents summary statistics for the variables. 46.1% of firm-years with underlying advertising disclose their advertising expenses. *AdRivalry* is, on average, much larger than *AdRivalry*[public], suggesting that private firms are a non-negligible source of competitive pressure. On average, *AdRivalry*[0,2] is larger than *AdRivalry*[3,5] and *AdRivalry*[6,100], which is consistent with the notion that advertising rivalry from close rivals is more intense than that from distant rivals. On average, firms advertise on 5.07 media outlets (*MediaNumber*), have a media concentration index of 0.65 (*MediaHHI*), and advertise on national media 43.8% of the time (*National*). Summary statistics for other variables, including control variables and product life cycle indicators, are comparable to those in prior studies (e.g., Heitzman et al., 2010; Li, 2010; Ali et al., 2014; Anthony and Ramesh, 1992; Dickinson, 2011; Cantrell and Dickinson, 2020).

Panel B of Table 2 presents Pearson (Spearman) pairwise correlations among competition measures above (below) the diagonal. The correlations between *AdRivalry* and other competition measures are relatively low (≤ 0.19), which is consistent with the expectation that *AdRivalry* captures a distinct dimension of competition. Untabulated results indicate that the correlations between *AdRivalry* and other independent variables are also relatively low.

4.2. Advertising rivalry and likelihood of disclosing advertising expenses (testing H1)

Table 3 reports the results of estimating Equation (1). Column (1) presents the results without any control variables or fixed effects. Column (2) includes control variables and year fixed effects but does not include industry effects. Column (3) additionally controls for industry effects, which include industry-year fixed effects and *PeerDisclosure* to capture industry disclosure conventions. The coefficient on *AdRivalry* is negative and statistically significant at the 1% level in all three columns, consistent with H1. Moreover, the coefficients on *AdRivalry* barely change after adding controls and industry-year fixed effects, suggesting that it is less likely that an omitted variable is driving the results. The findings are also economically meaningful. For instance, Column (3) shows that a one standard deviation increase in *AdRivalry* corresponds to a 6.7% (= 0.049 × 1.360) decrease in the likelihood of disclosing advertising expenses, comparable to the effect sizes of the materiality proxies *Kantar/Sales* (1.328 × 0.029 = 3.9%) and *ERC* (0.002 × 7.923 = 1.6%).

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[30] For comparison, about 38% of firm-years in my sample have missing R&D expenses.
[31] Results are robust to excluding observations in 1995 (untabulated).

Table 2

Descriptive statistics.

This table reports the descriptive statistics for the sample. Panel A reports summary statistics for the variables. Panel B reports pairwise Pearson (Spearman) correlations for the competition measures above (below) the diagonal. Please see for variable definitions.

Panel A: Summary Statistics (N = 29,869)

	Mean	STD	p10	p25	p50	p75	p90
Dependent Variable							
Disclosure	0.461	0.498	0.000	0.000	0.000	1.000	1.000
Advertising Rivalry Variables							
AdRivalry	5.359	1.360	3.398	4.457	5.486	6.400	7.037
AdRivalry^{Public}	2.894	1.230	1.227	2.006	2.885	3.865	4.504
AdRivalry$^{[0,2]}$	2.628	0.987	1.201	1.947	2.741	3.462	3.788
AdRivalry$^{[3,5]}$	1.261	1.417	0.000	0.006	0.536	2.502	3.583
AdRivalry$^{[6,100]}$	0.753	1.208	0.000	0.000	0.034	1.127	2.854
Advertising Media Trackability Proxies							
MediaNumber	5.067	4.200	1.000	2.000	4.000	7.000	12.000
MediaHHI	0.646	0.293	0.254	0.372	0.622	0.988	1.000
National	0.438	0.496	0.000	0.000	0.000	1.000	1.000
Other Competition Variables							
ExistComp	1.215	1.415	−0.589	−0.023	1.126	2.340	3.313
EntrantComp	−1.171	1.982	−4.187	−2.136	−0.281	0.265	0.459
IndProfitability	−0.141	0.762	−0.892	−0.436	−0.044	0.261	0.594
SalesSimilarity	3.389	1.437	1.490	2.319	3.319	4.432	5.347
ProductSimilarity	3.060	4.991	1.020	1.125	1.561	3.018	5.956
ProductFluidity	6.063	2.950	2.760	3.911	5.578	7.585	10.094
Other Control Variables							
Kantar/Sales	0.010	0.029	0.000	0.000	0.001	0.006	0.025
Kantar/PI	0.169	0.539	0.000	0.002	0.011	0.078	0.347
Kantar/AT	0.010	0.029	0.000	0.000	0.001	0.006	0.025
ERC	2.715	7.923	−2.541	−0.227	1.083	4.169	10.151
AbROS	−0.024	0.349	−0.133	−0.024	0.016	0.064	0.151
NumSegment	2.249	1.486	1.000	1.000	2.000	3.000	4.000
LogMV	7.129	2.212	4.099	5.638	7.189	8.684	9.986
Leverage	0.247	0.211	0.000	0.061	0.227	0.370	0.520
MB	3.303	5.367	0.734	1.309	2.182	3.844	7.032
ROA	0.012	0.159	−0.108	−0.003	0.042	0.081	0.126
StdEarn	0.069	0.111	0.008	0.015	0.031	0.073	0.160
StdRet	0.125	0.081	0.051	0.070	0.103	0.154	0.228
NewIssue	0.925	0.263	1.000	1.000	1.000	1.000	1.000
Litigation	0.400	0.490	0.000	0.000	0.000	1.000	1.000
Analyst	9.276	9.491	0.000	1.000	6.000	15.000	23.000
InstOwnership	0.610	0.300	0.122	0.394	0.675	0.849	0.952
Auditor	0.834	0.372	0.000	1.000	1.000	1.000	1.000
LogNonMissing	5.719	0.139	5.505	5.613	5.762	5.832	5.872
PMDAccruals	−0.008	0.120	−0.134	−0.055	−0.003	0.046	0.115
PeerDisclosure	0.338	0.227	0.024	0.146	0.325	0.501	0.667
Indicators for Product Life Cycle (four-digit SIC industry level)							
Ind_Med_Age	13.016	9.971	3.750	6.000	10.000	17.047	26.229
Ind_Med_SalesGrowth	0.108	0.095	0.015	0.047	0.089	0.143	0.230
Ind_Med_DividendPayout	7.625	16.484	0.000	0.000	0.000	6.199	27.253
Ind_SalesGrowth	0.087	0.110	−0.023	0.022	0.066	0.131	0.232
Ind_NewEntryGrowth	−0.002	0.071	−0.082	−0.045	0.000	0.022	0.086
Ind_CF_LifeCycle	2.302	0.746	1.000	2.000	2.152	3.000	3.000

Panel B: Pearson (Spearman) Pairwise Correlation of Competition Measures Above (Below) the Diagonal

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	AdRivalry		0.159	0.114	−0.112	0.186	−0.005	0.101
(2)	ExistComp	0.161		−0.196	−0.240	0.784	0.284	0.350
(3)	EntrantComp	0.107	−0.216		0.102	−0.401	−0.154	−0.203
(4)	IndProfitability	−0.096	−0.274	0.076		−0.242	−0.072	−0.181
(5)	SalesSimilarity	0.174	0.783	−0.417	−0.283		0.315	0.420
(6)	ProductSimilaity	0.126	0.431	−0.232	−0.164	0.474		0.524
(7)	ProductFluidity	0.126	0.366	−0.211	−0.199	0.450	0.648	

Table 3
Advertising rivalry and likelihood of disclosing advertising expenses.

This table reports the results of linear probability model regressions estimating Equation (1). The dependent variable is the disclosure decision (*Disclosure*) and the main variables of interest are advertising rivalry (*AdRivalry*) and its decile ranks scaled to be within [0,1] (*Decile_AdRivalry*). Control variables are those specified in Equation (1), including existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), abnormal return on sales (*AdROS*), number of business segments (*NumSegment*), firm size (*LogMV*), firm leverage (*Leverage*), market-to-book (*MB*), return on assets (*ROA*), volatility of earnings (*StdEarn*), volatility of stock returns (*StdRet*), new issuance of equity or debt (*NewIssue*), litigation risk (*Litigation*), number of analyst following (*Analyst*), percentage of institutional ownership (*InstOwnership*), big-four auditor (*Auditor*), number of non-missing Compustat items (*LogNonMissing*), performance-matched discretionary accruals (*PMDAccruals*), and peer disclosure proportion (*PeerDisclosure*). Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. Please see Appendix A for variable definitions.

