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Title matters: Impacts of titles on user engagement in short video platforms

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I hereby declare that this DBA dissertation is my original work and it has been written by me in its entirety.
I have duly acknowledged all the sources of information which have been used in this dissertation.

This DBA dissertation has also not been submitted for any degree in any university previously.

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Abstract

With the increasing popularity of short video marketing in business world, understanding how to engage short video viewers has attracted the attention from both academics and practitioners. Prior studies on short videos mainly focus on how characteristics of users or the attributes of video content affect marketing effectiveness. As a heuristic cue of short video content, the video title is expected to grab viewers' attention thereby playing an important role in influencing viewers' attitudes towards the short video consumption. Drawing on signaling theory, I propose that the characteristics of short video titles, such as the length, the sentiment strength, and the use of emoji, can influence the viewers' engagement. Using a large sample of short videos from Kwai platform, I conduct a series of empirical analyses and find that short videos with longer titles, or with titles in lower sentiment strength, or with titles containing emojis, receive more likes and comments from viewers. The results of quantile analysis show that these characteristics of titles play a stronger role in influencing the viewers' engagement when the engagement level is low. I also conduct a further analysis to explore the moderating effects of titles on viewers' engagement

across different video characteristics (i.e., the video duration and the short video topics) and characteristics of video creator (i.e, the popularity and the productivity). All the results remain consistent across different robustness tests. I also discuss the theoretical and practical implications of these findings.

Keywords: short video titles, title length, emoji usage, sentiment strength, viewer engagement

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Last but not least, I would like to emphasize that learning brings me joy and propels me forward.

Chapter 1 Introduction

According to the 48th Statistical Report on China's Internet Development by China Internet Network Information Center (CNNIC, 2021), up to June 2021, the number of mobile Internet users in China had reached 1,007 million, and the proportion of China's netizens accessing the Internet via mobile phones have amounted to 99.6%. Thanks to the fast development of mobile Internet and exponential growth of mobile Internet users, the lifestyle of Chinese people is experiencing a profound digital transformation. Starting from online shopping and online payment, mobile Internet has increasingly penetrated people's daily life on every aspect, from work and study to leisure and entertainment. Recent years have witnessed the explosive growth of the short video market not only in China but also in developed countries like the US. Short-form videos usually refer to video content posted through various social media sites like Twitter and TikTok, the length of which ranges from dozens of seconds to a few minutes. It is a new content format after text, pictures, and traditional long videos for users to communicate and interact with others through online social media platforms. Short video market emerged in China as early as 2011. However, it had been developed with a slow pace until the original launch of Douyin (the name of Chinese version for TikTok) in 2016. Since then, the short video industry has entered a fast-growing period and more and more new entrants has made this market increasingly crowded and competitive.

Short videos are flourishing across China and become popular among people of different age groups for two main reasons. First of all, the fast pace of modern lifestyle makes people time-poor. Short-form videos offer content that viewers are interested in with the least time cost. They adapt perfectly to the needs of modern people thus quickly become an important method for people to kill time and record life. In addition, the unexpected COVID-19 pandemic has promoted the growth of the stay-at-home economy in China. With rigorous lockdown policies implemented across China to respond to the coronavirus crisis, Chinese people keep staying at home for long time, making short videos creation, sharing, and viewing even more popular activities for relaxation and entertainment. As a result, the user base of the short video

applications, represented by the TikTok and Kwai, becomes larger and larger, and its influence has gradually expanded, further promoting the emergence of "Internet communities" (Wang et al., 2019).

Although short video applications are originally born for easy video creation serving only for entertainment purpose, their great attention-grabbing ability and fast dissemination speed have empowered a new marketing revolution, especially in e-commerce area. Meanwhile, many traditional industries that suffered great losses in the COVID-19 pandemic, including catering, tourism, clothing, transportation and so on, are attempting to transform their marketing activities from traditional offline channels to online social media platforms. The rise of short videos provides a desirable opportunity for such transition and many worldwide retailers has adopted short-video marketing (Aparna, 2017; Williamson, 2021). Such an integration with online businesses further promotes the development of short video market and makes it a more and more important in the digital economy.

Academics also began to pay attention to this innovative new marketing method and have investigated the role and effect of short video marketing. To date, the extant literature mainly documents the positive effect of user-generated short video advertisements on product sales (e.g., Ge et al., 2021), and explored the marketing effectiveness of short videos from the perspective of video content (e.g., Ge et al., 2021; Zhao and Wang, 2020; Ma et al., 2020; Gao et al., 2021). However, prior to specific content consumption, the short video titles play an important role in generating users' interests and grabbing users' attention. Moreover, because the likes and comments are public available, users who care about their image and publicity often like and comment on the short videos based on titles. How the title descriptions influence online users' engagement is interesting but remains an unexplored area of research. Therefore, this study attempts to fill the gap by investigating how the title of a short video influences the online engagement of the video viewers.

This study examines the impact of several title characteristics of short videos on the viewers' engagement. Specifically, I investigate the influence of the video title from three aspects: the

length, the sentiment, and the use of emoji. This study focuses on the title of short videos for the following reasons. First, title is the most basic and important element of various types of content, including textual content (books and articles) and visual content (pictures, charts, and videos). As a heuristic cue of the content offered, titles not only determine the first impression of potential audience, but also affect their expectation of the specific information conveyed by the content. How the descriptions of the video title influence viewers' behavior deserves the research efforts and the answer to this question can supplement existing literature on content titles.

Second, different from traditional video watching, where viewers see video titles first and then choose to watch it or not, short videos on various platforms like TikTok and Kwai are automatically pushed to viewers, so viewers see the title descriptions, and the video content at the same time and the title descriptions remain on the screen during the playing of the video until the end. Therefore, investigating the influence of the short video titles on viewer's engagement activities uncovers whether the text can facilitate viewer's understanding of the video content, which can contribute to the research on the interactive role between text and image. Existing study has shown that image could facilitate peoples' understanding of the information in the text (Levie and Lentz, 1982). However, we know little about whether text can improve our understanding of the image content.

Third, video creators can attract more attention from internet viewers through composing better title descriptions for the short videos (Bedrina, 2019). Video title descriptions contain key information about the video content and the composition of longer descriptions requires greater effort from the creators (Zhang et al., 2022). The description of the short video title serves an opportunity for the video creators to appeal more views through facilitating the viewers to grab the key idea of the video in a shorter time, which could carry over to viewer's engagement intention. Therefore, this study also attempts to answer the question on how to improve the effectiveness of short video marketing through polishing the title description of a short video.

I conduct this study under the China setting for the following reasons. First, the number of netizens and mobile phone users in China has reached more than 900 million and the time that they spend on watching short videos through various social platforms each day has exceeded 300 million hours. The large user size of online short videos in China makes China an ideal setting to observe viewers' diverse behavior patterns regarding short videos watching. Second, China has many excellent and mature short video platforms, such as TikTok and Kwai, which can provide sufficient data support for short video research. Third, as the second largest economy in the world, China has become an important market for many muti-national retailers. Understanding the behavior of short video users of China is important for international businesses to not only craft appropriate marketing strategy in China, but also generalize this knowledge to other markets.

I collect a large sample of short videos from Kwai with the technical support from a leading multi-channel network company. The sample composes 3,370,636 short videos covering various topics. They are randomly selected from all the short videos released by 82,776 Kwai accounts from January 1st, 2019, to August 15th, 2019. Based on the examination of this large sample of short videos from Kwai, I obtain the following findings. First, the title length and emoji usage in the title is positively associated with viewers' engagement while sentiment strength of titles is negatively associated with viewers' engagement. Viewers do care about the characteristics of the short video titles when they decide to like or comment after watching the videos. Such results remain robust in fixed effects model and in quantile analysis. Second, further analyses reveal that video characteristics and video creator characteristics could moderate the impact of titles on viewer's engagement, and they show different moderating effects on likes and comments. Specifically, longer video duration strengthens the effect of titles on likes but weakens the effect on comments. The titles of short videos which offer "emotion"-related content have stronger signaling effect than short videos which offer "game and live streaming"-related content and short videos which offer "food and life"-related content. However, emoji use in short video titles also largely promotes viewers to comment on short videos of "food and life" topic. The positive effect of using emojis in the title on viewers' engagement is stronger among short videos released by more popular creators, while the

creator's popularity only strengthens the negative effect of higher sentiment strength on likes but not on comments. The positive effect of title length on viewers' engagement is stronger among short videos released by more productive creators. The use of emoji only improves comments while higher sentiment strength only decreases likes of short videos from productive creators. Overall, the popularity and productivity of video creators strengthen the impact of short video titles on viewers' engagement. The biggest endogeneity concern of this study is the influence of video content. Title characteristics are likely to be closely corelated with characteristics of video content. Thus, it is difficult to disentangle the effect of video content from the effect of video title. In the baseline research, I control video characteristics and author characteristics as much as possible in the model and use fixed effects model to alleviate the bias caused by the variation in the video content. To further reduce the concern of the endogeneity issue related with video content, I use the LDA approach to summarize the topic of video content and control the topic of each short video in the model. The control of video topic could mitigate the confounding explanation of the results caused by the omitted variable video content.

My research first contributes to the emerging but still limited literature on short videos. Early studies attempt to explain the great popularity and fast development of short video platforms from both social and psychological perspectives (e.g., Wang et al., 2019) or focus on the detrimental behavioral effects of users that are caused by the use of short video applications (Montag et al., 2021). With the widespread application of short video advertisements in business marketing, recent research began to pay attention to how the characteristics of short video advertisements influence the marketing effectiveness and outcome (e.g., Ma et al., 2020; Zhao and Wang, 2020). But these studies mainly focus on the characteristics of the content of short videos and are specific to certain industry. My research investigates how the title of short videos influences the online engagement of video viewers, and the answer to which could be applicable to many marketing contexts. Therefore, my research can deepen our understanding of the dissemination mechanism on short videos and enrich existing research .

Second, given the increasing popularity of social media marketing and the widespread application of short video advertisements, my research also contributes to the customer engagement literature. The wide adoption of the internet technology in various areas at the beginning of this century has made online customer engagement become a more and more important social phenomenon than traditional offline customer engagement. Although numerous studies have investigated the determinants of customers' online engagement and the underlying mechanisms on how these determinants can play an influential role in customers' online behaviors under various scenarios (e.g., Loureiro et al., 2017; Kim and Kim, 2020; Chung et al., 2018), research on examining the online customer engagement in the context of short videos is still scarce. To the best of my knowledge, my research is one of the first to examine the influence of short video titles on users' online engagement. My research results suggest that titles matter in user engagement. Users are incentivized to engage with videos of high quality as well as better titles. Therefore, my results help better understand how the title of short videos makes a difference and can be generalized to other customer online engagement contexts, enlightening more research related with short video marketing. Consequently, this study could enrich the customer engagement literature in the digital environment.

My research is also related to a large body of literature on user-generated content (UGC) and marketer-generated content (MGC), which are two important research topics in information system and marketing. Prior studies in these fields have extensively investigated how UGC and MGC, separately or jointly, affect the consumers' brand engagement and decision-making process. It is found that UGC usually plays a more significant role in influencing consumers' engagement intention and purchase decisions (Zhao et al., 2022). However, how UGC and MGC can interact with each other has received little attention from academia. The results of my research can cast some light on this point through documenting how the title of short videos (MGC) affects viewers' online engagement (UGC), thus further supplement the research on UGC and MGC in information system and marketing disciplines.

The rest of my thesis is organized as follows. In Chapter 2, I summarize related literature on user engagement, the outcome variable of my research, and the characteristics of titles, the

antecedent variables, of my research. The literature review provides a solid foundation for my later hypothesis development and research design. Next, I propose my research hypotheses and present the framework of my research in Chapter 3. Then, I describe my research sample, data sources, and empirical model in Chapter 4. I also describe definitions and measurements for all the variables used in my research in detail in this chapter. After that, I report the empirical results for my main hypothesis tests in Chapter 5. In Chapter 6, I conduct additional model analyses and a series of robustness checks. Chapter 7 concludes my research and discuss the implications, limitations and future directions of my research.

Chapter 2 Literature Review

In the following, the literature of engagement and key title characteristics related to this study are reviewed, followed by the importance of short video titles, and the literature gap and position of this study are identified at last.

2.1 Engagement

"Engagement" is an important concept that is commonly used in many academic disciplines, such as sociology, political science, psychology, and organizational behavior. User engagement refers to any interactions that users conduct with another party, like a company, a website, an application, or a product. In today's dynamic business environment with various interactive behaviors by users, user engagement has increasingly gained attention from both the academia and the practitioners because it is highly correlated with the sales of the product or the service being offered, and largely determines the revenues and profits of the business activities. Customer engagement is a concept closely related with user engagement but refers to a more specific group of users who have become the consumers of a product or a service. As a very important metric to forecast future sales and an effective way to increase customer loyalty, customer engagement is a key outcome variable that has been widely researched in many marketing studies, especially under the context of various Internet social network platforms (Brodie et al., 2011).

Prior studies have defined customer engagement from different perspectives. For example, Van Doorn et al. (2010) define the customer engagement from the behavioral perspective. They describe customer engagement as customers' behaviors after they have paid attention to the brand or the enterprise. Under such a behavioral view, customer engagement is very similar to customer participation in relationship marketing, like participating in the community activities, making referrals and writing reviews, so on and so forth. Brodie et al. (2011) propose that customer engagement presents the psychological state of customers. Similar to Brodie et al. (2011), Mollen and Wilson (2010) offer a more detailed description and define customer

engagement as customers' positive cognitive and emotional commitment to the brand. It is worth noting that customer engagement is a different concept from customer loyalty. However, these two concepts closely relate to each other. Bowden (2009), who also argues that customer engagement is a kind of psychological process, view customer engagement as an antecedent of customer loyalty. In the meanwhile, Brodie et al. (2011) also find that more customer engagement can lead to improvement of customer loyalty.

Brodie et al. (2011) first explore the theoretical foundation of customer engagement. They argue that the concept of customer engagement is rooted in the theory of interactive experience and value co-creation within marketing relationships. The emergence and popularity of the concept of "customer engagement" reflects that the current marketing logic has transformed from "goods-dominant" to "service-dominant" (Vargo and Lusch, 2004). Customer engagement reveals customers' positive cognitive and emotional commitment to the brand, which can further translate into customers' interest in the brand and their emotional dependence on the product or the service (Mollen & Wilson, 2010). Since the product market is very competitive and the attitude and preference of customers can change rapidly, customer satisfaction, another very important concept in marketing that measures a customer's perceived quality, value and expectations of the product or the service being offered, can only reflect customers' past consumption experiences but cannot provide sufficient information to predict customers' future purchase intentions. However, it is obvious that those who are willing to make a purchase in the future are the most important to company's future sales performance and these potential customers are whom the company should pay special attention to. Therefore, customer engagement, which is highly positively correlated with customer loyalty, is proposed as an appropriate measurement to forecast a customer's future purchase intention. Vargo and Lusch (2004) have reviewed the evolution of marketing thinking and explained the phenomenon that both businesses and scholars are putting more and more effort to understand customer engagement by the marketing logic transformation. Under a service-dominant marketing strategy, customers are regarded as co-creators of value, and as a result, an enterprise can achieve sustainable development through establishing and maintaining interactive and close relationships with its customers. In addition to the change of marketing logic, the rapid

development of new information technology also makes interactions between businesses and their customers much easier, more common, and unavoidable, through various Internet social network channels. Today's social and information environment makes customer engagement an even more important factor that the companies need to consider when they plan their marketing efforts.

Corresponding to the rapid development of online social media platforms and great popularity of online social networking activities, many recent studies focus on factors influencing user engagement under digital information dissemination. Li and Xie (2020) examine the effect of picture in social media posts on social media engagement. Their results suggest that image content can significantly increase social media engagement, especially those high-quality and professionally shot pictures. Other characteristics related to pictures, like colorfulness, the presence of human face, and image-text fit, can also play a role under some circumstances. Yu and Egger (2021) focus on the role of color in recognizing tourist experience and influencing tourist emotion. Their study uncovers that the presence of the color blue in photos featuring natural scenery, high-end gastronomy, and sacral architectures contributes to user engagement. They also provide abundant evidence regarding the relationship between color and user engagement based on pictures with different features. Yim et al. (2021) further provide a framework to process and interpret various photographic elements of travel photos using deep learning algorithms, and they examine how these elements influence user engagement in online travel review sites. The results reveal that a photo that can invoke consumers' subjective interpretations of authentic, creative, or emotional dimensions of the destination experience leads to higher user engagement. With the explosive growth of video market, more and more studies related with user engagement on various video platforms emerge. Qu et al. (2022) investigate how the use contexts affect users' psychological process and finally lead to behavioral engagement. They propose four use contexts of tourism short video platforms, including information acquisition, leisure and entertainment, attention obtainment, and social interaction. They find that different use contexts differ in their influences on engagement. The differences depend on the degree to which these use contexts satisfy users' psychological needs. Wei, Zhang and Qiao (2022) focus on the personal branding on short video platforms and

explore the differences in the effect of personal branding stereotypes on user engagement. The results show that different personal branding styles influence different types of engagement behaviors. The perceived warmth exerts a more significant influence on user emotional engagement, while perceived competence impacts more on user cognitive and behavioral engagement. Lu, Yu and Wang (2023) conduct a comprehensive analysis regarding the dissemination of short videos in affecting user engagement in response to the challenges to discern the key features of short videos. Building on deep learning and text mining method, they extract features from videos' acoustics, textual, and visual data as high-dimensional variables and propose a variable screening method to reduce the vector dimensionality. They applied the new method to the TikTok platform to show the key factors that determine user engagement structure.

