

The Impact of Service System Design and Flow Experience on Customer Satisfaction in Online Financial Services

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Prior research examines customer satisfaction in retailing and e-commerce settings, yet online financial services have received little research attention. To understand customer satisfaction with this fast-growing service, this study investigates the role of flow experience, a sensation that occurs as a result of significant cognitive involvement. The study examines how service system characteristics affect the cognitive states of the flow experience, which determines customer satisfaction. The flow construct and total experience design suggest a structural model that is empirically tested using responses from a large sample of online investors. In support of the model and most of the hypotheses it suggests, the empirical results clarify the important antecedents and consequence of flow experience in online financial services and suggest the viability of using a dual-layer experience construct to investigate customer satisfaction. These findings can help researchers and service providers understand when, where, and how flow experience is formulated in online financial services.

Introduction

Since first introduced in the early 1990s, online brokerage has revolutionized the way customers make investment decisions. Compared with many other aspects of e-commerce, online financial services have achieved considerable penetration; for example, online retail sales represented only 5% of overall retail sales in 2006,¹ whereas online stock trading accounted for nearly 40% of all retail investment transactions (Balasubramanian, Konana, and Menon 2003), with more than \$4 trillion in assets administered by online investors. According to the Security Industry and Financial Markets Association, approximately 68% of equity investors in the United States used the Internet for finance-related purposes in 2004; among them, 50% managed financial accounts and 46% obtained financial news.² EMarketer and Tiburon Strategic Advisors report that the number of online brokerage accounts increased from

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14.3 million in 2000 to 34.1 million in 2006—an impressive 138.5% growth over a 7-year period.³

To compete in the fast-growing online brokerage market, established financial firms strive to reduce transaction costs and improve service quality, whereas new providers in this market often compete through deep discounts, such as service fees of less than \$5. Although commission fees influence investors' initial choices of service provider (Ding, Verma, and Iqbal 2007), customer satisfaction remains critical and can substantially affect the bottom line, because satisfied customers stay longer with a firm, make more purchases, and tend to contribute to word-of-mouth branding (Anderson and Srinivasan 2003). The impact of customer satisfaction on loyalty is particularly crucial in the financial service sector, where more than 70% of customer attrition results from customer dissatisfaction (Loveman 1998). Prior research examines customer satisfaction with brick-and-mortar financial services (Krishnan et al. 1999; Loveman 1998). Yet the increasing proliferation of online financial services and the fierce competition in online financial markets warrant investigation of a fundamental question: What drives customer satisfaction in online financial services?

Since online financial service is an information-intensive industry, one can argue that a firm's market-based performance (e.g., customer satisfaction, loyalty, word-of-mouth) will be dependent on its customers' experiences related to the flow of events within the service delivery process (Chase and Dasu 2001). Past research has shown that sequence of events and peak experiences in a service delivery process affect customer satisfaction (e.g., Verhoef, Antonides, and de Hoog 2004). Other scholars have shown that the design of operations systems to facilitate swift and even flow results in higher performance (e.g., Schmenner 2004; Schmenner and Swink 1998). In another related research, Frei (2006) showed that there is a tradeoff in efficiency and customer service and that higher performance can be achieved by variability reduction in the service delivery process. The brief overview of several articles above suggests that we need to take a closer look at the customer's experience with respect to service system and the process flow to understand the drivers of satisfaction.

Drawing on past research, therefore, we propose a structural model for explaining customer satisfaction in online financial services. Furthermore, we empirically test that model by conducting a survey of 905 active online investors. Specifically, we study the impact of service systems and customer flow experiences on their satisfaction. Our investigation focuses on how the design of important service system components elicits flow experience that in turn influence customer satisfaction (Korzaan 2003; Novak, Huffman, and Yung 2000; Pullman and Gross 2004). Our study will help online service providers to gauge service performance, identify specific components that need improvements, and assess their relative advantages and service capabilities effectively. The proposed model is comprehensive, embracing essential key customer satisfaction drivers that pertain to service system and flow experience in online financial service contents.

The organization of the remainder of the article is as follows. First, we review relevant research pertaining to customer satisfaction, service system, and flow experience. Second, we describe a structural framework of the key antecedents and consequence of flow experience. Third, we present our research model and study design and then discuss important empirical results. We conclude with research and managerial insights, a discussion of our contributions, and future research directions.

Literature Review

Customer Satisfaction and Online Financial Service

Customer satisfaction reflects “a summary psychological state resulting from a product/service acquisition and/or consumption experience” (Oliver 1997, p. 13) or a cognitive computation of online experience or the contentment with a purchase experience (Anderson and Srinivasan 2003). Most studies agree that satisfaction represents an overall psychological state, yet few examine online customer satisfaction from the customer flow experience perspective, despite its increasing importance in service research and the service economy (Chase and Dasu 2001; Pine and Gilmore 1999; Schmenner 2004).

According to the service typology suggested by Cook, Goh, and Chung (1999), online financial services differ from conventional services because of their capital intensity and customer involvement. Online stock trading often requires substantial capital investments, and many investors seek large amounts of data (e.g., real-time stock quotes, up-to-date news, financial statements, analyst reports) and process them extensively. Investors thus actively participate in the service process by evaluating investment opportunities, formulating strategies, assessing risks, placing orders, and managing their portfolios. Such capital intensity and customer involvement attract attention from researchers and practitioners. Several studies examine service performance in a brick-and-mortar context and find a variety of important determinants for service quality and customer satisfaction, including product offerings, customer service, operational competence, account information, account statements, and employee satisfaction (Balasubramanian, Konana, and Menon 2003; Krishnan et al. 1999; Loveman 1998; Roth and Jackson 1995).

Although these studies advance understanding of customer satisfaction in traditional financial services, online financial services might involve different or additional drivers because of their self-service nature and credence characteristics (e.g., Ding, Verma, and Iqbal 2007). Analysis of online retailing shows increasing commoditization; that is, many Web sites are highly comparable in product offerings, service information, return policies, Web site functionality, and security safeguards. Customers who contact different sites with questions are likely to wind up with the same call center that provides customer support services to competing providers simultaneously. Thus, if such elements can be replicated without much difficulty, they are not likely to create sustainable competitive advantages for firms. In this

connection, how can a service provider survive or excel in the fiercely competitive online financial service market?