DV: *Disclosure*	(1)	(2)	(3)	(4)	(5)	(6)
AdRivalry	−0.056***	−0.055***	−0.049***			
	(-9.16)	(-9.04)	(-8.21)			
Decile_AdRivalry				−0.228***	−0.219***	−0.206***
				(-8.67)	(-8.35)	(-8.08)
ExistComp		−0.024***	−0.009		−0.025***	−0.009
		(-3.87)	(-1.25)		(-3.98)	(-1.23)
EntrantComp		0.017***	−0.008		0.016***	−0.008
		(3.75)	(-1.54)		(3.44)	(-1.62)
IndProfitability		0.021**	0.008		0.021**	0.008
		(2.45)	(0.82)		(2.53)	(0.84)
Kantar/Sales		2.385***	1.328***		2.424***	1.334***
		(8.09)	(5.18)		(8.20)	(5.21)
ERC		0.002***	0.002***		0.002***	0.002***
		(3.85)	(2.86)		(3.88)	(2.86)
AbROS		0.051**	0.047**		0.053**	0.048**
		(2.38)	(2.37)		(2.49)	(2.39)
NumSegment		−0.004	0.006		−0.005	0.005
		(-0.64)	(1.10)		(-0.82)	(0.99)
LogMV		−0.030***	−0.012**		−0.030***	−0.012**
		(-5.33)	(-2.13)		(-5.25)	(-2.15)
Leverage		−0.043	−0.051		−0.042	−0.048
		(-1.24)	(-1.49)		(-1.19)	(-1.40)
MB		0.003***	0.001*		0.003***	0.001*
		(2.79)	(1.67)		(2.89)	(1.75)
ROA		0.139***	0.001		0.135***	0.000
		(2.79)	(0.03)		(2.73)	(0.00)
StdEarn		0.096	0.079		0.103*	0.080
		(1.64)	(1.38)		(1.75)	(1.40)
StdRet		0.322***	0.175**		0.323***	0.173**
		(4.42)	(2.54)		(4.42)	(2.51)
NewIssue		−0.036**	−0.019		−0.036**	−0.018
		(-2.09)	(-1.13)		(-2.10)	(-1.10)
Litigation		0.184***	0.065**		0.180***	0.065**
		(9.62)	(2.37)		(9.37)	(2.34)
Analyst		0.004***	0.002**		0.004***	0.002**
		(3.40)	(2.15)		(3.38)	(2.13)
InstOwnership		0.001	0.012		−0.003	0.011
		(0.03)	(0.44)		(-0.08)	(0.39)
Auditor		−0.043**	−0.060***		−0.044**	−0.060***
		(-2.49)	(-3.60)		(-2.53)	(-3.61)
LogNonMissing		1.012***	0.699***		1.024***	0.700***
		(7.25)	(5.45)		(7.23)	(5.41)
PMDAccruals		−0.028	−0.018		−0.030	−0.019
		(-1.01)	(-0.67)		(-1.08)	(-0.74)
PeerDisclosure			0.531***			0.534***
			(10.44)			(10.46)
Fixed Effects	No	Year	Industry × Year	No	Year	Industry × Year
Adjusted R²	0.023	0.156	0.286	0.021	0.154	0.285
Observations	29,869	29,869	29,869	29,869	29,869	29,869

Columns (4) to (6) replace *AdRivalry* with decile ranked *AdRivalry* scaled to be between zero and one (*Decile_AdRivalry*). Using *Decile_AdRivalry* helps control for potential outliers and nonlinearity, and facilitates interpretation of the economic magnitudes of the effect of advertising rivalry.[32] The results resemble those using continuous *AdRivalry* in Columns (1) to (3).

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[32] I use continuous *AdRivalry* in subsequent tests because decile ranked *AdRivalry* does not exploit as much information, but the results remain robust when using decile ranked *AdRivalry* (untabulated).

Regarding economic magnitudes, Column (6) shows that firms in the highest decile of advertising rivalry are 20.6% less likely to disclose advertising expenses than those in the lowest decile, which represents 44.7% ($= 0.206 \div 0.461$) of the base rate of *Disclosure* in the sample.

Coefficients on control variables are largely consistent with expectations. Interestingly, the product market competition measures *ExistComp*, *EntrantComp*, and *IndProfitability* have signs consistent with theoretical predictions (e.g., Wagenhofer, 1990; Darrough and Stoughton, 1990; Darrough, 1993) in Column (2) when industry effects are not included, but become insignificant when industry effects are included in Column (3). This suggests that these measures mainly capturing cross-industry variation, and highlights that *AdRivalry* captures a unique dimension of competition that is distinct from industry-based product market competition measures. In addition, the positive coefficients on *Kantar/Sales* and *ERC* are in line with the positive impact of materiality on the disclosure of advertising expenses. The positive coefficient on *AbROS* is consistent with the prediction that lower agency costs (proxied by higher *AbROS*) are associated with a higher likelihood of disclosure.

In untabulated results, I conduct a within-firm analysis by including firm fixed effects and year fixed effects instead of industry × year fixed effects in Equation (1). The inclusion of firm fixed effects controls for all time-invariant firm characteristics (both observable and unobservable), reducing concerns about correlated omitted variables that do not vary within the firm. An alternative approach is to use a change model, which takes the first difference of all variables in Equation (1) to control for time-invariant firm-specific variables. Perhaps unsurprisingly, the results become weaker: the coefficient on *AdRivalry* in the fixed effects model is negative but insignificant, and the coefficient on Δ*AdRivalry* in the change model is negative and significant at the 10% level. These results are likely due to the limited within-firm variation across time in the dependent variable: only 3.08% of observations in *Disclosure* have non-zero changes (as shown in Table 1, Panel D). Thus, I employ other approaches to mitigate alternative explanations, as discussed in Section 4.5. Moreover, in Section 4.6.3, I use a firm-fixed effects model with continuous dependent variables based on advertising-related narrative disclosures to corroborate the baseline results. However, since my study cannot control for endogeneity completely, I advise caution in drawing causal inferences.

4.3. Entropy balancing

To alleviate endogeneity concerns arising from differences in covariates between firms with high and low advertising rivalry, I perform a matched sample analysis (e.g., Imbens, 2004). Specifically, I assign a firm-year observation to the treated group if its advertising rivalry is above the sample median sorted annually, and to the control group otherwise.[33] I use the entropy balancing method described in Hainmueller (2012) to balance the covariates between firms with high and low advertising rivalry. I then use the resulting matched sample in my regression analyses. Compared with propensity score matching, which discards observations (e.g., one-to-one nearest neighbor matching) or involves tedious reweighting/balancing (e.g., kernel matching), entropy balancing adjusts covariate distributions efficiently through a reweighting scheme that can preserve the full sample and increase the robustness of results (Zhao and Percival, 2017).

Panel A of Table 4 shows that after entropy balancing, the treated and the control groups exhibit almost the same means for all the control variables. Panel B reports the linear probability model regression results. Specifically, Columns (1) and (2) present the results of the unmatched and matched samples, respectively. In both columns, the indicator of high advertising rivalry (*High_AdRivalry*) is associated with a lower likelihood of disclosure. Columns (3) and (4) focus on advertising rivalry based on public rivals and yield similar findings. Overall, this analysis strengthens confidence in the effect of advertising rivalry.

4.4. Cross-sectional analysis (testing H2 and H3)

4.4.1. Advertising media trackability

To test the second hypothesis, I estimate Equation (1) in subsamples partitioned based on proxies for media trackability and compare the coefficients on *AdRivalry* across these subsamples. Specifically, I assign observations to the high media trackability subsample if firms have a lower-than-median number of media outlets (*Low_MediaNumber* = 1), a higher-than-median concentration of media outlets (*High_MediaHHI* = 1), or use at least one national media outlet (*National* = 1), and to the low media trackability subsample otherwise. As shown in Table 5, *AdRivalry* has a negative and significant coefficient in both high and low subsamples for all three media trackability proxies. More importantly, the coefficient on *AdRivalry* in the high trackability subsample is less negative than that in the low trackability subsample, and this difference is statistically significant at the 1% level. This finding supports H2, which posits that the negative association between advertising rivalry and disclosure is less pronounced when firms advertise on more trackable media outlets.

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[33] The cutoff between high and low is, to some extent, arbitrary. Results using a top quartile cutoff (i.e., assigning a firm to the treated group if its advertising rivalry is in the top quartile) are qualitatively the same (untabulated).

Table 4

Advertising rivalry and likelihood of disclosing advertising expenses: Entropy balance matching.

This table reports the results of entropy balancing matching (EBM) analysis. Treated firms are defined as those with *AdRivalry* above the median (*High_AdRivalry*). Control firms are reweighted to achieve the covariant balance via EBM. Panel A reports the means of control variables for treated and control firms after EBM. Panel B reports the results of linear probability model regressions estimating Equation (1). The main variables of interest are advertising rivalry (*AdRivalry*) and its variant based on public rival firms (*AdRivalry^Public*). Control variables as those specified in Equation (1) and industry × year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. Please see Appendix A for variable definitions.

