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The Working Mechanism of Online Trust: A Principal-Agent Perspective

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Abstract

Trust has been widely recognized as an important factor affecting consumer behavior in the e-commerce context where uncertainty abounds. Drawing on agency theory, we attempt to provide a rich understanding of how trust can enhance consumers’ adoption of online shopping from a principal-agent perspective. A research model was developed which posits that two sources of uncertainty, information asymmetry and opportunistic behavior, negatively affect consumers’ intention to adopt online shopping and trust can reduce consumers’ uncertainties. A total of 377 responses were collected using an online survey method. The results of data analyses support all the hypotheses. The major contribution of this paper is that it provides a new perspective to examine the effect of trust in the context of e-commerce.

Keywords: E-commerce, trust, agency theory, uncertainty, information asymmetry, opportunistic behavior, online prescription filling
1. Introduction

Trust has been widely recognized as an important factor affecting consumer behavior, especially in the e-commerce context where uncertainty abounds (Ba & Pavlou, 2002; Friedman et al., 2000; Gefen et al., 2003; Pavlou, 2003). Yet research on the working mechanism of online trust remains open which calls for more theoretically grounded studies. In this paper, we contend that agency theory can be utilized to provide a rich understanding of how trust can enhance consumers’ adoption of online prescription filling.

Agency theory is a general theory that can be applied to many agency relationships such as employer-employee and buyer-supplier relationships (Eisenhardt, 1989). The principal delegates work to the agent who performs the work according to a contract. In the context of e-commerce, we regard the consumer as the principal and the e-vendor as the agent. For example, when a consumer purchases a book or a stock trading service from an e-vendor, a principal-agent relationship is established. The principal-agent relationship is susceptible to agency problems which make the cooperation outcome uncertain (Eisenhardt, 1989). Uncertainty can increase the transaction cost and erode consumers’ buying intention (Liang & Huang, 1998). According to transaction cost economics, consumers tend to choose sellers associated with the lowest possible transaction cost (Williamson, 1981). Uncertainty in an e-commerce buyer-seller relationship has two sources: opportunistic behavior of the sellers and information asymmetry between buyers and sellers (Ba & Pavlou, 2002; Mishra et al., 1998). Uncertainty needs to be mitigated so that consumers’ adoption of online shopping can be enhanced.

Trust refers to the subjective assessment of one party that another party will perform a particular transaction according to his or her confident expectations, in an environment characterized by uncertainty (Ba & Pavlou, 2002). A plethora of research has demonstrated that trust can reduce risk and is positively related to e-commerce adoption (Ba & Pavlou, 2002; Gefen, 2000; Gefen et al., 2003; Pavlou, 2003). Thus, an advanced understanding of how trust interacts with uncertainty factors is critical for the success of e-commerce.

We selected the adoption of online prescription filling to investigate the working mechanism of trust from the principal-agent perspective. This selection is deliberate given the idiosyncrasies of this emerging phenomenon. Prescription drugs differ dramatically from other types of products because they can be life threatening. People tend to be more cautious when they purchase medications than when they purchase other commodities. Hence, trust issues in
online prescription filling are likely to be different from those involving other online products. Building trust for online prescription filling is challenging and the working mechanism of trust needs to be understood before an effective trust building technology can be designed.

Online prescription filling has a great market potential. According to Forrester, Americans in 1999 bought $158 million worth of prescription drugs over the Internet, and online prescription drug sales will reach $15 billion by the year 2004 (Pastore, 2004). Although online demand for prescription drugs is growing rapidly, online pharmacies are struggling to attract customers and make profits (Saliba, 2001). The institutional environment for online drug selling is chaotic. A recent survey revealed that half of the popular online pharmacies were unlicensed, and one-third did not have adequate privacy measures to protect patients (Silverman & Perlstein, 2003). A number of online pharmacies which are not licensed with state pharmacy boards and have no addresses and phone numbers are trying to hide from law enforcement (Richards, 2001). Complicated legal controversy may arise when cross-border prescription filling is involved (Schick, 2002). By and large, online pharmacies and online prescription filling services are facing a survival crisis. The investigation of trust and uncertainty issues in this area is likely to provide e-vendors with guidance in constructing appropriate online strategies to attract and retain customers.

The rest of the paper is organized as follows. The next section presents the research model and develops the hypotheses. Section 3 describes research methods. Then data analysis and results are depicted in Section 4. The findings are discussed in Section 5, and Section 6 concludes the paper.

