FIRM RESPONSES TO THE CONTENT AND EMOTIONS EXPRESSED IN SOCIAL-MEDIA WORD OF MOUTH

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ABSTRACT

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This study examines the influence of content and emotional feedback expressed through social-media channels on 1) firm revenues and consumer purchasing decisions, 2) firm quality outcomes, and 3) firm operational and resource allocations. Using psychology theory as a framework and textual analyses methods, I classify web scrapings of millions of social media posts for 19 US airlines for the 2007–2019 period based on their cognitive content and emotional type. I identify social media word-of-mouth (SWOM) feedback about five *quality-related* themes and two *emotional types*. The results show that negative and non-negative quality-related SWOM impact consumer and firm outcomes. Firm revenues and consumer volume decrease (increase) following negative (non-negative) quality-related SWOM. Firms improve quality outcomes (such as on-time performance) following negative quality-related SWOM. Firms also alter the level of operations (carrying capacity), change pricing strategies, and enhance quality-cost investments (quality failure and signaling costs) following quality-related emotional SWOM. In additional analyses, I find that non-quality related SWOM has little to no impact on consumer and firm choices. This research highlights the usefulness of SWOM as a source of customer feedback for firms and its decision-facilitating role. It provides evidence that firms incorporate both the content and emotional type of customer feedback in their management control design.

Keywords: Quality performance, Social-Media, Sentiment, Feedback , Management Controls

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KEY TO ABBREVIATIONS

WOM	Word of Mouth
SWOM	Social-Media Word of Mouth

1. INTRODUCTION

"You can't transform something you don't understand. If you don't know and understand what the current state of the customer experience is, how can you possibly design the desired future state?" - Annette Franz, Founder, CEO of CX Journey Inc, Customer experience thought leader

Organizations use information generated from management control systems (MCS) for planning and decision making to achieve their goals and objectives (Sprinkle, 2003). An important element of MCS is *feedback* to direct attention towards activities that benefit the organization. Feedback, especially from stakeholders such as customers, contains information about the consequences of the organization's current actions (Otley, 1999; Maiga & Jacobs, 2005). The effectiveness of MCS depends on whether such customer feedback is incorporated into product or service design, delivery, and other operating decisions.

The ability of firms to respond to feedback regarding emerging conditions is influenced by the specificity, timeliness, and reliability of feedback information (Tyler et al., 2984; O'Grady et al., 2016; Luckett & Eggleton, 1991; Ilgen et al., 1979). Sentiments embedded in social-media word of mouth (SWOM) can provide important information about consumer perceptions about the variance between expected and actual performance, thus influencing consumers' future willingness to purchase and impacting future revenues and profits. Accordingly, organizations can use SWOM as a source of feedback about quality and improve their products and services, modify their operations, and alter resource allocations. This study investigates whether organizations use information in the form of SWOM, particularly negative SWOM, about the *quality* of their services as a source of feedback.

SWOM is a contemporary source of feedback that has achieved prominence in the past decade. It can serve as a diagnostic control and provide timely decision-facilitating information which can in turn enable performance improvements. Using psychology theory as a framework

and textual analyses methods, I parse two features of SWOM feedback—the *content* (quality-related) and *emotional type* (negative vs non-negative) and study its impact on consumer and firm decisions. I do so in order to ensure that the SWOM feedback contains decision-relevant and decision-facilitating information and not random noise.

In this study, I focus on firm quality performance decisions. Quality performance is a critical driver of future financial performance, marketing performance and customer satisfaction (Maiga et al., 2005; Sharma, 2005; Su et al., 2018) and is a staple feature of strategic management control systems such as balanced scorecards. Content (quality-related) and emotions (valence) ingrained in SWOM can inform a firm's leadership, in real time, about its quality performance. Emotions entrenched in SWOM can also inform a firm about consumer perceptions about the brand and can help anticipate future demand. Firms can use such information to accordingly alter the level of their operations, modify pricing decisions, and adjust resources. I aim to shed light on how decision-facilitating feedback information in quality-related emotional SWOM influences operational and resource adjustment decisions. I focus on three major operational decisions—capacity of operations, pricing, and quality cost investments.

The airline industry provides a suitable context to examine how consumers and firms react to SWOM. First, it is a customer-intensive industry and, therefore, customer sentiments are an important component of firm decision-making processes. Second, it is an experience good, and consumers rely heavily on their previous experiences and those of other consumers in making their choices, which makes SWOM an important source of information for their purchase decisions. Finally, quality, and operational decisions can be measured in a standardized manner and used in statistical analysis. My empirical analysis includes 625 firm-quarters from 19 major US airlines for years 2007-2019. I use Infegy Atlas data on social media posts (SWOM) on five

quality-related themes – convenience, expectations, service quality, place, and promotion, and two emotional types – negative (anger, disgust, fear, sadness) and non-negative (joy, trust, anticipation, surprise) (Plutchik, 1980).

I first investigate whether feedback in quality-related SWOM affects firm revenues and consumer purchasing decisions. I find that negative (non-negative) quality-related SWOM is associated with decreases (increases) in revenues and consumer volume. Next, I examine the impact of quality-related emotional SWOM on firm quality outcomes. I find that negative quality-related SWOM is associated with quality-improvements, such as lower delays, diversions and taxing times, in a future period. These effects are concentrated in airlines which are likely to be most affected by negative quality-related SWOM. There is no impact of non-negative quality-related SWOM on firm quality performance. Finally, I explore the relationship between quality-related emotional SWOM and firm operational and resource adjustment decisions. I find that airlines decrease (increase) levels of *some* of their operations (i.e. carrying capacity) in response to negative (non-negative) quality-related SWOM. Negative quality-related SWOM is also associated with lower price or airfare in a future period. In terms of resource adjustments, negative (non-negative) quality-related SWOM is seen to be associated with increases (decreases) in quality failure and quality signaling costs.

My study makes several contributions. First, I add to the literature in accounting that looks at the role of feedback in improving performance and affecting decision making processes. My study sheds light on the *content* (quality-related) and *emotional type* (negative vs non-negative) of feedback that influences not only consumer purchasing decisions, but also firm decisions and performance outcomes. Second, I contribute to the literature on quality management practices in the broader framework of management control systems. Accounting

and management literatures have studied the determinants of quality performance and operation of management control systems in the context of quality management (Maiga and Jacobs 2005, Otley 1999). I identify a source of feedback information, namely, quality-related emotional SWOM, that can act as a management control tool for organizations. Third, academics and practitioners alike acknowledge the social and economic impacts of information disseminated on social media channels. However, researchers have largely focused on how customer sentiments in social media affects consumer purchasing decisions (Godes and Mayzlin 2004, Chevalier and Mayzlin 2006) and other external stakeholders such as investors (Nguyen et al. 2020). An exception is the recent study by Dube and Zhu (2021) that looks at firm responses to online employee reviews. My study contributes to the literature on the relationship between social media sentiment and firm quality and operational choices. Fourth, my study contributes to the nascent literature on the influence of social media on product design choices (Godes 2017, Feldman, Papanastasiou, and Segev 2019; Campbell 2020). I extend this literature by empirically testing the relationship between the *content* and *emotional type* of SWOM and product quality decisions. Finally, I shed light on operational and resource decisions that are altered in response to quality-related emotional SWOM.

This rest of the paper is organized as follows: Section 2 contains the background and relevant literature review; Section 3 contains details on the setting, data, and methodology used; Sections 4 contains the main analyses; Section 5 contains additional analyses and robustness tests; Section 6 concludes.

2. BACKGROUND

2.1 Feedback's Role in Management Control Systems

"With Social Media so prevalent we are all extremely visible. Your prospective clients, your peers and your competition can drill as deep as they wish searching, reading and gathering information online about you and posted by you without you ever knowing who's searching. Depending on what they find, your prospects may choose to do business with you or not." – Mari Smith, Queen of Facebook, Premier social media marketing expert and thought leader

Organizations implement a variety of control practices that operate as a system (Malmi & Brown, 2008). Five central issues determine the efficacy of the system: objective setting, planning, budgeting/ target-setting, incentive, and reward structure design (performance measurement), and designing feedback processes (Otley, 1999). Research has investigated how these five aspects of MCS, individually or together, impact organizational outcomes (Simon 2000; Malmi & Brown, 2008). This study focuses on *feedback* about performance, which is a "necessary final ingredient to complete the control loop" (Otley, 1999) and is viewed as a central component of the MCS (Luckett & Eggleton, 1991).

Performance feedback enables performers to discern how well they are performing (Rummler & Brache, 1995), allows them to adjust performance (Daniels, 1994), and acts as a diagnostic control. Feedback also provides a motivation function and allows for the performer to engage in self-improvement (Sedikides & Hepper, 2009; Wood, 1989) and assists in the broader process of self-regulation (Bandura, 1986; 1991; Carver & Scheier, 1982; Latham & Locke, 1991). From a Bayesian perspective, new information generated by the performance feedback mechanism can promote learning when individuals use the new information to update their beliefs about the probable consequences of their choices (Nyarko & Kiefer, 1995; Savage, 1972). Feedback is thus a key component of the learning process (Kuchinke 2000), an essential

ingredient of strategy formulation and revision (Otley 1999), and a driver of performance improvements for individuals and firms alike.

These improvements could include a variety of measures such as quality (Maiga & Jacobs, 2005; Barnett et al., 1978; Flynn et al., 1995), customer satisfaction (Van Vaerenbergh et al., 2012), and organizational processes (Johnston & Michel, 2008). However, some studies indicate that the effect of feedback is contingent on a variety of contextual factors such as competition (Kortick & O'Brienn, 1996), proximity to task (Kluger & DeNisi, 1996), and feedback features such as detail, frequency (Casas-arce et al., 2017), timeliness (Schonberger, 1985) and source (Randolph et al., 2009). This research focuses on a contemporary source of customer feedback that has achieved prominence in the past decade, namely – social media word of mouth (*SWOM*) and two of its features – *content* and *valence* (i.e., *emotional-type*).

2.2 WOM, SWOM, and Impact on Consumer Decisions

"If you make customers unhappy in the physical world, they might each tell 6 friends. If you make customers unhappy on the Internet, they can each tell 6,000 friends" - Jeff Bezos, Founder and CEO, Amazon

Word of mouth (WOM) has always been a critical source of decision information for consumers and can be more persuasive than traditional communications, such as advertising (Chevalier & Mayzlin, 2006; Trusov et al., 2009; Yang et al., 2012; Rosario et al., 2016; Godes, 2017).[1] WOM can influence brand strategy effectiveness and economic performance (Trusov et

[1] An early study by Katz and Lazarsfeld (1955) outlines a 'two-step flow' model of communication which posits that certain people (opinion leaders) can exert personal influence on the decision-making of others through WOM conversations. A rich literature followed, that inferred the value of WOM from self-reports in surveys (Godes and Mayzlin 2004; Money, Gilly, and Graham 1998). Researchers have examined various aspects of WOM such as the conditions under which it is effective, the motivations for people to spread word about a product, and the variation in strength of people's influence on their peers. Further, customer acquisition through WOM can add more long-term value to the firm than customer acquisition through traditional marketing channels (Villanueva, Yoo, and Hanssens 2008).

al., 2009, Bambauer-Sachse & Mangold, 2011). In today's digital world, social media has increased the reach of WOM (SWOM) and has been observed to influence purchase decisions of users (Chen & Xie, 2008), enable new product adoption (Godes & Mayzlin, 2004; East et al., 2008), increase brand exposure, enhance customer awareness, influence attitudes and choice, and impact brand equity and brand economic performance (Keller, 2007; Bambauer-Sachse & Mangold, 2011). Rosario et al. (2016) describe SWOM as "one of the most significant developments in contemporary consumer behavior" (p. 297). Research finds significant associations between SWOM (online consumer reviews) and sales revenue (Chen et al., 2011; Moe & Trusov, 2011; Chevalier & Mayzlin, 2006).[2] Nascent research uses text-mining tools to complement numeric data such as product ratings and shows that the verbal portion of reviews can be used to improve sales predictions. The additional information from verbal portion arises because the distribution of numeric ratings is usually bimodal and therefore less informative (Hu et al., 2010; Archak et al., 2011). The verbal portion of reviews can therefore carry new information beyond numeric data to improve predictive modelling and planning.