We follow the resource-based view (Barney 1991; Scott 2007) and argue that unique online experiences are difficult to imitate and therefore can create sustainable competitive advantages and long-run economic values for firms. We propose a model for understanding how essential service system elements (e.g., product variety, service quality, and process feature) might elicit favorable flow experience, which enhances customer satisfaction and future behavior to ensure sustainable competitive advantages (e.g., Chase and Dasu 2001; Frei 2006).

Service Experience Design

An experience entails aggregate, cumulative customer perceptions created during interactions with a product or service (Pullman and Gross 2004). Experiences are created when a provider intentionally uses services as the stage, and goods as props, to engage customers in a way that creates a memorable event (Pine and Gilmore 1999) or when customers have sensations or knowledge acquisition through their interaction with different elements of a context purposefully designed by a provider (Gupta and Vajic 1999). The goods, services, and anything else customers can see, smell, taste, hear, or perceive while interacting with service systems constitute clues (Berry, Wall, and Carbone 2006) that directly affect the experience the customer perceives or forms.

Firms seeking to design and manage such experiences might apply a metaphor of a stage play, such that the total customer experience equals the combined effect of every element of the play. According to Voss and Zomerdijk (2007), experiential services are analogous to theatrical performances; they include a physical environment (stage), service employees (actors), service delivery processes (script), fellow customers (audience), and back office support (backstage crew). These experience elements and characteristics are often perceived and reflected as essential service system elements in the experience design that can be engineered or orchestrated to influence a customer's overall assessment of an experience favorably (Berry, Wall, and Carbone 2006; Pine and Gilmore 1999).

Chase and Dasu (2001) suggest that the use of behavioral science is enhancing customer experience. Similarly, Berry, Wall, and Carbone (2006) describe engineering customer experience by managing the clues embedded in customers' experiences with service systems that trigger their emotions. According to these investigators, a service system thus can be categorized as containing functional, mechanic, or humanic clues. Functional clues indicate technical quality and the reliability and functionality of the offering, whereas mechanical clues provide a physical representation of the intangible service. Humanic clues refer to the service provider's behavior or appearance, such as tone of voice, level of enthusiasm, body language, neatness, and appropriate dress.

The customer service element of online financial services provides a key determinant of customer intentions and behavior and corresponds to humanic clues (Anderson and Srinivasan 2003; Parasuraman, Zeithaml, and Malhotra 2005). The collective findings from prior studies point to several important customer service quality characteristics that include service representatives' knowledge, responsiveness, courtesy, and ease of access (Froehle 2006; Parasuraman, Zeithaml, and Malhotra 2005). The process element pertains to functional clues and encompasses ease of use and usefulness, which affect customers' intention to use a service (DeLone and McLean 2003; Wixom and Todd 2005). Important process features can affect customer satisfaction in an online service context and are commonly measured in terms of design, functionality, availability, and reliability (DeLone and Mclean 2003; Parasuraman, Zeithaml, and Malhotra 2005). Finally, product variety influences customer satisfaction and resembles mechanic clues (Krishnan et al. 1999). In the context of online financial services, product variety includes the variety of financial products, research tools, and the amount of leverage the provider offers, such as the interest rate charged for borrowing.

Flow Experience

The goal of experience design is to create a compelling experience that can be measured and analyzed on the basis of flow experience (Csikszentmihalyi 2000). Similar to many context-based experiences, flow experience affects customer satisfaction and future behaviors. Csikszentmihalyi (2000) shows that flow exists in various service contexts and suggests that an optimum state of flow, or "autotelic experience," occurs when (1) a clear set of goals requires an appropriate response, (2) feedback is immediate, and (3) a person's skills are fully involved in overcoming a significant but manageable challenge. Ghani and Deshpande (1994) analyze autotelic experiences and argue that flow depends on a customer's sense of control and the level of challenges associated with using a system or the services it supports.

A review of earlier research shows a focus on flow channel segmentation models on the basis of desirable congruence of skills and challenges (Csikszentmihalyi 2000). Novak, Hoffman, and Yung (2000) conceptualize online flow as a cognitive state that a customer experiences during navigation, jointly determined by skills, perceived control, challenge, arousal, focused attention, interactivity, and telepresence. They also report significant relationships between such experiences and service assessments. Korzaan (2003) combines flow and the theory of reasoned action (Ajzen 1991) to show that the psychological state of flow influences customers' exploratory behaviors and attitudes toward online purchases.

We extend service quality and process features discussed by Roth and Jackson (1995) and empirically test relationships among service system, flow experience, and customer satisfaction. Specifically, we posit that flow experience in online financial services results from cognitive states, including skill, perceived control, challenge, focused attention, and interactivity (Novak, Hoffman, and Yung 2000). Furthermore, we respond to the call to examine customer experience on the basis of experience design, delivery, performance measurement, and cognitive science (Chase and Dasu 2001; Roth and Menor 2003). By analyzing essential service

system elements and testing their impact on customer satisfaction through flow experience, our study contributes to the limited research on design choices and contingencies that affect customer experiences created by different servicescapes (Bitner 1992).

From an operations research perspective, this distinctive construct in our research framework is important for three reasons. First, it sheds lights on the debate over human issues in service design by moving away from the long-fought battle for universally positive or negative performance impact of a service system toward a more fine-grained quest for why some firms can derive more satisfied customers from experience design than others (Chase and Dasu 2001; Cook et al. 2002). Second, it provides us a unique opportunity to contribute to the operations literature: We are among the first to reveal the importance of explicit physical structures and event flows (e.g., servicescapes) in eliciting implicit psychology and emotion of customers (Roth and Menor 2003; Schmenner and Swink 1998). Third, this construct seeks to advance our understanding of different types of variability introduced by customers (e.g., effort, capability, and subjective preference) during the service production process (Frei 2006).

Research Model and Hypotheses

We analyze key antecedents of customer satisfaction by anchoring them in service system design and flow structure, which allows us to conceptualize how customer satisfaction is formed in online financial services. As we depict in Figure 1, when a consumer accesses a service provider's Web site, he or she first experiences certain process features, product offerings, and customer services (Berry, Wall, and Carbone 2006). These service system components then shape the customer's perceptions as he or she learns about, acquires, uses, maintains, and disposes of the product or service. The perceptions constitute actual experience, which we propose to assess with the construct of flow experience (Novak, Hoffman, and Yung 2000). That is, we argue that important cognitive states (i.e., perceived control, skill, focused attention, interactivity, and challenges) determine the psychological state of customer satisfaction (Korzaan 2003; Oliver 1997; Pullman and Gross 2004).

