SIGNALING THEORY AND INFORMATION ASYMMETRY IN ONLINE COMMERCE FROM THE SELLER AND BUYER PERSPECTIVES

BY

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ABSTRACT

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While online commerce offers certain benefits for buyers, buyers face challenges evaluating the quality of online sellers because of the virtual representation of goods and services. The uncertainty associated with the quality of sellers and products is influenced by information asymmetry between sellers and buyers and is generally resolved by signaling. Online signaling is the focus of three studies in my dissertation. In particular, I examine how sellers of high and low quality use website signals to influence buyer behavior and how buyers evaluate website signals to avoid the problem of adverse selection (e.g. choosing a wrong seller). Using signaling, trust and deception theories, I consider website signals both from the seller and buyer perspectives.

This research seeks to answer the following questions: What is the difference in quantity and types of signals that high- and low-quality online sellers use pre-contractually? What signals affect buyer perceptions of seller and product quality as well as deception, trust and eventually willingness to buy? In addition, this research investigates the existence of a separating equilibrium in online marketplaces.

To investigate these questions, three complementary studies were conducted. The first study investigates the seller perspective and draws from signaling theory to develop a tri-dimensional framework to classify signal usage by sellers of varying quality. The framework is tested with a content analysis of existing websites. The results of this study

confirm that there is a difference in signal usage between low-and high-quality online sellers and show that low-quality sellers are likely to avoid costly, easy-to-verify signals and tend to use fewer signals than high-quality sellers do.

The second and the third studies focus on the buyer perspective with an evaluation of behavioral attitudes and perceptions of buyers towards website signals, sellers and products. The results of the second study demonstrate that buyers pay attention to product presentation and find trust inducing signals important in evaluating the quality of sellers and products. The findings of the third study suggest that signal perceptions are formed according to tenets of signaling theory and are influenced by the cost of signals. More costly signals are found more significant in affecting buyer perceptions of deception and trust. In addition, the results suggest that a separating equilibrium exists in online marketplaces as buyers can differentiate among websites of high and low quality by perceiving high quality websites as more trustworthy and less deceptive, and low quality websites as less trustworthy and more deceptive.

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CHAPTER 1. INTRODUCTION

1.1 Information Asymmetry in Online Commerce

Information asymmetry refers to the disproportionate amount of information that two different parties have during the transaction and is based on the premise that the party that has more information may behave opportunistically and choose what kind information to provide to a second party (Kirmani and Rao 2000). Two types of information are particularly important in situations of information asymmetry – information about quality, when quality is limited or hidden, and information about intent, when behavioral intentions of one party are not fully transparent (Stiglitz 2000). Information asymmetry exists in various settings including transactions between employers and employees (Spence 1973), sellers and buyers (Kirmani and Rao 2000), and more recently, online sellers and buyers (Wells et al. 2011).

While online commerce offers certain benefits for buyers, uncertainty and inability to inspect products before the purchase makes buyers reluctant to engage in online exchange relationships (Pavlou et al. 2007). The web interface challenges the ability of buyers to evaluate the quality of an online seller because of the lack of physical communication with the seller (Grazioli et al. 2000). Exploiting this fact, fraudulent websites have become increasingly widespread, generating billions of dollars in revenue at the expense of internet users by pretending to be legitimate websites (Abbasi et al. 2010).

The digital nature of the internet enforces information asymmetry between a seller and a buyer. Since buyers cannot examine products before purchasing, it is easy for merchants to behave opportunistically and manipulate website features and product

presentation to fraudulently signal quality. In situations with incomplete information, buyers must rely on signals provided by sellers to assess the sellers' ability to provide quality products (Shapiro 1982) and to avoid deception. Deception in online commerce can result in delivering inferior products, financial fraud, unauthorized collecting and selling of buyer private information, failure to acknowledge refund, delayed product delivery or no delivery at all (Gefen et al. 2008; Pavlou et al. 2007).

1.2 Deception in Online Environments

In some respects, deception on the internet is similar to deception that may occur in the physical world. Two major strategies that are used by deceivers are *concealment* and *distortion* of information (Ekman 1992). The virtual representation of an online store and products makes it easier for deceitful sellers to manipulate information by concealing facts that may identify a seller as illegitimate, or distorting (exaggerating) product features to create more favorable attitudes toward products. By manipulating website design and product characteristics, deceitful sellers can signal a legitimate service while in fact they do not have an intention to provide the service or deliver products that they promise. For example, a seller may take advantage of the virtual representation of the web store and advertise one product but deliver an inferior one. Such strategies are made possible by employing product presentation manipulation in which advertised product attributes do not correspond to the actual product or by using website signals that are created to indicate a certain seller quality when in fact sellers do not possess such qualities.

The role of website signals is to resolve the buyer's problem of differentiating between high- and low-quality sellers in the face of potential deception. Assuming that

sellers are rational, buyers may look for signals that would be beneficial for a high-quality seller to display and unprofitable for a low-quality seller. These signals can be in the form of textual information, images, website design features and other strategies selected by sellers.

1.3 Signaling in Online Commerce

Signals are observable characteristics of an object that can be manipulated by a signaler to alter the perceptions of a receiver (Spence 1973). The virtual environment of the internet does not allow online sellers to invest into expensive physical signals that could indicate quality in traditional stores such as a prestigious location, expensive furniture or dazzling interior design. Thus, to communicate higher quality, online sellers are limited to displaying virtual signals to convey quality. These signals may include online product presentation, the use of the latest technologies and verification seals among others (Kim et al. 2006).

Since many virtual signals are cheaper to produce than physical signals, deceitful sellers are able to easily mimic legitimate sellers by forging some of the signals to promote quality and trust. While some signals are easy to forge, other signals require more effort. For example, displaying an actual third-party verification seal on the website demands the approval by the third-party company and involves annual fees[1]. Thus, displaying certain third-party seals can be disadvantageous for sellers who do not wish to stay in business for a long time as such expenditures may not be justified in the future. On the other hand, displaying a return policy as a signal of good will in resolving post-purchase issues, does not require much effort for a seller. At the same time, the intention

[1] Here and throughout the text we refer to a third-party verification signal as an actual and legitimately obtained logo that is linked to a provider website.

of a seller to adhere to the return policy is difficult to detect before the need to return the product arises.

1.4 Research Questions

According to signaling theory, sellers select signals that correspond to the online store image they try to convey. Buyers, on the other hand, evaluate these signals to be able to avoid the problem of adverse selection (i.e. choosing the wrong seller). If a buyer is convinced of the quality of the seller, s/he may be willing to transact with the seller. Figure 1.1 depicts the dynamics between buyers and sellers and the role of website signals in online transactions.

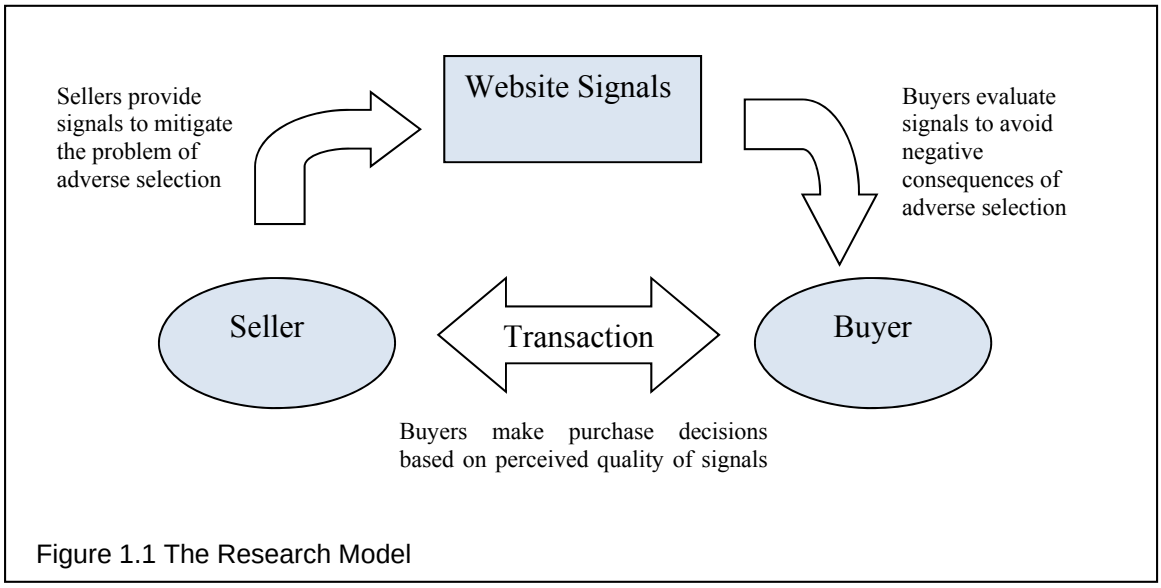

Figure 1.1 The Research Model

To fully understand issues of signaling in online transactions and to evaluate how signaling and buyer perception of signals affect purchasing decisions, this research is focused on both the seller and buyer perspectives.

From the seller perspective, we examine specific signals that online sellers use to encourage buyers to engage in transactions and investigate whether the choice of signals

differentiates low-quality sellers from high-quality ones. From the buyer perspective, we are interested in the buyers' attitudes towards website signals, and their ability to distinguish among sellers of varying quality.

Accordingly, this research consists of three complementary studies. In Study One, we investigate the seller perspective and draw from signaling theory to develop a tri-dimensional framework to classify signal usage by sellers of varying quality. To test this framework, we use a content analysis of existing websites. Study Two and Study Three focus on the buyer perspective and extend the findings of Study One with the evaluation of behavioral attitudes and perceptions of buyers towards website signals, sellers and products.

To provide a deeper insight into signaling issues, we examine the usage of signals in different contexts covering pharmaceutical websites and luxury goods websites. Both pharmaceutical and luxury goods are subjects of counterfeiting and deception (Silverman et al. 2003). In addition, to provide a broader insight, we observe buyer behavior in both actual and experimental websites.