2.2 Whether and why does the title matter?

The title is usually an essential component of many types of materials intended for information transmission (such as articles, pictures, books, and so on). Whether and why the title influences the information transferring process and the information receivers' responses have attracted interest from academia. Many studies have made exploratory efforts to answer these two questions. Berger & Milkman (2012) discuss the effect of video titles on the likelihood of the video being shared. They believe that the video title has a significant impact on viewer's perceived value and decision whether to share or not. Li et al. (2022) find that the surrounding elements (e.g., emoticons, title and thumbnail images) of video clips do influence the pre-roll advertising effectiveness. Their results suggest that the valence and arousal level of title texts and thumbnail images have significant impacts on viewers' attention and intention to watch the videos, and the emoticons moderate the effects of both positive and negative valence on title texts and thumbnail images.

Prior studies have also provided numerous evidence on the influence of title from the perspective of information content. Based on their cross-sectional research over 545 articles published in 6 major psychiatry journals from January to June 2007, Hafeez et al. (2019) find

that reporting study design in title can significantly increase the citation rate of the study. They explain that because most study designs reported in the title are meta-analysis, randomized controlled trials, surveys, cohorts or reviews, which are higher up in hierarchy of evidence, reporting these study designs in title attracted scientific community seeking higher level of evidence and hence increased the number of citations. Di Girolamo and Reynders (2016) assess whether specific title characteristics could influence the likelihood of being included in the ‘‘Altmetric Top 100’’, an article metric that measures several aspects of dissemination of scientific findings based on homonymous hashtag. They retrieved 108 “Medical and health sciences’’ articles in 2013–2015 “Altmetric Top 100’’ and randomly matched them to 216 control articles. Their statistical analysis over the titles of these articles reveals that the declarative titles (refer to titles covering the key conclusions of the research) with a lower number of uncommon words are significantly more represented in the Altmetric list. Rainero and Modarelli (2020) conduct sentiment analysis over news titles collected from BTCworldnews.com for the period from January 2015 to January 2019. They confirm that scarcity and exclusivity perception, higher perceived value, and persuasion, if conveyed in news titles, can serve an implicit marketing strategy behind bitcoin success. Their research results lend further support to the notion that titles influence the information transmission process and outcome. Leder at al. (2006) categorize the titles of paintings into elaborative and descriptive ones, with the former referring to titles providing a possible interpretation or explanation of the artwork and the latter referring to titles summarizing the most important aspects of the painting in a few descriptive words. They find that how these two types of titles influence perceivers’ appreciation and understanding of paintings is contingent on temporal properties. For short presentation times (1s), descriptive titles increase the understanding more than elaborative titles, whereas for medium presentation times (10s), elaborative titles increase the understanding more than descriptive titles.

Some studies go further to explore the mechanism through which titles influence perceivers’ understanding and judgement. Seifert and Chattaraman (2020) examine the effect of titles on aesthetic perception of artistic photographs based on the model of aesthetic appreciation and judgment, which divides the process of aesthetic perception into two components: an emotional

and a cognitive dimension. Their experimental results suggest that the title enhances perceivers' aesthetic judgment of an artwork through increasing the depth of cognitive processing. Samanian et al. (2016) argue that titles of works serve a potential learning element and act as a medium between the artwork and audience. The survey conducted in their research suggests that both importance and functionality of a title play a determinant role in the reading and interpretation of the artworks. The communication function of title is the most important to the learning process of the audience.

2.3 Text length of titles

Length is a basic characteristic of many concrete information carriers such as text and video. Past studies have examined how the length of a piece of text or a video can influence the information transmission outcome. Jaeger et al. (2022) examine this question under the setting of text highlighting, which is a novel method for measuring consumer attitudes where participants read information about a focal topic and use highlighting functions to select aspects of the text that they like and dislike. Their research results show that a single highlighting task on a longer text decreases the overall frequency of highlighting and frequency of 'like' highlighting, compared with consecutive highlighting tasks on shorter texts. Highlighting task on a longer text also discourages participants to engage in later task. Text length also influences sentiment scores. But such influence is contingent on the specific topic and content. Goodrich et al. (2015) examine how length influences the information transmission process under the setting of online-video advertisements. Their results show that intrusive advertisements negatively affect attitudes and intentions of consumers toward both the advertised brand and the host Web site. They further find that longer ads are perceived as less intrusive, suggesting that longer ads can achieve better marketing outcome.

Some studies find that the title length of an article also makes a difference in its dissemination process. However, there is mixed evidence regarding whether shorter or longer titles would be beneficial. It seems that nowadays the title length of a scientific paper is increasing. For example, although the suggested length of a title for scientific papers in American Psychological Association (APA) journals has long been recommended to be no more than 12

words, titles in published papers are becoming more complex over time and often exceed the suggestion from the APA manual in recent times (Hallock and Dillner, 2016). In their comment article, Hallock and Dillner (2016) call for the APA to re-evaluate whether it is still appropriate to recommend a title limit of 12 words and re-consider whether it is necessary to adhere to such recommendation. They argue that longer titles allow the audience to gather more information from a title before consulting the body or even the abstract of the article, which can save readers' time and speed up the dissemination of the article. Some studies document that title length is directly proportional to the number of times they are cited in medical journals (e.g., Jacques and Sebire, 2010). However, some other studies find the opposite effect that shorter titles are cited more frequently (e.g., Letchford et al., 2019). Guo et al. (2018) attempts to provide an explanation for such controversy produced by previous studies. They employ one of the largest pools of papers which contain over 300,000 economic papers spanning a very long time period (1956–2012). Their results show that title length and the number of citations is negatively correlated between 1956 and 2000 but becomes positively correlated after 2000. They explain this change by the wide application of online searches since 2000. Longer title offers more information which facilitates literature retrieval through online searches using key words. They further show that longer titles are especially crucial for papers with relatively lower influence, which researchers can typically only access using online searches. Bramoullé and Ductor (2018) relate the length of the title of an economic article with its scientific quality in their research. They find that articles with shorter titles tend to be published in better journals, to be more cited and to be more innovative. Their work reveals a negative correlation between the title length of a research article and its scientific quality.

2.4 Textual sentiment of titles

The rapid development of artificial intelligence and widely applied machine learning approach make sentiment analysis of natural language an effective tool to grasp writers' attitudes, emotions, or minds from their writings, especially when researchers are faced with tremendous volume of text. With more and more businesses transforming their offline marketing activities to online ones, textual sentiment analysis is becoming more and more useful in marketing

research field for researchers to collect information on customer satisfaction from a large amount of online user-generated content. Mittal and Agrawal (2022) conduct a sentiment analysis of 32,217 complete customer reviews which are collected from a website providing customer reviews of almost all types of banks. They find that positive and negative sentiments extracted from online reviews about banking services are positively and negatively correlated with customer satisfaction respectively. They conclude that overall sentiment of customer reviews can be used to denote customer satisfaction. Guerreiro and Rita (2020) explore what may drive travelers to make a personal and explicit recommendation of the travel services through analyzing travelers' reviews using natural language processing program. They find that negative attitudes of travelers are triggers of negative direct recommendations, whereas positive feelings predict a positive recommendation in the reviews. Sentiment analysis has also penetrated finance field and is used to understand the opinions of investors. Li at el. (2020) collect the discussions and comments of investors in the Chinese stock market from the stock message board of Eastmoney.com and construct text-extracted investor sentiment measurement. Their comprehensive study confirms a traditional hypothesis that investor sentiment contains predictive information for stock prices, and they also find that investors do update their expectations during trading hours.

Besides a large body of literature showing that the sentiment contained in the writings reflects the attitudes and emotions of the writers, some studies find the interesting phenomenon that the sentiment of the content can influence the attitudes and emotions of the readers. For instance, Brader (2005) provides empirical evidence about this research question under the setting of political elections. In his experimental research, the subjects were exposed to campaign ads with different emotional cues. The results confirm the long-standing assumption that politicians can use campaigns to manipulate emotions of voters and thereby influence their voting behaviors. The work by Brader not only has valuable practical implications for politicians who launch electoral campaigns, but also casts light on the important theoretical hypothesis that the sentiment of the content (e.g., text, music, or picture) can trigger emotions of information receivers and then influence their behaviors.

Based on the knowledge that textual sentiment is contagious and can be influential to human behaviors, a large stream of literature investigates how the sentiment of the content affects its dissemination process. This is an important question because how emotions expressed in short texts affect their spreading across online social media has practical implications for effective policy and strategy design regarding online content generation and diffusion. Early studies obtain mixed results as to whether positive or negative content receives more attention and then leads to higher sharing. De León and Trilling (2021) evaluate how positive versus negative political news relates to online emotional engagement and demonstrate a negativity bias in news sharing on Facebook. Consistent with prior studies that find negative political news attract more attention and show higher level of "sharing worthiness", the work by León and Trilling takes our understanding of the negativity bias beyond the simplified positive-negative classification of news article and provides more insights on the underlying mechanism of how negative articles are shared across Facebook by making nuanced distinctions over different types of emotional reactions. By contrast, Ferrara and Yang (2015) find a positive bias in information diffusion across Twitter. Their results show that positive messages reach larger audiences than negative ones, although they also find that negative messages spread faster positive ones. However, their research examines general messages posted by Twitter users rather than only focusing on politics-related ones, which might explain why they have different findings from De León and Trilling (2021). Nonetheless, their results suggest that people are generally more inclined to share and favorite positive contents.

Fan et al. (2018) propose an agent-based model to simulate the emotion contagion and competition on online social media platforms. To reconcile the mixed findings about how positive and negative sentiment expressed in texts affects information diffusion, they argue that different emotions would have different preferences on propagation ties. Specifically, joyful messages tend to transfer between close friends while angry ones are more likely to evoke resonances of strangers. Taking tie strength into consideration offers important foundation for the understanding of different diffusion patterns of positive and negative emotions in social networks. The agent-based model concurrently considers emotion influence and tie strength preferences and thus can well reproduce patterns observed in the empirical data. Firdaus et al.

(2018) explain the complex diffusion patterns of messages expressing different emotions through relating emotions to specific topic. Their research explores the impact of user's topic specific emotion on his retweet decisions, and they do find that user's preferences on different topics vary with different emotional levels. This finding contributes a new predictive factor—-the user's emotion towards a topic—into the model of users' online message sharing decision.

Different from most of past studies, Yuan et al. (2021) examine the impact of sentiment from the perspective of sentiment strength rather than sentiment orientation. The core difference between sentiment strength and sentiment orientation lies in that a narrative with plenty of positive and negative words may have a neutral sentiment orientation, but it could have strong sentiment strength. Although positive and negative sentiments might play their roles through different mechanisms, they could both significantly impact individual's behavior. Yuan et al. (2021) conduct their research under the setting of crowdfunding and focus on the moderating effect of sentiment strength of campaign narratives on the relationship between motivational cues and fundraising success. They distinguish between intrinsic and extrinsic motives, the former sourcing from the spontaneous psychological needs of individuals while the latter stemming from external demands. Their empirical analysis shows that the sentiment strength positively moderates the effect of intrinsic motives on fundraising success but negatively moderates the impact of extrinsic motives on fundraising success. The results provide managerial insights for practitioners to stimulate specified motives by using the narratives with proper sentiment strength.

2.5 The use of Emoji in titles

Emoji, as a simple and vivid way to convey the emotional information in the message from the sender to the receiver, has been widely adopted in computer-mediated communication (CMC). Numerous studies have investigated the use of emoji in online communication from both the perspectives of individuals who use emojis and individuals who view emojis (Manganari, 2021). Regarding people's perception when they read emojis in online communication, extant literature has confirmed that viewing emojis makes a difference both under informal personal

communication context and formal business communication context. Thompsen and Foulger (1996) is one of the early studies that examine the function of emojis in online communication. They find that using emojis in hostile verbal communication reduce individual's perception of negative emotions because people tend to take text with the presence of emojis less seriously. One recent study by Rodrigues et al. (2017) examines the effect of using emojis on the expression of affection between romantic partners. Their experimental results suggest that the quality of relationship between two romantic partners can both benefit from and be harmed by adding emojis into text because emojis can increase the positivity of positive replies and the negativity of negative replies. Jaeger et al. (2019) conduct an online survey with 1084 adults from the USA in their research to reveal meanings associated to 33 common facial emojis. According to the survey results, facial emojis can express a wide range of different emotions, but the semantic meaning of one emoji might differ from its intended meaning, which suggest that the use and interpretation of emojis is flexible.

Recent studies explore the heterogeneity in the effect of emoji in online communication. Drawing on facial emotion processing literature, Jones at al. (2020) extend the theory of emotional negativity bias, which posits that women are more sensitive to negative facial emotion than men, to the interpretation of smiley emojis. Consistent with their anticipation, sex differences are significant in the use of negative smiley emojis but insignificant for positive emojis. With the penetration of CMC into various domains including marketing, emoji research has been largely extended and is no longer limited to online communication. Das et al. (2019) examines the consumers' reactions to the use of emojis in advertisements. The results of the laboratory experiment and the online study consistently suggest that including emojis in advertisements makes consumers feel more positive affect and thus leads to their higher purchase intentions. However, the positive effect of using emojis on increasing consumers' purchase intentions is conditional on promoting hedonic products, in contrast to utilitarian products. Cavalheiro et al. (2022) examine the factors that lead to perception variation in emoji usage by employing five different brand-consumer communication contexts. The attitudes of participants towards the use of emojis vary with different situations. They consider it more appropriate for brands to use emoji when publicizing on social media but less appropriate when

making callbacks of defective products. They also find that the perceptions of emojis vary with different demographic and individual characteristics.

2.6 Literature Gap

Existing literature has provided a wide scope of research on user engagement. Some theoretical works contribute to the definition of concepts related with user engagement while others explore the underlying marketing logic transformation behind the focus on user engagement. Given the increasing importance of user engagement research in the digital era, more and more studies provide insights about how to increase user engagement on various social media platforms. However, our understanding towards factors influencing engagement activities of short videos, a burgeoning form of social media post, is still limited. No research has explored the strategies for user engagement promotion from the perspective of video titles. Previous studies have suggested that characteristics of titles can influence the information dissemination effect for many types of materials. Many of them also explore the underlying mechanisms through which titles play a role. The literature provides a solid theoretical foundation for my research to examine the effect of titles on viewers' engagement of short videos. As for whether and how the text length, text sentiment, and emoji in the text influences information communication process and outcome, prior literature provides mixed evidence. My research on how the title length, sentiment of the title, emoji in the title of short videos affect user engagement could enrich the literature and supplement these research areas with new evidence of short video scenarios.

Chapter 3 Hypothesis Development

The signaling theory, which was originally proposed by Spence (1973), provides a theoretical foundation for explaining why and how short video titles could influence the engagement intention of video viewers. Signaling theory is concerned with how two parties with asymmetric information communicate with each other through signal sending and signal interpretation. Under the theoretical framework of signaling, the party who owns more information sends signal to the party who needs the information to make decisions, the process of which is subject to various environmental influences. Usually, the signal sender could get feedbacks in a certain form from the receivers. Such theoretical framework has been widely applied in many social science research areas to explain a wide range of economic and social phenomena (Kirmani and Rao, 2000; Connelly et al., 2010). The basic premise of signaling theory is that individuals with superior information about their own characteristics or abilities have an incentive to signal this information to others. The video creators who post their works on social media platforms are usually eager to increase the popularity of their works to earn social currency. More social currency not only can create huge economic value but also can improve the video creators' psychological well-being (Kesgin and Murthy, 2019; Ostic et al., 2021). The more likes and comments received by a short video, the larger audience the short video will be recommended to, so that the video creators will have more opportunities to attract new followers. Besides making fantastic video works of interesting topics, the title of the short video, which remains below the screen while the video is playing, serves as the only channel through which the video creator could influence the video viewers' impression about the short video. The video creators know better about the content of their short video works than any potential viewers. Through compiling the video titles with key information about the video content, the video creators who post excellent short videos try to differentiate themselves from those who only post ordinary short videos.

The signaling theory also suggests the determining role of information receiver in the effectiveness of signal communication (Gulati and Higgins, 2003; Ilmola and Kuusi, 2006).

Signaling is costly for the sender. Therefore, the sender will decide to signal only when he/she expects that the receivers will take the signal into consideration when they make judgements. In practice, when people are rushed or the decision is less important to them, they tend to be more easily persuaded by the peripheral information cues (Hopper, 2020). Under the case of watching short videos, the viewers are usually not willing to invest a lot of time and energy to think about the authenticity of the video content. As a result, the viewers' attitudes and evaluation about the video are susceptible to very superficial factors like attractiveness, mind of status and various cues, so video titles can influence viewers' engagement decisions through providing important peripheral cues. People rely on heuristic decision-making models when the information redundancy is high and where there is no certain evaluation criterion (Gigerenzer and Todd, 2012). Online short video platforms offer plenty of short videos of various topics. At the same time, people usually have different preferences for short video content. Under such case, heuristics saves a lot of effort and achieves less-is-more effect (Gigerenzer and Gaissmaier, 2011). Therefore, the viewers' engagement decisions will be affected by the peripheral cues offered by the video titles, consciously or unconsciously.

Short video creators post their works on the platform to generate engagement through invoking appreciation or sympathy of viewers. When a video is played on the platform, its title always remains on the screen, which is the peripheral information that could catch viewers' attention. Longer titles can signal greater effort and higher credibility on the part of video creators, which can leave a positive impression on viewers. Creators for short videos of high quality could provide detailed and relevant information on the video content with very low cost while creators for short videos of low quality would find it difficult to do so because they need to fabricate a lot of fake information that is irrelevant with the video content. Therefore, titles serve as reliable heuristic cues for viewers to evaluate the video content. The signals conveyed through titles can also be seen as social cues that express the creators' willingness to provide authentic information and build relationships with potential viewers. These positive impressions can enhance the creators' reputation and help to increase their social currency. As a result, viewers feel greater empathy and more affection towards the creators and may be more likely to engage with the short videos. In the subsequent subsections, I will analyze how the

characteristics of the short video titles can influence the viewers' engagement intention from three specific aspects, the length of the title, the textual sentiment of the title, and the use of emojis in the title.

