

Advertising Rivalry and Discretionary Disclosure

1. Introduction

Advertising is an important competition device that affects interactions among firms in the product market (Bagwell 2007).¹ Literatures in economics and marketing suggest that advertising is often *combative* in nature, i.e., advertising mainly “steals” business from rivals and has negative net externalities on rivals’ profits (e.g., Lambin 1976; Netter 1982). As a response to a firm’s increase in advertising, rivals tend to increase reciprocal advertising efforts, which in turn reduces the firm’s profits. In equilibrium, profit-maximizing firms have excessive advertising, resulting in a prisoner’s dilemma (e.g., Stigler 1968; Dixit and Norman 1978). In this study, I examine the effect of advertising rivalry on firms’ discretionary disclosure of advertising expenses in their financial statements.

Examining discretionary disclosure of advertising expenses is important. First, as advertising expenditures represent firms’ brand-related investments, advertising expenses may reveal value-relevant information to market participants who are not likely to fully track a firm’s advertising activities due to search costs (e.g., Gow et al. 2017).² For instance, a *Business Insider* article reported that Apple Inc. stopped disclosing how much it spends on ads in 2016 and financial analysts were complaining about Apple’s decision because firm-disclosed advertising expenses are useful for them.³ Product market competition is suspected to be the reason as the article mentioned “most (firms) don’t want to share that kind of data with competitors”. Second,

¹ The importance of advertising in product market is also reflected in the large amount of corporate advertising expenditures. For instance, in 2014 alone, companies in the United States spent a total of estimated \$297 billion on advertising across all industries and media outlets, which is comparable to the \$283 billion spent on research and development (R&D) directly funded by companies (IHS Markit 2015; Wolfe 2016).

² In the subset of firms disclosing advertising expenses, I find that advertising expenses are positively associated with one-year ahead operating performance after controlling for the third-party tracked advertising outlet costs, consistent with advertising expenses containing incremental information about firm fundamentals (see Appendix B for details).

³ The article “Apple mysteriously stopped disclosing how much it spends on ads” on *Business Insider* can be found at: <https://www.businessinsider.com/apple-stopped-disclosing-ad-spend-2016-11>

accounting researchers have not recognized the significant discretion in firms' disclosure of advertising expenses in financial statements despite the materiality constraint, which has implications for research on firm valuation and investment policies.⁴ Third, prior studies tend to examine the effects of general competition measures on broad disclosure outcomes, generating mixed evidence for the proprietary cost hypothesis (Beyer et al. 2010; Berger 2011). My study links a unique dimension of competition (i.e., advertising rivalry) to a specific aspect of firms' disclosure (i.e., disclosure of advertising expenses).

Advertising rivalry is defined as the intensity of a firm's competition with its advertising rivals, where an advertising rival is a peer firm that advertises in at least one same product category. Intuitively, a firm faces more intense advertising rivalry when it has more advertising rivals, and competes more directly with its rivals by advertising in more overlapping product categories and allocating a higher proportion of its advertising expenditures in the overlapping product categories.

I hypothesize that firms facing more intense advertising rivalry have stronger incentives to hide their advertising expenses in order to avoid triggering rivals' aggressive responses, holding constant other disclosure costs and benefits.⁵ Specifically, when advertising rivalry is more intense, firms with high advertising expenses are less likely to disclose in order to avoid signaling their aggressiveness that may trigger rivals' reciprocal actions. Firms with low advertising expenses are also less likely to disclose in order to avoid signaling their incompetence that may trigger rivals' predatory actions (e.g., Darrough 1993; Clinch and Verrecchia 1997).

⁴ For instance, the Walt Disney Company spent almost one billion dollars (or 4% of sales) in 2001 on advertising media outlets tracked by a third-party company, but did not disclose its advertising expenses in its 10-K.

⁵ Advertising expenses reflect almost all the underlying advertising expenditures because Statement of Position (SOP) 93-7, later codified to Accounting Standards Codification (ASC) 720-35, requires firms to expense advertising costs either as incurred or the first time the advertising takes place, except for direct-response advertising that may be capitalized when stringent conditions are met.

This hypothesis has two strong tensions. First, current US Generally Accepted Accounting Principles (GAAP) explicitly require public firms to disclose the amount of advertising expenses when material, so competition should not affect the disclosure decision as long as the materiality constraint is binding (Heitzman et al. 2010).⁶ Second, rivals may estimate a firm's advertising expenses by observing its advertising activities or historical advertising expenses, which makes the disclosure decision less consequential.

Empirically, I rely on a proprietary dataset from an industry-leading media-tracking company that provides firms' advertising *outlet costs* over major media including television, print, radio, outdoors and digital, for top 50,000 advertisers at the product category level. The third-party data only tracks firms' costs paid to the advertising media outlets, but does not capture costs on ads production or non-trackable advertising activities.⁷ However, the data provides two advantages for my study. First, it enables me to not only identify real non-disclosers (i.e., firms that have advertising activities but do not disclose advertising expenses), but also assess the degree of (unobserved) advertising materiality for non-disclosers as the data provides the lower bound of firms' advertising costs. Second, it allows me to construct firm-level advertising rivalry measures that incorporate information of both public and private firms.

I manually match the third-party data with Compustat/CRSP via firm names and keep firms covered by both datasets during the period of 1995-2009.⁸ By doing so, I construct a sample of firms with actual advertising activities and available disclosure choices. Using this sample, I find 54% of firms with advertising activities do not disclose advertising expenses. More importantly,

⁶ ASC 720-35 "The notes to financial statements shall disclose the total amount charged to advertising expense".

⁷ It is very costly, if not impossible, to track certain types of advertising such as direct-mail advertising where ads are not publically observable or search engine advertising where the occurrence of ads depends on consumers' own search.

⁸ Starting the sample in 1995 is reasonable, because the first universal accounting standards on advertising costs (i.e., SOP 93-7) became effective in June 1994, before which firms' advertising data were less comparable as firms had large flexibility in choosing whether to capitalize or expense advertising costs.

30% do not disclose even among firms with third-party tracked advertising outlet costs exceeding or meeting the conventional materiality threshold (i.e., 1% of sales).⁹

I then examine whether proprietary cost can explain the high likelihood of non-disclosure of advertising expenses. To test this hypothesis, I develop a firm-level advertising rivalry measure to capture the closeness of a firm and its peers in the advertising dimension. Specifically, the rivalry is measured as *the weighted average number of a firm's advertising rivals* in the economy, where the weight is the pairwise cosine similarities between a firm and its advertising rivals in terms of their advertising distributions across product categories. A firm's advertising rivalry is higher if it has more advertising rivals, advertises in more overlapping product categories, and allocates a higher proportion of its advertising expenditures in the overlapping product categories.

Consistent with the hypothesis that advertising rivalry on average discourages firms' disclosure of advertising expenses, I find a negative association between the likelihood of disclosing advertising expenses and advertising rivalry, after controlling for the materiality of advertising expenses and other disclosure costs and benefits. In contrast, general competition measures used in prior studies are largely unassociated with the advertising disclosure likelihood once controlling for industry fixed effects, consistent with my measures of advertising rivalry capturing a distinct dimension of competition at the firm level.

To further test the proprietary cost hypothesis, I examine the heterogeneity in the effects of advertising rivalry. First, I predict and find that the negative association between advertising rivalry and the disclosure likelihood is less pronounced when the firm advertises on more trackable media (operationalized by fewer, less diversified, and national media outlets), consistent with

⁹ Before 1994, the SEC required public firms to disclose advertising costs if the item exceeds 1% of sales (Reg. 210.12-11). In 1994, Financial Reporting Release (FRR) No. 44 removed this bright-line materiality threshold, but in practice 1% of sales is still used as a conventional materiality threshold.

advertising expenses being considered less proprietary when rivals can observe its advertisements with lower costs. Second, I predict and find that the negative association is more pronounced when the firm has more volatile advertising expenditures, consistent with firm-disclosed advertising expenses being considered a more useful signal for rivals when they are less able to estimate the firm's advertising expenditures by observing its past advertising activities. Third, I predict and find that the negative association is more pronounced when the firm has more mature products, consistent with advertising expenses being considered more proprietary when advertising has a stronger business stealing effect for mature products than new products.

The main inferences hold in a variety of robustness checks. Specifically, I continue to find a negative association between advertising rivalry and the likelihood of disclosing advertising expenses when using variants of advertising rivalry measures, the entropy balancing matched sample (Hainmueller 2012), and the advertising-intensive subsample. Analysis on the impact threshold of confounding variable (Larcker and Rusticus 2010) suggests that in order to overturn the results of advertising rivalry, a potential unobserved omitted variable needs to have a larger impact than that of any current control variables. Finally, I find a negative association between advertising rivalry and another measure for firms' advertising disclosures in financial reports, i.e., narrative advertising-related disclosures in 10-Ks, corroborating my main results.

This study contributes to the literature on firms' discretion in *mandatory* disclosure which is subject to the materiality constraint (e.g., Gleason and Mills 2002; Ellis et al. 2012; Rice and Weber 2012; Ayers et al. 2015; Koh and Reeb 2015). Using a large sample of firms with the third-party advertising data, my study estimates that over half of firms with actual advertising activities do not disclose advertising expenses, and 30% of firms with third-party tracked advertising outlet costs meeting or exceeding the conventional materiality threshold do not disclose, which is

surprising given that US GAAP explicitly requires public firms to separately disclose advertising expenses. The disclosure discretion may introduce measurement errors in firms' advertising data, which may have implications for market participants and accounting researchers who use firm-disclosed advertising expenses in firm valuation and investment decisions.¹⁰

My study also contributes to the empirical research on product market competition and proprietary costs of disclosure. Prior studies provide conflicting evidence on this line of research, due to various empirical challenges such as difficulties in capturing the multi-dimensions of competition (e.g., Beyer et al. 2010, Berger 2011). Recent studies address this issue by examining competition in the technological dimension (Cao et al. 2018; Ettredge et al. 2017). My study complements prior studies by focusing on another economically important dimension, i.e., advertising competition, and shows the importance of aligning the competition dimension with the aspect of disclosure. While Heitzman et al. (2010) do not find the effect of industry concentration (a proxy for general product market competition) on firms' disclosure of advertising expenses when the expenses are likely to be material, my study finds that advertising rivalry remains a significant determinant even if the materiality constraint is likely to be binding.

2. Literature Review and Hypothesis Development

2.1. Advertising Rivalry

Advertising is one of the most important competition devices that affect a firm's competitive position in the product market. Specifically, advertising is used to attract customers and increase revenues by enhancing product awareness and strengthening brand loyalty (Bagwell 2007).

¹⁰For instance, while earlier studies (e.g., Hirschey 1982; Hirschey and Weygandt 1985) find value-relevance of advertising outlet costs using the third-party tracked data, more recent studies (e.g., Bublitz and Ettredge 1989; Lev and Sougiannis 1996; Core et al. 2003) rely on firm-disclosed advertising expenses in Compustat and do not find a positive association between advertising expenses and share price or future profitability.

Findings from prior research in economics and marketing largely suggest that advertising on average imposes negative net externalities on product market rivals (e.g., Lambin 1976; Netter 1982). Specifically, advertising mainly has a “business stealing” effect, i.e., it redistributes the market share by attracting customers from rivals, which hurts rivals’ demand (e.g., Erickson 1985; Eckard 1987; Dekimpe and Hanssens 1995). In some circumstances (e.g., for new products), advertising may have positive externalities via a “market expanding” effect, i.e., it expands the aggregated market demand by attracting new customers to the product, which mitigates the business stealing effect (e.g., Nelson 2005; Tremblay and Tremblay 2005).