Most research examining the effects of SWOM on sales and consumer purchasing decisions have focused on *volume* of SWOM (Godes & Mayzlin, 2004, Chevalier & Mayzlin, 2006; Liu, 2006). *Volume* is an important dimension because it is linked to the quantity of information available to the consumer and can serve as a proxy for product popularity. However, it is important to study how different components of SWOM which reflect distinct aspects of the customer experience affect consumer decisions and sale outcomes. While a few studies have investigated the effect of *valence* or the *emotional content* of SWOM (Liu, 2006; Chintagunta, et

[2] Chevalier and Mayzlin (2006) analyze book sales data and find that an improvement in online consumer reviews leads to an improvement in relative sales rank. Dellarocas et al. (2007) find that incorporating information in online movie ratings significantly improves predictive power of box-office sales models relative to a baseline model.

al., 2010; Rosario et al. 2016), most have used a practice framework. An exception is Hang et al. (2020), which classifies SWOM emotions in a theory-consistent manner and examines the impact of SWOM on sales, earnings, and investor behavior.

The *content* of SWOM has received little attention and, as such, I examine not only the emotions engrained in SWOM, but also the *content* (theme) of SWOM. Using sentiment analyses based on psychology theory and theme-based textual analyses methods, I focus on *quality-related emotional SWOM* and its impact on consumer decisions and firm revenue outcomes. While any type of SWOM can contain views on various aspects such as firm practices, CSR behaviors, intent to purchase and brand popularity, *quality-related emotional SWOM* provides decision facilitating information to consumers about attributes such as the *quality* of products/ services offered and can efficiently aid consumer decision-making processes.

2.3 SWOM as a Source of Quality Feedback to Firms

"We're utilizing the tool to monitor conversations and what people are talking about online. It's been helpful as far as trying to understand how people are reacting to us"- Matt Brum, Director of Digital Strategy and Social Media, BMLG on using social media as an information source

Few studies examine how firms alter their product design choices and operational decisions in response to SWOM.[3] SWOM feedback from customers can serve as a diagnostic control and enable effective performance improvements. Diagnostic control practices track progress towards goals, review performance, plan operations and identify exceptions from expectations, and enable appropriate actions (Simon, 2000; Henri, 2006; Su et al., 2017). Feedback from customers contains information about the consequences of organizations

[3] A recent accounting study that looks at firm responses to online employee reviews is Dube and Zhu (2021). They find that firms with negative reviews improve workplace practices and relevant disclosure behavior.

strategies (Otley, 1999; Maiga & Jacobs, 2005) and the effectiveness of an MCS depends on whether such customer feedback is incorporated into product design and operating decisions.

Sentiments embedded in SWOM can provide timely, direct, and credible information about consumer perceptions regarding the firm's performance, which are important attributes of feedback (Schonerberg, 1986; Otley, 1999; Luckett & Eggleton, 1991).[4] Organizations can thereby use SWOM as a source of quality feedback to improve their products and services and modify their operation. However, if organizations believe SWOM to be transient and merely "noise," they will not incorporate the feedback into their decisions. Further, if they believe negative sentiments can be 'managed' through promotional and impression management strategies, there would be no real-effects in terms of performance (quality) improvement. I examine whether negative SWOM about the *quality* of a firm's product/ service is associated quality improvements in future periods.

2.4 SWOM and its Impact on Quality

"Customers don't expect you to be perfect. They expect you to fix things when they go wrong." - Donald Porter, VP, British Airways

Quality is an important organizational outcome and is positively linked to other aspects of business performance such as financial performance, R&D performance, customer satisfaction (Sharma, 2005; Maiga & Jacobs 2005) and time-to-market (Fynes & Voss 2001). It is thus an important aspect of MCS. *Quality-related emotional SWOM* can act as a source of standardized, real-time quality-feedback and inform the firm about shortcomings in their products/ services,

[4] The ability of firms to respond to feedback regarding emerging conditions is influenced by the timeliness of feedback information (O'Grady, Morlidge, Rouse 2016) and whether recipients internalize information in feedback depends on the credibility/ reliability of the source (Luckett and Eggleton 1991; Ilgen et al. 1979).

consumer perceptions and extent of customer satisfaction. Firms can in-turn use such information to alter product/ service quality.[5]

An emerging stream of literature has modeled the relevance of WOM to firms and its positive impact on product design choices related to quality (Feldman et al., 2019). Godes (2017) show analytically that 'optimal' quality is increasing in WOM when such WOM persuasive. Persuasive communication is defined as that which changes beliefs about a product/ service.[6] Positive relationships have also been modeled between SWOM and product/service quality. Zhao and Zhang (2019) find that with increased SWOM, suppliers are forced to provide higher quality products especially for experience goods (e.g., restaurants, air travel, salons, etc.) wherein quality of goods is generally known only after purchase. However, with user generated SWOM, potential consumers can shape quality perceptions of the product/service of interest (Delgado Alvarez, Van Ackere, and Larsen 2017) even before the purchase occurs. This facilitates information sharing among consumers, increases quality transparency (Chong et al., 2017) and consequently leads to higher future quality (Campbell et al., 2020).

The *content* and *emotional* type of customer feedback has informative value to organizations. Non-negative SWOM is often cognitive in nature where customers assess service attributes and conclude upon whether there were valid reasons for company to produce the quality that they experienced. For example, customers may post that they were happy with the service quality because the flight landed on time despite bad weather, which is an indication of competence and responsibility of the staff. On the other hand, negative SWOM is more affective

[5] Studies investigating the impact of other types of customer feedback have also found that systematic customer feedback (e.g., monthly satisfaction reporting) improved quality outcomes (Hyrkas & Lehti 2003)
[6] The other type of WOM is one which expands awareness about the product. i.e., cases where consumers are not aware of the product. In such a case, Godes (2017) shows that product quality can increase or decrease with such WOM.

or emotional in nature, i.e., it is derived from *feelings* rather than cognitive *analysis*. Affective reactions "persists even after a complete invalidation of the original cognitive basis" (Zajoc, 1980, p. 157) and are often assuaged by 'venting' (Sweeny et al., 2005). However, affective SWOM can have value if it contains decision-facilitating information about how the service was provided (i.e., some cognitive content) rather than simply be an emotional outburst. The informational value of feedback to the firm is therefore related to the specificity of feedback, particularly in the case of negative feedback (Taylor et al., 1984; Kluger & DeNisi, 1996).[7] Negative SWOM which is simply an affect-driven vent may not always have relevant information needed by firms to improve their performance. By concentrating on *quality-related emotional SWOM,* I thwart this issue and focus only on feedback which carries decision-facilitating information for the firm.

2.5 SWOM and its Impact on Operational and Quality-Cost Decisions

"I use social media as an idea generator, trend mapper and strategic compass for all of our business ventures" - Paul Barron, CEO, futurist, speaker, exec producer, author, filmmaker, and creator of Foodable Network

In determining when and how to respond to SWOM, decision makers must interpret the information content embedded within such feedback. Feedback has a critical role in improving performance, *if* it is incorporated in decision making and used to revise individuals' and firms' strategies (Brand et al., 2010; Yao et al., 2014)**.** Feedback is associated with a variety of firm

[7] In studying response to feedback, particularly negative feedback, Taylor et al. (1984) state that "…strategy development is more likely to take place when feedback is *specific* enough to suggest distinct ways of behaving" (p. 8.5). Other studies have also emphasized on the importance of specificity of feedback (Kluger and DeNisi 1996; Park, Johnson, Moon, and Lee 2019; Goodman and Wood 2004) and the need for 'outcome information' in feedback (Hirst and Luckett 1987; Tindale 1989; Lavoie et al. 2009). Customer feedback in the form SWOM can potentially contain a lot of noise. By focusing on the content (quality-related) of SWOM, I parse out feedback that has information relevant to the firm for decision making regarding quality.

strategic and operational outcomes such as agility with respect to product introductions (Joseph & Gaba 2014), risk management (Lim & McCann, 2014), organizational change (Greve, 1998; Lant & Hewlin, 2002), strategic repositioning (Park, 2007), and corporate transactions (Haleblian & Rajagopalan, 2005).

Customer feedback in the form of SWOM can allow firms to anticipate future consumer perceptions and reactions. Feedback can thus form the foundation for operational and cost strategy decisions such as capacity planning (Cooper & Kaplan, 1992), pricing (Cannon, 2014; Milgrom & Roberts, 1986), and investments in quality failure and advertising costs (Chen & Xie, 2005; Nelson, 1974; Kihlstrom & Riordan, 1984; Milgrom & Roberts, 1986; Zhao, 2000). Therefore, while firms can use quality-related emotional SWOM to improve the quality of their products/ services, they can also use such information when making important operational decisions. However, if firms believe sentiments embedded in SWOM to be short-lived or believe that they can quickly turn around negative sentiments *only* by short-term targeted improvements, they may refrain from making operational and strategic changes. Important operational and resource adjustment decisions influenced by customer feedback include level of operations, pricing decisions and quality-cost adjustments.

2.6 Research Questions

Do consumers use the emotional content of quality-related feedback in their purchasing decisions? Do organizations use the emotional content of quality-related feedback to learn about their quality performance and improve future service quality? Do organizations incorporate the emotional content of quality-related feedback into their operational, pricing and resource decisions? I attempt to shed light on the above questions in the following analysis. The setting, data, and methodology are discussed next.

3. SETTING, DATA, AND METHODOLOGY

3.1 Setting and Data

The airline industry provides an appropriate context for my research questions due to its customer-intensive nature and provision of an experience good. My empirical analysis includes 625 firm-quarters from 19 major US airlines for the years 2007-2019. Quarterly airline quality and operational outcomes data are from BTS.gov. Data on social media posts (SWOM) are from Infegy Atlas.[8] The analysis includes five quality related themes that are relevant to this industry – convenience, expectations, service quality, place, and promotion. Using psychology theory (Plutchik, 1980), I classify social media posts into two broad emotional types – negative and non-negative. Classification of SWOM into themes and emotions are discussed next.

Classification of SWOM

I identify five quality-related themes of SWOM. These include: *Convenience* (location, delivery, or transaction as it relates to products and brands, e.g., "My Postmates driver got my food to me in record time.") ; *Expectation* (references to awaiting or anticipating an event happening in the future, e.g., “I can’t wait to pick up my new Tesla!”) *; Service-quality* (how a good or service is made or presented, e.g., “My new dress fell apart after two washes.”) ; *Place* (includes conversations regarding cleanliness, ambiance, comfort, access, and restrooms, e.g., "The restrooms were spotless.") ; *Promotion* (conversation around the brand’s promotional strategies such as advertising and discounts, e.g., "There's a sale going on right now at

[8] Infegy scrapes millions of social conversations from a wide range of social media channels using data mining methodologies such as mining algorithms related to search, classification, clustering, and associations. Theme and emotion analysis use natural language processing techniques. Most Fortune 1000 companies use Infegy’s database.

Nordstrom!"). Posts can be classified under more than one theme (e.g., convenience and service quality). Therefore, to avoid multicollinearity issues, I study all five themes separately.

Posts are also classified into one of eight emotions based on Plutchik's Wheel of Emotions (Plutchik, 1980). These include: *Anger* (strong feeling of being upset or annoyed. e.g., "This weather is upsetting!"); *Disgust* (strong feeling of dislike for something that has a very unpleasant appearance, taste, smell, etc. e.g., "This commercial is sickening.") ; *Fear* (to be afraid of someone or something, e.g., "That company's privacy policy is scary.") ; *Sadness* (affected with or expressive of grief or unhappiness, e.g., "I was heartbroken when we broke up.") ; *Joy* (feeling of great happiness, e.g., "We are elated to announce the birth of our son!") ; *Trust* (belief that someone or something is reliable, good, honest, effective, etc., e.g., "That seems fake.") ; *Surprise* (feeling caused by something that is unexpected or unusual, e.g., "That is astonishing.") ; *Anticipation* (act of looking forward to a specific date or time, e.g., "It is rumored that Apple will release a new product this May"). I classify anger, disgust, fear and sadness as *negative* emotions and joy, trust, surprise, and anticipation as *non-negative emotions*. Examples of quality-related emotional SWOM for airlines are in Appendix Table A1.

3.2 Methodology

I use the following ordinary least squares (OLS) model to estimate the effect of quality-related emotional SWOM on firm revenues, consumer purchasing behaviors, firm quality outcomes and firm operational and cost decisions. Effect of SWOM in quarter *t* is studied on outcomes in quarter *t+1* since it is tenable that consumers and organizations both respond to customer feedback in the form of SWOM immediately (Nguyen et al., 2020).

$$Ln(DV)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1)$$

DV_{t+1} refers to dependent variables in quarter *t+1*. $ThemeNeg_t$ and $ThemeNonNeg_t$ refer to negative and non-negative SWOM about the five quality-related themes in quarter *t*. *Controls* include variables in quarter *t*, such as cash, assets, long-term debt, annual GDP growth in industry and level of operations in quarter *t+1* (i.e., number of flights or number of passengers).[9] All analyses include firm and quarter fixed effects and robust standard errors.[10]

[9] Control variables such as market value are not available since all airlines are not publicly listed. Additional control variables are used when studying outcomes like sales, passengers, and air-fare.
[10] Since there are only 19 airlines, clustering standard errors is not feasible. More information on controlling for serial correlation in error terms is provided in additional analyses.