This research seeks to answer the following questions:

1. What is the difference in quantity and types of signals that high- and low-quality sellers use pre-contractually (before the purchase takes place)?
2. How the manipulation of website signals affects the buyers' perceived deception, trust and willingness to buy?
3. How do the buyers' perceptions of signals affect perceived deception, trust and purchase intentions pre-contractually?
4. Does a separating equilibrium exist in online marketplaces?

The following chapters provide the background and conceptual framework for understanding the role of signals in online commerce transactions. Chapter Two reviews and synthesizes the literature on signaling, information asymmetry on the internet and types of signals. Chapter Three introduces Study One in which a three-dimensional framework of website signals is developed. Chapter Four outlines Study Two in which the role of the signals is explored in light of deceptive practices such as the selling of counterfeit products on the internet. Chapter Five describes Study Three in which the buyers' perceptions towards signals are discussed, the effect of signals on buyer purchase intentions is tested, and the type of equilibrium that exists in online markets is evaluated. Then, the review and integration of three empirical studies is provided, followed by limitations, suggestions for future research and conclusions.

CHAPTER 2. LITERATURE REVIEW ON SIGNALING

2.1 Signaling Theory

Signaling theory is a framework for understanding how two parties deal with the asymmetric information in pre-contractual contexts (Wells et al. 2011). Generally, one party, the signaler, must choose the quantity and method of communicating information, while the second party, the receiver, must interpret the signal (Connelly 2011).

Signaling theory has its roots in the writings of Thorstein Veblen, who in his seminal work "The Theory of the Leisure Class" (1899) suggested that conspicuous consumption and wasteful spending of the wealthy served as a signal of their status as elite. In the 1970s, signaling theory was used in evolutionary biology to explain certain behaviors of animals. Zahavi (1975) introduced a concept of honest signaling, that posits that the natural selection favors signals that are achieved at a higher cost, those that are not easy to produce deceptively. At the same time, Spence (1973) used signaling theory in the field of economics to explain the role of education as a signal in employer-employee relationships.

Signaling is based on signals, that serve as indicators of hidden qualities that are either deliberately communicative or have evolved with the intention of communicating the signaler's qualities. Signals have the purpose to alter the receiver's beliefs and behavior in ways that benefit the signaler (Donath 2007b). In online commerce, signals are intentional channels that carry information from sellers to buyers or in general, from those with more information to those with less information in situations of incomplete and asymmetrically located information (Spence 2002).

The core of signaling theory (Spence 1973) consists of the analysis of various types of signals and the situations in which these signals are used (Donath 2007a). Signaling suggests a "rational consumer" who assumes that a firm is committed to a promise, communicated through a signal, because opposite behavior is economically unwise (Kirmani et al. 2000). In contrast to a pure behavioral perspective, signaling considers the firm's incentives to behave according to the signals it provides (Kirmani et al. 2000). In seller-buyer markets, high-quality sellers have an incentive to differentiate themselves from low-quality sellers by providing specific signals, while low-quality sellers attempt to imitate signals that high-quality sellers use (Spence 2002). Thus, in commercial interactions, signals convey information about seller characteristics. Buyers are recipients of these signals and examine them to evaluate the credibility and validity of a seller's true qualities (Pavlou et al. 2007).

Signaling theory explains environments with incomplete information and analyzes the relationship between signals and qualities, showing why some signals are reliable and others are not (Donath 2007a). For a signal to be reliable, it should be interpreted by buyers as a credible commitment of a high-quality seller that cannot be easily imitated by a low-quality seller (Pavlou et al. 2007), and the costs of deceptively fabricating the signal must surpass the benefits of falsifying it (Donath 2007a). Buyers should believe that high-quality sellers can afford a signaling mechanism, which is too costly for low-quality sellers to use, and that a seller will incur a cost in the form of forfeited wealth or reputation in case the signal is false (Boulding et al. 1993).

Most signals are intentional, therefore they must be beneficial for a seller, otherwise there is no advantage for the seller to produce a signal (Donath 2007b).

However, occasionally signalers can signal without complete awareness that they are signaling (Spence, 2002). Signals that are not intentional are relatively ignored in signaling research (Connelly et al., 2011), thus the investigation of unintentional signals is equally important.

When signals are truthful, both sellers and buyers benefit from it. When signals are deceptive, it hurts buyers who may believe that a signal is true and may become a victim of a dishonest seller, and it hurts other honest sellers, as surrounded by fake signals, buyers may come to ignore or misinterpret signals.

Signaling theory has been used in the fields of economics, marketing, management and information systems.

In economics, the implications of signals such as cost (Spence 1973), warranties (Spence 1977), price (Milgrom et al. 1986), and advertising (Milgrom et al. 1986) were discussed.

Spence (1973) proposed that in order to solve the problem of asymmetric information one party should send a relevant signal to another party. The recipient party would interpret the signal and then make a decision accordingly. In his seminal work, Spence (1973) describes signals in a job market context. Potential employees, in order to be differentiated from other employees, send a signal about their ability level by obtaining education credentials. By doing so, prospective employees decrease the information gap between them and the employer. In turn, the employer assumes that the level of education is positively correlated with having better performance at work and hires more employees having education degrees. Spence assumes that the level of education per se is not associated with better performance, however the cost of the

opportunity which is the sum of time, tuition and effort spent on education is a good predictor of performance.

In addition to cost, Spence (1977) suggests that warranties can be used as signals of quality in situations of quality uncertainty because a warranty provides protection against product failure and may persuade buyers that a product is of good quality otherwise offering a warranty is unwise. Milgrom and Roberts (1986) consider the introductory price and the level of uninformative advertising expenditures as signals of quality for newly introduced experience goods. To separate themselves from low-quality sellers, high-quality sellers may use both price and advertising expenditures so it is more difficult for low-quality sellers to mimic high-quality ones.

Marketing researchers experimentally tested consumer side implications of signaling theory. Boulding and Kirmani (1993) evaluated consumer reactions to warranties as signals of quality. They found that better warranties are beneficial only for high-credibility firms and not beneficial for low-credibility firms. In addition, the effect of prior knowledge in the consumers' use of warranties as a signal of quality has been examined (Srivastava et al. 1998). It was found that for experts, a better warranty serves as a signal of higher quality despite the firm reputation, and for novices a better warranty is associated with higher quality only when the firm is reputable. Kirmani and Rao (2000) described how marketing signals work and created a typology of marketing signals based on three characteristics: the monetary consequence of a signal inferred by the firm, sale contingency of a signal, and the risk of future consequences in case a signal is false.

In the Management literature, signaling theory has been applied in studies of strategic management, entrepreneurship and human resource management. For example, Zhang and Wiersema (2009) discuss how CEOs can use financial statements as observable signals of unobservable quality of their firms to signal quality to investors. In entrepreneurship, the presence of venture capitalists and angel investors serves as a signal of quality of a new venture (Elitzur and Gavius 2003). In human resource management, signaling that occur during the recruitment process are discussed (Suazo, Martínez, and Sandoval 2009).

In Information Systems research, the issue of signaling has been discussed in the areas of strategic signaling, online commerce and social networks. Zmud et al. (2010) examined the role of strategic IT signals, namely automate, informate and transform signals that appear in annual reports and press releases. They found that firms in the transform industry employ more IT signals than firms in the automate and informate industries. In addition, low-performing firms employ more signaling than high-performing firms do.

Gao et al. (2010) discuss the effect of Capability Maturity Model (CMM) certification as a signal of unobservable quality in offshore outsourcing. They find that such certification does not benefit all offshore vendors equally. Software vendors gain more from CMM certification when their offerings are diversified, when they are located away from a cluster of other software firms, and when the extent of CMM penetration in the competition is low.

Banker et al. (2010) study how vendor reputation, education, experience, preferred provider status and references affect the survival rate of software service

providers in online markets. They find that all signals listed above besides vendor education have significant impact on the ability of a software firm to survive.

Donath (2007a) presents signaling theory as a conceptual framework to assess social networking sites and discusses how the number of friends and user profiles serve as signals to establish trust, identity and cooperation in social networks.

Gregg and Scott (2006) examine the role of reputation as a signal in online auctions. They find that reputation serves as an informative signal to experienced buyers and is useful in predicting future online auction fraud. Gregg and Walczak (2008) investigate signaling in online auctions and examine if a professional online e-image can signal buyers about unobservable seller and product quality. They find that improving the quality of an e-image increases buyers' willingness to transact and increases prices that online sellers can charge at auction.

In online commerce context, signaling theory has been used to evaluate the role of reputation in online trading (Bolton et al. 2008). The study reports that sellers who invest in maintaining strong reputation receive higher returns than sellers with low reputation.

In addition, signaling theory has been used in B2C context. Chu et al. (2005) explore the role of online infomediaries and evaluate the following signals: infomediary reputation, manufacturer brand, and retailer brand. They find that an established online retailer brand increases purchase intention for a weak manufacturer brand more than for a strong one, and that an infomediary with a strong reputation increases purchase intentions for a strong manufacturer brand more than for a weak one. Wells et al. (2011) evaluate the role of website quality as a signal of product quality. The results inform us that website quality influences perceptions of product quality and positively affects purchase

intentions. In addition, signal credibility is found instrumental in strengthening the relationship between website quality and product quality

Table 2.1 summarizes key concepts in IS research in which signaling theory has been employed.

CONCEPT	AUTHORS/YEAR
1. Strategic signaling	Banker et al. (2010), Gao et al. (2010), Zmud et al. (2010)
2. Social network signaling	Donath (2007a)
3. Online auction signaling	Gregg and Scott (2006); Gregg and Walczak (2008)
4. Online commerce signaling	Chu et al. (2005); Bolton et al. (2008); Wells et al. (2011)

Table 2.1 Summary of key concepts of signaling in IS research

Unlike previous studies, this research aims to assess the role of signals from both seller and buyer perspectives. From the seller perspective, this research provides a classification of signals that sellers of varying quality are most likely to use. From the buyer perspective, buyer perceptions towards signals and sellers of varying quality are evaluated. In addition, the research evaluates the existence of separating and pooling equlibria in online markets. Thus, this research aims to provide a more complete account of the interactions between sellers and buyers in online commerce.