Due to the negative net externality of advertising, rivals have incentives to respond to a firm’s advertising with reciprocal advertising efforts, which in turn reduces the firm’s profits. Theoretical research on advertising competition largely suggests that in equilibrium, profit-maximizing firms have excessive advertising (e.g., Stigler 1968; Dixit and Norman 1978). Specifically, similar to firms compete in price in a Bertrand competition, firms compete in advertising may engage in advertising war, resulting in a prisoner’s dilemma. For example, in the 1960s, tobacco companies (e.g., Reynolds and Philip Morris) advertised heavily on TV. A firm’s advertising canceled out the effects of the others, and all firms’ profits fell by the cost of advertising. After 1970, tobacco companies ceased TV advertising due to the advertising ban. Consequently, cigarette advertising decreased and industry profits rose (Brown 1978).

Advertising rivalry is distinct from other dimensions of product market competition. For instance, firm A uses advertising to compete with firm B in the product category of coffee, while using R&D to compete with firm C in the product category of coffee machine. Firm A is more likely to compete head-to-head with firm B than with firm C, because advertising is on average combative and has weaker deterrence effect than R&D. Thus, advertising rivalry involves a

different set of rivals and has different implications for how firms compete compared to other forms of rivalry such as quantity or R&D.

2.2. Product Market Competition and Disclosure of Discretionary Expenses

Discretionary expenses such as advertising or R&D expenses represent intangibles expenditures that convey value-relevant information (e.g., Hirschey 1982; Hirschey and Weygandt 1985; Lev and Sougiannis 1996; Core et al. 2003). Despite that GAAP requires firms to disclose material discretionary expenses, a high proportion of Compustat/CRSP firms have missing values in advertising ($\geq 75\%$) or R&D ($\geq 60\%$), suggesting potentially severe disclosure discretion.

Product market competition is arguably an important incentive for the non-disclosure, as discretionary expenses can convey useful information for rivals to act against the disclosing firm. However, the literature provides limited evidence on how product market competition affects disclosure of discretionary expenses in financial statements, due to at least three reasons.

First, there is a lack of alignment between the dimension-specific competition and the type of disclosure. Because product market competition is multi-dimensional, findings from prior studies on price or quantity competition (e.g., Karuna 2010; Li 2010) may not be generalized to advertising or R&D. Recent studies (e.g., Cao et al. 2018) recognize the importance of alignment and examine the relation between R&D-related competition and R&D-related voluntary disclosures.

Second, measuring the intensity of competition is difficult. While earlier studies often use Compustat-based industry concentration as a proxy for product market competition, this proxy is problematic because industry concentration in theory can be positively or negatively associated with competition (e.g., Sutton 1991; Raith 2003) and the measurement error can be severe when omitting private firms (Ali et al., 2009, 2014). Some accounting studies use industry-level empirical measures such as industry PP&E or industry price-cost margins (e.g., Karuna 2007,

2010; Li 2010), which lacks sufficient variation to explain firm-level discretionary disclosures. Most recent studies construct firm-level measures focusing on a specific type of competition such as technological rivalry (e.g. Bloom et al. 2013; Cao et al. 2018; Ettredge et al. 2017).

Third, it is empirically difficult to distinguish real non-disclosers from firms with immaterial information. Koh and Reeb (2015) use patent data to show that firms with missing R&D expenses on average have more patents than firms reporting zero R&D expenses.

Compared with R&D, advertising-related disclosure (such as the issue of missing advertising expenses) has attracted much less attention.¹¹ Two accounting papers Heitzman et al. (2010) and Simpson (2008), and one marketing working paper by Shi et al. (2017) have examined the disclosure decision of advertising expenses, all of which use the setting of FRR No.44 that removes the bright-line materiality threshold. Specifically, Heitzman et al. (2010) focus on the role of materiality in firms' disclosure decision of advertising expenses. Simpson (2008) examines capital market disclosure benefits and proprietary disclosure costs arising from advertising's positive spillover, and Shi et al. (2017) examine the effect of industry peers on disclosure.

My study confirms the important role of materiality in advertising disclosure as shown in Heitzman et al. (2010). While Heitzman et al. (2010) do not find significant results for industry concentration (a proxy for product market competition) on disclosure when the materiality constraint is likely to be binding, my study suggests that their insignificant results may be driven by the noise in the competition measure. By using the third-party tracked advertising data, my study also mitigates two concerns in Simpson (2008) and Shi et al. (2017). First, both studies treat

¹¹ Marketing literature has long recognized the limitations in firm-disclosed advertising/marketing data (e.g., Hanssens, Rust, and Srivastava 2009; Kim and McAlister 2011). To get around these data challenges, marketing studies tend to use third-party tracked advertising data (e.g., Shankar 1997; Rao et al. 2004; Luo and Donthu 2006; Kim and McAlister 2011). One caveat is that marketing studies often assume firms' disclosure of advertising expenses to be purely voluntary and thus do not consider the materiality constraint or study the disclosure issue.

firms' disclosure of advertising expenses to be purely voluntary after FRR No.44, which is not true since US GAAP explicitly requires public firms to disclose advertising expenses in ASC 720-35. Thus, their findings on voluntary disclosure incentives could be driven by the immateriality. Second, their main variables of interest are estimated using data in the pre-FRR No.44 period, which are likely to contain substantial measurement errors. Specifically, FRR No.44 became effective in 1994, which is the same as the first authoritative accounting standards on advertising costs (SOP 93-7). Before 1994, firms had large discretion in choosing whether to capitalize or expense advertising costs (e.g., see Item 21, SOP 93-7). Therefore, firms' advertising expenses are less comparable prior to FRR No.44, which makes findings from these studies less reliable.

2.3. Hypothesis Development

My first hypothesis concerns the average effect of advertising rivalry on firms' disclosure of advertising expenses in financial statements. Managers may trade off benefits of disclosing *mandatory* financial statement information with various disclosure costs. My study focuses on whether the proprietary cost induced by advertising rivalry is an important determinant for the non-disclosure of advertising expenses, holding constant other ex-ante disclosure costs and benefits documented in the prior literature.

Due to the combative nature of advertising, I predict that proprietary costs of disclosure increase as advertising rivalry increases, and firms facing more intense advertising rivalry are less likely to disclose advertising expenses, holding constant the level of advertising expenditures and other disclosure costs and benefits (Verrecchia 1983).

More specifically, this prediction is consistent with disclosure theories regarding the effect of competition among existing rival firms (e.g., Darrough 1993; Clinch and Verrecchia 1997). Due to the combative nature of advertising, the proprietary cost of disclosure is likely to increase in

advertising rivalry for a given level of advertising expenses. When advertising rivalry is more intense, firms with high advertising expenses (i.e., higher than rivals' expectation) are less likely to disclose to avoid signaling their aggressiveness that may trigger rivals' reciprocal actions. Firms with low advertising expenses (i.e., lower than rivals' expectation) are also less likely to disclose to avoid signaling their incompetence that may trigger rivals' predatory actions.

This prediction may not be supported due to two tensions: materiality constraint and visibility of advertisements. First, as US GAAP requires firms to disclose material advertising expenses, competition should not affect the disclosure decision as long as the materiality constraint is binding (Heitzman et al. 2010). However, prior studies suggest that managers have leeway in disclosing material information in regulatory filings (e.g., Ellis et al. 2012; Rice and Weber 2012; Ayers et al. 2015; Koh and Reeb 2015) for three reasons. (i) There is no bright-line materiality threshold, so the evaluation of materiality involves discretion subject to managers', auditors' and the SEC's professional judgments (Acito et al. 2009, 2016). (ii) Subjective components in the accounting standards allow managers flexibility in classifying or aggregating financial statement items (e.g., McVay 2006). (iii) The expected noncompliance costs of failing to disclose are low (e.g., Ellis et al. 2012). For instance, auditors may be less concerned about the non-disclosure of advertising expenses, which does not directly affect the bottom line. A search for the SEC comment letters also reveals very few cases that firms are asked to provide explanations when they do not disclose advertising expenses, consistent with the possibility that auditors and the SEC are unaware of firms' potential noncompliance with the disclosure requirement.

Second, to the extent that rivals (or the media-tracking company) can accurately estimate a firm's advertising expenditures, the disclosure decision is inconsequential. However, at least three points suggest that advertising expenses contain proprietary information. (i) Search costs prevent

outsiders from tracking all types of advertising activities such as direct-mail advertising where the ads are not publically observable and search engine advertising where the occurrence of ads depends on customers' own search. (ii) Outsiders are unlikely to obtain the proprietary information regarding the production costs of ads. (iii) Firm-disclosed advertising expenses are audited and considered credible, which can confirm rivals' information from other sources (Ball et al. 2012).

Based on the above discussions, I hypothesize that firms facing more intense advertising rivalry are less likely to disclose advertising expenses due to their concerns of proprietary costs. I thus formally test the following hypothesis (in the alternative form):

H1: Advertising rivalry is negatively associated with the likelihood of disclosing advertising expenses in financial statements (either on the face or in the footnotes).

To further test the proprietary cost hypothesis, I examine the heterogeneity in the effects of advertising rivalry. First, advertising expenses are less proprietary when the firm advertises on more trackable media outlets. Specifically, when a firm advertises on fewer or less diversified media, it is less costly for its rivals to observe its ads. Additionally, a national media is more visible than a local media because the former allows a wider audience, especially geographically distant rivals, to easily follow the ads (e.g., Genztkow and Shapiro 2008; Gurun and Butler 2012). I thus expect firms' concern of proprietary costs from advertising rivalry to be smaller when they advertise on more trackable media and test the following hypothesis (in the alternative form):

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 and national media).

Second, rivals might estimate a firm's advertising expenditures by observing its historical advertising activities. The more volatile a firm's underlying advertising expenditures, the less

precise rivals' estimates, and the more useful firm-disclosed advertising expenses for rivals to revise their expectations. This is consistent with the Bayesian theory and prior studies' findings that investors and analysts rely more on firm-reported earnings to revise their forecasts when the ex-ante uncertainty of earnings is high (e.g., Yeung 2009; Sheng and Thevenot 2012). I thus expect firms' concern of proprietary costs from advertising rivalry to be larger when their advertising expenditures are more volatile and test the following hypothesis (in the alternative form):

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

Prior research in economics and marketing suggests that advertising has different degrees of externalities on rivals along product life cycle. Specifically, when a product is new, advertising is more likely to attract new customers and thus expand the market-wide demand, which mitigates the business stealing effect (e.g., Roberts and Samuelson 1988). When a product is mature and well known to customers, advertising primarily "steals" rivals' customers and has little impact on the market-wide demand (e.g., Dekimpe and Hanssens 1995). I thus expect firms' concern of proprietary costs from advertising rivalry to be larger when rivals tend to respond more aggressively to mature products due to a stronger business stealing effect, and test the following hypothesis (in the alternative form):

H4: The negative association between advertising rivalry and the likelihood of disclosing advertising expenses is more pronounced when firms have more mature products.

3. Research Design

I use a probit model to estimate the effect of advertising rivalry on the binary disclosure choice. Specifically, I estimate the following regression model:

$$Disclosure_{it} = \alpha_1 AdRivalry_{it} + \sum_{j=2} \alpha_j Controls_{jit} + Industry\ FE + Year\ FE + \varepsilon_{it} \quad (1)$$

where *Disclosure* is the disclosure choice for firm *i* at the end of year *t*, *AdRivalry* is the advertising rivalry for firm *i* in year *t*, *Controls* is a vector of firm-year level control variables, *Industry FE* are industry fixed effects (at the four-digit SIC level) and *Year FE* are year fixed effects.¹² Firm fixed effects are not included primarily due to the little within-firm variation of the dependent variable (less than 5% firm-years have non-zero changes in *Disclosure*). All continuous variables are winsorized at 1% and 99% percentiles. Standard errors are clustered by firm (Petersen 2009).¹³ My first hypothesis predicts a negative coefficient on *AdRivalry* ($\alpha_1 < 0$).

