

THE CONFLUENCE OF ELECTRONIC WORD OF MOUTH AND FIRM PERFORMANCE
OUTCOMES

By

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ABSTRACT

Electronic word of mouth (eWOM) has become ubiquitous in the business environment. EWOM provides customers the power to influence others and drive firm strategic decisions. Through two essays, I examine the relationship between eWOM and performance outcomes. In the first essay, counter to traditional assumptions, I show how piracy has a positive impact on firm performance due to its positive influence on global and local eWOM. Additionally, this essay highlights that local and global eWOM should be considered separate constructs due to the nature of the consumers who produce this eWOM. Lastly, country institutional profiles are considered to examine the boundary conditions of these relationships. The second essay focuses on investigating content moderation policies in online review platforms. Through four different studies using both field and experimental data, I show that while assumptions and intentions are that content moderation leads to positive outcomes for consumers and firms, the opposite actually occurs. Content moderation policies harm performance outcomes due to a loss of trust in the e-commerce platform and increased perceived risk by the consumer. Policy, product, and consumer-level boundary conditions are also examined. This essay provides meaningful insights for managers and policymakers when considering different online content management policies.

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ESSAY ONE: DEFENDING THE TURF – PIRACY AND EWOM OF EUROPEAN FOOTBALL CLUBS AND THE IMPACT ON REVENUE

ABSTRACT

Using a unique large panel data sample of professional European football teams from 2010-2019, this paper examines how piracy impacts local eWOM (LeWOM), global eWOM (GeWOM), and firm performance. Specifically, this research provides evidence that while piracy is often viewed as a net negative for firms, there are some positive externalities of piracy. Namely, piracy can have a positive effect on firm performance through an increase in both LeWOM and GeWOM. We also examine how country institutional profiles including the regulatory, normative, and cultural environments influence the focal relationships. Lastly, this research suggests that LeWOM and GeWOM are distinct. Results suggest that while piracy has a larger influence on LeWOM, it is GeWOM that has a stronger impact on firm performance. Findings provide pertinent implications for policymakers and brand managers to assess brand protection strategies and highlight the differential importance of LeWOM and GeWOM for firm performance.

Keywords: electronic word-of-mouth, piracy, brand globalness, brand strategy, sports marketing

INTRODUCTION

Professional sports is a massive, global industry with a total estimated annual sales of over \$500 billion in 2022 (Globe Newswire 2022a). For instance, the total revenue of the European professional soccer market in the 2019/20 season was estimated at 25.2 billion euros (Ajadi et al. 2021). Each of the top 50 most valuable professional sports teams is worth more than \$2 billion (Badenhausen 2019). Professional sports brands create value through entertainment at sporting events, revenues from merchandise, and broadcasting deals. Professional sports teams typically draw their fans from their local markets, since they are historically and physically tied to their home stadiums or arenas in specific locations. However, many sports teams are now developing into massive global brands and attracting customers from all over the world to be able to compete in the global sports industry (Germano 2022; Harris 2022). With a global marketplace, branded products of professional sports teams like the Los Angeles Lakers, Dallas Cowboys, Manchester United, and Real Madrid can be purchased and delivered from anywhere on the globe through e-commerce channels (Globe Newswire 2022b). In addition, the internet and social media channels provide consumers the ability to watch games of their favorite teams from any location around the world through online streaming services to stay up to date with the team's current performance.

However, while the internet has allowed people from around the world to connect with brands, it has also given rise to the threats of piracy (Steenkamp 2020), which is a key issue that has plagued the professional sports industry. More specifically, the piracy¹ of live sporting events has become a normal practice in the lives of consumers. In this research, we define piracy as watching unauthorized live broadcast video content that is continually delivered in real-time

¹Consistent with Eisend (2019), hereafter we use the terms “illegal or illicit streaming”, “illegal consumption” and “piracy” interchangeably.

through online channels (Nikoltchev et al. 2021). It is estimated that 84% of sports fans have watched pirated sports streams in the past (Synamedia 2020), representing a multibillion-dollar industry of illicit activity and potentially lost revenues for firms (Hennig-Thurau, Henning, and Sattler 2007; Lu, Rajavi, and Dinner 2021). In addition to its financial impact on firms, many studies have shown that piracy has detrimental effects on brands as these efforts weaken brand associations and lead to an erosion of brand value (Collins-Dodd and Zaichkowsky 1999; Commuri 2009; Satomura, Wedel, and Pieters 2014). In contrast, other studies have suggested that piracy can lead to positive externalities such as serving as a trial purchase for future consumers (Givon, Mahajan, and Muller 1995) and creating increased brand awareness (Lu, Wang, and Bendle 2020; Qian 2014). These mixed findings raise the question as to when and how piracy impacts firm performance. A summary of relevant findings can be found in Table 1-1.

Table 1-1. Relevant Piracy Literature.

Study	Context	Method	Effect	Moderators	Outcomes
Conner and Rumelt 1991	Software	Analytical model development	Positive		Product users, product utility
Givon, Mahajan, and Muller 1995	Software	Analytical model development	Positive		Sales
Chellappa and Shivendu 2005	Digital goods	Analytical model development	Negative	Product hype	Sales
Hennig-Thurau, Henning, and Sattler 2007	Movies	SEM; Regression analysis	Negative		Box office revenue; DVD sales
Jain 2008	Media products	Analytical model development	Positive	Copyright protection	Competition; profits; innovation
Commuri 2009	Premium brands	Qualitative research	Negative	Genuine brand ownership	Brand repurchase
Smith and Telang 2009	Movies	Regression analysis	Positive		Sales
Qian 2014	Shoes	Regression analysis	Positive	Product luxury status	Advertising
Ma et al. 2014	Movies	Regression analysis	Negative	Timing (pre vs. post-release)	Revenues
Papies and van Heerde 2017	Music	Regression analysis	Negative		Sales

Table 1-1 (cont'd)

Lu, Wang, and Bendle 2020	Movies	Regression analysis	Positive	Timing (pre vs. post-release)	Revenue; online reviews
Miric and Jeppesen 2020	Mobile apps	Regression analysis	Positive	Product popularity	New product development
Bellégo and De Nijis 2020	Movies	Natural experiment	Negative	Product origin	Consumption; competition
Kim, Park, and Bang 2022	TV Shows	Regression analysis	Negative		Television viewership
This Study	Live sports streaming	Regression analysis	Positive	Regulatory environment; normative environment; cultural environment	Firm Performance; local eWOM; global eWOM

In this study, we investigate a positive externality of piracy: we suggest that piracy impacts firm performance through the creation of electronic word-of-mouth (eWOM). From a firm's perspective, they can only engage in certain actions to combat piracy, since most of the solutions to combat piracy exist from a policy-level standpoint within countries and need to be enforced by governmental agencies and law enforcement. Therefore, from a firm or brand perspective, understanding how piracy can be beneficial to a firm allows firms to effectively allocate their resources in their brand protection efforts or invest them elsewhere to offset the losses from piracy. This research suggests that piracy leads to a greater volume of eWOM due to consumers interacting with the brand (illegally) from increases in piracy. EWOM then influences other consumers regarding the brand and ultimately impacts firm revenues (Babić Rosario et al. 2016). This leads us to our first research question: does piracy impact firm performance via eWOM?

EWOM presents information about consumers' experiences with a product or brand, which is publicly displayed to other consumers in a digital format (Babić Rosario, de Valck, and Sotgiu 2020; Chintagunta, Gopinath, and Venkataraman 2010). It is meaningful since it is one of the primary methods by which consumers communicate about professional sports teams through the internet and social media channels (Goldblatt 2020, p. 26). Because of the growth of these

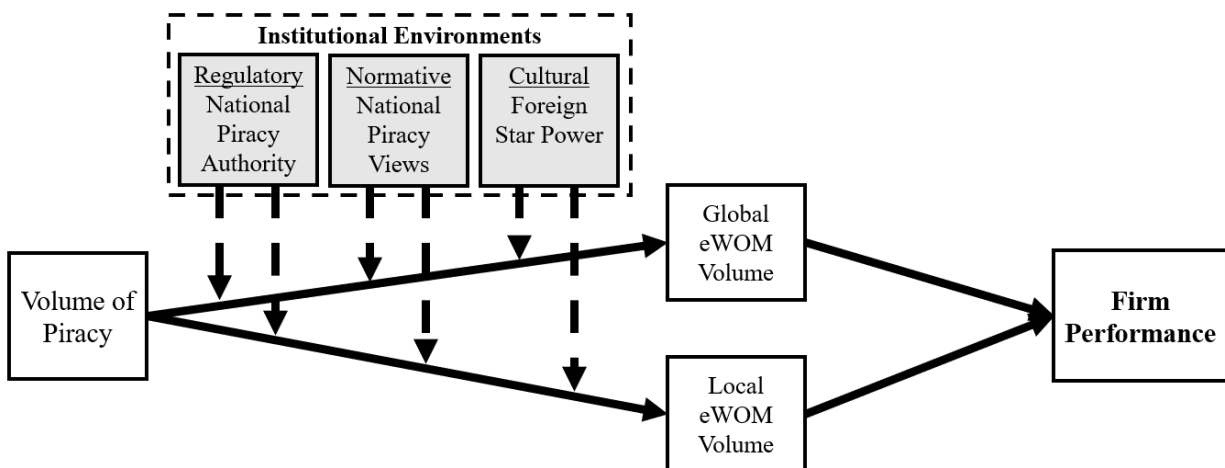
digital channels, both local fans and fans from across the globe can interact with their favorite team through social media, blogs, discussion boards, and online brand communities where they can discuss player information, scores, or the latest gossip about their teams (Liu, Steenkamp, and Zhang 2018). EWOM represents the virtual “voice of the customer” (Rust et al. 2021) and reflects the customer sentiments and preferences toward brands (Berger 2014; Eelen, Özturan, and Verlegh 2017; Lamberton and Stephen 2016). EWOM has a salient influence on the behaviors of other customers (Akpınar and Berger 2017; Nguyen and Chaudhuri 2019) and has become a vital tool for customers, both locally and globally, to communicate about brands, which ultimately drives sales (Babić Rosario et al. 2016; You, Vadakkepatt, and Joshi 2015) and firm performance outcomes (Nguyen, Calantone, and Krishnan 2020; Tirunillai and Tellis 2012). Thus, we question: does piracy lead to eWOM and ultimately firm revenues?

Firms today exist in a global, connected world and many firms today are global in nature, having both large local and global customer segments. These local customers and global customers around the world engage with other consumers and generate eWOM about brands online. However, whether the local and global eWOM should be treated as separate phenomena is a critical question. Recent scholars have called for the disentanglement of the effects of local and global eWOM in the context of global brands because local and global consumers have different motives, associations, and intentions (Gürhan-Canli, Sarial-Abi, and Hayran 2018; Steenkamp 2020). Thus, we suggest that LeWOM and GeWOM should be treated as distinct from one another. We define local eWOM (LeWOM) as eWOM that originates from consumers within the brand’s home country whereas global eWOM (GeWOM) is defined as eWOM about the brand from consumers outside of the brand’s home country. It is also important to note that LeWOM primarily influences local consumers, whereas GeWOM primarily influences other

global consumers since eWOM primarily impacts customers that are geographically closer and have similar identities to the eWOM senders (Berger 2014; Peng et al. 2018; Todri, Adamopoulos, and Andrews 2022). This leads us to our next research question: how are local and global eWOM differentiated?

The institutional environments within each country may impact the outcomes of piracy. Different rules, norms, and systems within a country affect the influences of piracy due to the way society interprets and engages in illegal activity (DiMaggio and Powell 1983). Different forms of regulatory, normative, and cultural institutions within each country could impact consumers' perceptions and affinity for piracy. Furthermore, these institutional environments could impact whether consumers talk about pirated products and impact firm performance. Thus, we question: how do country institutional environments impact the effects of piracy on eWOM and firm performance? Our conceptual framework can be found in Figure 1-1.

Figure 1-1. Conceptual Framework.



This study provides the following contributions to the literature. First, this study contributes to the literature on piracy and illicit consumption by examining the mechanism by which piracy impacts firm performance: eWOM. Piracy can have a net positive effect on firm

performance due to its positive influence on eWOM, which influences other consumers and ultimately firm revenues.

Second, this study focuses specifically on the effects of the piracy of live sports streams on firm performance. This context is unique in that, to the best of our knowledge, no previous studies have examined the effects of pirated live streams, but rather other forms of piracy or illicit consumption, which can hold utility over longer periods of time. Pirated live streams, by nature, typically only generate positive utility during the exact time that a match or game is being played, allowing this study to provide add a unique perspective to the piracy and illicit consumption literature.

Third, this study contributes to the international marketing and eWOM literature by answering the call to disentangle the effects of local and global eWOM (Gürhan-Canli, Sarial-Abi, and Hayran 2018; Steenkamp 2020). Local eWOM is the “voice of the local customer” influencing other local consumers, while global eWOM is the “voice of the global customer” and influences other global consumers. Local and global consumers are unique in their motives, sentiment, and thoughts toward the brand, which are impacted in different ways by piracy and have varying impacts on firm performance. Thus, managers and researchers must consider both global and local eWOM in the context of global firms.

Lastly, our paper highlights the boundary conditions which impact the piracy and LeWOM/GeWOM relationships. Factors such as institutional environments in which the firm exists impact how piracy converts to eWOM. The regulatory environment in which the brand exists, normative institutions within society, and cultural institutions related to the product impact the piracy-eWOM relationships. The rest of the paper is as follows: first, we provide an overview of the current literature and develop our conceptual framework and hypotheses. We

then explain the data and methods used in this research along with the results from the analyses. Lastly, we discuss our findings and contributions.

CONCEPTUAL DEVELOPMENT

Overview of Piracy and Illicit Consumption

Research on piracy and illicit consumption has developed in a variety of fields such as marketing, management, information systems, economics, and law. Mainstream assumptions and academic literature have suggested that piracy is negatively associated with firm outcomes. For example, Papies and van Heerde (2017) find that when music piracy increases, concert demand, and record demand decrease. Kim, Park, and Bang (2022) find that piracy of television shows harms broadcast viewership due to customers substituting paid consumption for illicit consumption. In addition, Hennig-Thurau, Henning, and Sattler (2007) find that movie piracy cannibalizes movie theater revenues, DVD rental sales, and DVD purchases. Increases in piracy can also reinforce future behaviors and increase tolerance for piracy (August and Tunca 2008; Eisend 2019). In addition, reinforcement theories suggest that piracy can spill over into other areas of the consumers' purchasing behaviors (Eisend 2019). However, other research has found that there are some positive externalities of piracy. For example, the entry of counterfeit products into the marketplace can generate increased awareness for high-end products (Qian 2014). In addition, Lu, Wang, and Bendle (2020) find that when movie piracy occurs after the release of the film, this can lead to positive spillover effects on box office revenues. Miric and Jeppesen (2020) even suggest that app piracy leads firms to engage in more radical innovations and increase their new product development to eliminate the negative effects of piracy.

The drivers of piracy are often typically explained by utility theory (Hennig-Thurau, Henning, and Sattler 2007). Pirated products are often easily substitutable for their legal version.

For example, the quality of pirated sports streams is often very similar to that of legal streams of sports matches (Bushnell 2019), creating additional utility for pirated products. Piracy also offers significant price utility over legal consumption since pirated products and services are typically lower in cost compared to legal products or services (Eisend 2019). As consumers save money due to piracy, their satisfaction may increase leading to greater transaction utility for the pirated product (Grewal, Monroe, and Krishnan 1998). In some situations, pirated products are more easily accessible than legal products. For example, broadcasts of live sports matches are typically provided on one or a few channels (Scherer and Sam 2012), resulting in low competition for legal viewing opportunities, leading more people to engage in piracy (Geng and Lee 2013) and increased utility for pirated products.

Therefore, we suggest that as the volume of piracy grows, more people are engaging with the brand, which leads to more conversations about the brand online (eWOM). This is especially true in the professional sports industry where consumers who watch a match through a pirated stream both have similar incentives to engage in eWOM about the match online as legal viewers. Consumers are driven to engage in eWOM due to a need for social bonding and impression management (Berger 2014). Thus, engaging with a brand drives the need to talk about the brand with others, regardless of if it was consumed legally. Consumers who pirated the brand gain social utility from consuming the product or service (Hennig-Thurau, Henning, and Sattler 2007), similar to consumers who consumed it legally. For example, if a consumer wanted to be knowledgeable about an upcoming sports match so they could discuss it with their friends and maintain their status in their social circle, they would pirate the match and gain a similar social utility as someone who legally watched the match. Thus, we hypothesize:

Hypothesis 1: The volume of piracy is positively associated with local eWOM volume (H1a) and global eWOM volume (H1b).

Differentiating Local and Global EWOM

We define local eWOM as eWOM from the brand's home country, whereas global eWOM is eWOM from outside the brand's home country. Thus, local eWOM is the "voice of the local customer" influencing other local consumers, while global eWOM is the "voice of the global customer" and influences other global consumers. Local and global consumers are unique in their motives, sentiment, and thoughts toward the brand. For example, local fans typically have stronger social identity ties with local teams (Bodet and Chanavat 2010; Hunt, Bristol, and Bashaw 1999), integrate the sports team into parts of their identity (Swoboda, Penneman, and Taube 2012), and have greater pride in a sports team (Decrop and Derbaix 2010; Schmidt-Devlin, Özsomer, and Newmeyer 2022) due to externalities of supporting the team in the local environment (Shimp and Sharma 1987; Verlegh 2007). They also are more likely to be emotionally attached to the sports brand since local professional sports brands influence the community around them and are associated with the local culture (Arnould and Thompson 2005; Özsomer 2012; Schmidt-Devlin, Özsomer, and Newmeyer 2022; Steenkamp 2019). Local brands are often more popular in their home country than global brands (Davvetas and Diamantopolous 2016; Kim, Moon, and Iacobucci 2019), and thus more visible and talked about within the local markets. Based on utility theory (Fishburn 1968; Stigler 1950), this suggests that local fans gain greater higher social utility from engaging in eWOM about the brand since the networks are more closely connected and there is additional social influence to encourage others to talk about the brand online.

In comparison, the average global consumer is often less committed to the brand than local fans (Kim, Moon, and Iacobucci 2019) and may only engage with global brands due to affinity of one aspect of the brand such as a key player (Hunt, Bristol, and Bashaw 1999). They are less likely to integrate the brand into their identity and have less pride (Maderer and Holtbrügge 2019). As global consumers are geographically distant from a professional sports brand in another country, they do not have opportunities to generate pride in the sports team through engaging in rituals, and traditions, and interacting with other fans on a more consistent basis (Decrop and Derbaix 2010), reducing the social aspect of consuming the brand. Additionally, the global community is a much larger, more distant, and more diverse community than the local fan community. Thus, interpersonal connections between global consumers are likely to be weaker, resulting in less camaraderie and pride in the team. Networks of people consuming the brand in global markets are often more sparse, reducing the chance that there is emotional significance of being a part of the group (Zeugner, Žabkar, and Diamantopoulos 2015). This results in a lower social utility from engaging in eWOM about the brand for global consumers compared to local consumers. Thus, we suggest:

Hypothesis 2: The volume of piracy has a stronger positive association with local eWOM volume compared to global eWOM volume.

The Moderating Role of Institutional Environments

Institutional environments are embedded within society and countries impacting both firms and consumers. Institutional theory suggests that these institutional environments involve rules, norms, and systems that encompass society (DiMaggio and Powell 1983; Kostova 1999). Literature suggests that there are three key dimensions of the institutional environment within countries: regulative, normative, and cognitive dimensions (Busenitz, Gomez, and Spencer

2000). The regulative dimension involves formal rules, laws, regulations, and the ability of authorities to enforce these (Kirca, Bearden, and Roth 2011). The normative dimension refers to the prescriptive, evaluative, and obligatory dimensions in social life dictating the norms of right and wrong (Steenkamp and Geyskens 2006). The cognitive dimension refers to the common cultural beliefs and attitudes within society that shape shared meaning within society (Gäthke, Gelbrich, and Chen 2022). While all three dimensions exist, certain dimensions may be more prevalent in certain situations (Scott 2013). We examine the moderating effects of all three dimensions.

Regulatory environment.

The rule of law is an essential part of the regulatory environment (Scott 2013). In the context of piracy, it is an illegal action that is often difficult to enforce. Different countries have engaged in passing different laws to combat piracy. However, these are often not enforced, since general law enforcement prioritizes other more serious crimes. Thus, some countries have designated specific governing authorities to specifically combat piracy in the marketplace. These national authorities exist in combination with judicial authorities and can enforce copyright laws and issue blocking orders to remove piracy online (Nikoltchev et al. 2021). By having specific governmental agencies to combat piracy, resources, and attention can be more focused on eliminating it from the marketplace. Thus, for brands in countries where a national authority exists, fewer people are likely to consume pirated content, since copyright laws are more likely to be enforced. A national authority for copyright law reduces the utility of pirated content since there is an increased moral hazard to consuming the content. On the other hand, if consumers do still engage in consuming pirated content, they will be less likely to talk about the pirated content

they consumed, due to an increase in shame about engaging in piracy (Kim and Johnson 2013).

Thus, we suggest:

Hypothesis 3: When there is a national authority for piracy in the home country, the relationship between the volume of piracy and local eWOM volume (H3a) and global eWOM volume (H3b) is weaker.