2.2 The Role of Signals in Situations of Information Asymmetry

In commercial transactions, the primary focus of signaling is to mitigate information problems that arise as a result of pre-contractual information asymmetry (Kirmani et al. 2000). Signaling theory evolved from the studies of information economics in situations of market interactions in which different parties have asymmetric information (Spence 1973; Boulding et al. 1993). Information asymmetry is the inability

of the buyer to evaluate the quality prior to purchase (Mishra et al. 1998) and it is based on the principle that different parties in an exchange relationship have different amounts of information regarding the transaction. In addition, different parties have incongruent goals that influence their decision regarding what quality and quantity of information to provide (Akerlof 1970). The seller can claim the ability to provide a high quality product or service when in fact he or she lacks the ability to do so (Eisenhardt 1989; Kirmani et al. 2000).

Many markets are affected by information asymmetry. Job markets, financial markets, consumer durables, food and pharmaceuticals are characterized by information gaps (Spence 2002). Recently, due to online commerce proliferation, online markets have become places that promote information asymmetry by permitting misrepresentation of a seller's true attributes or offering false product information (Pavlou et al. 2007).

Some markets are characterized by a separating equilibrium (Boulding et al. 1993). In such equilibrium a high-quality seller has an incentive to use a particular strategy, while a low-quality seller has a disincentive to choose the same strategy as revenues associated with such a strategy may not recover the initial investment. In these situations, buyers can differentiate between two types of sellers because they employ different market strategies and send different signals to buyers.

The differentiation between two types of sellers is more complicated in a pooling equilibrium (Boulding et al. 1993). In this type of equilibrium, market incentives do not force sellers to select different strategies. Thus, both high- and low-quality sellers may choose the same strategy and buyers have difficulty to differentiate between two types of

sellers. Therefore, it is important that buyers correctly perceive signals sent by sellers and develop the ability to differentiate among various signals and sellers.

2.3 Types of Signals on the Internet

Donath (2007a) considers signal reliability as a central part of signaling theory and suggests two categories of signals: assessment and conventional. *Assessment signals* are essentially reliable because producing the signal requires significant effort (Donath 2007a). For example, a reputable brand name is reliable, as companies with strong and reliable brand names have been around for a long time and have invested a significant amount of effort to build brand equity including advertising and product design (Kirmani et al. 2000). In contrast, *conventional signals* are not essentially reliable (Donath 2007a) as they are relatively easy to falsify. For example, to create an illusion of trustworthiness, websites may provide bogus privacy, security, and return policies by copying them from other credible websites. By faking these features, websites promote positive perceptions and reduce uncertainty associated with the purchase. Fake signals created by low quality sellers may be occasionally perceived by buyers as genuine. In this scenario, buyers perceive a lower degree of adverse selection and uncertainty even when these perceptions are based on untruthful information (Pavlou et al. 2007).

In economics, the allocation of time and cost are considered significant signals of quality (Spence, 2002). Some of the signals identified in marketing include brand name, price, warranties and advertising expenditures (Kirmani et al. 2000). Signals that have been studied in online commerce research include technological characteristics of websites, website design features as well as content and product characteristics. Although these signals are generally defined as ‘website features’ in e-commerce studies, the

notion of website features corresponds to our definition of signaling – providing an intentional means of communication of website and seller qualities. The following studies investigate the effects of website features in online transactions.

Pavlou and Fygenson (2006) observe technological characteristics of websites such as download delay, website navigability, information protection, product characteristics and product value and report that they positively influence attitudes towards purchasing from an online seller. Kimery and McCord (2006) evaluate the role of third party seals such as Verisign, TRUSTe and BBB Online. Kim and Benbasat (2006) consider seals of approval, brand and reputation, privacy and security policies, links to other websites, consumer feedback, referrals and website quality as factors influencing the consumers' trusting belief. Kim and Benbasat (2009) analyze the effect of price, source and content on the online buyers' trusting belief.

Fogg et al. (2001) identify groups of features that affect the credibility of a website. They find that features that correspond to the real world feel, ease of use, seller expertise, seller trustworthiness and tailoring to user needs increase website credibility, while commercial implications (mainly the amount of advertising) and seller amateurism decrease website credibility.

Gregg and Walczak (2008) explore an e-image of an online auction store. They consider professional name, detailed product information, clear return and shipping policies and professional look as factors related to higher quality websites.

Grazioli and Wang (2001) identify features such as seals, warranties, newsclips and physical location as assurance mechanisms that decrease risks, and testimonials, store size and reputation as trust mechanisms increasing trust.

The following table (Table 2.2) summarizes website features studied in the field of online commerce.

YEAR	AUTHORS	FEATURES
2001	Fogg et al.	Real world feel, ease of use, seller expertise, seller trustworthiness, tailoring to user needs, commercial implications (mainly the amount of advertising) and seller amateurism
2001	Grazioli and Wang	Seals, warranties, newsclips, physical location, testimonials, store size and reputation
2006	Kimery and McCord	Third party seals
2006	Pavlou and Fygenson	Download delay, website navigability, information protection, product characteristics and product value
2006	Kim and Benbasat	Seals of approval, brand and reputation, privacy and security policies, links to other websites, consumer feedback, referrals and website quality
2008	Gregg and Walczak	E-image (professional name, detailed product information, clear return and shipping policies and professional look)
2009	Kim and Benbasat	Price, source and content

Table 2.2. Website features in online commerce studies

While online commerce research produced significant results in studying the effect of signals or groups of signals on trust and purchase behavior, there is a paucity of research regarding the effect of signals on both buyers and sellers. The contribution of our research is filling this gap in IS research. By analyzing the role of different website signals both from the seller and the buyer perspective we expect to produce valuable results for the further development of signaling studies in the IS field.

CHAPTER 3. THREE-DIMENSIONAL FRAMEWORK OF WEBSITE SIGNALS (STUDY ONE)

Chapter Two presented the review of signaling theory and the role of signals in online transactions. Since it is important to understand how sellers use signals to influence buyer behavior, this chapter presents a study that investigates specific signals that online sellers, both legitimate and fraudulent, use to encourage online buyers to engage in online transactions.

Using signaling theory, we develop a theoretical framework with three dimensions – purchase time continuum, ease of verification and signaling cost. We examine how these dimensions influence the online sellers' decisions to display signals on their websites. In addition, we develop a classification that categorizes actual website signals in accordance with their specific characteristics. We then demonstrate how our framework and signal classification can be used in empirical research for theory testing by conducting a content analysis of existing pharmaceutical websites and testing hypotheses derived from our framework. In this study, we concentrate on observable website signals related to the online transaction process that are provided by sellers pre-contractually (i.e. before an actual purchase takes place). We focus on the seller's perspective and compare the quantity and quality of signals that are displayed by high quality and low quality sellers.

This study provides both theoretical and practical contributions. At the theoretical level, we conceptualize the nature and role of signals as mechanisms for indicating quality in situations of information asymmetry in online commerce. At the practical level,

our framework can help inform online users, online retailers and regulatory institutions of the type of signals that high- and low quality online sellers are likely to use.

This paper is organized as follows. In the next section, we provide the theoretical background based on signaling theory and information asymmetry. Then, we introduce a classification of website signals. Next, we formulate hypotheses, followed by the methodology and results sections. We conclude with the discussion and implications of our findings, and with suggestions for future research.

3.1 Introduction

The internet has become a significant sales channel during the past two decades. According to the Census Bureau of the Department of Commerce (2010), online sales in the U.S. totaled $39.7 billion in the second quarter of 2010 and are increasing. Forrester Research forecasts U.S. online sales to reach $248 billion in 2014 (Forrester Inc. 2009). As the primary purpose of online retail is acquiring and retaining customers, and the competition is fierce, it is important to examine strategies that online retailers use to successfully run their business. However, there is a paucity of research that provides a strategic website evaluation (Chiou et al. 2010). Up to date, the majority of website evaluation studies are centered on user-based surveys, while issues regarding strategic website evaluations from a seller point of view are largely overlooked (Chiou et al. 2010).

The focus of this research is to evaluate retail websites from the seller perspective. To this end, we analyze actual websites and examine website features that online sellers provide to signal quality to buyers. While honest sellers use truthful signals to convey

information about their quality, deceptive sellers may behave opportunistically and manipulate website features to fraudulently signal quality.

Our objective is to examine specific signals that online sellers, both legitimate and fraudulent, use to encourage online buyers to engage in online transactions. Using signaling theory we develop a theoretical framework with three dimensions – purchase time continuum, ease of verification and signaling cost. We examine how these dimensions influence the online sellers' decisions to display signals on their websites. In addition, we develop a classification that categorizes actual website signals in accordance with their specific characteristics. We then demonstrate how our framework and signal classification can be used in empirical research for theory testing by conducting a content analysis of existing pharmaceutical websites and testing hypotheses derived from our framework. In this study, we concentrate on observable website signals related to the online transaction process that are provided by sellers pre-contractually (i.e. before an actual purchase takes place). With focus on the seller perspective, we compare signals that high- and low-quality sellers are most likely to use.

3.2 Information Asymmetry and Adverse Selection

Signals are indicators of hidden qualities that are either deliberately communicative or have evolved with the intention of transmitting the signaler's qualities. Signals have the purpose of altering the receiver's beliefs and behavior in ways that benefit the signaler (Donath, 2007b). In online commerce, signals are intentional channels that carry information from sellers to buyers or in general, from those with more information to those with less information in situations of incomplete and asymmetrically located information (Spence, 2002).

The core of signaling theory (Spence, 1973) consists of the analysis of various types of signals and the situations in which these signals are used (Donath, 2007a). Signals convey information about seller characteristics. Buyers are recipients of these signals and examine them to evaluate the credibility and validity of a seller's true qualities (Pavlou, Liang, & Xue, 2007). Signaling theory explains environments with incomplete information and analyzes the relationship between signals and qualities, showing why some signals are reliable and others are not (Donath, 2007a). For a signal to be reliable, it should be interpreted by buyers as a credible commitment of a high-quality seller that cannot be easily imitated by a low-quality seller (Pavlou et al., 2007) and the costs of deceptively fabricating the signal must surpass the benefits of falsifying it (Donath, 2007a).