Panel A: Covariate Balance after Entropy Balancing Matching				
Variables	*High_AdRivalry* = 1 (N = 14,909)	*High_AdRivalry* = 0 (N = 14,960)	Difference	*t*-statistics
ExistComp	1.3732	1.3732	0.000	0.00
EntrantComp	−1.0011	−1.0011	0.000	0.00
IndProfitability	−0.1878	−0.1878	0.000	0.00
Kantar/Sales	0.0069	0.0069	0.000	−0.06
ERC	2.9406	2.9407	0.000	0.00
AbROS	−0.0220	−0.0220	0.000	0.01
NumSegment	2.2235	2.2234	0.000	0.00
LogMV	6.9772	6.9772	0.000	0.00
Leverage	0.2213	0.2213	0.000	0.00
MB	3.3338	3.3339	0.000	0.00
ROA	0.0108	0.0108	0.000	0.01
StdEarn	0.0726	0.0726	0.000	−0.01
StdRet	0.1302	0.1302	0.000	0.00
NewIssue	0.9294	0.9294	0.000	0.00
Litigation	0.4083	0.4083	0.000	0.00
Analyst	9.2957	9.2955	0.000	0.00
InstOwnership	0.6261	0.6261	0.000	0.00
Auditor	0.8384	0.8384	0.000	0.00
LogNonMissing	5.7219	5.7219	0.000	0.00
PMDAccruals	−0.0060	−0.0060	0.000	0.00
PeerDisclosure	0.3328	0.3328	0.000	−0.01

Panel B: Regression Results				
DV: *Disclosure*	(1)	(2)	(3)	(4)
High_AdRivalry	−0.103***	−0.091***		
	(−7.66)	(−6.65)		
High_AdRivalry^Public			−0.124***	−0.103***
			(−8.58)	(−7.11)
EBM Sample	No	Yes	No	Yes
Controls, Industry × Year FE	Yes	Yes	Yes	Yes
Adjusted R²	0.283	0.281	0.285	0.278
Observations	29,869	29,869	29,869	29,869

4.4.2. Product maturity

To test the third hypothesis, I estimate Equation (1) in subsamples partitioned based on proxies for product maturity and compare the coefficients on *AdRivalry* across these subsamples. Specifically, I assign observations to the high product maturity subsample if firms have a higher-than-median value on a product maturity proxy (*High_ProdMaturity1* = 1, *High_ProdMaturity2* = 1, or *High_ProdMaturity3* = 1), and to the low product maturity subsample otherwise. As shown in Table 6, *AdRivalry* is consistently negative and significant in both subsamples for all three product maturity proxies. Furthermore, the coefficient on *AdRivalry* is more negative in the high product maturity subsample, with a significance level of 5% or better. This finding supports H3, which posits that the negative association between advertising rivalry and disclosure is more pronounced for firms with mature products.

4.5. Discussion of alternative explanations

As my study largely relies on cross-sectional variation in firms' disclosure, the main endogeneity concern comes from omitted variables correlated with advertising rivalry. In this section, I discuss potential alternative explanations and how my analyses mitigate these concerns.

4.5.1. Product market competition

Product market competition is a significant confounding factor. If the advertising rivalry measure is correlated with other aspects of competition, my findings on *AdRivalry* may not accurately reflect the effect of advertising rivalry. To mitigate this concern, I control for several dimensions of product market competition in the regression analyses, including competition from existing industry peers (*ExistComp*), competition from potential entrants (*EntrantComp*), and industry profitability (*IndProfitability*).

Table 5
Cross-sectional analysis: Advertising media trackability.
This table reports the results of linear probability model regressions estimating Equation (1) in subsamples partitioned by high and low media trackability proxy (*MediaNumber*, *MediaHHI* or *National*). The dependent variable is the disclosure decision (*Disclosure*). Control variables as those specified in Equation (1) and industry × year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. *p*-values for testing the difference in the coefficients on *AdRivalry* across subsamples are reported in the square brackets. Please see Appendix A for variable definitions.

DV: *Disclosure*	(1)	(2)
	Low_MediaNumber = 1	*Low_MediaNumber = 0*
AdRivalry	−0.024***	−0.065***
	(−4.00)	(−7.05)
p-value for diff. in coef. on *AdRivalry*	[0.000]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.228	0.331
Observations	16,583	13,286
	High_MediaHHI = 1	*High_MediaHHI = 0*
AdRivalry	−0.024***	−0.070***
	(−3.94)	(−8.61)
p-value for diff. in coef. on *AdRivalry*	[0.000]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.239	0.333
Observations	14,927	14,942
	National = 1	*National = 0*
AdRivalry	−0.029***	−0.065***
	(−4.57)	(−7.78)
p-value for diff. in coef. on *AdRivalry*	[0.000]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.196	0.333
Observations	13,079	16,790

To further differentiate advertising rivalry from product market competition, I control for additional competition measures that capture a firm's competition with rivals that have similar revenue sources (*SalesSimilarity*) or products (*ProductSimilarity* and *ProductFluidity*). Similar to *AdRivalry*, these measures are the weighted average of the number of "revenue" rivals (those with similar revenue sources) or "product" rivals (those with similar products). As such, they are determined by: (i) the number of revenue rivals or product rivals, and (ii) the weight, which is the pairwise similarity based on revenue sources or product descriptions. Compared with the number of advertising rivals, the number of revenue rivals or product rivals is more highly correlated with the number of industry rivals, as industry classification is to some extent based on revenue sources or product output. In addition, the pairwise similarity based on revenue sources or product descriptions does not capture how closely two firms allocate their advertising spending. Thus, compared with *AdRivalry*, these measures are more correlated with industry-level competition measures, such as *ExistComp* (as shown in Table 2, Panel B). I expect these measures to have a similar effect on the disclosure of advertising expenses as industry-level competition measures, meaning that they mainly explain the variation of firms' advertising expense disclosures across industries but not within industries.

Table 7 shows the results after controlling for these additional competition measures. The findings are consistent with my expectations. Specifically, Columns (1), (3), and (5) indicate that the coefficients on *SalesSimilarity*, *ProductSimilarity*, and *ProductFluidity* are negative and significant. However, Columns (2), (4), and (6) reveal that these coefficients become insignificant after controlling for industry effects (industry × year fixed effects and *PeerDisclosure*).[34] The coefficient on *AdRivalry* remains significantly negative after controlling for these additional competition measures, supporting it capturing a distinct aspect of competition.[35] These findings highlight the importance of aligning the dimension of competition and disclosure.

4.5.2. Agency costs

The agency costs explanation is perhaps one of the most significant alternative explanations to the proprietary cost hypothesis (Berger, 2011). Advertising rivalry could exacerbate agency costs of disclosing advertising expenses if the expenses signal lower advertising efficiency. To mitigate this concern, I control for abnormal return on sales (*AbROS*) as a proxy for agency costs in the regression analyses. A higher *AbROS* indicates lower the agency costs. The positive and significant coefficient on *AbROS* supports the effectiveness of this control for agency costs.

Furthermore, cross-sectional tests on media trackability and product maturity help mitigate the agency costs explanation. Advertising through more trackable media outlets (indicated by fewer, less-diversified, or national media outlets) may not be more efficient. In contrast, advertising through a more diversified media mix, which is less trackable, may be more efficient

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[34] *PeerDisclosure* is not required to be included to subsume *SalesSimilarity*, *ProductSimilarity*, and *ProductFluidity*, as these measures become insignificant when controlling for industry-year fixed effect (untabulated).
[35] The coefficient on *AdRivalry* is negative and statistically significant at the 1% level when controlling for these alternative competition measures in the same regression (untabulated).

Table 6

Cross-sectional analysis: Product maturity.

This table reports the results of linear probability model regressions estimating Equation (1) in subsamples partitioned by high and low product life cycle proxy (*ProdMaturity1*, *ProdMaturity2* or *ProdMaturity3*). The dependent variable is the disclosure decision (*Disclosure*). Control variables as those specified in Equation (1) and industry × year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. *p*-values for testing the difference in the coefficients on *AdRivalry* across subsamples are reported in the square brackets. Please see Appendix A for variable definitions.

DV: *Disclosure*	(1)	(2)
	High_ProdMaturity1 = 1	**High_ProdMaturity1 = 0**
AdRivalry	−0.070***	−0.035***
	(−9.10)	(−5.08)
p-value for diff. in coef. on *AdRivalry*	[0.000]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.348	0.234
Observations	14,878	14,991
	High_ProdMaturity2 = 1	**High_ProdMaturity2 = 0**
AdRivalry	−0.062***	−0.041***
	(−9.32)	(−6.13)
p-value for diff. in coef. on *AdRivalry*	[0.003]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.313	0.267
Observations	14,713	15,156
	High_ProdMaturity3 = 1	**High_ProdMaturity3 = 0**
AdRivalry	−0.064***	−0.043***
	(−7.96)	(−6.51)
p-value for diff. in coef. on *AdRivalry*	[0.018]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.356	0.238
Observations	12,923	16,946

Table 7

Analysis of different competition measures.