Normative environment.

The core social infrastructure of society is driven by the normative environment. This drives social expectations of the consumption environment within society (Scott 2013). In the context of piracy in professional sports, live sports streams are often pirated. Different societies may have different norms towards piracy. In some countries, it may be the norm that consumers have a more positive view toward piracy since they do not see it as a negative to society. However, in other countries, attitudes towards piracy may be more negative. These attitudes toward piracy impact how consumers engage with piracy and whether that leads to them talking about pirated products or hiding them from others. Thus, we suggest that the views and attitudes toward piracy within each country establish the normative environment for the effects of piracy on brand outcomes. Thus, we suggest:

Hypothesis 4: Positive home country views towards piracy strengthen the relationship between the volume of piracy and local eWOM volume but do not affect the relationship between the volume of piracy and global eWOM volume.

Cultural environment.

Brands are embedded within cultures and many cultural values and norms can be found in the way a brand is perceived and consumed. Many brands have incorporated international cultural aspects into their brand to reach a broader global user base, increase global sales, expand global

channels, and enhance global connectivity (Steenkamp 2020). Greater brand globalness or brand internationalization can lead to additional popularity across countries (Kim, Moon, and Iacobucci 2019), as well as increased brand engagement and purchases (Steenkamp, Batra, and Alden 2003). In the context of sports, which is rivaled by passionate fans and loyal followers, one of the key aspects of the brand is the players, and more specifically, the star players on that team. Some sports teams have begun acquiring key star players, who are the face of the team, from countries other than the home country to incorporate that culture into their brand. For example, in the NBA, many teams signed foreign star players to reach more global fans (Germano 2022). Star power in other entertainment industries, like the movie industry, has been shown to drive attention to weaker brands (Basuroy, Chatterjee, and Ravid 2003) and across different cultures (Akdeniz and Talay 2013). However, even with foreign star power, many of these global fans may be more temporary fans, who follow the teams due to their affinity for the star player from their home country (Hunt, Bristol, and Bashaw 1999). For example, Lionel Messi, one of the most famous football players, joined the French team, Paris Saint-Germain in 2021, but is from Argentina. As such, many Argentinians may have engaged with Paris Saint-Germain due to his signing. However, these fans are not necessarily loyal to the team but follow it due to the star player. These fans are more likely to engage in piracy, but the global eWOM may increase at a greater rate, due to these global fans following the team. In contrast, a foreign star player transferring to a team is unlikely to impact the local fans and local eWOM, since they typically do not have a strengthened affinity with the team due to this player. Thus:

Hypothesis 5: A foreign star player transferring to the team (foreign star power) strengthens the relationship between the volume of piracy and global eWOM volume but does not affect the relationship between the volume of piracy and local eWOM volume.

The Mediating Role of EWOM in the Piracy-Performance Relationship

Past research shows that eWOM is a key driver of the behavior of other consumers and is highly impactful on brand sales (Babić Rosario et al. 2016; You, Vadakkepatt, and Joshi 2015) and firm performance (Nguyen, Calantone, and Krishnan 2020; Tirunillai and Tellis 2012). Higher levels of LeWOM volume suggest that local consumers are talking more frequently about the brand, whereas high levels of GeWOM volume suggest global consumers are talking more frequently about the brand. Thus, higher levels of eWOM volume within the local/global market allow brands to be more prominent in the public eye, which increases customer awareness of the brand (Colicev et al. 2018; Stephen and Galak 2012; Trusov, Bucklin, and Pauwels 2009) and can influence a greater number of customers. Thus, increased eWOM or buzz can lead to potential new customers engaging with the brand (Houston et al. 2018), which includes actions such as attending team sporting events, purchasing merchandise, or watching broadcasts of games for professional sports teams (Wetzel et al. 2018). Therefore:

Hypothesis 6: Local eWOM volume (H6a) and global eWOM volume (H6b) mediate the relationship between piracy and firm performance.

The Differential Effects of Local and Global EWOM

Research suggests that eWOM has a greater influence on people with more similar networks (Peng et al. 2018), closer geographical distance (Todri, Adamopoulos, and Andrews 2022), and more similar social identities (Berger 2014). Thus, GeWOM is likely to make global consumers aware of the brand, whereas LeWOM is likely to impact local consumer awareness of the brand. The global marketplace consists of larger customer heterogeneity and customers are less likely to be aware of brands from other markets (Kim, Moon, and Iacobucci 2018; Schmidt-Devlin, Özsomer, and Newmeyer 2022). In comparison, local consumers, are more likely to be aware of

the brand, knowledgeable about the sports brand, and have set opinions about that sports brand (Boyle and Magnusson 2007; Hunt, Bristol, and Bashaw 1999). Thus, the potential consumer and revenue growth from the influence and brand awareness of GeWOM is greater than that of LeWOM, since consumers in the global marketplace represent a market that is less aware and larger than that of the local markets. Therefore:

H7: Global eWOM volume has a stronger effect on firm performance than local eWOM volume.

METHOD

Data Description

Our sample consists of a sample size of 760 firm-years across 149 different professional European football teams from the 2010-2019 seasons. First, we collected data from Transfermarkt, which provides records for professional football clubs and leagues from around the world. In addition, Transfermarkt provides detailed information regarding team demographics and attendance. Financial data was collected from Orbis. To collect the eWOM data for each team, we utilized Infegy Atlas, a firm that tracks and records social media and electronic word-of-mouth information for brands across the world. From this database, we were able to obtain brand-level social media metrics for specified time segments. Information regarding country-level perceptions towards piracy and counterfeiting was collected from the European Union Intellectual Property Office (EUIPO) (EUIPO 2017). Information regarding country-level agencies and policies to combat piracy was collected from the European Audiovisual Observatory (Nikoltchev et al. 2021). Lastly, we utilized The World Bank website for population data (The World Bank 2022b). Data was collected based on the fiscal year for each team, which typically runs the course of each football season. The variable descriptions and

sources can be found in Table 1-2. Summary statistics can be found in Table 1-3 and correlations can be found in Table 1-4.

Table 1-2. Variable Descriptions and Sources.

Variable Name	Purpose	Description	Data Source
Revenue	Dependent variable	Natural log of operating revenue for a firm within a given fiscal year	Orbis
Local eWOM Volume	Dependent variable	Natural log of # local eWOM posts per local internet user	Infegy Atlas
Global eWOM Volume	Dependent variable	Natural log of # global eWOM posts per global internet user	Infegy Atlas
Volume of Piracy	Independent variable	Natural log of # of social media posts with illicit streaming keywords and associated with a team	Infegy Atlas
Authority	Moderating variable	Dummy if there is a legal competent authority other than judicial bodies to enforce online copyright law	European Audiovisual Observatory
Foreign Star	Moderating variable	Dummy if a foreign star player was transferred to the team	Transfermarkt
Piracy Views	Moderating variable	% that agree with “buying counterfeit products allows making a smart purchase that enables you to have the items that you wanted while preserving your purchasing power”	EUIPO
Local eWOM Valence	Control variable	Net sentiment of eWOM from home country	Infegy Atlas
Global eWOM Valence	Control variable	Net sentiment of eWOM outside of the home country	Infegy Atlas
Code of Conduct	Control variable	Dummy if a code of conduct or MOU exists at the national level	European Audiovisual Observatory
Piracy Activity	Control variable	Average % of people within the country that have recently engaged in piracy	EUIPO
Legal Access	Control variable	Average % of people within the country that agree that the quality and diversity of legal content is similar to that of illegal content	EUIPO
Population	Control variable	Natural log of population	World Bank
Global Matches	Control variable	# UEFA Competition matches	Transfermarkt
Foreign Play	Control variable	# of minutes played by foreign players / # minutes non-foreign players	Transfermarkt
Foreigners	Control variable	# of foreign players on a team	Transfermarkt
Capacity	Control variable	Natural log of stadium capacity	Transfermarkt
Spectators	Control variable	Natural log of total spectators	Transfermarkt
League Points	Control variable	# points earned in league play	Transfermarkt
Assets	Control variable	Natural log of total assets	Orbis

Table 1-3. Summary Statistics.

Variable Name	Mean	SD	Min	Max
Revenue	9.47	1.63	1.93	13.39
Local eWOM Volume	.15	.28	.00	2.46
Global eWOM Volume	.01	.05	.00	.94
Volume of Piracy	3.18	1.98	.00	8.48
Authority	.55	.50	.00	1.00
Foreign Star	.02	.15	.00	1.00
Piracy Views	.30	.08	.14	.43
Local eWOM Valence	-.04	.49	-1.00	1.00
Global eWOM Valence	.35	.34	-.85	1.00
Code of Conduct	.27	.45	.00	1.00
Piracy Activity	.51	.09	.31	.74
Legal Access	.64	.10	.45	.76
Population	17.17	.91	15.22	18.23
Global Matches	2.41	4.33	.00	19.00
Foreign Play	1.11	1.43	.01	19.83
Foreigners	14.23	6.71	1.00	41.00
Capacity	9.95	.71	8.07	11.31
Spectators	12.10	1.04	9.45	14.14
League Points	52.66	14.65	14.00	102.00
Assets	10.04	1.77	4.03	14.07

Notes: Summary statistics reflect variables used in the analyses.

Table 1-4. Correlation Matrix.

Variable	1	2	3	4	5	6	7
1. Revenue	1						
2. Local eWOM Volume	.32	1					
3. Global eWOM Volume	.31	.50	1				
4. Volume of Piracy	.27	.44	.31	1			
5. Authority	.02	-.07	-.09	-.23	1		
6. Foreign Star	.23	.25	.40	.14	-.02	1	
7. Piracy Views	-.13	-.08	-.20	-.10	-.03	-.19	1

Notes: Control variables are omitted for brevity. Correlations significant at the .05 are in **bold**.

Volume of Piracy

Since data on actual illicit activities, such as piracy, is often difficult to collect, we utilized a unique approach to measure the volume of piracy. Pirated live streams are very prominent in the professional sports industry since the majority of the value and entertainment gained from watching sporting events comes from viewing them live. Capturing the supply of these live

streams in real-time is challenging, since by definition, the live stream is illicit, and it is not available after the sporting event is complete. However, one of the most prominent ways to distribute live sports streams to consumers is through social media channels (Bushnell 2019). Social media posts with the live stream typically contain a link to an external website that is hosting the live stream, driving distribution through that social media post, as mentioned by the CEO of a large anti-piracy firm (Christian 2021). Thus, the number of social media posts associated with sports piracy represents a proxy measure for the volume of piracy.

Piracy posts on social media typically contain a link to a live stream and some short phrases explaining the post. Thus, we utilize the Infegy Atlas platform to measure the number of piracy posts by extracting the total number of posts that are associated with each brand and contain at least one phrase related to pirated live streaming. Similar approaches to capturing illicit activity have been used in recent literature. For example, Lu, Rajavi, and Dinner (2021) use Google Search data with a list select set of phrases related to illicit content to capture the demand of illicit consumption for movies. The method of obtaining these posts presents a unique opportunity, since Infegy Atlas stores the social media posts in their archives, even if the post is now deleted or blocked from the platform. This allows us to obtain an accurate measurement of the number of piracy posts. To determine these phrases used to count the number of piracy posts, we consulted a group of experts from a university counterfeiting and brand protection research center to rate the degree to which they believed the phrases represented a social media post that contained a pirated live streaming link. A total of seven different expert raters rated different phrases. Phrases that contained high interrater agreement and were highly rated as representing pirated live streaming were used in the extraction process (e.g., free stream, watch stream, live

free, stream free, watch free, free live, free watch). An example of a social media post distributing pirated live streams on Twitter is provided in Figure 1-2.

Figure 1-2. Piracy Live Streaming Post Example.



Global and Local EWOM

We collected eWOM data using Infegy Atlas for each brand (i.e., football team) across the sample period. Both local eWOM and global eWOM measures were collected. Local eWOM represents eWOM from the country of origin of the brand. Global eWOM represents eWOM from outside of the country of origin of the brand. For example, eWOM originating from within Spain about FC Barcelona (a Spanish team) represents local eWOM, whereas eWOM originating from outside of Spain about FC Barcelona represents global eWOM. We measure LeWOM/GeWOM volume by calculating the number of posts per thousand internet users (The World Bank 2022a) within the given local or global population. This measurement enables us to equally compare the rate at which people are talking about a brand online across different-sized populations.

Firm Performance

We measure firm performance as the natural log of total operating revenue for the brand within a given year. We collect this data from Orbis, which is a large database that provides financial data for companies worldwide. The financial data has been converted to U.S. dollars to allow

comparison across firms from different countries. In addition, it has been scaled by year CPI to account for any inflationary effects to allow similar comparisons across years. In addition, we use the net sales and market value as additional measures of firm performance for robustness tests. Net sales are obtained from Orbis and market value is obtained from the estimated total market value from Transfermarkt.

Control Variables

We utilize a variety of control variables. First, EWOM valence is measured by the net sentiment of the social media posts. Specifically, it is calculated by subtracting the negativity ratio from the positivity ratio, which eliminates any confounding effects with eWOM intensity and is consistent with prior studies (Babić Rosario et al. 2016). Thus, a positive value for eWOM valence suggests that eWOM for a brand in a given period is more positive than negative, whereas a negative valence value suggests that eWOM for a brand in a given period is more negative. Thus, we used both local eWOM valence and global eWOM valence as controls when estimating firm performance. However, they are not included as controls when estimating global and local eWOM volume. All other controls are used when estimating performance, local eWOM volume, and global eWOM volume.

We control for a variety of country-level factors that may influence LeWOM/GeWOM and firm performance. Some countries have national codes of conduct or memorandums of understanding regarding piracy to provide overarching mechanisms to combat piracy. Thus, we use a dummy variable to control whether that exists in each country. Additionally, we control for the activity of piracy within each country by accounting for the recent engagement in a variety of different forms of piracy from movies to sporting events. People who may have more or less access to legal channels may be more or less likely to utilize piracy. Thus, we control for the

access to legal channels within each country. Teams in larger or smaller countries may financially benefit from being in larger markets. Thus, we control for the population of each country.

In addition to controlling for country-level factors, we also control for team-level factors. European football teams play within leagues within their domestic markets. While these teams have both local and global fans, firm performance can also be driven by a team's performance and exposure to global markets. Thus, examine the degree of exposure to global markets by capturing the number of matches played in UEFA competitions. UEFA competitions are tournaments that are organized by the governing body of European football including clubs from across Europe that compete internationally. Thus, when competing in UEFA competitions, there is greater exposure to a larger number of international markets and global consumers. Financial performance could also be impacted by the composition of the players on the team and their presence on the team. When there are more foreign players or foreign players who contribute more to the team, this may draw a larger and more global audience. We control for this by calculating the ratio of the number of minutes played by foreign players compared to domestic players. Additionally, we control for the number of foreign players on each team. Teams with larger audiences or larger stadiums may also have more revenue than teams with smaller audiences or revenues. Thus, we control for the stadium capacity of each team and the average number of spectators for each team. The performance of a team in matches during the domestic league season can impact the financial performance of a team. Therefore, we control for the number of league points earned in each season. Lastly, we control for the assets of each team.

Model

Performance equation.

Our data is structured as panel data; therefore, we observe each firm's performance over multiple years. We examined our data using firm-years since the financial data is only available in annual frequency. Additionally, the professional sports industry is a highly seasonal business, thus, by using annual data we accurately capture the phenomena of study by eliminating any seasonal effects. To estimate our model for firm i in year t , we estimate the following model:

$$\begin{aligned} \text{PERFORMANCE}_{it+1} = & \beta_0 + \beta_1 \text{LEWOMVOL}_{it} + \beta_2 \text{GEWOMVOL}_{it} + \beta_3 \text{VOLPIR}_{it-1} + \\ & \beta_4 \text{VOLPIR}_{it-1} * \text{AUTH}_{it-1} + \beta_5 \text{VOLPIR}_{it-1} * \text{FORSTAR}_{it-1} + \beta_6 \text{VOLPIR}_{it-1} * \text{PIRVIEW}_{it-1} + \\ & \beta_7 \text{AUTH}_{it-1} + \beta_8 \text{FORSTAR}_{it-1} + \beta_9 \text{PIRVIEW}_{it-1} + \beta_{\text{CTRL}} \text{CTRL}_{it-1} + \varepsilon_{it+1} \quad (1) \end{aligned}$$

In Equation 1, PERFORMANCE_{it} represents the firm performance of firm i in year t , which is the focal outcome variable. LEWOMVOL_{it} is the local eWOM volume for firm i in year t , whereas LEWOMVOL_{it} captures the global eWOM volume. VOLPIR_{it} captures the volume of piracy. AUTH_{it} represents a dummy to capture if there is a competent authority within the firm's home country. FORSTAR_{it} represents if there was a foreign star who transferred to the team. PIRVIEW_{it} captures the views towards piracy and counterfeiting of people within the firm's home country. Interactions are also included in the model.

EWOM equations.

We estimate both LeWOM and GeWOM to be a function of the volume of piracy. To estimate our model of local and global eWOM for firm i in year t , we estimate the following models:

$$\begin{aligned} \text{LEWOMVOL/GEWOMVOL}_{it} = & \alpha_0 + \alpha_1 \text{VOLPIR}_{it-1} + \alpha_2 \text{VOLPIR}_{it-1} * \text{AUTH}_{it-1} + \\ & \alpha_3 \text{VOLPIR}_{it-1} * \text{FORSTAR}_{it-1} + \alpha_4 \text{VOLPIR}_{it-1} * \text{PIRVIEW}_{it-1} + \alpha_5 \text{AUTH}_{it-1} + \\ & \alpha_6 \text{FORSTAR}_{it-1} + \alpha_7 \text{PIRVIEW}_{it-1} + \alpha_{\text{CTRL}} \text{CTRL}_{it-1} + \varepsilon_{it} \quad (2) \end{aligned}$$

Two separate models, one with LeWOM as an outcome and the other with GeWOM as an outcome are estimated. All independent variables and control variables are consistent throughout each model. The independent variables and control variables in Equation 2 also are consistent with the variables in Equation 1.

Endogeneity

Our model contains a variety of control variables to address the endogeneity associated with heterogeneity in firm performance. However, even with several control variables, there still may be potential concerns of endogeneity due to other omitted variables correlated that may influence illicit streaming supply and the eWOM variables. Thus, we use the control function approach (Petrin and Train 2010) to address these concerns. We introduce three new variables, each corresponding to each of the three potentially endogenous variables (volume of piracy, local eWOM volume, and global eWOM volume). After accounting for the influence of the control function correction on firm performance, the endogenous independent variable should no longer be correlated with the error terms, mitigating the concerns of endogeneity. We use a two-step procedure to develop the control function estimates (Sridhar et al. 2016).

In the first step, we utilize an auxiliary regression to regress the potential endogenous variable on a set of predetermined exogenous variables and an instrument. Instruments must be theoretically associated with the endogenous independent variable, which is known as the relevancy criterion. Instruments should also not impact the dependent variable, conditional on the endogenous independent variable, which is known as the exclusion restriction. Second, the predicted residuals from the auxiliary regression are included in the main regression model as control variables. The coefficients in this equation are then unbiased and mitigate endogeneity concerns.

To satisfy the relevancy criterion and exclusion restriction, we follow guidelines from previous literature to develop instruments (German, Ebbes, and Grewal 2015; Golmohammadi et al. 2021; Sridhar et al. 2016). Specifically, for the volume of piracy, we used the average volume of piracy of peer firms as an instrument. For firm i in year t , this represents other firms within the same country and league tier. We believe that this peer measure is a good instrument for two primary reasons. First, firms within a single industry often face similar conditions (Germann, Ebbes, and Grewal 2015). Piracy distributors are most likely to distribute pirated streams for multiple teams and not just one focal team. Often, pirates will stream and distribute matches from an entire league. Therefore, if pirated streams from other teams within a league are being distributed, it is likely that a focal team's pirated streams are being distributed as well. This satisfies the relevancy criterion. Second, industry or league averages are also unlikely to correlate with firm-level omitted variables that can impact a firm's financial performance (Germann, Ebbes, and Grewal 2015). The volume of piracy of another team within a given league is unlikely to impact the financial performance of a focal team. Therefore, this instrument meets the exclusion restriction criteria. For the local and global eWOM volume, we take a similar approach. We used the average local and global eWOM volume of peers of firm i in year t as instruments for firm i in year t . Like the volume of piracy, peer firms are categorized as teams within the same country and league tier. Our auxiliary regressions for the first stage of the control function approach are specified by the following equations:

$$\text{VOLPIR}_{it} = \theta_0 + \theta_1 \text{PVOLPIR}_{it} + \theta \text{CTRL}_{it-1} + \varepsilon_{it} \quad (3)$$

$$\text{LEWOMVOL}_{it} = \lambda_0 + \lambda_1 \text{PLEWOMVOL}_{it} + \lambda \text{CTRL}_{it-1} + \varepsilon_{it} \quad (4)$$

$$\text{GEWOMVOL}_{it} = \delta_0 + \delta_1 \text{PGEWOMVOL}_{it} + \delta \text{CTRL}_{it-1} + \varepsilon_{it} \quad (5)$$

In these equations, PVOLPIR is the average peer volume of piracy. PLEWOMVOL is the average peer local eWOM volume and PGEWOMVOL is the average peer global eWOM volume. We estimate the first-stage control functions in equations 3,4, and 5 and then use the errors as the control function corrections in Equation 1 and Equation 2.