Signaling theory evolved from the studies of information economics in situations of market interactions in which different parties have asymmetric information (Spence, 1973; Boulding & Kirmani, 1993). Information asymmetry is the inability of the buyer to evaluate the quality prior to purchase (Mishra, Heide, & Cort, 1998) and it is based on the principle that different parties in an exchange relationship have different amounts of information regarding the transaction. In addition, different parties have incongruent goals that influence their decision regarding what quality and quantity of information to provide (Akerlof, 1970). The seller can claim the ability to provide a high quality product or service when in fact he or she lacks the ability to do so (Eisenhardt, 1989; Kirmani & Rao, 2000).

In traditional stores, the quality of a product is often observable during the selection process and completely observable after the purchase. In contrast, online stores

are characterized by a time lag between product selection and the purchase and product delivery, and there is a distance gap that prevents buyers from directly examining products. This temporal and spatial separation enforces information asymmetry (Pavlou et al., 2007) because the buyer lacks exact information about the product until the product is delivered. Online sellers control the information that they provide to buyers, and are able to exaggerate or overstate quality through product presentation manipulation. Thus, some high quality online offerings may be almost indistinguishable from low quality ones. Uncertainty associated with online purchases leads to two information asymmetry problems: *adverse selection* and *moral hazard* (Akerlof, 1970; Pavlou et al., 2007).

Adverse selection is the distortion of information that results in pre-contractual misrepresentation of the seller's true characteristics (Mishra et al., 1998; Pavlou et al., 2007). Moral hazard arises post-contractually in situations when sellers do not fulfill their promises and engage in activities that benefit them at the buyer's expense (Pavlou et al., 2007). Adverse selection problems are resolved by signals, and moral hazard problems are resolved by incentives (Kirmani & Rao, 2000). Signals, such as signs and logos, allow high-quality sellers to disclose their true identity to buyers. Incentives, such as price premiums combined with repeated sales, motivate sellers to provide higher quality (Mishra et al., 1998). The underlying principle of using signals is that a seller spends money on signals now in anticipation of future revenues, and buyers expect that quality-related claims made by a seller must be true; otherwise such upfront expenditures are unwise (Kirmani & Rao, 2000).

To evaluate the properties of various signals, we develop a framework that defines signals on the basis of the purchase time continuum, ease of verification and

signaling cost. The framework is applied to compare the quality and quantity of signals provided by sellers of varying quality. For the purpose of this study, two types of sellers are considered – high quality and low quality sellers. More specifically, we are examining online sellers of pharmaceutical products. The quality of these sellers is informed by the definitions of the National Association of Boards of Pharmacy (NABP) that maintains a database of recommended and not recommended sellers. According to NABP definitions, low quality sellers are fraudulent sellers, sellers who do not comply with patient privacy regulations, sellers who have been subject to prior disciplinary action, or sellers who sell low quality pharmaceutical products, such as expired products, products that have not been stored correctly, products that come from unidentified sources, products that are not distributed in accordance with the U.S. law, or products that are distributed by a non-licensed pharmacist among others. High quality sellers are sellers that follow all NABP regulations and distribute pharmaceutical products of high quality, that are non-expired and which are stored correctly (LegitScript 2011).

3.3 Three-Dimensional Framework of Website Signals

In traditional offline stores, signals are defined as sale-independent (pre-purchase) and sale-contingent (post-purchase) signals (Kirmani & Rao, 2000). *Pre-purchase* signals involve expenditures even if the sale does not occur. In online retail stores, signals such as the provision of product related information, including product description and product reviews, result in expenditures regardless of whether or not the sale takes place. *Post-purchase* signals involve expenditures only after the sale has taken place. In online commerce, a signal such as sending an automatic confirmation e-mail containing terms

and conditions of the purchase contract results in expenditures only after the sale has taken place.

Online stores are different from traditional stores in that they offer an additional shopping phase that takes place after the selection of the products to be purchased but before their actual purchase. This shopping phase, which we will call the *purchasing* phase, occurs largely during the online checkout process. *Purchasing* phase signals are observed after product selection has been completed and products have been added to the shopping cart. There is some similarity between online and offline checkout processes as in both situations the buyer is required to provide a payment. However, contrary to physical store processes, in an online environment during the checkout, the buyer does not have immediate access to products, physical products in particular; instead, the buyer is directed to various webpages on which different signals conveying product, billing, and delivery information are displayed. Thus, the first dimension in our framework is the *online purchase time continuum,* which has three phases: pre-purchase, purchasing, and post-purchase. Pre-purchase signals and some purchasing signals appear pre-contractually (before payment is made) and can alleviate the issue of adverse selection. Some purchasing signals and all post-purchase signals and incentives appear post-contractually and mitigate problems of moral hazard (see Figure 3.1).

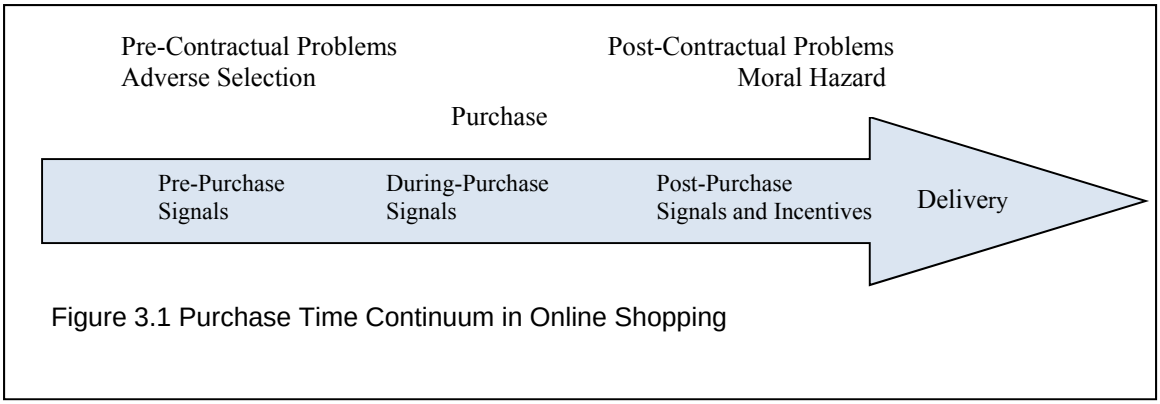

Figure 3.1 Purchase Time Continuum in Online Shopping

In an online environment, due to their virtual representation, businesses can easily manipulate how they want to present themselves (Gregg & Walczak, 2008). According to signaling theory, online markets are characterized as a pooling equilibrium in which the differentiation between high- and low-quality sellers is complicated (Boulding & Kirmani, 1993). In this type of equilibrium, market incentives do not force sellers to select different strategies, and both high- and low-quality sellers may choose the same signals. In such situations buyers have difficulty in differentiating between the two types of sellers and may come to ignore or misinterpret signals. Therefore, prior to making a purchase decision, buyers face the problem of verification of the true qualities of website signals. Some signals can be easily verified as authentic by buyers, and some signals are more difficult to verify. For example, questionable signals, such as a phony contact address that can be validated in online directories, or a forged third-party seal that is not linked to the actual seal provider's website can be potentially verified by buyers and may create negative attitudes towards the website. In contrast, the presence of a privacy policy may signal quality and elicit trust, since such a signal is not easily verifiable by buyers, even after an actual purchase has taken place. Sellers may or may not keep promises stated in their privacy policy but such deviations are difficult to detect by buyers before or after the purchase.

Donath (2007a) argues that if there is a high cost of punishment in case a signaler is caught displaying a false signal, signals are likely to be more reliable. The cost of punishment in online markets can be exhibited as a refusal of buyers to transact with a seller. Thus, we introduce *ease of verification* as the second signaling dimension. We expect that the ease of verification affects the sellers' choice of signals because, according to signaling theory, sellers anticipate that signaling expenditures should be recovered by future sales (Kirmani & Rao, 2000), and the cost of punishment should be avoided (Donath, 2007a). Since displaying fake signals that are easily verified as false may negatively affect buyer purchasing decisions, initial investment on such signals is not justified and sellers may refrain from using them.

Finally, all signals, regardless of the purchase phase during which they are used or their ease of verification, are further divided by the amount of resources necessary to produce. Buyers should believe that high-quality sellers can afford a signaling mechanism, which is too costly for low-quality sellers to use, and that a seller will incur costs in the form of forfeited wealth or reputation in case the signal is false (Boulding & Kirmani, 1993). Thus, the *signaling cost* (Spence, 1973) is the third dimension of our framework. Some of the signals are costly to produce. For instance, the introduction of live chat software or a real-time product comparison chart might be expensive. Although the use of expensive technology or rich website content as signals of high quality may improve seller reputation and increase sales in the long term, low-quality sellers may avoid signals that are time consuming or require high-priced technology as they do not plan to stay in business for a long time and are not determined to make significant investments. In addition, some signals are difficult to obtain. For example, displaying an

authentic third-party seal such as that of the Better Business Bureau (www.bbbonline.org) requires accreditation and compliance with the BBB Code of Business Practices.

Based on the three dimensions discussed above we propose a three-dimensional framework for signals in online commerce (see Figure 3.2). The time dimension is unique for online stores due to the temporal and spatial separation between product selection and delivery. In traditional stores, the quality of a product is often observable during the selection process and completely observable after the purchase. In contrast, online stores are characterized by a time lag between product selection, the purchase and product delivery, and there is a distance gap that prevents buyers from directly examining products. The other two dimensions – signaling cost and ease of verification – are informed by signaling theory (Spence, 1973). Signals are more likely to be reliable when it is prohibitively costly for the signal to convey false information. These costs manifest themselves in two primary ways. First, the more costly it is to produce a signal, the more reliable it is likely to be (Spence, 1973). Second, if there is a high cost of punishment if caught conveying a false signal, signals are likely to be more reliable (Donath, 2007a). Hence, costs and verification are helpful to determine signal reliability.