3.1 Title length

People watch short videos for various reasons. Some may want to learn some knowledge or skills, and others may just browse for entertainment purposes. No matter what reasons, the title provides important information for viewers to get a first and general understanding of the video content. Since longer titles usually offer more information, I argue that title length is positively correlated with viewers' engagement intention after watching the short video for the following reasons. First, a longer video title facilitates viewers' cognitive processes while watching the video. From the perspective of psychology, viewing short video is a complex human activity involved with at least four types of cognitive processes: focusing attention, interpreting information through perception, producing thought, and forming memory. A longer title usually contains more information related with the video content. It can also provide additional information that is not contained in the video but necessary for adding the meaningfulness of the video. Therefore, longer titles help viewers learn more from the video through easing their cognitive processes, triggering more of their thoughts, inducing more of their emotional responses, and strengthening their memories about the video content. According to the aesthetic processing model proposed by Leder et al (2004), the pleasure derived from watching a video usually prerequisite on the feeling of having grasped the meaning and key points of the video, thus longer titles of short videos are expected to improve the perception and attitudes of the viewers towards the video. Consequently, viewers are expected to have better viewing experiences and give more positive feedbacks about short videos with longer titles, increasing their engagement intention after watching them.

Second, longer titles signal more efforts by video creators, thus leave better impressions on viewers. The effort signals are social cues sent to the viewers, expressing video creators' willingness to provide detailed information and establish relationships with their potential viewers. These positive impression makes the video creators look good, and successfully earn

their social currency in the eyes of their viewers. After receiving such information, the viewers' empathy and affection may increase, thus increasing the possibility of user engagement. Second, during watching the video, even though the viewers do not read the short video titles carefully at all, their quick glance at the title, which is usually inevitable, will also make a difference to their impression towards the video. Third, as a longer title contains more information, users feel secured and confident in liking and commenting the videos with informational titles compared with those with shorter title. Based on my discussions above, compared to the shorter title, the longer title, the more information, which could also signal the author's effort, increases the user's engagement intention when watching the video. Therefore, the first hypothesis is proposed as below:

H1: A longer short video title increases viewers' engagement.

3.2 Textual sentiment

Text sentiment is closely related with the topics covered in the message. Plenty of previous studies have found that emotional messages (either with positive or negative content) are more popular, lead to higher sharing and consequently spread more quickly (e.g., Berger and Milkman, 2012; Fan et al., 2018). Existing literature provides mixed results as to whether negative or positive content receives more attention and has dissemination advantage. The mixture suggests that the effect on information diffusion of negative and positive sentiment expressed in the content might vary from case to case and their respective underlying mechanisms can be very complex. Therefore, following Yuan et al. (2021), I do not distinguish sentiment orientation but focus on the sentiment strength in this study. In other words, I aim to examine how the sentiment strength of the title of a short video influences the viewers' engagement behavior after watching the video.

According to prior literature, strong sentiment in the title of short videos could have two opposite effects on viewers' engagement intention. On the one hand, viewers might have higher engagement intention for short videos with less emotional titles. There are two main reasons. First, titles that are too positive or too negative tend to contain many subjective words (Yuan

et al., 2021). Compared with objective words, subjective words are less compelling and can only serve a limited role in facilitating viewers to understand the video content. Subjective words can also decrease the authenticity of the video, which might trigger negative attitudes of viewers towards the video and further discourage viewers' engagement intention. Different from other social media platforms like Weibo, Facebook, or Twitter, through which users read news, keep connected with the world, and express their emotions and opinions, short video platforms are usually entertainment oriented. Users log in short video applications to meet two main needs: cognitive needs and pleasure needs (Wang et al., 2019). The former refers to that viewers want to learn something, like learning how to cook from food tutorials, and the latter refers to that viewers watch videos for fun. Emotional titles neither help satisfy users' cognitive needs nor pleasure needs. Therefore, emotional video titles are likely to have negative effect on viewers' engagement intention.

Second, the emotion expressed in titles with strong sentiment are less likely to match with the attitudes or mind state of viewers. Viewers show more positive attitudes toward content with which they share similar emotions and sentiments. Since most users have neutral or nearly neutral sentiment while only a few of users have extreme emotions, more neutral video titles have less significant emotional divergence with most of users' state of mind. Thus, users have higher probability to show empathy and offer approval towards such videos, which can obviously increase their engagement intention. Finally, it feels much safer and more objective for users to leave likes and comments for neutral videos.

On the other hand, viewers might have higher engagement intention for short videos with high emotional titles. Many prior studies suggest that emotional messages are more popular on social networks (De León and Trilling, 2021). Emotional content is more contagious, spreading faster and reaching larger audience (Ferrara and Yang, 2015). Although short video platforms are different from other traditional online social network platforms in terms of function and content form, it is also likely that research results concluded from prior studies can be generalized to the scenario of short videos. Therefore, how sentiment strength of short video

titles affects viewers' engagement is an empirical question. Therefore, I propose a set of competing hypotheses as follows:

H2a: Lower sentiment strength of short video titles increases viewers' engagement.

H2b: Higher sentiment strength of short video titles increases viewers' engagement.

3.3 The use of Emoji

According to the research on emoji usage in online communication, the effect of including emojis in the title of short videos on the engagement of video viewers can be mixed. On the one hand, adding emojis into short video titles might increase the engagement intention of video viewers for the following reasons. First, emojis facilitate emotional expressions and lead to more effective emotion communication. Many prior studies consistently document that seeing emojis significantly influence viewers' emotions (Das et al., 2019). Ganster et al. (2012) show that people feel significantly happier when they receive positive messages with smiley emojis than when they receive positive messages with only text. Similarly, results also suggest that people feel worse when they receive negative messages with sad emojis than when they receive negative messages with only text. Although it is not clear why and how emojis have the capability to affect an individual's emotion, the empirical evidence from literature support the notion that using emojis in textual communication can make message receivers understand the feelings of senders better and easily. The emojis serve as emotional cues in online communication, to some extent making up efficiency loss in communication caused by lacking facial expression, body movement, or tone of voice, which serve as important emotional signals in face-to-face communication. In a similar vein, when a short video has emojis in its title, online users can quickly get the emotional information conveyed in the text of the title and thus are more likely to show empathy. Consequently, they have more enjoyable watching experiences, which can reasonably increase their engagement intentions.

Second, video titles with emojis are more likely to be read by video viewers. In general, emojis help to grasp viewers' attention (Manganari, 2021). Nearly all emojis, as graphic

representations of facial expressions, are designed to be brightly colored using yellow, red, or green. These bright colors make emoticons have higher capability to grab viewers' attention while they are watching the short videos, compared with the black or white colored text. Moreover, reading emojis, which are vivid mini pictures of facial expressions, the sun, flowers and so on, requires less cognitive resources and incur lower information processing cost compared with reading textual description (Duan et al., 2018). Consequently, it is easy for people to neglect plain text content but pay more attention to text with emojis. Attention-grabbing colors and low information processing cost both make titles containing emojis more likely to be noticed by viewers, thus the viewers have a higher probability to read the titles carefully. The description in the title can help the viewers get a better and deeper understanding of the video content and consequently are more likely to cause emotional resonance of viewers, making them show more empathy, or acknowledge more opinions and values conveyed in the video. Under these circumstances, the viewers are expected to have higher appraisal towards the videos and thus are more willing to engage. Consistently, numerous research results suggest that using emojis enhances online users' responsiveness and trigger their positive attitudes (e.g., Das et al., 2019; Cui et al., 2010).

However, adding emojis into the title of a short video may also have negative effect on video viewers' engagement intention. Some studies have provided evidence that cast light on the dark side of using emojis. Li et al. (2019) investigates the effect of using emojis on commercial relationships and their research results from laboratory and field experiment show that customers perceive service employees who use emojis in communication to be lower in competence compared with those who do not use emojis. Willoughby and Liu (2018) find in their experimental research that students perceive messages with emojis to be less credible and they prioritize to process messages without emojis. Credibility was found to be an important factor that influences viewers' attitudes towards the message that they receive (Hu and Shyam Sundar, 2010). Therefore, adding emojis in the title of short video may make the video look informal and short videos containing emojis in their titles may be perceived to be incredible, leading to negative evaluation of the video content by viewers. Such negative evaluation consequently reduces viewers' engagement intention after watching the videos. Based on the

discussions above, I propose another set of competing hypotheses regarding the effect of emojis inclusion in titles.

H3a: Adding emojis in the title increases viewers' engagement.

H3b: Adding emojis in the title decreases viewers' engagement.

Below is the research framework of this study (Figure 3-1).

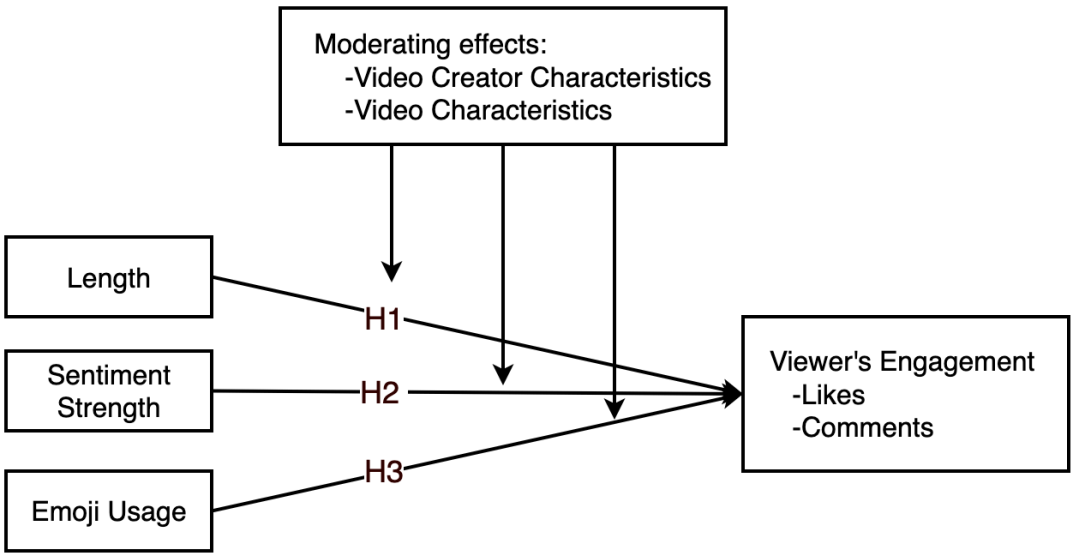

Figure 3-1 Research framework

Chapter 4 Research Design

4.1 Data and sample

My study employs a large sample of short videos which are randomly selected from all the videos posted on Kwai from January 1st to August 15th in 2019. Kwai is one of the most popular short video applications in China, on which users can make and share their own short video works and can also view other people's works for fun. Usually, the application recommends new short videos to users according to the user's profile and his/her viewing history. This is one reason that I did not study the impacts of title characteristics on the number of views as the views are largely determined by the recommendation system. The users can also search works on a specific topic or posted by a specific account using key words. Like other internet social media platforms, people can interact with the creator of a short video through giving likes or making comments to his/her work. If you like someone's works especially, you can follow the video content creator so that you can view his/her updates in time and won't miss his/her new works.

I collect the data from Kwai through the X company, which is a multi-channel network platform providing targeted marketing service. The company offers commercial service through short video marketing based on big data analytics. Positioned as a commercial service provider based on new media and big data, the company focuses on operational commercialization of social media accounts on various platforms through optimizing algorithms. By means of big data analytics, it has helped customers from e-commerce, gaming, finance, and many other industries to achieve targeted marketing. The company also provides marketing service on China's main short video platforms to help live broadcast e-commerce to achieve more accurate customer targeting. In 2020, the company served more than 15,000 internet celebrities whose followers amount to more than one million. The X Company has real time access to the data on Kwai through API, making the data collection for my research possible.

The data collection began on June 25th, 2019. I randomly selected sample short videos which were released by different user accounts. The following information was obtained for each

short video: the duration, the title description, the number of likes received, the number of comments received, and the posting date. I also collected some key information on the accounts to capture the creator-specific characteristics, including the total number of short videos posted and the number of followers. Moreover, the sample spans from January 1st to August 15th but the account information is collected on the day of collection not the day the video was posted. This could cause data bias because the account information could change a lot during the sample period. Since it is impossible to retrieve the account information at the time point when a sample short video was posted, I mitigate this problem of changed account information by including the time elapsed between the video posting day and the data collection day to alleviate possible bias caused by changed account characteristics on user engagement.

4.2 Summary Statistics

The sample selection began with a large number of original short videos acquired from Kwai. I focus on two kinds of engagement activities by users in this study: giving likes and making comments. For each short video, I collect the data on the total count of likes (*like count*) and the total count of comments (*comment count*). I use the natural logarithm of the total likes and the total comments of a short video to measure the engagement activity of users and run regressions separately.

I extracted the titles of the sample short videos and constructed the three key independent variables through text analysis. The first key independent variable is the length of the description (*Title length*), which is the total count of words contained in the descriptions of the short video titles. This variable takes the natural logarithm form in the regression. The second key independent variable is the sentiment strength of the description of the short video title (*Sentiment strength*), which is measured by the absolute value of the mean-centered sentiment score of the short video descriptions. It represents the relative sentiment strength of the description for a short video comparing to the average sentiment level of all the descriptions of the whole sample short videos. The sentiment of the short video description is closer to the average sentiment level when the value of the sentiment strength variable is nearer to zero. A

larger sentiment strength value represents more extreme emotions (negative or positive) contained in the short video descriptions compared to the average sentiment level of the sample short videos. The raw sentiment score of the short video description is obtained through textual analysis using SnowNLP, which serves a sentiment analysis tool for Chinese text developed by machine learning approach (Chen et al., 2018). The original sentiment score ranges from 0 to 1, with a larger value representing a more positive sentiment orientation. As explained in hypotheses development section, I focus on the sentiment strength of short video titles in this study rather than the sentiment orientation. Thus, I calculate the absolute value of the mean-centered sentiment score to define the sentiment strength, rather than using the absolute sentiment values. Since the sentiment of titles for short videos posted in social media platforms is more positively oriented, calculating the relative sentiment strength rather than the absolute sentiment strength is more appropriate in my research setting.[1] The last key independent variable is a dummy variable indicating whether the description of the video title contains any emoji (*Emoji use*). It takes the value of 1 if there is at least one emoji in the description of video title and 0 otherwise.

To address potential endogenous problems caused by omitted variables, a series of control variables are included in the regression model that are expected to have influence on user engagement, especially those are correlated with user engagement and characteristics of descriptions in short video titles. The following set of variables is controlled. First, variables measuring the characteristics of the user account. For instance, users who have posted more short videos, had more followers, or received more likes for video posted before, are expected to create short videos of higher quality and thus their posting naturally entail more user engagement. Those users are also more likely to craft better titles. Therefore, I have included the total number of videos posted (Video count) by the account, the total number of users following the account (Follower count) as creator-related control variables.

[1] Please see the descriptive statistics for *desc_senti* variable in Table 2 of *Summary Statistics* section for evidence.

I also include video-specific characteristics as video-related control variables, including the time length of the short video (Duration), the view counts of the short video, and the time length for which the short video has been posted. The length of the short video could correlate with the quality of the video content, in that a popular short video is usually neither too short nor too long. It is hard for a very short video to contain much valuable information that people have great interest in, while if a short video is too long, people may have no patience to watch it to the end. A short video with higher view counts naturally receive more likes and more comments. Short videos that have been posted for a longer time are expected to naturally entail more user engagement. To exclude the view count bias and the posting time bias, the total view counts of the short video (View count) and the time length from the date (Time elapsed) when the short video was posted to the date when the data was collected should also be added into the model. The detailed definitions for all the variables used in the regressions are presented in Table 4-1.

Table 4-1 Variable description

VARIABLE	Description
Like count	Total number of likes received by the short video.
Comment count	Total number of comments received by the short video.
Title length	The total number of words contained in the description of the short video title. I take the log transformation in regression.
Sentiment strength	The absolute value of the mean-centered sentiment score of the short video descriptions. The sentiment value of a title is obtained through textual analysis using SnowNLP.
Emoji use	Dummy variable that takes the value of 1 if the video title contains an emoji, and 0 otherwise.
View count	The total number of impressions (view count) received by the short video.
Videos count	Total number of short videos that have been posted by the author.
Follower count	Total number of fans following the author.
Time elapsed	The time elapsed since the video posting date to the data collecting date.
Duration	The time length of the short video.

The final sample consists of 3,370,636 short videos released by 82,776 Kwai accounts. Table 2 reports the descriptive statistics of all the variables used in the regression analysis. As can be seen from Table 2, the average number of likes for the sample short videos are much higher than the average number of comments for the sample short videos. This is consistent with our common sense that making comments incurs more cost than giving likes, so that fewer users are willing to make comments after watching a short video. The standard deviations for the number of likes and comments are large, which indicates sufficient variation in user engagement among the sample short videos. The third quartiles (P75) for the two engagement variables are much smaller than their mean values, suggesting that the user engagement of the sample short videos is left-skewed. For most of the short videos in the sample, they have received a very low level of likes and comments. A small portion of the sample short videos are highly popular, and they have triggered extremely active user engagement.