4. RESULTS

4.1 Descriptives

Table 1 provides number of observations, means, standard deviations, and range for all the variables used. An airline experiences on average 420-595 negative and 1170-1720 non-negative posts in each quarter for each of the five quality-related themes. There is high variation in the amount of SWOM experienced on a quarterly basis as is evident by the high standard deviations. Airlines can experience anywhere from zero to over 10,000 posts about the quality of their services in each quarter.

Revenues average to $2.8 billion per quarter and airlines carry, on average, 14.9 million domestic and 3.1 million international passengers in each quarter (i.e. 165.5K and 34.4K domestic and international passengers per day respectively). Airlines operate on average 102,670 domestic flights in a quarter (1,140 a day) and 12,740 international flights in a quarter (141 a day). Departure delays average about 1.26 million minutes in a quarter (14,066 minutes a day), of which, carrier delays average about 367K minutes in a quarter (4,077 minutes a day). An average of 252 flights are diverted in a quarter and airplanes spend about 2.44 million minutes in taxing time in a quarter (27,066 minutes a day). Domestic airfares average to $338 per flight-ticket and airlines spend $620 million and $17 million per quarter on passenger servicing (quality-failure costs) and advertising expenses (quality-signaling costs) respectively.

TABLE 1: Descriptives

Variable	*N*	*Unit*	*Mean*	*Std. Dev*	*Min*	*Max*
SWOM variables						
ConvenienceNeg	625	Count	421.35	636.62	0	5,234
ConvenienceNonNeg	625	Count	1,189.27	1,500.29	0	9,390
ExpectNeg	625	Count	388.46	583.07	0	4,656
ExpectNonNeg	625	Count	1,210.93	1,497.78	0	8,760
ServQualityNeg	625	Count	476.11	749.97	0	6,999
ServQualityNonNeg	625	Count	1,172.54	1,532.07	0	10,122
PlaceNeg	625	Count	465.61	750.42	0	8,262
PlaceNonNeg	625	Count	1,182.27	1,567.30	0	9,720
PromotionNeg	625	Count	594.03	894.26	0	9,174
PromotionNonNeg	625	Count	1,722.37	2,088.65	0	15,358
AllQualityNeg	625	Count	739.47	1,236.09	0	20,096
AllQualityNonNeg	625	Count	1,862.89	2,597.85	0	25,633
AllNonQualityNeg	625	Count	540.69	1185.74	0	19,982
AllNonQualityNonNeg	625	Count	1002.75	1874.25	0	24,992
Dependent variables						
Sales	625	‘000’s $	2,828,813.00	3,268,842.00	177,417.00	11,600,000.00
DomPax	625	‘000’s	14,900.00	28,100.00	1,807.89	192,000.00
IntlPax	625	‘000’s	3,082.89	8,258.86	0	62,100.00
CarrierDelays	625	‘000’s mins	367.24	286.26	13.06	1,341.62
DepDelays	625	‘000’s mins	1,266.31	1,012.32	45.13	5,350.76
Diversions	625	Flights	252.06	207.77	3.00	1,178.00
TaxingTime	625	‘000’s mins	2,436.51	1,679.48	256.26	6,786.65
DomASM	625	‘000’s ASM	11,900.00	10,900.00	1,274.79	39,900.00
IntlASM	625	‘000’s ASM	6,000.52	8,793.20	0	31,600.00
AvgFare	625	$	338.42	86.90	86.08	531.67
PaxSvcExp	625	‘000’s $	620,682.00	785,789.00	5,950.00	3,504,487.00
PaxAdvExp	625	‘000’s $	17,621.00	43,087.00	0	131,703.00
DomFlights	625	‘000’s	102.67	75.56	12.25	343.66
IntlFlights	625	‘000’s	12.74	13.42	0	51.88
Control variables						
Cash	625	‘000’s $	754.65	1,170.48	0.13	7,818.57
FlightEquip	625	‘000’s $	7,824.79	9,219.38	60.10	40,800.00
GroundEquip	625	‘000’s $	1,401.81	1,887.68	5.29	7,146.12
LongTermDebt	625	‘000’s $	3,299.45	4,169.62	-	20,500.00
GdpAirlineGrowth	625	%	0.04	0.07	-0.14	0.19

Notes: Table 1 presents means, standard deviations, minimum and maximum values for variables used in analyses.

4.2 Effect of Quality-Related Emotional SWOM on Revenues and Consumers

I first investigate whether quality-related emotional SWOM impacts firm revenues and alters consumer purchasing behaviors. To do so, I augment equation (1) with the following DVs:

$$Ln(Sales)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.1)$$

$$Ln(DomPax)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.2)$$

$$Ln(IntlPax)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.3)$$

Panel A of Table 2 presents the results of estimating equation (1.1). Coefficients on $Ln(ThemeNeg)_t$ are negative and significant while coefficients on $Ln(ThemeNonNeg)_t$ are positive and significant for all quality-related themes. Column (1) indicates that a 1% increase in convenience-related negative SWOM in time *t* is associated with a 0.043% decrease in future revenues (i.e. $1.22 million drop in quarterly revenues calculated as $2.82 billion * 0.043%). Conversely, a 1% increase in convenience-related non-negative SWOM in time *t* is associated with a 0.059% increase in future revenues (i.e. $1.67 million rise in quarterly revenues calculated as $2.82 billion * 0.059). Columns (2) – (5) give similar effects of expectation, service quality, place, and promotion related themes on future revenues.

In terms of absolute effect sizes, the effect of non-negative quality-related SWOM on future revenues is greater than the effect of negative quality-related SWOM (e.g. 0.059 > 0.043, *p-value < 0.10*). However, means as in Table 1 suggest that the number of non-negative posts is in general higher than negative posts. For example, while a 1% increase in convenience-related negative SWOM corresponds to only four posts, a 1% increase in convenience-related non-negative SWOM corresponds to approximately 12 posts. What this means is that while an

increase of mere four negative posts is associated with a potential revenue loss of $1.22 million, it takes 12 non-negative posts to gain revenues of $1.67 million. Therefore, revenue lost per negative post is $305K ($1.22 million/4) while revenue gained per non-negative post is only $139K ($1.67 million/12). While I make no formal statistical comparisons between such numbers, it is important to note its consequences for the interpretation of results. Specifically, negative quality-related SWOM has as much of an impact (if not more) on future revenues as non-negative quality-related SWOM. Overall, results as in Panel A of Table 2 provide initial evidence that the content and emotional type of customer feedback affects future firm revenues, indicating that customers care about such feedback.

Because revenue is a function of ticket price, number of flights, and number of passengers, I examine purchasing decisions directly in the form of number of passengers using equations (1.2) and (1.3). Results are in Panels B (domestic passengers) and C (international passengers) of Table 2. Coefficients on $Ln(ThemeNeg)_t$ are negative and significant while coefficients on $Ln(ThemeNonNeg)_t$ are positive and significant for all quality-related themes in Panel B of Table 2. For example, column (1) in Panel B indicates that a 1% increase in convenience-related negative (non-negative) SWOM in time *t* is associated with a 0.031% (0.034%) decrease (increase) in future domestic passengers.[11] Similarly, column (2) indicates that a 1% increase in expectation-related negative (non-negative) SWOM in time *t* is associated with a 0.051% (0.056%) decrease (increase) in future domestic passengers.[12] Effects of negative and non-negative quality-related SWOM on domestic purchasing decisions are not different from

[11] On average, an airline has 14.9 million domestic passengers in a quarter. A 0.031% (0.034%) decrease (increase) in customer base corresponds to over 4,500 (5,000) customers.
[12] A 0.051% (0.056%) decrease (increase) in customer base corresponds to over 7,500 (8,000) customers.

each other in terms of magnitude.[13] Domestic passengers (Panel B) show higher sensitivity to quality-related emotional SWOM relative to international passengers (Panel C). Results in Panel C of Table 2 indicate little to no impact of quality-related emotional SWOM on international purchasing decisions. This is a plausible result because the domestic air travel industry is more competitive and offers consumers more choice. Overall, results suggest that the content (quality-related) and emotional-type of customer feedback in the form of SWOM impacts consumer purchasing decisions and can thereby provide useful information to the firm.

[13] Since the average number of negative posts is lower than non-negative posts, the per-post impact of negative SWOM is likely higher than the per-post impact of non-negative SWOM.

TABLE 2: Effect of Quality-Related Emotional SWOM on Revenues and Consumers

Panel A: Effect of Quality-Related Emotional SWOM on Revenues

Variables	(1) $Ln(Sales)_{t+1}$	(2) $Ln(Sales)_{t+1}$	(3) $Ln(Sales)_{t+1}$	(4) $Ln(Sales)_{t+1}$	(5) $Ln(Sales)_{t+1}$
$LnConvenienceNeg_t$	-0.043***				
	(0.012)				
$LnConvenienceNonNeg_t$	0.059***				
	(0.012)				
$LnExpectationNeg_t$		-0.029**			
		(0.014)			
$LnExpectationNonNeg_t$		0.051***			
		(0.015)			
$LnServQualityNeg_t$			-0.034**		
			(0.016)		
$LnServQualityNonNeg_t$			0.054***		
			(0.017)		
$LnPlaceNeg_t$				-0.034**	
				(0.015)	
$LnPlaceNonNeg_t$				0.049***	
				(0.016)	
$LnPromotionNeg_t$					-0.028**
					(0.013)
$LnPromotionNonNeg_t$					0.050***
					(0.013)
$LnCash_t$	0.026***	0.026***	0.026***	0.025***	0.025***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
$LnFlightEquip_t$	0.008	0.011	0.010	0.010	0.011
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
$LnGroundEquip_t$	0.169***	0.160***	0.168***	0.174***	0.165***
	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)
$LnLongTermDebt_t$	0.027***	0.028***	0.027***	0.026***	0.027***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
$GdpAirlineGrowth_t$	0.392***	0.394***	0.403***	0.408***	0.400***
	(0.075)	(0.078)	(0.077)	(0.076)	(0.077)
$LnFlights_{t+1}$	0.643***	0.641***	0.650***	0.646***	0.647***
	(0.047)	(0.047)	(0.047)	(0.048)	(0.047)
Constant	3.681***	3.719***	3.575***	3.578***	3.622***
	(0.375)	(0.371)	(0.378)	(0.386)	(0.379)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	0.016**	0.022***	0.020***	0.015**	0.022***
Observations	625	625	625	625	625
R-squared	0.293	0.321	0.275	0.256	0.289
Additional controls	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel A of Table 2 presents results of estimating equation (1.1). Columns show effects of each of the five quality-related themes separately and include firm and quarter fixed effects. Additional controls include average airfare in time *t+1*. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 2 (cont'd)

Panel B: Effect of Quality-Related Emotional SWOM on Domestic Consumer Decisions

Variables	*(1)* $Ln(DomPax)_{t+1}$	*(2)* $Ln(DomPax)_{t+1}$	*(3)* $Ln(DomPax)_{t+1}$	*(4)* $Ln(DomPax)_{t+1}$	*(5)* $Ln(DomPax)_{t+1}$
$LnConvenienceNeg_t$	-0.031***				
	(0.009)				
$LnConvenienceNonNeg_t$	0.03**				
	(0.009)				
$LnExpectationNeg_t$		-0.051***			
		(0.007)			
$LnExpectationNonNeg_t$		0.056***			
		(0.007)			
$LnServQualityNeg_t$			-0.048***		
			(0.008)		
$LnServQualityNonNeg_t$			0.051***		
			(0.009)		
$LnPlaceNeg_t$				-0.037***	
				(0.008)	
$LnPlaceNonNeg_t$				0.039***	
				(0.009)	
$LnPromotionNeg_t$					-0.034***
					(0.008)
$LnPromotionNonNeg_t$					0.043***
					(0.009)
$LnCash_t$	0.012***	0.014***	0.013***	0.012***	0.012***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$LnFlightEquip_t$	-0.005	-0.006	-0.007	-0.005	-0.005
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
$LnGroundEquip_t$	0.035***	0.024**	0.034***	0.038***	0.030***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$LnLongTermDebt_t$	-0.009***	-0.007***	-0.008***	-0.009***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$GdpAirlineGrowth_t$	-0.022	-0.043	-0.028	-0.019	-0.032
	(0.036)	(0.035)	(0.037)	(0.036)	(0.037)
$LnDomFlights_{t+1}$	1.034***	1.033***	1.038***	1.037***	1.040***
	(0.017)	(0.017)	(0.017)	(0.018)	(0.017)
Constant	3.812***	3.913***	3.786***	3.746***	3.781***
	(0.146)	(0.146)	(0.151)	(0.157)	(0.147)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	0.003	0.005	0.004	0.002	0.009***
Observations	625	625	625	625	625
R-squared	0.131	0.177	0.128	0.106	0.131
Additional controls	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel B of Table 2 presents results of estimating equation (1.2). Columns show effects of each of the five quality-related themes separately and include firm and quarter fixed effects. Additional controls include average domestic airfare in time *t+1*. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 2 (cont'd)