Each dimension in the framework is a continuous variable that can take any value within a specified range. For example, time can range from 0 to t, where 0 corresponds to the beginning of selection and purchasing process, and t corresponds to the length of the entire session. Signaling cost can range from free to the most expensive, and ease of verification can range from very easy to impossible. These values can be specified depending on the context in which the framework is applied.

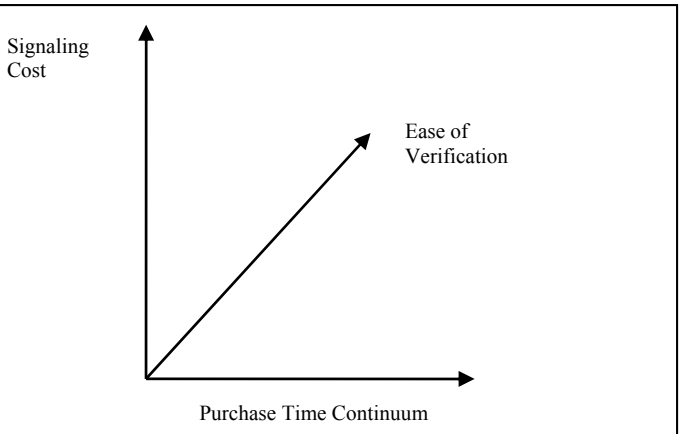

Figure 3.2. Dimensions of the Framework

Although the proposed dimensions are continuous, they can be split into distinct units when applied in a specific context. As an example of such an application, we introduce a classification of website signals. We split the time continuum into three stages (pre-, during-, and post-purchase), while signaling cost and ease of verification are split into two states each (low/high and easy/difficult respectively).

For this classification, we consider signals that are used in business-to-consumer situations rather than business-to-business. Prior research has identified various signals, such as brand name (Cheskin, 1999; Kim & Benbasat, 2006); third-party seals (Cheskin, 1999; McKnight, Kacmar, & Choudhury, 2004; Kim & Benbasat, 2006; Hu, Wu, Wu, & Zhang, 2010), privacy and security policies (Cheskin, 1999; Kim & Benbasat, 2006), contact information (Fogg et al., 2001), and feedback mechanisms (Ba & Pavlou, 2002; Kim & Benbasat, 2006). Our focus is on directly observable signals that are either present or absent and cannot be subjectively interpreted. Thus, signals such as brand name, are omitted from our classification.

Depending on the structure of a website, the positioning of signals may overlap among different purchase phases (i.e. some signals may appear in more than one phase). Table 3.1 displays signals based on their typical appearance during the purchase time continuum. The placement of signals was verified with a group of experts from industry and academia. Purchase time and signaling cost can be derived from observing the positioning of signals on websites and comparing costs of obtaining a signal. However, ease of verification is a less objective dimension. Thus, we asked a group of experts to evaluate the ease of verification of proposed signals. The experts were Information Systems, Information Management and Digital Forensics professionals (legal, banking, and design industries) and PhD and Master students in Information Systems and Information Technology. The percentage of expert agreement regarding signal placement in the pre-purchase and purchasing phases ranged from 67% to 100%. Signals with lower agreement percentage were further arbitrated by an independent expert to make placement determination.

Table 3.1. Characteristics of Signals

Ease of Verification / **Signaling Cost**	**Purchase Time Continuum**					
	Pre-Contractual (Adverse Selection)			**Post-Contractual (Moral Hazard)**		
	Pre-Purchase		**During Purchase**		**Post-Purchase**	
	Easy-to-verify	**Difficult-to-verify**	**Easy-to-verify**	**Difficult-to-verify**	**Easy-to-verify**	**Difficult-to-verify**
Low	•Contact Information	• Privacy Policy • Return Policy • Security Policy • Credit Card Logos	• Secure Transaction (Secure Socket Layer Encryption)	• Delivery Date Claim • In Stock Availability Claim • Product Quality Claim • Shipping Methods	• Email Confirmation • *Coupons (promo codes as incentives to buy again)**	• *Actual Delivery Date*

High	• Third-party Seals • Live Chat • Regulatory Compliance • Store Locator	• Consumer Feedback • Domain Specific Content	• Alternative Electronic Payment Mechanisms	• Cash Back • Coupon Redemption	• Order Status (tracking information)	• *Actual Product Quality*

Notes: Incentives are shown in italics

In the following section, we elaborate on the classification of signals based on our three dimensions: purchase time continuum, ease of verification and signaling cost.

3.3.1 Pre-Purchase Signals

Pre-purchase signals include up-front spending on website features that might increase the willingness to transact. The purpose of pre-purchase signals is to show that the seller incurs expenditures now and expects to recover expenses in the future through forthcoming sales (Kirmani & Rao, 2000). To resolve adverse selection problems for buyers, sellers convey information that signals their quality as merchants, the quality of their products, and their fairness in managing private information about buyers (Pavlou et al., 2007).

Low-cost, Easy-to-verify Signals include signals that are not costly to produce by sellers and easy to verify by buyers. For example, *contact information* is a signal that is easily produced by displaying a physical address, phone and email information on the website. Buyers can potentially verify if the contact information is true by conducting a search engine search or consulting online directories. If the contact information is false, does not exist, or belongs to a different entity, buyers will not trust the seller and the sale will not take place.

High-cost, Easy-to-verify Signals include physical store presence information, third-party seals and regulatory compliance statements. Physical store presence signals such as a *store locator* convey longevity and stability of a website as they show that a solid monetary investment has been made for the development of physical stores (Fogg et al., 2001). Live chat features demonstrate that real people work behind a virtual store representation and can increase real store feel (Fogg et al., 2001).

Third-party seals are provided by independent certifying bodies that can assure that the seller's behavior is consistent with online commerce standards (Kim, Steinfield, & Lai, 2008). Two types of seals can appear on websites. The first type is a general verification seal, such as Verisign (www.verisign.com) that proves secure e-commerce transactions for any type of websites. The second type is *domain specific*, for example VIPPS (Verified Internet Pharmacy Practice Sites) seals (www.nabp.net) are used in the pharmaceutical industry and confirm that a pharmacy is licensed and complies with federal regulations. Third-party seals are costly as they are given to websites that are approved by third-party seal providers and require membership fees. Buyers can easily verify the authenticity of these signals by checking shopping directories and third-party seal websites.

Regulatory compliance signals include conformity with federal or state regulations pertaining to a specific industry. For example, websites with rated content may require user confirmation of age eligibility. Pharmaceutical websites must request a prescription that is filled by an appropriate health care provider in order to dispense prescription medicines (FDA, 2009). Buyers are able to verify these signals by checking the method of distribution of products. If no prescription or confirmation is required, the

website may be violating legal regulations, and a buyer may suspect that the seller may follow the same non-compliance working ethic when it comes to buyer-seller relationships.

Low-cost, Difficult-to-verify Signals refer to issues related to customer service and include signals such as *Privacy Policy*, *Return Policy and Security Policy* (Kim & Benbasat, 2003). They also include mechanisms supporting the information flow between the time of actual purchase and the time a product is received, as well as information regarding the security of transaction and information sharing. Some websites may include additional policies. For example, in the pharmaceutical industry, legitimate pharmacies must provide the Health Insurance Portability and Accountability Act or *HIPAA privacy statement* on their websites. Buyers cannot easily verify if these statements are true before the purchase, as the credibility of these statements is not observable until after the purchase, and it is questionable if the seller will behave according to the policies published if a violation has occurred.

Credit card logos are often displayed on retail websites as signals that a seller accepts payments from particular merchant services. Although credit card logos are universally recognized and represent security associated with merchant services (Cheskin, 1999), the cost of producing such a signal is low and such logos are not usually linked to credit card provider websites, nor is there a database that lists online sellers who have a right to carry such a logo. This presents a difficulty for buyers, as it is not easy to verify the link between merchant logos displayed on a seller website and a secure credit card service.

High-cost, Difficult-to-verify Signals include feedback and website content signals. *Consumer feedback* is a signaling mechanism established to discourage opportunistic behavior in uncertain markets, and refers to comments about buying and selling experiences as well as evaluations of sellers (Ba & Pavlou, 2002). Buyers have difficulty verifying whether the posted feedback corresponds to opinions of real buyers as feedback can be potentially fabricated by sellers.

Domain Specific Content refers to the availability of specific product information that is useful for consumers (Huizingh, 2000). The content may include expert product reviews, press releases, FAQ sections, and news. Richer content provided by a seller leads to a better perception of the website. Creating, updating and modifying content requires effort and is time consuming for sellers and the verification of content by buyers can be difficult as a certain level of expertise is required to do so.

3.3.2 Purchasing Signals

Purchasing signals are those observable after product selection but before the purchase is completed. They provide information about payment mechanisms, product delivery date and assumptions about the actual quality and quantity of a product being delivered.

Low-cost, Easy-to-verify Signals include *Secure Transactions (Secure Socket Layer Encryption)* that permit encryption of private information during online transactions (Yu, Winslett, & Seamons, 2003). As the cost of SSL technology has become cheaper, it is more affordable for both high- and low-quality sellers[2]. Buyers can

[2] At the time of this writing (Fall 2011), SSL certificates by GoDaddy.com are sold for $12.99 annually. We expect that prices may be reduced further in the future.

easily identify the presence of secure transaction mechanisms by looking for *https* at the beginning of URL in the browser location bar. Browsers also provide information about the website identity through its digital certificate.

High-cost, Easy-to-verify Signals include *payment options* such as credit card payments, money transfer or alternative electronic payment mechanisms (e.g. PayPal (www.paypal.com), Google Checkout (www.checkout.google.com), Bill Me Later (www.billmelater.com)). The presence of alternative payment mechanisms provides a convenient and secure way to pay for online purchases (Amab & Hutchison, 2007). Participation in electronic payment programs is costly for merchants as they are required to pay transaction fees. Buyers can identify if the seller legitimately participates in such a program by checking the electronic payment providers' websites.