This table reports the results of linear probability model regressions estimating Equation (1) after controlling for the additional competition measure (*SalesSimilaity, ProductSimilarity, ProductFluidity*). The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are *AdRivalry, SalesSimilaity, ProductSimilarity* and *ProductFluidity*. Industry effects (*PeerDisclosure* and industry × year fixed effects) are not included in Columns (1), (3) and (5), but included in Columns (2), (4) and (6). All other control variables as those specified in Equation (1) are included in all columns. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. Please see Appendix A for variable definitions.

DV: *Disclosure*	(1)	(2)	(3)	(4)	(5)	(6)
AdRivalry	−0.053***	−0.049***	−0.055***	−0.049***	−0.053***	−0.049***
	(−8.65)	(−8.22)	(−9.16)	(−8.21)	(−8.74)	(−8.24)
SalesSimilarity	−0.021**	−0.004				
	(−2.25)	(−0.38)				
ProductSimilarity			−0.006***	0.000		
			(−4.85)	(0.23)		
ProductFluidity					−0.011***	0.003
					(−4.10)	(1.14)
PeerDisclosure	No	Yes	No	Yes	No	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Year	Industry × Year	Year	Industry × Year	Year	Industry × Year
Adjusted R^2	0.157	0.286	0.159	0.286	0.159	0.286
Observations	29,869	29,869	29,869	29,869	29,869	29,869

because consumers tend to consume small "chunks" of multiple media types (known as "media multiplexing"), allowing for a more comprehensive and effective advertising campaign by utilizing each media channel's unique strengths (e.g., Lin et al., 2013). Therefore, higher media trackability is not necessarily associated with lower agency costs of disclosure. Thus, the findings that the effect of advertising rivalry is less pronounced when firms advertise on more trackable media outlets are not consistent with the agency costs explanation. Similarly, product maturity may not relate to agency costs of disclosure. In mature markets where advertising primarily steals rivals' customers and has little impact on market-wide demand (i.e., more combative), the return on advertising may decrease, but shareholders may adjust their expectations accordingly. Therefore, a more mature product market does not necessarily indicate higher agency costs (which arise when return on advertising is lower than investors' expectations). Hence, if the agency costs explanation prevails, we would not expect the effect of advertising rivalry to vary with product maturity, which is inconsistent with the cross-sectional test results.

4.5.3. Industry peer disclosures and other industry-wide practices

Industry-wide disclosure conventions may confound my results if they are correlated with the advertising rivalry measure. To reduce this concern, I include industry-year fixed effects to enable a clean comparison between firms within the same industry and year. Furthermore, I control for the proportion of industry peers that disclose advertising expenses in the regression analyses. The impact of peers' disclosures on firms' disclosure decisions is ex ante unclear. When more industry peers disclose advertising expenses, a firm may be more likely to disclose as investors may update their assessments about the firm's likelihood of incurring advertising expenses. On the other hand, a firm may be less likely to disclose as investors may infer the firm's advertising expenses from its peers' disclosures, thereby reducing the marginal benefit of disclosure. Empirically, the positive coefficient on *PeerDisclosure* is consistent with firms being more likely to disclose under pressure from industry peers (e.g., Koh and Reeb, 2015; Shi et al., 2021).

4.6. Additional analysis

4.6.1. Analysis of advertising rivalry variants

Table 8 presents the results of estimating Equation (1) using advertising rivalry measures based on different sets of rivals. Column (1) shows that the coefficient on $AdRivalry^{public}$ is significantly negative, corroborating the main findings using *AdRivalry*. When decomposing $AdRivalry^{public}$ to three components ($AdRivalry^{[0,2]}$, $AdRivalry^{[3,5]}$, and $AdRivalry^{[6,100]}$) based on the distance of rivals, I find all measures are negative at the 1% significance level, as shown in Columns (2) to (4). More notably, the magnitude of the coefficient on $AdRivalry^{[0,2]}$ is larger than that of $AdRivalry^{[3,5]}$ and $AdRivalry^{[6,100]}$, and the difference is statistically significant at the 1% level. The magnitude of the coefficient on $AdRivalry^{[3,5]}$ is also larger than that of $AdRivalry^{[6,100]}$ at the 5% significance level. This is consistent with advertising rivalry from close peers having a stronger effect than that from distant peers.

4.6.2. Analysis of advertising materiality

To assess the robustness of my results to different advertising materiality measures, I replace *Kantar/Sales* with alternative materiality proxies and report the results in Panel A of Table 9. Specifically, Columns (1) to (5) show the results of estimating Equation (1) when controlling for one of the five alternative materiality proxies: *Kantar/PI*, *Kantar/AT*, a dummy variable that equals one if *Kantar/Sales*≥1%, a dummy variable that equals one if *Kantar/PI*≥5%, and a dummy variable that equals one if *Kantar/AT*≥1%. Across all columns, the coefficients on *AdRivalry* remain negative and significant at the 1% level.

To further assess how the effect of advertising rivalry may vary with advertising materiality, I perform cross-sectional tests using materiality proxies. The potential impact of materiality on the relationship between advertising rivalry and disclosure is unclear. When advertising expenses are more material, firms have a greater duty to disclose, which may increase the costs of noncompliance and lead to a less pronounced effect of advertising rivalry. On the other hand, when advertising expenses are more material, the advertising information may be more useful to rivals, which may increase proprietary costs and lead to a more pronounced effect of advertising rivalry.

Empirically, I estimate Equation (1) in subsamples partitioned based on proxies for advertising materiality. Specifically, I assign observations to the high materiality subsample if the materiality proxy meets or exceeds the common threshold

Table 8
Analysis of *AdRivalry* variants.
This table reports the results of linear probability model regressions estimating Equation (1) using various variants of *AdRivalry*. The dependent variable is the disclosure decision (*Disclosure*) and the main variables of interest are advertising rivalry from public rivals ($AdRivalry^{Public}$) and its variants based on how far public rivals are from the focal firm ($AdRivalry^{[0,2]}$, $AdRivalry^{[3,5]}$ and $AdRivalry^{[6,100]}$). Control variables as those specified in Equation (1) and industry × year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. *p*-values for testing the difference in the coefficients on different *AdRivalry* variants are reported in the square brackets. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)	(4)
$AdRivalry^{Public}$	−0.059***			
	(-8.40)			
$AdRivalry^{[0,2]}$		−0.070***		
		(-8.16)		
$AdRivalry^{[3,5]}$			−0.044***	
			(-7.59)	
$AdRivalry^{[6,100]}$				−0.038***
				(-6.05)
p-value for diff. in coef. of:				
$AdRivalry^{[0,2]}$ vs. $AdRivalry^{[3,5]}$	[0.000]			
$AdRivalry^{[0,2]}$ vs. $AdRivalry^{[6,100]}$	[0.000]			
$AdRivalry^{[3,5]}$ vs. $AdRivalry^{[6,100]}$	[0.047]			
Controls, Industry × Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.287	0.286	0.284	0.280
Observations	29,869	29,869	29,869	29,869

Table 9

Analysis of advertising materiality.

This table reports the results of the analysis of advertising materiality. Panel A reports the results of linear probability model regressions estimating Equation (1), controlling for alternative materiality proxies: *Kantar/PI*, *Kantar/AT*, a dummy variable for *Kantar/Sales* ≥ 1% (*D_Kantar/Sales*), a dummy variable for *Kantar/PI* ≥ 5% (*D_Kantar/PI*) and a dummy variable for *Kantar/AT* ≥ 1% (*D_Kantar/AT*) in Columns (1) to (5), respectively. Panel B reports the results of linear probability model regressions estimating Equation (1) within subsamples partitioned based on common materiality thresholds proxied by 1% of *Kantar/Sales*, 5% of *Kantar/PI*, and 1% of *Kantar/AT*. In all panels, the dependent variable is the disclosure decision (*Disclosure*) and the main variable of interest is advertising rivalry (*AdRivalry*). Control variables as those specified in Equation (1) and industry × year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. Please see Appendix A for variable definitions.