Panel C: Effect of Quality-Related Emotional SWOM on International Consumer Decision

Variables	(1) $Ln(IntlPax)_{t+1}$	(2) $Ln(IntlPax)_{t+1}$	(3) $Ln(IntlPax)_{t+1}$	(4) $Ln(IntlPax)_{t+1}$	(5) $Ln(IntlPax)_{t+1}$
$LnConvenienceNeg_t$	-0.018				
	(0.025)				
$LnConvenienceNonNeg_t$	0.025				
	(0.025)				
$LnExpectationNeg_t$		-0.051**			
		(0.022)			
$LnExpectationNonNeg_t$		0.063**			
		(0.022)			
$LnServQualityNeg_t$			-0.026		
			(0.031)		
$LnServQualityNonNeg_t$			0.036		
			(0.030)		
$LnPlaceNeg_t$				-0.013	
				(0.024)	
$LnPlaceNonNeg_t$				0.024	
				(0.023)	
$LnPromotionNeg_t$					-0.024
					(0.026)
$LnPromotionNonNeg_t$					0.041^
					(0.026)
$LnCash_t$	-0.028**	-0.025**	-0.028**	-0.029**	-0.028**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
$LnFlightEquip_t$	-0.015	-0.022	-0.014	-0.018	-0.020
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
$LnGroundEquip_t$	-0.220***	-0.242***	-0.222***	-0.222***	-0.234***
	(0.038)	(0.043)	(0.038)	(0.039)	(0.041)
$LnLongTermDebt_t$	-0.018***	-0.012*	-0.017***	-0.016**	-0.014**
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
$GdpAirlineGrowth_t$	-0.313**	-0.375***	-0.311**	-0.337**	-0.359**
	(0.130)	(0.141)	(0.130)	(0.140)	(0.140)
$LnIntlFlights_{t+1}$	1.497***	1.495***	1.498***	1.498***	1.498***
	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)
Constant	4.059***	4.248***	4.029***	4.019***	4.127***
	(0.349)	(0.386)	(0.344)	(0.352)	(0.365)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	0.007	0.011	0.010	0.011	0.017^
Observations	625	625	625	625	625
R-squared	0.123	0.127	0.125	0.125	0.122
Additional controls	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel C of Table 2 presents results of estimating equation (1.3). Columns show effects of each of the five quality-related themes separately and include firm and quarter fixed effects. Additional controls include average international airfare in time *t+1*. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

4.3 Firm Responses to SWOM Feedback

4.3.1 Effect of Quality-Related Emotional SWOM on Firm Quality Outcomes

I next examine whether firms use information in quality-related SWOM to improve quality performance. I augment equation (1) with the following DVs which capture important quality outcomes in airlines that customers care the most about:[14]

$$Ln(DepDelays)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.4)$$

$$Ln(CarrierDelays)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.5)$$

$$Ln(Diversions)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.6)$$

$$Ln(TaxingTime)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.7)$$

Results are presented in Panels A-D of Table 3. Negative and significant β_1's indicate that increased negative quality-related SWOM is associated with improvements in future quality. Specifically, greater the negative quality-related SWOM in quarter *t*, lower the delays, diversions, and taxing time in quarter *t+1*. The magnitude of these effects range from 0.025% to 0.099%.[15] There is no significant effect of non-negative quality-related SWOM on future quality outcomes indicating that firms do not adjust the quality of their services following positive feedback. These results suggest that the content and emotional type of customer feedback

[14] These measures are available only for non-stop domestic flights. Departure delays refer to the time difference between a flight's scheduled departure time and the time when it leaves the gate. Carrier delays refer to delays because of circumstances within the airline's control (e.g., maintenance/ crew problems, aircraft cleaning, baggage loading, fueling, etc.).

[15] A 0.025% decrease in carrier delays corresponds to about 92 minutes of decreased delay. A 0.099% decrease in carrier delays corresponds to over 360 minutes of decreased delay.

(SWOM) contains decision-facilitating information for firms and that firms use such information to improve their quality performance.[16]

TABLE 3: Firm Quality Responses to SWOM Feedback

Panel A: Effect of Quality-Related Emotional SWOM on Departure Delays

Variables	(1) $Ln(DepDelays)_{t+1}$	(2) $Ln(DepDelays)_{t+1}$	(3) $Ln(DepDelays)_{t+1}$	(4) $Ln(DepDelays)_{t+1}$	(5) $Ln(DepDelays)_{t+1}$
$LnConvenienceNeg_t$	-0.068***				
	(0.021)				
$LnConvenienceNonNeg_t$	0.018				
	(0.022)				
$LnExpectationNeg_t$		-0.047**			
		(0.022)			
$LnExpectationNonNeg_t$		0.003			
		(0.022)			
$LnServQualityNeg_t$			-0.068***		
			(0.025)		
$LnServQualityNonNeg_t$			0.017		
			(0.025)		
$LnPlaceNeg_t$				-0.044*	
				(0.027)	
$LnPlaceNonNeg_t$				-0.007	
				(0.024)	
$LnPromotionNeg_t$					-0.047**
					(0.021)
$LnPromotionNonNeg_t$					0.003
					(0.024)
$LnCash_t$	0.018	0.017	0.017	0.017	0.016
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
$LnFlightEquip_t$	0.004	0.002	-0.003	0.001	0.005
	(0.038)	(0.039)	(0.038)	(0.038)	(0.039)
$LnGroundEquip_t$	-0.033	-0.032	-0.026	-0.022	-0.030
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
$LnLongTermDebt_t$	-0.006	-0.006	-0.005	-0.006	-0.007
	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)
$GdpAirlineGrowth_t$	0.006	0.022	0.013	0.036	0.021
	(0.121)	(0.120)	(0.120)	(0.120)	(0.122)
$LnDomFlights_{t+1}$	1.149***	1.160***	1.150***	1.151***	1.161***
	(0.058)	(0.059)	(0.059)	(0.059)	(0.059)
Constant	1.193**	1.059*	1.197**	1.109**	1.031*
	(0.560)	(0.561)	(0.566)	(0.564)	(0.561)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	-0.050***	-0.044**	-0.051***	-0.037***	-0.044***
Observations	625	625	625	625	625
R-squared	0.234	0.221	0.235	0.233	0.220
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel A of Table 3 presents results of estimating equation (1.4). Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

[16] Several of the quality measures (in *t*) are positively associated with negative quality-related SWOM (in *t*). Thus, consumers are affected by these outcomes and give feedback with regards to it. Firms can use such feedback to improve the quality of their services in future periods.

TABLE 3 (cont'd)

Panel B: Effect of Quality-Related Emotional SWOM on Carrier Delays

Variables	*(1)* *Ln(CarrierDelay)$_{t+1}$*	(2) *Ln(CarrierDelay)$_{t+1}$*	(3) *Ln(CarrierDelay)$_{t+1}$*	(4) *Ln(CarrierDelay)$_{t+1}$*	(5) *Ln(CarrierDe y)$_{t+1}$*
LnConvenienceNeg$_t$	-0.099***				
	(0.025)				
LnConvenienceNonNeg$_t$	0.023				
	(0.024)				
LnExpectationNeg$_t$		-0.072***			
		(0.026)			
LnExpectationNonNeg$_t$		0.003			
		(0.026)			
LnServQualityNeg$_t$			-0.099***		
			(0.029)		
LnServQualityNonNeg$_t$			0.022		
			(0.028)		
LnPlaceNeg$_t$				-0.083***	
				(0.029)	
LnPlaceNonNeg$_t$				0.007	
				(0.027)	
LnPromotionNeg$_t$					-0.082***
					(0.025)
LnPromotionNonNeg$_t$					0.012
					(0.026)
LnCash$_t$	0.039***	0.038***	0.038***	0.037***	0.036***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
LnFlightEquip$_t$	0.057	0.054	0.047	0.048	0.057
	(0.039)	(0.040)	(0.040)	(0.040)	(0.040)
LnGroundEquip$_t$	-0.043	-0.040	-0.032	-0.027	-0.038
	(0.040)	(0.041)	(0.041)	(0.040)	(0.040)
LnLongTermDebt$_t$	-0.015*	-0.015*	-0.014*	-0.013	-0.015*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
GdpAirlineGrowth$_t$	0.108	0.133	0.117	0.135	0.123
	(0.131)	(0.131)	(0.131)	(0.130)	(0.132)
LnDomFlights$_{t+1}$	1.099***	1.115***	1.101***	1.105***	1.116***
	(0.063)	(0.065)	(0.065)	(0.065)	(0.065)
Constant	-0.161	-0.343	-0.163	-0.291	-0.362
	(0.649)	(0.647)	(0.656)	(0.652)	(0.648)
LnThemeNeg$_t$ + *LnThemeNonNeg$_t$*	-0.076***	-0.069***	-0.077***	-0.075***	-0.070***
Observations	625	625	625	625	625
R-squared	0.282	0.266	0.281	0.279	0.267
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel B of Table 3 presents results of estimating equation (1.5). Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 3 (cont'd)

Panel C: Effect of Quality-Related Emotional SWOM on Diversions

Variables	(1) $Ln(Diversions)_{t+1}$	(2) $Ln(Diversions)_{t+1}$	(3) $Ln(Diversions)_{t+1}$	(4) $Ln(Diversions)_{t+1}$	(5) $Ln(Diversions)_{t+1}$
$LnConvenienceNeg_t$	-0.061**				
	(0.028)				
$LnConvenienceNonNeg_t$	0.047				
	(0.032)				
$LnExpectationNeg_t$		-0.053*			
		(0.030)			
$LnExpectationNonNeg_t$		0.044			
		(0.033)			
$LnServQualityNeg_t$			-0.066**		
			(0.032)		
$LnServQualityNonNeg_t$			0.047		
			(0.034)		
$LnPlaceNeg_t$				-0.010	
				(0.032)	
$LnPlaceNonNeg_t$				-0.002	
				(0.034)	
$LnPromotionNeg_t$					-0.043
					(0.030)
$LnPromotionNonNeg_t$					0.037
					(0.035)
$LnCash_t$	-0.003	-0.003	-0.003	-0.004	-0.004
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
$LnFlightEquip_t$	0.080	0.078	0.076	0.086	0.083
	(0.064)	(0.066)	(0.066)	(0.067)	(0.065)
$LnGroundEquip_t$	-0.070	-0.078	-0.065	-0.064	-0.074
	(0.054)	(0.055)	(0.054)	(0.054)	(0.056)
$LnLongTermDebt_t$	-0.013	-0.011	-0.012	-0.015	-0.013
	(0.012)	(0.013)	(0.013)	(0.013)	(0.012)
$GdpAirlineGrowth_t$	-0.197	-0.199	-0.188	-0.152	-0.192
	(0.159)	(0.159)	(0.157)	(0.160)	(0.160)
$LnDomFlights_{t+1}$	0.895***	0.901***	0.898***	0.898***	0.905***
	(0.068)	(0.068)	(0.069)	(0.069)	(0.069)
Constant	-5.015***	-5.024***	-5.041***	-5.146***	-5.132***
	(0.622)	(0.620)	(0.625)	(0.629)	(0.622)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	-0.014	-0.086	-0.018	-0.012	-0.065
Observations	625	625	625	625	625
R-squared	0.295	0.294	0.295	0.291	0.293
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel C of Table 3 presents results of estimating equation (1.6). Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 3 (cont'd)