3.1. Measure for Disclosure Decision

The dependent variable *Disclosure* is a binary variable that equals one if firm *i* discloses advertising expenses in financial statements (on the face or in the footnotes) in year *t*, and zero otherwise. Empirically, I first require firms to be covered by both Compustat/CRSP and the third-party tracked advertising dataset, to ensure that my sample firms are subject to GAAP's disclosure requirement and have non-zero advertising activities. I then identify disclosers versus non-disclosers based on firm-disclosed advertising expenses (*xad*) recorded in Compustat Fundamental Annual file, i.e., *Disclosure* = 1 if firm *i* has non-missing *xad* in year *t*, and = 0 if *xad* is missing.¹⁴

3.2. Measures for Advertising Rivalry

A large number of prior studies have used the number of industry peers as a proxy for the industry competition. I follow a similar intuition and construct a measure of advertising rivalry as *the weighted average number of advertising rivals* by three steps.

¹² Results are robust when including industry×year fixed effects.

¹³ Results are robust if clustering standard errors by industry or by firm and year.

¹⁴ Manual check for a random sample of 150 firms' 10-Ks suggests a high accuracy rate (> 95%) for non-financial firms' advertising expenses recorded in Compustat.

First, I identify a firm's advertising rivals as those firms that advertise in at least one common product category as the focal firm, where the product category is defined by an industry-leading media-tracking company that estimates firms' advertising costs paid to media outlets. The media-tracking company classifies a total of 924 product categories, more granular than the SIC four-digit industry classification (a total of 454 four-digit SIC industries in Compustat).

Advertising peers can be very different from peers in other dimensions, such as industry peers. For instance, Apple Inc. is mainly a manufacturer with a SIC of 3571 while Amazon.com Inc. is mainly an online retailer with a SIC of 5961. Apple Inc. and Amazon.com Inc. are not considered as industry peers since they are from different economic sectors, but they are advertising peers since they advertise in at least one common product category such as tablet computers.

Second, I assume advertising rivalry between any two firms is more intense when the firms are more direct competitors. I assess how direct a firm competes with another firm in the advertising dimension by calculating the pairwise cosine similarity between firm i and firm j 's vectors in year t : $S_{it}=(S_{it,1},S_{it,2},\dots,S_{it,k},\dots,S_{it,924})$ and $S_{jt}=(S_{jt,1},S_{jt,2},\dots,S_{jt,k},\dots,S_{jt,924})$, where the k^{th} element of each vector ($S_{it,k}$ or $S_{jt,k}$) equals the firm's *ratio* of its third-party tracked advertising outlet costs in product category k to its total advertising outlet costs:¹⁵

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

Third, I sum up the pairwise similarities between firm i and all the other J firms in the economy in year t , where the economy consists of all firms covered in the third-party tracked database (i.e.,

¹⁵ I assume that the distribution of a firm's third-party tracked advertising outlet costs across product categories is the same as the distribution of its underlying advertising expenditures across product categories.

top 50,000 advertisers in year t , including both public and private firms), and take the natural logarithm to arrive at a firm-year level measure (a numerical example is provided in Appendix C):

$$\text{AdRivalry}_{it} = \log\left(1 + \sum_{j=1}^J w_{ijt}\right)$$

In addition, I construct several variants of *AdRivalry* based on different sets of rival firms:

$\text{AdRivalry}_{it}^{\text{public}}$: The total advertising similarity summed over public rival firms

$\text{AdRivalry}_{it}^{[x,y]}$: The total advertising similarity summed over the set of public rivals with pairwise similarity in the range of $[x, y]$ percentiles. For instance, $\text{AdRivalry}_i^{[0,2]}$ is measured as the sum of pairwise similarity scores between firm i and its top 2% closest public rivals, capturing a similar degree of similarity to the three-digit SIC industries since roughly 2% of public firm pairs are in the same three-digit SIC industries (Hoberg and Phillips 2016).

3.3. Measures for Control Variables

In addition to industry fixed effects and year fixed effects, I control for firm-year level variables that may explain firms' disclosure of advertising expenses, including materiality of advertising expenses and other disclosure costs and benefits documented in the prior literature.

Materiality of Advertising Expenses

I control for the materiality of advertising expenses using two proxies following Heitzman et al. (2010): (i) Magnitude of advertising expenses, proxied by the ratio of third-party tracked advertising outlet costs to firm sales (*Kantar/Sales*) as the outlet costs and firms' advertising expenses are likely to be highly correlated.¹⁶ (ii) Informativeness of advertising expenses, proxied

¹⁶ The high correlation assumption is reasonable since in the subset of firms that disclose advertising expenses, third-party tracked advertising outlet costs and firm-level advertising expenses are highly correlated (correlation > 0.8).

by earnings response coefficient which is estimated by regressing quarterly stock returns on the seasonal change in price-deflated earnings per share (*ERC*).

Operating Complexity

To control for the direct cost of financial reporting such as costs associated with tracking, analyzing and recording advertising expenses, I control for the number of business segments to proxy for operating complexity (*NumSegment*).

General Product Market Competition

To isolate the effect of advertising rivalry from general product market competition, I control for composite competition measures following Li (2010). Specifically, I use principal component analysis of nine segment-level (based on the four-digit SIC) variables to construct three measures: Competition among existing rivals (*ExistComp*), competition from potential entrants (*EntrantComp*), and industry profitability (*IndProfitability*). In the additional analysis, I replace *ExistComp* with alternative measures for existing competition: (i) Text-based product similarity: a measure for competition among existing rivals based on how similar firms' products are, measured as the sum of pairwise cosine similarities between a firm's and all other firms' product descriptions in 10-Ks (*ProductSimilarity*) (Hoberg and Phillips 2016). (ii) Text-based product fluidity (*ProductFluidity*): a measure for competition from new entrants, measured as the sum of pairwise cosine similarities between a firm's product descriptions and all other firms' annual change of product descriptions in 10-Ks (Hoberg et al. 2014).¹⁷ (iii) Sales similarity (*SalesSimilarity*): a measure for competition based on how similar firms' revenue sources are, measured as the sum of pairwise cosine similarities between a firm's revenue distribution across four-digit industry segments and all other firms' revenue distributions.

¹⁷ *ProductSimilarity* and *ProductFluidity* are directly obtained from www.hobergphillips.usc.edu.

Capital Market Incentives

I control for capital market incentives of discretionary disclosure following prior studies (e.g., Li 2010; Ali et al. 2014; Merkley 2014; Cao et al 2018): (i) General firm characteristics: firm size (*LogMV*), leverage (*Leverage*), and market-to-book (*MB*). (ii) Performance and uncertainty: profitability (*ROA*), volatility of stock returns (*Std(Ret)*), and volatility of earnings (*Std(Earn)*). (iii) New issuance of equity or debt (*NewIssue*). (iv) Information demand and monitoring: analyst following (*Analyst*) and percentage of institutional ownership (*InstOwnership*). (v) Litigation risk dummy (*Litigation*). (vi) Auditor effect: whether a firm's auditor is one of the big four accounting firms, i.e., Deloitte, PricewaterhouseCoopers (PwC), Ernst & Young (EY) and KPMG (*Auditor*).

To further control for agency costs related to advertising quality, it is ideal to use firm-specific *abnormal* advertising effectiveness, where agency costs arise when managers have incentives to hide advertising expenses when the advertising effectiveness is below investors' expectations. Conceptually, advertising rivalry is unlikely to correlate with agency costs arising from managers' self-serving purposes. Empirically, I control for abnormal return on sales (*AbROS*) as a proxy for the abnormal return on advertising, where *AbROS* is measured as a firm's return on sales minus the industry median based on four-digit SIC code.¹⁸

Firm Reporting Quality

To control for firms' general disclosure and reporting quality, I include the following two variables: (i) Log of the number of non-missing items in Compustat (*LogNonMissing*), a proxy for the firm's general disclosure quality (Chen et al. 2015).¹⁹ (ii) Performance-matched discretionary accruals (*PMDAccruals*) (Kothari et al. 2005).

¹⁸ My relatively short sample period prevents me from estimating an abnormal advertising return proxy without dramatically reducing the sample size. Nevertheless, my results are robust when controlling for an advertising return proxy estimated from 7-year firm-specific rolling regressions using the third-party data (untabulated).

¹⁹ Results are robust if using disclosure of R&D (or SG&A) expenses as a proxy for firm's disclosure convention.

Industry Peer Disclosure

To control for time-invariant industry-wide disclosure convention, I include industry fixed effects in all regressions. To further control for potential peer effect on disclosure, I control for the proportion of peer firms that disclose advertising expenses in the four-digit SIC industry (measured at the beginning of the year to mitigate the endogeneity of the peer disclosure) (*PeerDisclosure*). The sign of the peer disclosure proportion is ex ante unclear. On one hand, firms may have stronger incentives to disclose under the stronger peer disclosure pressure. On the other hand, firms may have weaker incentives to disclose because the marginal benefit of disclosure is smaller when the capital market can infer firms' advertising expenses from peer disclosures.

Lastly, I do not include lagged disclosure decision, i.e., lagged dependent variable, because both the dependent variable (*Disclosure*) and the variable of interest (*AdRivalry*) are highly serially correlated. In this case, including lagged dependent variable would lead to substantial downward bias for the estimates of the variable of interest and current econometric techniques such as Arellano-Bond estimation do not fix this downward bias (Achen 2000). Nevertheless, results are qualitatively the same when including lagged disclosure decision (i.e., the coefficient on *AdRivalry* remains negative and statistically significant at the 1% level).

3.4. Measures for Advertising Trackability

I use three measures to capture how easily rivals can track a firm's advertising activity: (i) Media Number (*MediaNumber*), measured as the number of unique media outlets used by a firm. (ii) Media Concentration (*MediaHHI*), measured as the Herfindahl-Hirschman Index based on the share of each media's advertising for a firm, i.e., the sum of squares for the ratio of advertising in each media to the firm's total third-party tracked advertising outlet costs. (iii) National media

(*National*), a dummy that equals one if a firm advertises on any national media, i.e., any media outlet that is not classified as local radio, local magazine or outdoor, and zero otherwise.

3.5. Measures for Advertising Expenditures Volatility

I measure the volatility of advertising expenditures as the firm-specific standard deviation of third-party tracked advertising outlet costs scaled by firm sales over the sample period, assuming that the outlet costs are highly correlated with the firm's advertising expenditures. Due to the short sample period, I use the entire sample to estimate firm-specific advertising volatility, assuming the volatility reflects a sticky firm style on advertising.

Additionally, I use two other proxies for the volatility of advertising expenditures: The standard deviation of the unscaled third-party tracked advertising outlet costs, and the standard deviation of the firm sales assuming a positive link between advertising expenditures and sales.