RESULTS

Endogeneity Correction Results

We first present the results from our auxiliary regression in Table 1-5. The values for peer volume of piracy, peer local eWOM volume, and peer global eWOM volume are significant predictors of focal firm volume of piracy, local eWOM volume, and global eWOM volume, respectively. In addition, the F-values for each of the models is greater than 10, suggesting our instruments are strong (Stock and Yogo 2002), supporting the legitimacy of the control function approach.

Table 1-5. Control Function Results.

	Volume of Piracy	Local eWOM Volume	Global eWOM Volume
	Est. (SE)	Est. (SE)	Est. (SE)
Intercept	-63.626 (37.761)*	4.502 (8.369)	.480 (.872)
Peer Volume of Piracy	.455 (.047)***		
Peer Local eWOM Volume		.103 (.046)**	
Peer Global eWOM Volume			.187 (.055)***

* $p < .10$; ** $p < .05$; *** $p < .01$

Notes: Standard errors are in parentheses. Coefficients of exogenous regressors are not reported for brevity.

Test of Hypotheses

The results of our primary analyses can be found in Table 1-6. Model 1 shows the results of the effects of the volume of piracy on LeWOM volume. Model 2 provides the results for the effects of the volume of piracy on GeWOM volume. Lastly, Model 3 specifies the results of firm performance. Each of the models highlights both results with and without interaction terms. Each model also contains control variables, firm, league, and tier fixed effects, as well as the control

function variables to correct for endogeneity. Clustered-robust standard errors were used in each model to correct for heteroskedasticity (White 1980). Model 1 showed that the volume of piracy was positively associated with LeWOM volume ($\beta = .039, p < .01$) and was significant.

Additionally, Model 2 showed that the volume of piracy was also significantly positively associated with GeWOM volume ($\beta = .007, p < .05$). Thus, both H1a and H1b were confirmed.

We then test the difference in magnitude of the effects of piracy on LeWOM and GeWOM volume. Tests ($z = -4.09; p < .01$) confirm that the effect of the volume of piracy on LeWOM volume is stronger than the effect on GeWOM volume, confirming H2.

The interaction between the volume of piracy and national authority ($\beta = -.011, p < .01$) was negative and significant in Model 1 with LeWOM volume as an outcome and was also negative and significant in Model 2 with GeWOM as an outcome ($\beta = -.004, p < .05$), confirming H3a and H3b. The interaction between the volume of piracy and home country piracy views was not significant in either Model 1 ($\beta = -.020, p > .10$) or Model 2 ($\beta = .002, p > .10$), resulting in no confirmation of H4. We also tested the interaction between the volume of piracy and foreign star. The interaction between the volume of piracy and foreign star ($\beta = .042, p > .10$) was positive but not significant in Model 1 and was positive and significant ($\beta = .024, p < .05$) in Model 2 with GeWOM volume as an outcome. Thus, H5 was confirmed.

Table 1-6. Estimation Results.

	Model 1: DV – LeWOM Volume		Model 2: DV – GeWOM Volume		Model 3: DV - Revenue	
	Main Effect	Interactions	Main Effect	Interactions	Main Effect	Interactions
	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
LeWOMVol					.641*** (.132)	.630*** (.131)
GeWOMVol					1.764*** (.428)	1.551*** (.434)
VolPir	.028*** (.007)	.039*** (.014)	.005* (.003)	.007** (.003)	-.025 (.025)	-.015 (.046)
VolPir*Authority		-.011*** (.004)		-.004** (.002)		-.010 (.023)
VolPir*PirViews		-.020 (.038)		.002 (.004)		-.018 (.122)
VolPir*ForStar		.042 (.028)		.024** (.011)		.046 (.034)
Authority	-.000 (.013)	.042** (.019)	-.011** (.006)	.005 (.004)	.116 (.084)	.154 (.129)
PirViews	2.515 (2.038)	1.774 (2.042)	.980** (.433)	.599 (.402)	9.237 (6.990)	8.879 (6.988)
ForStar	.044 (.038)	-.158 (.104)	.028* (.014)	-.083* (.044)	-.017 (.101)	-.233 (.163)
LeWOMVal					.125** (.050)	.131*** (.050)
GeWOMVal					-.026 (.089)	-.030 (.088)

Table 1-6 (cont'd)

CodeConduct	.126 (.108)	.129 (.108)	-.002 (.005)	-.001 (.005)	.087 (.114)	.089 (.114)
PiracyActivity	.583** (.253)	.538** (.257)	.108** (.050)	.086* (.047)	1.879 (1.202)	1.884 (1.186)
LegalAccess	2.190* (1.309)	1.800 (1.300)	.558** (.232)	.387* (.210)	-.039 (3.767)	-.213 (3.783)
Population	-1.083 (.670)	-.873 (.665)	-.330** (.131)	-.228* (.117)	-4.136* (2.212)	-4.058* (2.221)
Global Matches	.000 (.001)	.000 (.001)	-.000 (.000)	-.000 (.000)	.016** (.006)	.016*** (.006)
Foreign Play	-.010** (.005)	-.011** (.005)	-.000 (.000)	-.001* (.000)	.009 (.013)	.009 (.014)
Foreigners	.000 (.001)	.000 (.001)	.000 (.000)	-.000 (.000)	-.002 (.004)	-.002 (.004)
Capacity	-.001 (.048)	.006 (.044)	-.025 (.026)	-.023 (.023)	.178** (.077)	.170** (.077)
Spectators	.008 (.019)	.004 (.018)	.006 (.005)	.005 (.005)	.336*** (.077)	.340*** (.077)
League Points	.001** (.000)	.001*** (.000)	.000** (.000)	.000** (.000)	.006*** (.002)	.006*** (.002)
Assets	.032** (.013)	.032** (.013)	.006 (.004)	.006 (.004)	.195*** (.041)	.197*** (.041)
CF_VolPir	-.026*** (.008)	-.028*** (.008)	-.006*** (.003)	-.007** (.003)	.015 (.028)	.014 (.028)
CF_ LeWOMVol					-.849*** (.195)	-.858*** (.198)
CF_ GeWOMVol					-2.550*** (.733)	-2.540*** (.722)
Constant	13.920 (8.712)	11.141 (8.626)	4.496** (1.777)	3.133** (1.553)	61.131** (29.917)	60.134** (30.044)
League FE	Yes	Yes	Yes	Yes	Yes	Yes
Tier FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.529	.541	.293	.430	.895	.895

* $p < .10$; ** $p < .05$; *** $p < .01$

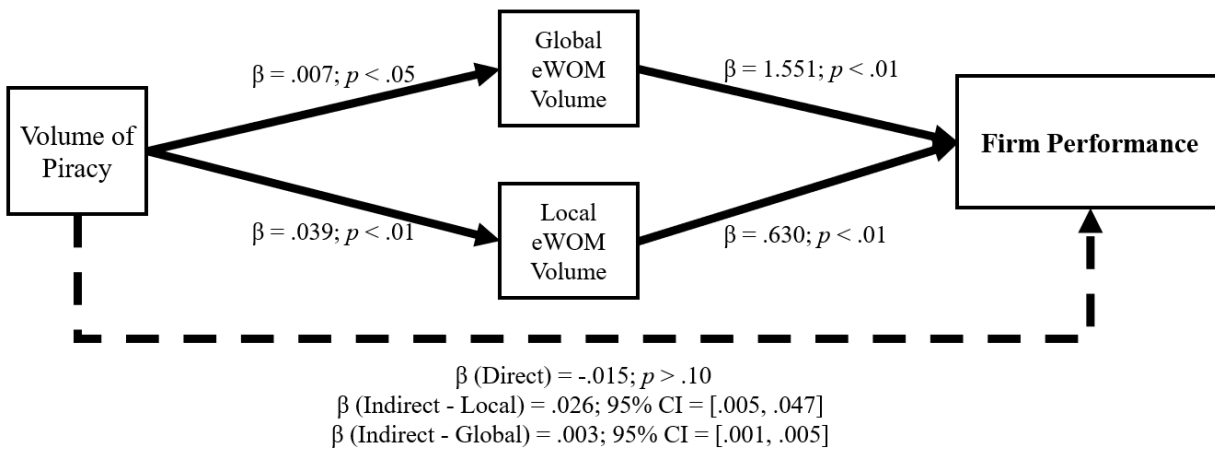
Notes: N = 760. Standard errors are in parentheses. The standard errors are heteroskedasticity corrected.

Mediation

We hypothesize that LeWOM and GeWOM volume mediate the relationship between the volume of piracy and firm performance in Hypothesis 6. We find that the volume of piracy is positively associated with both LeWOM volume ($\beta = .039$, $p < .01$) and GeWOM volume ($\beta = .007$, $p < .05$) as reported in Model 1 and Model 2 in Table 1-6. In addition, in Model 3, we find that both LeWOM volume ($\beta = .630$, $p < .01$) and GeWOM volume ($\beta = 1.551$, $p < .01$) are positively associated with firm performance, providing preliminary evidence of mediation. However, we formally test mediation by testing the indirect effects of the volume of piracy on firm performance mediation through LeWOM volume and GeWOM volume. We draw 1,000 bootstrap samples to obtain a 95% confidence interval for the indirect effects (Preacher and Hayes 2004). The indirect effect of the volume of piracy on firm performance mediated by LeWOM volume ($\beta = .026$; 95% CI = [.005, .047]) is positive and the confidence interval does not contain zero. Similarly, the indirect effect of the volume of piracy through GeWOM volume ($\beta = .003$; 95% CI = [.001, .005]) is also positive and does not contain zero. Thus, we can

conclude that LeWOM and GeWOM fully mediate the relationship between the volume of piracy and firm performance supporting H6a and H6b. A visual representation of the effects can be found in Figure 1-3.

Figure 1-3. Mediation Effects.



EWOM Effect Magnitude

Hypothesis 7 stated that GeWOM volume has a stronger influence on firm performance than LeWOM volume. Model 3 shows that the coefficient of LeWOM volume ($\beta = .630, p < .01$) is smaller than the coefficient of GeWOM volume ($\beta = 1.551, p < .01$), providing initial evidence that GeWOM volume has a stronger influence on firm performance. Additionally, we conduct a Wald test ($F = 5.26; p < .05$) to compare the two coefficients, which is significant. Thus, H7 was supported.

Robustness Checks

To ensure the validity of our findings, we also conducted several robustness checks. First, we estimated our original model with net sales as the dependent variable instead of total revenue. The results of this model are found in Model 1 of Table 1-7 and are similar to those in our original model. Additionally, we also use another alternative dependent variable to measure firm

performance. Specifically, we use the natural log of the estimated market value of each team in each season as measured by Transfermarkt in Model 2 of Table 1-7. These results are also similar to our focal results. Overall, results for robustness models are generally consistent with our original results, further bolstering our findings.

Table 1-7. Robustness Results.

	Model 1: DV – Net Sales		Model 2: DV – Market Value	
	Main Effect	Interactions	Main Effect	Interactions
	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
LeWOMVol	1.103*** (.365)	1.123*** (.363)	.526*** (.133)	.516*** (.140)
GeWOMVol	3.030** (1.441)	2.841** (1.431)	1.589* (.864)	1.932** (.935)
VolPir	-.047 (.037)	-.047 (.081)	-.004 (.023)	-.023 (.057)
VolPir*Authority		-.025 (.031)		.010 (.016)
VolPir*PirViews		.046 (.226)		.046 (.142)
VolPir*ForStar		.047 (.037)		-.079* (.043)
Authority	.145 (.105)	.232 (.146)	.061 (.067)	.020 (.098)
PirViews	16.477* (9.080)	15.481* (9.094)	-4.942 (6.341)	-4.079 (6.378)
ForStar	.036 (.116)	-.183 (.209)	.087 (.085)	.465* (.243)
LeWOMVal	.263* (.145)	.269* (.146)	.121*** (.038)	.118*** (.040)
GeWOMVal	-.019 (.106)	-.020 (.104)	-.036 (.065)	-.035 (.066)
CodeConduct	-.024 (.152)	-.018 (.151)	-.173* (.103)	-.173 (.105)
PiracyActivity	2.855* (1.582)	2.784* (1.573)	-1.482* (.854)	-1.434* (.848)
LegalAccess	3.636 (4.885)	3.172 (4.907)	-3.889 (3.280)	-3.408 (3.316)
Population	-5.451* (2.798)	-5.228* (2.803)	1.436 (1.855)	1.169 (1.867)
Global Matches	.011* (.007)	.011 (.007)	.026*** (.005)	.026*** (.005)
Foreign Play	.004 (.016)	.003 (.016)	-.012 (.015)	-.011 (.014)
Foreigners	-.014** (.006)	-.014** (.006)	.003 (.004)	.003 (.004)
Capacity	.395*** (.121)	.404*** (.123)	.133** (.053)	.127** (.053)
Spectators	.397*** (.105)	.391*** (.106)	.235*** (.059)	.237*** (.057)
League Points	.004* (.003)	.004* (.003)	.004*** (.001)	.004*** (.001)
Assets	.178*** (.053)	.176*** (.053)	.125*** (.029)	.124*** (.029)
CF_VolPir	.065 (.045)	.062 (.043)	.023 (.029)	.025 (.027)
CF_ LeWOMVol	-1.185*** (.425)	-1.229*** (.433)	-.511*** (.200)	-.484** (.202)
CF_ GeWOMVol	-4.281*** (1.595)	-4.432*** (1.610)	-1.888 (1.277)	-1.957 (1.201)
Constant	74.055** (37.742)	71.198* (37.825)	-13.349 (24.357)	-9.748 (24.524)
League FE	Yes	Yes	Yes	Yes
Tier FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R-squared	.815	.815	.901	.901

* $p < .10$; ** $p < .05$; *** $p < .01$

Notes: N = 760 for DV-Operating revenue. N = 737 for DV-Market value. Standard errors are in parentheses. The standard errors are heteroskedasticity corrected.

DISCUSSION

The professional sports industry has been grappling with piracy for a long time. With the rise of the internet over the past few decades, the degree of piracy has greatly increased. This research

takes a different view of piracy in the professional sports industry than mainstream opinions. Rather than looking at piracy as solely a negative to firms due to cannibalization and erosion of brand value, piracy does provide some positive externalities through an increased level of eWOM. Managers of professional sports teams can use this research to guide their resource allocation decisions to take advantage of the positive benefits of eWOM growth from piracy to offset the potential cannibalization of revenue. By examining a large dataset across a broad set of European football teams, this research finds that as the volume of piracy increases, both local and global eWOM increase and lead to positive changes in firm performance. Additionally, piracy has a stronger positive effect on local eWOM, but it is global eWOM that has a larger positive effect on firm performance. A strong regulatory environment such as having a national authority to combat piracy attenuates the effect of the volume of piracy on both local and global eWOM. In contrast, if sports teams engage in attracting foreign culture through signing foreign star players to internationalize their brand, the effect of the volume of piracy on global (but not local) eWOM volume is strengthened.

Managerial Implications

This research provides a variety of relevant insights for managers. First, we show that piracy should not be treated as a net negative in all situations for all firms. Specifically, piracy can have a positive impact on eWOM generation, which influences other consumers to engage with the brand, leading to increases in firm performance. Other research has suggested that there is a piracy dilemma where managers must consider allocating resources to combatting piracy, which also reduces or eliminates the positive externalities of piracy (Danaher, Dhanasobhon, and Telang 2010; Smith and Danaher 2020). Our research confirms the positive externalities of piracy in the professional sports industry via eWOM. Managers who are tasked with allocating

resources for the brand may find that allocating resources to combatting piracy may not be the most optimal decision for firm performance. Instead of allocating resources to fighting piracy in a typical “whack-a-mole” style attempt of removing individual sites where they just are reposted minutes or days later, managers may want to allocate those resources to exploiting eWOM that is generated from piracy. Additionally, these decisions may change based on the brand’s internationalization strategy and the institutional environment in which the brand exists. A summary of findings and relevant implications can be found in Table 1-8.

Table 1-8. Summary of Findings and Implications.

Hypothesis	Results	Managerial Implications
H1: The volume of piracy is positively associated with local eWOM volume (H1a) and global eWOM volume (H1b).	H1a – confirmed H1b – confirmed	EWOM serves as a positive externality of piracy. Firms should focus on strategies to maximize eWOM engagement from live matches, even if they are pirated. Resources may be better suited in this fashion, rather than combatting piracy.
H2: The volume of piracy has a stronger positive association with local eWOM volume compared to global eWOM volume.	H2 - confirmed	Firms should dedicate more resources to fighting piracy within the global markets, rather than the local market since they are gaining brand awareness from those markets due to piracy.
H3: When there is a national authority for piracy in the home country, the relationship between the volume of piracy and local eWOM volume (H3a) and global eWOM volume (H3b) is weaker.	H3a – confirmed H3b - confirmed	For firms in countries that have created regulatory measures to combat piracy, resources may be better diverted toward converting pirates into paid customers, since the eWOM effect is weaker.
H4: Positive home country views towards piracy strengthen the relationship between the volume of piracy and local eWOM volume but do not affect the relationship between the volume of piracy and global eWOM volume.	H4 – not confirmed	The consumer perceptions of piracy are irrelevant to capturing positive value from piracy via eWOM; thus, utilizing resources to influence consumer opinions about piracy would be wasted.
H5: A foreign star player transferring to the team (foreign star power) strengthens the relationship between the volume of piracy and global eWOM volume but does not affect the relationship between the volume of piracy and local eWOM volume.	H5 – confirmed	Teams that acquire foreign stars can extract additional value from piracy due to global fan engagement from different cultures. Thus, acquiring foreign stars can expand the market into new cultures for teams and offset piracy cannibalization further.
H6: Local eWOM volume (H6a) and global eWOM volume (H6b) mediate the relationship between piracy and firm performance.	H6a – confirmed H6b – confirmed	Firms should focus on diverting resources to maximize eWOM engagement, regardless of piracy, to improve performance and further offset piracy with greater eWOM.

Table 1-8 (cont'd)

H7: Global eWOM volume has a stronger effect on piracy than local eWOM volume.

H7 – confirmed

For firms to maximize revenue from eWOM, they need to focus on the global markets and allocate additional resources towards global eWOM campaigns, rather than local.

Theoretical Implications

This research also contributes to the marketing literature. First, this research contributes to the illicit consumption and brand protection literature by showing the mediating mechanism of eWOM on the piracy-firm performance relationship. Whereas most research has focused on the direct effects of piracy on firm performance or consumer decisions, we highlight that the relationship is more complex and consumer reactions to piracy, such as eWOM, need to be considered. Additionally, extant literature finds mixed results on the effects of piracy on firm performance. Our mediation mechanism helps to clarify some of those results. Next, we contribute to the eWOM and international marketing literature by answering the recent call to disentangle the effects of local and global eWOM (Gürhan-Canli, Sarial-Abi, and Hayran 2018; Steenkamp 2020). We show that eWOM cannot be considered in an aggregate manner for firms with local and global consumers, but instead, local eWOM (LeWOM) and global eWOM (GeWOM) are distinct constructs. EWOM drivers have differential effects on LeWOM and GeWOM, as we find that piracy is a stronger driver of LeWOM than GeWOM. Additionally, LeWOM and GeWOM are differentially important to firm performance with GeWOM having the stronger effect. Research should now consider how the eWOM of different customer bases varies since the social utility of engaging in brand eWOM varies across local and global customer bases. Additionally, we contribute to the literature by showing how institutional environments impact the piracy-eWOM relationship. Attracting foreign cultures through foreign star power heightens the social utility of piracy, leading to additional global eWOM. In contrast, stricter regulatory environments reduce the social utility of piracy, reducing eWOM generation.

Limitations and Future Research

While our study provides a variety of insights; however, like any study, it is not without its limitations. First, our sample consists of football teams in Europe. Additional studies would benefit from looking at this phenomenon across a sample of different types of professional sports teams, across other regions of the world, and examining different types of products. While the professional sports industry is massive, it would be interesting to see if the same effects occur for other cultural products such as movies or music. Next, our study focuses on one key externality of piracy: eWOM. Future studies could examine other potential positive and negative externalities of piracy such as competitive spillover effects. Finally, it would behoove researchers to examine the differentiation between LeWOM and GeWOM in different contexts and with different outcomes. LeWOM and GeWOM may have differential impacts on outcomes such as firm risk, customer satisfaction, or long-term performance outcomes.

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ESSAY TWO: ONLINE REVIEW CONTENT MODERATION IN E-COMMERCE PLATFORMS

ABSTRACT

Through four different studies including field data using a regression discontinuity-in-time design and experimental studies, this research examines the effects of content moderation policies on online reviews in e-commerce platforms. While intentions and assumptions suggest these policies have a positive impact on firm and product performance outcomes, this research surprisingly finds that content moderation policies of online reviews, specifically the removal of review bombs, have a detrimental effect on firm and product performance. Expectancy disconfirmation theory is leveraged to show that a drop in trust and an increase in perceived consumer risk are the mechanisms behind this effect. Additionally, this research investigates how consumer-firm relationship strength, policy announcement timing, and product type moderate these effects. This research provides key theoretical and managerial implications for e-commerce platforms and informs content management policies.