The length of the titles of the sample short videos varies from 1 to 300 words, with an average value of 36.71. Most of short videos are longer than 9 words (P25) but no more than 47 words (P75). Extremely long or extremely short titles are rare for the sample short videos. The raw sentiment value of the titles ranges from 0 to 1. The average sentiment value is 0.67. I use the absolute value of the mean-centered score in the analysis, so that the maximum value of the Sentiment strength is 0.67. As for the emoji indicator, an average value of 0.13 means that only 13% of all the sample short videos contain emojis in the descriptions of their titles. Adding emojis into the title seems to be an uncommon practice for most of short video users. The description statistics of control variables are also shown in Table 4-2. Table 4-3 reports the pairwise correlations of the variables.

Table 4-2 Descriptive statistics

VARIABLES	N	mean	Sd	min	max	p25	p50	p75
Duration	3,370,636	9.95	10.77	0.01	1,588.44	3.73	7.28	13.78
View count	3,370,636	112,804.23	460,400.65	1.00	75932562.00	4,378.00	15,861.00	57,291.00
Like count	3,370,636	4,102.56	24,431.87	0.00	9,478,013.00	114.00	440.00	1,823.00
Comment count	3,370,636	282.85	2,268.61	0.00	1,688,168.00	17.00	51.00	148.00
Title length	3,370,636	36.71	43.81	1.00	300.00	9.00	24.00	47.00
Sentiment strength	3,370,636	0.29	0.14	0.00	0.67	0.23	0.29	0.33
Emoji use	3,370,636	0.13	0.34	0.00	1.00	0.00	0.00	0.00
Videos count	3,370,636	286.15	550.46	0.00	15,569.00	57.00	128.00	295.00
Followers count	3,370,636	286,171.15	776,828.62	0.00	45602296.00	25,731.00	85,587.00	251,558.00
Time elapsed	3,370,636	32.19	36.18	0.00	226.00	7.00	20.00	44.00
Number of user id	82,776							

Table 4-3 Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Like count	1.00								
(2) Comment count	0.38	1.00							
(3) Title length	0.03	0.02	1.00						
(4) Sentiment strength	0.01	0.01	0.21	1.00					
(5) Emoji use	0.03	0.02	0.30	0.04	1.00				
(6) View count	0.80	0.46	0.03	0.01	0.03	1.00			
(7) Duration	0.03	0.02	0.13	0.02	0.04	0.03	1.00		
(8) Time elapsed	0.06	0.03	-0.01	-0.02	0.03	0.09	-0.01	1.00	
(9) Videos count	0.00	-0.01	-0.07	-0.01	-0.07	0.01	-0.03	-0.19	1.00
(10) Followers count	0.46	0.33	0.01	0.01	0.03	0.58	0.04	0.01	0.06

4.3 Model specification

One major endogeneity problem is how to distinguish the influence of the title characteristics from the influence of the video content. First, videos with longer titles may provide meaningful and rich content. Such videos also attract and retain more viewers because viewers can learn substantial new information from these videos. The new information could trigger the viewers' inspiration, stimulate new thoughts of them, and thus encourage their interaction intention. Therefore, video content could be a missing variable in identifying the impact of title length on engagement.

Second, short videos with very emotional titles usually offer emotional content. As previously discussed, different from other social media platforms intended for expressing personal views or emotions, short video platforms are developed to satisfy users' cognitive and pleasure needs. Videos that are too subjective and full of personal emotions are difficult to retain users' interest because such videos usually neither convey useful knowledge nor tell interesting stories, thus cannot meet users' intrinsic demand. Short video applications offer a social network platform to share short video works among strangers, and people usually do not care personal emotions of strangers. Therefore, users have no patience to watch videos expressing personal sentiment to the end, let alone commit engagement to such videos. Moreover, short videos with emojis in their titles are more likely to be emotionally contagious and have higher appeal. The decision of the video creators on whether to add an emoji in the video title might be associated with the attribute of the video content. People use more emojis in socio-emotional than in task-oriented social contexts (Derks et al., 2008). It is reasonable to expect that short videos related with socio-emotional topics are more likely to trigger viewers inspiration and emotion, thereby increasing their probability to participate in online interactions.

In sum, considering the possible alternative explanations discussed above, eliminating the impact of video content on the title characteristics is our primary task, because we are not sure whether more or less engagement of viewers is viewers' responses to the video content or the title characteristics.

In order to alleviate such concerns, I added a set of control variables. For popularity concern caused by video content, I have added view counts as a control variable to reduce the endogenous problem. View counts represent the total impressions that the short video got, which is directly measure the popularity of the short video. If the title characteristics' impacts on engagement (title length or emoji use) are caused by the popularity of the short video content, it should be diminished after controlling view count in the model. Then, other controls such as video duration, the number of followers also help to partial out other potential correlations between title characteristics and video content.

To further reduce such concern, I also conduct title topic analysis and include title topic dummies in the research model. Generally, the confounding impact of video content on title characteristics should be affected through title content. Therefore, the correlation of the omitted variable (video content) and title characteristics should be much more weaken after controlling the title content. Following prior studies (Kumar, Qiu and Kumar, 2022; Zhang and Luo, 2022), the topic of each short video is determined through computerized text analysis of the comments received by the short video based on Latent Dirichlet Allocation (LDA) model. LDA is a non-supervised machine learning model which is commonly used for text classification and topic prediction in analysis of huge number of documents or text corpora. LDA is a three-level hierarchical Bayesian model, in which each item of a collection is modeled as a finite mixture over an underlying set of topics. Each topic is, in turn, modeled as an infinite mixture over an underlying set of topic probabilities.

I use LDA to categorize all the sample short videos into several topics. In the context of text modeling in my research, each comment will be reduced into a vector of key words and frequency counts after tokenization and stop words removal. I employ the Bag-of-Words model in this process and do not consider word order. Then these comment vectors are used for topic modelling, after which the topic probabilities for each comment are calculated. The topic of each short video is finally determined based on the topic distribution of all its comments. I train the model with a different topic number from 2 to 30. The performance of each training is

evaluated by the value of likelihood on a held-out test set. Higher likelihood indicates better generalization performance. I compute the perplexity of a held-out test set to determine the optimal topic number. The perplexity, used by convention in language modeling, is monotonically decreasing in the likelihood of the test data, and is algebraically equivalent to the inverse of the geometric mean per-word likelihood. A lower perplexity score indicates better generalization performance. Figure 4-1 reports the values of likelihood and perplexity for each topic number. As shown in Figure 4-1, the lowest perplexity score occurs when the topic number is three.

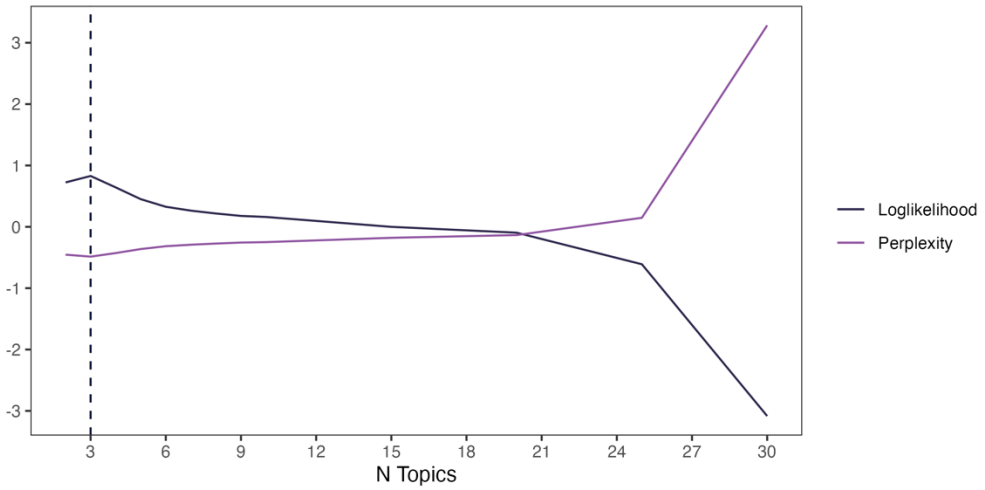

Figure 4-1 Likelihood and perplexity results

In all, to examine my hypotheses, I conduct OLS regression analysis by running engagement on the three key characteristics of (Title length, sentiment strength, and emojis use) and a set of control variables described earlier. The base model used in the regression analysis is specified as follows:

$$Engagement = \alpha + \beta_1 \text{Title length} + \beta_2 Sentiment\ strength + \beta_3 Emoji\ use + Controls + \varepsilon$$

The dependent variable $Engagement$ represents variables proxying users' engagement activities after watching the short videos, namely the natural logarithm for the total amount of likes and the total amount of comments received by a short video. I examine the impact of the three title characteristics on the two different engagement activities of viewers in two regressions separately. Moreover, I also use creator fixed effects in the model to account for the similarity of video content by the same creator.

Chapter 5 Empirical Analysis

5.1 Main results

Table 5-1 reports the baseline results on how title length, the sentiment strength and the emojis of the descriptions of the short video titles affect the viewers' engagement. Column (1) examines how the title characteristics influence the number of likes given to the short videos using OLS regression. In Column (1), the coefficient on *Tilte Length* is significantly positive at the 1% level ($b = 0.073$, $p < 0.01$)., suggesting a general positive relationship between the length of the titles of short videos and the engagement commitment of viewers. The influence of the title length on the likes given to the short video is also economically significant, in that 1% increase of the title length can lead to as high as 0.078% increase of the likes. This means that for a short video whose title has an average length of description (36.71 words) and which has received an average level of likes (4102.56), one more word increase in the title can translate into 9 more likes ($1/36.71 \times 100 \times 0.073\% \times 4102.56 \approx 8$). Such result is consistent with my first hypothesis that longer titles increase the viewers' engagement.

The coefficient on *Emoji use* is significantly positive in Column (1), suggesting that short videos that contain emojis in their titles receive significantly more likes ($b = 0.108$, $p < 0.01$). Specifically, a short video that contains emojis in its title averagely receives approximately 0.108% more likes than one that does not contain any emoji in the title. For a short video with an average number of likes, adding an emoji into its title could make it receive around 4 ($0.108\% \times 4102.56 \approx 4$) more likes. The results support my hypothesis ***H3a***, which states that adding emojis in the short video titles can increase the video viewers' engagement.

The coefficient on *Text sentiment* is significantly negative in Column (1), suggesting that strong sentiment expressed in the title of the short video has a negative effect on the willingness of the viewers to give a like to the video ($b = -0.120$, $p < 0.01$). For a short video receiving an average level of likes, the extreme sentiment (from neutral sentiment score 0.5 to 0 or 1) of the titles could result in nearly 3 ($0.5 \times 0.120\% \times 4102.56 \approx 3$) reduction of likes given to the video.

Such results are consistent with my hypothesis ***H2a***, which anticipates that short video titles with higher sentiment strength discourage viewers' engagement intention.

Column (2) examines how the title characteristics influence the number of comments received by the short videos. As can be seen from column (2) of Table 4, the length ($b = 0.089$, $p < 0.01$), the sentiment strength ($b = 0.025$, $p < 0.01$), and the emojis use ($b = -0.026$, $p < 0.01$) of the titles influence the number of comments of the short videos in a similar pattern as the like counts.

Table 5-1 Results of Title effects on Engagement

	(1) OLS	(2) OLS	(3) Fixed effects	(4) Fixed effects
VARIABLES	Like count	Comment count	Like count	Comment count
Title Length	0.073***	0.089***	0.014***	0.016***
	(0.002)	(0.004)	(0.001)	(0.001)
Emoji use	0.108***	0.025***	0.034***	0.011***
	(0.005)	(0.008)	(0.001)	(0.002)
Sentiment strength	-0.120***	-0.036***	-0.038***	-0.002
	(0.008)	(0.012)	(0.002)	(0.003)
View count	0.922***	0.728***	0.893***	0.701***
	(0.002)	(0.003)	(0.001)	(0.001)
Duration	0.152***	0.155***	0.141***	0.109***
	(0.003)	(0.005)	(0.001)	(0.002)
Time elapsed	-0.019***	0.003	-0.019***	-0.019***
	(0.003)	(0.005)	(0.001)	(0.001)
Video count	-0.102***	-0.092***		
	(0.003)	(0.004)		
Follower count	0.065***	-0.056***		
	(0.002)	(0.003)		
topic1	0.344***	0.471***	0.093***	0.121***
	(0.009)	(0.014)	(0.002)	(0.003)
topic2	0.121***	0.321***	0.039***	0.042***
	(0.009)	(0.014)	(0.002)	(0.004)
Constant	5.961***	3.749***	6.109***	3.971***
	(0.010)	(0.015)	(0.003)	(0.005)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.887	0.638	0.846	0.538
No. of user id			82,776	82,776

Notes: This table reports the effect of each title characteristic variable on viewers' engagement with video topics controlled. In column (3) and column (4), user account fixed effect is controlled. All the discrete variables have been scaled by logarithm. Robust standard errors are reported in parentheses; ***, **, and * represent $p<0.01$, $p<0.05$, and $p<0.1$ respectively.

5.2 Quantile Analysis

The short videos on the social media platforms are diversified both in terms of topics and content quality, thus they naturally have different levels of likes and comments. The extremely

large variation in likes and comments of my sample short videos, as suggested by their distributions in Table 2, entails us to present a more complete picture about the relationship between the explanatory variables and the user engagement. Therefore, I employ quantile regression approach and model the influences of title characteristics at the deciles of each type of user engagement activities. Quantile regression is a statistical method used to estimate the conditional quantiles of the dependent variable. Different from traditional ordinary least squares regression analysis, which focuses on modeling the mean of the dependent variable, quantile regression models the relationship between the independent variables and specific quantiles of the dependent variable. Quantile regression is particularly useful when the distribution of the response variable is asymmetric or has long tails, allowing us to estimate different parts of the dependent variable and test whether there are inconsistent or unbalanced impacts.

5.2.1 Quantile regression results of Title effects on Like

The quantile regression results for like are presented in Table 5-2. In order to delineate the changing pattern of the influence of each explanatory variable on like across deciles of *Like count*, I draw all the coefficients estimated by quantile regressions for each explanatory variable in Figure 5-1, 5-2, 5-3. The coefficients before *Title length* across column (1) to column (9) in Table 5-2 are all significantly positive but the magnitude of these coefficients decreases as the number of likes received by the short videos goes up. This means although a longer video title has a positive effect on promoting viewers to give likes to the short video, such effect is stronger for videos with fewer likes received. It means as the popularity of the video increases, the effect of title length decreases.

The coefficients before *Emoji use* exhibit a similar pattern as that of *Title length.* All the coefficients for *Emoji use* are significantly positive, but as the number of like of the short video increases, the coefficient gets smaller. The coefficient for the first decile is 0.128 while that for the ninth decile is only 0.062, nearly the half of that for the first decile. This indicates adding an emoji into the short video title has a much more positive effect in increasing the number of

like when it is at a low level, compared with the case when the number of like for the short video is at a high level.

The coefficients before *Title sentiment* are all significantly negative. Similarly, the absolute values for the coefficient before *Title sentiment* goes down from the first decile in column (1) to the ninth decile in column (9). The coefficients in Table 5-2 suggest that although extreme sentiment orientation of the description in short video titles has negative effect on like giving by viewers, but the influence largely diminishes by nearly a half for short videos with the highest level of like.

In summary, all the three title characteristics, namely the title length, the use of emoji, and the sentiment strength, consistently show a diminishing influence on the like giving behavior of video viewers as the number of like goes from the bottom decile to the top decile. The number of like received by a short video indicates the popularity of the video content because those short videos that have received a large number of like have very attractive content. Undoubtedly, the most important factor that determines the popularity of a short video is the video content itself, rather than some heuristic cues such as the characteristics of video titles. Therefore, we can see that as the video content becomes more and more popular (high quantile of engagement), the influence of the characteristics of video titles on promoting like giving largely weakens. However, the results for the quantile regressions also suggest that compiling the video titles strategically is still helpful in increasing like count, especially when the video content itself is not so attractive. Since short videos whose liks amount belongs to the same decile are much more similar in the popular level of the video content, the quantile regressions also have advantage in better controlling the variation in video content. The relationships between title characteristic variables and like count identified by the baseline model in Table 5-1 consistently hold across all the deciles of like in Table 5-2.