Panel D: Effect of Quality-Related Emotional SWOM on Taxing Time

Variables	(1) *Ln(TaxingTime)$_{t+1}$*	(2) *Ln(TaxingTime)$_{t+1}$*	(3) *Ln(TaxingTime)$_{t+1}$*	(4) *Ln(TaxingTime)$_{t+1}$*	(5) *Ln(TaxingTime)$_{t+1}$*
LnConvenienceNeg$_t$	-0.025***				
	(0.008)				
LnConvenienceNonNeg$_t$	0.008				
	(0.008)				
LnExpectationNeg$_t$		-0.041***			
		(0.008)			
LnExpectationNonNeg$_t$		0.028**			
		(0.010)			
LnServQualityNeg$_t$			-0.040***		
			(0.010)		
LnServQualityNonNeg$_t$			0.023**		
			(0.010)		
LnPlaceNeg$_t$				-0.030***	
				(0.011)	
LnPlaceNonNeg$_t$				0.013	
				(0.010)	
LnPromotionNeg$_t$					-0.024***
					(0.008)
LnPromotionNonNeg$_t$					0.013
					(0.010)
LnCash$_t$	0.009**	0.009***	0.009**	0.008**	0.008**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
LnFlightEquip$_t$	0.054***	0.049***	0.049***	0.050***	0.053***
	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)
LnGroundEquip$_t$	-0.017	-0.024*	-0.016	-0.013	-0.020
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
LnLongTermDebt$_t$	-0.014***	-0.012***	-0.013***	-0.013***	-0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
GdpAirlineGrowth$_t$	-0.031	-0.050	-0.040	-0.032	-0.037
	(0.041)	(0.041)	(0.041)	(0.041)	(0.042)
LnDomFlights$_{t+1}$	0.985***	0.990***	0.987***	0.988***	0.992***
	(0.026)	(0.025)	(0.026)	(0.026)	(0.026)
Constant	2.892***	2.920***	2.900***	2.858***	2.830***
	(0.269)	(0.263)	(0.272)	(0.271)	(0.271)
LnThemeNeg$_t$ + *LnThemeNonNeg$_t$*	-0.017***	-0.013***	-0.017***	-0.017***	-0.011**
Observations	625	625	625	625	625
R-squared	0.428	0.412	0.420	0.418	0.408
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel D of Table 3 presents results of estimating equation (1.7). Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

Placebo Tests for Quality Outcomes

To ensure that above results are a function of firm responses to customer feedback and not just a feature of the data or time trends, I conduct two placebo tests. I augment equation (1) with two additional DVs: *Ln(WeatherDelays)* and *Ln(SecurityDelays)*. These outcomes, while may lead to increased negative quality-related SWOM from customers, are influenced by external factors which are not under the control of airlines.[17] Therefore, there should not be any associations of such outcomes with customer feedback. Consistent with this expectation, I find negative and non-negative quality-related SWOM in time *t* to be insignificant in affecting weather and security delays in time *t+1* (untabulated). This provides additional confidence the results that firms use information in quality-related emotional SWOM to improve quality outcomes that are within their control.

Who Responds to Feedback?

To further understand firm responses to feedback, I conduct cross-sectional tests to examine whether quality-improvements are concentrated in certain *types* of airlines. I split my sample into two subsamples – airlines with relative higher (domestic) market share and airlines with relatively lower (domestic) market share.[18] The split is conducted based on median domestic market share (based on domestic passengers) in a given firm-quarter. Airlines that have a large market share will be less likely to respond to quality-related SWOM. Such airlines are less affected by demand fluctuations arising from consumer reactions to SWOM. Moreover, consumers may have limited choice to switch from such powerful carriers. Results from

[17] Correlation tests indicate that negative quality-related SWOM in *t* is positively and significantly associated with security delays in *t* and marginally positively associated with weather delays in *t*.
[18] I use domestic market share to conduct the sample split because domestic passengers show highest sensitivity to quality-related emotional SWOM.

estimating equations (1.4) – (1.7) for subsamples with high and low market share are presented in Panels A and B of Table 4. Airlines which had a relatively high proportion of the domestic market share in time *t* make little to no improvements to the service quality in response to negative SWOM. Quality improvements in response to negative quality-related SWOM are concentrated in airlines which had relatively low market share in time *t*. Therefore, firm responses to customer feedback are influenced by how important negative customer feedback is to the firm's future financial health.[19]

[19] Cross-sectional tests also indicate that firms who had above median proportion of their customer-base as international customers showed little to no improvements in quality outcomes following negative quality-related SWOM. Recall that international consumer volume showed little to no sensitivity to SWOM. Therefore, airlines with a relatively larger proportion of their customer base as international passengers would have limited incentives to improve quality performance.

TABLE 4: Variation in Firm Quality Responses to SWOM Feedback

Panel A: Effect of Quality-Related Emotional SWOM on Quality Outcomes – Firms with High Market Share

	(1)	(2)	(3)	(4)
High Domestic Market Share	$Ln(DepDelay)_{t+1}$	$Ln(CarrierDelay)_{t+1}$	$Ln(Diversions)_{t+1}$	$Ln(Taxing\ time)_{t+1}$
$LnConvenienceNeg_t$	0.006	0.021	-0.015	0.016
	(0.025)	(0.024)	(0.052)	(0.012)
$LnConvenienceNonNeg_t$	-0.034	-0.050*	-0.038	-0.025***
	(0.025)	(0.025)	(0.055)	(0.009)
$LnExpectationNeg_t$	0.019	0.013	0.024	0.005
	(0.032)	(0.032)	(0.057)	(0.007)
$LnExpectationNonNeg_t$	-0.049	-0.045	-0.080	-0.026***
	(0.034)	(0.032)	(0.060)	(0.009)
$LnServQualityNeg_t$	0.012	0.029	0.065	0.013
	(0.037)	(0.035)	(0.058)	(0.010)
$LnServQualityNonNeg_t$	-0.047	-0.063^	-0.120*	-0.035**
	(0.037)	(0.038)	(0.062)	(0.012)
$LnPlaceNeg_t$	0.021	0.014	0.081^	-0.001
	(0.033)	(0.030)	(0.052)	(0.010)
$LnPlaceNonNeg_t$	-0.051^	-0.045	-0.133*	-0.018*
	(0.033)	(0.030)	(0.055)	(0.010)
$LnPromotionNeg_t$	0.040	0.028	0.011	0.019*
	(0.026)	(0.025)	(0.051)	(0.010)
$LnPromotionNonNeg_t$	-0.069**	-0.061*	-0.060	-0.039***
	(0.028)	(0.028)	(0.055)	(0.010)

Notes: Panel A of Table 4 present results of estimating equation (1.4)-(1.7) for subsamples with high domestic market share. Each of the theme based regression is conducted separately and all controls are used as in Table 3. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 4 (cont'd)

Panel B: Effect of Quality-Related Emotional SWOM on Quality Outcomes – Firms with Low Market Share

Low Domestic Market Share	(1) $Ln(DepDelay)_{t+1}$	(2) $Ln(CarrierDelay)_{t+1}$	(3) $Ln(Diversions)_{t+1}$	(4) $Ln(Taxing\ time)_{t+1}$
$LnConvenienceNeg_t$	-0.082***	-0.106***	-0.054*	-0.033***
	(0.028)	(0.033)	(0.031)	(0.008)
$LnConvenienceNonNeg_t$	0.045^	0.036	0.075^	0.027***
	(0.029)	(0.032)	(0.040)	(0.008)
$LnExpectationNeg_t$	-0.054**	-0.049^	-0.047^	-0.040***
	(0.027)	(0.031)	(0.031)	(0.009)
$LnExpectationNonNeg_t$	0.021	-0.018	0.069^	0.036**
	(0.028)	(0.031)	(0.041)	(0.010)
$LnServQualityNeg_t$	-0.092***	-0.106***	-0.073*	-0.046***
	(0.033)	(0.036)	(0.040)	(0.011)
$LnServQualityNonNeg_t$	0.049^	0.033	0.069^	0.038**
	(0.033)	(0.034)	(0.041)	(0.011)
$LnPlaceNeg_t$	-0.067***	-0.097***	-0.023	-0.031***
	(0.031)	(0.032)	(0.040)	(0.011)
$LnPlaceNonNeg_t$	0.026	0.023	0.044	0.024**
	(0.031)	(0.029)	(0.043)	(0.011)
$LnPromotionNeg_t$	-0.057**	-0.068**	-0.016	-0.031***
	(0.027)	(0.031)	(0.035)	(0.009)
$LnPromotionNonNeg_t$	0.024	-0.001	0.043	0.030**
	(0.028)	(0.029)	(0.041)	(0.011)

Notes: Panel B of Table 4 present results of estimating equation (1.4)-(1.7) for subsamples with low domestic market share. Each of the theme based regression is conducted separately and all controls are used as in Table 3. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

4.3.2 Effect of Quality-Related Emotional SWOM on Operational and Quality-Cost Decisions

My final research question examines the operational and cost decisions that firms alter in response to customer feedback in the form of quality-related emotional SWOM. I first look at changes to the level of operations and augment equation (1) with the following DVs:

$$Ln(DomASM)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.8)$$

$$Ln(IntlASM)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.9)$$

DomASM and *IntlASM* refer to domestic and international available seat miles. In the airline industry available seat miles is an established measure of passenger carrying capacity. It is equal to the number of seats available multiplied by the miles flown. Following quality-related emotional SWOM, airlines can anticipate future demand in terms of passengers and can accordingly alter supply (Cooper & Kaplan, 1992). However, such changes would not accrue if airlines believed that customer sentiments can be managed via quality improvements or impression management strategies, or they decide to maintain excess capacity (Cannon 2014).

Results of estimating equations (1.8) and (1.9) are presented in Panels A and B Table 5. Results as in Panel A of Table 5 show that negative (non-negative) quality-related SWOM is associated with a decrease (increase) in the domestic carrying capacity in a future period. The magnitude of negative effects ranges from 0.035% to 0.054% while positive effects range from 0.041% to 0.058%. These effects are comparable to the effects of quality-related SWOM on domestic passengers (Table 2, Panel B) and indicate that airlines use information in SWOM to anticipate demand fluctuations and accordingly alter operations. There are generally no

significant differences between the effects of negative and non-negative quality-related SWOM on domestic ASM. [20,21]

Results as in Panel B of Table 5 shows largely insignificant effects of quality-related SWOM on international ASM. These results are consistent with section 4.2, which indicate that international purchasing decisions show little to no sensitivity to customer quality-related emotional SWOM feedback. Therefore, airlines alter the levels of their domestic operations and not their international operations.[22]

[20] Since the average number of negative posts is lower than non-negative posts, the per-post impact of negative SWOM is likely higher than the per-post impact of non-negative SWOM.

[21] Another measure used in the airline industry to measure capacity utilization is passenger load factor. It is used to assess how efficiently an airline fills seats and generates fare revenue. While my analyses already look at effects of SWOM on passengers and ASM (both factors that determine load factor), I also investigate the relationship between SWOM and load factor. Untabulated analyses indicate that negative (non-negative) quality-related SWOM in *t* is negatively (positively) associated with domestic load factor in *t+1*. This indicates that airlines are not able to fully adjust supply to be in line with demand decreases following negative SWOM. Alternatively, airlines decide to maintain excess unused capacity in the face of decreased demand. Capacity utilization increases when demand rises.

[22] It is more costly to alter design of international operations such as changing the size of the flights and/or reducing and increasing number of flights. Untabulated analyses indicate no effect SWOM on international load factor.