Flow Experience and Satisfaction

Perceived control. Perceived control relates to self-efficacy (Compeau and Higgins 1995) and suggests a cognitive state in which a person believes he or she can respond to and influence an event (Ajzen 1991). Because it can generate positive emotional responses in a service setting, perceived control can increase customer satisfaction (Quelch and Klein 1996). In an online setting, such controls are rooted in an individual's perception of his or her ability to navigate a Web site in an effective and efficient manner or in how well he or she expects that the Web site will respond to his or her inputs (Novak, Hoffman, and Yung 2000). In online financial services, perceived control emerges when an investor, on an investment Web site, knows what to expect when clicking on a link, whether the presented information is consistent with his or her expectation, and the specific task that he or she must perform to complete a transaction. Many consumers value online financial services because of convenience and

increasing perceived control and related reduction in process variability (Ding, Verma, and Iqbal 2007; Frei 2006). Accordingly, we test the following hypothesis:

Hypothesis 1A: In online financial services, perceived control is positively associated with customer satisfaction.

Skill. Skill refers to capacity for action (Ajzen 1991), another important cognitive state that generally denotes a person's judgment of his or her own ability to perform a task or engage in an activity. Operations and marketing research shows that skill predicts satisfaction (Flynn et al. 1990). In online financial services, investors must search, process, and integrate information from multiple pages; many investors also use computer-based decision support systems. Therefore, their skill in locating relevant information, understanding that information, and executing transactions should affect their satisfaction with the financial services delivered by the Web site. We therefore anticipate a positive relationship between skill and customer satisfaction:

Hypothesis 1B: In online financial services, skill is positively associated with customer satisfaction.

Focused attention. Attention centered on a limited stimulus field constitutes a crucial cognitive state of flow experience (Ghani and Deshpande 1994). To experience optimal flow, customers must engage in service activities and act as coproducers. Online customers constantly receive a large influx of stimuli that compete for their limited attention and processing capacity (Quelch and Klein 1996), distract them from their main task (Koufaris 2002), mitigate their concentration, and adversely affect their satisfaction (Xia and Sudharshan 2000). Compared with general e-tailing, the volatility and dynamics of online financial market demand higher focused attention, because any distractions in the decision-making process can lead to considerable financial losses. Thus, we argue that focused attention helps investors process information flow and analyze market movement, which lead to wiser investment decisions and higher user satisfaction.

Hypothesis 1C: In online financial services, focused attention is positively associated with customer satisfaction.

Interactivity. When they obtain good flow, customers are likely to perceive their online experiences as compelling and become involved (Chase and Dasu 2001; Novak, Hoffman, and Yung 2000). Thoughts, stimuli, or events not directly related to this navigation should be filtered, enabling the user's full engagement with the Web site. Steuer (1992) proposes a three-stage conceptualization of virtual reality, in which interactivity occurs when the pages on a Web site load rapidly, the site responds quickly to each click, and the user is interested. Palmer (2002) also advocates the criticality of interactivity to a Web site's success. According to Schlosser (2000), an interactive Web site can make users enjoy their visits and thus increase their satisfaction with the services delivered by the site. Accordingly, we test the following hypothesis:

Hypothesis 1D: In online financial services, interactivity is positively associated with customer satisfaction.

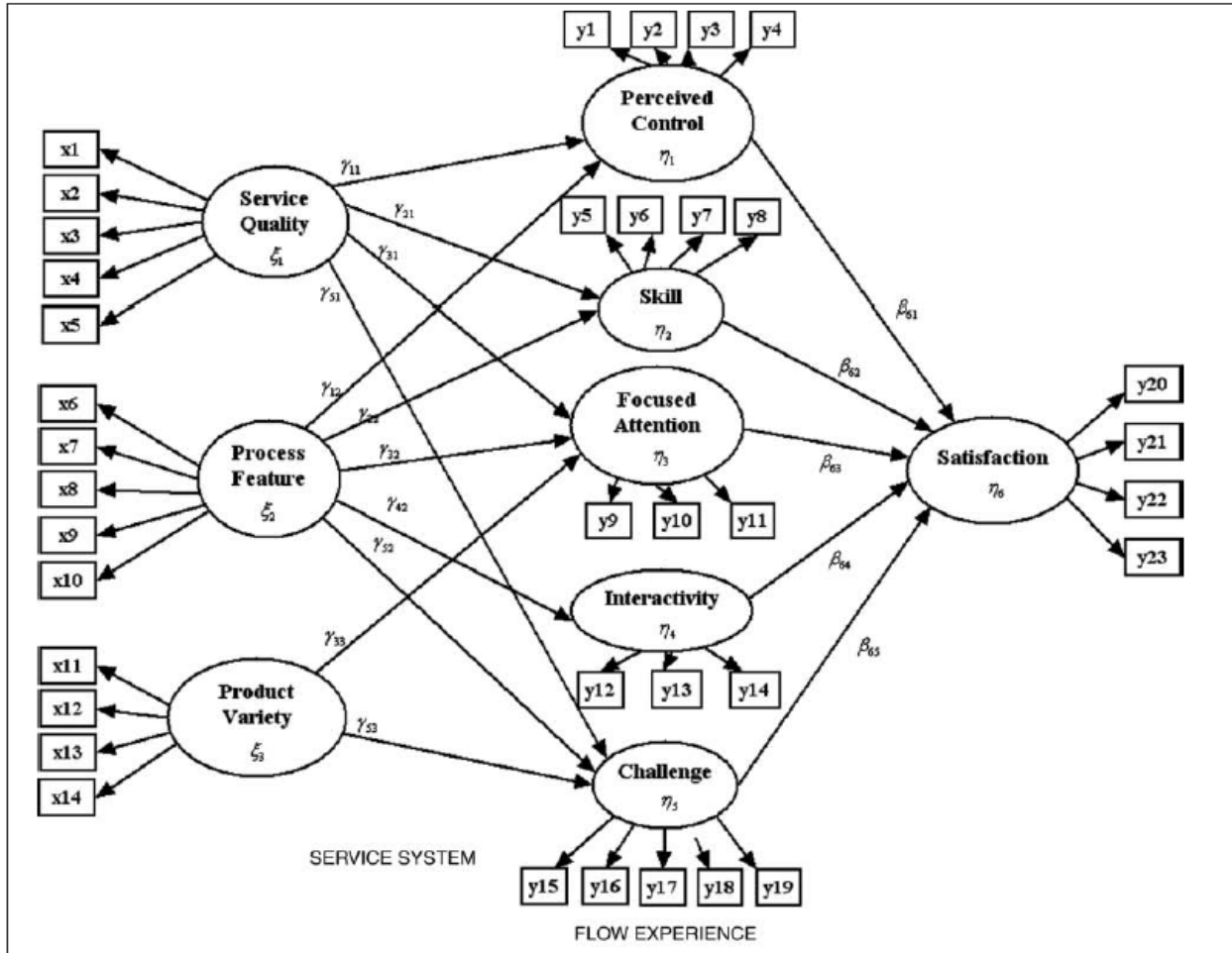


Figure 1. Structural model for customer satisfaction in online financial services.