Table 5-2 Quantile regression results of Like

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	.1	.2	.3	.4	.5	.6	.7	.8	.9
Title length	0.090***	0.085***	0.082***	0.079***	0.075***	0.072***	0.068***	0.063***	0.051***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Emoji use	0.128***	0.128***	0.125***	0.119***	0.113***	0.105***	0.097***	0.085***	0.062***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Sentiment strength	-0.144***	-0.132***	-0.128***	-0.131***	-0.123***	-0.113***	-0.105***	-0.095***	-0.075***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)
View count	0.926***	0.915***	0.910***	0.909***	0.910***	0.913***	0.920***	0.930***	0.947***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Duration	0.259***	0.234***	0.210***	0.188***	0.166***	0.140***	0.111***	0.080***	0.042***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time elapsed	0.015***	0.009***	0.002***	-0.006***	-0.013***	-0.022***	-0.031***	-0.044***	-0.061***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.403***	0.387***	0.376***	0.362***	0.348***	0.334***	0.317***	0.286***	0.244***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Topic 2	0.223***	0.188***	0.163***	0.140***	0.114***	0.090***	0.062***	0.030***	0.016***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Videos count	-0.084***	-0.092***	-0.098***	-0.103***	-0.107***	-0.109***	-0.109***	-0.105***	-0.097***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Followers count	0.104***	0.099***	0.094***	0.087***	0.079***	0.069***	0.056***	0.037***	0.009***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Constant	5.011***	5.339***	5.568***	5.768***	5.964***	6.162***	6.370***	6.608***	6.917***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Observations	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636

Notes: This table reports the quantile regression results for the influence of the title characteristics on likes giving by viewers. All the discrete variables have been scaled by logarithm. Robust standard errors are reported in parentheses; ***, **, and * represent p<0.01, p<0.05, and p<0.1 respectively.

v

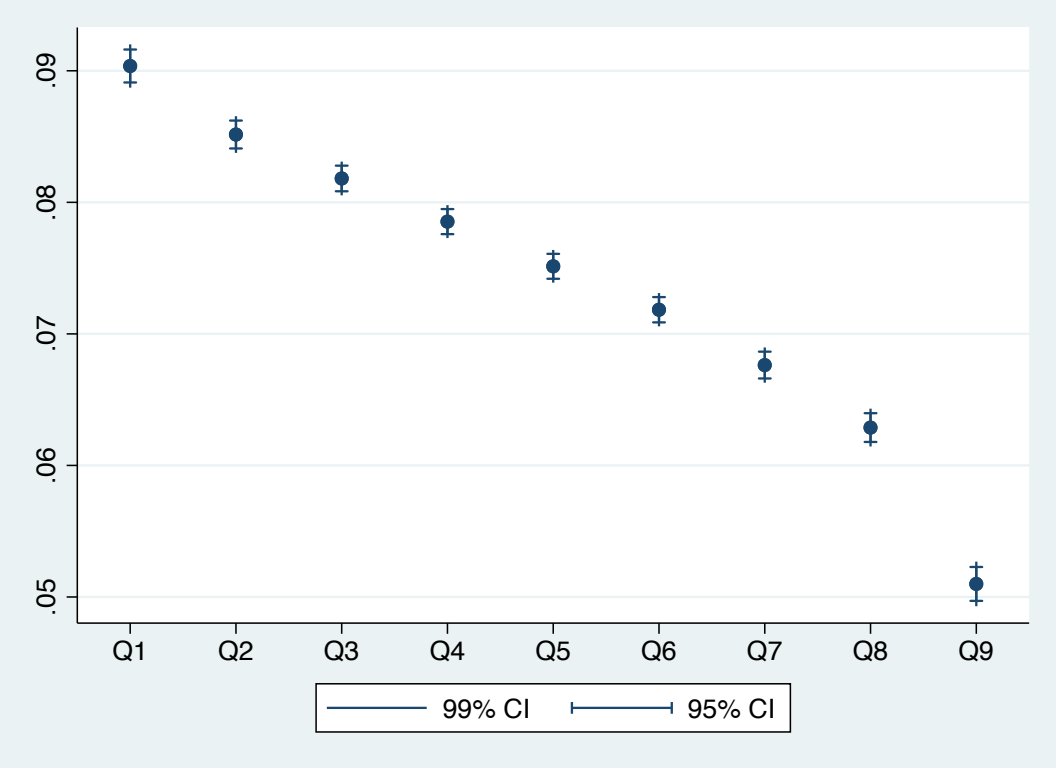

Figure 5-1 Quantile plots for Like (*Title Length*)

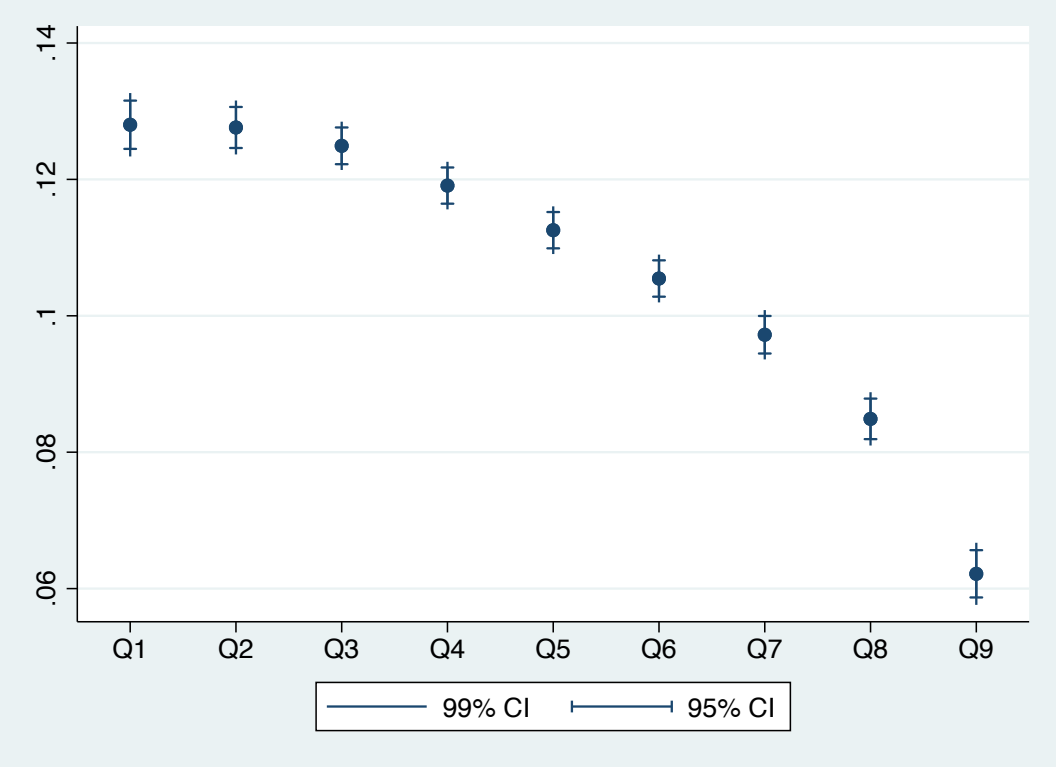

Figure 5-2 Quantile plots for Like (*Emoji Use*)

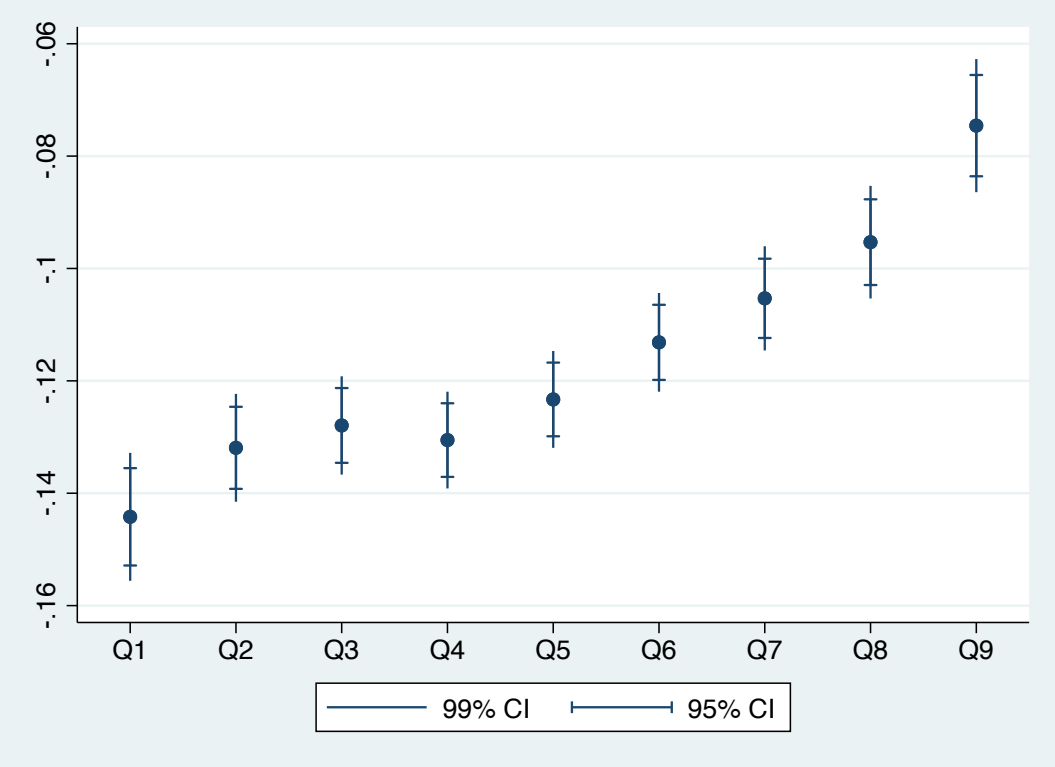

Figure 5-3 Quantile plots for Like (*Sentiment strength*)

5.2.2 Quantile regression results of Title effects on Comments

The coefficients of *Title length* across column (1) to column (9) in Table 5-3 are all significantly positive but the magnitude of these coefficients decreases as the number of comments received by the short videos goes up. It is similar with the coefficients of the effects on like, which suggests that despite the positive effect of longer titles on promoting viewers to give comments to the short videos, such effect substantially weakens for short videos with large number of comments. The coefficients estimated by quantile regressions for each explanatory variable in Figure 5-4, 5-5, 5-6.

From the first decile to the ninth decile, the coefficient for *Emoji use* decreases to 0.011 in the fourth decile from 0.023, and then bounds up to 0.026. The U-shaped relationship between the magnitude of the influence of emoji use and the deciles of comments received is interesting. I think such a relationship reflects the fact that making comments is a different engagement activity from giving likes. Making comments require more time, energy, and cognitive resources input from viewers. Therefore, the viewers need stronger engagement intention.

Although in general the number of comments received is positively associated with the quality of the video content, those short videos with a large quantity of comments need to possess some characteristics in addition to high attractiveness. They have the ability to inspire strong empathy, not only appreciation, of the video viewers. Using emoji in the video title greatly facilitates the emotional transmission thus are important to inspire the video viewers to express their opinions. As a result, we see the phenomenon that using emoji becomes less important to promoting viewers' comment behavior as the popularity of video content increases, but its influence strengthens for those short videos with a large number of comments.

The coefficients of *Text sentiment* are all significantly negative from column (1) to column (9). The magnitude of these coefficients remains stable with slight fluctuations less than 0.01. This suggests that the sentiment strength of short video titles has a consistent negative effect on the comments giving behavior of viewers across all the deciles of comments count. As discussed above, engaging through making comments requires higher empathy than giving likes. The comments count of a short video is positively associated with its ability to inspire empathy as well as the attractiveness of its content.

Overall, as the comments received by a short video increase, the title length, a characteristic irrelevant to emotional transmission, shows a weakening effect on viewers' engagement of comments, while the emoji use and sentiment strength, which are two characteristics closely related with emotional contagion and empathy inspiration, still play a significant role in promoting viewers' engagement of comments. The relationships between title characteristic variables and comments count identified by the baseline model in Table 5-1 consistently exist across all the deciles of comments in Table 5-3.

Table 5-3 Quantile regression result of Comments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	.1	.2	.3	.4	.5	.6	.7	.8	.9
Title Length	0.128***	0.092***	0.079***	0.071***	0.065***	0.059***	0.054***	0.052***	0.058***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.023***	0.014***	0.013***	0.011***	0.011***	0.011***	0.011***	0.016***	0.026***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Sentiment strength	-0.020***	-0.021***	-0.018***	-0.023***	-0.026***	-0.026***	-0.029***	-0.028***	-0.034***
	(0.008)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
View count	0.772***	0.755***	0.745***	0.738***	0.731***	0.724***	0.717***	0.709***	0.697***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Duration	0.237***	0.193***	0.173***	0.157***	0.141***	0.124***	0.106***	0.084***	0.056***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time elapsed	0.064***	0.014***	-0.003***	-0.013***	-0.019***	-0.024***	-0.026***	-0.028***	-0.026***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.448***	0.436***	0.454***	0.469***	0.478***	0.483***	0.476***	0.462***	0.444***
	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Topic 2	0.371***	0.309***	0.295***	0.282***	0.274***	0.264***	0.254***	0.242***	0.245***
	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Video count	-0.078***	-0.081***	-0.084***	-0.088***	-0.091***	-0.092***	-0.095***	-0.098***	-0.101***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Follower count	-0.086***	-0.050***	-0.036***	-0.029***	-0.026***	-0.026***	-0.026***	-0.024***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	2.633***	3.079***	3.348***	3.577***	3.793***	4.016***	4.257***	4.550***	4.965***
	(0.013)	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.009)
Observations	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636	3,370,636

Notes: This table reports the quantile regression results for the influence of the title characteristics on comments giving by viewers. All the discrete variables have been scaled by logarithm. Robust standard errors are reported in parentheses; ***, **, and * represent $p<0.01$, $p<0.05$, and $p<0.1$ respectively.

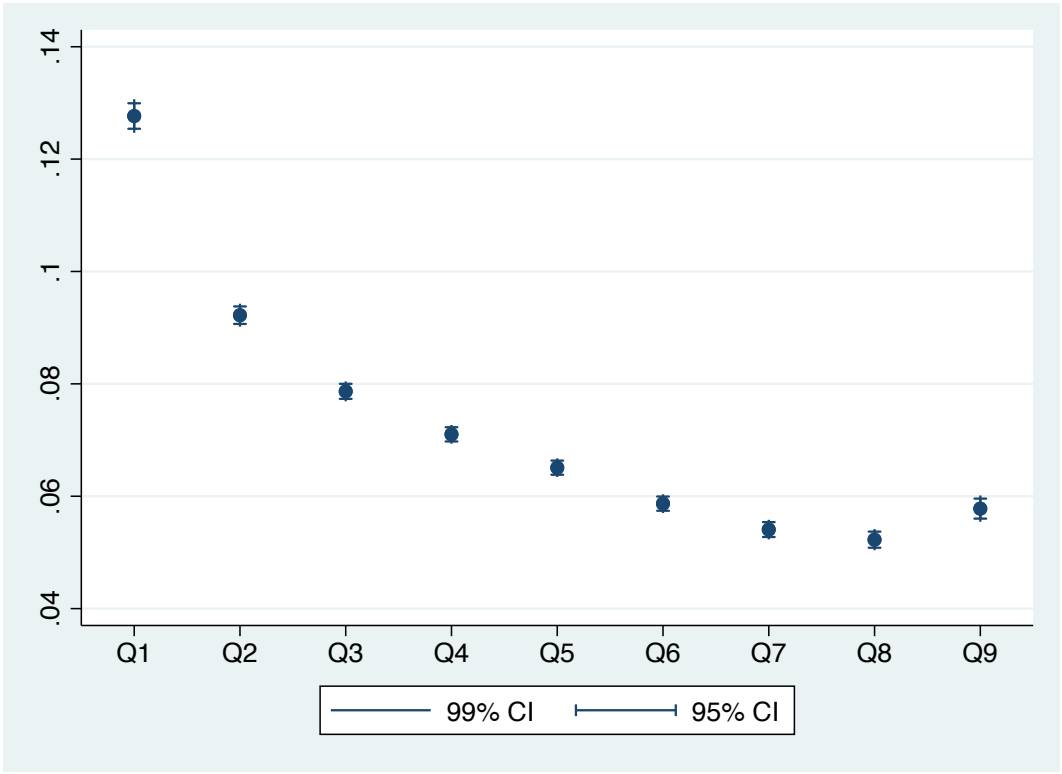

Figure 5-4 Quantile plots for Comments (*Title Length*)

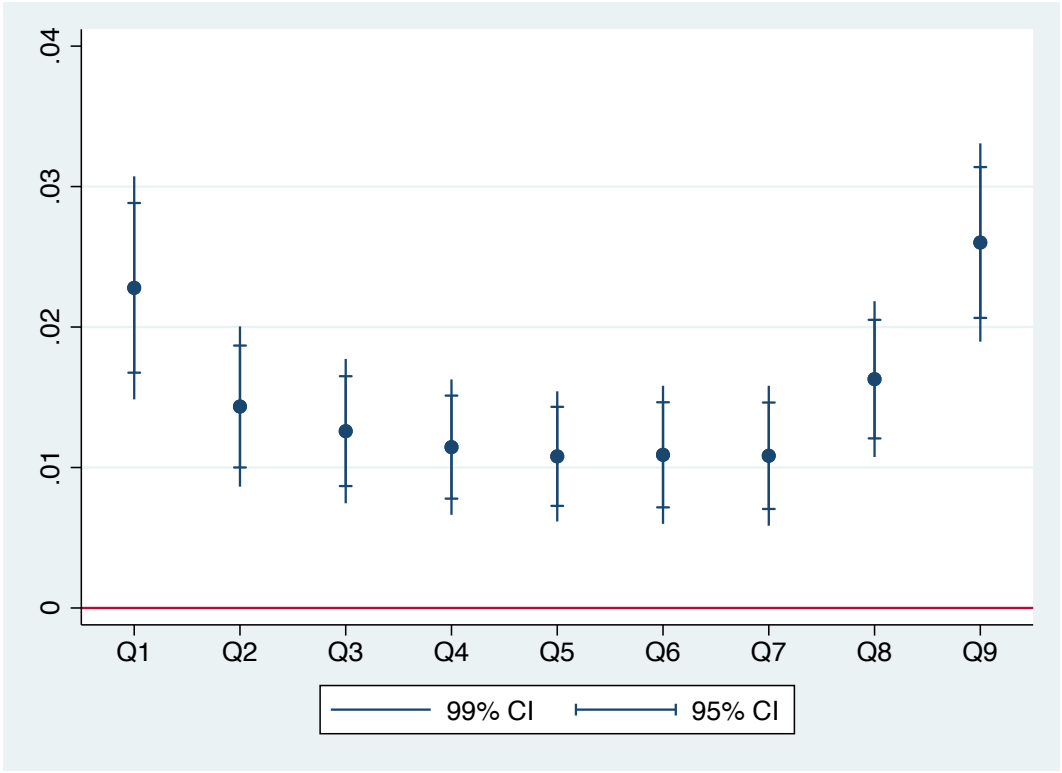

Figure 5-5 Quantile plots for Comments (*Emoji Use*)