TABLE 5: Firm Operational Responses to SWOM Feedback

Panel A: Effect of Quality-Related Emotional SWOM on Domestic Operations

Variables	*(1)* *Ln(DomASM)$_{t+1}$*	(2) *Ln(DomASM)$_{t+1}$*	(3) *Ln(DomASM)$_{t+1}$*	(4) *Ln(DomASM)$_{t+1}$*	(5) *Ln(DomASM)$_{t+1}$*
LnConvenienceNeg$_t$	-0.035***				
	(0.009)				
LnConvenienceNonNeg$_t$	0.041***				
	(0.010)				
LnExpectationNeg$_t$		-0.046***			
		(0.008)			
LnExpectationNonNeg$_t$		0.055***			
		(0.008)			
LnServQualityNeg$_t$			-0.054***		
			(0.010)		
LnServQualityNonNeg$_t$			0.058***		
			(0.010)		
LnPlaceNeg$_t$				-0.038***	
				(0.010)	
LnPlaceNonNeg$_t$				0.044***	
				(0.010)	
LnPromotionNeg$_t$					-0.043***
					(0.009)
LnPromotionNonNeg$_t$					0.055***
					(0.009)
LnCash$_t$	0.033***	0.034***	0.034***	0.033***	0.033***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
LnFlightEquip$_t$	0.015*	0.015**	0.013*	0.016**	0.014*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
LnGroundEquip$_t$	0.024**	0.014	0.023*	0.028**	0.018
	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)
LnLongTermDebt$_t$	-0.012***	-0.010***	-0.011***	-0.012***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
GdpAirlineGrowth$_t$	0.030	0.014	0.024	0.035	0.015
	(0.044)	(0.043)	(0.043)	(0.043)	(0.044)
LnDomFlights$_{t+1}$	1.017***	1.015***	1.021***	1.020***	1.023***
	(0.022)	(0.021)	(0.022)	(0.022)	(0.022)
Constant	3.560***	3.649***	3.532***	3.486***	3.535***
	(0.213)	(0.210)	(0.219)	(0.225)	(0.213)
LnThemeNeg$_t$ + *LnThemeNonNeg$_t$*	0.006	0.009*	0.004	0.005	0.013**
Observations	625	625	625	625	625
R-squared	0.453	0.454	0.455	0.451	0.450
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel A of Table 5 presents results of estimating equation (1.8). Robust errors in parenthesis *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 5 (cont'd)

Panel B: Effect of Quality-Related Emotional SWOM on International Operations

Variables	*(1)* $Ln(IntlASM)_{t+1}$	*(2)* $Ln(IntlASM)_{t+1}$	*(3)* $Ln(IntlASM)_{t+1}$	*(4)* $Ln(IntlASM)_{t+1}$	*(5)* $Ln(IntlASM)_{t+}$
$LnConvenienceNeg_t$	-0.023				
	(0.029)				
$LnConvenienceNonNeg_t$	0.045				
	(0.033)				
$LnExpectationNeg_t$		-0.008			
		(0.030)			
$LnExpectationNonNeg_t$		0.032			
		(0.030)			
$LnServQualityNeg_t$			-0.012		
			(0.039)		
$LnServQualityNonNeg_t$			0.039		
			(0.041)		
$LnPlaceNeg_t$				0.0288	
				(0.031)	
$LnPlaceNonNeg_t$				-0.003	
				(0.031)	
$LnPromotionNeg_t$					0.004
					(0.031)
$LnPromotionNonNeg_t$					0.026
					(0.032)
$LnCash_t$	-0.043***	-0.041***	-0.044***	-0.044***	-0.043***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
$LnFlightEquip_t$	-0.010	-0.009	-0.004	-0.005	-0.010
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
$LnGroundEquip_t$	-0.330***	-0.343***	-0.332***	-0.328***	-0.341***
	(0.045)	(0.048)	(0.045)	(0.046)	(0.047)
$LnLongTermDebt_t$	-0.009	-0.006	-0.009	-0.009	-0.006
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
$GdpAirlineGrowth_t$	-0.388**	-0.404**	-0.369**	-0.372**	-0.409**
	(0.162)	(0.171)	(0.162)	(0.170)	(0.169)
$LnIntlFlights_{t+1}$	1.546***	1.545***	1.548***	1.547***	1.547***
	(0.022)	(0.021)	(0.022)	(0.022)	(0.022)
Constant	5.497***	5.580***	5.413***	5.393***	5.511***
	(0.422)	(0.448)	(0.417)	(0.418)	(0.431)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	0.022^	0.023*	0.027*	0.026*	0.030**
Observations	625	625	625	625	625
R-squared	0.104	0.106	0.105	0.105	0.103
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel B of Table 5 presents results of estimating equation (1.8). Robust errors in parenthesis *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

Placebo Tests for Operational Outcomes

Changes to available seat miles can stem from various reasons: change in number of flights operating, change in size of aircrafts or a change in distance covered (miles flown). However, in the airline industry, it is challenging to reduce or increase the number of flights operating out of airports, alter flight destinations, or modify flying routes. Therefore, I conduct two placebo tests to ensure that my results are indeed driven by tenable firm responses to customer feedback. I augment equation (1) with two additional DVs: *Ln(DomFlights)* and *Ln(IntlFlights)*. Results (untabulated) show no significant associations between quality-related emotional SWOM, and number of flights operated. This provides additional confidence in my findings that firms use information in quality-related emotional SWOM to anticipate demand and alter operations which are under their control.

Effect of Quality-Related Emotional SWOM on Price

I next examine whether firms alter product pricing in response to customer feedback about the quality of their services. In doing so I augment equation (1) with the following DV:

$$Ln(AvgFare)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.10)$$

Following quality-related emotional SWOM, particularly negative quality-related SWOM, airlines can anticipate a fall in the demand for their services. Firms may accordingly adopt strategies that aid customer acquisition and retention, such as pricing (Zeithmal, 2000). Decreasing prices can provide a signal to customers that the firm cares about their satisfaction and retention (McWilliams & Gerstner, 2006; Lewis, 2006; Dawes, 2009; Cannon, 2014).

Since effects of quality-related emotional SWOM are largely concentrated among domestic consumers and operations, I investigate its effect on domestic pricing decisions, namely *Ln(AvgFare)*. Results of estimating equations (1.10) are presented in Table 6 and indicate a negative association between negative quality-related SWOM and domestic airfare for several of the quality related themes. That is, increased negative SWOM about quality of services is associated with decreased pricing in future periods.

On the other hand, there is little to no effect on pricing in response to non-negative quality-related SWOM. Further, the price decreases following negative quality-related SWOM are greater in magnitude than (marginal) price increases following non-negative quality-related SWOM. Thus, following negative SWOM, firms decrease prices in an attempt to retain and acquire customers.[23] Untabulated analyses using international average airfare as a dependent variable show no significant effects of quality-related SWOM.

[23] Note that reduction in domestic passengers (Panel B, Table 2) and reduction in pricing (Table 6) following negative quality-related SWOM accrue in time *t+1*. This implies that even though airlines reduce airfares following negative quality-related SWOM, they experience a reduction in their (domestic) customer base. This is not to say that price reduction is an ineffective strategy. There is a negative relationship between number of passengers and average fare (*coeff = -0.198, p<0.01*). Therefore, in the absence of price reduction, the loss of customers could be greater.

TABLE 6: Firm Pricing Responses to SWOM Feedback

Effect of Quality-Related Emotional SWOM on Price

Variables	*(1)* $Ln(AvgFare)_{t+1}$	*(2)* $Ln(AvgFare)_{t+1}$	*(3)* $Ln(AvgFare)_{t+1}$	*(4)* $Ln(AvgFare)_{t+1}$	*(5)* $Ln(AvgFare)_{t+1}$
$LnConvenienceNeg_t$	-0.016^				
	(0.012)				
$LnConvenienceNonNeg_t$	0.003				
	(0.013)				
$LnExpectationNeg_t$		-0.024**			
		(0.011)			
$LnExpectationNonNeg_t$		0.004			
		(0.010)			
$LnServQualityNeg_t$			-0.024*		
			(0.013)		
$LnServQualityNonNeg_t$			0.003		
			(0.013)		
$LnPlaceNeg_t$				-0.043***	
				(0.014)	
$LnPlaceNonNeg_t$				0.021^	
				(0.014)	
$LnPromotionNeg_t$					-0.022**
					(0.012)
$LnPromotionNonNeg_t$					0.007
					(0.012)
$LnCash_t$	-0.014**	-0.012*	-0.013**	-0.013**	-0.014**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
$LnFlightEquip_t$	-0.023	-0.028*	-0.026*	-0.029*	-0.024
	(0.016)	(0.016)	(0.015)	(0.015)	(0.016)
$LnGroundEquip_t$	0.109***	0.102***	0.111***	0.114***	0.111***
	(0.019)	(0.018)	(0.019)	(0.018)	(0.019)
$LnLongTermDebt_t$	-0.007**	-0.005	-0.006*	-0.005	-0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$GdpAirlineGrowth_t$	0.079	0.043	0.055	0.042	0.080
	(0.078)	(0.077)	(0.078)	(0.076)	(0.078)
$LnDomFlights_{t+1}$	-0.152***	-0.150***	-0.153***	-0.150***	-0.153***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Constant	8.244***	8.608***	8.335***	8.348***	8.221***
	(0.727)	(0.744)	(0.727)	(0.706)	(0.723)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	-0.014**	-0.014**	-0.016***	-0.017***	-0.016***
Observations	625	625	625	625	625
R-squared	0.242	0.256	0.251	0.263	0.246
Additional controls	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Table 6 presents results of estimating equation (1.10). Columns show effects of each of the five quality-related themes separately and include firm and quarter fixed effects. Additional controls include crude oil prices in time t+1. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

Effect of Quality-Related Emotional SWOM on Quality Failure and Quality Signaling Costs

Finally, I examine the effect of customer feedback in the form of quality-related emotional SWOM on quality failure and signaling costs. In doing so I augment equation (1) with the following DVs:

$$Ln(PaxSvcExp)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.11)$$

$$Ln(PaxAdvExp)_{t+1} = \alpha + \beta_1 * Ln(ThemeNeg)_t + \beta_2 * Ln(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + \delta * QuarterFE + \varepsilon \quad (1.12)$$

Research suggests that as quality levels fall, failure costs increase and vice-versa (Juran, 1962; Schneiderman, 1986; Fons, 2012; Chopra & Singh, 2015). Failure costs refer to correctional expenses associated with defects found after the customer receives the product or service. *PaxSvcExp* captures such failure costs and includes expenses such as passenger-related servicing, traffic and reservation expenses and food and communication expenses. These expenses can be viewed as customer satisfaction costs. Following quality-related emotional SWOM, which indicates levels of customer satisfaction and short-comings, if any, in the services offered, firms may respond by altering investments in such costs.

Results of estimating equation (1.11) are presented in Panel A of Table 7. *PaxSvcExp* is positively associated with negative quality-related SWOM and negatively associated with non-negative quality-related SWOM. Effect sizes range from 0.03% to 0.07%. Overall, the results are consistent with theory and show that firms learn about the quality of their services from customer feedback in the form of SWOM and accordingly undertake correctional actions.

TABLE 7: Firm Quality-Cost Responses to SWOM Feedback

Panel A: Effect of Quality-Related Emotional SWOM on Quality Failure Costs

Variables	(1) *Ln(PaxSvcExp)* $_{t+1}$	(2) *Ln(PaxSvcExp)* $_{t+1}$	(3) *Ln(PaxSvcExp)* $_{t+1}$	(4) *Ln(PaxSvcExp)* $_{t+1}$	(5) *Ln(PaxSvcExp)* $_{t+1}$
$LnConvenienceNeg_t$	0.037**				
	(0.018)				
$LnConvenienceNonNeg_t$	-0.031*				
	(0.018)				
$LnExpectationNeg_t$		0.054***			
		(0.015)			
$LnExpectationNonNeg_t$		-0.052**			
		(0.016)			
$LnServQualityNeg_t$			0.073***		
			(0.016)		
$LnServQualityNonNeg_t$			-0.065***		
			(0.016)		
$LnPlaceNeg_t$				0.049***	
				(0.016)	
$LnPlaceNonNeg_t$				-0.046**	
				(0.018)	
$LnPromotionNeg_t$					0.052***
					(0.016)
$LnPromotionNonNeg_t$					-0.047**
					(0.015)
$LnCash_t$	0.007	0.005	0.005	0.007	0.007
	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
$LnFlightEquip_t$	0.137***	0.143***	0.146***	0.144***	0.139***
	(0.021)	(0.021)	(0.021)	(0.022)	(0.021)
$LnGroundEquip_t$	0.152***	0.160***	0.148***	0.149***	0.155***
	(0.025)	(0.026)	(0.025)	(0.025)	(0.025)
$LnLongTermDebt_t$	0.003	-0.001	-0.000	-0.000	0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
$GdpAirlineGrowth_t$	0.188**	0.219**	0.210**	0.208**	0.209**
	(0.088)	(0.090)	(0.088)	(0.090)	(0.089)
$LnPax_{t+1}$	0.109*	0.121*	0.116*	0.109*	0.113*
	(0.064)	(0.062)	(0.063)	(0.062)	(0.062)
Constant	-0.897	-1.108*	-1.045*	-0.852	-0.903
	(0.653)	(0.615)	(0.626)	(0.641)	(0.631)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	0.006	0.002	0.008	0.003	0.005
Observations	625	625	625	625	625
R-squared	0.552	0.555	0.557	0.555	0.556
Additional controls	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel A of Table 7 presents results of estimating equation (1.11). Columns show effects of each of the five quality-related themes separately and include firm and quarter fixed effects. Additional controls include total operating expenses in time *t+1*. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

TABLE 7 (cont'd)