3.6. Measures for Product Maturity

Since a product is more mature when it reaches the later stage of its life cycle, I use firms' product life cycle to measure firms' product maturity. As a firm can operate in multiple product markets, I construct proxies for firm-level product life cycle by aggregating segment-level life cycles, assuming that products are homogeneous within an operating segment. Specifically, I measure segment-level product life cycle in three ways: (i) The segment median value of a composite measure based on firm-specific life cycle indicators (*ProdMaturity1*): firm age, sales growth, and dividend payout ratio (Anthony and Ramesh 1992). (ii) A composite measure based on segment-level life cycle indicators (*ProdMaturity2*): industry sales growth and industry new entry rate (Parsons 1975). (iii) A segment-level cash flow based life cycle measure (*ProdMaturity3*) (Cantrell and Dickinson 2015).

3.7. Entropy Balancing Matched Sample

Since firms' disclosure of advertising expenses lacks within-firm variation, I primarily rely on cross-sectional variation to estimate the effect of advertising rivalry. Thus, it is important to control for systematic differences between firms with high versus low advertising rivalry. In particular, a linear model may not fully control for non-linear correlations between advertising rivalry and control variables. To reduce endogeneity concerns arising from model dependence, I perform a matched sample analysis (e.g., Imbens 2004).

Specifically, I first dichotomize the continuous advertising rivalry measure by assigning a firm to a treated group if its advertising rivalry is above the sample median, and to a control group otherwise. I then use the entropy balancing method described in Hainmueller (2012) to balance the covariates across treated and control groups, and use the matched sample in regression analyses. Compared with propensity score matching schemes that discard observations (e.g., one-to-one nearest neighbor matching) or involve tedious reweight/balance interactions (e.g., kernel matching), the entropy balancing method adjusts covariate distributions efficiently via a reweighting scheme that can preserve the full sample size and increase the robustness of results (Zhao and Percival 2017). Nevertheless, I also conduct a propensity score matched sample analysis and find qualitatively the same results (untabulated).

One disadvantage of using the matched sample analysis is that it requires a binary treatment (i.e., high vs. low advertising rivalry) which disregards valuable information in the continuous variable of advertising rivalry. The cutoff of high vs. low is also to some extent arbitrary. I also check the results using the cutoff of top quartile, i.e., assign a firm to the treated group if its advertising rivalry is in the top quartile, and find qualitatively the same results (untabulated).

4. Data and Sample

4.1. Advertising Data

Third-party tracked advertising data is provided by Kantar Media (Kantar hereafter), an industry-leading media-tracking company. Kantar basically estimates advertising outlet costs via two steps: (i) tracks firms' advertisement occurrences over major media outlets including TV, print, radio, outdoors and digital, and (ii) multiplies each advertisement occurrence by its related rate provided by media outlets to obtain a dollar amount estimate.²⁰

The Kantar data has several advantages. First, it directly tracks firms' advertisements and estimates the advertising outlet costs free of firms' managerial discretion. Thus, it enables me to identify non-disclosers (i.e., firms that have advertising activities but do not disclose advertising expenses). Second, it has been a standard data source used in the marketing and economics literatures for at least two decades (e.g., Rogers and Tokle 1995; Shankar 1997).²¹ While marketing studies tend to focus on a small sample of firms or industries, my data covers a large sample of firms, including the top 50,000 advertisers. Third, the data is granular: it is available at the product category level, where the product category is based on the Kantar classification that is more granular than the four-digit SIC classification (a total of 924 product categories, compared with a total of 454 four-digit SIC industries in Compustat).

Note that Kantar does not track *all* types of advertising expenditures. In fact, in the subset of firms that disclose advertising expenses, Kantar-tracked advertising outlet costs on average represent 56% of firms' total advertising expenses. The uncovered portion mainly consists of: (i) the production costs of advertisements, and (ii) costs on non-trackable advertising activities such

²⁰ In determining the rate for each advertisement, Kantar considers various factors such as the size and the media channel of the advertisement. Kantar does not take into account volume discounts or sales commissions, which might introduce measurement errors especially for firms with stronger ex ante bargaining power with media outlets. Results are robust in subsamples with high vs. low firm-specific bargaining power proxies (i.e., firm size, Kantar-tracked advertising outlet costs, and the industry concentration) (untabulated).

²¹ The advertising data source was formally known as TNS Media from 2000 to 2008 before it was acquired by Kantar. It was also known as Competitive Media Reporting (CMR) and Leading National Advertisers (LNA) before 2000.

as direct-mail advertising, cooperative advertising and search engine advertising.²² The uncovered portion is unlikely to impair the internal validity of my results as long as the tracked outlet costs are highly correlated with the firm's advertising expenses. I acknowledge that my results may not be generalized to firms that mainly use non-trackable advertising activities.

I match Kantar with Compustat via firm name using three steps. First, for each firm in Compustat/CRSP, I use the fuzzy matching algorithm in SAS to find the candidate name matches from Kantar. Second, I manually check the candidate matches and keep the accurate ones. Third, for each unmatched firm in Compustat/CRSP, I manually search the keyword of the firm name in Kantar, and keep the accurate matches.²³

For firms covered by both Kantar and Compustat/CRSP, I aggregate quarterly Kantar data to the fiscal-year data. Specifically, I sum up Kantar-tracked outlet costs for the four quarters prior to the fourth fiscal quarter. For instance, if a firm ends its fiscal year 2005 in March 2006, I sum up its Kantar data for calendar quarters covering the 12 months from April 2005 to March 2006 to obtain its annual Kantar advertising outlet costs for the fiscal year 2005.

4.2. Sample Selection and Description

Table 1 Panel A shows the sample selection. My sample starts with 26,284 firm-years for Compustat/CRSP firms (with positive sales and total assets) that are manually matched with the Kantar dataset over the 15-year period 1995-2009. I exclude 5,493 observations for firms from regulated utilities industries (SIC code: 4900-4999) or financial industries (SIC code: 6000-6799) due to their different reporting environments. I further remove 3,649 observations with missing

²² It is very costly, if not impossible, to track certain types of advertising activities such as direct-mail ads where the ads are not publically observable or search engine ads where the occurrence of ads depends on consumers' own search.

²³ Two main reasons for unmatched firms: (1) the Compustat firm is the parent or subsidiary of a Kantar firm. In this case, I discard the firm to ensure that the Kantar data and the firm-disclosed advertising data are for the same level of firms. (2) The Compustat firm does not advertise on any of the tracked media outlets.

values in main variables, resulting in a sample of 17,142 firm-years. Lastly, I drop 1,556 observations from the four-digit SIC industries with zero variation in *Disclosure*, resulting in a final sample of 15,586 firm-years (or 2,794 firms).²⁴ My sample represents about 60% of Compustat/CRSP population in terms of market value and 80% in terms of advertising expenses.

Table 1 Panel B reports the sample distribution by disclosure choice for three groups: (i) Compustat/CRSP population (firms with positive sales and total assets, excluding financial and regulated utilities industries), (ii) my sample of firms with underlying advertising activities (15,586 firm-years), and (iii) a subsample of advertising-intensive firms (as proxied by Kantar-tracked outlet costs no less than the conventional materiality threshold, i.e., 1% of sales).

Row (1) shows that 68.7% firm-years (or 80% firms) in the Compustat/CRSP population have missing values in advertising expenses.²⁵ Rows (2) and (3) show that over half of (53.6%) firms with actual advertising activities do not disclose advertising expenses, and this percentage remains 30.3% for firms with Kantar-tracked outlet costs exceeding or meeting the conventional material threshold.²⁶ These results indicate significant discretion in firms' disclosure of advertising expenses despite the materiality constraint.

Table 1 Panel C presents the sample distribution by industry sectors defined at the two-digit SIC level. Columns (1) and (2) show that manufacturing industries have the highest frequency (49.9%), followed by services (23.4%) and retails (13.7%). Columns (2) and (3) suggest that the industry distribution of my sample is comparable to that of the Compustat/CRSP population. Column (4) shows that non-disclosers are well populated within each industry sector.

5. Empirical Results

²⁴ Results are robust if using industry fixed effects based on other industry classifications like two-digit SIC and Fama-French 48 industries.

²⁵ For comparison, about 38% firm-years have missing R&D expenses.

²⁶ This percentage is conservative since Kantar only tracks a portion of firms' advertising costs, i.e., the outlet costs.

5.1. Descriptive Statistics

Table 2 Panel A reports the summary statistics of variables. Panel A shows that, 46% of the firm-years with underlying advertising activities disclose advertising expenses. *AdRivalry* is on average much larger than *AdRivalry^{public}*, suggesting that private firms are a non-negligible source of competitive pressure. *AdRivalry^[0,2]* is on average larger than *AdRivalry^[3,5]* and *AdRivalry^[6,100]*, consistent with advertising rivalry from close rivals being more intense than from distant rivals. In terms of advertising media, an average firm uses 4.72 different types of media outlets, has a media Herfindahl-Hirschman Index (HHI) of 0.68 and a national media percentage of 53%.²⁷

Compustat-based competition measures (*ExistComp*, *EntrantComp*, and *IndProfitability*) are estimated at the segment level and then aggregated to the firm level by taking the weighted average across all segments for a given firm (Li 2010; Karuna 2010). Text-based competition measures (*ProductSimilarity* and *ProductFluidity*) are directly obtained from the Hoberg and Phillips' online database. Summary statistics for other variables, including product life cycle indicators, are comparable to those in prior studies (e.g., Anthony and Ramesh 1992; Heitzman et al. 2010; Li 2010; Ali et al. 2014; Cantrell and Dickinson 2015).

Table 2 Panel B reports Pearson (Spearman) pairwise correlations among competition measures above (below) the diagonal. The correlations between *AdRivalry* and other competition measures are relatively low (≤ 0.25), consistent with my expectation that *AdRivalry* captures a distinct competition dimension. Correlations between *AdRivalry* and other independent variables are in general low (untabulated).

5.2. Advertising Rivalry and Disclosure Likelihood of Advertising Expenses

²⁷ Advertising media outlets are classified by Kantar to 18 types including: 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.

Table 3 reports the results of estimating probit model (1). To facilitate interpretation, I report the average marginal effects of the variables. Column (1) shows the results without industry fixed effects as prior studies (e.g., Li 2010). The average marginal effect of *AdRivalry* is negative and statistically significant at the 1% level, consistent with H1. General product market competition measures *ExistComp*, *EntrantComp*, and *IndProfitability* have signs consistent with theoretical predictions (e.g., Darrough and Stoughton 1990; Darrough 1993).

Column (2) shows the probit regression results after controlling for industry fixed effects. Notably, *ExistComp*, *EntrantComp*, and *IndProfitability* are insignificant, consistent with them capturing cross-industry variations. The average marginal effect of *AdRivalry* remains negative and significant (-0.039), suggesting that one standard deviation increase in *AdRivalry* reduces the likelihood of disclosing advertising expenses by 5.6% ($=-0.039 \times 1.43$), which is comparable to the marginal effects of other important determinants such as *Kantar/Sale* ($0.948 \times 0.04 = 3.8\%$). Column (3) shows similar results for *AdRivalry* (-0.037) after further controlling for the industry peer disclosure proportion. Note that *PeerDisclosure* is significantly negative, consistent with peer disclosure reducing capital market demand for the firm's disclosure.²⁸

Columns (4) to (6) replace *AdRivalry* with the decile ranked *AdRivalry* scaled to be within [0, 1] and produce similar inferences as in Columns (1) to (3). For instance, Column (6) shows that the average marginal effect of *Decile_AdRivalry* is negative (-0.155) and statistically significant at the 1% level, suggesting that the firm in the highest decile of advertising rivalry is on average 15.5% less likely to disclose advertising expenses than that in the lowest decile.