Keywords: online reviews, e-commerce, content moderation, regression discontinuity in time

INTRODUCTION

Online reviews, a form of electronic word-of-mouth (eWOM), are prominent in today's society. Online reviews provide information directly from the thoughts and minds of consumers, representing the virtual "voice of the customer" (Rust et al. 2021). Thus, reviews are immensely important for consumers to make decisions when shopping online. More than 92% of consumers use online reviews to guide their purchasing decisions (Forbes 2022). Online reviews are so vital to e-commerce sales that they were predicted to impact more than \$3.8 trillion in revenue across the world in 2021 (Brandes, Godes, and Mayzlin 2023). Thus, the importance of online reviews for both consumers and firms has led many firms to try to optimize their management of these online review systems. While many online review management policies are assumed to lead to positive outcomes for firms and consumers, we investigate how content moderation policies in online review systems can actually lead to negative outcomes for both e-commerce platforms and products listed by third-party sellers on those platforms.

The importance of online reviews has led to many organizations attempting to manage online reviews. Even government agencies, such as the Federal Trade Commission, have a guide for online review management (Federal Trade Commission 2022). Some strategies to manage online reviews include providing management responses to reviews, which can impact its online reputation (Proserpio and Zervas 2017), sales for the firm (Kumar, Qiu, and Kumar 2018), and future online reviews (Wang and Chaudhry 2018). Firms can strategically design online review platforms to provide more information may increase sales (Chen, Hong, and Liu 2018). In addition, some firms may focus on combatting fake reviews, which may mislead or misinform consumers about products or brands (Wu et al. 2020). This has led to some platforms engaging in the strategy of content moderation (Liu, Yildirim, and Zhang 2022). We define content

moderation as the process of deleting, removing, or hiding information from users based on a specific standard or guideline.

Our first contribution is examining the outcomes of online review content moderation in e-commerce platforms. Specifically, we examine how a specific type of content moderation, the removal of review bombs, impacts firm and consumer outcomes. We define review bombs as groups of a large number of negative reviews during a short period of time that are deemed off-topic by the e-commerce or online review platform. While past research has examined incentives for eWOM content moderation from a firm perspective (Liu, Yildirim, and Zhang 2022), there is scant research examining content moderation in the context of online reviews. We show how policies that remove review bombs not only impact consumer attitudes about the e-commerce platform which engages in the policy but these effects spill over onto outcomes related to individual products listed on the platform. This is relevant because e-commerce platform strategic decisions impact a variety of stakeholders: themselves, third-party sellers on their platforms, and consumers.

Our second contribution is leveraging the expectancy-disconfirmation theory to highlight the theoretical mechanisms that drive the effect of review bomb removal policies on platform and product outcomes. Extant research has primarily leveraged the expectancy-disconfirmation theory framework to explain how disconfirmation of consumer expectations with a product or service leads to consumer choices (Evangelidis and Van Osselaer 2018), customer satisfaction (Diehl and Poyner 2010), and customer revenge (Grégoire et al. 2018). This paper takes a slightly different approach by focusing on a firm policy change, rather than a product or service interaction, as the catalyst for disconfirmation. We show that consumer trust

mediates the relationship between online review content moderation and platform and product outcomes.

Lastly, we examine moderators for the proposed relationships. We examine how consumer, policy, and product-level factors impact how consumers react to online review content moderation policies. At the consumer level, the customer-firm relationship strength can affect the direction and degree of disconfirmation from an interaction with the firm (Harmeling et al. 2015). The announcement and launch of a content moderation policy can also impact the degree to which online review content moderation impacts consumer attitudes and firm outcomes. Thus, we examine the announcement timing for online review content moderation to determine whether a pre-announcement of a policy has a different impact than an announcement with an immediate policy implementation. Different e-commerce sites often prioritize selling certain types of products. Thus, we test whether an e-commerce platform selling hedonic vs. utilitarian products impacts the effect of online review content moderation on consumer attitudes and product/platform outcomes.

We use a multimethod design with four studies to investigate the effects of online review content moderation. In Study 1, we field data and a quasi-experimental regression discontinuity-in-time design to provide causal evidence of the effects of the launch of an online review content moderation policy on platform and product outcomes. In Study 2, we probe the mediating mechanism by showing that the online review content moderation policy in Study 1 led to a drop in trust in the eWOM about the online platform. Study 3 tests for mediation using a lab experiment. Lastly, Study 4 is a lab experiment that tests the various moderators and moderated mediation models. A summary of our conceptual framework can be found in Figure 2-1. An overview of the studies can be found in Table 2-1.

Figure 2-1. Conceptual Framework.

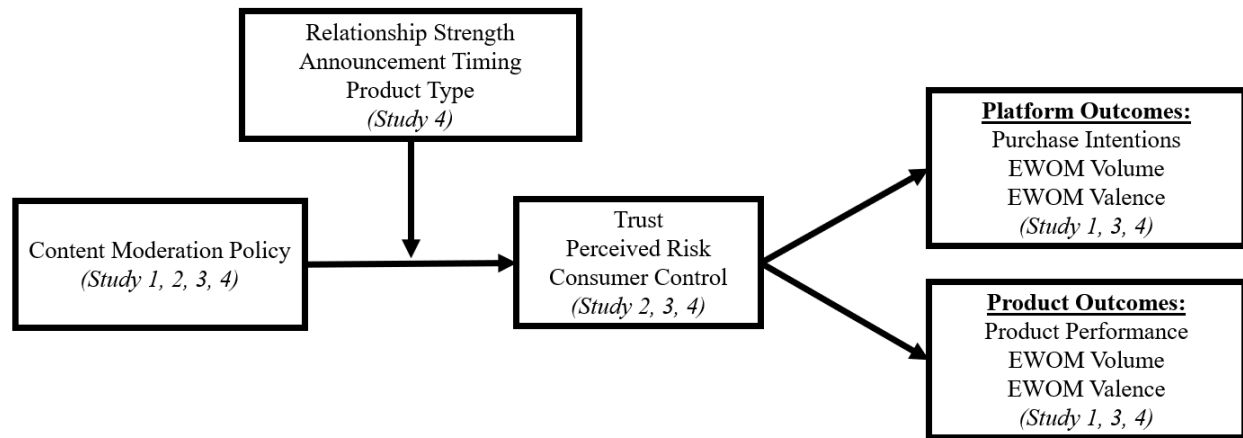


Table 2-1. Overview of Studies.

Study	Type	Relationships Tested
1	Field Data	Main effect on product outcomes
2	Field Data	Main effect on mediator
3	Experiment	Mediation with platform and product outcomes
4	Experiment	Moderated-mediation with platform and product outcomes

CONCEPTUAL FRAMEWORK

Relevance of Online Reviews

In e-commerce settings, consumers must rely upon online reviews to get first-hand information about products and brands (Pavlou, Liang, and Xue 2007). As a result, information from online reviews is traditionally seen as more credible than many other forms of information, even a customer's own past experiences (Zhao et al. 2013). For instance, as much as 95% of consumers read online reviews before shopping online (Globe Newswire 2022). This provides immense power for consumers to influence others in the marketplace. Therefore, many consumers engage in writing reviews for both extrinsic and intrinsic reasons (Khern-am-nuai, Kannan, and Ghasemkhani 2018). Consumers may write a review to praise or complain about a product or brand (Ho, Wu, and Tan 2017). Others may leave reviews because they desire to impress their

opinions upon others (Berger 2014). Some consumers are motivated to provide helpful information to others (Eigenraam et al. 2018). Additionally, loyal consumers feel an inherent need to help the brand or signal their identity by engaging in online reviews about the brand (Eelen et al. 2017).

Firms also find online reviews important for a variety of reasons. For one, online reviews have the power to influence customer purchase intentions and the sales of products (Babic Rosario et al. 2016; Chen and Xie 2008; Chevalier and Mayzlin 2006). Negative reviews can deter consumers from engaging with a brand or purchasing a product (Hennig-Thurau et al. 2015; Ho-Dac, Carson, and Moore 2013). A larger volume of reviews (Zhu and Xhang 2010) and more consistent reviews can lift sales (Kim et al. 2023). In addition, fake reviews can increase visibility for a product or service, which can benefit the firm or be extremely negative and diminish the reputation of a firm (Lappas, Sabnis, and Valknas 2016).

Online Review Policies and Consumer Disconfirmation

With the importance of online reviews, many firms are seeking to optimize these systems to improve outcomes for themselves, third-party products listed on their platform, and consumers. While there is a dearth of extant research examining the effects of characteristics of online reviews on consumer and firm outcomes, there is significantly less research examining managerial policies related to online review management policies. Extant research has examined how management responses to reviews impact future ratings (Proserpio and Zervas 2017) and consumer opinions (Wang and Chaudry 2018). Contingency factors such as investing in other marketing actions (Chen, Liu, and Zhang 2013) or highlighting specific types of reviews that are informational for consumers (Reich and Maglio 2020) can amplify the effects of online reviews. However, little is known about how content moderation of online reviews, a strategy used by

many firms, impacts firm outcomes. More specifically, we examine the removal of review bombs, a subset of content moderation, which has received scant attention.

We leverage expectancy disconfirmation theory to suggest that online review content moderation policies have a negative impact on firm and product outcomes. The expectancy disconfirmation theory² states that disconfirmations can be positive or negative (Oliver 1980). A positive disconfirmation occurs when a consumer has an expectation and that expectation is exceeded, or positively disconfirmed, often leading to positive outcomes, such as increased customer satisfaction (Churchill and Surprenant 1982) and firm or product performance. On the other hand, when a consumer expectation is not met or falls below the threshold expected by the consumer, a negative disconfirmation occurs, often resulting in complaining (Grégoire and Fisher 2006) and a reduction in product or firm performance outcomes.

When consumers are shopping on e-commerce sites and using their online review platforms to inform their decisions, there are certain expectations that exist. For instance, consumers often turn to online reviews to obtain information directly from the consumer, since it is seen as highly credible (Zhao et al. 2013). Consumers have an expectation about learning from a review, even more so than their own experience (Zhao et al. 2013). Thus, they believe that the online review platform is providing them with the most accurate information for their decision-making. When a firm engages in a policy change to remove online review content from a platform, this challenges previously held consumer expectations of the online shopping experience with the e-commerce platform. Significant changes causing disconfirmations can then cause consumers to have negative adverse reactions to the policy change (Harmeling et al. 2015). Thus, when a firm enacts a new policy of removing online reviews included in review bombs,

² Also referred to as the expectation disconfirmation framework and expectation disconfirmation theory.

consumers may adversely react to this change. Their expectation of getting the most accurate and full amount of information from online reviews is now not met, resulting in a negative disconfirmation from the policy change. Thus:

H1: Online review content moderation policies in e-commerce platforms will lead to a decrease in platform repurchase intentions (a), platform eWOM volume (b), platform eWOM valence (c), product performance (d), product eWOM volume (e), and product eWOM valence (f).

Trust as a Mediating Mechanism

Consumer disconfirmations occur as a result of a difference between expectations and actual experiences by the consumer. When negative disconfirmations occur, consumer expectations are not met. When this occurs consumers often feel disappointed (Inman, Dyer, and Jia 1997), dissatisfied (Morgeson et al. 2020), and even betrayed (Grégoire and Fisher 2008) by the firm. All of these are associated with a violation of presumptive trust between the consumer and the firm. As such, negative disconfirmations from product failures lead to a drop in firm trust (Darke et al. 2010). We expect that this mechanism also occurs when a policy change such as content moderation is implemented. A drop in trust will lead to a reduction in consumer attitudes toward the e-commerce firm, a reduction in purchase intentions with the e-commerce platform (Kim and Peterson 2017), and a reduction in word-of-mouth (WOM) behavior and valence (Ismagilova et al. 2021). Thus, we hypothesize:

H2: Trust mediates the relationship between online review content moderation policies in e-commerce platforms and platform (a) and product (b) outcomes.

Perceived Risk as a Mediating Mechanism

When consumer expectations are not met and consumer disconfirmation occurs, this impacts how consumers evaluate their relationship with a firm in the future. If a firm fails to meet expectations now, there is a higher perceived likelihood or risk they may fail to meet them in the future. Consumers may perceive that the firm has a higher risk of failing to meet consumer needs in other ways as well (Mitchell 1993). The firm is the sole entity that controls future policies and the management of the e-commerce platform. Thus, when control is held by fewer entities, there is a higher risk that the relationship between the consumer and the firm fails. Risk also increases decision uncertainty (Taylor 1977), ultimately reducing purchasing intentions and future interactions with the firm. Thus:

H3: Perceived risk mediates the relationship between online review content moderation policies in e-commerce platforms and platform (a) and product (b) outcomes.

Consumer Control as a Mediating Mechanism

Online review content moderation policies may also inhibit a consumer's control of their shopping experience. If there is the possibility that their online reviews may be removed or hidden from a platform, consumers may believe they have less control over providing information to other consumers. Control is associated with a sense of empowerment for consumers (Wathieu et al. 2002), which leads to increased customer satisfaction. However, the opposite can also occur. A reduction in control can lead to negative firm outcomes (Whang et al. 2021) because consumers feel as though they have lost agency and responsibility (Hui and Bateson 1991). Therefore,

H4: Consumer control mediates the relationship between online review content moderation policies in e-commerce platforms and platform (a) and product (b) outcomes.

Consumer-Firm Relationship Strength

The relationship strength of a consumer's relationship with a firm can dictate how they perceive negative disconfirmations associated with the firm (Harmeling et al. 2015). When consumers have strong relationships with a firm, this acts as a buffer from detrimental events and negative outcomes (Hess, Ganesan, and Klein 2003). The stronger a relationship a consumer has with a firm, the more goodwill they have to suppress these negative interactions with the firm (Morgeson et al. 2020). In contrast, when consumers are newer consumers to a firm, engage less with a firm, or are considered weaker relationship consumers, small negative disconfirmations can lead to them turning away from the firm. Thus, we suggest that when online review content moderation policies create negative disconfirmation, negative consumer reactions are attenuated when the consumer has a stronger prior relationship with the firm. Thus,

H5: Relationship strength moderates the mediated relationship between online review content moderation policies in e-commerce platforms and platform (a) and product (b) outcomes such that the relationships are weaker (stronger) when relationship strength is stronger (weaker).

Policy Timing

Next, we examine the moderating effects of policy timing. Specifically, we examine whether, if a content review moderation policy is implemented, the timing of the policy impacts outcomes. We examine whether a policy announcement with an immediate effect vs. a pre-announcement of the policy to go into effect at a later date has different effects. Pre-announcements, often studied in the new product development literature, are known to positively impact product success by building anticipation for the product (Schatzel and Calantone 2006). We suggest that this effect of anticipation building also exists for a policy announcement. However, in the case of

the creation of a negative disconfirmation via online review content moderation, we suggest that a pre-announcement would strengthen the negative effects of the negative disconfirmation due to the building negative anticipation of the new policy. Pre-announcements also provide signals from a firm (Bayus, Jain, and Rao 2001) about their strategies and intentions with the policy. Thus, compared to a policy announcement with an immediate effect, a pre-announcement gives consumers a longer time to contemplate their reactions, allowing negative reactions to build. Thus, we suggest:

H6: Announcement timing moderates the mediated relationship between online review content moderation policies in e-commerce platforms and platform (a) and product (b) outcomes such that the relationships are weaker (stronger) when the policy announcement is immediate (pre-announced).

Product Type

The focal product type a firm sells can also influence the relationship of online review content moderation policies with outcome variables. Specifically, we examine whether the e-commerce firm primarily sells hedonic or utilitarian products. Hedonic products are products that typically lead to some sort of excitement for pleasure when consumed, compared to utilitarian products which are consumed for an inherent purpose. Online reviews for hedonic products typically contain more emotion compared to utilitarian products (Kronrod and Danziger 2013) and are based more upon personal experiences and opinions, rather than objective content. As a result, consumers tend to rely on reviews and information from other consumers much more so for utilitarian products (Li et al. 2020). Since utilitarian products are goal-driven and consumers want to make the optimal decision when purchasing these items (Novak, Hoffman, and Duhachek 2003), consumers want to utilize as many online reviews in their search process as

possible. Thus, when content moderation policies are incorporated into an online review platform, this limits information, resulting in worse information for consumers seeking utilitarian products, heightening the negative disconfirmation from the policy change. Therefore, we suggest:

H7: Product type moderates the mediated relationship between online review content moderation policies in e-commerce platforms and platform (a) and product (b) outcomes such that the relationships are weaker (stronger) when the focal products are hedonic (utilitarian).

METHOD

To test our conceptual framework, we conduct four different studies. In Study 1, we utilize field data from an e-commerce platform to examine the effects of implementing a new content moderation policy. Specifically, we test the main effect of content moderation policy implementation on product-related outcomes for products listed on the e-commerce platform. Study 1 uses a regression discontinuity-in-time to assess the effects. Study 2 provides a follow-up to Study 1 by examining the effects of the same content moderation policy in Study 1. However, Study 2 uses eWOM data about the e-commerce platform to examine how the content moderation policy impacts the trust of the platform, which is the proposed mediator. Study 3 then uses an experiment to test for mediation with both product and platform outcomes. Lastly, Study 4 includes an experiment to test for moderation and moderated-mediation of the proposed moderators.

STUDY 1: EXAMINATION OF CONTENT MODERATION IN THE FIELD

The primary focus of this paper is to examine the effect of online review content management policies. Thus, in Study 1, we test the main effect of a real online review content management

policy change in the field on relevant outcome variables. Specifically, we examine the effects of a key policy change in the online review system for an e-commerce platform. This platform primarily sells video game products from third-party publishers. In March 2019, this platform made a significant change to its online review policies, involving content moderation of online reviews. This new content moderation policy was announced and launched on the same day. The new policy suggested that the platform would now use a proprietary method to identify and remove review bombs from the standard review viewing options and exclude them from the overall ratings for products on their platform. Reviews bombs are defined as a large number of negative reviews during a short period of time that are deemed off-topic by the platform. According to the platform, the primary goal of removing review bombs was to provide fairer and more accurate feedback about listed products.

Since the policy change occurred at a specific point in time, we obtained longitudinal data before and after the policy change to estimate the effects of relevant outcome variables. To model the effect of the policy change, we use the quasi-experimental method, regression discontinuity in time (RDiT), which allows us to provide a causal estimate of the effects of the policy change (Hausman and Rapson 2018; Shi, Liu, and Srinivasan 2022).

Data

Our dataset consists of more than 15 million individual online reviews from 720 different products listed on the e-commerce platform. We aggregate the individual online reviews at the product and month levels. Additionally, our sample consists of data surrounding the 36-month period around the policy change, with 18 months prior to and post-policy change. This lends a total sample of 25,012 product-month observations in our sample. We collect all data directly

from the e-commerce platform including online review data, reviewer characteristics, and product performance data.

Measures

The outcome variable in this study is the average number of daily users for each video game within each month. We also use the peak number of users and change in the number of users within each month as outcome variables for robustness. Since we are also concerned about how the policy change impacts eWOM about products on the platform, we measure different relevant eWOM outcomes associated with the reviews.

First, we estimate the policy effects on the volume of reviews after the policy change. We are also concerned about the content of the reviews including the valence. Thus, we estimate the policy effects on the average rating in each month after the policy change. This represents a form of the valence of eWOM about the products. For robustness, we also examine the textual content of the reviews using natural language processing. Specifically, we use the Vader package in Python to estimate the valence of the content of the reviews. Additionally, we were curious about other factors of eWOM (online reviews) that may be impacted by the policy change. Thus, we measure the effects of the policy on review length by estimating the average word count of reviews. Lastly, we also estimate the policy effects on the helpfulness of reviews, as measured by the number of helpfulness votes.

To control for factors that may influence outcome variables, we include relevant covariates in our analyses. We control for the volume of reviews by including the cumulative number of reviews at each month t as a covariate. Additionally, we control for the current sentiment towards the game by controlling for the cumulative rating of each game in month t . Lastly, some games may be more popular at one time and then less popular in other months, so

we control for the relative popularity ranking of each game on the platform in month t . A description of variables can be found in Table 2-2 and summary statistics can be found in Table 2-3.

Table 2-2. Study 1 Variable Descriptions.

Variable Name	Purpose	Description
Total users	Dependent variable	Natural log of # average daily users in month t
Review volume	Dependent variable	Natural log of # reviews in month t
Product rating	Dependent variable	Average product rating in month t
Review valence	Dependent variable	Calculated score based on the text of reviews
Review length	Dependent variable	Natural log of the average word count of reviews in month t
Review helpfulness	Dependent variable	Natural log of # helpfulness votes in month t
Cumulative volume of reviews	Control variable	Natural log of the cumulative volume of reviews in time t
Cumulative product rating	Control variable	Cumulative product rating in time t
Product rank	Control variable	Natural log of the popularity rank in month t

Table 2-3. Study 1 Summary Statistics.

Variable	Mean	SD	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)Total users	2338.55	19419.78	.5	857604.3								
(2)Review volume	181.17	878.22	1	35980	.63							
(3)Product rating	.83	.17	0	1	.01	.08						
(4)Review valence	.40	.19	-1	1	-.05	-.01	.46					
(5)Review length	54.30	41.30	0	1434	-.06	-.11	-.23	.09				
(6)Review helpfulness	2.22	3.13	0	111	-.03	-.06	-.29	-.11	.28			
(7)Cum. Rev. volume	8639.72	31016.26	1	909244	.87	.74	.06	-.03	-.10	-.05		
(8)Cum. Prod. rating	.85	.11	.36	1	.01	.05	.60	.32	-.15	-.21	.05	
(9)Product rank	401.68	230.84	1	822	.20	.27	.06	-.01	-.07	.04	.28	-.03

Notes: Correlations in bold are significant at $p < .05$.