2. Conceptual Development and Research Model

2.1. Agency Theory

Agency theory (Eisenhardt, 1989) addresses the ubiquitous agency relationship in which one party (the principal) delegates work to another (the agent) and attempts to address this relationship using the metaphor of a contract. In this cooperative structure, the principal and the agent have differing goals and differing attitudes towards risk, thus leading to two types of agency problems: adverse selection and moral hazard (Eisenhardt, 1989). Adverse selection refers to the misrepresentation of ability or false claims of product quality by the agent. Adverse selection arises because the principal cannot tell if the agent is telling the truth. Moral hazard
refers to lack of effort on the part of the agent who may shirk. Moral hazard takes place because the principal does not possess enough information to assess what the agent has actually done. In the context of electronic commerce, the consumer can be considered to be the principal and the e-vendor to be the agent. The contract between them is an online purchase order.

Three assumptions of agency theory have implications in the context of e-commerce (Eisenhardt, 1989). First, agency theory assumes that individuals pursue self-interest. Second, agency theory assumes that individuals are boundedly rational. Third, agency theory assumes that information is distributed asymmetrically between exchange partners, that is, the principal and the agent. Information asymmetry has been recognized as a common problem in marketing relationships in which the sellers possess more information of products or services than the buyer (Mishra et al., 1998). In the context of e-commerce, information asymmetry deteriorates since consumers are physically separated from the products. Consumers are unable to assess product or service quality accurately prior to purchase. This inability could be exploited by e-vendors who may behave opportunistically for their self-interest, which leads to the problems of adverse selection and moral hazard. We contend that when consumers notice the presence of information asymmetry and potential opportunistic behavior of e-vendors, they tend to perceive online shopping as uncertain. As a consequence, their adoption of online prescription filling is likely to be impeded.

Given that online prescription filling is an emergent phenomenon subject to uncertainties of the agency relationship between e-vendors and consumers, trust building can be an effective means for e-vendors to attract consumers. Based on the extant literature on trust and agency theory, a research model is designed in an effort to examine the working mechanism of online trust (Figure 1). The model postulates that the consumer’s intention to adopt online prescription filling is largely hindered by uncertainty and uncertainty is determined by information asymmetry and opportunistic behavior. Trust takes effects by reducing uncertainty and its two determinants as well as enhancing intention of adoption directly. It needs to be noted that when we refer to these constructs, we are always talking about consumers’ beliefs and perceptions instead of objective facts. The remainder of this section elaborates the theoretical bases of the constructs and derives the hypotheses.
2.2. Uncertainty

From the principal-agent perspective, outcome uncertainty is inevitable due to self-interest and information asymmetry. Uncertainty refers to the degree to which an individual or organization cannot anticipate or accurately predict the external environment (Pfeffer & Salancik, 1978). Prior research has demonstrated that uncertainty increases transaction cost and decreases acceptance of online purchasing (Liang & Huang, 1998). Uncertainty leads to risk. Risk refers to the probability of loss as perceived by a decision maker (Chiles & McMackin, 1996) and has a negative influence on consumer acceptance of e-commerce (Jarvenpaa et al., 2000; Pavlou, 2003). Uncertainty regarding whether trading parties intend to and will act appropriately is the source of transaction risk which erodes exchange relationships and increases transaction cost (Rousseau et al., 1998). Transaction risks can result from the impersonal nature of the electronic environment. These risks are rooted in two types of uncertainties: about the identity of online trading parties or about the product quality (Ba & Pavlou, 2002). In the cyber space which lacks security, a dishonest seller can easily masquerade as an honest one to attract an credulous buyer into a fraudulent transaction (Neumann, 1997). In addition, the lack of information (i.e., information asymmetry) about the true quality of the product or service prior to actual purchase
makes the buyer more uncertain. Similar to Ba and Pavlou’s (2002) remark on types of uncertainty, Liang and Huang (1998) suggested that two types of uncertainties are relevant in an e-commerce transaction: product uncertainty and process uncertainty. Product uncertainty addresses product quality, while process uncertainty addresses how transactions are carried out. Online prescription filling is a special form of online exchange relationship between patients and e-vendors. Since prescription drugs are involved, a relatively higher degree of uncertainty or risk will be perceived by consumers, thus posing a negative impact on the intended use of online prescription filling services.