Challenges. Challenges in an online context refer to an individual's opportunities for enhancing his or her action on the Web and the accompanying enjoyment (Novak, Hoffman, and Yung 2000). As Anand and Sternthal (1990) note, a Web site that fails to offer sufficient challenge prompts tedium and boredom, whereas adequate challenges have positive effects on users' attitudes and perceived flow (Ghani and Deshpande 1994; Novak, Hoffman, and Yung 2000). Flow occurs when visitors are challenged enough to avoid boredom but not so much that they experience anxiety (Csikszentmihalyi 2000). Thus, a good Web site appears positively challenging, much like an enjoyable electronic game (Koufaris 2002). We anticipate that online investors value reasonable challenges and exhibit satisfaction when they confront such challenges.

Hypothesis 1E: The level of challenge in online financial services is positively associated with customer satisfaction.

Service System and Flow Experience

When engaging in online trading activities, customers first experience context-based, mechanic, functional, and humanic clues on the service system. They then formulate a cognitive state, that is, a flow experience characterized by perceived control, focused attention, interactivity, skill and challenge. Although clues and flow experience have been examined separately in earlier research (e.g., Berry, Wall, and Carbone 2006), few studies analyze the relationship between context-based clues pertaining to service systems and flow experience online.

Product variety. Firms can attract new customers and retain existing customers by offering a comprehensive array of products, detailed information, and effective analysis tools (Chen and Hitt 2002). However, product offerings alone cannot create sustainable advantages (Kotha, Rajgopal, and Venkatachalam 2004) because competitors can easily observe and imitate such visible offers (Barney 1991; Scott 2007). However, firms might attract customers' attention by creating comprehensive product offerings and effective decision support that enhances satisfaction. For example, many investors use analysis tools available on the service provider's Web site to optimize their returns. Overall, firms that provide a wider range of product offerings should attract more attention than those with a narrower range.

Moreover, when a firm augments its product offerings, the firm might make its Web site increasingly challenging (Koufaris 2002) by providing more financial products, more analysis tools, and more investment information. From an opportunity cost perspective, a wider range of product offerings reduces search efficiency, increases cognitive processing requirements, and may make the search process more challenging (Chen and Hitt 2002). Accordingly, we test the following hypotheses:

Hypothesis 2: Product variety on a financial service Web site is positively associated with a customer's (A) focused attention and (B) the level of challenge.

Service quality. Customer services produce essential social and economic outcomes, such that service quality significantly influences customers' attitudes, intentions, and behaviors (Parasuraman, Zeithaml, and Malhotra 2005). In particular, customer service through multiple channels may be critical for online financial services (Krishnan et al. 1999). When a customer contacts a service representative by phone, e-mail, or other means, he or she expects timely responses and satisfactory solutions from the representative, who must be knowledgeable, courteous, and easy to reach (Froehle 2006). Such responses reduce the customer's anxiety about using online services (Wolfenbarger and Gilly 2003), increase a sense of perceived control (Ding, Verma, and Iqbal 2007), and help the customer focus on investment activities (Krishnan et al. 1999). Such services also can augment customers' knowledge base and skills as they interact with and learn from service representatives (Froehle 2006), which may reduce their perception of the challenges associated with the online financial services.

Hypothesis 3: Service quality on a financial service Web site is positively associated with a customer's (A) perceived control, (B) skill, and (C) focused attention but (D) negatively with the level of challenges.

Process feature. Evaluations of service systems generally involve process characteristics that remain invariant across user groups and independent of the task, context, or application (Nelson, Todd, and Wixom 2005), such as security, reliability, ease of use, availability (accessibility), response time, and interface (DeLone and McLean 2003; Palmer 2002). Process feature affects not only user satisfaction (Parasuraman, Zeithaml, and Malhotra 2005; Wolfinbarger and Gilly 2003) but also customer retention (Chen and Hitt 2002) and its effectiveness (e.g., Schmenner 2004; Schmenner and Swink 1998). For example, a user-friendly, easy-to-navigate Web site can reduce the challenge level and help customers locate target information, find appropriate analysis tools, and reduce their choice set, which should increase their focused attention and perceived control (Pavlou and Fygenson 2006). Many customers use online tools for their portfolio management, to track performance, or to make better investment decisions, which can enhance their analysis capabilities, skills, and interactions with the Web site. Finally, reliability is particularly important for online financial services and may help customers overcome psychological barriers to online trading, which should enhance their focused attention and perceived control (Nelson, Todd, and Wixom 2005). Thus, we posit

Hypothesis 4: Process feature of a financial service Web site is positively associated with a customer's (A) perceived control, (B) skill, (C) focused attention, and (D) interactivity but (E) negatively associated with the level of challenge.

Study Design and Analysis Results

We operationalize each investigated construct using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). To examine the relationship between each investigated determinant and customer satisfaction, we review important variables affecting customers' Web usage, salient measurement scales in previous research, and common metrics frequently used by leading marketing firms. Specifically, we adapt items from Novak, Hoffman, and Yung (2000) and Korzaan (2003) to measure the flow experience constructs of challenge, perceived control, skill, focused attention, and interactivity. We adapt the items for service systems pertaining to service quality from Krishnan et al. (1999) and Froehle (2006); process feature from Nelson, Todd, and Wixom (2005); and product variety from Balasubramanian, Konana, and Menon (2003). We also employ key metrics suggested by companies including SMARTMONEY, JDPOWER, and KIPLINGER.

We followed Churchill's (1979) recommendations to assess the preliminary instrument in terms of comprehensiveness and clarity. We first examined the instrument's face validity using a panel of 15 seasoned researchers and 10 experienced online investors. To validate and fine-tune our instrument, we conducted a pretest with 35 subjects knowledgeable about online investment services. Each respondent completed a questionnaire and provided feedback about

the appropriateness and clarity of the question items and the data collection procedure. Overall, the respondents indicated that the questionnaire was relatively clear and easy to complete. Several suggestions pertaining to the wording of particular items and the questionnaire structure were incorporated into the revised instrument.