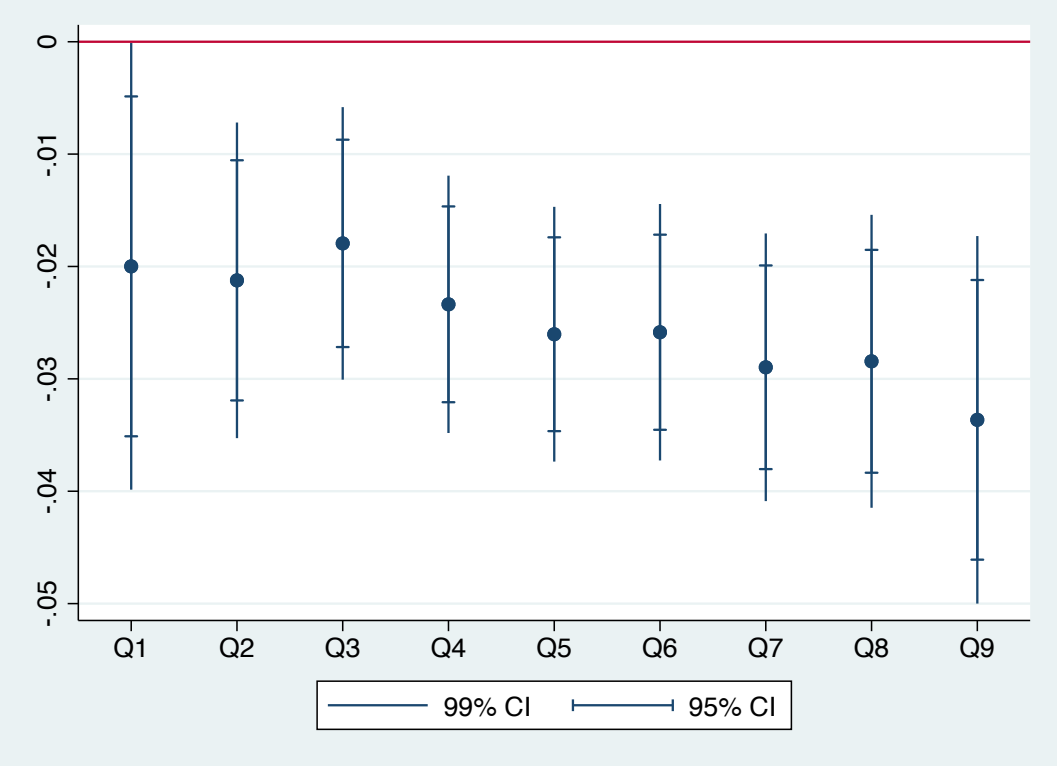

Figure 5-6 Quantile plots for Comments (*Sentiment strength*)

5.3 Summary of Hypothesis Testing Results

In sum, I find that longer short video titles have a significant positive effect both on the likes giving and comments making by viewers. The positive relationships hold for fixed effects model and across all the deciles of likes (or comments). Thus, the empirical evidence supports ***H1*** which states that a longer short video title increases viewers' engagement. I also find that stronger sentiment of short video titles is negatively associated with the likes and comments received by the short videos. The negative effects remain robust for fixed effects model and across all the deciles of likes (or comments). Therefore, ***H2a*** which proposes that lower sentiment strength of short video titles increases viewers' engagement is supported. The results show that short videos whose titles containing emojis receive more likes and more comments. Such results hold for fixed effects model and across all the deciles of customer engagement. The empirical evidence supports ***H3a*** which argues that adding emojis in the title

increases viewers' engagement. The hypotheses testing results are summarized in Table 5-4 below.

Table 5-4 Results of Hypotheses Testing

Hypotheses	Supported or not
H1: A longer short video title is positively associated with viewers' engagement after watching the video.	Yes
H2a: Lower sentiment strength of short video titles is positively associated with viewers' engagement after watching the video.	Yes
H2b: Higher sentiment strength of short video titles is positively associated with viewers' engagement after watching the video.	No
H3a: The inclusion of emojis in the title is positively associated with viewers' engagement after watching the video.	Yes
H3b: The inclusion of emojis in the title is negatively associated with viewers' engagement after watching the video.	No

Chapter 6 Analysis of Moderating Effects

In this section, I examine the moderating effects of video characteristics and video creator's characteristics on the relationship between the video titles viewers engagement. Video characteristics include the video duration and topics. Video creator characteristics include the number of follower count and the number of short videos posted in the past. All the models in this chapter are creator-level fixed effect models.

6.1 Video Characteristics

6.1.1 Video Duration

In this section, I examine how the signaling effect of short video titles varies among short videos of different length of duration. I added the interactions between each title characteristic variable and *Duration* into my regression model. The results on the moderating effect of video duration on how title characteristics influence likes giving behavior of viewers are displayed in Table 6-1. As reported in Column (4) of Table 6-1, the interaction item of *Title Length* and *Duration* has a significantly positive coefficient. This suggests that longer short video titles have a more positive effect on the likes giving by viewers for longer short videos. The coefficient for the interaction between *Emoji use* and *Duration* is significantly positive at the 1% level. This indicates that a title containing emojis increases the likes received by the short video more for longer short videos. The coefficient for the interaction between *Sentiment strength* and *Duration* is nonsignificant in column (4). Overall, the results in Table 6-1 suggest that the title length and emoji using in the titles have stronger influences on likes giving by the viewers for longer short videos.

Whether the signaling role of titles is effective in reducing information asymmetry between video creators and video viewers depends on whether the viewers can receive the signal and how well the viewers can interpret the signal. Videos with longer duration

provide higher opportunities for viewers to be attracted by peripheral objects, thereby increasing the possibility of viewers to receive the signals contained in the short video titles. In addition, longer video duration also makes viewers have more time to think about the short video titles, thus viewers can have a better understanding of the signals contained in the short video titles.

What's more, longer videos usually provide a large amount of information. From the perspective of viewers' signal demand, the signals in the short video titles are more valuable for viewers to better understand the video content when they watch longer videos. Thus, the short video titles play a more salient signaling role for short videos of longer duration. Based on the theoretical analysis above, it is not surprising to observe that the duration of short videos strengthens the positive effect of title length and emojis in the title on viewers' likes giving. The evidence in Table 6-1 is consistent with our discussion on the mechanisms about how the characteristics of the short video titles influence the engagement intention of the viewers in hypotheses development section.

Table 6-1 The moderating effect of Duration on Like

VARIABLES	(1) Log(like+1)	(2) Log(like+1)	(3) Log(like+1)	(4) Log(like+1)
Title Length	0.014***	0.014***	0.014***	0.014***
	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.034***	0.034***	0.034***	0.034***
	(0.001)	(0.001)	(0.001)	(0.001)
Sentiment strength	-0.039***	-0.039***	-0.038***	-0.039***
	(0.002)	(0.002)	(0.002)	(0.002)
View count	0.893***	0.893***	0.893***	0.893***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.141***	0.140***	0.141***	0.140***
	(0.001)	(0.001)	(0.001)	(0.001)
Time elapsed	-0.019***	-0.019***	-0.019***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.094***	0.093***	0.093***	0.094***
	(0.002)	(0.002)	(0.002)	(0.002)
Topic 2	0.039***	0.039***	0.039***	0.039***
	(0.002)	(0.002)	(0.002)	(0.002)
Title Length*Duration	0.006***			0.006***
	(0.001)			(0.001)
Emoji use*Duration		0.010***		0.005***
		(0.002)		(0.002)
Sentiment strength*Duration			0.009***	-0.000
			(0.003)	(0.003)
Constant	6.108***	6.109***	6.109***	6.108***
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.846	0.846	0.846	0.846
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the duration of short videos moderates the influence of the title characteristics on likes giving by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent $p<0.01$, $p<0.05$, and $p<0.1$ respectively.

The regression results on the moderating effect of video duration on how title characteristics influence comments making of viewers are reported in Table 6-2. As shown in Column (4) of Table 6-2, the coefficient for the interaction between *Emoji use* and *Duration* is significantly negative at the 1% level while the coefficient for the interaction between *Title Length* and *Duration* and the coefficient for the interaction between *Sentiment strength* and *Duration* are neither significant. This indicates that a title containing emojis increases the comments received by the short video more for short videos of shorter duration. On the whole, the results in Table 6-2 suggest that the emoji using in the titles have stronger influences on comments making by the viewers for shorter short videos.

It is interesting to observe that video duration moderates the effect of title characteristics on comments in an opposite direction to the one in which it moderates the effect of title characteristics on likes. Such results might be caused by the fact that making a comment for a short video is a totally different engagement activity from giving a like to a short video. Making comments and giving likes are different at least in two points. The first one is that people can only make comments for short videos of which they have a very good understanding, but they don't need to deeply understand the short videos to which they give likes. The second point lies in that it takes people much more cost, including time, energy, and cognitive resources, to make a comment than to give a like. These two differences mean that short videos which are more likely to receive comments usually have different characteristics from those which are more likely to receive likes.

For instance, the social distance between the viewers and the video creators might influence the viewers' preference for engagement activities when they have interactive intentions while watching the video. When the social distance between the viewer and the video creator is long, the viewers are more likely to show their agreement, empathy, or appreciation by giving likes. But when the short video works are posted by creators

who are positioned in a place of a short social distance, the viewer feel more familiar with the video creators, and they are more likely to interact with the creators through making comments. For short videos posted by business organizations, usually long social distance exists between the viewer and the video creator, under which case the viewer is more likely to give a like to show his/her positive affection towards the video content. For short videos posted for non-business purposes, the social distance between the viewer and the video creator tends to be short, under which case the viewers are more likely to interact with the video creators through making comments, especially for those short videos posted by creators with whom they are very familiar.

On the one hand, videos posted for non-business purposes are more likely to have been made by non-professional video creators and thus is short in duration. On the other hand, since the viewers are familiar with the video creators, they have less degree of information asymmetry. The adoption of signaling to communicate information conditions on the incentive of senders and the information demand of receivers. Under the case where viewers are familiar with the video creators, the video creators have less incentive to signal through titles and the viewers also have less need for those signals. Consequently, the positive role of using emojis in the title in encouraging viewers to make comments diminishes as the video duration becomes longer.

Another case where the viewers have intention to make comments is when the short videos have aroused high agreement or empathy of the viewers. However, under such case, viewers are more likely to be involved with the video content at a high level, where they focus more on the video itself and pay less attention to the title. Longer duration makes the viewers immersed in the video content thereby decreasing the possibility that the viewers are attracted by heuristic cues in the titles. Therefore, the title characteristics have less influences on viewers' engagement of comments for

longer short videos. Such results further support the theoretical foundation of signaling which has been discussed in hypotheses development section.

Table 6-2 The moderating effect of Duration on Comments

VARIABLES	(1) Log(comment+1)	(2) Log(comment+1)	(3) Log(comment+1)	(4) Log(comment+1)
Title Length	0.016***	0.016***	0.016***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.011***	0.012***	0.011***	0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
Sentiment strength	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
View count	0.701***	0.701***	0.701***	0.701***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.109***	0.111***	0.109***	0.111***
	(0.002)	(0.002)	(0.002)	(0.002)
Time elapsed	-0.019***	-0.019***	-0.019***	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.121***	0.121***	0.121***	0.121***
	(0.003)	(0.003)	(0.003)	(0.003)
Topic 2	0.042***	0.042***	0.042***	0.042***
	(0.004)	(0.004)	(0.004)	(0.004)
Title Length*Duration	-0.002**			-0.002
	(0.001)			(0.001)
Emoji use*Duration		-0.011***		-0.009***
		(0.003)		(0.003)
Sentiment strength*Duration			0.004	0.007
			(0.005)	(0.005)
Constant	3.971***	3.971***	3.971***	3.971***
	(0.005)	(0.005)	(0.005)	(0.005)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.538	0.538	0.538	0.538
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the duration of short videos moderates the influence of the title characteristics on comments making by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each short video account are always controlled. Robust

standard errors are reported in parentheses; ***, **, and * represent p<0.01, p<0.05, and p<0.1 respectively.

6.1.2 Topics

In this section, I examine how the relationships between title characteristics and user engagement vary among short videos of different topics. The topic of each short video is determined by the LDA model. Based on the analysis results of the LDA model, I categorize all the sample short videos into three groups of topics: emotion, game and live-streaming, and food and life. The keywords for each topic are reported in Table 6-3. I use the topic analysis model to predict the probabilities for each short video to fall into each topic group and the topic group of each short video is finally determined by the highest probability estimated by the topic prediction model. For example, if the probability prediction result for each topic of a short video is [0.5, 0.2, 0.3], where the maximum probability value is 0.5, then this short video will be grouped into Topic 1. Specifically, the dummy variable of Topic1 for this short video takes the value of 1 while the dummy variables of Topic 2 and Topic 3 both take the value of 0.

Table 6-3 Topic categories

		Words
Topic 1	Emotion	能量 生活 平台 努力 真的 传播 加油 快乐 希望 哈哈哈 拍点 情感 开心 七夕 孩子
Topic 2	Game and live-streaming	直播 视频 评论 谢谢 更新 王者 荣耀 作品 老铁 记得 精英 和平 晚上 搞笑 直播间
Topic 3	Food and life	热爱 时尚 美食 日常 分享 世界 吃货 宝宝 好看 触漫 搭配 好吃 团队 迷你 小号

To examine the moderating effects of topic dummies on the relationships between title characteristics and user engagement, I interacted each topic variable with each title characteristic variable and inserted these interactions into the regression model. The regression results on the moderating effects of short video topics on likes are reported

in Table 6-4. In column (4) of Table 6-4, all the coefficients before the interactions of *Title Length* and each topic variable are significantly positive at the 1% level while the largest coefficient occurs in Topic 1 group. This suggests that a longer title can increase the likes of a short video from any topic group, but it has the most positive effect for short videos of Topic 1. The coefficients before the interactions centered by *Emoji use* and *Sentiment strength* exhibit a similar pattern with those for the interactions centered by *Title Length*. In order to compare the moderating effects of different short video topics more directly, I plot the coefficients of the interactions for each title characteristic variable separately in Figure 6-1, Figure 6-2, and Figure 6-3. On the whole, the results in Table 6-4 show that the signaling efforts that the video creators put into the short video titles, including extending title length, using emojis and decreasing sentiment strength, are more effective in stimulating likes from viewers for short videos with emotional content. Given the implications of signaling theory, such results are not out of my expectation. Short videos of Topic 2 are intended for entertainment or retaining existed followers in live streaming. The information asymmetry between video creators and viewers is not an important issue when viewers watch video works which are just for fun, and there is also less information asymmetry between live streamers and their followers. Therefore, both the signaling incentive of video creators and the signal demand of viewers for short videos of Topic 2 get weakened. Short videos of Topic 3 focus more on describing objective facts and sharing public knowledge, thus the video creators have little discretion over the information conveyed in such videos. Under this case, the information asymmetry between the video creators and the viewers also has less impact on the viewers' evaluation about the video content. However, short videos of Topic 1, which mainly offer emotion-related content, contain many personal opinions and much private knowledge. The content of such short videos is hard to be falsified and is easy to be manipulated by the video creators. Therefore, the information asymmetry problem between creators and viewers for short videos of Topic 1 is the most severe. Under this case, the video creators make more efforts to signal through

short video titles and the viewers also rely more on the signals in the title. As a result, we observe that the title characteristics have the largest influence on viewers' likes giving behavior for short videos with emotion-related content.

Table 6-4 The moderating effect of Topic on Like

	(1)	(2)	(3)	(4)
VARIABLES	Log(like+1)	Log(like+1)	Log(like+1)	Log(like+1)
Title Length		0.019***	0.019***	
		(0.001)	(0.001)	
Emoji use	0.033***		0.033***	
	(0.001)		(0.001)	
Sentiment strength	-0.040***	-0.040***		
	(0.002)	(0.002)		
Title Length *Topic1 dummy	0.020***			0.020***
	(0.001)			(0.001)
Title Length *Topic2 dummy	0.018***			0.018***
	(0.001)			(0.001)
Title Length *Topic3 dummy	0.016***			0.016***
	(0.001)			(0.001)
Emoji use *Topic1 dummy		0.037***		0.035***
		(0.002)		(0.002)
Emoji use *Topic2 dummy		0.032***		0.032***
		(0.002)		(0.002)
Emoji use *Topic3 dummy		0.027***		0.029***
		(0.002)		(0.002)
Sentiment strength			-0.043***	-0.046***
*Topic1 dummy			(0.003)	(0.003)
Sentiment strength			-0.039***	-0.039***
*Topic2 dummy			(0.003)	(0.003)
Sentiment strength			-0.035***	-0.032***
*Topic3 dummy			(0.004)	(0.004)
View count	0.893***	0.893***	0.893***	0.893***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.141***	0.141***	0.141***	0.141***

	(0.001)	(0.001)	(0.001)	(0.001)
Time elapsed	-0.019***	-0.019***	-0.019***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic1 dummy	0.041***	0.040***	0.041***	0.040***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic2 dummy	0.017***	0.018***	0.018***	0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	6.133***	6.133***	6.132***	6.133***
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.846	0.846	0.846	0.846
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the time length for which a short video has been posted moderates the influence of the title characteristics on likes giving by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent p<0.01, p<0.05, and p<0.1 respectively.