Model

We use a regression discontinuity in time (RDiT) model to examine the effects of the online review content moderation policy on relevant outcome variables. RDiT is similar to traditional regression discontinuity modeling techniques, except that it uses time as a running variable (Hausman and Rapson 2018). Our focal model specification for RDiT is:

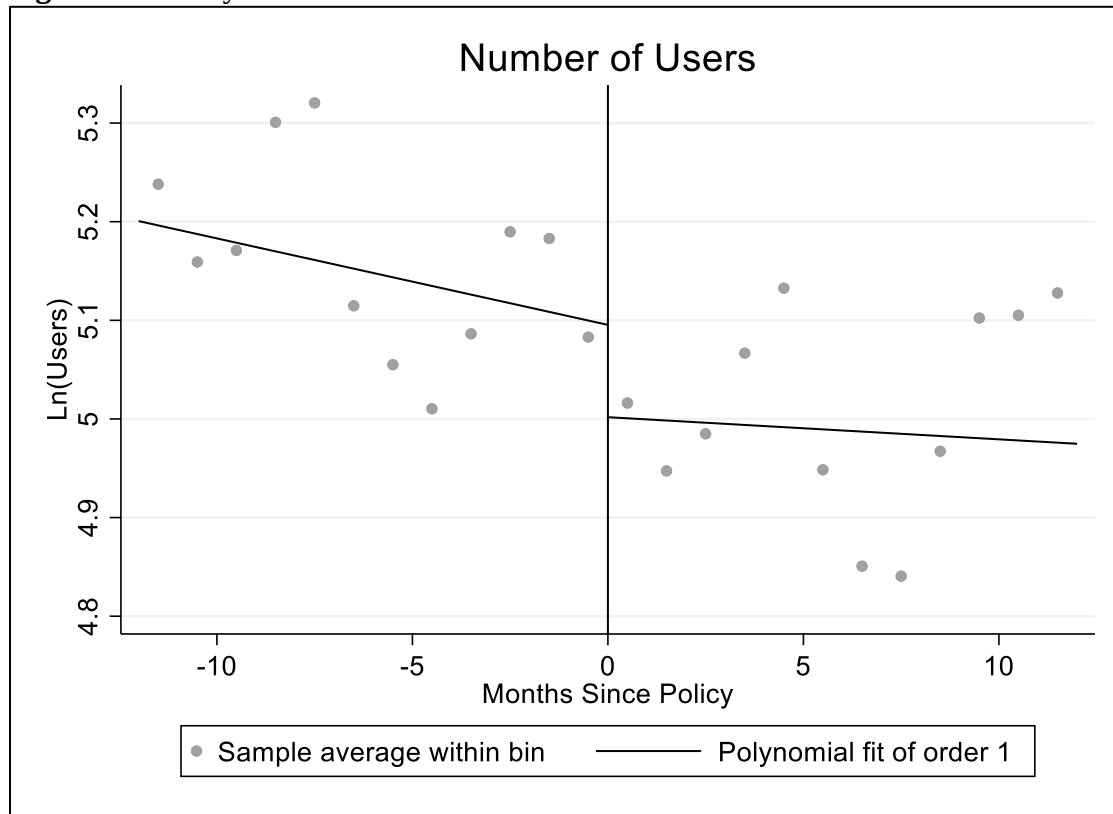
$$Y_{it} = \text{Policy}_{it} \times \tau + \sum_{n=1}^3 \delta_n t^n + \vec{\beta} \vec{X}_{it} + \xi_i + \varepsilon_{it} \quad (1)$$

Y_{it} is the outcome variable of interest for product i in time t . The treatment variable Policy_{it} is set to 1 if period t for product i is after the policy change and set to 0 otherwise. $\vec{X}_{it}$ is a vector of covariates related to product i in time t . Covariates include the natural log of the cumulative number of reviews in time t , the cumulative rating of product i in time t , and the ranking of product i in time t . $\sum_{n=1}^3 \delta_n t^n$ represents time-varying factors including time polynomials up to the third degree, subject by Bayesian information criterion (BIC) scores (Hausman and Rapson 2018). ξ_i is a product fixed effect, which accounts for any unobservable product characteristics. Each of our models uses clustered robust standard errors clustered by product to account for heteroskedasticity and autocorrelation (Wooldridge 2003).

Visual Analysis

One of the primary tools to use in RDiT models is graphical examinations of the effects of the event of study (Hausman and Rapson 2018). First, we plot our outcome variable with the policy change as the cutoff and time as a running variable in Figure 2-2. We use a 12-month bandwidth in the plots and focal analyses with triangular bins at a monthly period with no covariates. The results are robust to alternative bandwidths. We also plot the outcome variable using a linear function, second-degree polynomial, and third-degree polynomial for robustness which can be found in the Appendix. Each of the plots suggests that the policy effect is robust across specifications of the outcome variable and bandwidths.

Figure 2-2. Study 1 Plot of Users with 12-Month Bandwidth.



Results

To test the effects of the policy change on performance, we run regressions using Equation 3. Our focal analysis regresses covariates, time, and treatment on the outcome variables in month i . Product, month, and year fixed effects are used to control for unobserved heterogeneity. Clustered-robust standard errors are used. We also run additional robustness checks by using alternative bandwidths (Hausman and Rapson 2018). Robustness checks include models with bandwidths of 6 months, 9 months, 15 months, and 18 months. The 15-month and 18-month bandwidths also included the beginning of the Covid-19 pandemic, in which video game usage generally increased. Overall, we find that the policy ($\beta = -.241$; $p < .01$) results in a decrease in the total number of users in Model 1 and these results are robust across bandwidths. The results of our regressions can be found in Table 2-4.

Table 2-4. Study 1 Policy Effects on Total Users.

	Model 1: 12M BW	Model 2: 6M BW	Model 3: 9M BW	Model 4: 15M BW	Model 5: 18M BW
DV: LN(Users)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
After Policy Change	-.241 (.010)***	-1.264 (.065)***	-1.414 (.052)***	-.130 (.009)***	-.091 (.009)***
Cum. Rev. Volume	.539 (.141)***	.353 (.159)**	.390 (.114)***	.447 (.094)***	.422 (.070)***
Cum. Prod. Rating	1.047 (1.246)	2.552 (1.606)	1.818 (.863)**	1.894 (.891)**	2.081 (.719)***
Product Rank	1.316 (.062)***	1.333 (.076)***	1.294 (.069)***	1.320 (.055)***	1.318 (.054)***
Month FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes
Observations	16927	8801	12866	20978	25012
R-Sq.	.698	.701	.710	.693	.693

Notes: All estimations include first-order time effects. SE are in parentheses. BW = bandwidth.

*** $p < .01$, ** $p < .05$, * $p < .1$

We also conduct additional robustness checks to provide additional evidence to support our results. First, we conduct a donut-hole RD regression (Barreca et al. 2011) to mitigate any concerns that there is merely a short-run selection of the policy effects. We remove one month and two months before and after the policy change to conduct the donut-hole RD regressions. The results shown in Table 2-5 suggest that results hold when removing the months next to the cutoff, providing additional support for the policy effect.

Table 2-5. Study 1 Donut Hole Regression Results.

	Model 1: 1 Month Removed	Model 2: 2 Months Removed
DV: LN(Users)	B (SE)	B (SE)
After Policy Change	-.268 (.015)***	-.339 (.020)***
Cum. Rev. Volume	.552 (.143)***	.565 (.144)***
Cum. Prod. Rating	1.343 (1.295)	1.458 (1.328)
Product Rank	1.304 (.064)***	1.301 (.063)***
Month FE	Yes	Yes
Year FE	Yes	Yes
Product FE	Yes	Yes
Observations	14898	8801
R-Sq.	.699	.701

Notes: All estimations include first-order time effects. SE are in parentheses. All models use a 12-month bandwidth.

*** $p < .01$, ** $p < .05$, * $p < .1$

Placebo test.

To quell concerns about the endogeneity of the policy, we conduct a placebo test by estimating the RDiT regression model using an alternative treatment date (Shi, Liu, and Srinivasan 2022). Specifically, we use a date of six months prior to the policy as a placebo date. The results of our placebo test in Table 2-6 show that the policy ($\beta = -.004$; $p > .10$) is not

significantly related to the number of users. Thus, the placebo test further suggests the legitimacy of the effects of the policy treatment.

Table 2-6. Study 1 Placebo Test Results.

DV: LN(Users)	Model 1: DV- LN(Users)
	B (SE)
After Policy Change	-.004 (.010)
Cum. Rev. Volume	.347 (.089)***
Cum. Prod. Rating	3.285 (1.136)***
Product Rank	1.326 (.047)***
Month FE	Yes
Year FE	Yes
Product FE	Yes
Observations	16723
R-Sq.	.726

Notes: All estimations include first-order time effects. SE are in parentheses. All models use a 12-month bandwidth.

*** $p < .01$, ** $p < .05$, * $p < .1$

EWOM outcomes.

In addition to examining the number of users as a measure of product performance, we also estimate the effects of the policy change on relevant eWOM variables. Specifically, we measure the effects of the policy change on the volume of reviews, product rating, review valence, length of reviews, and helpfulness of reviews. The results of these estimations can be found in Table 2-7. We find that the policy change leads to a decrease in review volume ($\beta = -.081$; $p < .01$) in Model 1. However, we do not find evidence that the policy change leads to changes in product ratings ($\beta = -.004$; $p > .10$) or review valence ($\beta = -.004$; $p > .10$).

Additionally, in Model 4, we examine the policy effects on review length ($\beta = -.062$; $p < .05$) which are negative and significant. In Model 5, we find that the policy change leads to a decrease in review helpfulness ($\beta = -.059$; $p < .05$). In summary, we find support that content moderation policies, and more specifically the removal of review bombs, do impact product eWOM outcomes such as eWOM volume, review length, and review helpfulness, but do not find evidence of any impact on eWOM valence.

Table 2-7. Study 1 Policy Effects on eWOM Outcomes.

	Model 1: DV-Review Volume	Model 2: DV-Product Rating	Model 3: DV-Review Valence	Model 4: DV-Review Length	Model 5: DV-Review Helpfulness
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
After Policy Change	-.081 (.019)***	.008 (.006)	.014 (.010)	-.062 (.028)**	-.059 (.026)**
Cum. Rev. Volume	..821 (.156)***	-.062 (.017)***	-.051 (.014)***	-.222 (.050)***	-.220 (.062)***
Cum. Prod. Rating	7.003 (1.372)***	2.078 (.235)***	.903 (.154)***	-4.312 (.580)***	-4.302 (.665)***
Product Rank	.725 (.095)***	.001 (.009)	.012 (.008)	.139 (.025)***	.018 (.033)
Month FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes
Observations	16927	16927	16927	16927	16297
R-Sq.	.552	.126	.012	.189	.158

Notes: All estimations include first-order time effects. SE are in parentheses. All estimations use a 12-month bandwidth.

*** $p < .01$, ** $p < .05$, * $p < .1$

Discussion

Study 1 provided us with evidence of the causal effects of a real-life content moderation policy change. We found that when a firm launches an online review content moderation policy, products listed on that e-commerce platform are hurt. This is counter to the intentions of the firm, as they believe engaging in these policies is beneficial for customers and leads to improved outcomes. Instead, when content moderation policies are enacted, customer expectations about their shopping experiences on the e-commerce platform are disconfirmed in a negative manner. As a result, there is a decrease in customer engagement with products on the e-commerce platform, and various important online review metrics are adversely impacted. Customers leave fewer reviews, shorter reviews, and less helpful reviews. This ultimately hurts the products listed on the e-commerce platform and other customers, since they receive less useful information. With causal evidence that content moderation policies negatively disconfirm customer expectations about their shopping experience and lead to negative outcomes, we turn to Study 2 to investigate the theoretical mechanisms behind why this effect occurs.

STUDY 2: TESTING TRUST AS A MEDIATOR

In Study 2, we examine our proposed mediator, trust, using field data from the same content moderation policy change in Study 1. Specifically, we capture the eWOM about the e-commerce

platform and use natural language processing tools to codify trust in that eWOM. EWOM about the platform is obtained from the social media analytics provider, Infegy Atlas, which provides eWOM about topics, brands, and keywords across a variety of channels and locations. We examine how the policy change impacts trust in eWOM about the e-commerce platform and compare the change in trust eWOM to other emotions using an interrupted time series model.

Data and Measures

Our outcome variable of interest is the consumer's emotional eWOM about the platform. We obtain eWOM data about the steam platform using Infegy Atlas. From Infegy Atlas, we extract the data regarding the number of total eWOM posts about the platform on a daily basis. We extract the data 180 days before and after the date of the policy change. In the eWOM data, we extract ten eWOM emotions about the platform from these posts: joy, trust, anger, disgust, sadness, fear, surprise, anticipation, love, and hate. Emotions are measured by assigning words to each emotion. Thus, some words represent emotions like joy, whereas others represent anger. To measure each emotion on a similar scale to compare changes, we measure an emotion rate by dividing the number of emotion words in eWOM by the total number of eWOM posts (scaled by the hundreds) about the e-commerce platform:

$$\text{Emotion}_{\text{rate}} = \frac{\# \text{ of emotion words}}{\# \text{ of eWOM posts}} \quad (2)$$

This measure of emotion rate allows a similar comparison across emotions. In addition, it provides a measure of the intensity of each emotion scaled by the total volume of eWOM about the e-commerce platform. We also control for the natural log of eWOM volume within each period.

Model

We use interrupted time series (ITS) to test the difference between eWOM emotion posts before and after the policy change (Linden 2015). First, we conduct a single-group analysis using an

interrupted time series model. The focal specification for the interrupted time series model is as follows:

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \epsilon_t \quad (3)$$

Y_t represents the outcome variable at time t . T_t is the time distance from the intervention. X_t is a dummy variable that represents the intervention policy (0 = pre-policy; 1 = post-policy). $X_t T_t$ is the interaction between time and the intervention. Thus, β_0 represents the intercept or starting outcome for the outcome variable. β_1 represents the slope for the outcome variable before intervention. β_2 represents the change in the level of the outcome that occurs in the time period immediately after the intervention, an immediate treatment effect. β_3 represents the difference between the slopes for the outcome before the intervention and after the intervention, a treatment effect over time (Linden and Adams 2011). We estimate the effect of the intervention by using a 90-day window and 120-day window for robustness.

Additionally, we also conducted a multi-group analysis which compares the treatment or focal group (trust eWOM) to control or comparison groups (other eWOM emotions). The interrupted time series model for the multi-group analysis is specified as follows:

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z + \beta_5 Z T_t + \beta_6 Z X_t + \beta_7 Z X_t T_t + \epsilon_t \quad (4)$$

The model is similar to the model for the single-model analysis, except it also includes terms to delineate the treatment and control groups. Z is a dummy variable that represents the group assignment. $Z T_t$, $Z X_t$, and $Z X_t T_t$ represent interactions between Z , the intervention policy (X_t), and the time from intervention (T_t). β_0 , β_1 , β_2 , and β_3 represent the control group, while β_4 , β_5 , β_6 , and β_7 represent values for the treatment group. β_4 represents the difference in intercept between the treatment group and control group prior to intervention. β_5 represents the difference in the slope between the treatment and control groups prior to intervention. β_6 represents the

difference between treatment and control groups in the period immediately after the intervention. β_7 represents the difference between slopes for the treatment and control groups variable after the intervention compared with prior to the intervention. This is similar to a difference-in-difference of slopes.

Results

The results for the single-group interrupted time series models are reported in Table 2-8. Results are reports using Newey-West standard errors. Model 1 of Table 2-8 shows the results for the ITS model with a 90-day window, whereas Model 2 shows the results for a 120-day window. Specifically, we find in Model 1, that the policy change ($\beta = -1.004$; $p < .05$). has an immediate negative impact on trust eWOM about the e-commerce platform for the 90-window. Additionally, we find a negative effect using a 120-day window ($\beta = -.731$; $p > .10$), but the effect is not significant. It is also worth noting that for both the 90-day window ($\beta = -.038$; $p < .01$), and 120-window ($\beta = -.018$; $p < .01$), we find a long-term negative impact of the policy change on trust eWOM. To provide additional insights, we also plot the results of the 90-day model in Figure 2-3, which shows the immediate negative effect of the policy change and long-term negative effects.

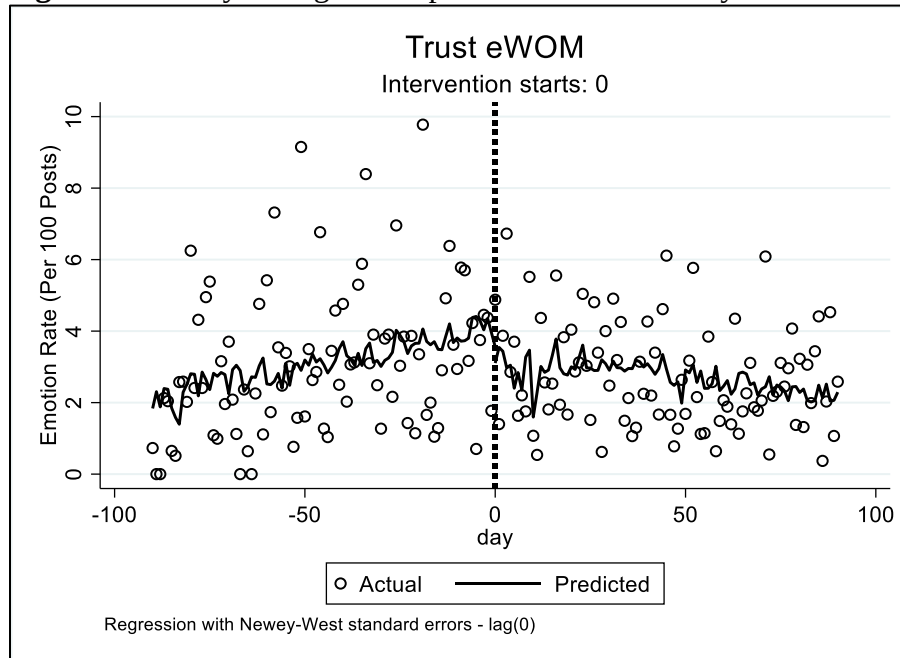
Table 2-8. Study 2 Single-Group Interrupted Time Series Results.

	Model 1: 90-day Window	Model 2:120-day Window
	Coef. (SE)	Coef. (SE)
Time	.031 (.008)***	.015 (.006)**
Policy Change	-1.004 (.512)**	-.731 (.459)
Time*Policy Change	-.038 (.010)***	-.018 (.007)***
LN(Volume)	-1.244 (.482)**	-.742 (.432)*
Constant	7.967 (2.285)***	5.829 (2.068)***
F-Value	4.68***	2.47**
Maximum lag	0	0
Number of obs.	181	241

Notes: Dependent variable is volume of trust eWOM

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figure 2-3. Study 2 Single-Group ITS Plot With 90-Day Window.



We also tested the policy change on trust eWOM using a multi-group ITS model. This utilizes other groups in the data as controls to compare against the focal variable. In this case, we test the impact of the policy change on trust eWOM compared to nine other emotions: joy, love, surprise, anticipation, anger, disgust, fear, sadness, and hate. Additionally, we also compare trust to the other positive and neutral emotions, since trust is a positive emotion. The results of these models can be found in Table 2-9. Model 1 shows that the interaction between trust and the policy change is negative and significant for a 90-day window ($\beta = -.193$; $p < .10$) and Model 3 shows that the interaction is significant for a 120-day window ($\beta = -.847$; $p < .10$) when using all emotions as a comparison. However, we argue that comparing against only other positive and neutral emotions is a more accurate estimate. We find that the interaction between trust and the policy change is significant for both a 90-day window ($\beta = -1.358$; $p < .05$) and a 120-day window ($\beta = -1.061$; $p < .10$). Additionally, in each of the models, we find that the three-way interaction between trust, time, and the policy change is negative and significant, suggesting

long-term declines in trust eWOM after the policy change. We provide a plot of Model 2 in Figure 2-4 to provide a visual representation of the effects of the policy change on trust eWOM.

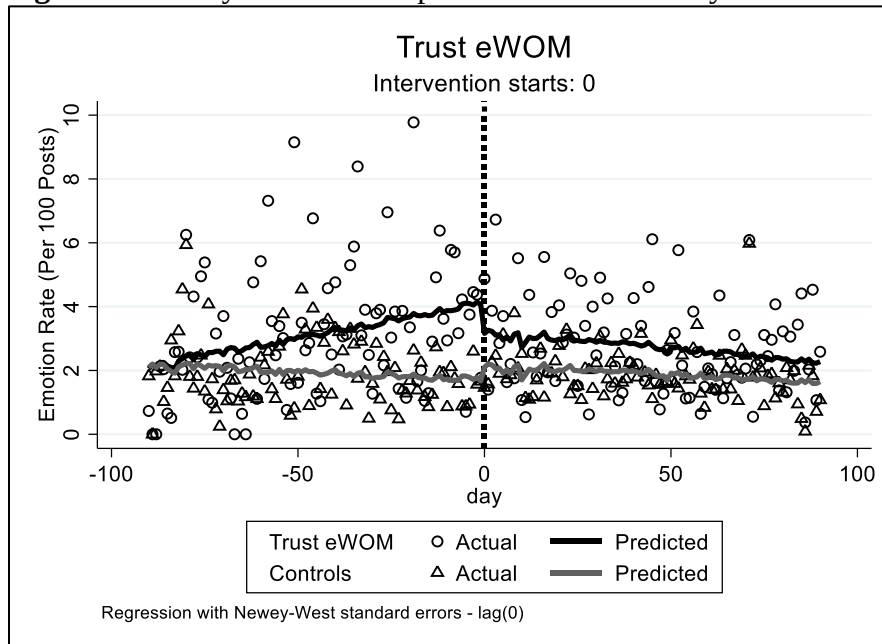
Table 2-9. Study 2 Multi-Group Interrupted Time Series Results.