We also performed a large-scale pilot study with 230 volunteers familiar with online financial services to examine important psychometric properties. Their responses suggested further refinements of the instrument in terms of purification, reliability, and convergent and discriminant validity. To validate the instruments, we first examined the corrected item-to-total correlations and Cronbach's alphas and dropped items with correlations of less than .5 (Flynn et al. 1990) and those that did not contribute strongly to the Cronbach's alphas (Cronbach 1951). Exploratory factor analysis was then used to assess each construct, submitted as groups, in terms of their internal and convergent validity and eliminates those items that did not load at .60 or greater. We then recalculated Cronbach's alphas for the retained items to ensure internal consistency. To assess the instrument's discriminant validity, we performed another exploratory factor analysis of all resulting items, scrutinized the cross-loadings, and removed items that exhibited significant cross-loadings (Harman 1976). Finally, we examined the reliability of the remaining items according to their Cronbach's alphas. The instrument exhibited reasonably satisfactory reliability and convergent and discriminant validity, after several (minor) changes to our survey instrument.

Data Collection

We employed an online survey to collect investors' satisfaction assessments of online investment services and their response to flow experiences. Online surveys offer convenience, cost efficiency, and minimal time requirements; enhance our ability to reach subjects; and can be assembled more quickly, coded more flexibly, and stored electronically compared with paper surveys (Boyer et al. 2002). Subjects also benefit from the convenience of completing online surveys at any time and place. However, online surveys suffer from potential biases in coverage or selection in the sampling; for example, they exclude people without Internet access, and they include only those who agree to participate. Duffy et al. (2005) show that online surveys appear to attract more knowledgeable, opinionated respondents than do face-to-face surveys. Therefore, our data collection method is appropriate because our target subjects have convenient Internet access, are highly familiar with online contexts, and have a good understanding of online investments.

Sample

We recruited subjects using the database of a leading U.S.-based marketing research firm that specializes in online product and service design surveys. The random sample generated from the database consisted of volunteers with prior online financial service experience. We sent an e-mail to potential respondents, inviting them to participate in return for a \$5 cash reward and entry in a raffle for a \$25,000 prize. When participants logged onto the secure study

Web site, they indicated the intensity and frequency of their online financial investment activities during the previous year (i.e., 2006-2007). Those respondents who passed these screening questions then began the online survey, which started with questions about demographic characteristics (e.g., age, gender, education, household income, online trading history), followed by items that measured their trading experience and satisfaction with their primary trading account provider.

Among the 8,500 persons we e-mailed, more than 90% indicated interest in the study by logging onto the secure Web site and attempting to complete the screening questions. Therefore, gross nonresponse bias is a minimal concern (Flynn et al., 1990). After eliminating some respondents on the basis of their responses to the screening questions, we obtained a sample of 905 subjects, for a total response rate of 10.65%. The characteristics of our sample conformed with published studies of online investors (Danaher, Mullarkey, and Essegai 2006).

The amount of time each subject took to complete the survey identified those respondents who failed to complete the survey with a sufficient level of attention. According to our analysis of data from the pilot study, respondents should take at least 4 minutes to complete the survey. Respondents who completed it in less than 4 minutes likely failed to read the questions or did not think about how to answer them carefully. We therefore removed respondents who took less than 4 minutes between clicking "Start the Survey Now" and "Exit the Survey." We also examined the response pattern of each subject by assessing response consistency across positively worded and reverse-worded question items for the same constructs. On the basis of the minimal time requirement and response consistency criteria, we obtained a final sample of 734 respondents to test our model and hypotheses.

Descriptive Sample Statistics

All respondents had been active in online investments in the past year, and 57% made more than six transactions. More male than female investors, with an approximate ratio of 6 to 4, appeared in the sample, and a vast majority (80%) had attained at least some college education; 55% reported a household income exceeding \$75,000. Half the subjects were between 40 and 60 years of age. In addition, approximately 78% had 3 or more years of experience with online investments; 15.7% maintained their primary online trading account with Ameritrade, followed by Fidelity (14.9%), Scottrade (14.6%), Sharebuilder (12.7%), eTrade (11.4%), Charles Schwab (9.7%), TD Waterhouse (4.0%), American Express (1.0%), and others (15.8%). Most respondents (91.5%) indicated high satisfaction with their online investment services, marking a score of 4 or 5 on the 5-point scale. This relatively high satisfaction is consistent with rates reported by J.D. Power, 4 the American Customer Satisfaction Index (ACSI), 5 and Tiburon Strategic Advisors. That is, most investors either are satisfied or are becoming increasingly satisfied with their online experiences, despite substantial market volatility and a struggling economy.

Measurement Model Analysis and Testing

We first performed a principal component analysis with direct Oblimin rotation and a confirmatory factor analysis (CFA) to evaluate our scales (Gerbing and Anderson 1988). The principal component analysis does not impose orthogonal assumptions on the investigated factors and offers greater simplicity and a wider range of probable oblique solutions (Harman 1976). We followed the two-step approach suggested by Gerbing and Anderson (1988) for our measurement model construction and testing. We first purified the measurement model by eliminating measured variables or latent factors that did not fit well, according to the initial CFA model. We performed a separate CFA for each service system, flow experience, and satisfaction construct to assess whether any structural model exhibited an acceptable goodness-of-fit level. As a result, we removed two measurement items for the system construct and one measurement item for the service construct that did not load properly. We also excluded a satisfaction item that loaded highly on two constructs simultaneously. We then fit the structural model to the purified measured variables retained from the first step.

In Table 1, we display the estimates of item loadings and cross-loadings for the investigated constructs in an unconstrained analysis. To examine the psychometric properties of the measurement model, we analyzed the indicators and constructs for reliability, convergent validity, and discriminant validity. Each investigated construct provided a Cronbach's alpha value and composite reliability greater than .70, in support of the satisfactory reliability of our scales (Flynn et al. 1990; Fornell and Larcker 1981).

We assessed the convergent validity of our scales at both item and construct levels by examining the item loadings and average variance extracted (AVE) (Fornell and Larcker 1981). An individual item loading greater than .7 suggests that an indicator shares more variance with the construct it measures than with error variances (Gefen, Straub, and Boudreau 2000). An AVE greater than .50 manifests a construct that shares more variance with its indicators than with error variances (Fornell and Larcker 1981). As we show in Table 1, most items loaded highly on the constructs they measured, with item loadings of .7 or greater, except for five indicators. Our measurement items also converged properly on their intended constructs. The items exhibited good convergent validity, as suggested by the AVE greater than .50 for each investigated construct.