5.3. Analysis on Entropy Balancing Matched Sample

²⁸ *PeerDisclosure* is significantly positive if measured at the two-digit SIC level, consistent with firms having stronger incentives to disclose under higher peer disclosure pressure (Koh and Reeb 2015). Results are robust to using either four-digit or two-digit SIC based peer disclosure measures, or controlling for both measures.

Table 4 presents the analysis using the entropy balancing matched sample. Panel A shows that after entropy balancing, the treated and the control groups exhibit almost the same means for the regression variables. Panel B reports the probit regression results using matched versus unmatched samples. Specifically, Column (1) shows that the disclosure likelihood is negatively associated with the indicator of high advertising rivalry (*High_AdRivalry*) (-0.076) when using the unmatched sample. Column (2) shows that the average marginal effect on *High_AdRivalry* continues to be negative and statistically significant (-0.065) when using the matched sample (note that the sample size is the same, but the weight for each observation has been adjusted). Columns (3) and (4) also report significantly negative coefficients for advertising rivalry based on public rival firms. In sum, this analysis alleviates some endogeneity concerns and strengthens our confidence regarding the estimated effect of advertising rivalry.

5.4. Cross-Sectional Analysis on Advertising Media Trackability

To test the second hypothesis, I add the interaction term between advertising rivalry and media trackability as well as the direct effect of media trackability to the baseline model (1).²⁹ I use three proxies of advertising media trackability: Media number (*MediaNumber*), media concentration (*MediaHHI*) and national media indicator (*National*). Column (1) of Table 5 shows that the average interaction effect between advertising rivalry and *High_MediaNumber* is -0.036 ($t = -3.77$), suggesting that firms' concern of proprietary costs from advertising rivalry is larger when firms advertise on less trackable media outlets. Columns (2) and (3) of Table 5 show that the average interaction effects between *AdRivalry* and both *High_MediaHHI* and *National* are positive. Taken together, the results in Table 5 are consistent with H2 that the negative association between

²⁹ I estimate the average interaction effect in a probit model following Ai and Norton (2003).

advertising rivalry and disclosure likelihood is less pronounced when firms advertise on more trackable media outlets (i.e., fewer, more concentrated or national media).

5.5. Cross-Sectional Analysis on Advertising Expenditures Volatility

To test the third hypothesis, I add the interaction term between advertising rivalry and advertising expenditures volatility as well as the direct effect of advertising expenditures volatility to the baseline model (1). To proxy for advertising expenditures volatility, I use the firm-specific standard deviations of Kantar-tracked advertising outlet costs scaled by sales ($Std(Kantar/Sales)$), Kantar-tracked advertising outlet costs ($Std(Kantar)$), and firm sales ($Std(Sales)$), respectively. Table 6 shows that the average interaction effects between advertising rivalry and advertising expenditures volatility proxies are negative and significant, consistent with H3 that the negative association between advertising rivalry and disclosure likelihood is more pronounced when firms have more volatile underlying advertising expenditures.

5.6. Cross-Sectional Analysis on Product Maturity

To test the fourth hypothesis, I add the interaction term between advertising rivalry and product maturity as well as the direct effect of product maturity to the baseline model (1). I use three proxies for product maturity based on firm-level ($ProdMaturity1$), industry-level ($ProdMaturity2$) and cash flow-based ($ProdMaturity3$) product life cycle indicators. Table 7 shows that the average interaction effects between advertising rivalry and product maturity measures are negative and significant, consistent with H4 that the negative association between advertising rivalry and disclosure likelihood is more pronounced when firms have more mature products.

6. Extensions and Robustness

6.1. Analysis on Different Competition Measures

To further differentiate advertising rivalry from general product market competition, I replace *ExistComp* with alternative measures that capture competition from existing rivals. Column (1) of Table 8 shows that sales-based competition (*SalesSimilarity*) is significantly negative, consistent with proprietary costs of disclosure being larger when firms generate higher proportion of revenues in more overlapping industry segments. Column (2) shows that *SalesSimilarity* becomes insignificant once controlling for industry fixed effects or industry peer disclosure proportion, suggesting that *SalesSimilarity* mainly captures cross-industry variations in explaining the advertising disclosure. Similarly, Columns (3) to (6) show that the negative marginal effects of product similarity (*ProductSimilarity*) and product fluidity (*ProductFluidity*) are gone once controlling for industry fixed effects or industry peer disclosure proportion.³⁰

The average marginal effects on *AdRivalry* remain significantly negative after controlling for alternative competition measures in Table 8, consistent with *AdRivalry* capturing a distinct aspect of competition at the firm level. Robustness tests show that the coefficient of *AdRivalry* is negative and statistically significant at the 1% level when controlling for these alternative product market competition measures in the same regression (untabulated).

6.2. Analysis on Advertising Rivalry Variants

Table 9 presents the results of advertising rivalry based on different sets of rivals. Column (1) shows that the average marginal effect of *AdRivalry*^{public} is significantly negative, corroborating the main findings using *AdRivalry*. Column (2) shows that *AdRivalry*^[0,2] has a negative marginal effect (-0.051), which is significantly larger in magnitude than those of *AdRivalry*^[3,5] (-0.035) in Column (3) and *AdRivalry*^[6,100] (-0.032) in Column (4), respectively.

³⁰ Note that *ProductFluidity*, by construction, captures the threat from newly entered rivals. The positive coefficient in Column (6) is consistent with this measure also capturing the threat from potential entrants, as theory predicts a positive association between disclosure and entry threat (e.g., Wagenhofer 1990; Darrough and Stoughton 1990).

6.3. Analysis on Advertising-Intensive Firms

Table 10 reports the results of model (1) in a subsample of firms with Kantar-tracked outlet costs meeting or exceeding the conventional materiality threshold of advertising expenses (i.e., 1% of sales). Consistent with findings in Table 3, I continue to find a negative (and not surprisingly, weaker) association between advertising rivalry and the likelihood of disclosing advertising expenses in this subsample.³¹ Results are robust if using the entropy balancing matched sample.

6.4. Analysis on Impact Threshold of Confounding Variable

To assess the impact of a potential *unobserved* omitted variable on the results of advertising rivalry, I perform an analysis on the impact threshold of confounding variable (i.e., ITCV) as recommended in Larcker and Rusticus (2010). The basic idea is that for an unobserved omitted variable to overturn the result of the variable of interest (i.e., the x variable), it needs to be correlated with both the x variable and the y variable. Accordingly, the ITCV is calculated as the lowest product of the partial correlation between x and the confounding variable and the partial correlation between y and the confounding variable (conditioning on all the control variables) that makes the coefficient of x statistically insignificant (Frank 2000). If the ITCV is high, the regression results are relatively robust to the concern of omitted variables.

In Table 11, Columns (1) and (2) show the same average marginal effects and z -statistics as Column (3) of Table 3. Column (3) of Table 11 shows that the ITCV for *AdRivalry* is -0.036, implying that the product of the partial correlation between an omitted variable and *AdRivalry* and the partial correlation between the omitted variable and *Disclosure* would need to be 0.036 in magnitude to invalidate the result of *AdRivalry*. As a benchmark, Column (4) presents the impact of control variables on the inference of *AdRivalry*, calculated as the lowest product of the partial

³¹ The association between *AdRivalry* and *Disclosure* is negative and statistically significant in subsamples with the top, mid, and bottom tercile of the materiality proxy *Kantar/Sales*, respectively (untabulated).

correlation between the control variable and *AdRivalry* and the partial correlation between the control variable and *Disclosure*. Column (4) suggests that *Kantar/Sales* has an impact value of -0.007, which is the largest in magnitude among all control variables. This value has a much smaller magnitude than that of ITCV (-0.037), suggesting that a potential omitted variable needs to have a larger impact than any of my current control variables in order to overturn the result of *AdRivalry*. The ITCV result provides more confidence in the robustness for the results of advertising rivalry.

6.5. Analysis on Narrative Advertising-Related Disclosures

To corroborate the main findings, I examine the effect of advertising rivalry on firms' narrative advertising-related disclosures in 10-Ks which 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 narrative advertising-related disclosures.

I follow prior studies to construct narrative advertising-related disclosures in 10-Ks (e.g., Li et al. 2013; Merkley 2014). Specifically, I use the "regular expression" routine in Python to count the number of advertising-related keywords in the entire 10-K, 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 "marketing", "promotion", "sampling", and "detailing" which are broadly related to advertising (*PctADV_2*).

Table 12 shows the results for the narrative disclosure analysis. The sample size is slightly smaller than the main sample due to the 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 1.51 for *PctADV_1* and 4.22 for *PctADV_2*, respectively, comparable to that of competition-related keywords in Li et al. (2013).

Panel B shows the regression results. The continuous narrative disclosure measures have much more within-firm variation than the disclosure dummy of advertising expenses, which enables me to use firm fixed effects to control for potential unobserved firm-specific time-invariant omitted variables. The results show that the coefficients on advertising rivalry are significantly negative, consistent with advertising rivalry being one important determinant of the firm's overall disclosure of advertising-related information.³² Overall, these findings strengthen our confidence in the main inferences and also support the notion that the disclosure of advertising expenses is a good proxy for the firm's overall advertising-related disclosures.

7. Conclusion

Despite its economic importance, research on advertising has received little attention in the accounting literature. My study focuses on firms' discretion in disclosing advertising expenses in financial statements subject to the materiality constraint.

Using a large sample of firms with third-party tracked advertising outlet costs, I find a high proportion of firms with advertising activities do not disclose advertising expenses. This percentage remains high in the subsample of firms with third-party tracked outlet costs meeting or exceeding the conventional materiality constraint, suggesting that managers have leeway in disclosing even material advertising expenses despite the explicit requirement by US GAAP.

To examine whether proprietary cost hypothesis explains the high likelihood of non-disclosure, I construct advertising rivalry measures and find these measures are negatively associated with the likelihood of disclosing advertising expenses, after controlling for other disclosure costs and

³² Results are qualitatively the same if measuring narrative disclosures at the sentence level (Merkley 2014).

benefits. I demonstrate that while other competition measures fail to explain firms' discretionary advertising disclosure after controlling for industry-level effects, advertising rivalry remains an economically significant determinant. The inferences are robust to using the entropy balancing matched sample, the advertising-intensive subsample, and narrative advertising-related disclosures in 10-Ks as another measure for firms' advertising disclosure in financial reports. The impact threshold analysis also suggests that my results are robust to unobserved confounding variables. Consistent with the proprietary cost hypothesis, I further find that the negative association is more pronounced when firms advertise on less trackable media outlets, have more volatile advertising expenditures or have more mature products.

Collectively, my findings suggest that firms consider their advertising expenditures proprietary and that firms' concerns of product market competition discourage their disclosure of advertising expenses in financial statements despite the materiality constraint. These findings may have implications for market participants and accounting researchers when they use firm-disclosed advertising expenses in firm valuation and investment decisions.

My results are also subject to several caveats. First, since the outcome of interest is the firm's disclosure of advertising expenses which has little within-firm variation, my study relies on control variables, cross-sectional tests and robustness analyses to mitigate the endogeneity concern, which could not rule out all confounding factors especially unobserved ones. Second, my advertising rivalry measure is essentially the weighted average number of advertising rivals, where the weight focuses on only one dimension, i.e., how direct firms compete with others in advertising. Future studies can refine the measure by adding more weights to incorporate other dimensions that may affect advertising competition such as advertising magnitude, advertising effectiveness and firm size (which are separately controlled for in my study). Third, my sample ends in 2009 which may

limit the generalization of my results when firms shift from traditional media advertising to online advertising. However, to the extent that online advertising enables a firm to more accurately reach its targeted customers (such as search engine advertising where the occurrence of ads depends on the customer's own search) and makes its rivals less able to track the firm's online advertising (due to confidentiality agreement between the firm and online advertising companies such as Google), I expect the negative association between advertising rivalry and advertising disclosure to be more pronounced in the recent years.