Panel A: Controlling for Alternative Materiality Proxies					
DV: *Disclosure*	(1)	(2)	(3)	(4)	(5)
AdRivalry	−0.050***	−0.048***	−0.045***	−0.042***	−0.045***
	(−8.38)	(−8.08)	(−7.70)	(−7.46)	(−7.70)
Kantar/PI	0.066***				
	(7.25)				
Kantar/AT		1.453***			
		(5.82)			
D_Kantar/Sales			0.193***		
			(10.64)		
D_Kantar/PI				0.201***	
				(13.23)	
D_Kantar/AT					0.188***
					(10.17)
Other Controls	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R²	0.286	0.287	0.299	0.307	0.298
Observations	29,869	29,869	29,869	29,869	29,869

Panel B: Using Subsamples Partitioned by Common Materiality Thresholds		
DV: *Disclosure*	(1)	(2)
	Kantar/Sales≥1%	**Kantar/Sales<1%**
AdRivalry	−0.039***	−0.036***
	(−3.92)	(−6.14)
p-value for diff. in coef. on *AdRivalry*	[0.791]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R²	0.205	0.264
Observations	5682	24,187
	Kantar/PI ≥ 5%	**Kantar/PI<5%**
AdRivalry	−0.042***	−0.035***
	(−4.99)	(−5.80)
p-value for diff. in coef. on *AdRivalry*	[0.464]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R²	0.216	0.245
Observations	9074	20,795
	Kantar/AT≥1%	**Kantar/AT<1%**
AdRivalry	−0.039***	−0.042***
	(−3.93)	(−6.90)
p-value for diff. in coef. on *AdRivalry*	[0.787]	
Controls, Industry × Year FE	Yes	Yes
Adjusted R²	0.184	0.261
Observations	5623	24,246

(*Kantar/Sales*≥1%, *Kantar/PI*≥5%, or *Kantar/AT*≥1%), and to the low materiality subsample otherwise.[36] Psanel B of Table 9 shows that *AdRivalry* remains negative and significant at the 1% level in both high and low materiality subsamples. In addition, the difference in the coefficients on *AdRivalry* between the two subsamples is insignificant (*p*-values are 0.791, 0.464, and 0.787 for subsamples partitioned by *Kantar/Sales*, *Kantar/PI*, and *Kantar/AT*, respectively). Overall, these findings suggest that the association between advertising rivalry and disclosure is robust to alternative materiality proxies and does not vary significantly with advertising materiality.

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[36] Inferences remain the same when forming subsamples based on the cutoffs specified in Heitzman et al. (2010) (i.e., bottom 27%, 28%−72%, and top 27% of materiality proxies) or on the tercile ranks of materiality proxies.

Table 10

Analysis of advertising-related narrative disclosure.

This table reports the results of the analysis of advertising-related narrative disclosures in 10-Ks. The sample size is smaller than the main sample due to an incomplete match between EDGAR (from which 10-Ks are downloaded) and Compustat via the central index key (CIK). Panel A reports the descriptive statistics of advertising-related narrative disclosures, measured as the percentage of advertising-related keywords per 10,000 words in 10-Ks, where *PctADV_1* counts the keywords of "advertising," "advertise," "advertise," "advertisement" and their variants, and *PctADV_2* counts the keywords of those in *PctADV_1* plus "marketing," "promotion," "sampling," and "detailing". Panel B reports OLS regression results. The dependent variables are advertising-related narrative disclosures (*PctADV_1* and *PctADV_2*) and the main variables of interests are advertising rivalry (*AdRivalry*) and its decile ranks scaled to be within [0,1] (*Decile_AdRivalry*). Control variables as those specified in Equation (1), firm fixed effects and year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. Please see Appendix A for variable definitions.

Panel A: Summary Statistics of Advertising-Related Narrative Disclosure (N = 27,477)							
	Mean	STD	p10	p25	p50	p75	p90
PctADV_1	1.236	2.072	0.000	0.024	0.491	1.432	3.280
PctADV_2	3.283	4.106	0.188	0.669	1.856	4.095	8.247

Panel B: Advertising Rivalry and Advertising-Related Narrative Disclosure				
	(1)	(2)	(3)	(4)
DV	*PctADV_1*	*PctADV_2*	*PctADV_1*	*PctADV_2*
AdRivalry	−0.028*	−0.084**		
	(−1.74)	(−2.42)		
Decile_AdRivalry			−0.122*	−0.383***
			(−1.91)	(−2.76)
Controls, Firm FE, and Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.751	0.710	0.751	0.710
Observations	27,477	27,477	27,477	27,477

4.6.3. Advertising-related narrative disclosures

To corroborate the main findings, I investigate the effect of advertising rivalry on advertising-related narrative disclosures in 10-Ks, as these disclosures are positively related to the disclosure dummy of advertising expenses. Similar to H1, I predict a negative association between advertising rivalry and the quantity of advertising-related narrative disclosures.

Following prior studies (e.g., Li et al., 2013; Merkley, 2014), I use the "regular expression" routine in Python to count the number of advertising-related keywords in 10-Ks and measure narrative disclosures as the percentage of advertising-related keywords per 10,000 words. I construct two narrative disclosure measures based on different sets of keywords: one includes the keywords "advertising," "advertise," "advertize," "advertisement," and their variants with an "s" appended (*PctADV_1*), and the other includes the set of keywords in *PctADV_1* plus words broadly related to advertising such as "marketing," "promotion," "sampling," and "detailing" (*PctADV_2*).

Table 10 presents the results. The sample size is smaller than the main sample due to an incomplete match between EDGAR (from which 10-Ks are downloaded) and Compustat via the central index key (CIK). Panel A shows that the average number of advertising-related keywords per 10,000 words is 1.24 for *PctADV_1* and 3.28 for *PctADV_2*, respectively, comparable to that of competition-related keywords in Li et al. (2013). Panel B reports the results of estimating Equation (1), where the dependent variable is replaced with *PctADV_1* or *PctADV_2*. Compared with the binary variable *Disclosure*, the continuous variables derived from advertising-related narrative disclosures exhibit greater within-firm variation. This allows me to include firm fixed effects to control for all time-invariant firm-specific variables, which mitigates endogeneity concerns arising from correlated omitted variables that do not vary within the firm. Columns (1) and (2) show a negative coefficient on *AdRivalry*, consistent with advertising rivalry discouraging firms' advertising-related narrative disclosures. This finding remains robust across Columns (3) and (4), where *AdRivalry* is replaced with *Decile_AdRivalry*. Overall, these results corroborate the main findings of this study on the effect of advertising rivalry.

5. Conclusion

Using third-party tracked advertising outlet costs, I document the prevalence of missing advertising expenses, even among firms with underlying advertising activities. I further develop a measure of advertising rivalry and find a negative association between advertising rivalry and the likelihood of disclosing advertising expenses, consistent with the proprietary cost hypothesis. I also find that the negative association is more pronounced when firms advertise on less trackable media outlets or have more mature products. Collectively, my findings suggest that firms consider their advertising expenses proprietary and that their concerns about advertising rivalry discourage the disclosure of advertising expenses, even among firms with expenses that are likely to be material. These findings have potential implications for capital market participants and researchers when they use firm-disclosed advertising expenses in firm valuation and investment decisions.

Declaration of competing interest

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Appendix A. Variable definitions

Advertising Disclosure Variables	
Disclosure	A dummy variable that equals one if the firm discloses advertising expenses on the face or in the footnotes of financial statements (captured by nonmissing *xad* in Compustat), and zero otherwise.
PctADV_1	Percentage of advertising-related keywords per 10,000 words in the firm's 10-K, where the keywords include "advertising," "advertise," "advertize," "advertisement," and their variants with an "s" appended.
PctADV_2	Percentage of advertising-related keywords per 10,000 words in the firm's 10-K, where the keywords include those in *PctADV_1* plus "marketing," "promotion," "sampling," "detailing," and their variants with an "s" appended.
Advertising Rivalry Variables	
AdRivalry	Advertising rivalry, measured as the logarithm of the sum of pairwise cosine similarity scores, based on third-party tracked advertising spending across 924 product categories for a given firm with all other firms in the database.
$AdRivalry^{Public}$	A variant of *AdRivalry* that is summed over public rival firms.
$AdRivalry^{[x,y]}$	A variant of *AdRivalry* that is summed over public rivals with similarity scores in the top [x,y] percentile range, where [x,y] ranges from [0,2], [3,5], and [6100].
Other Competition Variables	
ExistComp	Following Li (2010), *ExistComp* is measured as the factor loaded by the underlined variables in the principal component analysis (PCA) based on nine industry-level variables (i.e., Industry PPE, industry capital expenditure, industry R&D, industry price-cost margin, industry ROA, industry four firm concentration, industry HHI, number of firms in the industry, and market size of the industry). A higher *ExistComp* suggests greater competition among incumbent firms.
EntrantComp	Similar to *ExistComp*, *EntrantComp* is measured as the factor loaded by the underlined variables in the PCA based on nine industry-level variables (i.e., Industry PPE, industry capital expenditure, industry R&D, industry price-cost margin, industry ROA, industry four firm concentration, industry HHI, number of firms in the industry, and market size of the industry). A higher *EntrantComp* suggests greater competition from potential entrants.
IndProfitability	Similar to *ExistComp*, *IndProfitability* is measured as the factor loaded by the underlined variables in the PCA based on nine segment-level variables (i.e., Industry PPE, industry capital expenditure, industry R&D, industry price-cost margin, industry ROA, industry four firm concentration, industry HHI, number of firms in the industry, and market size of the industry). A higher *IndProfitability* indicates a more profitable industry segment.
SalesSimilaity	Sales-based similarity, measured as the sum of pairwise cosine similarity scores in terms of firm sales across a total of 454 segments, for a firm with all other firms in Compustat.
ProductSimilarity	Product-based similarity, measured as the sum of pairwise cosine similarity scores in terms of 10-K product descriptions between a firm and other firms in the same text-based network industry (Hoberg and Phillips, 2016), obtained from www.hobergphillips.usc.edu.
ProductFluidity	Product fluidity, measured as the sum of pairwise cosine similarity scores between a firm's product-related words used in its 10-K and other firms' annual changes of product-related words used in their 10-Ks (Hoberg et al., 2014), obtained from www.hobergphillips.usc.edu.
Proxies for Materiality	
Kantar/Sales	The ratio of Kantar-tracked advertising outlet costs to firm sales.
Kantar/PI	The ratio of Kantar-tracked advertising outlet costs to the absolute value of firm pretax income.
Kantar/AT	The ratio of Kantar-tracked advertising outlet costs to firm total assets.
ERC	Earnings response coefficients, estimated by regressing quarterly stock returns on the seasonal change in earnings per share deflated by stock price.