	90-day Window		120-day Window	
	Model 1: All Emotions	Model 2: Positive/Neutral Emotions	Model 3: All Emotions	Model 4: Positive/Neutral Emotions
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
Time	.000 (.003)	-.003 (.005)	-.001 (.002)	-.003 (.003)
Trust	1.111 (.393)***	-.041 (.455)	1.224 (.396)***	.040 (.438)
Trust*Time	.023 (.008)**	.027 (.009)***	.014 (.006)**	.017 (.006)***
Policy Change	.101 (.164)	.400 (.311)	.083 (.146)	.305 (.279)
Time* Policy Change	-.002 (.003)	-.002 (.006)	.000 (.002)	.001 (.004)
Trust* Policy Change	-1.053 (.543)*	-1.358 (.603)**	-.847 (.486)*	-1.061 (.540)**
Trust*Time* Policy Change	-.030 (.010)***	-.032 (.011)***	-.017 (.007)**	-.019 (.008)**
LN(Volume)	-.193 (.181)	-.302 (.319)	-.212 (.153)	-.353 (.268)
Constant	2.093 (.747)***	3.586 (1.550)**	2.093 (.747)***	3.946 (1.310)***
F-Value	29.26***	7.24***	35.85***	7.84***
Maximum lag	0	0	0	0
Number of obs.	1810	905	2410	1205

Notes: Dependent variable is volume of trust eWOM

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figure 2-4. Study 2 Multi-Group ITS Plot With 90-Day Window.



Discussion

Study 2 investigates the theoretical mechanism that drives negative disconfirmations caused by content moderation policies. In Study 2, we find that when content moderation policies are enacted, customer expectations are negatively disconfirmed due to a drop in trust in the e-commerce platform. Through examining eWOM about the e-commerce platform, we find that customers talk less about trust when discussing the platform compared to other emotions. Additionally, the drop in trust eWOM continues to decline over a long period of time. Since the data in this study is at a daily level, we assume that the longer-term effects are caused by customers finding out about the policy change at different points in time. Some customers may not engage with the platform on a daily basis, so there is a trickling-out effect of customers reacting to the policy. We turn to Study 3 to further investigate the mediating mechanism behind the effects of content moderation policies by using an experiment to test mediation.

STUDY 3: LAB EXPERIMENT TESTING ALL MEDIATORS

We further investigate the mediating mechanisms of content moderation policies on platform and product outcomes using experience in Study 3. The primary goal is to provide additional evidence of the mediating effect of trust as found in Study 2, and examine other mediators of the relationship: perceived risk and consumer control. By examining other mediators, we further tease out the theoretical mechanisms deriving negative disconfirmations as a result of the content moderation policies. Additionally, we examine a variety of outcome variables at both the platform and product levels to show that the content moderation and mediation effects impact both the e-commerce platform and individual products listed by third parties on the platform.

Experimental Design and Procedure

We employed a between-subjects experimental design to test the effects of online review content moderation policies. Specifically, 163 participants who are real-life consumers were recruited for compensation from Centiment.co for this study. A sample of 118 participants (53% Women; $M_{\text{Age}} = 47.81$ years) remained after removing participants who failed the final attention check and manipulation check. Participants were first provided a description of a hypothetical e-commerce platform that sold products listed by third-party brands and provided an opportunity to provide online reviews for those products. After reading a prompt describing the e-commerce platform, participants were asked an attention check question. Participants who incorrectly answered the attention check were then removed from eligibility in the study. The remaining participants were then prompted to make a mock purchase by being told they were in the market for a new book to read and asked to make a selection of the type of book they would like to purchase. Each option was the same price.

Participants were told that after receiving the book in the mail and finishing reading it, they were emailed an update from the e-commerce platform with an update about their online review policy details. They were told this was a normal occurrence since customers often receive email updates from the e-commerce platform. Participants were randomly assigned a prompt either reiterating that the platform has no content moderation policies for online reviews or mentioning the launch of a new policy stating that the firm will engage in content moderating policies to combat review bombs, similar to the policy in Study 1.

We then prompted participants to answer questions defining our mediators and outcome variables. They were asked to rate their agreement to statements regarding the e-commerce platform about their trust ($\alpha = .958$; four-item scale adapted from Grégoire and Fisher 2008),

perceived risk ($\alpha = .898$; four-item scale adapted from Laroche et al. 2005), and level of control ($\alpha = .827$; four-item scale adapted from Kleijnen et al. 2007). Each of the statements used a 7-point scale with 1 = “Strongly Disagree” and 7 = “Strongly Agree”. Next, they were asked about their likelihood of engaging in eWOM about the platform ($\alpha = .827$; three-item scale adapted from Moldovan, Goldenberg, and Chattopadhyay 2011), positive eWOM ($\alpha = .917$; two-item scale adapted from Moldovan, Goldenberg, and Chattopadhyay 2011) about the platform, negative eWOM ($\alpha = .873$; two-item scale adapted from Moldovan, Goldenberg, and Chattopadhyay 2011) about the platform, and repurchase intentions ($\alpha = .854$; four-item scale adapted from Maxham and Netemeyer 2002) with the platform. These items all used a 7-point scale with 1 = “Very Unlikely” and 7 = “Very Likely”. After answering questions regarding the platform, participants were prompted to respond to their likelihood of engaging in activities concerning the product they were prompted to “purchase” earlier in the scenario. They were asked about their likelihood of writing a review for the product ($\alpha = .935$; three-item scale adapted from Wu et al. 2016), whether they would say positive things ($\alpha = .923$; two-item scale adapted from Moldovan, Goldenberg, and Chattopadhyay 2011) about the product, and whether they would say negative things ($\alpha = .824$; two-item scale adapted from Moldovan, Goldenberg, and Chattopadhyay 2011) about the product. Lastly, they were asked demographic questions.

Results

First, we conducted an analysis of covariance (ANCOVA) on the mediators and measured outcome variables as a function of the random assignment to the online review content moderation policy. The effects reported of the comparison of the control condition of no content moderation policy to respondents who were assigned to the content moderation policy are reported in Table 2-10. We find respondents in the content moderation policy condition had less

trust, higher perceived risk, and less consumer control regarding the e-commerce platform. Additionally, these respondents also were less likely to engage in WOM about the platform, engage in positive WOM about the platform, and are less likely to purchase from the platform again, but were more likely to engage in negative WOM about the platform. We find similar results for the product outcomes. Respondents in the content moderation policy condition were less likely to write a review for the product purchased on the e-commerce platform, less likely to engage in positive WOM about the product, and more likely to engage in negative WOM about the product.

Table 2-10. Study 3 ANOVA Results.

	Variable	M(Control)	M(ConMod)	F-Value	p-value
Mediators	Trust	5.47 [5.17, 5.78]	4.20 [3.79, 4.62]	23.81	.000
	Perceived Risk	2.69 [2.31, 3.06]	4.03 [3.63, 4.42]	24.37	.000
	Consumer Control	4.85 [4.55, 5.16]	4.16 [3.83, 4.49]	9.33	.003
Platform Outcomes	WOM Volume	3.97 [3.55, 4.39]	3.36 [2.90, 3.82]	3.822	.053
	Positive WOM	4.70 [4.29, 5.10]	3.56 [3.09, 4.03]	13.39	.000
	Negative WOM	1.97 [1.66, 2.29]	3.24 [2.77, 3.71]	19.95	.000
	Repurchase Intentions	4.73 [4.38, 5.08]	3.59 [3.15, 4.03]	16.37	.000
Product Outcomes	Willingness to Review	4.63 [4.09, 5.17]	3.53 [3.00, 4.05]	8.55	.004
	Positive WOM	5.16 [4.63, 5.68]	4.27 [3.81, 4.72]	6.61	.011
	Negative WOM	2.10 [1.71, 2.50]	2.70 [2.29, 3.11]	4.40	.038

Notes: N = 118. 95% CI is noted after the group means.

The focus of this study was to test the mediating mechanisms of trust, perceived risk, and consumer control on platform and product outcomes as a result of content moderation policies. Thus, we tested for mediation using PROCESS (Hayes 2017) Model 4 to test these three mediators simultaneously. We enter the randomized content moderation policy condition as the independent variable; trust, perceived risk, and consumer control are entered as mediators; age and gender are used as covariates. We repeat this model for each of our outcome variables using 5,000 bootstrapped samples (Preacher and Hayes 2004). Results for these models for platform outcomes can be found in Table 2-11 and results for product outcomes will be found in Table 2-12.

Table 2-11. Study 3 PROCESS Model Results for Platform Outcomes.

	Trust	Perceived Risk	Consumer Control	WOM Volume	Positive WOM	Negative WOM	Repurch. Intent.
Policy	-1.26 (.26)***	1.35 (.28)***	-.70 (.23)***	.25 (.27)	.15 (.23)	.21 (.23)	.12 (.20)
Trust				.76 (.13)***	.80 (.11)***	-.14 (.11)	.58 (.10)***
Risk				.17 (.08)**	-.10 (.07)	.70 (.07)***	-.30 (.06)***
Control				.10 (.14)	.12 (.12)	.02 (.12)	.14 (.11)
Gender	-.23 (.27)	.09 (.28)	-.16 (.23)	.18 (.24)	.27 (.20)	.15 (.21)	-.11 (.18)
Age	-.01 (.01)	.00 (.01)	-.00 (.01)	-.01 (.01)*	-.01 (.01)	-.01 (.01)	-.01 (.01)
Constant	6.19 (.43)***	2.63 (.45)***	5.04 (.37)***	-.66 (.77)	.26 (.66)	1.15 (.66)*	2.17 (.58)***
F-Value	9.04***	8.03***	3.28**	17.09***	34.36***	26.66***	38.00***
R-Sq.	.192	.175	.080	.480	.650	.590	.673
Direct Effect				.25	.15	.21	.12
				[-.29, .78]	[-.30, .61]	[-.25, .68]	[-.29, .52]
Ind. Effect (Trust)				-.96	-1.01	.17	-.74
				[-1.45, -.52]	[-1.48, -.58]	[-.19, .61]	[-1.12, -.39]
Ind. Effect (Risk)				.23	-.14	.94	-.41
				[.03, .52]	[-.35, .06]	[.53, 1.41]	[-.66, -.20]
Ind. Effect (Control)				-.07	-.09	-.02	-.10
				[-.30, .11]	[-.32, .08]	[-.25, .17]	[-.30, .05]
Ind. Effect (Total)				-.80	-1.23	1.10	-1.24
				[-1.28, -.31]	[-1.74, -.73]	[.63, 1.60]	[-1.71, -.80]

Notes: N = 118. 5,000 Bootstrap samples. SE in parentheses. 95% CI reported in brackets for direct and indirect effects. Indices of moderated mediation in bold are significant. Gender: 1 = Female. *** $p < .01$; ** $p < .05$; * $p < .10$.

Table 2-12. Study 3 PROCESS Model Results for Product Outcomes.

	Trust	Perceived Risk	Consumer Control	Willing to Review	Positive WOM	Negative WOM
Policy	-1.26 (.26)***	1.35 (.28)***	-.70 (.23)***	-.26 (.39)	.23 (.33)	-.12 (.29)
Trust				.56 (.19)***	.50 (.16)***	-.10 (.14)
Risk				.06 (.12)	-.19 (.10)*	.51 (.09)***
Control				.15 (.21)	.23 (.17)	.12 (.15)
Gender	-.23 (.27)	.09 (.28)	-.16 (.23)	.66 (.35)*	.14 (.29)	-.07 (.26)
Age	-.01 (.01)	.00 (.01)	-.00 (.01)	-.02 (.01)	-.02 (.01)*	-.01 (.01)
Constant	6.19 (.43)***	2.63 (.45)***	5.04 (.37)***	1.10 (1.11)	2.52 (.93)***	1.12 (.83)
F-Value	9.04***	8.03***	3.28**	7.46***	12.01***	7.30***
R-Sq.	.192	.175	.080	.287	.394	.283
Direct Effect				-.26	.23	-.12
				[-1.03, .51]	[-.42, .88]	[-.70, .46]
Ind. Effect (Trust)				-.70	-.64	.12
				[-1.36, -.20]	[-1.18, -.22]	[-.28, .53]
Ind. Effect (Risk)				.08	-.26	.69
				[-.26, .54]	[-.56, .02]	[.30, 1.20]
Ind. Effect (Control)				-.11	-.16	-.08
				[-.46, .27]	[-.47, .17]	[-.31, .13]
Ind. Effect (Total)				-.73	-1.06	.73
				[-1.27, -.17]	[-1.51, -.60]	[.34, 1.18]

Notes: N = 118. 5,000 Bootstrap samples. SE in parentheses. 95% CI reported in brackets for direct and indirect effects. Indices of moderated mediation in bold are significant. Gender: 1 = Female. *** $p < .01$; ** $p < .05$; * $p < .10$.

In summary, we find that trust mediates the relationship between content moderation policies and platform WOM volume (95% CI = -1.45, -.52), positive WOM about the platform

(95% CI = -1.48, -.58), and platform repurchase intentions (95% CI = -1.12, -.39), but not negative WOM about the platform. Additionally, trust mediates the relationship between content moderation policies and willingness to review the product (95% CI = -1.36, -.20) and positive WOM about the product (95% CI = -1.18, -.22), but not negative WOM about the product. Perceived risk mediates the relationship between platform WOM volume (95% CI = .03, .52), negative WOM about the platform (95% CI = .53, 1.41), and platform repurchase intentions (95% CI = -.66, -.20), but not positive WOM about the platform. Additionally, risk mediates the relationship between content moderation policies and positive WOM about the product (95% CI = -.56, .02), marginally, and negative WOM about the product (95% CI = .30, 1.20), but not the willingness to review. Consumer control does not mediate any of the relationships. Thus, H2a and H2b which suggested that trust mediates the relationship between content moderation policies and platform (H2a) and product (H2b) outcomes were both confirmed. H3a and H3b which suggested that perceived risk mediated those relationships were also confirmed. However, H4a and H4b were not confirmed.

Discussion

Study 3 provided evidence of the theoretical mechanisms driving platform and product outcomes from engaging in content moderation policies. Trust is the key mechanism behind the effects of platform WOM volume, positive WOM, and repurchase intentions as well as the willingness to review the product and positive WOM about the product. Results suggest that when content moderation policies are enacted, consumers lose trust in the platform due to the negative disconfirmation from the policy change, resulting in negative outcomes for the platform, which ends up spilling over negative outcomes for the product as well. Additionally, results suggest that risk also serves as a mediating mechanism. Perceived risk mediates the relationship between

content moderation policies and platform outcomes including WOM volume, negative WOM, and repurchase intentions. Additionally, perceived risk mediates the relationship between content moderation policies and product outcomes such as negative WOM. Interestingly, both trust and risk exhibit strong mediation for the platform outcomes, risk does not mediate the same product outcomes, suggesting the spillover is not as strong. It is also worth noting, that when considering WOM valence about both the platform and products, trust is the mediating mechanism driving positive WOM, whereas risk is the mediating mechanism driving negative WOM. This study also rules out consumer control as a mediating mechanism. We follow up this study with Study 4 to investigate relevant moderators.

STUDY 4: LAB EXPERIMENT TESTING MODERATORS

Study 4 expands upon Study 3 by using a lab experiment to investigate moderators of the mediated relationships. The primary goal of this study is to investigate consumer, product, and policy moderators. Specifically, we examine the moderating effects of consumer relationship strength with the firm, product type (hedonic vs. utilitarian), and policy timing (immediate effect vs. pre-announcement). These moderators serve as boundary conditions for the mediated effects found in Study 3. We use a similar design and scales to Study 3 in order to maintain consistency and increase robustness across studies.

Experimental Design and Procedure

We employed a 3x2x2 (policy type/timing x product type x relationship strength) between-subjects experimental design to test the moderating effects in this study. 248 participants (50% Women; $M_{\text{Age}} = 46.59$ years) were recruited from Centiment.co which obtains real-life consumers as a sample. Similar to Study 3, participants were first provided a description of a hypothetical e-commerce platform that sold products listed by third-party brands and provided an

opportunity to provide online reviews for those products. Participants were then randomly assigned to a strong or weak relationship condition. After priming their relationship strength, participants made a mock product purchase and were randomly assigned to either purchase an office chair (utilitarian) or video game (hedonic). Each condition was told that the e-commerce platform primarily sold that type of product. Lastly, participants were told that after purchasing the product, they were emailed an update from the e-commerce platform with an update about their online review policy details. Participants were randomly assigned to the control group (no content moderation), pre-announcement policy group, or immediate effect group.

Participants were then prompted to answer questions similar to Study 3 about the platform and product to obtain measures of our mediators and outcome variables. All measured scales were reliable. Measures included trust ($\alpha = .959$), perceived risk ($\alpha = .879$), and level of control ($\alpha = .911$), the likelihood of engaging in eWOM about the platform ($\alpha = .932$), positive eWOM ($\alpha = .941$) about the platform, negative eWOM ($\alpha = .857$) about the platform, and repurchase intentions ($\alpha = .830$) with the platform. Participants also answered questions related to the product that was purchased similar to Study 3. Scales included their willingness of writing a review for the product ($\alpha = .933$), positive WOM ($\alpha = .919$) about the product, and negative WOM ($\alpha = .786$) about the product. Lastly, they were asked demographic questions.

Results

First, we conducted an analysis of covariance (ANCOVA) on the mediators and measured outcome variables as a function of the random assignment to the timing of the online review policy. We found no significant differences between a policy pre-announcement and an announcement with a policy with immediate effects. Therefore, for the rest of the analyses, we simply compare a content moderation policy with a control group (no content moderation

policy). The ANCOVA results of the immediate effect vs. pre-announcement can be found in the Appendix.

Next, we run a two-way ANCOVA to test the interaction effects of the moderators and content moderation policies. Relevant covariates such as age and gender are also included. The effects reported include the comparison of the control condition of no content moderation policy to respondents who were assigned to a content moderation policy. The results of this analysis are reported in Table 2-13.

Table 2-13. Study 4 ANCOVA Results.

	Variable	Policy * Hedonic	Policy * Strong Rel.
Mediators	Trust	4.178 (.042)	.339 (.561)
	Perceived Risk	1.499 (.222)	.231 (.631)
	Consumer Control	2.408 (.122)	2.515 (.114)
Platform Outcomes	WOM Volume	5.451 (.020)	4.183 (.042)
	Positive WOM	1.575 (.211)	1.497 (.222)
	Negative WOM	.017 (.896)	.074 (.786)
	Repurchase Intentions	.985 (.322)	5.033 (.026)
Product Outcomes	Willingness to Review	.002 (.965)	7.168 (.008)
	Positive WOM	.019 (.890)	3.569 (.060)
	Negative WOM	.330 (.566)	.002 (.964)

Notes: N = 248. F-Values are reported with *p*-values in parentheses.

Results show that there are significant interactions with content moderation policies and hedonic products when considering trust and platform WOM volume as outcome variables. Similarly, there are significant interactions between content moderation policies and relationship strength when platform WOM volume, repurchase intentions, willingness to review the product, and positive WOM about the product are outcome variables. To probe these effects further and provide more evidence for moderated mediation, we next turn to officially testing the moderated mediated effects using PROCESS model 10 (Hayes 2017). Results for the PROCESS models with platform outcomes can be found in Table 2-14 and results for platform outcomes can be found in Table 2-15.

Table 2-14. Study 4 PROCESS Model Results for Platform Outcomes.