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Appendix A Variable Definitions

Advertising Disclosure Variables	
Disclosure	A dummy variable equals one if the firm discloses advertising expenses on the face or in the footnote of financial statements (<i>xad</i> is not missing in Compustat), and zero otherwise
PctADV_1	Percentage of advertising-related keywords per 10,000 words in the firm's 10-K filing, where the keywords include "advertising", "advertise", "advertise", "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 filing, where the keywords include those in <i>PctADV_1</i> plus "marketing", "promotion", "sampling", "detailing" and their variants with an "s" appended
Advertising Rivalry Variables	
AdRivalry	Advertising rivalry, measured as the sum of pairwise cosine similarity scores in terms of third-party tracked advertising spending across 924 product categories for a firm with all other firms in the third-party tracked advertising database
AdRivalry ^{Public}	<i>AdRivalry</i> variant that is summed over public rival firms
AdRivalry ^[x,y]	<i>AdRivalry</i> variant that is summed over public rivals with the similarity scores falling in the top [x,y] percentiles, where [x,y] has values of [0,2], [3,5] and [6,100]
Other Competition Variables	
ExistComp	Following Li (2010), <i>ExistComp</i> is measured as the factor loaded by the underlined variables in the principal component analysis (PCA) based on nine segment-level variables (i.e., <u>Industry PPE</u> , <u>industry capital expenditure</u> , <u>industry R&D</u> , <u>industry price-cost margin</u> , <u>industry ROA</u> , <u>industry four firm concentration</u> , <u>industry HHI</u> , <u>number of firms in the industry</u> , and <u>market size of the industry</u>). A higher <i>ExistComp</i> suggests more intense competition among incumbents. Segment-level variable is aggregated to firm-level by taking the weighted average across segments for a firm, where the weight is the ratio of segment sales to firm sales
EntrantComp	Similar to <i>ExistComp</i> , <i>EntrantComp</i> is measured as the factor loaded by the underlined variables in the PCA based on nine segment-level variables (i.e., <u>Industry PPE</u> , <u>industry capital expenditure</u> , <u>industry R&D</u> , <u>industry price-cost margin</u> , <u>industry ROA</u> , <u>industry four firm concentration</u> , <u>industry HHI</u> , <u>number of firms in the industry</u> , and <u>market size of the industry</u>). A higher <i>EntrantComp</i> suggests more intense competition from potential entrants
IndProfitability	Similar to <i>ExistComp</i> , <i>IndProfitability</i> is measured as the factor loaded by the underlined variables in the PCA based on nine segment-level variables (i.e., <u>Industry PPE</u> , <u>industry capital expenditure</u> , <u>industry R&D</u> , <u>industry price-cost margin</u> , <u>industry ROA</u> , <u>industry four firm concentration</u> , <u>industry HHI</u> , <u>number of firms in the industry</u> , and <u>market size of the industry</u>). A higher <i>IndProfitability</i> suggests higher segment industry-level profitability
SalesSimilarity	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 of 10-K product descriptions between a firm and all other firms for a given year, obtained from Hoberg and Phillips' website (www.hobergphillips.usc.edu)
ProductFluidity	Product fluidity, measured as the sum of pairwise cosine similarity scores between a firm's 10-K product description and other firm's annual change in 10-K product description for a given year, obtained from Hoberg and Phillips' website (www.hobergphillips.usc.edu)
Other Control Variables	
Kantar/Sales	Ratio of third-party advertising spending to firm sales
ERC	Earnings response coefficient, estimated by regressing quarterly stock returns on the seasonal change in EPS deflated by stock price
NumSegment	Number of business or operating segments

LogMV	Log(1+ Market value of equity), where market value is measured as 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
Std(Earn)	Volatility of earnings, measured as 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
Std(Ret)	Volatility of stock returns, calculated with monthly stock return data over the fiscal year
NewIssue	A dummy variable equals one if the firm has new equity or debt issues during the fiscal year, and zero otherwise
Litigation	a dummy variable 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	Number of analysts who issued at least one earnings forecast for the firm during the year
InstOwnership	Percentage of shares owned by institutional investors. Data are from obtained from Thomson-Reuters Institutional Holdings (13F)
Auditor	A dummy variable equals one if the firm has a big-four auditor (Deloitte, PwC, EY and KPMG), and zero otherwise
LogNonMissing	Log(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
AdROS	Abnormal return on sales, measured as a firm's return to sales adjusted for industry median
PeerDisclosure	Peer disclosure, measured as the proportion of peer firms that disclose advertising expenses to the total number of public firms in a four-digit SIC industry at the beginning of the year

Advertising Media Trackability Proxies

MediaNumber	The number of unique media used by a firm
MediaHHI	Herfindahl-Hirschman Index of the third-party tracked advertising over media types
National	A dummy variable 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

Advertising Volatility Proxies

Std(Kantar/Sales)	Firm-specific standard deviation of third-party tracked advertising expenditures scaled by sales over the sample period
Std(Kantar)	Firm-specific standard deviation of third-party tracked advertising expenditures over the sample period
Std(Sales)	Firm-specific standard deviation of firm sales over the sample period

Product Maturity Proxies

ProdMaturity1	First measure of firm-level product maturity, measured as the weighted average of segment-level life cycle, which is measured as the sum of the ranks of the industry median of three firm-specific indicators: Firm age, firm sales growth, and firm dividend payout ratio (Anthony and Ramesh 1992)
ProdMaturity2	Second measure of firm-level product maturity, measured as the weighted average of segment-level life cycle, which is measured as the sum of the ranks for two industry-level indicators: Industry sales growth, and industry new entry rate (Parsons 1976)
ProdMaturity3	Third measure of firm-level product maturity, measured as the weighted average of segment-level life cycle, which is measured as industry-level cash-flow based product life cycle (Cantrell and Dickinson 2015)

Appendix B
Advertising Expenses and Future Operating Performance

This appendix shows that firm-disclosed advertising expenses are positively associated with one-year ahead operating income and this positive association remains even after controlling for the third-party tracked advertising outlet costs, suggesting that advertising expenses contain value-relevant information incremental to the third-party tracked advertising outlet costs.

Table B1

This table presents the regression results for the association between firm-disclosed advertising expenses and one-year ahead operating income (*OpIncome*), in the subsample of firms disclosing advertising expenses. 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 provided by the third-party company Kantar Media (*Kantar*), R&D expenses (*R&DExp*, missing values are replaced with zero) and other tangible and intangible assets (*OtherAssets*, measured as the sum of PP&E, inventories, and purchased intangibles). All variables are scaled by total assets. Results are robust if additionally controlling for SG&A expenses as a proxy for other intangible-related expenditures and the disclosure dummy for R&D expenses, or in the subsample of non-missing R&D expenses (untabulated). Firm and year fixed effects are included. Standard errors are clustered by firm. *t*-statistics for two-tailed tests are in parentheses.

DV: OpIncome _{t+1}	(1)	(2)	(3)
AdExp_t	0.948*** (6.72)		0.846*** (6.53)
Kantar _t		0.604*** (3.63)	0.264* (1.95)
R&DExp _t	0.371*** (3.38)	0.429*** (3.77)	0.366*** (3.34)
OtherAssets _t	0.087*** (3.72)	0.078*** (3.18)	0.087*** (3.75)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R ²	0.11	0.07	0.11
Observations	6,927	6,927	6,927

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 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 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 larger than that from C (i.e., $(A, C) = 0.18$).
- ii. The higher proportion of advertising expenditures allocated in overlapped product categories, the more intense the advertising rivalry between two firms. 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 larger than D (i.e., $(A, D) = 0.13$).
- iii. The larger the number of advertising rivals in the economy, the more intense the advertising rivalry for a firm. In this example, A has a total of four advertising rivals (B, C, D and E) while E has two advertising rivals (A and B), so the advertising rivalry for A (i.e., 1.60) is larger than E (i.e., 1.29).

Table 1
Sample Selection and Description

This table presents the sample selection and description. Panel A reports the sample selection process. Panel B reports the sample distribution by disclosure type for three samples: (1) Compustat/CRSP population (excluding financial industries and regulated utilities industries), (2) the main sample of this study (i.e., firms covered by both Compustat/CRSP and Kantar), and (3) a subsample of firms with likely material advertising expenses (i.e., firms with the ratio of third-party tracked outlet costs to sales no less than 1%). Panel C reports the sample distribution by industry sectors defined by two-digit SIC. Please see Appendix A for variable definitions.

Panel A: Sample Selection

Selection Criteria	#Firms	#Firm-years
Firms that are covered by both Compustat/CRSP and Kantar during fiscal years 1995-2009 (with positive sales and total assets)	4,487	26,284
Less: Firms that are from regulated utilities industries (SIC4: 4900-4999) or financial industries (SIC4: 6000-6799)	(803)	(5,493)
Less: Observations with missing data on key variables	(590)	(3,649)
Less: Four-digit SIC Industries that have no variation in disclosure	(300)	(1,556)
Final Sample	2,794	15,586

Panel B: Sample Distribution by Disclosure Choice

	%Non-Discloser	%Discloser	
	(1)	(2) Adv/Sale \geq 1%	(3) Adv/Sale $<$ 1%
(1) Compustat/CRSP Population	68.69	20.17	11.14
(2) My Sample (i.e., Kantar data $>$ 0)	53.55	33.02	13.43
(3) My Sample with <i>Kantar/Sales</i> \geq 1%	30.26	66.85	2.89

Panel C: Sample Distribution by Industry Sectors

Two-digit SIC	N	%	%Compustat	%Non-Discloser within Industry
	(1)	(2)	(3)	(4)
Agriculture and Forestry (01-09)	47	0.30	0.36	76.60
Mining (10-14)	24	0.16	4.95	83.33
Construction (15-17)	265	1.70	1.41	45.28
Manufacturing (20-39)	7,782	49.93	51.07	59.25
Transportation and Communications (40-48)	1,040	6.67	6.61	54.90
Wholesale (50-51)	588	3.77	4.46	67.52
Retail (52-59)	2,139	13.72	7.79	23.75
Services (70-88)	3,652	23.43	23.22	55.94
Other	49	0.32	0.13	81.63
Full Sample	15,586	100.00	100.00	53.55

Table 2
Descriptive Statistics

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

Panel A: Summary Statistics (N = 15,586)