Low-cost, Difficult-to-verify Signals refer to claims provided by a seller during the checkout process and include d*elivery date claims, in-stock availability claims, product quality claims, and shipping methods*. These claims are not expensive for a seller to display but difficult to verify for a buyer because actual delivery date, actual shipping methods and actual product quality are not observable until after product delivery.

High-cost, Difficult-to-verify Signals may include *cash back* and c*oupon redemption* mechanisms. These signals are costly for a seller as they require either additional technology expenses or extra discounts. Money savings promises are not easily verifiable by a buyer during a purchase as some time is required for savings to appear on credit card statements.

3.3.3 Post-Purchase Signals

Post-purchase signals are observable only after the purchase has occurred. These signals usually include final confirmation of the order and details for tracking the product before delivery. There are fewer signals in this category because post-contractually buyers mainly face the problem of moral hazard, which is mitigated by incentives.

Low-cost, Easy-to-verify Signals include *E-mail confirmation* that serves as proof of an order and is designed to improve customer relationships. E-mail confirmation of transactions has been found to increase the credibility of websites (Fogg et al., 2001). While the technological cost of an e-mail confirmation is low, it can be easily verified by buyers by checking the content of their e-mail inbox. Although it may not be possible to verify the true identity of the sender or the accuracy of the message, the mere presence or absence of e-mail confirmation may serve as a signal of seller quality. The presence of such a signal proves that the seller is compliant with the norm of providing a receipt to a buyer, while the absence of this signal leads to a suspicion that the sale has not been carried out correctly.

High-cost, Easy-to-verify Signals include *Order tracking information* that enables buyers to track a package during the time between purchase and delivery (Cheskin, 1999). To use this signal, sellers have to invest in applications that allow the integration between seller and shipment company websites. Buyers are able to verify the validity of the tracking number only after a product has been shipped, so this signal only works post-purchase.

3.4 Empirical Investigation

In this section, the proposed framework for signal classification is used as a theory-testing tool. We examine how the proposed signaling dimensions influence the choice of signals by low- and high-quality sellers in the context of online pharmacies. To limit the scope of investigation, we focus on pre-contractual signaling that mitigates problems of adverse selection. As our framework includes purchase time, ease of verification and signaling cost, the relevance of each dimension is explored in light of a theoretical context. In addition, we analyze the practical application of our framework.

3.4.1 Pre-Contractual Signaling

Pre-contractual signals that include pre-purchase and some purchasing signals require expenditures even if the sale does not occur and are designed to alleviate the problem of adverse selection. When the information about quality is transparent, high-quality sellers gain from the provision of pre-contractual signals and low-quality sellers do better by not signaling. However, in situations when buyers cannot easily discern seller quality, low-quality sellers do better by signaling, as benefits from false claims about high quality may prevail over losses from being exposed (Kirmani & Rao, 2000). As the internet intensifies information asymmetry by anonymity and physical and temporal distances (Pavlou et al., 2007), we expect that both high- and low- quality sellers will rely on pre-contractual signals to indicate a certain quality and to motivate buyers to transact. High-quality sellers may invest in costly signals as such investment is justified by profits from future sales, and may display both easy- and difficult-to-verify signals as the information they provide is likely to be true. If signals are costly, mimicking high-quality sellers is unattractive for low-quality sellers (Balachander &

Srinivasan, 1994). Furthermore, illegitimate mimicking of high quality signals imposes costs on low-quality sellers in case the false signal is discovered (Donath, 2007a). Thus, low-quality sellers have fewer choices of signals to display on their websites.

H1: *Pre-contractually, low-quality online sellers will display fewer signals than high-quality sellers.*

3.4.2 Ease of Verification

According to signaling theory, signals are alterable and therefore are subject to manipulation (Spence, 1973). While high-quality sellers may use signals to correctly inform buyers about the quality of their products, low-quality sellers may misinform buyers in order to get a quick return and leave the market (Kirmani & Rao, 2000). Few signals are impossible to fake, no matter how costly they are (Donath, 2007a), and the virtual representation of online stores provides an opportunity for sellers to display a wide array of false signals. Although false signals can be misinterpreted by buyers as genuine, only legitimate signals can alleviate true uncertainty in adverse selection problems (Pavlou et al., 2007). Thus, sellers will choose signals based on their beliefs that draw from the buyer's ability to evaluate these signals. For a signal to be reliable, it should be interpreted by buyers as a credible commitment of a high-quality seller that cannot be easily imitated by a low-quality seller (Pavlou et al., 2007). When signals are easily identified as false, buyers are able to recognize the low quality of the seller and consequently refrain from purchasing. Thus, low-quality sellers who want to be on the safe side may omit signals that are subject to easy verification if fraudulent, and this practice may limit the number of signals they can use. High-quality sellers have an advantage over low-quality sellers as they can use easy-to-verify signals because these

signals are likely to be true. As the number of signals that can be displayed on the website is limited, high-quality sellers may have more instances of easy-to-verify signals on their websites. Thus, we expect:

H2: *Low-quality online sellers will display fewer easy-to-verify signals than high-quality sellers.*

3.4.3 Signaling Cost

To be effective, a signal should be costly enough to differentiate between a high-quality seller and a low-quality one (Spence, 1973). A high-quality seller attempts to be perceived differently from a low-quality seller by using signals that are costly and therefore not attractive for low-quality sellers (Kirmani & Rao, 2000). To promote quality, low-quality sellers may try to mimic high-quality sellers. However, for low-quality sellers, the cost of expensive signals may surpass the benefits of having such signals (Donath, 2007a) as the expenditure related to the signal will be lost if a seller defaults on the claim (Kirmani & Rao, 2000). Therefore, high-cost signaling is more profitable for high-quality sellers as they can assure buyers that a firm is a high quality provider, and less profitable for low-quality sellers as mimicking signals of high-quality sellers leads either to the direct money loss when the true quality is revealed, or indirect loss because of forgone strategy choices (Kirmani & Rao, 2000). As a signaling party selects signals to maximize the difference between future profits and signaling cost (Spence, 1973) we expect that low-quality sellers will refrain from engaging in high-cost expenditures on signals as profits from future sales may not be enough to recoup their investment. Therefore, we hypothesize,

H3: *Low-quality online sellers will display fewer high-cost signals than high-quality sellers.*

3.4.4 Grouping of Signals

Since most signals are intentional, they must be beneficial for a seller. Otherwise, there is no advantage for the seller to produce a signal (Donath, 2007b). If a seller invests in high-cost signals, we may assume that this seller intends to provide higher quality offerings, or else such expenditures are unwise (Kirmani & Rao, 2000). If sellers intend to provide higher quality, it is likely that they will provide accurate information about themselves that can be manifested in the usage of easy-to-verify signals. Thus, we expect that sellers that invest into high-cost signals will also display easy-to-verify signals to correctly inform buyers about their quality.

H4: *Online sellers that display high-cost signals will also display easy-to-verify signals*

On the contrary, sellers who refrain from displaying signals that are easy to verify if fake, may have something to hide and do not intend to correctly inform buyers about the actual quality of their offerings. If the seller has something to hide, the expenditure on high-cost signals may be lost in case the true quality of offerings is revealed. Thus, for this category of sellers, it makes little sense to invest into high-cost signals. Therefore, we expect:

H5: *Online sellers that display difficult-to-verify signals will also display low-cost signals.*

3.5 Methodology

In order to test our hypotheses, we use a content analysis of existing pharmaceutical websites and code signals that high- and low-quality sellers in the pharmaceutical industry are likely to use. Pharmacies selected for the analysis have been taken from North American directories of recommended and not recommended online pharmacies.

To test Hypotheses 1-3, we use a Mann-Whitney test to compare signal usage between high and low quality online sellers. The Mann-Whitney test is the non-parametric counterpart of t-test (Black 2009). If the assumption of normally distributed population is not valid, or data are ordinal in measurement as in our case, Mann-Whitney ranks the values of the two sub-groups and gives a z-score that indicates whether the sub-groups are significantly different from each other. To test Hypotheses 4-5, we employ a cluster analysis to investigate if there is a natural occurrence of groups of signals in pharmaceutical websites.

3.5.1 Content Analysis

Content analysis is a method often used to code and examine the content of written communication. Because it is based on explicit content, this method offers clear advantages over surveys and interviews that provide subjective perceptions of artifacts. In our research, the unit of data collection is a website, and the unit of analysis is a website signal. It is recommended that variables, coding rules and measurements be specified in advance as a pre-defined analysis structure allows for a more consistent collection of relevant data (Neuendorf, 2002). Accordingly, we identify 15 distinct variables that belong to the pre-contractual phase of the online purchase time continuum (see Table

3.2). These variables are displayed by cost and ease of verification. Consistent with our focus on adverse selection, we consider only observable signals that alleviate pre-contractual problems, and exclude signals that appear post-contractually. All variables are identified from reviewing the existing literature on e-commerce and studies of online pharmacies. Some variables such as brand name are not included in our analysis due to their subjective nature.

Table 3.2. Variables and Definitions

Signaling Cost		Ease of Verification	
High Cost Signals	**Low Cost Signals**	**Difficult to Verify Signals**	**Easy to Verify Signals**
Third Party Seals	Contact details	Credit card logos	Contact details
Domain Specific Seals	Credit card logos	Privacy Policy	Third Party Seals
Live Chat	Privacy Policy	Security Policy	Domain Specific Seals
Store Locator	Security Policy	Return Policy	Live Chat
Prescription Requirements	Return Policy	HIPAA privacy policy	Store Locator
Consumer Feedback	HIPAA privacy policy	Consumer Feedback	Prescription Requirements
Electronic Payment Mechanisms	Secure Transactions	Health Content	Secure Transactions
Health Content			Electronic Payment Mechanisms

Note: Signals that appear in pre-purchase and purchasing phases are listed

3.5.2 Sample

We compiled a directory of online pharmacies from different sources such as pharmacy.org[3], Google's listing of online pharmacies[4], and PharmacyChecker[5]. We eliminated duplicates from the master list and designated each pharmacy as high-quality, or low-quality based on guidelines from the National Association of Boards of Pharmacy

[3] http://www.onlinepharmacydirectory.org

[4] http://www.google.com/Top/Shopping/Health/Pharmacy/Online_Pharmacies

[5] http://www.pharmacychecker.com

(NABP), which accredits online pharmacies. The quality of online pharmacies was informed by recommendations of NABP and LegitScript databases of recommended and not recommended pharmacies. LegitScript follows the NABP's guidelines. Both NABP and LegitScript assign pharmacies into one of the two groups – recommended/not recommended. Thus, the quality of an online pharmacy in our study is a binary variable provided by a third party.