Finally, we examined discriminant validity by comparing the correlations among constructs and the AVE values (Fornell and Larcker 1981). In general, the square root of the AVE for a construct should be greater than the correlations between that construct and all other constructs. As we summarize in Table 2, the square roots of the AVE were greater than any of the corresponding correlations. Hence, our scales exhibited appropriate discriminant validity. We sought additional support for discriminant validity by comparing item loadings and cross-loadings in Table 1. All the items loaded substantially higher on their intended construct than on other constructs, thus further suggesting that our scales possessed adequate discriminant validity (Fornell and Larcker 1981).

Examining Common Method Bias Analysis

Because each respondent answered question items pertaining to both independent and dependent variables, we assessed potential common method bias, although the specificity of the measurement items and our use of adequate anchors for different scales should reduce this bias. We first performed Harmon's single-factor test using exploratory factor analysis to determine if a single factor emerged or a general factor accounted for the majority of the covariance. Our results indicated nine factors, none of which accounted for the majority of the variances. We also employed a technique suggested by Podsakoff, MacKenzie, and Podsakoff (2003). Our results reveal that when adding a latent variable that represents common method, model fit improved (χ^2 difference = 672.48, $df = 97$, $p < .01$) but the variance accounted for by the common method latent variable was only 6.5% of the total variance. Together, these results suggest that common method bias was not a serious threat to our analysis (Podsakoff, MacKenzie, and Podsakoff 2003).

Table 1. Questionnaire Items and Measurement Properties

Construct	SL	CR	AVE	Items
Service quality	.76	.95	.73	The service representative is responsive.
	.70			...is courteous.
	.82			...solves questions, problems, or concerns in a timely fashion.
	.76			...is easy to reach.
	.80			...is knowledgeable.
Process feature	.63	.94	.68	The site is always available.
	.75			...is easy to navigate.
	.70			...responds to my requests quickly.
	.73			...has a friendly interface.
	.71			...is always reliable.
Product variety	.71	.78	.54	The site allows me to trade on a wide range of products.
	.64			...provides comprehensive research tools.
	.70			...lets me borrow money at a reasonable rate.
	.62			Cash balance in my account earns interests.
Challenge	.81	.90	.72	Using the trading service challenges me.
	.70			...provides a good test of my skills.
	.86			...stretches my capabilities to my limit.
	.89			The service challenges me a lot compared to other things I do on PC.
	.84			The service challenges me a lot compared to offline stock trading.
Perceived control	.70	.85	.64	While trading on the site, I am controlling the process.
	.74			When I use the service, I always know what to expect in each step.
	.72			I know what information will be provided on each Web page.
	.70			I always know how long it will take to complete the transaction process.
Focused attention	.87	.93	.87	While using the trading service, I am completely absorbed in what I am doing.
	.91			..., my attention is totally focused.
	.91			..., I am concentrated fully.
Interactivity	.66	.81	.69	Interacting with the site is slow and tedious. ^a
	.81			Pages on the site usually load quickly.
	.74			There is very little waiting time between my actions and the site's responses.
Skill	.78	.85	.65	I am extremely skillful at using the trading service on the site.
	.80			I consider myself knowledgeable about trading on the site.
	.70			I know how to find what I am looking for on the site.
	.67			I am more skillful at using the service than at other things I do on PC.
Satisfaction	.80	.98	.87	If I had to trade stocks again, I would use the same site.
	.81			I am sure it was the right thing to trade stocks on the site.
	.81			I am satisfied with my decision to use this site.
	.80			I am happy that I traded stocks at this site.

SL = standardized loadings; CR = composite reliability; AVE = average variance extracted. Items are measured on 5-point scales, where 1 represents *strongly disagree*, 3 is the *neutral point*, and 5 is *strongly agree*.

^aReverse-scored item.

Model and Hypothesis Testing and Discussions

To test our model and the hypotheses it suggests, we examined the relationships between service system (i.e., service quality, process feature, and product variety) and flow experience (i.e., perceived control, skill, focused attention, interactivity, and challenge) as well as those between flow experience and customer satisfaction (see Figure 1). The h latent endogenous constructs in the model represent flow experience and satisfaction, and the x latent exogenous constructs denote service system. We estimated the goodness of fit between the data and our model using the comparative fit index (CFI), normed fit index (NFI), Tucker-Lewis index (TLI), parsimony comparative fit index (PCFI), and parsimony normed fit index (PNFI) (Bentler 1990), for which values close to 1 indicate a good fit. As shown in Table 3, our data fit reasonably well to our model, showing a satisfactory fit index value with respect to the commonly suggested thresholds. Table 3 also contains the standardized path estimates and key ratio values for the structural model. The squared multiple correlations for the equations (R^2 values) were .38 for satisfaction, .05 for challenge, .08 for focused attention, .56 for interactivity, .26 for skill, and .51 for perceived control.

Table 2. Descriptive Statistics, Reliability, Correlations, and Discriminant Validity

Construct	M	SD	SK	α	Construct ^a									
					1	2	3	4	5	6	7	8	9	
1. Service quality	4.30	0.59	-0.44	.90	<i>.85</i>									
2. Process feature	4.14	0.55	-0.44	.88	<i>.64</i>	<i>.82</i>								
3. Product variety	3.84	0.58	0.01	.70	<i>.56</i>	<i>.65</i>	<i>.73</i>							
4. Challenge	2.41	0.88	0.39	.89	<i>-.18</i>	<i>-.13</i>	<i>-.02</i>	<i>.85</i>						
5. Perceived control	3.82	0.59	-0.32	.81	<i>.59</i>	<i>.71</i>	<i>.49</i>	<i>-.11</i>	<i>.80</i>					
6. Focused attention	3.73	0.75	-0.57	.92	<i>.25</i>	<i>.32</i>	<i>.28</i>	<i>-.04</i>	<i>.24</i>	<i>.93</i>				
7. Interactivity	3.97	0.64	-0.80	.77	<i>.48</i>	<i>.72</i>	<i>.49</i>	<i>-.10</i>	<i>.53</i>	<i>.24</i>	<i>.83</i>			
8. Skill	3.62	0.64	-0.50	.81	<i>.44</i>	<i>.51</i>	<i>.36</i>	<i>-.08</i>	<i>.38</i>	<i>.17</i>	<i>.38</i>	<i>.81</i>		
9. Satisfaction	4.26	0.66	-0.79	.95	<i>.39</i>	<i>.53</i>	<i>.36</i>	<i>-.13</i>	<i>.51</i>	<i>.33</i>	<i>.55</i>	<i>.30</i>	<i>.93</i>	

M = mean construct score (unweighted); SD = standard deviation; SK = skewness; α = Cronbach's alpha.