	Mean	STD	p10	p25	p50	p75	p90
Dependent Variable							
Disclosure	0.46	0.50	0.00	0.00	0.00	1.00	1.00
Advertising Rivalry Variables							
AdRivalry	5.44	1.43	3.37	4.45	5.59	6.59	7.20
AdRivalry ^{Public}	2.99	1.28	1.31	2.07	2.92	3.99	4.78
AdRivalry ^[0,2]	2.71	1.01	1.28	2.02	2.78	3.59	3.87
AdRivalry ^[3,5]	1.29	1.50	0.00	0.00	0.44	2.63	3.82
AdRivalry ^[6,100]	0.88	1.35	0.00	0.00	0.03	1.48	3.32
Advertising Media Trackability Proxies							
MediaNumber	4.72	4.18	1.00	1.00	3.00	7.00	11.00
MediaHHI	0.68	0.30	0.26	0.39	0.70	1.00	1.00
National	0.53	0.50	0.00	0.00	1.00	1.00	1.00
Other Competition Variables							
ExistComp	0.92	0.97	-0.28	0.24	0.86	1.58	2.30
EntrantComp	-0.50	1.42	-2.44	-1.09	0.09	0.47	0.62
IndProfitability	-0.23	0.81	-1.25	-0.48	-0.07	0.22	0.56
SalesSimilarity	3.50	1.41	1.62	2.46	3.48	4.50	5.38
ProductSimilarity	2.87	2.64	1.00	1.25	1.86	3.39	16.63
ProductFluidity	6.14	2.94	1.38	3.94	5.65	7.79	15.20
Other Control Variables							
Kantar/Sales	0.01	0.04	0.00	0.00	0.00	0.01	0.03
ERC	3.10	9.46	-3.16	-0.27	1.32	4.78	11.62
NumSegment	1.62	0.96	1.00	1.00	1.00	2.00	3.00
LogMV	6.42	2.16	3.52	4.90	6.43	7.89	9.27
Leverage	0.22	0.21	0.00	0.02	0.18	0.34	0.50
MB	3.05	4.12	0.67	1.24	2.12	3.70	6.55
ROA	-0.01	0.20	-0.16	-0.01	0.04	0.08	0.13
StdEarn	0.09	0.14	0.01	0.02	0.04	0.09	0.21
StdRet	0.15	0.09	0.06	0.08	0.12	0.18	0.27
NewIssue	0.92	0.27	1.00	1.00	1.00	1.00	1.00
Litigation	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Analyst	9.92	10.00	0.00	2.00	7.00	15.00	25.00
InstOwnership	0.32	0.37	0.00	0.00	0.01	0.69	0.88
Auditor	0.80	0.40	0.00	1.00	1.00	1.00	1.00
LogNonMissing	5.66	0.13	5.48	5.55	5.66	5.78	5.83
PMDAccruals	0.00	0.08	-0.09	-0.03	0.00	0.04	0.09
AbROS	-0.07	0.47	-0.21	-0.03	0.01	0.05	0.12

PeerDisclosure	0.32	0.20	0.08	0.17	0.29	0.46	0.63
Indicators for Product Life Cycle (four-digit SIC industry level)							
Ind_Age	9.74	7.25	3.00	5.00	7.66	12.00	19.29
Ind_DividendPayout	0.03	0.08	0.00	0.00	0.00	0.00	0.14
Ind_SalesGrowth	0.14	0.12	0.04	0.07	0.12	0.18	0.28
Ind_NewEntryGrowth	0.01	0.09	-0.09	-0.05	0.00	0.04	0.11
Ind_CF_LifeCycle	2.15	0.70	1.00	2.00	2.00	2.96	3.00
Advertising Expenditures Volatility Proxies							
Std(Kantar/Sales)	0.01	0.02	0.00	0.00	0.00	0.01	0.09
Std(Kantar)	8.82	24.12	0.00	0.12	0.70	4.34	155.51
Std(Sales)	1,262.07	3,026.60	0.00	34.14	195.61	912.55	18,978.85

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) AdRivalry		0.22	0.09	-0.17	0.25	0.12	0.15
(2) ExistComp	0.22		-0.18	-0.31	0.76	0.34	0.35
(3) EntrantComp	0.05	-0.21		0.19	-0.43	-0.24	-0.31
(4) IndProfitability	-0.14	-0.28	0.18		-0.34	-0.15	-0.27
(5) SalesSimilarity	0.24	0.74	-0.49	-0.33		0.41	0.46
(6) ProductSimilarity	0.15	0.37	-0.31	-0.14	0.44		0.48
(7) ProductFluidity	0.18	0.36	-0.32	-0.26	0.49	0.45	

Table 3
Advertising Rivalry and Likelihood of Disclosing Advertising Expenses

This table presents the probit regression results for the effect of advertising rivalry on the likelihood of disclosing advertising expenses. The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are advertising rivalry (*AdRivalry*) and its decile rank scaled to be within [0,1] (*Decile_AdRivalry*). Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and z-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)	(4)	(5)	(6)
AdRivalry	-0.052***	-0.039***	-0.037***			
	(-7.74)	(-6.13)	(-6.00)			
Decile_AdRivalry				-0.219***	-0.160***	-0.155***
				(-7.65)	(-6.00)	(-5.87)
ExistComp	-0.026**	-0.020	-0.010	-0.025**	-0.019	-0.010
	(-2.34)	(-0.99)	(-0.50)	(-2.27)	(-0.99)	(-0.49)
EntrantComp	0.023***	0.001	-0.005	0.022***	-0.000	-0.005
	(2.92)	(0.05)	(-0.35)	(2.79)	(-0.01)	(-0.41)
IndProfitability	0.029***	-0.002	-0.005	0.029***	-0.002	-0.004
	(2.77)	(-0.29)	(-0.72)	(2.85)	(-0.25)	(-0.68)
Kantar/Sales	1.532***	0.948***	0.948***	1.546***	0.959***	0.959***
	(5.27)	(4.26)	(4.34)	(5.33)	(4.31)	(4.38)
ERC	0.001	0.001**	0.001**	0.001	0.001**	0.001*
	(1.45)	(2.07)	(1.98)	(1.43)	(2.05)	(1.96)
NumSegment	-0.013	0.002	0.001	-0.014	0.001	0.001
	(-1.19)	(0.16)	(0.12)	(-1.28)	(0.12)	(0.09)
LogMV	-0.024***	-0.017**	-0.018***	-0.024***	-0.017**	-0.018***
	(-3.21)	(-2.54)	(-2.62)	(-3.23)	(-2.55)	(-2.63)
Leverage	0.033	-0.024	-0.022	0.033	-0.022	-0.020
	(0.79)	(-0.63)	(-0.59)	(0.78)	(-0.57)	(-0.54)
MB	-0.002	0.000	0.000	-0.002	0.000	0.000
	(-1.46)	(0.19)	(0.17)	(-1.36)	(0.22)	(0.21)
ROA	-0.002	-0.037	-0.028	-0.003	-0.037	-0.029
	(-0.04)	(-0.92)	(-0.72)	(-0.06)	(-0.93)	(-0.72)
StdEarn	0.009	0.044	0.052	0.009	0.043	0.051
	(0.14)	(0.85)	(1.02)	(0.15)	(0.83)	(1.00)
StdRet	0.218***	0.212***	0.205***	0.216***	0.212***	0.205***
	(3.02)	(3.49)	(3.43)	(3.00)	(3.48)	(3.42)
NewIssue	0.006	-0.004	-0.007	0.006	-0.004	-0.007
	(0.29)	(-0.25)	(-0.43)	(0.32)	(-0.22)	(-0.40)

Litigation	0.185*** (7.78)	0.044 (0.50)	0.050 (0.56)	0.183*** (7.70)	0.041 (0.46)	0.047 (0.53)
Analyst	0.005*** (3.32)	0.005*** (3.65)	0.005*** (3.85)	0.005*** (3.30)	0.005*** (3.62)	0.005*** (3.83)
InstOwnership	0.002 (0.05)	-0.013 (-0.47)	-0.012 (-0.46)	0.004 (0.12)	-0.012 (-0.44)	-0.011 (-0.43)
Auditor	-0.026 (-1.35)	-0.041** (-2.53)	-0.040** (-2.45)	-0.025 (-1.31)	-0.041** (-2.49)	-0.039** (-2.40)
LogNonMissing	0.580*** (3.53)	0.876*** (6.43)	0.870*** (6.49)	0.580*** (3.53)	0.875*** (6.43)	0.869*** (6.48)
PMDAccruals	0.032 (1.06)	0.056** (2.24)	0.055** (2.24)	0.032 (1.04)	0.055** (2.20)	0.054** (2.20)
AbROS	0.055*** (2.66)	0.038** (2.13)	0.035** (1.99)	0.056*** (2.70)	0.039** (2.16)	0.036** (2.01)
PeerDisclosure			-0.604*** (-9.75)			-0.604*** (-9.78)
Industry FE	No	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.10	0.25	0.26	0.10	0.25	0.26
Observations	15,586	15,586	15,586	15,586	15,586	15,586

Table 4

Advertising Rivalry and Likelihood of Disclosing Advertising Expenses: Entropy Balance Matching

This table presents the results of Entropy Balancing (EB) matched sample analysis for the effect of advertising rivalry on the likelihood of disclosing advertising expenses. Treated firms are those that have *AdRivalry* above its median (*High_AdRivalry*). Control firms are reweighted to achieve the covariant balance via EB. Panel A reports the means of control variables across treated and control firms after EB matching. Panel B reports the probit regression results (marginal effects). The dependent variable is the disclosure choice (*Disclosure*), and the main variables of interests are advertising rivalry (*AdRivalry*) and its variant based on public rival firms (*AdRivalry^{Public}*). Control variables, industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. z-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

Panel A: Covariate Balance after Entropy Balancing (EB) Matching

Variables	High_AdRivalry=1 (N=7,781)	High_AdRivalry=0 (N=7,805)	Difference	t-statistics
ExistComp	1.084	1.084	0.000	0.01
EntrantComp	-0.406	-0.407	0.001	0.04
IndProfitability	-0.314	-0.314	0.000	0.00
Kantar/Sales	0.010	0.010	0.000	-0.14
ERC	3.343	3.343	0.000	0.00
NumSegment	1.572	1.572	0.000	0.00
LogMV	6.266	6.266	0.000	0.00
Leverage	0.187	0.187	0.000	-0.02
MB	3.110	3.110	0.000	0.00
ROA	-0.009	-0.009	0.000	0.01
StdEarn	0.094	0.094	0.000	-0.01
StdRet	0.155	0.155	0.000	-0.01
NewIssue	0.924	0.924	0.000	0.00
Litigation	0.472	0.472	0.000	0.00
Analyst	9.762	9.762	0.000	0.00
InstOwnership	0.332	0.332	0.000	0.01
Auditor	0.798	0.798	0.000	0.00
LogNonMissing	5.659	5.659	0.000	0.00
PMDAccruals	-0.008	-0.008	0.000	0.00
AbROS	-0.073	-0.073	0.000	0.02
PeerDisclosure	0.311	0.311	0.000	-0.01

Panel B: Regression Results

DV: Disclosure	(1)	(2)	(3)	(4)
High_AdRivalry	-0.076***	-0.065***		
	(-5.41)	(-4.30)		
High_AdRivalry^{Public}			-0.094***	-0.082***
			(-6.48)	(-4.86)
EB Matched Sample	No	Yes	No	Yes
Other Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R ²	0.26	0.25	0.26	0.24
Observations	15,586	15,586	15,586	15,586

Table 5
Cross-Sectional Analysis: Advertising Media Trackability

This table presents the probit regression results for the effect of advertising media trackability on the relation between advertising rivalry and the likelihood of disclosing advertising expenses. The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are the interaction terms between advertising rivalry and media trackability proxies, where the media trackability proxies are dummies ranked annually to high/low and scaled to be within [0,1] (*High_MediaNumber* and *High_MediaHHI*), and *National*. Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and z-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)
AdRivalry	-0.036*** (-5.79)	-0.037*** (-6.02)	-0.039*** (-6.12)
AdRivalry*High_MediaNumber	-0.036*** (-3.77)		
High_MediaNumber	0.119*** (7.31)		
AdRivalry*High_MediaHHI		0.032*** (3.88)	
High_MediaHHI		-0.075*** (-5.81)	
AdRivalry*National			0.025*** (2.73)
National			-0.087*** (-5.83)
Other Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Pseudo R ²	0.27	0.27	0.27
Observations	15,586	15,586	15,586