Panel B: Effect of Quality-Related Emotional SWOM on Quality Signaling Costs

Variables	*(1)* *Ln(PaxAdvExp)* $_{t+1}$	*(2)* *Ln(PaxAdvExp)* $_{t+1}$	*(3)* *Ln(PaxAdvExp)* $_{t+1}$	*(4)* *Ln(PaxAdvExp)* $_{t+1}$	*(5)* *Ln(PaxAdvExp)* $_{t+1}$
$LnConvenienceNeg_t$	0.111				
	(0.125)				
$LnConvenienceNonNeg_t$	-0.225*				
	(0.122)				
$LnExpectationNeg_t$		0.302**			
		(0.131)			
$LnExpectationNonNeg_t$		-0.450***			
		(0.133)			
$LnServQualityNeg_t$			0.448***		
			(0.146)		
$LnServQualityNonNeg_t$			-0.530***		
			(0.143)		
$LnPlaceNeg_t$				0.391***	
				(0.140)	
$LnPlaceNonNeg_t$				-0.491***	
				(0.141)	
$LnPromotionNeg_t$					0.085
					(0.136)
$LnPromotionNonNeg_t$					-0.202
					(0.132)
$LnCash_t$	0.228***	0.211***	0.215***	0.226***	0.226***
	(0.071)	(0.070)	(0.069)	(0.070)	(0.071)
$LnFlightEquip_t$	0.042	0.060	0.082	0.078	0.022
	(0.152)	(0.155)	(0.152)	(0.149)	(0.154)
$LnGroundEquip_t$	0.691***	0.782***	0.707***	0.681***	0.714***
	(0.177)	(0.179)	(0.177)	(0.176)	(0.175)
$LnLongTermDebt_t$	0.043	0.014	0.019	0.027	0.042
	(0.042)	(0.042)	(0.041)	(0.041)	(0.042)
$GdpAirlineGrowth_t$	0.445	0.719	0.643	0.657	0.448
	(0.800)	(0.804)	(0.800)	(0.808)	(0.824)
$LnPax_{t+1}$	-3.065***	-2.996***	-3.038***	-3.056***	-3.055***
	(0.464)	(0.460)	(0.454)	(0.451)	(0.463)
Constant	38.542***	36.856***	37.875***	38.417***	38.447***
	(5.899)	(5.841)	(5.760)	(5.710)	(5.903)
$LnThemeNeg_t$ + $LnThemeNonNeg_t$	-0.114^	-0.148**	-0.082	-0.100^	-0.117^
Observations	625	625	625	625	625
R-squared	0.186	0.195	0.194	0.194	0.186
Additional controls	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel B of Table 7 presents results of estimating equation (1.12). Columns show effects of each of the five quality-related themes separately and include firm and quarter fixed effects. Additional controls include total advertisement expenses in time t+1. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20

Another strategy that a firm may adopt in response to fall in customer perceptions about quality is increasing spending on advertising – a quality signaling tool (Nelson, 1974; Kihlstorm & Riordan, 1984; Horstmann & MacDonald, 1994; Kirmani, 1997; Barigozzi et al., 2009). Moreover, if the firm is not able to garner sufficient interest in their products though social interactions, they could spend more on traditional promotional expenses such as advertising and vice-versa (Godes, 2017). Equation (1.12) studies whether firms alter quality signaling strategies such as advertising in response to customer feedback about the quality of their services. *PaxAdvExp* captures passenger related advertising expenses.

Results of estimating equation (1.12) are presented in Panel B of Table 7. Consistent with theory, *PaxAdvExp* is positively associated with negative SWOM and negatively associated with non-negative SWOM about the quality. Magnitude of increases in quality signaling costs range from 0.30% to 0.45% while magnitude of decreases in quality signaling costs range from 0.23% to 0.53%. Decreases in quality signaling costs in response to non-negative SWOM is marginally greater in magnitude than increases in quality signaling costs in response to negative SWOM.[24] Overall, these results show that firms use information in quality-related SWOM to garner information about brand-quality perceptions and accordingly alter investments in quality signaling costs.[25]

[24] Since the average number of negative posts is lower than non-negative posts, the per-post impact of negative SWOM is likely higher than the per-post impact of non-negative SWOM.

[25] The theme 'promotion' has no effect on quality-signaling costs as proxied by advertising expenses. This is tenable. If firms notice that customers are not happy with their promotional strategies such as advertising (which is what most of the promotion-related SWOM is about), they may try other promotional strategies. Similarly, if their advertising strategies garner positive responses, they may not want to reduce investments.

4.4 Anecdotal Evidence from the Field

To obtain field insights, I interviewed the customer experience head and some customer service representatives of a major US airline. This airline has a dedicated customer experience and insight team, the members of which work in association with other operational divisions such as airport service, in-flight operations, etc. The team's task is to incorporate specific customer insights from social media and other sources. For example, if in a particular week there are a lot of complaints regarding in-flight operations, the in-flight operation representative on the customer insight team will take the findings to the respective division. The customer insight teams have weekly meeting to provide updates and insights to senior leadership about the existing problems and solutions to the same. A separate team monitors social media data and responds to consumer and stakeholder concerns in real time.

5. ADDITIONAL ANALYSES AND ROBUSTNESS TESTS

5.1 Controlling for Serial Correlation in Error Terms

Robust standard errors are estimated for all regression coefficients in the main analyses. Clustered standard errors (untabulated) to address serial correlation concerns produces qualitatively similar results. However, the issue of clustering with insufficient *N* remains.[26] To address these concerns, I supplement my analyses with two robustness tests: inclusion of lagged DVs and Driscoll-Kray standard error estimations.

Inclusion of Lagged DV

Including lagged values of the dependent variable can control for serial correlation in the error terms provided the model is dynamic, i.e., if the lagged value of the DV is (theoretically) associated with current values of the DV (Keele & Kelly, 2006; Achen, 2000). In my setting, lagged DVs can have negative or positive effects on current values of the DV. For example, firms with relatively poor quality in quarter *t* can strive to improve quality in quarter *t+1* (independent of SWOM). On the other hand, firms with poor quality in quarter *t* are also the firms who are more likely to continue having poor quality outcomes in quarter *t+1*.

However, even when the inclusion of lagged DV is warranted, it could lead to an upward (downward) bias in other coefficient estimates if $\beta < 0$ ($\beta > 0$) (where β is the coefficient on the variable of interest) and inconsistency in OLS estimates. This is especially true if error terms are serially correlated (Keele & Kelly, 2005; Achen, 2000; Griliches, 1961; Hibbs, 1974;

[26] Clustering is feasible with N as small as 30 (Hansen 2007). However, in my setting, the N = 19.

Maddala & Rao, 1973; Malinvaud, 1970; Phillips & Wickens, 1978). Such biases may be negligible if T is sufficiently large (Nickell, 1981).[27]

Estimation of the main analyses with controls for lagged values of the dependent variable (untabulated) reveal qualitatively similar results. The coefficient on the lagged DVs is *positive* and significant. This indicates that independent of SWOM, firms do not make improvements to the quality of their services, lending further support for my findings.

Driscoll-Kraay Standard Errors

Inclusion of lagged DVs to solve the problem of serial correlation in error terms raises the risk of bias and inconsistencies in the coefficient estimates. Therefore, I estimate all main analyses using the Driscoll-Kraay standard error estimation technique where the error structure is allowed to be heteroskedastic and autocorrelated up to some lag (Driscoll & Kraay, 1998). This procedure is best suited for settings where *N* is fixed while *T* is large ($T \rightarrow \infty$). Vogelsan (2012) extend the use of Driscoll-Kraay estimation and allow for fixed effects estimation with or without the use of time dummies.[28] Estimating all main analyses using Driscoll-Kraay estimation and allowing for up to three lags of the dependent variable (untabulated) produces qualitatively similar results in terms of sign, significance, and magnitude.

5.2 Eliminating Alternative Explanations

It is possible that SWOM is highly correlated with other sources of feedback such as complaints on firm websites, customer satisfaction surveys, monitoring customer-employee

[27] This is true when including lagged DVs in fixed-effects models (as in my setting) and a sufficiently large T. In my setting, T > 30 quarters.

[28] In STATA this is achieved by using the following command: xi: xtscc y x1 x2 … xK i.time, fe lag(M), where the lag qualifier is optional.

conversations for quality control purposes, etc. Therefore, even in the absence of SWOM, organizations may have the opportunity to make similar improvements to quality and operations. That is, SWOM may not be an incrementally valuable source of feedback. To investigate this, I conduct my analyses for two subsamples – years 2007-2013 and years 2014-2019.

As per my data, there was a major increase in SWOM activity from 2014. While social media was in existence prior to 2014, its use was rather limited. However, if SWOM is merely a proxy for all types of feedback and has no standalone value, one must observe similar effects of *Ln(ThemeNeg)* and *Ln(ThemeNonNeg)* in initial and later periods of the sample. This is because other sources of feedback were in use and would be correlated with SWOM (however little there was). This is not the case. Untabulated analyses indicate that effects are more prominent in the years 2014-2019. In several cases there is no effect of *Ln(ThemeNeg)* and *Ln(ThemeNonNeg)* in the initial sample period. This provides additional support for the premise that SWOM brings in unique decision-facilitating information.

5.3 Alternate Specifications

5.3.1 Ratio of Negative and Non-Negative SWOM and Independent Variables

Correlation between negative and non-negative quality related SWOM can lead to issues of multicollinearity. To address this, I created a new variable which combines negative and non-negative quality-related themes into a ratio and use this as an independent variable in all augmentations of equation (1). The variable is created as *RatioTheme = LnThemeNeg / LnThemeNonNeg.* Higher values of this variable indicate higher proportion of negative quality-

related SWOM.[29] Estimating equation (1) using $RatioTheme_t$ as an independent variable yields qualitatively similar results (untabulated). Higher $RatioTheme_t$ is associated with i) lower revenues and domestic passengers in *t+1*, ii) lower delays, diversions, and taxiing time in *t+1* and, iii) lower domestic ASM, lower air fare and higher quality costs in *t+1*.

5.3.2 Changes on Changes Analyses

I also estimate a changes-on-changes model for my main analyses. The model is as follows:

$$ChangeLn(DV)_{t+1} = \alpha + \beta_1 * ChangeLn(ThemeNeg)_t + \beta_2 * ChangeLn(ThemeNonNeg)_t + \beta_{3\text{-}8} * Controls + \gamma * FirmFE + + \varepsilon \quad (2)$$

$ChangeLn(DV)_{t+1}$ refers to change in the dependent variable from *t* to *t+1*.[30] $ChangeLn(ThemeNeg)_t$ and $ChangeLn(ThemeNonNeg)_t$ are changes in negative and non-negative theme related SWOM from *t-1* to *t*.[31] Estimating equation (2) yields results that are qualitatively similar to the main analyses (untabulated). The coefficient on change in negative quality-related SWOM from *t-1* to *t* ($ChangeLn(ThemeNeg)_t$) is negative with respect to revenues, domestic passengers, quality outcomes, domestic ASM and airfare and is positive with respect to quality cost outcomes.

5.4 Combining Individual Themes into a Larger Umbrella

Posts are often classified as belonging to more than one theme (e.g., convenience and service-quality), which increases multicollinearity risk. For robustness, I combine individual

[29] For example, consider an airline which had 500 negative convenience related posts and 700 non-negative convenience related posts in quarter *t*, $RatioConvenience_t$ would be Ln(500)/Ln(700) = 0.948.
[30] For example, if an airline had carrier delay of 1000 minutes in quarter t and 900 minutes in quarter *t+1*, $ChangeLn(CarrierDelay)_{t+1}$ would be Ln(900) – Ln(1000) = -0.105.
[31] For example, if an airline had 400 negative convenience related posts in t-1 and 500 negative convenience related posts in *t*, $ChangeLn(ConvenienceNeg)_t$ would be Ln(500) - Ln(400) = 0.223.

themes into a larger umbrella of 'quality-related SWOM'. I group posts belonging to the five quality-related posts into one, namely *AllQuality* and distinguish between negative and non-negative SWOM based on Plutchiks Wheel of Emotions (as in main analyses). In doing so, I am careful to avoid double counting of posts that are classified as belonging to more than one theme. I re-estimate all main analyses by augmenting equation (1) with $Ln(AllQualityNeg)_t$ *and* $Ln(AllQualityNonNeg)_t$ as independent variables.

Results are presented in Panel A of Table 8. While most results remain qualitatively similar to the main results, some retain significance only at marginal levels and at magnitudes lower than those of individual themes. Thus, the five themes of quality are separate theoretical constructs. If we combine them into one variable, the resultant aggregate variable has limited meaningful information. These results underscore the importance of studying individual quality themes in a disaggregated manner to understand the information value present in the *content* of feedback.[32]

[32] All main and additional analyses are reconducted using more control variables such as log of R&D spending and shares outstanding. Results (untabulated) remain qualitatively similar. Inclusion of these variables lead to loss of over 50 observations and are hence not included in the main specification.