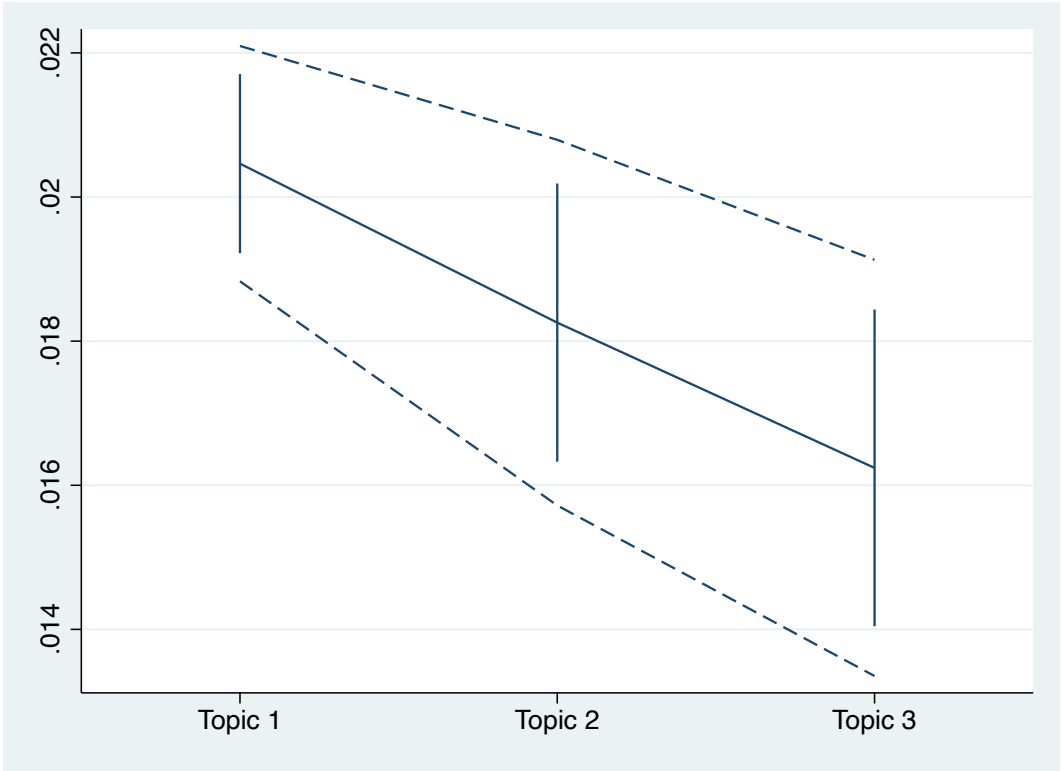

Figure 6-1 The coefficients plot for *Title Length*

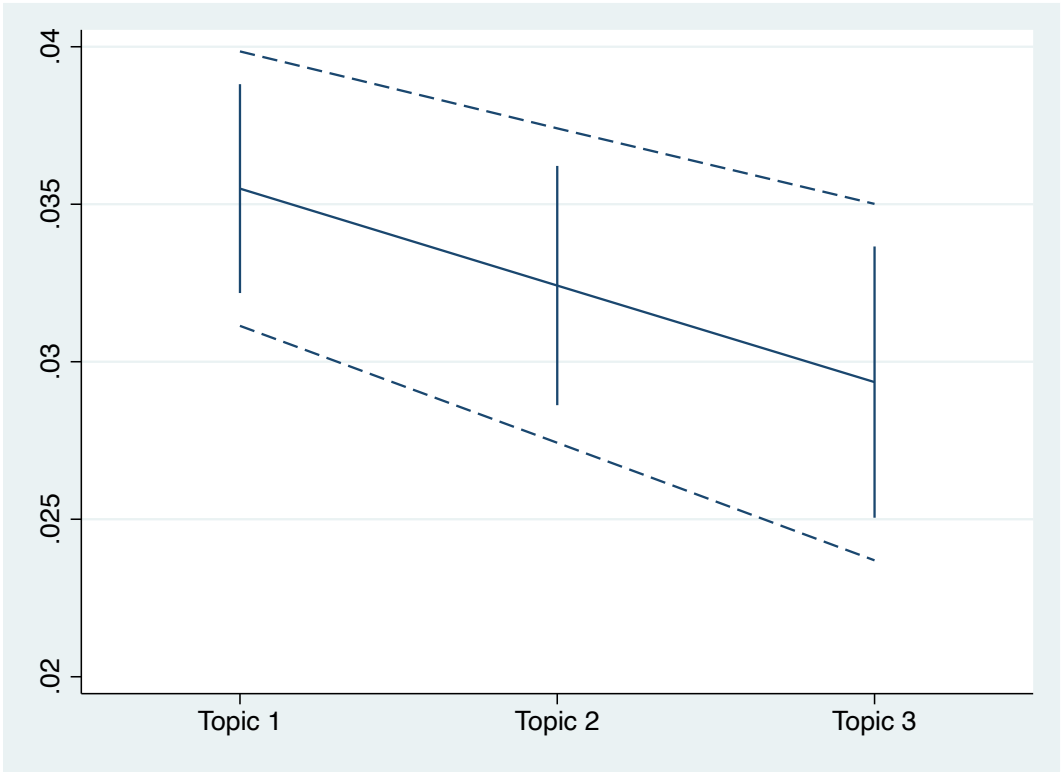

Figure 6-2 The coefficients plot for *Emoji Use*

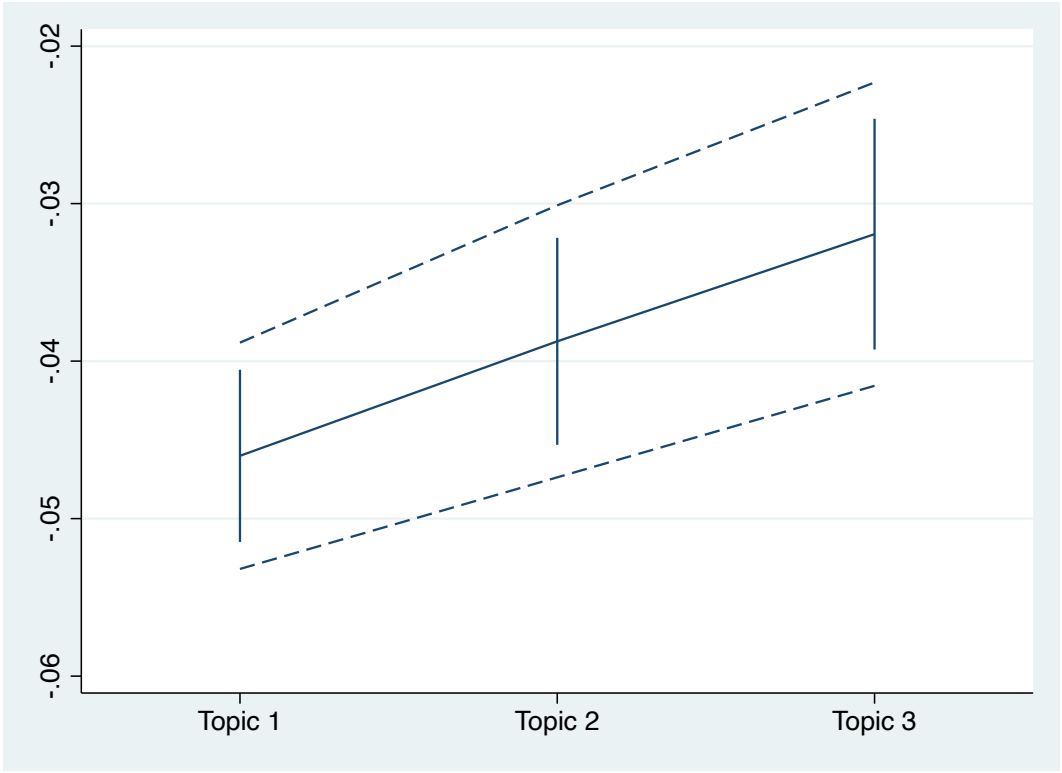

Figure 6-3 The coefficients plot for *Sentiment strength*

The regression results on the moderating effects of short video topic on the relationships between title characteristics and comments are reported in Table 6-5. The coefficients of all the interaction items for each title characteristic are plotted in Figure 6-4, Figure 6-5, and Figure 6-6. As shown in the three figures, the moderating effects of short video topics on how each title characteristic influences comments making by viewers are consistent with those for likes giving by viewers, except the one regarding emoji use in the title. As displayed in Figure 6-5, adding emojis into the title exerts as much positive influence on promoting viewers to make comments for short videos of Topic 3 as that for short videos of Topic 1. It is interesting to observe that emojis in the title promote comments more than likes for short videos of Topic 3. I try to explain this phenomenon from two aspects. First, viewers are more likely to engage with short videos from Topic 3 group by making comments. Compared with short videos of the other two topics, short videos of Topic 3 offer more informal content and focus on sharing daily life or public knowledge. Understanding such type of information requires lower cognitive ability so the audience base for short videos of Topic 3 tends to be larger. Also, processing such information costs less cognitive resources, so it is much easier for viewers to make comments for short videos of Topic 3. Given that making comments costs viewers more than giving likes, short videos of Topic 3 are expected to receive more comments from viewers. Second, using emojis in the title is more effective in promoting viewers' engagement with short videos of Topic 3. Short videos of Topic 3 provide more hedonic content. Viewers watch such short videos for fun, aesthetics, and pleasure. Emojis, as a typical figurative language, fit well with the emotional profile of hedonic content thus are more effective in strengthening viewers' positive attitudes towards the short video (Das et al., 2019). Consequently, emoji use in titles for short videos of Topic 3 are more likely to increase viewers' engagement intention. Based on the two points discussed above, it is reasonable to observe that for short videos of Topic 3, emoji use in the titles plays a more important role in promoting viewers to make comments than to give likes.

Table 6-5 The moderating effect of Topic on Comments

	(1)	(2)	(3)	(4)
VARIABLES	Log(comment+1)	Log(comment+1)	Log(comment+1)	Log(comment+1)
Title Length		0.023***	0.023***	
		(0.001)	(0.001)	
Emoji use	0.010***		0.008***	
	(0.002)		(0.002)	
Sentiment strength	-0.003	-0.004		
	(0.003)	(0.003)		
Title Length *Topic1 dummy	0.031***			0.031***
	(0.001)			(0.001)
Title Length *Topic2 dummy	0.013***			0.013***
	(0.002)			(0.002)
Title Length *Topic3 dummy	0.006***			0.005***
	(0.002)			(0.002)
Emoji use *Topic1 dummy		0.021***		0.013***
		(0.003)		(0.003)
Emoji use *Topic2 dummy		0.001		0.005*
		(0.003)		(0.003)
Emoji use *Topic3 dummy		0.002		0.013***
		(0.004)		(0.004)
Sentiment strength *Topic1 dummy			0.004	-0.014***
			(0.005)	(0.005)
Sentiment strength *Topic2 dummy			-0.014**	-0.007
			(0.006)	(0.006)
Sentiment strength *Topic3 dummy			-0.001	0.017***
			(0.007)	(0.007)
View count	0.701***	0.700***	0.700***	0.701***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.109***	0.109***	0.109***	0.109***
	(0.002)	(0.002)	(0.002)	(0.002)
Time elapsed	-0.018***	-0.018***	-0.018***	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic1 dummy	0.049***	0.049***	0.051***	0.049***
	(0.002)	(0.002)	(0.002)	(0.002)

Topic2 dummy	0.019***	0.022***	0.021***	0.020***
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	4.005***	4.002***	4.001***	4.005***
	(0.005)	(0.005)	(0.005)	(0.005)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.538	0.538	0.538	0.538
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the time length for which a short video has been posted moderates the influence of the title characteristics on likes giving by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent p<0.01, p<0.05, and p<0.1 respectively.