	Trust	Perceived Risk	Consumer Control	WOM Volume	Positive WOM	Negative WOM	Repurch. Intent.
Policy	-1.87 (.51)***	.46 (.60)	-1.20 (.48)**	.05 (.52)	.09 (.42)	-.15 (.53)	.17 (.36)
Rel. Str.	.01 (.33)	-.22 (.38)	-.05 (.31)	-.08 (.32)	-.15 (.26)	.51 (.34)	-.19 (.23)
Hedonic	-.49 (.33)	-.64 (.39)	-.32 (.31)	-.73 (.33)**	-.26 (.27)	.07 (.34)	-.14 (.23)
Policy*Rel.	.22 (.40)	.05 (.47)	.26 (.38)	.25 (.40)	.31 (.32)	-.08 (.41)	.29 (.28)
Policy*Hed.	.85 (.41)**	.58 (.48)	.62 (.39)	.53 (.41)	-.31 (.20)	-.08 (.42)	-.04 (.29)
Trust				.48 (.10)***	.53 (.09)***	-.20 (.11)*	.41 (.07)***
Risk				.11 (.06)**	-.01 (.05)	.57 (.06)***	-.17 (.04)***
Control				.36 (.11)***	.41 (.09)***	-.03 (.11)	.39 (.08)***
Pol. Type	.23 (.24)	-.15 (.28)		-.21 (.24)	-.31 (.20)	.12 (.25)	-.27 (.17)
Gender	-.30 (.19)	.16 (.22)	-.35 (.18)*	-.15 (.19)	-.09 (.15)	.04 (.20)	-.13 (.13)
Age	-.01 (.01)**	-.01 (.01)	-.02 (.01)***	-.02 (.01)***	-.01 (.01)***	-.01 (.01)**	-.01 (.00)**
Constant	6.69 (.38)***	4.13 (.45)***	6.55 (.36)***	.58 (.64)	.96 (.52)*	2.33 (.66)***	1.83 (.45)***
F-Value	4.84***	1.49	5.19***	18.71***	34.91***	12.20***	33.87***
R-Sq.	.140	.048	.148	.466	.619	.362	.612
Indices of Moderated Mediation							
Via Trust (Rel. Str.)				.10 [-.25, .46]	.12 [-.24, .50]	-.04 [-.24, .11]	.09 [-.19, .39]
Via Trust (Hedonic)				.40 [.05, .83]	.45 [.07, .89]	-.17 [-.46, .03]	.34 [.05, .71]
Via Risk (Rel. Str.)				.01 [-.11, .14]	-.00 [-.05, .05]	.03 [-.54, .55]	-.01 [-.17, .16]
Via Risk (Hedonic)				.06 [-.05, .22]	-.01 [-.08, .05]	.33 [-.19, .86]	-.10 [-.28, .06]
Via Control (Rel. Str.)				.09 [-.17, .44]	.11 [-.18, .44]	-.01 [-.13, .09]	.10 [-.16, .41]
Via Control (Hedonic)				.22 [-.02, .62]	.25 [-.04, .63]	-.01 [-.19, .12]	.24 [-.04, .57]

Notes: N = 248. 5,000 Bootstrap samples. Pol. Type is a variable that differentiates between control, pre-announcement policy, and immediate policy. SE in parentheses. 95% CI reported in brackets for direct and indirect effects of moderated mediation. Indices of moderated mediation in bold are significant. Gender: 1 = Female. *** $p < .01$; ** $p < .05$; * $p < .10$.

In our models, we find that the interaction term between content moderation policies and product type ($\beta = .85$; $p < .05$) is positive and significant, suggesting that for hedonic products, the negative effect of content moderation policies is attenuated. This is the only interaction that we find significant. Additionally, using the PROCESS macro, we calculate the index of moderated mediation for our platform and product outcome variables. We find that the index of moderation mediation 95% confidence interval does not include zero with outcomes including platform WOM volume (Index = .40; 95% CI = .05, .83), positive WOM about the platform (Index = .45; 95% CI = .07, .89), and repurchase intentions for the platform (Index = .34; 95% CI = .05, .71). Additionally, we find that the index of moderated mediation confidence interval

does not contain zero when positive WOM about the product (Index = .27; 95% CI = .01, .72), is the outcome variable. Thus, we conclude that moderation mediation exists for these outcome variables via trust as a mediator.

Table 2-15. Study 4 PROCESS Model Results for Platform Outcomes.

	Trust	Perceived Risk	Consumer Control	Willing to Review	Positive WOM	Negative WOM
Policy	-1.87 (.51)***	.46 (.60)	-1.20 (.48)**	.79 (.59)	.77 (.51)	.29 (.58)
Rel. Str.	.01 (.33)	-.22 (.38)	-.05 (.31)	.40 (.37)	.02 (.32)	.41 (.36)
Hedonic	-.49 (.33)	-.64 (.39)	-.32 (.31)	.64 (.38)*	.56 (.33)*	.38 (.37)
Policy*Rel.	.22 (.40)	.05 (.47)	.26 (.38)	-.17 (.45)	.18 (.40)	-.09 (.44)
Policy*Hed.	.85 (.41)**	.58 (.48)	.62 (.39)	-.61 (.27)	-.56 (.40)	-.53 (.46)
Trust				.24 (.12)**	.32 (.10)***	-.06 (.12)
Risk				.12 (.06)*	.01 (.06)	.48 (.06)***
Control				.66 (.13)***	.63 (.11)***	.02 (.12)
Pol. Type	.23 (.24)	-.15 (.28)		-.31 (.27)	-.39 (.24)	-.06 (.27)
Gender	-.30 (.19)	.16 (.22)	-.35 (.18)*	-.01 (.22)	-.13 (.19)	.11 (.21)
Age	-.01 (.01)**	-.01 (.01)	-.02 (.01)***	-.02 (.01)***	-.02 (.01)***	-.02 (.01)***
Constant	6.69 (.38)***	4.13 (.45)***	6.55 (.36)***	.12 (.73)	.58 (.64)	1.86 (.72)**
F-Value	4.84***	1.49	5.19***	17.50***	22.97***	7.36***
R-Sq.	.140	.048	.148	.449	.517	.256
Indices of Moderated Mediation						
Via Trust (Rel. Str.)				.05 [-.13, .34]	.07 [-.15, .40]	-.01 [-.14, .08]
Via Trust (Hedonic)				.20 [-.04, .63]	.27 [.01, .72]	-.05 [-.28, .15]
Via Risk (Rel. Str.)				.01 [-.14, .15]	.00 [-.06, .06]	.01 [-.10, .11]
Via Risk (Hedonic)				.07 [-.05, .26]	.01 [-.08, .11]	.01 [-.15, .18]
Via Control (Rel. Str.)				.18 [-.29, .72]	.17 [-.26, .68]	.00 [-.10, .11]
Via Control (Hedonic)				.41 [-.06, .98]	.39 [-.07, .94]	.01 [-.15, .18]

Notes: N = 248. 5,000 Bootstrap samples. Pol. Type is a variable which differentiates between control, pre-announcement policy, and immediate policy. SE in parentheses. 95% CI reported in brackets for direct and indirect effects for moderated mediation. Indices of moderated mediation in bold are significant. Gender: 1 = Female. *** $p < .01$; ** $p < .05$; * $p < .10$.

Discussion

Study 4 provides evidence of various boundary conditions for the mediated relationships tested in Study 3. We find that trust is the only mediating mechanism that is moderated by relationship strength, product type, or policing timing. We find no evidence of moderated mediation for relationship strength or announcement timing, suggesting that these may not matter when it comes to disconfirmations that result from content moderation policies. However, we do find that for hedonic products or firms that primarily sell hedonic products, the negative effect of

content moderation policies on trust and ultimately platform and product outcomes is attenuated. This suggests that consumers may not put as high importance into online reviews for hedonic products, and thus, their reactions to online review content moderation policies are not as extreme compared to utilitarian products.

GENERAL DISCUSSION

This research leverages four studies using multiple methods and data sources including field data and experimental data to examine how content moderation policies within online review systems in e-commerce platforms impact platform and product outcomes. While content moderation policies such as the removal of review bombs enacted by a firm have the expectation of improving outcomes for firms and consumers, we find that the opposite occurs. Expectancy disconfirmation theory is leveraged to uncover that a reduction in trust and an increase in perceived risk are the mediating mechanisms between the negative effect of content moderation policies on relevant outcomes. A summary of our findings can be found in Table 2-16.

Table 2-16. Summary of Findings.

Hypothesis	Study Tested	Summary of Findings
H1: Content Moderation Policies -> Platform and Product Outcomes	1,3,4	Content moderation policies lead to a reduction in repurchase intentions on an e-commerce site, platform eWOM volume, platform eWOM valence, product performance, product eWOM volume, and product eWOM valence.
H2: Content Moderation Policies -> Trust -> Platform and Product Outcomes	2,3,4	Trust mediates the relationship between content moderation policies and outcomes including platform eWOM volume, platform eWOM valence, platform repurchase intentions, product eWOM volume, and product eWOM valence.
H3: Content Moderation Policies -> Perceived Risk -> Platform and Product Outcomes	3,4	Perceived risk mediates the relationship between content moderation policies and outcomes including platform eWOM valence, platform repurchase intentions, and product eWOM valence.

Table 2-16 (cont'd)

H4: Content Moderation Policies -> Consumer Control -> Platform and Product Outcomes	3,4	Content moderation policies have a negative effect on consumer control, but it does not mediate the relationship with any outcome variables.
H5: Content Moderation Policies *Relationship Strength -> Platform and Product Outcomes	4	Relationship strength does not moderate any of the mediated relationships.
H6: Content Moderation Policies *Announcement Timing -> Platform and Product Outcomes	4	Announcement timing does not moderate any of the mediated relationships.
H7: Content Moderation Policies *Product Type -> Platform and Product Outcomes	4	Product type moderates the mediated relationship between content moderation policies and platform eWOM volume, platform eWOM valence, platform repurchase intentions, and product eWOM valence via trust.

Theoretical Implications

This research provides a variety of theoretical contributions. First, by using expectancy disconfirmation theory as a theoretical lens, we show how disconfirmations occur based on firm policy changes. Research using expectancy disconfirmation theory focuses on product or service level phenomena, such as product failure (Grégoire et al. 2018), service recovery (Hess et al. 2003), or relational events (Harmeling et al. 2015), there is little that examines reactions to policy changes. Thus, we build upon this literature stream to highlight that negative disconfirmations can occur as a result of firm policy changes and these disconfirmations function in a way similar to that of other large disconfirmations ending in negative outcomes for firms and products.

Additionally, we highlight that trust and perceived risk are the mediating mechanisms behind the negative disconfirmations due to content moderation policies. Consumers lose trust in

e-commerce platforms when content moderation policies are applied since their trust in the platform to provide the most accurate and best information about products is diminished. By potentially removing content from online review systems, consumers feel as if they are not receiving the full extent of information about products. Additionally, this leads them to increased perceived purchasing risk, since they do not have the full information to make their decisions.

Lastly, we find that the negative effects of content moderation policies are attenuated for hedonic products. Theoretically, this is insightful, because satisfaction and enjoyment of hedonic products are based more upon personal opinion and experience than on utilitarian products. Consumers seeking utilitarian products want to have the most and best information available to them in making a purchasing decision. Thus, when that information has the potential to be limited, these effects are stronger for utilitarian than hedonic products. Online reviews are more vital and relevant to the sales and evaluation of utilitarian products, which leads to additional harm from content moderation policies.

Managerial Implications

This research also provides several insights for managers. First, for e-commerce platforms, we find that it is not in their best interest to engage in content moderation policies. Rather, managers of e-commerce platforms should engage with customers and ensure they feel they can provide feedback to others through online reviews without any possibility of those reviews being removed. Online review content moderation policies not only lead consumers to leave the platform, but this also results in a drop in WOM volume about the platform and WOM becomes more negative for the platform. These findings can hinder the long-term growth of e-commerce platforms.

Second, we find that content moderation policies not only impact the e-commerce platform, but also negatively impact products listed by third-party products on that platform. We find that content review moderation policies reduce product performance including the willingness to post reviews about that product and WOM about those products becomes more negative. Thus, the harm caused by content moderation policies on e-commerce platforms spills over to other firms that list products on those platforms.

Third, we find no evidence that the negative effects of content review moderation policies vary by policy announcement timing or customer-firm relationship strength. The fact that these effects are generalized to broad audiences and settings should be concerning for firms contemplating these types of policies. E-commerce firms may want to look into other strategies to optimize their online review platforms, rather than removing content. Some suggestions may be to highlight content that is most useful to customers or provide options for consumers to sort content in a variety of formats that would be most helpful to their specific purchasing situation. We recommend that firms provide more opportunities to engage with customer feedback from online reviews, rather than less.

Limitations and Future Research

Online review content moderation policies are an important topic for firms today since many firms sell their products on e-commerce sites. While this research focuses on online review content moderation policies, there are many other types of online review management policies that could be investigated. For example, future research could investigate how different display formats for online reviews impact relevant outcomes. Additionally, future research could examine how customer rating systems of the online reviews themselves impact relevant outcomes, such as customers rating reviews as helpful, funny, unhelpful, etc. We also suggest

that it would be fruitful for future research to examine content moderation policies in other settings. For example, content moderation in social media is a controversial topic today. It would be insightful to see how these policies impact consumer behaviors and firm outcomes. Does content moderation have the same impact on social media platforms as it does on online review platforms?

There are also a few limitations to this research. First, while we examine online review content moderation in a variety of settings, we cannot generalize to all online review settings. For example, it would be fruitful for future research to investigate if there are differential effects for service or experience-based products such as vacations. Additionally, this research focuses on B2C industries. B2B markets function in many different ways than B2C markets. Therefore, it would be fruitful to examine online review content moderation policies in B2B settings. In summary, our research provides insightful implications for managers, policymakers, and academics regarding online review content moderation policies and we hope that this research can help people optimize their online review management.

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APPENDIX

Figure A1. Plot of Users with 6-Month Bandwidth.

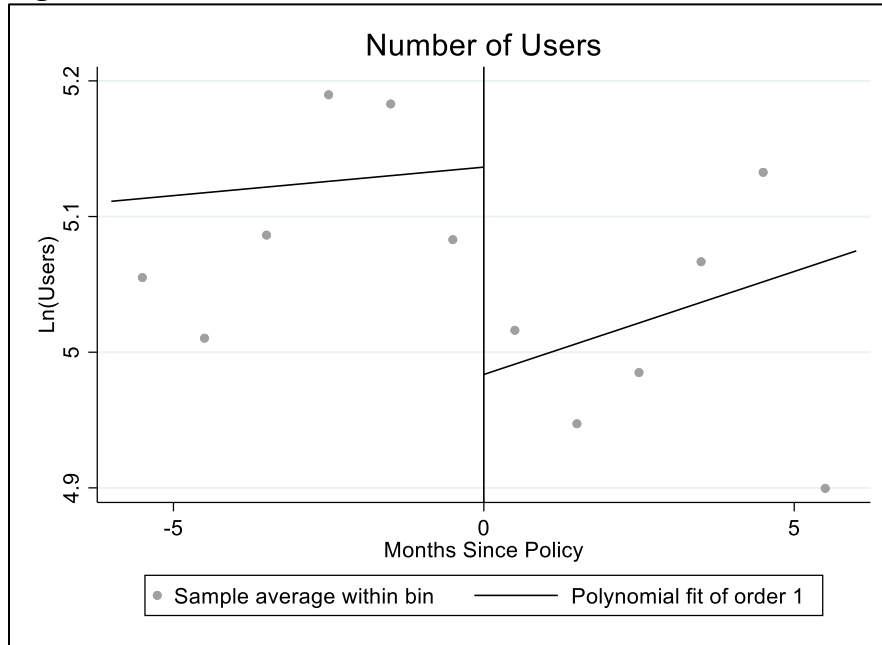


Figure A2. Plot of Users with 9-Month Bandwidth.

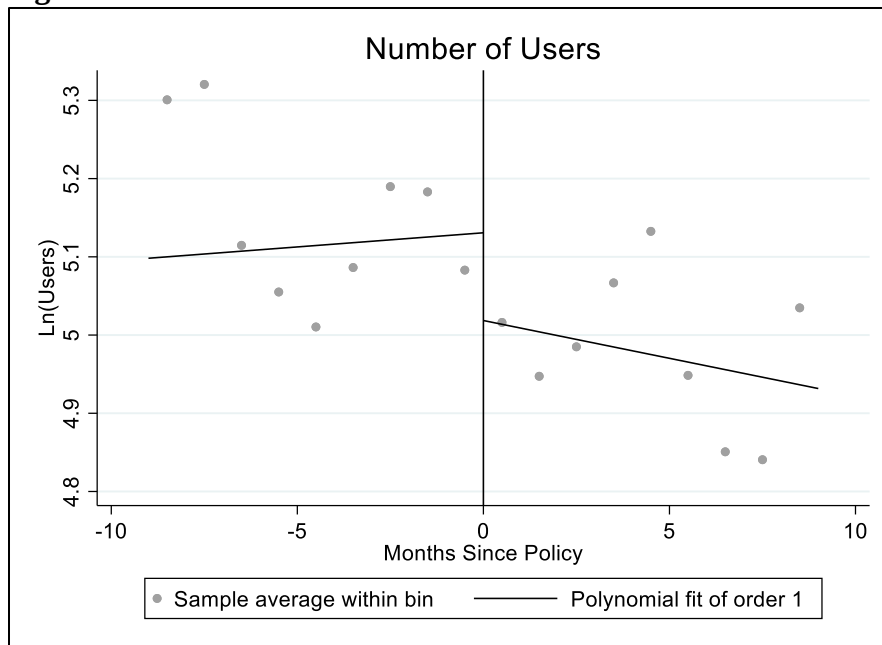


Figure A3. Plot of Users with 15-Month Bandwidth.

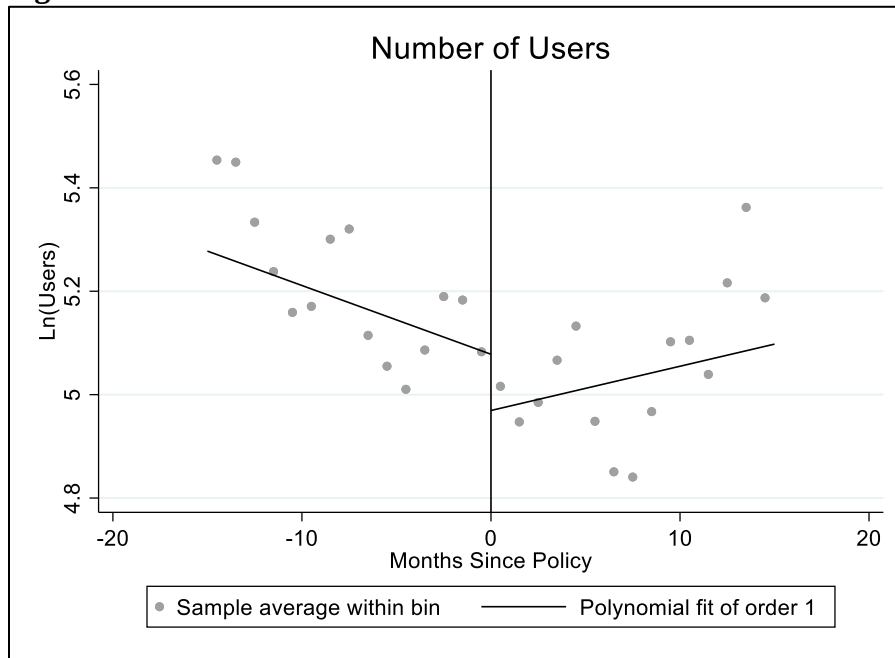


Figure A4. Plot of Users with 18-Month Bandwidth.

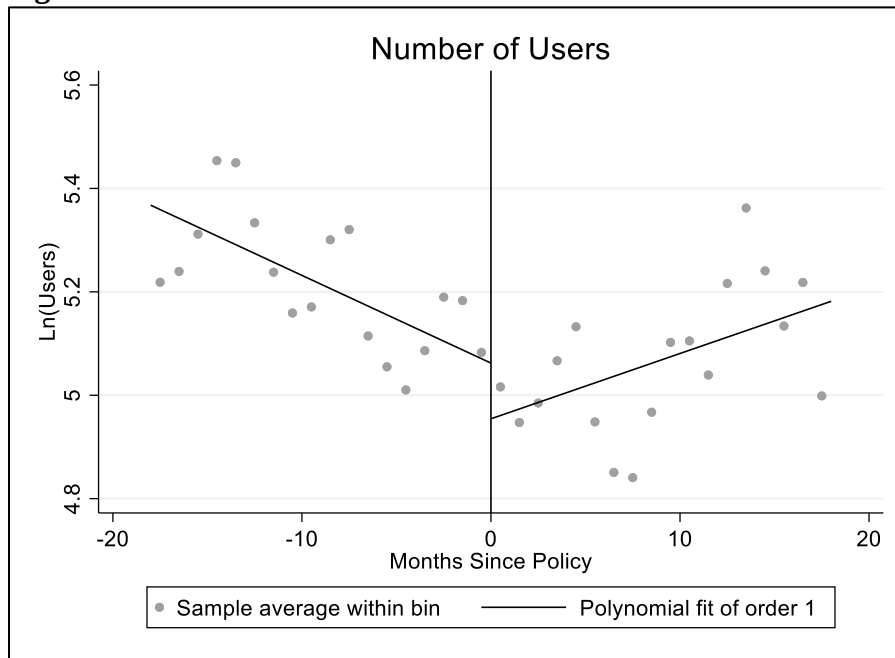


Figure A5. Plot of Users with 12-Month Bandwidth and 2nd-Degree Polynomial.