**H1: Uncertainty will negatively affect intention to adopt online prescription filling.**

2.3. Information Asymmetry

Zazzali (2003) argues that uncertainty originates from two sources. The first relates to information asymmetry which accounts for the fact that either party may not have access to all of the information it needs. The second pertains to the potential for different goals between transacting partners and recognizes that either party could take opportunistic behavior to serve its self-interest. Information asymmetry reflects the difference between the information possessed by buyers and sellers (Ba & Pavlou, 2002). Information asymmetry adds an additional layer of uncertainty to exchange relationships. Due to information asymmetry, it is difficult and costly for buyers to ascertain the attributes of products and services before purchase (Nayyar, 1990). Necessary information regarding quality of products or services may be incomplete or not readily available. Information asymmetry is a problem for Internet shopping due to the physical distance between buyers and sellers (Huston & Spencer, 2002). Two sets of problems result from information asymmetry (Nayyar, 1990). The first are moral hazard problems associated with the buyer’s inability to observe actions taken by the seller. The second are adverse selection problems which take place when the buyer is not capable of knowing the seller’s characteristics or the contingencies under which the seller operates. Some marketing researchers have observed that most buyer-seller relationships are characteristic of information asymmetry (Mishra et al., 1998). When consumers cannot be adequately informed to make a judgment, they are likely to be subjected to moral hazard and adverse selection problems and perceive a high degree of uncertainty. Health care is characterized by serious informational asymmetry since health
professionals control a specialized body of knowledge that is difficult for patients to access (Arrow, 1963). Hence, in the context of online prescription filling, the more consumers think they lack knowledge about the drug quality and the way their prescriptions are filled by the e-vendor, the more the consumers believe that e-vendors will behave opportunistically and the more the consumers feel uncertain.

\[H2: \text{Information asymmetry will positively affect perceived uncertainty.}\]
\[H3: \text{Information asymmetry will positively affect the e-vendor’s opportunistic behavior.}\]

2.4. Opportunistic Behavior

Opportunistic behavior is prevalent in principal-agent relationships. As discussed earlier, two types of agency problems exist: adverse selection and moral hazard (Eisenhardt, 1989), both of which are caused by the agent’s opportunistic behavior. In the online buyer-seller relationship, the seller may behave opportunistically by trying to meet its own goals regardless of the consumer’s benefits. Examples of opportunistic behavior include misrepresentation of the true quality of a product or service, incomplete disclosure of information, actual quality cheating, contract default, or failure to acknowledge warranties (Mishra et al., 1998). Gefen (2000) observes that online purchase renders a customer vulnerable in many ways due to the lack of proven guarantees that an e-vendor will not behave opportunistically by charging unfair prices, providing inaccurate product/service information, or sharing credit card information of buyers with third parties. In the online prescription filling situation, buyers may question whether they will receive quality health products and services, given that prescription e-vendors may possibly behave opportunistically. For example, in order to save costs, the drug e-vendor might not hire a licensed pharmacist to check drug-drug interactions for patients although its website claims so. Medication errors and adverse drug reactions could be caused as a result of this opportunistic behavior which removed an important step of prescription filling. Opportunistic behavior of prescription e-vendors could cause serious damage to the health of consumers. Therefore, the more consumers perceive that drug e-vendors could behave opportunistically against them, the more uncertain they will feel about online prescription filling.
**H4:** The e-vendor's opportunistic behavior will positively affect the consumer’s perceived uncertainty.