As of May 2009, NABP (www.nabp.net) published a list of 1,873 online pharmacies that do not meet NABP standards. NABP acknowledges that some non-accredited pharmacies may operate legitimately and be approved by other accreditation agencies. One of such alternative agencies is LegitScript, which as of May 2009, approved 254 online pharmacies, identified 745 pharmacies as candidates for approval, and classified thousands of pharmacies as unsatisfactory. We used LegitScript's validation feature that allows for checking the status of pharmacies. Additionally, the directory was checked against the list of rogue pharmacies at pharmacychecker.com[6].

We then divided the sampling frame into two lists according to status (high or low quality) and selected a random sample of 60 pharmacies from each list, 120 in total. The web pages of the selected pharmacies were coded based on the 15 signals proposed in Table 3.2. To perform a content analysis consistent with our theoretical framework, we developed a coding scheme based on the features of interest and coding rules. These steps were aimed at ensuring a consistent coding of relevant data. Three independent coders, trained on the coding scheme and rules, proceeded to analyze each pharmacy website in terms of its signals. Each variable in Table 3.2 is coded with a categorical descriptor to

[6] http://www.pharmacychecker.com/rogue-pharmacies.asp

indicate the presence (1) or absence (0) of that particular variable on the website. The coding was conducted using only explicit content (i.e. visible presence of the signal on the website).

3.6 Results

3.6.1 Inter-coder Reliability

Three independent researchers coded the sample of online pharmacies. The inter-coder reliability, computed as the percent of agreement obtained for all variables, ranges from 73% to 100%, showing a high level of reliability for all variables. Coding disagreements were adjudicated by discussion and consensus and a joint examination of the feature in question.

3.6.2 Hypotheses Testing

The categorical descriptors (1) or (0) were assigned to indicate the presence or absence of the variables and to calculate the total number of signals, total number of easy to verify signals and total number of high cost signals. Descriptive statistics reported in Table 3.1a provide the results of the coding. Overall, high quality sellers in our sample displayed a total of 400 signals. These 400 signals were split as 185 high cost signals and 215 low cost signals, and 144 difficult-to-verify signals and 256 easy-to-verify signals. Low quality sellers in our sample used a total of 300 signals. These 300 signals were divided between 100 high cost signals and 200 low cost signals, and 182 difficult-to-verify signals and 118 easy-to-verify signals.

Table 3.3a. Descriptive Statistics by Seller						
	Signals by Cost			**Signals by Ease of Verification**		
	High Cost Signals	Low Cost Signals	Total	Difficult to Verify Signals	Easy to Verify Signals	Total
High Quality Sellers	185	215	400	144	256	400
Low Quality Sellers	100	200	300	182	118	300

Although the maximum number of signals for a single web site in our coding scheme was 15, the range of signals displayed by online pharmacies in our sample was between 0 and 11, mean = 5.83, st. dev.= 2.059 (See Table 3.3b).

Table 3.3b Descriptive Statistics by Signals					
	N	Minimum	Maximum	Mean	Std. Deviation
High Cost Signals	120	0	6	2.38	1.277
Low Cost Signals	120	0	6	3.46	1.353
Difficult to Verify Signals	120	0	6	2.72	1.439
Easy to Verify Signals	120	0	6	3.12	1.535
Total Signals	120	0	11	5.83	2.059

In order to compare signal usage of high- and low-quality sellers, the Mann-Whitney test was conducted on the mean scores of the coded website signals. Non-parametric tests, such as the Mann-Whitney, are helpful for determining whether or not the values of an ordinal variable differ between two groups. This test employs ranks of the data and not the values themselves, which is appropriate when variables are dichotomous and represented with a 0-1 descriptor. Table 3.4 shows results of the hypotheses 1-3 testing with mean ranks, z-scores and p-values. All hypotheses are supported.

Table 3.4. Results of Hypotheses Testing

H#	Hypothesis	Low-quality Seller Mean Rank	High-quality Seller Mean Rank	Mann-Whitney Z	Hypothesis Supported
H1	Low-quality sellers display fewer signals than high-quality sellers do	46.17	74.83	-4.575***	Y
H2	Low-quality sellers display fewer easy-to-verify signals than high-quality sellers do	33.71	87.29	-8.637***	Y
H3	Low-quality sellers display fewer high-cost signals than high-quality sellers do	41.28	79.72	-6.264***	Y

Note: *** p<.0001

To test hypotheses 4 and 5 we conducted a cluster analysis. The purpose of the cluster analysis is to determine if the data contain naturally occurring homogeneous subsets of observations (Lattin et al. 2003). Each subset, or cluster, is internally homogenous and externally heterogeneous. Thus, each cluster depicts classes to which its members belong based on the data collected, and these depictions can be abstracted to create taxonomy (Benbunan-Fich & Altschuller, 2005).

A hierarchical clustering method with standardized variables produced a two-cluster solution. Based on the groupings provided by the cluster analysis it appears that, as predicted in H4 and H5, high-cost and easy-to-verify signals form one cluster (coefficient 37.6), and low-cost and difficult-to-verify signals form a second cluster (coefficient 42.1). The dendrogram depicted in Figure 3.3 illustrates the solution in graphical form. The dendrogram is a tree-like representation of the cluster arrangement, where the number of clusters and its characteristics are visible.

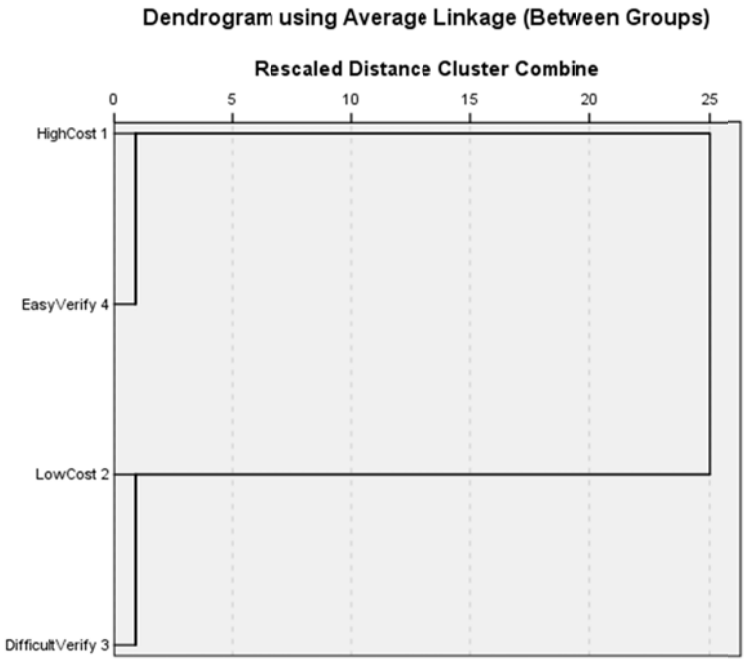

Figure 3.3 Dendrogram of two cluster solution

Stage	Cluster Combined			Stage Cluster First Appears		
	Cluster 1	Cluster 2	Coefficients	Cluster 1	Cluster 2	Next Stage
1	1	4	37.610	0	0	3
2	2	3	42.145	0	0	3

To count the number of cases in each cluster we ran a k-means analysis. The results show that cluster 1 consists of 61 cases, and cluster 2 consists of 59 cases (see Table 3.5). We also computed F-ratios to describe the difference between clusters. The significance levels reported in Table 3.6 demonstrate that selected variables contribute to the separation of clusters. Thus, the results of cluster analysis support hypotheses 4 and 5.

Table 3.5. Number of Cases in Each Cluster

Cluster	**Number of Cases**
1	61
2	59
Total	120

Table 3.6. ANOVA Results for Clusters						
	Cluster		Error			
	Mean Square	df	Mean Square	df	F	Sig.
Low Cost	102.303	1	1.028	118	99.529	.000
Difficult to Verify	214.907	1	1.080	118	198.957	.000
Easy to Verify	10.733	1	1.465	118	7.327	.008
High Cost	45.811	1	1.709	118	26.806	.000

3.7 Discussion

In this study, we developed a framework and a classification scheme for signaling in situations of information asymmetry in online commerce. To demonstrate the applicability of our framework and classification scheme for theory testing, we conducted an empirical study to compare signals provided by high- and low-quality online pharmacies. By validating the proposed framework in a specific context, we were able to shed light on the actual usage of signals in an online environment. The results of this study suggest that there is a difference in choice of signals between low-and high-quality sellers.

The framework that we created consists of three dimensions. The first dimension describes the purchasing time continuum in an online shopping environment. According to this dimension, buyers are exposed to different signals depending on the shopping phase they are in. Pre-purchase signals convey information about seller and product quality and facilitate the buyer transition from the pre-purchase phase to the purchasing (electronic checkout) phase. Purchasing signals are observable after product selection has been done and before the purchase is completed. These signals provide information about payment mechanisms, product delivery methods, and assumptions about the quality and

quantity of products being delivered. Post-purchase signals are observable after the purchase has been completed and include final information about the order and details on tracking the product before delivery.

The second dimension refers to the ease of verification of signals provided by sellers. Due to the virtual representation of online stores and products, sellers may use the opportunity to misrepresent the actual quality of their offerings. Signal verification serves as a mechanism for the prevention of such practices. However, signals do not share the same qualities when it comes to their verification: some signals are difficult to verify if false, and some are easier to verify. Based on these assumptions, sellers who plan to use fraudulent signals may use more difficult-to-verify signals as opposed to easy-to-verify signals.