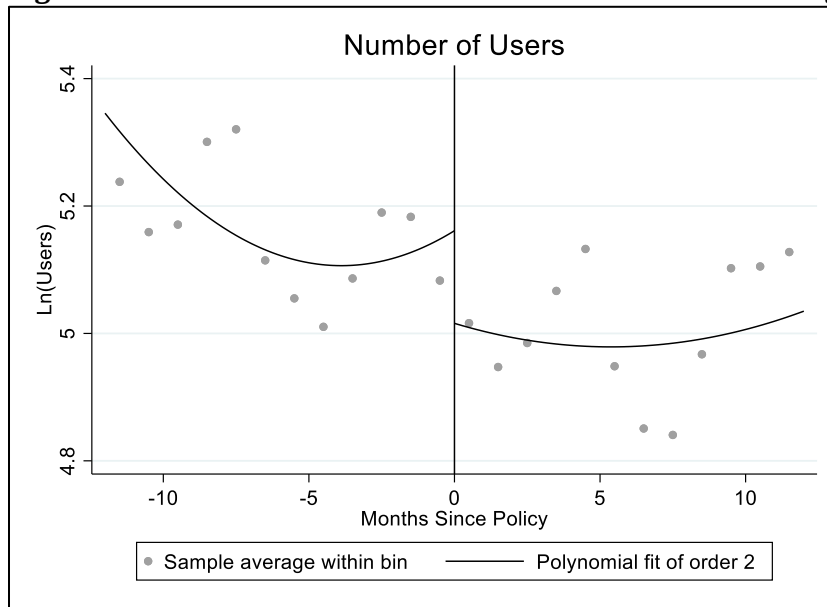


Figure A6. Plot of Users with 12-Month Bandwidth and 3rd-Degree Polynomial.

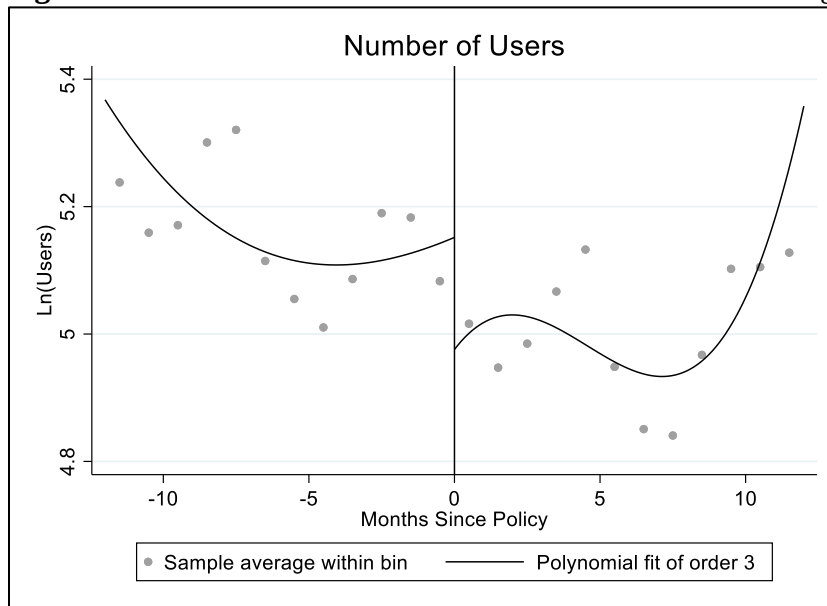


Figure A7. Plot of Raw Number of Users with 12-Month Bandwidth.

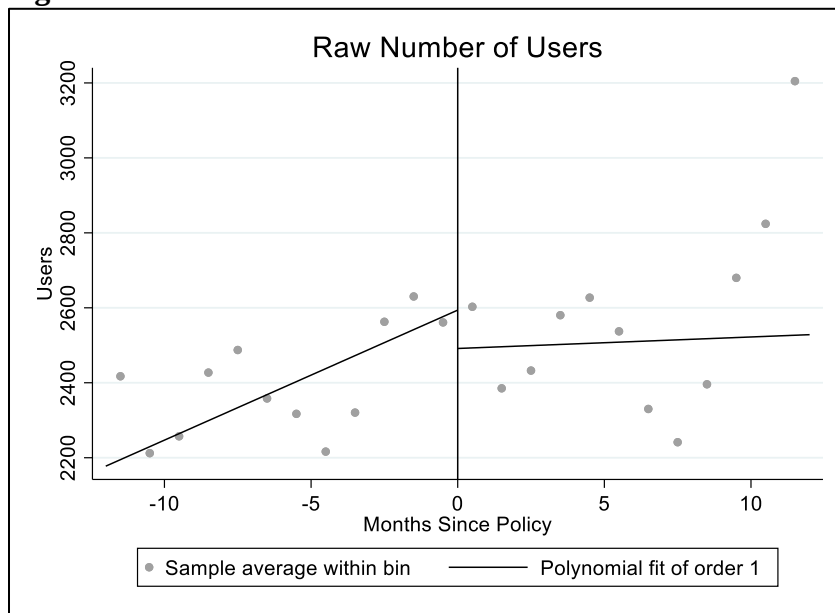


Figure A8. Plot of Peak Number of Users with 12-Month Bandwidth.

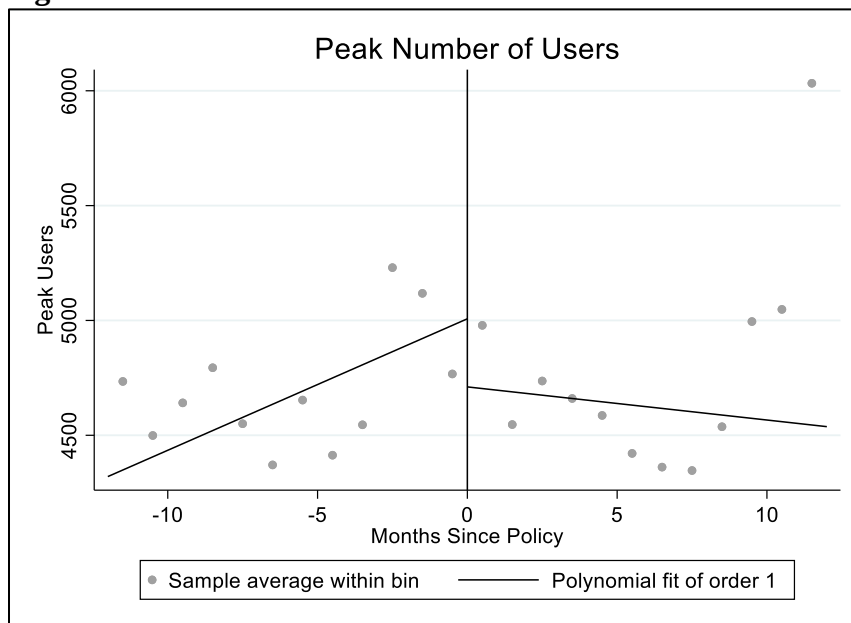


Figure A9. Plot of Change in Number of Users with 12-Month Bandwidth.

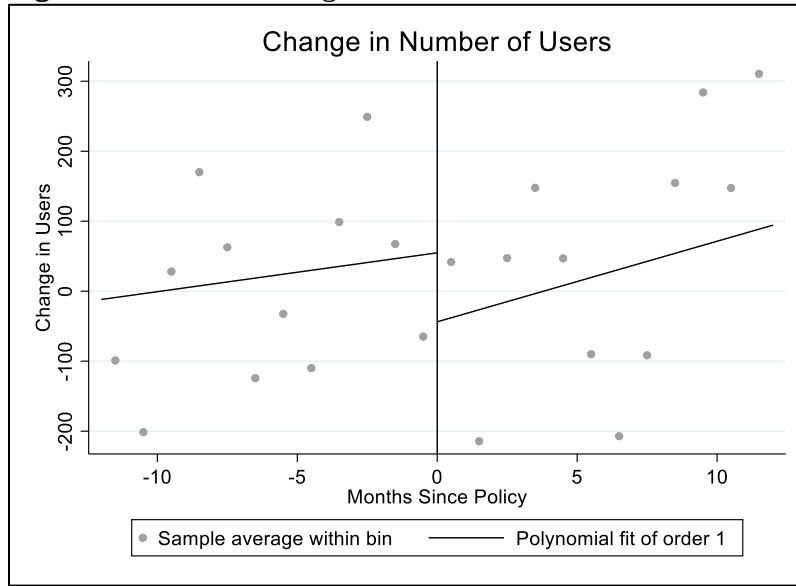


Table A1. Study 4 Policy Type ANCOVA Results.

	Variable	M(Pre-Ann.)	M(Immed.)	F-Value	p-value
Mediators	Trust	4.64 [4.28, 5.01]	4.89 [4.53, 5.24]	.855	.357
	Perceived Risk	3.94 [3.56, 4.32]	3.80 [3.42, 4.17]	.266	.607
	Consumer Control	4.57 [4.24, 4.90]	4.48 [4.16, 4.81]	.134	.714
Platform Outcomes	WOM Volume	3.88 [3.45, 4.32]	3.74 [3.31, 4.16]	.231	.631
	Positive WOM	4.22 [3.79, 4.64]	4.00 [3.58, 4.42]	.514	.474
	Negative WOM	3.15 [2.73, 3.58]	3.16 [2.74, 3.57]	.000	.983
	Repurchase Intentions	4.21 [3.84, 4.57]	4.02 [3.66, 4.38]	.489	.485
Product Outcomes	Willingness to Review	4.23 [3.77, 4.68]	3.89 [3.44, 4.35]	.996	.320
	Positive WOM	4.65 [4.22, 5.08]	4.26 [3.84, 4.69]	1.524	.219
	Negative WOM	2.98 [2.56, 3.39]	2.83 [2.52, 3.23]	.261	.610

Notes: N = 165 and excludes the no-policy control group. Comparison is between pre-announcement of a policy and a policy with immediate effect. 95% CI is noted after the group means.

Study 3 Experiment Script

Platform explanation (consistent across conditions)

Rainforest.com is an online e-commerce platform where many third-party products are listed. Many different brands from well-known brands to boutique brands sell their products via this platform. Rainforest.com provides the ability to purchase products and provides a platform for online reviews for those products.

Mock product purchase (consistent across conditions)

You have purchased products from Rainforest.com in the past and are in the market for a new book to read. Which type of book would you select to purchase? (Each book is a hardcover version and costs \$14.99.)

- Suspense or thriller
- Historical fiction
- Romance novel
- Science fiction
- Non-fiction
- Self-help

Random assignment to content moderation policy

Platform content moderation:

You receive the book you ordered from Rainforest.com in the mail three days later, and read the book within a week, since it was very entertaining for you. The day you finish the book, you happen to receive an email from Rainforest.com, since you are a customer who has purchased from them. Thus, you occasionally receive emails. This new email from Rainforest.com outlines a new policy regarding online reviews for products on their platform, effective immediately. The new policy states that Rainforest.com is now using a proprietary method to identify and hide “review bombs” from products on their platform. Review bombs are categorized as large sets of negative consumer reviews posted in a short period of time. Rainforest.com suggests that by hiding review bombs, customers will view more accurate ratings of the products listed.

No content moderation:

You receive the book you ordered from Rainforest.com in the mail three days later, and read the book within a week, since it was very entertaining for you. The day you finish the book, you happen to receive an email from Rainforest.com, since you are a customer who has purchased from them. Thus, you occasionally receive emails. This new email from Rainforest.com reminds customers of their policy regarding online reviews for products purchased on their platform. Their policy states that Rainforest.com confirms they allow all reviews to be immediately posted and visible on their platform, regardless of content or rating. Customers will be allowed to express their full opinions and feedback about products purchased on their platform.

Mediators (consistent across conditions)

Please provide your opinion about Rainforest.com. (1 = Strongly Disagree; 7 = Strongly Agree)

- *Platform trust (adapted from Gregoire and Fisher 2008)*
 - I feel that Rainforest.com is very dependable.
 - I feel that Rainforest.com is competent
 - I feel that Rainforest.com has very high integrity
 - I feel that Rainforest.com is very responsive to customers

- *Platform Perceived Risk (adapted from Laroché et al. 2005)*
 - There is a good chance I will make a mistake if I purchase something on Rainforest.com.
 - I have a feeling that purchasing through Rainforest.com will really cause me lots of trouble
 - I will incur some risk if I purchase through Rainforest.com in the next twelve months.
 - Purchasing on Rainforest.com is very risky.
- *Consumer control (adapted from Kleijnen et al. 2007)*
 - Using Rainforest.com for my transactions allows me to make a lot of decisions on my own
 - I have a lot to say about what happens during transactions with Rainforest.com.
 - I have flexibility when using Rainforest.com.
 - I have control over transactions when using Rainforest.com.

Platform outcomes (consistent across conditions)

Based on your opinion about Rainforest.com, how likely are you to do the following? (1 = Very Unlikely; 7 = Very Likely)

- *WOM Amount (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Talk about Rainforest.com
 - Tell many friends about Rainforest.com
 - Talk about Rainforest.com on every occasion
- *Positive WOM (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Say good things about Rainforest.com
 - Recommend Rainforest.com to others
- *Negative WOM (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Say bad things about Rainforest.com
 - Recommend to others NOT to use Rainforest.com
- *Repurchase intentions (Maxham and Netemeyer 2002)*
 - Intend to purchase from Rainforest.com in the future
 - Purchase from Rainforest.com if I was looking for an online shopping platform
 - In the near future, I will not use XXXX firm as my provider for XXX products.
 - In the future, I will continue to use XXX firm for XXX products.

Product outcomes (consistent across conditions)

Based on your experience with Rainforest.com, how likely are you to do the following regarding the book you purchased?

- *Willingness to review (adapted from Wu, Mattila, Wang, and Hanks 2016)*
 - Write a review about the book
 - Say something on an online forum about the book
 - Share my experience and opinion about the book online
- *Positive WOM (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Say good things about the book
 - Recommend the book to others
- *Negative WOM (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Say bad things about the book
 - Recommend to others NOT to buy the book

Demographics (consistent across conditions)

- *What is your gender?*
 - Male / Female
- *What is your age?*
 - (Fill in the blank)

Study 4 Experiment Script

Platform explanation (consistent across conditions)

Rainforest.com is an online e-commerce platform where many third-party products are listed. Many different brands from well-known brands to boutique brands sell their products via this platform. Rainforest.com provides the ability to purchase products and provides a platform for online reviews for those products.

Relationship strength (random assignment)

Strong Relationship:

You have been shopping on Rainforest.com for many years and consistently purchase from a variety of brands through the online platform. You have spent thousands of dollars on the platform and frequently leave reviews for your purchases. You would characterize your relationship with this online platform as very strong and a committed customer of the platform.

Weak Relationship:

You have recently started shopping on Rainforest.com and have only purchased things a few times. You haven't spent a significant amount of money on the platform at this time and have only left a single review since purchasing on the platform. You would characterize your relationship with this online platform as fairly weak and consider yourself a casual customer of the platform.

Mock product purchase (product type - random assignment)

Utilitarian/durable:

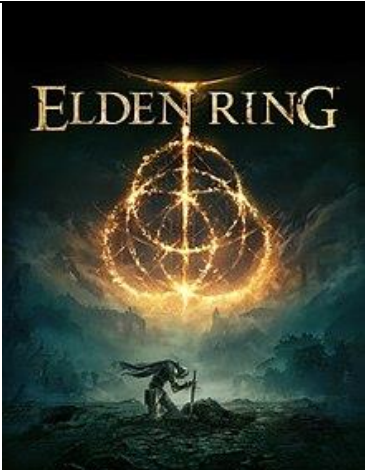
Rainforest.com primarily sells office equipment and is the industry leader in this area. You are in the market for a new office chair; therefore, you decide to browse Rainforest.com for one to purchase. Below are a few of the top recommended office chairs. Which type of office chair would you select to purchase? (Each chair comes with free shipping and is \$149.99)

Product	Description
	This gaming chair is wrapped in black and grey leatherette and carbon fiber in a sleek, race-inspired shape, providing an immersive gaming experience.

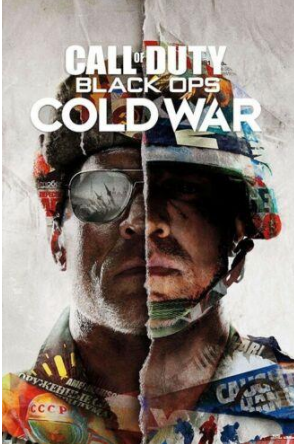
	The ergonomic chair is suited with an adjustable headrest, adjustable lumbar support bracket, adjustable height, adjustable seat depth, as well as 3D adjustable armrests for different office applications and comfort preferences.
	The high-back executive chair is great for home or office work spaces. It comes with bonded leather for style and durability and an ergonomic design with segmented padding on the seat and back.

Hedonic:

Rainforest.com primarily sells video games and is the industry leader in this area. You are in the market for a video game; therefore, you decide to browse Rainforest.com for one to purchase. Below are a few of the top recommended video games. Which video game would you select to purchase? (Each video game works on both Mac and PC and costs \$49.99.)

Product	Description
	The new fantasy action RPG. Rise, tarnished, and be guided by grace to brandish the power of the Elden Ring and become an Elden Lord in the Lands Between.

	FIFA 23 brings the world's game to the pitch, with HyperMotion2 Technology, men's and women's FIFA World Cup play, women's club teams, cross-play features, and more.
	Hogwarts Legacy is an immersive, open-world action RPG. Now you can take control of the action and be at the center of your own adventure in the wizarding world.
	Discover the mysteries of Minecraft Legends, a new action strategy game. Explore a gentle land of rich resources and lush biomes on the brink of destruction. The ravaging piglins have arrived, and it's up to you to inspire your allies and lead them in strategic battles to save the Overworld!

	Black Ops Cold War, the direct sequel to Call of Duty®: Black Ops, will drop fans into the depths of the Cold War’s volatile geopolitical battle of the early 1980s.
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Policy type assignment (random assignment)

Platform content moderation – immediate:

You obtain the product you purchased from Rainforest.com and begin using it. It sufficiently meets your needs and desires. You open your email and notice that you received a weekly email message from Rainforest.com since you are a customer who has purchased from them.

This email from Rainforest.com outlines a new policy regarding online reviews for products on their platform. The new policy states that Rainforest.com is now using a proprietary method to identify and hide “review bombs” from products on their platform. Review bombs are categorized as large sets of negative consumer reviews posted in a short period of time. Rainforest.com suggests that by hiding review bombs, customers will view more accurate ratings of the products listed.

The email mentions that this new policy will be effective immediately.

Platform content moderation – pre-announcement:

You obtain the product you purchased from Rainforest.com and begin using it. It sufficiently meets your needs and desires. You open your email and notice that you received a weekly email message from Rainforest.com since you are a customer who has purchased from them.

This email from Rainforest.com outlines a new policy regarding online reviews for products on their platform. The new policy states that Rainforest.com is now using a proprietary method to identify and hide “review bombs” from products on their platform. Review bombs are categorized as large sets of negative consumer reviews posted in a short period of time. Rainforest.com suggests that by hiding review bombs, customers will view more accurate ratings of the products listed.

The email mentions that this new policy will be launched on the platform in 30 days.

No content moderation:

You obtain the product you purchased from Rainforest.com and begin using it. It sufficiently meets your needs and desires. You open your email and notice that you received a weekly email message from Rainforest.com since you are a customer who has purchased from them. This email from Rainforest.com reminds customers of their policy regarding online reviews for

products purchased on their platform. Their policy states that Rainforest.com confirms they allow all reviews to be immediately posted and visible on their platform, regardless of content or rating. Customers will be allowed to express their full opinions and feedback about products purchased on their platform.

Mediators (consistent across conditions)

Please provide your opinion about Rainforest.com. (1 = Strongly Disagree; 7 = Strongly Agree)

- *Platform trust (adapted from Gregoire and Fisher 2008)*
 - I feel that Rainforest.com is very dependable.
 - I feel that Rainforest.com is competent
 - I feel that Rainforest.com has very high integrity
 - I feel that Rainforest.com is very responsive to customers
- *Platform Perceived Risk (adapted from Laroche et al. 2005)*
 - There is a good chance I will make a mistake if I purchase something on Rainforest.com.
 - I have a feeling that purchasing through Rainforest.com will really cause me lots of trouble
 - I will incur some risk if I purchase through Rainforest.com in the next twelve months.
 - Purchasing on Rainforest.com is very risky.
- *Consumer control (adapted from Kleijnen et al. 2007)*
 - Using Rainforest.com for my transactions allows me to make a lot of decisions on my own
 - I have a lot to say about what happens during transactions with Rainforest.com.
 - I have flexibility when using Rainforest.com.
 - I have control over transactions when using Rainforest.com.

Platform outcomes (consistent across conditions)

Based on your opinion about Rainforest.com, how likely are you to do the following? (1 = Very Unlikely; 7 = Very Likely)

- *WOM Amount (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Talk about Rainforest.com
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- *Repurchase intentions (Maxham and Netemeyer 2002)*
 - Intend to purchase from Rainforest.com in the future
 - Purchase from Rainforest.com if I was looking for an online shopping platform
 - In the near future, I will not use XXXX firm as my provider for XXX products.
 - In the future, I will continue to use XXX firm for XXX products.

Product outcomes (consistent across conditions)

Based on your experience with Rainforest.com, how likely are you to do the following regarding the product you purchased?

- *Willingness to review (adapted from Wu, Mattila, Wang, and Hanks 2016)*
 - Write a review about the product
 - Say something on an online forum about the product
 - Share my experience and opinion about the product online
- *Positive WOM (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Say good things about the product
 - Recommend the product to others
- *Negative WOM (adapted from Moldovan, Goldenberg, and Chattopadhyay 2011)*
 - Say bad things about the product
 - Recommend to others NOT to buy the product

Demographics (consistent across conditions)

- *What is your gender?*
 - Male / Female
- *What is your age?*
 - (Fill in the blank)