^aNumbers on the diagonal (in italic) represent the square root of the AVE. Off-diagonal numbers represent the correlations among constructs.

Table 3. Structural Model Results

Structural Paths	Parameter	Hypothesis	Estimate	CR
Perceived control → satisfaction	β_{61}	1A	0.259***	4.546
Skill → satisfaction	β_{62}	1B	0.034	0.732
Focused attention → satisfaction	β_{63}	1C	0.179***	5.005
Interactivity → satisfaction	β_{64}	1D	0.342***	5.949
Challenge → satisfaction	β_{65}	1E	-0.056*	-1.533
Product variety → focused attention	γ_{33}	2A	0.105*	1.897
Product variety → challenge	γ_{53}	2B	0.099*	1.722
Service quality → perceived control	γ_{11}	3A	0.171**	2.357
Service quality → skill	γ_{21}	3B	0.152*	1.752
Service quality → focused attention	γ_{31}	3C	0.067	0.958
Service quality → challenge	γ_{51}	3D	-0.141*	-1.624
Process feature → perceived control	γ_{12}	4A	0.692***	11.093
Process feature → skill	γ_{22}	4B	0.488***	9.147
Process feature → focused attention	γ_{32}	4C	0.262***	5.156
Process feature → interactivity	γ_{42}	4D	0.751***	13.788
Process feature → challenge	γ_{52}	4E	-0.146**	-2.733

$\chi^2 = 1833$; $df = 511$; $\chi^2/df = 3.59$; $p < .001$; root mean squared error of approximation = .062 (± 0.003 , upper/lower bound of a two-sided 90% confidence interval); comparative fit index = .983; normed fit index = .977; parsimony comparative fit index = .849; parsimony normed fit index = .843; Tucker-Lewis index = .980. CR = critical ratio.

* $p < .1$; ** $p < .01$; *** $p < .001$.

Our data support the hypotheses pertaining to the impacts of flow experience on customer satisfaction, with the exception of skill (Hypothesis 1B). Three of the five investigated cognitive states of flow experience (i.e., perceived control, focused attention, and interactivity) affected satisfaction directly and significantly, in support of Hypotheses 1A, 1C, and 1D. However, the negative association between challenge and customer satisfaction (Hypothesis 1E) suggests that consumers do not perceive challenges in a trading experience favorably, a finding that contrasts with that reported by Novak, Hoffman, and Yung (2000). The service typology and taxonomy proposed by Cook, Goh, and Chung (2000) may help explain this effect. Because online financial services involve considerable capital investment and demand intensive customer involvement, many customers are cautious or risk averse when processing the information, conducting market analysis, and trading stocks on a Web site. In this connection, it is not likely that individuals will risk their investments by taking on challenges in an online investment services context. In addition, more than 56% of our respondents did not consider themselves experts and generally preferred to assess their investment options with the assistance of financial advisors, which also helps explain the negative connection between challenge and satisfaction in online financial services.

Our data also support most of the hypotheses regarding the effects of service system on flow experience. Product variety has a positive influence on focused attention (Hypothesis 2A) and challenge (Hypothesis 2B). By offering a comprehensive array of product information and analysis tools, Web sites enable customers to multitask within the site domain without switching to other sites. Thus, product variety affect focused attention positively; in contrast, a narrow range of offerings may not attract customers' attention. Some trading sites in the study do not offer research tools or real-time quotes, and investors on those sites must search elsewhere for such support.

According to our results, service quality has a significant effect on perceived control, skill, and challenges but not on focused attention, in support of Hypotheses 3A, 3B, and 3D but not 3C. Customer service represents a crucial source of answers and solutions; regardless of the channel used (e.g., email, phone, face-to-face), customers demand responsive and courteous service. They also expect service personnel to be knowledgeable and able to answer their questions in a timely manner. High-quality customer services not only reach customers at the right time and in the right place but also help them overcome any problems and challenges, which increases their sense of perceived control and enhances their skill. Our data thus support the positive influences of customer service on customers' perceptions of perceived control and skill while mitigating the level of challenge. However, customer service also appears to have a negative affect on customers' focused attention, in concert with the result observed by Xia and Sudharshan (2000), who report that services enable customers to focus on trading but also may disrupt their concentration as a result of interactions with service representatives.

Finally, process feature affects all five cognitive states of flow experience, in support of Hypotheses 4A to 4E. From a process perspective, an online financial service process that is

reliable, responsive, and easy to use enables customers to take control of their investment activities. Online investors demand reliability and continual availability and expect the process to be responsive to their transaction instructions, orders, and clicks immediately. A well-designed transaction process makes customers' interactions with the site compelling, transparent, and smooth, which allows them to concentrate on information search, data analysis, market research, and investment decision making, without worrying about ineffective interactions with the site. As a result, investors may find their interaction with the site more manageable and less challenging.

Alternative Models

The proposed model represents one of the several possible structures for depicting the relationships among the investigated constructs. Conceivably, alternative models may explain or predict the antecedents and consequence of experience differently. Therefore, we compared our proposed model with three alternative models according to their goodness-of-fit indexes. The first alternative model used three service system components as direct predictors of customer satisfaction. The second alternative explained customer satisfaction directly as a result of the cognitive states of flow experience. The third alternative model tested whether service system and flow experience cognitive states simultaneously explain customer satisfaction better. The goodness-of-fit indices showed that our proposed model offered a better fit to the data than any of the alternative models. Specifically, the root mean squared errors of approximation (RMSEAs) of the first two alternative models were greater than .08 (i.e., .087 and .082) and the PCFI indexes were less than .8 (i.e., .73 and .79), which suggest poor fit (Bentler 1990). The fit of the third alternative model (i.e., RMSEA = .068, $\chi^2 = 1891.98$, $\chi^2/df = 3.5$, CFI = .95, PCFI = .81) is comparable to that of our proposed model (i.e., RMSEA = .062, $\chi^2 = 1832.88$, $\chi^2/df = 3.59$, CFI = .98, PCFI = .84), but it resembles a regression model structurally and cannot depict the important relationships between the service system and the cognitive states of flow experience. Overall, the proposed model provides the most logical depiction of how flow experience and customer satisfaction form; this theory-based model appears superior to the alternative models because it offers a better fit and can describe relationships between service system and flow experience with finer granularity.