TABLE 8: Combining Themes

Panel A: Effect of Quality-Related Emotional SWOM on Firm Outcomes (Combining All Themes)

Variables	*(1)* $Ln(Sales)_{t+1}$	*(2)* $Ln(DomPax)_{t+1}$	*(3)* $Ln(IntlPax)_{t+1}$
$LnAllQualityNeg_t$	-0.034***	-0.033***	-0.032
	(0.012)	(0.009)	(0.025)
$LnAllQualityNonNeg_t$	0.067***	0.047***	0.044^
	(0.014)	(0.009)	(0.026)
Observations	625	625	625
R-squared	0.212	0.128	0.122
Controls as in main analyses	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes

Variables	*(1)* $Ln(DepDelay)_{t+1}$	*(2)* $Ln(CarrierDelay)_{t+1}$	*(3)* $Ln(Diversions)_{t+1}$	*(4)* $Ln(TaxingTime)_{t+1}$
$LnAllQualityNeg_t$	-0.057**	-0.051*	-0.054^	-0.029***
	(0.022)	(0.031)	(0.037)	(0.011)
$LnAllQualityNonNeg_t$	0.014	-0.012	0.051	0.021*
	(0.023)	(0.033)	(0.036)	(0.011)
Observations	625	625	625	625
R-squared	0.226	0.239	0.132	0.100
Controls as in main analyses	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes

Variables	*(1)* $Ln(DomASM)_{t+1}$	*(2)* $Ln(IntlASM)_{t+1}$	*(3)* $Ln(AvgFare)_{t+1}$	*(4)* $Ln(PaxSvcExp)_{t+1}$	*(5)* $Ln(PaxAdvExp)_{t+1}$
$LnAllQualityNeg_t$	-0.042***	-0.038	-0.035**	0.047**	0.229^
	(0.010)	(0.038)	(0.014)	(0.019)	(0.015)
$LnAllQualityNonNeg_t$	0.059***	0.072*	0.013	-0.048**	-0.386**
	(0.011)	(0.037)	(0.014)	(0.019)	(0.151)
Observations	625	625	625	625	625
R-squared	0.438	0.100	0.158	0.556	0.191
Controls as in main analyses	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel A of Table 8 presents results of estimating equation (1.1) – (1.12) while combining all five themes into a larger umbrella of 'quality-related' SWOM. Controls include those used in Tables 2-7 respectively. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20.

TABLE 8 (cont'd)

Panel B: Effect of Non-Quality Related Emotional SWOM on Firm Outcomes (Combining All Themes)

Variables	*(1)* $Ln(Sales)_{t+1}$	*(2)* $Ln(DomPax)_{t+1}$	*(3)* $Ln(IntlPax)_{t+1}$
$LnAllNonQualityNeg_t$	-0.015	-0.001	-0.033
	(0.025)	(0.009)	(0.038)
$LnAllNonQualityNonNeg_t$	0.024	0.024**	0.061^
	(0.019)	(0.010)	(0.035)
Observations	625	625	625
R-squared	0.354	0.179	0.110
Controls as in main analyses	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes

Variables	*(1)* $Ln(DepDelay)_{t+1}$	*(2)* $Ln(CarrierDelay)_{t+1}$	*(3)* $Ln(Diversions)_{t+1}$	*(4)* $Ln(TaxingTime)_{t+1}$
$LnAllNonQualityNeg_t$	-0.012	-0.001	-0.001	-0.016
	(0.036)	(0.036)	(0.047)	(0.016)
$LnAllNonQualityNonNeg_t$	-0.023	-0.042	0.002	0.012
	(0.027)	(0.037)	(0.054)	(0.016)
Observations	625	625	625	625
R-squared	0.198	0.226	0.133	0.105
Controls as in main analyses	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes

Variables	*(1)* $Ln(DomASM)_{t+1}$	*(2)* $Ln(IntlASM)_{t+1}$	*(3)* $Ln(AvgFare)_{t+1}$	*(4)* $Ln(PaxSvcExp)_{t+1}$	*(5)* $Ln(PaxAdvExp)_{t+1}$
$LnAllNonQualityNeg_t$	-0.001	-0.077	-0.022*	0.020	0.106
	(0.016)	(0.070)	(0.012)	(0.025)	(0.141)
$LnAllQualityNonNeg_t$	0.024	0.069	0.014	-0.023	-0.215
	(0.016)	(0.065)	(0.012)	(0.026)	(0.219)
Observations	625	625	625	625	625
R-squared	0.227	0.092	0.173	0.560	0.186
Controls as in main analyses	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: Panel B of Table 8 presents results of estimating equation (1.1) – (1.12) using 'non-quality related' emotional SWOM as independent variables. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, ^ p < 0.20.

Placebo with Non-Quality Related SWOM

Finally, I conduct placebo tests to check whether the content of the SWOM matters. That is, whether the effect that is observed on consumer and firm outcomes is in-fact driven by quality-related SWOM or just by the sheer volume of SWOM. To do so, I estimate equation (1) by using $Ln(NonQualityNeg)_t$ and $Ln(NonQualityNonNeg)_t$ as independent variables. *NonQuality* refers to those social media posts that do not have any quality-related content in them. These refer to posts about topics such as availability (e.g., "No tickets were available for Delta"), intent to purchase (e.g., "Tomorrow, I'm going to fly United") and risk (e.g., "Why is flying so tiring?! #FlyFrontier").

Results of estimating equation (1) with the non-quality related emotional SWOM are presented in Panel B of Table 8. Effects on revenues and domestic purchasing decisions are limited. Importantly, there is no effect of non-quality related SWOM on firm quality outcomes. The effect of non-quality related SWOM on operational decisions such as domestic ASM, pricing decisions, and quality costs are also insignificant. Therefore, customer feedback (i.e., SWOM) does not carry decision-facilitating information that can be used by firms to learn about their performance, thus does not affect firm outcomes. Overall, these results emphasize the importance of *content* and *emotional type* of SWOM in consumer and firm decision-making processes.

6. CONCLUSION

In this study, I explore the role of the *cognitive content* and *emotional type* of social media-based word-of-mouth as a source of feedback for firms and thereby as a crucial management control practice. Using psychology theory and textual analyses methods, I unpack SWOM into five quality-related themes and two emotional types. I use the airline industry as a setting and find that quality-related emotional SWOM has implications for: 1) firm revenues and consumer purchasing decisions, 2) firm quality outcomes, and 3) firm operational and resource allocations. Specifically, negative (non-negative) quality-related SWOM is associated with lower (higher) revenues and fewer (greater) customers in a future period. Negative quality-related SWOM is associated with future quality improvements thus indicating that firms use information in SWOM as a source of feedback to learn about their performance. Moreover, such improvements are concentrated in firms who are most likely to be impacted by the loss in customers pursuant to negative quality-related SWOM. Negative and non-negative quality-related SWOM is also associated with several operational outcomes such as capacity decisions, pricing, and quality cost investments.

My study contributes by conceptualizing SWOM as a source of feedback and highlighting the importance of the *content* and *emotional type* of such feedback in influencing outcomes. Several studies have investigated the impact of SWOM on sales and consumer purchasing decisions but have focused mostly on the volume of SWOM. I add value by parsing out features of SWOM that potentially drive such results. Research on the impact of SWOM on product policy and firm decisions is in its infancy. I add to this literature by viewing SWOM as a source of customer feedback for firms and exploring the usefulness of its content and emotional type in driving outcomes. I find that SWOM is only useful when it contains information relevant

for decision making, i.e., the content is cognitive and not simply affective. SWOM which does not have cognitively relevant content has little to no impact on consumer and firm outcomes. My results shed light on how firms use contemporary sources of feedback such as SWOM as in their management controls and operational decisions. I open avenues for future research which can investigate how SWOM interacts with other elements in a firm's management control system to collectively influence crucial outcomes.

APPENDIX

TABLE A1: Examples of SWOM Posts

Convenience negative	"@VirginAtlantic hi, I've just checked my flight status online for SFO in Sept & there's changes to the aircrafts, seats & return times. I've had no email about these changes. I'm concerned I'll not get a message about cancellation. You have my correct email address."
Convenience non-negative	"Spirit Airlines has announced two daily non-stop flights from PDX (Portland, OR) to LAS (Las Vegas, NV).I heard about this on the news about a week ago .but only today did the light bulb switch on!I LOVE Portland.I LOVE IT!"
Expectation negative	"@flyfrontier YOU SUCK!I had the worse flying experience EVER IN LIFE! I will never use your airline again! Forget the credit I'd rather WALK!I will make it my business to bad mouth you every chance I get. Low fares done right? Get a new slogan. You guys dropped the ball SEVERAL times. Don't use @flyfrontier the worse airline in history."
Expectation non-negative	"Made this while I was on my flight home Saturday! @FlyFrontier will always be my #1 airline!"
Service quality negative	"SHAME ON CONTINENTAL/UNITED AIR: I talked to a "Ms. Brooks" at Continental Air (who was allegedly a "supervisor" but she wouldn't give me her ID NO. And showed no sympathy nor concern ...saying I "made a poor choice."
Service quality non-negative	"RT @MollyGrantham Airport drama this morn in CLT. Flights delayed. No one can help. Enter Michelle: @AmericanAir employee and good soul. Putting "customer" back in "customer service". I've learned in this world when people do nice things for you, you thank them. Thank you, Michelle. Thank you, AA."
Place negative	"Never fly @AlaskaAir.My husband flew (seattle to Raleigh), he had the surliest flight attendants & they had 2 restrooms out of 3 closed."
Place non-negative	"RT @Flyclopedia: RT @AlaskaAir: Beautiful view!Nice day for flying. View of the coast of Hawaii after takeoff."
Promotion negative	"I'm sure you all know what I'm talking about as of now, for those who don't, basically Alaska Airlines increased redemption rates on Emirates overnight. Some awards in Emirates First Class went up by as much as 100%… that's insane. Overnight. With no advance notice. Where do I begin?"
Promotion non-negative	"Thought some travel-loving people might enjoy this deal: All you can fly for one month for $599 on Jetblue. Limitations apply of course. Free flights from Sept 8 to Oct 8 and must purchase the pass by 8/21/09.Taxes included on domestic flights, taxes, and fees extra on international flights. I borrowed this from slick deals, where there is a thread discussing this deal for those interested: $599 - Unlimiting travel for a month on JetBlue: All-You-Can-Jet"

TABLE A2: Airlines Included in Sample

Industry	Brands used
Airlines	Alaska, Allegiant, American, Continental, Delta, Envoy, ExpressJet, Frontier, Hawaiian, JetBlue, Mesa, Northwest, Republic, Skywest, Southwest, Spirit, US airways, United, Virgin Atlantic

TABLE A3: Variable Description

Variable name	Description
Dependent variables:	
Ln(Sales)	Log of total operating revenues in a quarter
Ln(DomPax)	Log of total domestic passengers in a quarter
Ln(IntlPax)	Log of total international passengers in a quarter
Ln(DepDelays)	Log of total departure delay (in minutes) in a quarter
Ln(CarrierDelays)	Log of total carrier delays (in minutes) in a quarter
Ln(Diversions)	Log of total number of flights diverted in a quarter
Ln(TaxingTime)	Log of total taxing time (in minutes) in a quarter
Ln(DomASM)	Log of total domestic available seat miles in a quarter
Ln(IntlASM)	Log of total international available seat miles in a quarter
Ln(AvgFare)	Log of average (domestic) airfare in a quarter
Ln(PaxSvcExp)	Log of passenger service-related costs in a quarter – these include passenger related traffic, servicing, reservation, food, and communication expenses
Ln(PaxAdvExp)	Log of total passenger advertisement expenses in a quarter
Main independent variables:	
LnConvenienceNeg	Log of total convenience related negative posts in a quarter
LnConvenienceNonNeg	Log of total convenience related non-negative posts in a quarter
LnExpectNeg	Log of total expectation related negative posts in a quarter
LnExpectNonNeg	Log of total expectation related non-negative posts in a quarter
LnServQualityNeg	Log of total service-quality related negative posts in a quarter
LnServQualityNonNeg	Log of total service-quality related non-negative posts in a quarter
LnPlaceNeg	Log of total place related negative posts in a quarter
LnPlaceNonNeg	Log of total place related non-negative posts in a quarter
LnPromotionNeg	Log of total promotion related negative posts in a quarter
LnPromotionNonNeg	Log of promotion related non-negative posts in a quarter
Control variables	
LnCash	Log of total cash held by an airline in a quarter
LnFlightEquip	Log of flight and carrier equipment in a quarter
LnGroundEquip	Log of total ground equipment held by an airline in a quarter
LnLongTermDebt	Log of total long term debt held by an airline in a quarter
GdpAirlineGrowth	Annual GDP growth in the airline industry
LnFlights	Log of total number of flights operated by an airline in a quarter
LnDomFlights	Log of domestic flights operated by an airline in a quarter
LnIntlFlights	Log of international flights operated by an airline in a quarter
LnPax	Log of total passengers of an airline in a quarter

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