Other Variables

AdROS	Abnormal return on sales, measured as a firm's return to sales minus the (four-digit SIC) industry median for a given year.
NumSegment	The number of business or operating segments.
LogMV	Logarithm of (1+ market value of equity), where market value is measured as the number of shares outstanding times price at the fiscal year-end.
Leverage	Leverage, measured as the ratio of debt to total assets.
MB	Market-to-book, measured as the ratio of market value to book value.
ROA	Return on assets, measured as the ratio of earnings before extraordinary items and discontinued operations to total assets.
StdEarn	The volatility of earnings, measured as the standard deviation of earnings before extraordinary items and discontinued operations scaled by total assets over the prior five years with a minimum requirement of three observations.
StdRet	The volatility of stock returns, calculated with monthly stock return data over the fiscal year.
NewIssue	A dummy variable that equals one if the firm has new equity or debt issues during the fiscal year, and zero otherwise.
Litigation	A dummy variable that equals one if the firm operates in an industry facing high litigation risk, namely industries with primary four-digit SIC code 2833–2836, 8731–8734 (bio-tech); 3570–3577 (computer hardware); 3600–3674 (electronics); 7371–7379 (computer software); 5200–5961 (retailing); 4812–4813, 4833, 4841, 4899 (communications); or 4911, 4922–4924, 4931, 4941 (utilities); and zero otherwise.
Analyst	The number of analysts who issued at least one earnings forecast for the firm during the year.
InstOwnership	The percentage of shares owned by institutional investors; data are obtained from Thomson-Reuters Institutional Holdings (13 F).
Auditor	A dummy variable that equals one if the firm has a big-four auditor (Deloitte, PwC, EY, and KPMG), and zero otherwise.
LogNonMissing	Logarithm of (1 + number of non-missing items in Compustat Fundamental Annual).
PMDAccruals	Performance-matched discretionary accruals, measured as the difference between the total accruals and the expected accruals based on ROA-adjusted modified Jones model.
PeerDisclosure	Industry peer disclosure, measured as the proportion of a firm's industry peers that disclose advertising expenses. The industry disclosure proportion is first measured at the industry segment level at the beginning of the year (i.e., the number of industry peers, excluding the subject firm, that disclose advertising expenses to the total number of firms in the industry segment), and is then aggregated to the firm-level by taking the weighted average across segments for a firm, where the weight is the ratio of segment sales to firm sales.
MediaNumber	The number of distinct media outlets used by a firm as tracked by Kantar.
MediaHHI	The Herfindahl-Hirschman Index of Kantar-tracked advertising over media types, measured as the sum of squares for the ratio of advertising outlet costs on each media outlet to the firm's total Kantar-tracked advertising outlet costs.
National	A dummy variable that equals one if the firm advertises on national media, i.e., any medium that is not classified as local radio, local magazine, or outdoor by Kantar, and zero otherwise.
ProdMaturity1	First proxy of product maturity based on the industry segment medians of three firm-specific life cycle indicators (*Ind_Med_Age*, *Ind_Med_SalesGrowth*, *Ind_Med_DividendPayout*): Firm age, firm sales growth, and firm dividend payout ratio (Anthony and Ramesh, 1992). Each segment-level life cycle indicator is aggregated to the firm-year level using a weighted average, where the weight is segment sales. I create a composite measure by summing the ranks of the three life cycle indicators. The higher the age and dividend payout and the lower the sales growth, the higher the product maturity measure.
ProdMaturity2	Second proxy of product maturity based on two industry segment-level life cycle indicators (*Ind_SalesGrowth*, *Ind_NewEntryGrowth*): Industry sales growth and industry new entry rate (Parsons, 1976). Each segment-level life cycle indicator is aggregated to the firm-year level using a weighted average, where the weight is segment sales. I create a composite measure by summing the ranks of the two life cycle indicators. The lower the industry sales growth and the new entry rate, the higher the product maturity measure.
ProdMaturity3	Third proxy of product maturity based on the industry segment medians of firms' cash-flow-based life cycle following Dickinson (2011) (*Ind_CF_LifeCycle*). Specifically, the life cycle is coded as follows: 1 (introduction) if the sign of operating cash flows (OCF) is negative ($-$), the sign of investing cash flows (ICF) is negative ($-$) and the sign of financing cash flows (FCF) is positive ($+$); 2 (growth) if the sign for OCF/ICF/FCF is $(+)/(-)/(+)$; 3 (mature) if the sign for OCF/ICF/FCF is $(+)/(-)/(-)$; 4 (shake-out) if the sign for OCF/ICF/FCF is $(-)/(-)/(-)$ or $(+)/(+)/(+)$ or $(+)/(+)/(-)$; 5 (decline) if the sign for OCF/ICF/FCF is $(-)/(+)/(+)$ or $(-)/(+)/(-)$ (see Table 1 in Dickinson, 2011). The segment-level life cycle indicator is aggregated to the firm-year level using a weighted average, where the weight is segment sales, and then converted to annual ranks. The higher the cash-flow-based life cycle, the higher the product maturity measure.

Appendix B. Advertising expenses and future operating performance

This table reports the regression results for the association between firm-disclosed advertising expenses and one-year ahead operating income (*OpIncome*), in the subsample of firms that disclose advertising expenses and have non-missing operating income data in Compustat. Operating income is measured as the operating income before depreciation and the expensing of R&D and advertising. Control variables include estimated advertising outlet costs from a third-party company Kantar Media (*Kantar*), R&D expenses (*R&DExp*, missing values are replaced with zero) and other tangible and intangible assets (*OtherAssets*). All variables are scaled by total assets. Results are robust when further controlling for SG&A expenses as a proxy for other intangible-related expenditures and a dummy variable for R&D disclosure, or in the subsample of non-missing R&D expenses (untabulated). Firm and year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively.

DV: $OpIncome_{t+1}$	(1)	(2)	(3)
$AdExp_t$	0.919***		0.798***
	(11.52)		(9.80)
$Kantar_t$		0.693***	0.300***
		(7.09)	(3.94)
$R\&DExp_t$	0.442***	0.510***	0.441***
	(5.93)	(6.63)	(5.98)
$OtherAssets_t$	0.040**	0.044**	0.040**
	(2.11)	(2.20)	(2.15)
Firm FE, Year FE	Yes	Yes	Yes
Adjusted R^2	0.715	0.704	0.717
Observations	13,274	13,274	13,274

Appendix C. Numerical Example of *AdRivalry*

One illustrative example for firms A, B, C, D, and E's advertising across product categories V, W, X, Y, and Z.