2.5. The Mitigating Effect of Trust

Trust is crucial in facilitating exchange relationships, more so in an uncertain environment, especially the e-commerce environment in which the behavior of an e-vendor cannot be easily guaranteed or monitored (Reichheld & Schefter, 2000). Rousseau et al. (1998) observed that scholars in various disciplines have reached a consensus that trust is a psychological state developed under conditions of risk and interdependence. Trust is necessary only when there is some degree of uncertainty. If all transactions can be carried out under conditions of absolute certainty, there would be no need for trust (Lewis & Weigert, 1985; Zazzali, 2003). As a consequence, uncertainty and trust are closely related in a logical sense. They can be viewed as a pair of opposing forces shaping the principal-agent relationship. One objective of trust building is to reduce the principal’s perceived uncertainty so that transaction cost is lowered and a long-term exchange relationship sustains (Ganesan, 1994). Prior studies have stressed the important role of trust in reducing risk or uncertainty in Internet shopping (Gefen, 2000; Jarvenpaa et al., 2000). In their elaboration of how trust works, IS and marketing researchers explain that trust mitigates opportunism (Doney & Cannon, 1997) and information asymmetry (Ba & Pavlou, 2002) in uncertain contexts. Some researchers argue that trust can be defined as the expectation that an exchange partner will not engage in opportunistic behavior and one of the consequences of trust is to reduce perceived uncertainty associated with opportunistic behavior (Bradach & Eccles, 1989; Ganesan, 1994). The extant literature suggests that trust not only reduces uncertainty, but decreases the degree of information asymmetry and opportunistic behavior. Therefore, the following three hypotheses are proposed.

**H5:** Trust will negatively affect perceived opportunistic behavior of the e-vendor.

**H6:** Trust will negatively affect perceived information asymmetry.

**H7:** Trust will negatively affect perceived uncertainty.

Trusting beliefs are significantly correlated with trusting intentions (McKnight et al., 2002). The more one believes another to be trustworthy, the more one is likely to be willing to depend on
that other, even when negative consequences are possible (Stewart, 2003). Several studies showed that trust in an e-vendor has a significant positive influence on intention to buy from an e-vendor (Stewart, 2003; Gefen, 2000, 2003). Therefore, the following hypothesis is derived:

\[ H8: \text{Trust will positively affect intention to adopt online prescription filling.} \]

3. Research Method

A survey method is adopted for this study to gather responses from consumers who have no online prescription filling experiences so that their intention can be measured. At first, a literature review was conducted to identify measurement items for the proposed constructs. Then the items were reviewed by an expert panel to examine their face validity. Twenty-two undergraduate business students were asked to fill out the questionnaire as a pretest. Finally, a total of 377 undergraduate business students and MBA students in three major southern universities were asked to participate in the survey. Each of the three steps is depicted in detail next.

The constructs of trust and behavioral intention have been extensively studied in the area of electronic commerce. By referring to the extant literature, we composed trust items in such a way that they reflect specific beliefs of consumers in the e-vendor’s competence, integrity, benevolence, and credibility (Doney & Cannon, 1997; Ganesan, 1994; Gefen et al., 2003; McKnight et al., 2002). The development of items for consumers’ intention to adopt online prescription filling is based on the work of McKnight et al. (2003) and Gefen et al. (2003). The items intend to measure such trust-related Internet behaviors as providing personal information and purchasing from the vendor.

Although the constructs relating to agency theory are theoretically grounded, according to the best knowledge of the authors, they have not been operationalized by prior researchers in the context of electronic commerce. Thus we created items to measure these constructs on the basis of their substantive meanings. Items of uncertainty primarily measure the extent consumers cannot predict the outcome of online prescription filling. Given that the interest of this research is consumer adoption of online prescription filling, items of information asymmetry estimate the extent to which consumers lack information regarding e-vendors, although information asymmetry could also mean that e-vendors lack information regarding consumers. Opportunistic
behavior items are designed to capture consumers’ perceived risks associated with the quality of prescription drugs, assuming that e-vendors tend to behave to serve their self-interests and shift risks to consumers. All the items are assessed by using a seven-point scale where 1 means “Strongly disagree” and 7 means “Strongly agree.”

Face validity of the items was examined by an expert panel consisting of 14 experienced MIS researchers and two licensed pharmacists. Then the questionnaire was pretested in a paper based format with 22 undergraduate students to check the psychometric properties of the scales. Construct validity of each construct in the questionnaire was preliminarily verified with an exploratory factor analysis (EFA). The factor loadings indicated that the items of each scale roughly loaded on their assigned latent variables. After the questionnaire was finalized, a Web-based questionnaire was created so that responses could be collected into a database electronically.

The main data collection targeted at the online consumers who were undergraduate business students and MBA students in three major southern universities. At the beginning of the data collection session, an introduction to online prescription filling was presented to inform the students about procedures needed to fill prescriptions online. Two online pharmacy websites were also listed on the questionnaire and respondents were requested to browse through them before filling out the questionnaire. A total of 377 responses were obtained.