Table 6
Cross-Sectional Analysis: Advertising Expenditures Volatility

This table presents the probit regression results for the effect of advertising expenditures volatility on the relation between advertising rivalry and the likelihood of disclosing advertising expenses. The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are the interaction terms between advertising rivalry and the volatility of underlying advertising expenditures, where the volatility proxies are dummies ranked annually to high/low and scaled to be within [0,1] (*High_Std(Kantar/Sales)*, *High_Std(Kantar)*, *High_Std(Sales)*). Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and z-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)
AdRivalry	-0.032*** (-5.25)	-0.035*** (-5.75)	-0.040*** (-6.43)
AdRivalry*High_Std(Kantar/Sales)	-0.030** (-3.35)		
High_Std(Kantar/Sales)	0.189*** (12.53)		
AdRivalry*High_Std(Kantar)		-0.027* (-3.00)	
High_Std(Kantar)		0.137*** (8.86)	
AdRivalry*High_Std(Sales)			-0.028* (-2.99)
High_Std(Sales)			-0.106*** (-5.35)
Other Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Pseudo R ²	0.29	0.27	0.27
Observations	15,586	15,586	15,586

Table 7
Cross-Sectional Analysis: Product Maturity

This table presents the probit regression results for the effect of product maturity on the relation between advertising rivalry and the likelihood of disclosing advertising expenses. The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are the interaction terms between advertising rivalry and product maturity, where the product maturity proxies are dummies ranked annually to high/low and scaled to be within [0,1] (*High_ProdMaturity1*, *High_ProdMaturity2*, *High_ProdMaturity3*). Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and z-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)
AdRivalry	-0.038*** (-6.17)	-0.038*** (-6.10)	-0.038*** (-6.16)
AdRivalry*High_ProdMaturity1	-0.027*** (-3.18)		
High_ProdMaturity1	0.001 (0.10)		
AdRivalry*High_ProdMaturity2		-0.023** (-3.42)	
High_ProdMaturity2		-0.016* (-1.65)	
AdRivalry*High_ProdMaturity3			-0.026** (-3.18)
High_ProdMaturity3			-0.005 (-0.40)
Other Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Pseudo R ²	0.26	0.26	0.26
Observations	15,586	15,586	15,586

Table 8
Analysis on Different Competition Measures

This table presents the probit regression results for the effect of various competition measures on the likelihood of disclosing advertising expenses. The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are *AdRivalry*, *SalesSimilarity*, *ProductSimilarity* and *ProductFluidity*. Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and *z*-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)	(4)	(5)	(6)
AdRivalry		-0.038***		-0.037***		-0.038***
		(-6.10)		(-5.92)		(-6.14)
SalesSimilarity	-0.044***	0.018				
	(-5.23)	(1.32)				
ProductSimilarity			-0.007**	-0.004		
			(-2.06)	(-1.22)		
ProductFluidity					-0.013***	0.006*
					(-3.84)	(1.91)
EntrantComp	0.005	-0.007	0.014	-0.007	0.011	-0.008
	(0.54)	(-0.63)	(1.63)	(-0.58)	(1.27)	(-0.68)
IndProfitability	0.034***	-0.003	0.047***	-0.004	0.041***	-0.003
	(3.32)	(-0.44)	(4.53)	(-0.60)	(3.95)	(-0.41)
Kantar/Sales	1.813***	0.949***	1.843***	0.940***	1.870***	0.955***
	(6.11)	(4.36)	(6.21)	(4.32)	(6.31)	(4.38)
ERC	0.001	0.001**	0.001	0.001**	0.001	0.001*
	(1.32)	(1.97)	(1.35)	(1.99)	(1.48)	(1.95)
PeerDisclosure		-0.604***		-0.611***		-0.600***
		(-9.78)		(-9.88)		(-9.70)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.09	0.26	0.09	0.26	0.09	0.26
Observations	15,586	15,586	15,586	15,586	15,586	15,586

Table 9
Analysis on *AdRivalry* Variants

This table presents the probit regression results for the effect of advertising rivalry on the likelihood of disclosing advertising expenses. The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interest are advertising rivalry from public rivals (*AdRivalry^{Public}*) and its variants based on different sets of rivals, i.e., based on how far public rivals are from the focal firm (*AdRivalry^[0,2]*, *AdRivalry^[3,5]* and *AdRivalry^[6,100]*). Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and z-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)	(4)
<i>AdRivalry^{Public}</i>	-0.045*** (-6.32)			
<i>AdRivalry^[0,2]</i>		-0.051*** (-5.75)		
<i>AdRivalry^[3,5]</i>			-0.035*** (-6.15)	
<i>AdRivalry^[6,100]</i>				-0.032*** (-5.62)
ExistComp	-0.011 (-0.55)	-0.011 (-0.54)	-0.011 (-0.55)	-0.014 (-0.69)
EntrantComp	-0.005 (-0.34)	-0.004 (-0.33)	-0.004 (-0.34)	-0.003 (-0.20)
IndProfitability	-0.005 (-0.79)	-0.004 (-0.63)	-0.005 (-0.75)	-0.007 (-1.00)
Kantar/Sales	0.917*** (4.18)	0.933*** (4.23)	0.949*** (4.35)	0.997*** (4.55)
ERC	0.001* (1.82)	0.001* (1.86)	0.001* (1.79)	0.001* (1.71)
Other Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R ²	0.26	0.26	0.26	0.26
Observations	15,586	15,586	15,586	15,586

Table 10
Analysis on Advertising-Intensive Firms

This table presents the probit regression results for the effect of advertising rivalry on the likelihood of disclosing advertising expenses in the subsample of firms that likely have material advertising (i.e., *Kantar/Sales* ≥ 1%). The dependent variable is the disclosure choice (*Disclosure*) and the main variables of interests are advertising rivalry (*AdRivalry*), its decile rank scaled to be within [0,1] (*Decile_AdRivalry*), and a dummy that equals to one if *AdRivalry* is higher than its median (*High_AdRivalry*). Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Industry fixed effects (at the four-digit SIC level) and year fixed effects are included. Standard errors are clustered by firm. Average marginal effects are reported and *z*-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

DV: Disclosure	(1)	(2)	(3)	(4)
AdRivalry	-0.022*			
	(-1.91)			
Decile_AdRivalry		-0.093*		
		(-1.80)		
High_AdRivalry			-0.070**	-0.059**
			(-2.43)	(-2.12)
ExistComp	0.031	0.031	0.029	0.032
	(0.69)	(0.68)	(0.63)	(0.71)
EntrantComp	-0.015	-0.016	-0.014	-0.009
	(-0.51)	(-0.53)	(-0.47)	(-0.27)
IndProfitability	-0.001	-0.001	-0.001	-0.012
	(-0.10)	(-0.08)	(-0.07)	(-0.74)
Kantar/Sales	-0.041	-0.035	-0.042	-0.046
	(-0.22)	(-0.19)	(-0.22)	(-0.24)
ERC	0.000	0.000	0.000	0.000
	(0.19)	(0.18)	(0.19)	(0.42)
EB Matched Sample	No	No	No	Yes
Other Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R ²	0.28	0.28	0.28	0.30
Observations	3,256	3,256	3,256	3,256

Table 11
Analysis on Impact Threshold of Confounding Variable

This table presents the analysis of impact threshold of confounding variable (ITCV) to assess the robustness of the results for *AdRivalry* to unobserved confounding variables. Column (1) and (2) report the same average marginal effects and z-statistics as Column (3) of Table 3, where the dependent variable is the disclosure choice (*Disclosure*), the main variable of interest is advertising rivalry (*AdRivalry*), and control variables, industry fixed effects and year fixed effects are included. Column (3) reports the ITCV, calculated as the lowest product of the correlation between *AdRivalry* and the potential omitted variable and the correlation between *Disclosure* and the potential omitted variable to make the coefficient of *AdRivalry* statistically insignificant (conditioning on all the control variables). Column (4) reports the impact statistics for control variables, calculated as the lowest product of the correlation between *AdRivalry* and the control variable and the correlation between *Disclosure* and the control variable (conditioning on other control variables). Please see Appendix A for variable definitions.

DV: Disclosure	(1) Average Marginal Effect	(2) z-Statistic	(3) ITCV	(4) Impact
AdRivalry	-0.037***	-6.00	-0.036	
ExistComp	-0.010	-0.50		0.000
EntrantComp	-0.005	-0.35		0.000
IndProfitability	-0.005	-0.72		-0.000
Kantar/Sales	0.948***	4.34		-0.007
ERC	0.001**	1.98		0.001
NumSegment	0.001	0.12		-0.000
LogMV	-0.018***	-2.62		0.001
Leverage	-0.022	-0.59		0.000
MB	0.000	0.17		0.000
ROA	-0.028	-0.72		0.000
StdEarn	0.052	1.02		-0.001
StdRet	0.205***	3.43		0.000
NewIssue	-0.007	-0.43		-0.000
Litigation	0.050	0.56		0.000
Analyst	0.005***	3.85		-0.001
InstOwnership	-0.012	-0.46		-0.001
Auditor	-0.040**	-2.45		0.000
LogNonMissing	0.870***	6.49		0.003
PMDAccruals	0.055**	2.24		0.000
AbROS	0.035**	1.99		-0.000
PeerDisclosure	-0.604***	-9.75		-0.002

Table 12
Analysis on Narrative Advertising-Related Disclosure

This table presents the results for the effect of advertising rivalry on the quantity of narrative advertising-related disclosures in 10-Ks. Panel A reports the descriptive statistics of narrative advertising-related disclosures, measured as the percentage of advertising-related keywords per 10,000 words in the firm's 10-K, 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 narrative advertising-related disclosures (*PctADV_1* and *PctADV_2*) and the main variables of interests are advertising rivalry (*AdRivalry*) and its decile rank scaled to be within [0,1] (*Decile_AdRivalry*). Control variables include existing competition (*ExistComp*), potential entrant competition (*EntrantComp*), industry profitability (*IndProfitability*), advertising materiality proxies (*Kantar/Sales* and *ERC*), 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*), abnormal return on sales (*AdROS*) and peer disclosure proportion (*PeerDisclosure*). Firm fixed effects and year fixed effects are included. Standard errors are clustered by firm. *t*-statistics for two-tailed tests are in parentheses. Please see Appendix A for variable definitions.

Panel A: Summary Statistics of Narrative Advertising-Related Disclosure (N = 15,110)

	Mean	STD	p10	p25	p50	p75	p90
PctADV_1	1.51	2.72	0.00	0.06	0.49	1.57	4.11
PctADV_2	4.22	4.60	0.44	1.11	2.67	5.62	9.95

Panel B: Advertising Rivalry and Narrative Advertising-Related Disclosure

DV:	(1)	(2)	(3)	(4)
	PctADV_1	PctADV_2	PctADV_1	PctADV_2
AdRivalry	-0.057** (-2.54)	-0.089** (-2.09)		
Decile_AdRivalry			-0.255*** (-2.84)	-0.363** (-2.10)
ExistComp	0.147** (2.01)	0.212 (1.65)	0.146** (2.00)	0.211 (1.64)
EntrantComp	-0.063 (-1.41)	0.080 (1.02)	-0.063 (-1.42)	0.079 (1.00)
IndProfitability	-0.014 (-0.52)	-0.071 (-1.33)	-0.015 (-0.53)	-0.071 (-1.33)
Kantar/Sales	4.873*** (2.73)	10.999*** (3.66)	4.877*** (2.74)	11.011*** (3.66)
ERC	0.004 (1.43)	0.012*** (2.62)	0.004 (1.43)	0.012*** (2.61)
Other Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R ²	0.10	0.23	0.10	0.23
Observations	15,110	15,110	15,110	15,110