	V	W	X	Y	Z	Pairwise Cosine Similarity Scores									Sum
A	0.20	0.40	0.40	0.00	0.00	(A,B) =	0.40	(A,C) =	0.18	(A,D) =	0.13	(A,E) =	0.89		1.60
B	0.00	0.20	0.20	0.60	0.00	(B,A) =	0.40	(B,C) =	0.75	(B,D) =	0.83	(B,E) =	0.40		2.38
C	0.40	0.00	0.00	0.60	0.00	(C,A) =	0.18	(C,B) =	0.75	(C,D) =	0.98	(C,E) =	0.00		1.91
D	0.30	0.00	0.00	0.70	0.00	(D,A) =	0.13	(D,B) =	0.83	(D,C) =	0.98	(D,E) =	0.00		1.94
E	0.00	0.40	0.40	0.00	0.20	(E,A) =	0.89	(E,B) =	0.40	(E,C) =	0.00	(E,D) =	0.00		1.29

Take firm A as an illustration. The cosine similarity between A and B is $(A,B) = (0.2 \times 0 + 0.4 \times 0.2 + 0.4 \times 0.2 + 0 \times 0.6 + 0 \times 0)/(\sqrt{0.2^2 + 0.4^2 + 0.4^2} \sqrt{0.2^2 + 0.2^2 + 0.6^2}) = 0.40$, which is a proxy for B's response to A's one unit advertising. Similarly, responses from A's other advertising rivals are proxied by their pairwise cosine similarity scores: $(A, B) = 0.40, (A, C) = 0.18, (A, D) = 0.13$, and $(A, E) = 0.89$. The firm-level advertising rivalry score for A is the sum of the pairwise similarity scores between A and all its rivals, i.e., 1.60 ($= 0.40 + 0.18 + 0.13 + 0.89$). Similarly, the advertising rivalry scores for B, C, D, and E are 2.38, 1.91, 1.94, and 1.29, respectively. The intensity of advertising rivalry is jointly determined by the following factors:

i. The more overlapping product categories the firms advertise, the more intense the advertising rivalry between two firms. In this example, A has two overlapping product categories with B (i.e., W and X) while A has only one overlapping product category with C (i.e., V), so the competition pressure from B (proxied by the similarity between A and B, i.e., (A, B) = 0.40) is greater than that from C (i.e., (A, C) = 0.18).

ii. The higher the proportion of advertising expenditures allocated in overlapped product categories, the more intense the advertising rivalry between two firms would be. In this example, C allocates 40% of its total advertising expenditures in the overlapping product category with A (i.e., V) while D allocates 30% in the overlapping product category with A (i.e., V), so the competition pressure from C (i.e., (A, C) = 0.18) is greater than that from D (i.e., (A, D) = 0.13).

iii. The larger the number of advertising rivals in the economy, the more intense the advertising rivalry becomes for a firm. In this example, A has a total of four advertising rivals (B, C, D, and E) while E has only two rivals (A and B), so the advertising rivalry for A (i.e., 1.60) is greater than that for E (i.e., 1.29).

Appendix D. Including Firms from Financial Industries

This table reports the results using the sample that includes firms from financial industries. Panel A reports the sample distribution by disclosure type for five samples: (1) Compustat/CRSP population (including financial industries, with positive sales and total assets), (2) the main sample (including financial industries), (3) a subsample of firms with a materiality benchmark of *Kantar/Sales*≥1%, (4) a subsample of firms with a materiality benchmark of *Kantar/PI*≥5%, and (5) a subsample of firms with a materiality benchmark of *Kantar/AT*≥1%. Panel B reports the results of linear probability model regressions estimating Equation (1), using the sample that includes financial industries. The dependent variable is the disclosure decision (*Disclosure*) and the main variables of interest are advertising rivalry (*AdRivalry*) and its decile ranks scaled to be within [0,1] (*Decile_AdRivalry*). Control variables as those specified in Equation (1) and industry × year fixed effects are included. Standard errors are clustered by firm and *t*-statistics for two-tailed tests are in parentheses. ***, **, and * denote 1%, 5% and 10% levels of significance, respectively. Please see Appendix A for variable definitions.

Panel A: Sample Distribution by Disclosure Decision

		Disclosure = 0	Disclosure = 1	
		(1)	(2) Adv/Sale≥1%	(3) Adv/Sale <1%
(1)	Compustat/CRSP Population	65.30	21.63	13.08
(2)	My Sample (36,803 firm-years)	53.15	32.26	14.59
(3)	Subsample with *Kantar/Sales* ≥ 1%	26.86	69.85	3.29
(4)	Subsample with *Kantar/PI* ≥ 5%	29.56	61.73	8.71
(5)	Subsample with *Kantar/AT* ≥ 1%	24.18	72.05	3.77

Panel B: Regression Results

DV: *Disclosure*	(1)	(2)
AdRivalry	−0.046***	
	(-7.95)	
Decile_AdRivalry		−0.184***
		(-7.62)
Controls, Industry × Year FE	Yes	Yes
Adjusted R^2	0.294	0.293
Observations	36,803	36,803

References

Acito, A., Burks, J.J., Johnson, W.B., 2009. Materiality decisions and the correction of accounting errors. Account. Rev. 84 (3), 659–688.

Acito, A.A., Burks, J.J., Johnson, W.B., 2019. The materiality of accounting errors: evidence from SEC comment letters. Contemp. Account. Res. 36 (2), 839–868.

Ali, A., Klasa, S., Yeung, P.E., 2009. The limitations of industry concentration measures constructed with Compustat data: implications for finance research. Rev. Financ. Stud. 22 (10), 3839–3871.

Ali, A., Klasa, S., Yeung, P.E., 2014. Industry concentration and corporate disclosure policy. J. Account. Econ. 58 (2–3), 240–264.

American Institute of Certified Public Accountants (AICPA), 2012. Materiality in Planning and Performing an Audit. AU-C Section 320.

Anthony, J.H., Ramesh, K., 1992. Association between accounting performance measures and stock prices: a test of the life cycle hypothesis. J. Account. Econ. 15 (2–3), 203–227.

Ayers, Benjamin C., Schwab, Casey M., Utke, Steven, 2015. Noncompliance with mandatory disclosure requirements: the magnitude and determinants of undisclosed permanently reinvested earnings. Account. Rev. 90 (1), 59–93.

Bagwell, K., 2007. The economic analysis of advertising. Handb. Ind. Organ. 3, 1701–1844.

Ball, R., Jayaraman, S., Shivakumar, L., 2012. Audited financial reporting and voluntary disclosure as complements: a test of the confirmation hypothesis. J. Account. Econ. 53 (1), 136–166.

Bamber, L.S., Cheon, Y.S., 1998. Discretionary management earnings forecast disclosures: antecedents and outcomes associated with forecast venue and forecast specificity choices. J. Account. Res. 36 (2), 167–190.

Bens, D.A., Berger, P.G., Monahan, S.J., 2011. Discretionary disclosure in financial reporting: an examination comparing internal firm data to externally reported segment data. Account. Rev. 86 (2), 417–449.

Berger, P.G., 2011. Challenges and opportunities in disclosure research—a discussion of 'the financial reporting environment: review of the recent literature.'. J. Account. Econ. 51 (1), 204–218.

Berger, P.G., Hann, R.N., 2007. Segment profitability and the proprietary and agency costs of disclosure. Account. Rev. 82 (4), 869–906.

Beyer, A., Cohen, D.A., Lys, T.Z., Walther, B.R., 2010. The financial reporting environment: review of the recent literature. J. Account. Econ. 50 (2), 296–343.

Bloom, N., Schankerman, M., Van Reenen, J., 2013. Identifying technology spillovers and product market rivalry. Econometrica 81 (4), 1347–1393.

Botosan, C.A., Stanford, M., 2005. Managers' motives to withhold segment disclosures and the effect of SFAS No. 131 on analysts' information environment. Account. Rev. 80 (3), 751–772.

Bublitz, B., Ettredge, M., 1989. The information in discretionary outlays: advertising, research, and development. Account. Rev. 64 (1), 108–124.

Cantrell, B.W., Dickinson, V., 2020. Conditional life cycle: an examination of operating performance for leaders and laggards. Manag. Sci. 66 (1), 433–451.

Cao, S., Ma, G., Tucker, J.W., Wan, C., 2018. Technological peer pressure and product disclosure. Account. Rev. 93 (6), 95–126.

Chen, Shuping, Miao, Bin, Terry, Shevlin, 2015. A new measure of disclosure quality: the level of disaggregation of accounting data in annual reports. J. Account. Res. 53 (5), 1017–1054.

Clinch, G., Verrecchia, R.E., 1997. Competitive disadvantage and discretionary disclosure in industries. Aust. J. Manag. 22 (2), 125–137.

Core, J.E., Guay, W.R., Van Buskirk, A., 2003. Market valuations in the new economy: an investigation of what has changed. J. Account. Econ. 34 (1), 43–67.

Darrough, M.N., 1993. Disclosure policy and competition: Cournot vs. Bertrand. Account. Rev. 68 (3), 534–561.

Darrough, M.N., Stoughton, N.M., 1990. Financial disclosure policy in an entry game. J. Account. Econ. 12 (1–3), 219–243.

Dedman, E., Lennox, C., 2009. Perceived competition, profitability and the withholding of information about sales and the cost of sales. J. Account. Econ. 48 (2–3), 210–230.

Dekimpe, M.G., Hanssens, D.M., 1995. Empirical generalizations about market evolution and stationarity. Market. Sci. 14 (3_Suppl. ment), 109–121.