Of the respondents, 137 were women and 230 were men, with some missing values in the dataset. Most respondents had previous online shopping experience (n = 321). The average age of the respondents was 22.0 (SD = 2.88) ranging from 18 to 45. All scales ranged from 1 (strongly disagree) to 7 (strongly agree), and showed a reasonable dispersion in their distributions across the ranges.

4. Data Analysis and Results

4.1. Evaluating the Measurement Model

Confirmation factor analysis (CFA) was conducted by using Amos 5.0 to examine unidimensionality, convergent validity, and discriminant validity of the measurement scales. Unidimensionality and convergent validity reflect the extent that all indicators are determined by the same latent construct, and they were assessed by estimating a measurement model with all
six constructs freely correlated (Bollen, 1989). When the measurement model exhibits a good fit with the data, high unidimensionality and convergent validity are indicated. Table 1 shows the model fit indices. The model fit was examined by inspecting the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the normed fit index (NFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) (Hair et al., 1998; Raykov & Marcoulides, 2000). The $\chi^2$ was not used because it varies with the sample size and cannot reliably reflect the model fit. The GFI, NFI, and CFI indices are greater than .90, the AGFI values are greater than .80, and the RMSEA indices are between .05 and .08, indicating acceptable model fits (Brown & Cudeck, 1993; Teo et al., 2003). The fit indices strongly suggest that each scale was capturing a significant amount of variance in the latent variables. As an additional support of convergent validity, Table 2 shows the factor loadings of the items for each construct. The loadings are in acceptable range (0.65 - 0.96) and the t values indicate that all of them are significant at the .01 level.

Discriminant validity refers to the extent to which the measures for each construct are distinctly different from each other. It can be empirically evaluated by testing whether the correlations between pairs of constructs are significantly different from unity (Anderson, 1987; Bagozzi et al., 1991). A constrained model which fixes the correlation between two constructs to unity and an unconstrained model which allows the two constructs to freely correlate need to be compared for each pair of constructs. The $\chi^2$ of the two models are compared and a significant difference would indicate that the two constructs are not perfectly correlated and that discriminant validity is achieved. Discriminant validity testing results are presented in Table 3. Ten pair-wise tests were conducted for the six constructs. All the tests revealed significant $\chi^2$ differences at the 0.01 level, indicating that sufficient discriminant validity was achieved for the measurements we developed. As a complementary evidence for adequate discriminant validity, we compared the square root of average variance extracted (AVE) of each construct and the correlations between the construct and any other constructs. The criterion is that in order to show sufficient discriminant validity the square root of the AVE should be greater than all of the correlations (Chin, 1998b; Segars & Grover, 1998). As Table 4 demonstrates, discriminant validity of the constructs can be strongly inferred. Additionally, the absolute magnitudes of correlations between all pairs of constructs are well below the threshold valued of .90 (Bagozzi et al., 1991), reflecting that the constructs are distinct.
Finally, the internal consistency of the measurements is evaluated by calculating the Cronbach’s alpha, composite reliability, and the AVE (Hair et al., 1998). As Table 5 exhibits, all the reliability coefficients are above the threshold value of .70 (Nunnally, 1978) and the AVEs are all above the threshold value of .50 (Hair et al., 1998).

4.2. Testing the Structural Model

Partial Lease Square (PLS) was used for assessing the structural model (Chin, 1998a). A bootstrapping approach was used to generate 500 random samples of the original sample size from the data set by sampling through replacement. Hypotheses testing were performed by examining the size, the sign, and the significance of the path coefficients.

Figure 2 depicts the estimates obtained from the PLS analysis. The $R^2$ value of .33 indicates that the model explains a good amount of variance in intention to use online prescription filling. We find that uncertainty significantly reduces consumers’ intention to adopt online prescription filling, thus supporting H1. Opportunistic behavior and information asymmetry significantly lead to uncertainty, showing support for H2 and H4. Combined with trust, these two variables account for 50% of the variance of uncertainty. As predicted by H5, H6, and H7, opportunistic behavior, information asymmetry, and uncertainty can be mitigated by trust. Consistent with previous findings of trust research, trust has a positive effect on intention to adopt online prescription filling; hence H8 is supported. In addition, information asymmetry partially determines opportunistic behavior, which provides evidence for H3. Thus, we have found support for all of the research hypotheses.