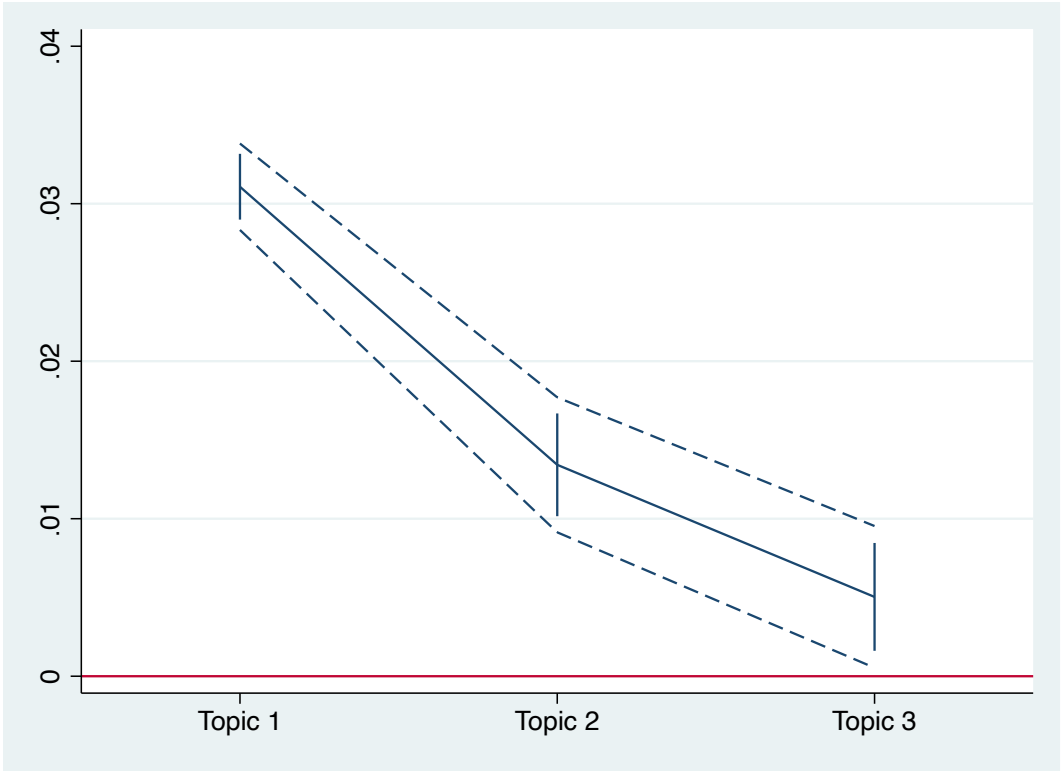

Figure 6-4 The coefficients plot for *Title length*

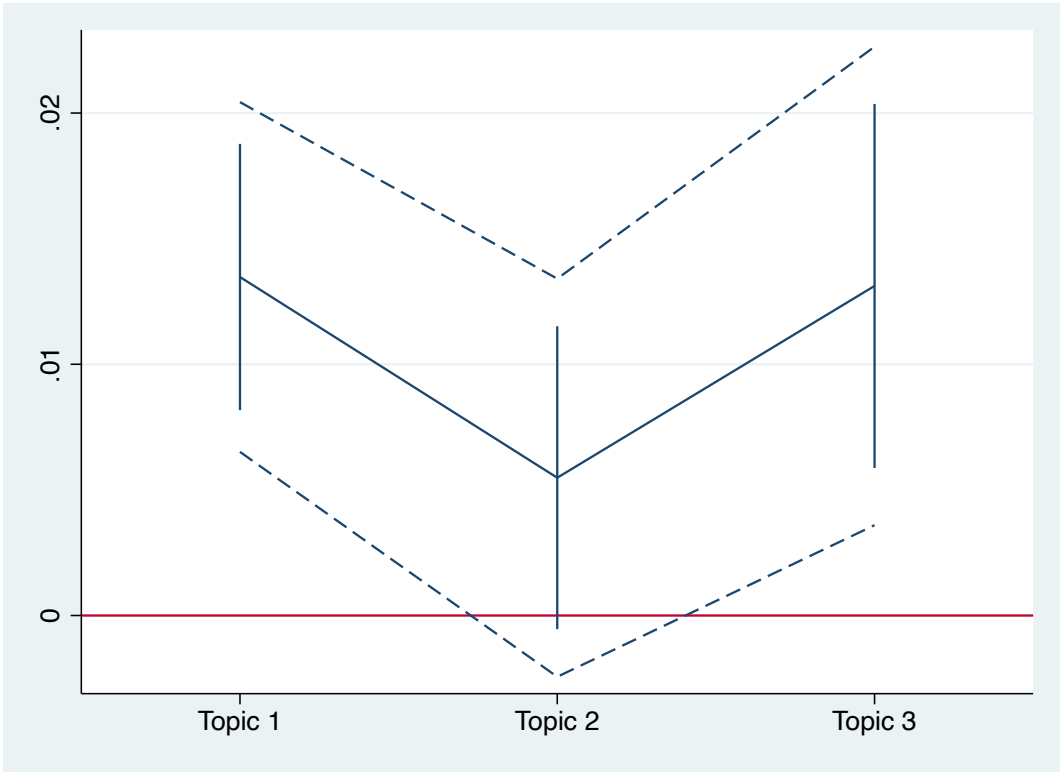

Figure 6-5 The coefficients plot *Emoji Use*

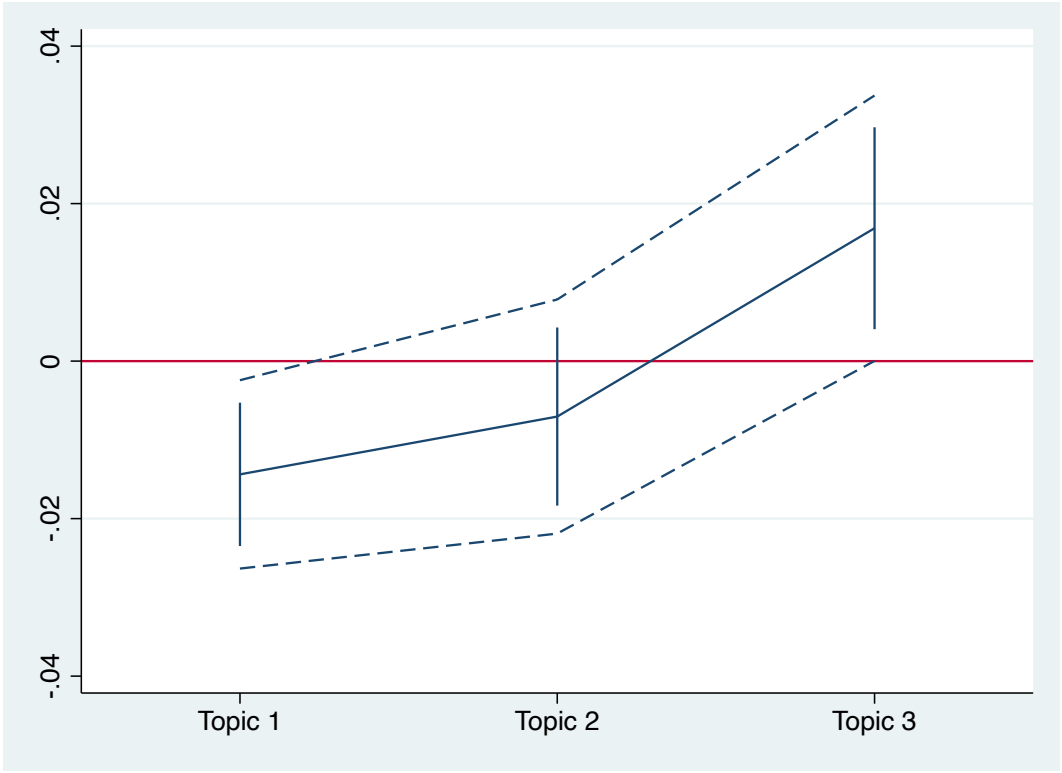

Figure 6-6 The coefficients plot for *Sentiment strength*

6.2 Video Creator Characteristics

6.2.1 Number of Followers

In this section, I examine how the popularity of the video creator moderates the effect of short video titles on viewers' engagement intention. I use the number of followers to proxy the popularity of a video creator. Video creators with large number of followers have more social currency and their video works are more influential on the short video platforms. Specifically, I interacted each title characteristic variable with *Followers Count* and inserted those interactions into my regression model. Table 6-6 reports the moderating effects of *Followers Count* on how title characteristics influence likes giving behavior of viewers. The coefficient for the interaction item of *Title Length* and *Follower count* is nonsignificant in column (4). This indicates that the video creator's popularity has no moderating effect on the relationship between the title length and the likes of the short videos posted by the creator. The coefficient for the interaction between *Emoji use* and *Follower count* is significantly positive at the 1% level in column (4). This indicates that the video creator's popularity intensifies the positive effect of adding emojis into the title on stimulating more likes from viewers. The coefficient for the interaction between *Sentiment strength* and *Follower count* is significantly negative at the 10% level in column (4). This indicates that the video creator's popularity deepens the negative effect of sentimental titles on increasing likes from viewers. In summary, the results in Table 14 show that the influences of using emojis in the short video title and the sentiment strength of the title on likes giving intention of viewers are strengthened for short videos posted by creators with more followers.

Most video creators share their works on short video platforms to earn social currency, which can be transformed into great pecuniary interests through business marketing activities. Obviously, the number of followers is a proxy for social currency of the video creator. Video creators with more followers have more social currency. Therefore,

video creators usually update short video works periodically to attract new followers. On the one hand, larger number of followers strengthens the incentive of video creators to increase their followers because as the number of followers increases to an upper level, the marginal economic value brought by the short video account grows higher. On the other hand, as the number of followers become larger, the video creator has accumulated more experience in attracting new followers. Therefore, video creators with more followers both have greater incentive and better ability to signal through compiling the short video titles strategically.

There is high information asymmetry between the video creator and the viewers who did not follow the creator before, thus viewers usually take extra caution when they make engagement decisions for short videos posted by such creators. Under this case, the heuristic cues offered in the short video titles are more useful for viewers to understand and evaluate the video content. Since the video creators with more followers usually update short videos to attract new followers, they put more emphasis on engaging potential followers, making the signaling effect of titles more important for information communication between the video creators and the viewers. Therefore, both the incentive of the creators to send signal through short video titles and the demand for signals in the short video titles of the viewers are strengthened. Consequently, signaling effect of title characteristics plays a more significant role for short videos posted by creators with more followers.

Table 6-6 The moderating effect of Follower count on Like

VARIABLES	(1) Log(like+1)	(2) Log(like+1)	(3) Log(like+1)	(4) Log(like+1)
Title Length	0.014***	0.014***	0.014***	0.014***
	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.034***	0.033***	0.034***	0.033***
	(0.001)	(0.001)	(0.001)	(0.001)
Sentiment strength	-0.039***	-0.038***	-0.038***	-0.038***
	(0.002)	(0.002)	(0.002)	(0.002)
View count	0.893***	0.893***	0.893***	0.893***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.141***	0.141***	0.141***	0.141***
	(0.001)	(0.001)	(0.001)	(0.001)
Time elapsed	-0.019***	-0.019***	-0.019***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.094***	0.093***	0.093***	0.093***
	(0.002)	(0.002)	(0.002)	(0.002)
Topic 2	0.039***	0.039***	0.039***	0.039***
	(0.002)	(0.002)	(0.002)	(0.002)
Title Length*Follower count	0.001**			0.000
	(0.000)			(0.000)
Emoji use*Follower count		0.005***		0.005***
		(0.001)		(0.001)
Sentiment strength*Follower count			-0.001	-0.002*
			(0.001)	(0.001)
Constant	6.109***	6.109***	6.109***	6.109***
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.846	0.846	0.846	0.846
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the number of followers of an account moderates the influence of the title characteristics of short videos released by the account on likes giving by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent $p<0.01$, $p<0.05$, and $p<0.1$ respectively.

The regression results on the moderating effects of *Followers Count* on how title characteristics influence comments making behavior of viewers are reported in Table 6-7. The coefficients for the interaction item of *Title Length* and *Follower count* and the interaction item of *Sentiment strength* and *Follower count* are both nonsignificant in column (4). This indicates that the video creator's popularity neither moderates the relationship between the title length and the comments of the short videos nor moderates the relationship between the sentiment strength of the title and the comments of the short videos. The coefficient for the interaction between *Emoji use* and *Follower count* is significantly positive at the 5% level. This suggests that the positive effect of emojis use in the title on stimulating comments from viewers is larger among short videos posted by the video creators with more followers. The moderating effect of the popularity of video creators on comment making by viewers is similar with that for likes giving by viewers. However, the mechanisms underlying these two moderating effects might be different. The moderating effect of creator's popularity on likes is driven by greater signaling incentive and demand while its moderating effect on comments is resulted from more viewers positioned in shorter social distance. As discussed in previous section, different from giving likes, making comments required more cost of viewers. Although more followers do not mean more comments, viewers who made comments for a short video possibly have followed its creator. For creators with more followers, they also have a larger base of viewers with whom they have established close relationships. Such viewers are more likely to engage with the short videos through making comments, under which case the heuristic cues in the title can play a more significant role in encouraging the viewers to make comments. Therefore, we observe that the positive effect of emojis use in the title becomes stronger for short videos posted by more popular creators.

Table 6-7 The moderating effect of Follower count on Comments

	(1)	(2)	(3)	(4)
VARIABLES	Log(comment+1)	Log(comment+1)	Log(comment+1)	Log(comment+1)
Title Length	0.016***	0.016***	0.016***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.011***	0.010***	0.011***	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)
Sentiment strength	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
View count	0.701***	0.701***	0.701***	0.701***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.109***	0.109***	0.109***	0.109***
	(0.002)	(0.002)	(0.002)	(0.002)
Time elapsed	-0.019***	-0.019***	-0.019***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.122***	0.121***	0.121***	0.121***
	(0.003)	(0.003)	(0.003)	(0.003)
Topic 2	0.042***	0.042***	0.042***	0.042***
	(0.004)	(0.004)	(0.004)	(0.004)
Title Length* Follower count	0.001			0.000
	(0.001)			(0.001)
Emoji use* Follower count		0.003**		0.003**
		(0.001)		(0.001)
Sentiment strength* Follower count			0.002	0.001
			(0.002)	(0.002)
Constant	3.971***	3.971***	3.971***	3.971***
	(0.005)	(0.005)	(0.005)	(0.005)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.538	0.538	0.538	0.538
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the number of followers of an account moderates the influence of the title characteristics of short videos released by the account on comments making by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each

short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent p<0.01, p<0.05, and p<0.1 respectively.

6.2.2 Amount of Past Work

In this section, I examine how the productivity of the video creator moderates the relationships between title characteristics and viewers' engagement. I use the amount of past works to proxy the video creator's productivity and add interactions of *Video Count* and each title characteristic variable into the regression model. The regression results are shown in Table 6-8. As indicated by the results in column (4) of Table 6-8, the interaction item of *Title Length* and *Video count* has a positive coefficient, and it is significant at the 1% level. This indicates that title length's positive impact is higher for short videos from productive creators. The coefficient for the interaction between *Emoji use* and *Video count* is nonsignificant, suggesting creator's productivity does not moderate the effect of emoji use in the title. The coefficient for the interaction between *Sentiment strength* and *Video count* is significantly negative at the 5% level. This estimation result to some extent supports that the negative effect of sentiment strength of the title is stronger for videos from productive creators. Overall, the results in column (4) indicate stronger signaling effect of titles of short videos posted by productive creators. On the one hand, productive creators have more experience in promoting engagement of viewers through compiling titles strategically, which means that productive creators have better ability to offer heuristic cues through short video titles. On the other hand, productive creators usually update their short video works to appeal new followers. Therefore, their short videos target more on viewers who are not their followers. Since the information asymmetry between the creators and their target viewers is high, the signaling role of short video titles is more valuable in promoting information communication between creators and viewers. Consequently, we observe that the signaling effect of short video titles are stronger for short videos posted by productive creators.

Table 6-8 The moderating effect of Video count on Like

VARIABLES	(1) Log(like+1)	(2) Log(like+1)	(3) Log(like+1)	(4) Log(like+1)
Title Length	0.014***	0.014***	0.014***	0.014***
	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.035***	0.035***	0.034***	0.035***
	(0.001)	(0.001)	(0.001)	(0.001)
Sentiment strength	-0.039***	-0.038***	-0.038***	-0.039***
	(0.002)	(0.002)	(0.002)	(0.002)
View count	0.893***	0.893***	0.893***	0.893***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.141***	0.141***	0.141***	0.141***
	(0.001)	(0.001)	(0.001)	(0.001)
Time elapsed	-0.019***	-0.019***	-0.019***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.093***	0.093***	0.093***	0.093***
	(0.002)	(0.002)	(0.002)	(0.002)
Topic 2	0.040***	0.039***	0.039***	0.040***
	(0.002)	(0.002)	(0.002)	(0.002)
Title Length*Video count	0.001***			0.001***
	(0.000)			(0.000)
Emoji use*Video count		0.001		0.000
		(0.001)		(0.001)
Sentiment strength*Video count			-0.002	-0.003**
			(0.002)	(0.002)
Constant	6.109***	6.109***	6.109***	6.109***
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.846	0.846	0.846	0.846
Number of user_id	82,776	82,776	82,776	82,776

Notes: This table reports how the number of past works released by an account moderates the influence of the title characteristics of short videos released by the account on likes giving by viewers. All the discrete variables have been scaled by logarithm and the fixed effects of each short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent $p<0.01$, $p<0.05$, and $p<0.1$ respectively.

The results on the moderating effect of creator's productivity on the relationships between three title characteristics and comments making by viewers are reported in Table 6-9. As shown in column (4) of Table 6-9, the interaction item of *Title Length* and *Video count* has a positive coefficient, and it is significant at the 5% level. The coefficient for the interaction between *Emoji use* and *Video count* is positively significant at the 10% level. The coefficient for the interaction between *Sentiment strength* and *Video count* is nonsignificant. In general, the results support that productive creators enhance the signaling effect of title characteristics on promoting viewers to make comments. Better signaling ability and stronger signaling incentive of productive creators, as discussed in the above paragraph, can also help to explain the stronger signaling effect of titles of their video works on promoting viewers' comments. Besides, those creators who frequently update their short video works usually have established very close relationships with their existing followers. Therefore, their video works could successfully attract a large number of viewers positioned in a shorter social distance, who are more willing to engage with the short videos through making comments. Therefore, the productivity of video creators strengthens the effect of title characteristics on promoting viewers' engagement of making comments.

Table 6-9 The moderating effect of Video count on Comments

	(1)	(2)	(3)	(4)
VARIABLES	Log(comment+1)	Log(comment+1)	Log(comment+1)	Log(comment+1)
Title Length	0.016***	0.016***	0.016***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)
Emoji use	0.011***	0.012***	0.011***	0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
Sentiment strength	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
View count	0.701***	0.701***	0.701***	0.701***
	(0.001)	(0.001)	(0.001)	(0.001)
Duration	0.109***	0.109***	0.109***	0.109***
	(0.002)	(0.002)	(0.002)	(0.002)
Time elapsed	-0.018***	-0.018***	-0.019***	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)
Topic 1	0.122***	0.121***	0.121***	0.121***
	(0.003)	(0.003)	(0.003)	(0.003)
Topic 2	0.043***	0.042***	0.042***	0.043***
	(0.004)	(0.004)	(0.004)	(0.004)
Title Length*Video count	0.002**			0.002**
	(0.001)			(0.001)
Emoji use*Video count		0.004**		0.003*
		(0.002)		(0.002)
Sentiment strength*Video count			0.001	-0.001
			(0.003)	(0.003)
Constant	3.971***	3.971***	3.971***	3.971***
	(0.005)	(0.005)	(0.005)	(0.005)
Observations	3,370,636	3,370,636	3,370,636	3,370,636
R-squared	0.538	0.538	0.538	0.538
No. of user id	82,776	82,776	82,776	82,776

Notes: This table reports how the number of past works released by an account moderates the influence of the title characteristics of short videos released by the account on comments making by viewers. All the discrete variables have been scaled by logarithm and the fixed

effects of each short video account are always controlled. Robust standard errors are reported in parentheses; ***, **, and * represent $p<0.01$, $p<0.05$, and $p<0.1$ respectively.

Chapter 7 Conclusion

7.1 Theoretical Contribution

This study focuses on the question whether and how the descriptions of the short video titles affect user engagement. Through data analysis over a large sample of short videos from Kwai, I conducted empirical analysis using regression models, taking endogenous and heterogeneous issues into account, found that short videos with longer titles, with emojis in the titles, with titles of lower sentiment strength receive larger number of likes and comments. My study has several important implications for academic literature and practice. First, this study extends the research on the effectiveness of short video marketing. Prior studies mainly examine how to increase user engagement through improving video content, and explored the marketing effects of short videos and their positive impact on product sales from the perspective of video content, while few studies have discussed how titles affect online user engagement. My research results fill this gap, the findings of my research indicate that the characteristics of short video titles can also make a difference to user engagement. From the perspective of effort signaling and attention catching, the findings show significant impacts of peripheral factors such as title length on user engagement, and as the number of comments and reviews increases, the impact of external factors on video viewers has also changed to a certain extent. Therefore, my research complements the customer engagement literature by providing new evidence under the context of short video marketing. Second, my study complements the literature regarding UGC and MGC. By contrast to prior studies which focus mainly on the influences of UGC and MGC on customer behaviors, the results that title characteristics of short videos affect comments making by viewers provide new evidence from the perspective of the interactive relationships between UGC and MGC, my research findings can illustrate this by documenting how the titles of short videos (MGC) affect audience participation online (UGC). Third, my study also contributes to the literature on the roles of titles in information dissemination and cognitive processing research area. My findings suggest that the titles of short

videos can influence the viewers' perception and judgment of the video content. These results help extend the research on the effects of titles from traditional static materials, like pictures and articles, into new multimedia materials.

7.2 Practical Implications

Nowadays, the short video market is thriving, my work also has several significant managerial implications for social media creators or marketing practioners who seek to increase the engagement of their short videos' audiences.

The results suggest that extending the title length, adding emojis into the title to facilitate emotional expression, and controlling the sentiment strength on the short video can promote the audience to engage more with the short video and bring better marketing performance, while its effects differ depending on the type of engagement activities. Considering the cost control, especially for the video creators, it is worthwhile to spend some efforts on the short video titles when preparing a short video marketing scheme to obtain more audience participation and better marketing effectiveness.

7.3 Limitations and Future Research

Although I have made great efforts to address the endogeneity issue, I have to acknowledge that the major limitation of my research still lies in the difficulty in distinguishing the influence of the video title from that of the video content. Future research may design experiment to better address this endogeneity concern. Through comparing the engagement levels of the same short video under situations where the video title is compiled differently, it is more convincing to establish the causality between title characteristics and engagement activities. Further, currently my study has only investigated the relationships between the length, the sentiment and the emojis of the titles and the user engagement activities. This study does not provide direct evidence

to document the mechanism through which titles influence viewers' engagement behaviors. This deserves further exploration in the future because understanding the mechanisms underlying the association between titles and engagement not only establishes causality, but also helps to explain the title effect under other similar research contexts. Lastly, my research proposes an innovative method to analyze the content of short videos through LDA. This method makes topic analysis for large number of videos possible. I believe this data analysis tool based on machine learning could be applied to many other studies about short videos in this big data era.

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