Dickinson, V., 2011. Cash flow patterns as a proxy for firm life cycle. Account. Rev. 86 (6), 1969–1994.

Eckard, E.W., 1987. Advertising, competition, and market share instability. J. Bus. 60 (4), 539–552.

Ellis, J.A., Fee, C.E., Thomas, S.E., 2012. Proprietary costs and the disclosure of information about customers. J. Account. Res. 50 (3), 685–727.

Erickson, G.M., 1985. A model of advertising competition. J. Market. Res. 60 (4), 297–304.

Ettredge, M., Feng, G., Ling, L., Tseng, K., 2017. Technology Spillover and Corporate Disclosure Transparency. *Working Paper*.

Financial Accounting Standards Board (FASB), 1993. Statement of Position 93-7: Reporting on Advertising Costs.

Financial Accounting Standards Board (FASB), 2010. Accounting Standard Codification 720-35: Advertising Costs.

Financial Accounting Standards Board (FASB), 2018. Amendments to Statement of Financial Accounting Concepts No.8: Conceptual Framework for Financial Reporting.

Gentzkow, M., Shapiro, J.M., 2008. Competition and truth in the market for news. J. Econ. Perspect. 22 (2), 133–154.

Glaeser, S., 2018. The effects of proprietary information on corporate disclosure and transparency: evidence from trade secrets. J. Account. Econ. 66 (1), 163–193.

Gleason, C.A., Mills, L.F., 2002. Materiality and contingent tax liability reporting. Account. Rev. 77 (2), 317–342.

Gow, I.D., Wahid, A.S., Yu, G., 2018. Managing reputation: evidence from biographies of corporate directors. J. Account. Econ. 66 (2–3), 448–469.

Gul, F.A., Wu, D., Yang, Z., 2013. Do individual auditors affect audit quality? Evidence from archival data. Account. Rev. 88 (6), 1993–2023.

Gurun, U.G., Butler, A.W., 2012. Don't believe the hype: local media slant, local advertising, and firm value. J. Finance 67 (2), 561–598.

Hainmueller, J., 2012. Entropy balancing for causal effects: a multivariate reweighting method to produce balanced samples in observational studies. Polit. Anal. 20 (1), 25–46.

Hanssens, D.M., Rust, R.T., Srivastava, R.K., 2009. Marketing strategy and Wall Street: nailing down marketing's impact. J. Market. 73 (6), 115–118.

Harris, M.S., 1998. The association between competition and managers' business segment reporting decisions. J. Account. Res. 36 (1), 111–128.

Heinle, M.S., Samuels, D., Taylor, D.J., 2022. Disclosure Substitution. Management Science, Forthcoming.

Heitzman, S., Wasley, C., Zimmerman, J., 2010. The joint effects of materiality thresholds and voluntary disclosure incentives on firms' disclosure decisions. J. Account. Econ. 49 (1), 109–132.

Hirschey, M., 1982. Intangible capital aspects of advertising and R&D expenditures. J. Ind. Econ. 30 (4), 375–390.

Hirschey, M., Weygandt, J.J., 1985. Amortization policy for advertising and research and development expenditures. J. Account. Res. 23 (1), 326–335.

Hoberg, G., Philips, G., 2016. Text-based network industries and endogenous product differentiation. J. Polit. Econ. 124 (5), 1423–1465.

Hoberg, G., Phillips, G., Prabhala, N., 2014. Product market threats, payouts, and financial flexibility. J. Finance 69 (1), 293–324.

Imbens, G.W., 2004. Nonparametric estimation of average treatment effects under exogeneity: a review. Rev. Econ. Stat. 86 (1), 4–29.

IHS Markit, 2021. The Economic Impact of Advertising on the US Economy.

Karuna, C., 2007. Industry product market competition and managerial incentives. J. Account. Econ. 43 (2), 275–297.

Karuna, C., 2010. Industry Product Market Competition and Corporate Voluntary Disclosure: Evidence from Discretionary Forward-Looking Line Items at the Industrial Segment Level. Working Paper.

Kim, M., McAlister, L.M., 2011. Stock market reaction to unexpected growth in marketing expenditure: negative for sales force, contingent on spending level for advertising. J. Market. 75 (4), 68–85.

Koh, P.S., Reeb, D.M., 2015. Missing R&D. J. Account. Econ. 60 (1), 73–94.

Kothari, S.P., Leone, A.J., Wasley, C.E., 2005. Performance matched discretionary accrual measures. J. Account. Econ. 39 (1), 163–197.

Lambin, J.J., 1976. Advertising, Competition and Market Conduct in Oligopoly over Time. North-Holland, Amsterdam.

Law, K.K., Zuo, L., 2021. How does the economy shape the financial advisory profession? Manag. Sci. 67 (4), 2466–2482.

Lev, B., Sougiannis, T., 1996. The capitalization, amortization, and value-relevance of R&D. J. Account. Econ. 21 (1), 107–138.

Li, X., 2010. The impacts of product market competition on the quantity and quality of voluntary disclosures. Rev. Account. Stud. 15 (3), 663–711.

Li, Y., Lin, Y., Zhang, L., 2018. Trade secrets law and corporate disclosure: causal evidence on the proprietary cost hypothesis. J. Account. 56 (1), 265–308.

Li, F., Lundholm, R., Minnis, M., 2013. A measure of competition based on 10-K Filings. J. Account. Res. 51 (2), 399–436.

Lin, C., Venkataraman, S., Jap, S.D., 2013. Media multiplexing behavior: implications for targeting and media planning. Market. Sci. 32 (2), 310–324.

Luo, X., Donthu, N., 2006. Marketing's credibility: a longitudinal investigation of marketing communication productivity and shareholder value. J. Market. 70 (4), 70–91.

McVay, S.E., 2006. Earnings management using classification shifting: an examination of core earnings and special items. Account. Rev. 81 (3), 501–531.

Merkley, Kenneth J., 2014. Narrative disclosure and earnings performance: evidence from R&D disclosures. Account. Rev. 89 (2), 725–757.

Netter, J.M., 1982. Excessive advertising: an empirical analysis. J. Ind. Econ. 30 (4), 361–373.

Parsons, L.J., 1975. The product life cycle and time-varying advertising elasticities. J. Market. Res. 12 (4), 476–480.

Petersen, M.A., 2009. Estimating standard errors in finance panel data sets: comparing approaches. Rev. Financ. Stud. 22 (1), 435–480.

Rice, S.C., Weber, D.P., 2012. How effective is internal control reporting under SOX 404? Determinants of the (non-) disclosure of existing material weaknesses. J. Account. Res. 50 (3), 811–843.

Raith, Michael, 2003. Competition, risk, and managerial incentives. Am. Econ. Rev. 93 (4), 1425–1436.

Rao, V.R., Agarwal, M.K., Dahlhoff, D., 2004. How is manifest branding strategy related to the intangible value of a corporation? J. Market. 68 (4), 126–141.

Roberts, M.J., Samuelson, L., 1988. An empirical analysis of dynamic, nonprice competition in an oligopolistic industry. Rand J. Econ. 19 (2), 200–220.

Rogers, R.T., Tokle, R.J., 1995. The economics of advertising: where's the data? Rev. Ind. Organ. 10 (6), 675–687.

Securities and Exchange Commission (SEC), 1994. Financial Reporting Release No.44: Financial Statements of Significant Foreign Equity Investees and Acquired Foreign Businesses of Domestic Issuers and Financial Schedules.

Shi, H., Grewal, R., Sridhar, S., 2021. Organizational herding in advertising spending disclosures: evidence and mechanisms. J. Market. Res. 58 (3), 515–538.

Simpson, A., 2008. Voluntary disclosure of advertising expenditures. J. Account. Audit. Finan. 23 (3), 403–436.

Sutton, J., 1991. Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration. MIT Press, Cambridge, MA.

Tremblay, C.H., Tremblay, V.J., 2005. The U.S. Brewing Industry: Data and Economic Analysis. MIT Press, Cambridge, MA.

Verrecchia, R.E., 1983. Discretionary disclosure. J. Account. Econ. 5, 179–194.

Verrecchia, R.E., Weber, J., 2006. Redacted disclosure. J. Account. Res. 44 (4), 791–814.

Wagenhofer, A., 1990. Voluntary disclosure with a strategic opponent. J. Account. Econ. 12 (4), 341–363.

Wolfe, 2021. Businesses Reported an 11.8% Increase to Nearly a Half Trillion Dollars for U.S. R&D Performance during 2019. National Science Foundation.

Wooldridge, J.M., 2010. Econometric Analysis of Cross Section and Panel Data. MIT press, Cambridge, MA.

Zhao, Q., Percival, D., 2017. Entropy balancing is doubly robust. J. Causal Inference 5 (1).