5. Discussion

There are many factors affecting the adoption of e-commerce in general and the adoption of online prescription filling in particular. We focus on trust and uncertainty because of the accumulated empirical evidence that trust plays a central role in helping consumers overcome perceptions of risk and accept online shopping. By taking a principal-agent perspective, we are interested in investigating how agency characteristics contribute to uncertainty and risk, and how trust relates to the uncertainty-related factors.

The results confirm that opportunistic behavior and information asymmetry are the sources of uncertainty. The path coefficients from opportunistic behavior and information
asymmetry to uncertainty are 0.41 and 0.16, respectively. This finding suggests that consumers are more concerned with e-vendors’ opportunistic behavior. If e-vendors sell adulterate or expired medications to consumers, the result could be life-threatening. On the other hand, information asymmetry significantly contributes to opportunistic behavior. Therefore, opportunistic behavior has a mediating role between information asymmetry and uncertainty. The inability of consumers to examine the prescription filling process and to inspect the medication quality gives e-vendors chances to behave opportunistically. While the e-vendor may or may not behave opportunistically, the consumer who is aware of the existence of information asymmetry tends to suspect that the e-vendor will behave opportunistically.

The significant negative paths between trust and the three uncertainty-related constructs corroborate the extant literature on trust (Ba & Pavlou, 2002). These findings suggest that trust can influence multiple dimensions of perceptions of uncertainty. Thus, when studying the relationship between trust and uncertainty or risk, a single construct representing uncertainty might not allow researchers to capture a holistic picture.

This study has several theoretical implications. By including uncertainty explicitly in the research model, we extended the current literature on online trust which mostly assumes the existence of uncertainty. The incorporation of the two antecedents of uncertainty, information asymmetry and opportunistic behavior, provides a rich understanding of how consumers develop fear or distrust in online shopping. We tested a revised model in which information asymmetry and intention were connected and opportunistic behavior and intention were connected. The testing results showed that both links were insignificant, which indicates that the effect of these two antecedents is totally mediated by uncertainty. Another contribution to the literature is that we investigated the working mechanism of trust by examining the relationship between trust and agency-related constructs including uncertainty, opportunistic behavior, and information asymmetry. The theoretical implication is that trust does not only affect consumers’ intention to adopt online shopping directly and it also has a more complex mechanism to influence consumers’ online behavior. Trust and uncertainty-related factors can be regarded as a pair of opposing forces which shape consumers’ intention to adopt online shopping. Our finding suggests that the interaction between this pair of opposing forces is dynamic and probably specific to products. Future theoretical investigations may examine the dynamic nature of the
relationship between trust and uncertainty and determine how trust reduces uncertainty and triggers the consumer’s adoption behavior.

This study also bears practical implications. The findings suggest that prescription drug e-vendors can increase consumer adoption by building online trust. Specifically, efforts are needed towards the direction of reducing information asymmetry. One example of trust building technology is to post such signals as authorization stamps, privacy disclaimers, and warranty statements on the e-vendor website. This technology is inherently problematic because from an agency theoretical perspective, the information posted by the e-vendor is doubtful given the possibility of the adverse selection problem, that is, a cheating e-vendor could post any false information. Ba and Pavlou (2002) demonstrated that online feedback mechanisms are a more effective trust building technology to establish a seller’s reputation in the online auction market. Different products have different levels of consumer adoption and are associated with different degree of information asymmetry (Ba & Pavlou, 2002; Liang & Huang, 1998). Prescription drugs are life-critical in nature and consumers are mostly concerned about the drug quality. A possible way to build trust is to affiliate with a reputable hospital or pharmacy and provide a toll free number on the website of the affiliated institution so that consumers can call to verify the credibility of the e-vendor. In this way, trust can be built by reducing information asymmetry. Similarly, trust can be built by reducing opportunistic behavior. For instance, the e-vendor can provide a link which points to the FDA website that shows the e-vendor is compliant with the Good Supply Practice (GSP).

A limitation of this study is that the respondents of our survey are undergraduate and graduate students in business schools. This sample is possibly not representative of the general population of online consumers, for example, the sample may be younger or have a higher education level. Another limitation is that trust is considered as a single dimensional construct. While this choice makes the model concise, it loses the opportunity to examine how the different antecedents of trust affect information asymmetry and opportunistic behavior differently. It is interesting for future research to examine how the three types of trust (Gefen et al., 2003), institution-based, calculative-based, and knowledge-based, affect uncertainty and intention to adopt online prescription filling.