Discussion and Future Research Directions

As the service economy shifts toward an experience-centric focus, firms must design and create unique experiences to attain sustainable competitive advantages (Barney 1991; Scott 2007). Therefore, the important antecedents and key consequences of flow experience can help researchers and managers understand when an autotelic experience occurs, how a cognitive state of experience evolves, and what to expect from an optimal flow experience. If they understand the role of experience in essential service contexts, firms can recognize when, where, and how flow experience occurs while customers shop in a store, dine in a restaurant, watch a movie, browse a Web site, or trade stocks online.

Research Contributions

This study contributes to extant research on service system design and flow management in several ways. Most prior empirical service operation and marketing research studied customer satisfaction at a functionality or product/service attribute level (Pullman and Gross 2004). Researchers in psychology and marketing have applied the flow construct to study how the flow experience influences customers' assessments and behaviors, including their intentions to return or repurchase (Korzaan 2003; Novak, Hoffman, and Yung 2000). However, few efforts have attempted to integrate these related streams by examining how system components may affect a customer's flow experience and, in turn, satisfaction. This study therefore represents a point of departure in that it integrates essential functionality or service attributes and flow experience while also establishing a logical link between the cognitive states of flow experience and customer satisfaction. We examined the key antecedents of flow experience with a conceptual analysis and empirical testing of service system in marketing, service, operations, and information systems. Hence, this study advances our understanding of how flow experience results from product variety, service quality, and process feature in online investment settings, a fast-growing sector of the financial market.

Our findings also point to the need to consider both physical elements and cognitive experiences to study customer satisfaction (Chase and Dasu 2001). Many major marketing research firms rely on context-based features (e.g., system, service, product, account, trades, information) to rank online brokers. These rankings signal quality to online investors, yet our findings suggest that marketing firms should consider expanding their criteria for evaluating and ranking different online investment service providers to include cognitive states of flow experience.

Our empirical findings also suggest the feasibility of a dual-layer framework for analyzing customer experience. The first layer pertains to the physical and relational components in a service system. After perceiving performance on the basis of the service system, a customer develops a cognitive state of the flow experience, which denotes the next layer of customer experience and determines satisfaction with the service. Our model development follows this dual-layer structure and conceptualization by integrating existing flow construct research and essential antecedents of the flow experience. From a research perspective, the dual-layer framework requires continued investigations for validation and refinement. However, our findings complement the dominant use of context-based features for evaluating online service providers. Our empirical results clarify how essential cognitive states of flow experience can affect customer satisfaction, which requires further testing in different settings that vary in terms of both services and target customers.

Practical Implications

Our research findings can advance service managers' understanding of customer experience in online financial services; the empirical results reveal the significance and

magnitude of the relationship between flow experience and customer satisfaction, which implies the relative importance of each flow experience factor for satisfaction. Judging by the path coefficients we observed in the model testing, interactivity is the most important driver (.34), followed by perceived control (.30) and focused attention (.18). For service providers, these path coefficients suggest ways to allocate finite resources to maximize customers' flow experiences. For example, firms should increase site responses to customers' clicks and reduce the waiting time between pages. Once service providers have a better understanding of the relative importance of satisfaction drivers, they can prioritize their attention and allocate resources accordingly. They also might consider implementing mechanisms that automatically detect each investor's Internet connection and PC settings, which would enable them to customize their information presentation and service flow and thereby reduce service interruptions and ensure a swift and even flow (Schmenner 2004; Schmenner and Swink 1998).

Challenge correlated negatively with customer satisfaction, which conflicts with some prior studies and signifies that customers may not always welcome challenges. Firms therefore should understand customers' desire for greater perceived control, minimal service interruptions, and easy-to-use online tools; service providers might explore the appropriate level of challenge, as perceived by customers, for providing services through a reliable, secure online channel.

Finally, online brokers should design customized services that balance skill and challenge, simplify the service process, enhance perceived control, and optimize the design by immersing customers in active, compelling interactions with the site and backend systems.

Conclusions and Further Research

Although we examined online financial services, our analysis and hypotheses may be generalizable to other service contexts that involve service systems and flow experience. To design and engineer customer experiences, firms might apply our proposed dual-layer experience model to assess and reconstruct their servicescape. In general, customers enter a service portal (e.g., Amazon.com, Secondlife.com) or physical site (e.g., Hard Rock Cafe) and detect and interpret the service system first; then they form cognitive states of their flow experience, which further determine their satisfaction. On sites such as Amazon and Secondlife, users come to recognize the process and services through repeated use, searching for product (service) information, and requesting assistance with their questions or problems. Collectively, these components provide the basis for the next level of cognitive states of flow experience, which ultimately determine the extent to which a customer is satisfied with the service delivered.

Our conceptual analysis and empirical investigation also point to several areas that require further research. First, continued research should assess the validity of the proposed dual-layer analysis structure in different online service contexts, such as online banking, gaming, shopping, or education. The model also should be tested in offline settings. According

to Cook, Goh, and Chung (1999), services can be classified into different categories on the basis of marketing and operations. Therefore, research that examines, validates, or extends the proposed conceptual framework should focus on marketing, services, operations, and information systems.

Second, research might empirically test the power of the dual-layer customer experience framework in contexts characterized by different target services and customer groups. Although most online services involve self-service components, customers' preferences for service systems and their desire for customer contact vary across user segments. Ding, Verma, and Iqbal (2007) show that self-service customers of online financial services differ from professional service customers in that they prefer cognitive control, avoid service personnel, and demand convenience. Research should test the robustness of this conceptual framework for predicting customer satisfaction across different customer groups.

Third, further research should investigate the flow experience and service recovery process for dissatisfied customers. Although customers seem increasingly satisfied with online investment services, partly because of improvements in online security and service quality, business managers must understand effective recovery strategies to retain dissatisfied customers. Most respondents exhibit relatively high satisfaction, a finding consistent with those reported by major online investment firms; nevertheless, caution is needed when generalizing our results, because we cannot rule out an underrepresentation of dissatisfied customers in our sample. Additional research should propose other variables, such as financial outcomes or portfolio selection, to capture the determinants of customer satisfaction in online financial services.

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