6. Conclusion
This paper argues that the online buyer-seller relationship can be considered to be a principal-agent relationship which is characteristic of outcome uncertainty, self-interest, information asymmetry, and opportunistic behavior. Drawing on agency theory and the prior research on consumer trust, this paper attempts to investigate the working mechanism of trust by examining trust, uncertainty, and their relationships with the consumer’s intention to adopt online prescription filling from a principal-agent perspective. A research model was developed and empirically tested using a large sample. It is found that (1) information asymmetry and the e-vendor’s opportunistic behavior contribute to uncertainty, (2) uncertainty has a negative influence on intention, (3) trust reduces information asymmetry, opportunistic behavior, and uncertainty, and (4) trust positively affects intention. The major contribution of this paper is that it provides a new perspective to examine the effect of trust in the context of e-commerce.
Table 1. Goodness of Fit Indices for the Measurement Model

<table>
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<tr>
<th>Goodness of Fit Indices</th>
<th>Measurement Model</th>
<th>Desired Levels*</th>
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<tbody>
<tr>
<td>$\chi^2$</td>
<td>422.99</td>
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</tr>
<tr>
<td>df</td>
<td>196</td>
<td>-</td>
</tr>
<tr>
<td>$\chi^2$/df</td>
<td>2.16</td>
<td>&lt; 3.0</td>
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<tr>
<td>GFI</td>
<td>.91</td>
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<tr>
<td>AGFI</td>
<td>.88</td>
<td>&gt; .80</td>
</tr>
<tr>
<td>NFI</td>
<td>.93</td>
<td>&gt; .90</td>
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<tr>
<td>CFI</td>
<td>.96</td>
<td>&gt; .90</td>
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<tr>
<td>RMSEA</td>
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<td>.05 - .08</td>
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<tr>
<td>Number of Latent Variables</td>
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<tr>
<td>Total Number of Items</td>
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<td>-</td>
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* The criteria are adapted from (Teo et al., 2003)
Table 2. Construct Factor Loadings

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<th>Construct</th>
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<td>Trust</td>
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<td></td>
<td>2</td>
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<td></td>
<td>2</td>
<td>.94</td>
<td>11.047</td>
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<td>3</td>
<td>.90</td>
<td>51.39</td>
</tr>
<tr>
<td>Intention</td>
<td>1</td>
<td>.95</td>
<td>91.94</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.96</td>
<td>85.51</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.94</td>
<td>99.77</td>
</tr>
</tbody>
</table>

Table 3. Assessment of Discriminant Validity

<table>
<thead>
<tr>
<th>Test</th>
<th>Constrained Model ?²</th>
<th>Unconstrained Model ?²</th>
<th>?² Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncertainty</td>
<td>464.387</td>
<td>101.667</td>
<td>362.720**</td>
</tr>
<tr>
<td>Opportunistic Behavior</td>
<td>364.377</td>
<td>113.753</td>
<td>250.624**</td>
</tr>
<tr>
<td>Information Asymmetry</td>
<td>287.991</td>
<td>91.813</td>
<td>196.178**</td>
</tr>
<tr>
<td>Intention</td>
<td>92.886</td>
<td>68.362</td>
<td>24.524**</td>
</tr>
<tr>
<td>Uncertainty with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunistic Behavior</td>
<td>110.962</td>
<td>98.876</td>
<td>12.086**</td>
</tr>
<tr>
<td>Information Asymmetry</td>
<td>59.105</td>
<td>31.845</td>
<td>27.260**</td>
</tr>
<tr>
<td>Intention</td>
<td>354.287</td>
<td>33.806</td>
<td>320.481**</td>
</tr>
<tr>
<td>Opportunistic Behavior with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Asymmetry</td>
<td>70.243</td>
<td>47.511</td>
<td>22.732**</td>
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<tr>
<td>Intention</td>
<td>238.936</td>
<td>20.749</td>
<td>218.732**</td>
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<td>Information Asymmetry with</td>
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<td></td>
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<tr>
<td>Intention</td>
<td>175.913</td>
<td>21.995</td>
<td>153.918**</td>
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</table>

** Significant at p < 0.01
Table 4. Construct Correlations

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<th>Construct</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>1. Trust</td>
<td>.85*</td>
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</tr>
<tr>
<td>2. Uncertainty</td>
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<td>-.55</td>
<td>.84*</td>
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<tr>
<td>3. Opportunistic Behavior</td>
<td>-.42</td>
<td>.62</td>
<td>.81*</td>
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<td>4. Information Asymmetry</td>
<td>-.31</td>
<td>.43</td>
<td>.42</td>
<td>.92*</td>
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</tr>
<tr>
<td>5. Intention</td>
<td>.47</td>
<td>-.53</td>
<td>-.39</td>
<td>-.24</td>
<td>.95*</td>
</tr>
</tbody>
</table>

* Square root of AVE of the construct.

Table 5. Construct Reliabilities

<table>
<thead>
<tr>
<th>Construct</th>
<th>Number of Items</th>
<th>Cronbach’s alpha</th>
<th>Composite Reliability</th>
<th>AVE</th>
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</thead>
<tbody>
<tr>
<td>Trust</td>
<td>6</td>
<td>.93</td>
<td>.94</td>
<td>.73</td>
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<tr>
<td>Uncertainty</td>
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<td>.87</td>
<td>.91</td>
<td>.67</td>
</tr>
<tr>
<td>Opportunistic behavior</td>
<td>5</td>
<td>.88</td>
<td>.91</td>
<td>.67</td>
</tr>
<tr>
<td>Information symmetry</td>
<td>3</td>
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<td>.94</td>
<td>.83</td>
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<tr>
<td>Intention</td>
<td>3</td>
<td>.94</td>
<td>.96</td>
<td>.90</td>
</tr>
</tbody>
</table>

References


Appendix A
Constructs and measurement items

Trust
1. Online prescription filling is handled in a competent manner.
2. Online prescription filling is reliable.
3. Online prescription filling is safe.
4. Online prescription filling is secure.
5. Online prescription filling is trustworthy.
6. I trust online prescription drug retailers.

Uncertainty
1. I am not sure that online prescription filling is good for me.
2. I am exposed to many risks if I fill my prescription online.
3. I feel that filling my prescription online involves a high degree of uncertainty.
4. I am afraid that something unpredictable may happen if I fill my prescription online.
5. Online prescription filling is an unclear process to me.

Opportunistic behavior
1. Online drug retailers and I have different goals in the prescription filling transaction.
2. The prescription drugs sold online could be manufactured in another country where lower drug quality standards apply.
3. The prescription drugs sold online could be of low quality.
4. The prescription drugs sold online could be expired or close to expiration.
5. The prescription drugs sold online could be counterfeit drugs.

Information asymmetry
1. From the information provided by the prescription filling website, I cannot tell if the company is reputable.
2. From the information provided by the prescription filling website, I cannot tell if the drug quality is good.
3. From the information provided by the prescription filling website, I cannot tell if the company is legitimate.

Intention to fill prescription online
1. I intend to do online prescription filling in the near future.
2. It is likely that I will purchase prescription drugs from the Internet.
3. I would provide my medical information to the website to get my prescription filled.
Our responsibility is to provide strong academic programs that instill excellence, confidence and strong leadership skills in our graduates. Our aim is to (1) promote critical and independent thinking, (2) foster personal responsibility and (3) develop students whose performance and commitment mark them as leaders contributing to the business community and society. The College will serve as a center for business scholarship, creative research and outreach activities to the citizens and institutions of the State of Rhode Island as well as the regional, national and international communities.

Mission

The creation of this working paper series has been funded by an endowment established by William A. Orme, URI College of Business Administration, Class of 1949 and former head of the General Electric Foundation. This working paper series is intended to permit faculty members to obtain feedback on research activities before the research is submitted to academic and professional journals and professional associations for presentations. An award is presented annually for the most outstanding paper submitted.

Founded in 1892, the University of Rhode Island is one of eight land, urban, and sea grant universities in the United States. The 1,200-acre rural campus is less than ten miles from Narragansett Bay and highlights its traditions of natural resource, marine and urban related research. There are over 14,000 undergraduate and graduate students enrolled in seven degree-granting colleges representing 48 states and the District of Columbia. More than 500 international students represent 59 different countries. Eighteen percent of the freshman class graduated in the top ten percent of their high school classes. The teaching and research faculty numbers over 600 and the University offers 101 undergraduate programs and 86 advanced degree programs. URI students have received Rhodes, Fulbright, Truman, Goldwater, and Udall scholarships. There are over 80,000 active alumnae.

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