The third dimension refers to the actual expenditure that sellers incur while displaying signals on their websites. Some signals cost very little and do not require sophisticated technology to be produced. Other signals may be costly or hard to obtain. The cost of a signal may affect a seller's decision to display or omit it. High-quality sellers may invest in costly signals to separate themselves from low-quality sellers. In contrast, low-quality sellers may refrain from using costly signals as future profits may not justify the cost in case the actual quality of their offerings is discovered.

Based on the framework, we produced a classification of actual website signals based on its three dimensions: purchase time, ease of verification and signaling cost. We demonstrated that website signals can be successfully classified in accordance with the proposed dimensions. In addition, we investigated how the proposed framework and signal classification can be used as a theory-testing tool. The relevance of each dimension

was explored and the practical application of the framework was analyzed in the context of online pharmacies.

We found that the proposed signaling dimensions influence the choice of signals for sellers. According to our first hypothesis (H1), low-quality pharmacies are likely to use fewer signals in the pre-contractual phase because they have fewer choices of signals to display. While high-quality pharmacies may display all signals, including costly signals and easy-to-verify signals, such choices are not attractive to low-quality pharmacies as buyers may refrain from purchasing if a false signal is displayed or if a true signal conveying unfavorable information is shown. In addition, the investment into costly signals may not be justified by future profits and is therefore undesirable. As a result, low-quality pharmacies display fewer signals pre-contractually.

In accordance with our second hypothesis (H2), low-quality pharmacies try to avoid signals that are easily verifiable. Although low-quality pharmacies may try to misinform buyers in order to promote sales, displaying signals that clearly indicate deception is not a wise choice as buyers can easily recognize dishonesty and will refrain from purchasing. On the other hand, high-quality pharmacies are not afraid of displaying signals that are easily verifiable as such signals are likely to be true. By displaying easy-to-verify signals, high-quality sellers promote trust and credibility and alleviate uncertainty in situations of adverse selection.

Consistent with the predictions of our third hypothesis (H3), we also found that low-quality pharmacies avoid high-cost signals. High-cost signals are not always profitable for low-quality pharmacies as they are aware that an initial expenditure on such signals may not be justified by future profits if the true quality of their offerings is

detected by buyers. In addition, while coding and analyzing low-quality pharmacies we noticed that the longevity of these pharmacies is short. Low-quality pharmacies enter and exit the market rapidly, and later reappear under new domain names. Under such circumstances investing in costly signals is highly unprofitable. In contrast, high-quality pharmacies stay on the market longer and thus may benefit from displaying high-cost signals as by doing so they differentiate themselves from low-quality pharmacies and help buyers make the right choice of a seller pre-contractually.

In line with hypotheses 4 and 5, sellers that invest in high-cost signals are likely to display easy-to-verify signals to correctly inform buyers about their quality, while sellers who do not wish to reveal their true identities and therefore avoid easy-to-verify signals also do not invest in high-cost signals. These findings are important as they inform us that signals are not used in isolation but clustered into groups with high-cost and easy-to-verify signals forming one group, and low-cost and difficult-to-verify signals forming a second group of signals.

In addition, as a post-hoc test, we found that there is no difference between high- and low quality sellers in terms of low cost signals usage. Sellers in both groups prefer using these signals as they are informative and not costly to display ($Z=-.866$, $p> 0.05$). However, low quality sellers show significant preference for difficult-to-verify signals ($Z=-2.223$, $p<0.05$).

These findings serve as a cautionary note for buyers to pay particular attention to the nature of the signals. While sellers of varying quality may display multiple signals, high quality sellers are characterized by displaying high cost signals as well as signals

that are easy to verify, and low quality sellers favor low cost signals and signals that are difficult to verify.

These findings are consistent with signaling theory as: 1) sellers display signals to alleviate problems of adverse selection; 2) high-quality sellers invest in costly signals more than low-quality sellers do; and 3) although signals are subject to manipulation, low-quality sellers prefer signals that are not easy to verify, to avoid the cost of punishment in case the false signal is discovered.

3.8 Contributions

Drawing upon signaling theory, this study extends the understanding of signal usage in online environments by proposing and validating a three-dimensional framework consisting of the purchase time continuum, ease of verification and signaling cost. This research is different from other studies on signaling because we focus on the role of an IT artifact (website and its characteristics), its usage, and its impact on a seller's decision to display a signal in situations of information asymmetry. This approach is consistent with the call for incorporating conceptualizations and theories of IT artifacts into IS studies (Orlikowski & Iacono, 2001, Al-Natour & Benbasat, 2009). To our knowledge, this is the first study that combines three distinct signaling dimensions into a framework to examine the actual usage of signals by online sellers of varying quality.

We extended our framework by introducing a classification of actual website signals, and we demonstrated how they correspond to the three dimensions. In addition, we tested the framework and validated it as a mechanism for explaining the online sellers' signaling behavior. By using the framework, we were able to explain signal usage

of low- and high-quality sellers in a sample of actual online pharmacies. We found that the extent to which sellers use signals in pre-purchase and purchasing phases depends significantly on signaling cost and ease of verification of a signal. We also found that certain groups of signals are likely to be used together, with high-cost and easy-to-verify signals forming one cluster, and low-cost and difficult-to-verify signals forming a second cluster of signals.

In addition, this study provides a new theoretical lens to clarify the role and nature of certain signaling mechanisms in online marketplaces. Our findings suggest that signaling theory and our three-dimensional framework based on actual website signals can be valuable in explaining the behavior of online merchants. Although signaling has been used in studies of online commerce, extensive frameworks offering explanations of online seller behavior have not been yet created. This study thus offers an important contribution in this regard.

Our results are noteworthy for e-commerce research in general, as the proposed framework can be equally useful in studies of various contexts in situations of online information asymmetry. The framework can help address existing challenges for the continued development of online marketplaces.

From a practical point of view, the study is informative for buyers, sellers and regulating bodies. As more people purchase products online, it is important to identify signals that low-quality and high-quality merchants are likely to use to induce shopping behavior. To promote seller quality and product quality, high-quality online sellers should invest in high-cost signals to differentiate themselves from low-quality sellers. In addition, high-quality sellers should provide easy-to-verify signals as proof that they are

transparent and honest businesses. Buyers will benefit from the inspection of signals offered by sellers. A greater number of costly and easy-to-verify signals may suggest that a seller is trustworthy and is able to provide a higher quality. The results might also be useful for regulatory institutions in their quest to educate online consumers and evaluate online pharmacies.

3.9 Limitations

This study provides initial indicative evidence that the proposed framework is beneficial in the evaluation of signal usage. In addition, this study lays down a path for future investigation of website signals. However, there are certain limitations to this study.

First, only pre-contractual signals alleviating adverse selection problems were analyzed. As problems of moral hazard are equally important in situations of information asymmetry, we suggest that future research focus on incentives that motivate sellers not to behave opportunistically.

Second, the focus of the empirical study was on signals that are directly observable and cannot be subjectively interpreted. Future research may investigate a wider selection of signals by focusing on buyer perceptions of subjective signals such as website appeal, website design, ease of use, the attractiveness of images and so on.

Third, this study examines only the presence of actual signals on websites and omits user perceptions of these signals. Thus, future research could attempt to collect behavioral data to evaluate buyer perceptions of the signals.

In addition, we demonstrated the usage of the framework in only one context, namely from the perspective of online pharmacies in heavily regulated North American

markets. Future research can apply this framework to a wider range of contexts – different countries, different industries, different markets, and different products – and possibly extend its dimensions to incorporate other categories or support other levels of analyses.

3.10 Conclusion

In this research, we examine the role of website signals as a means for signaling quality by online retailers. Drawing upon and extending signaling theory, this study sheds light on the actual usage of signals in an online environment by proposing and validating a three-dimensional framework for website signals. The results of this study confirm that there is a difference in signal usage between low-and high-quality online sellers. The results show that low-quality sellers are likely to avoid expensive, easy-to-verify signals and tend to use fewer signals than high-quality sellers do.

This study demonstrates that signaling theory can be successfully used in e-commerce research. In addition, by examining actual website signals, this study contributes to e-commerce literature where studies of actual IT artifacts are few. Furthermore, an awareness of signal usage enhances the buyers' ability to differentiate between online sellers and advances further development of e-commerce.

CHAPTER 4. COUNTERFEIT PRODUCTS ON THE INTERNET: THE ROLE OF SELLER LEVEL AND PRODUCT LEVEL INFORMATION (STUDY TWO)[7]

Study One revealed that there is a difference in signal usage between low-and high-quality online sellers. We assume that high-quality sellers are characterized by the high quality of products and service, while low-quality sellers lack both. Thus, it is possible that low-quality sellers may use numerous manipulative techniques to influence the buyers' purchase behavior. Given the concern about online deception and the scarcity of empirical research in this area, Study Two aims to explore deception techniques that sellers may use whereby they manipulate signals on their websites. The key question that we investigate is the effect of website signals and product presentation on perceived deception, trust and the willingness to buy.

Study Two extends Study One in three aspects:

1. It explores the effect of manipulating product presentation and website trust signals in a simulated online shopping context.
2. It investigates the influence of trust signals and product presentation on the buyers' perceptions of trust, perceived deception and willingness to buy.
3. It compares signaling theory and the theory of deception and suggests that signaling theory can be effectively combined with deception theory to shed light on signal usage in situations of online deception.

More specifically, Study Two explores information asymmetry and opportunistic behavior in the context of counterfeit sales on the internet. The study focuses on deceptive markets and considers the effect of counterfeiting that happens as a result of the

[7] This study is published in the International Journal of Electronic Commerce (15:2), 2011, pp. 79-104.

misrepresentation of product and seller characteristics. In addition, similar to Study One, this study is centered on pre-contractual issues and examines the effect of deception tactics on purchase intentions before the actual transaction takes place.

4.1 Introduction

As one of the effects of information asymmetry on the internet is the lack of physical contact with the sellers and products, sellers may claim that their offerings are authentic and provide images of authentic products as a signal of authenticity while delivering imitation goods that only resemble those displayed on the website. Leveraging this opportunity, counterfeiters may use product presentation and website signals to represent counterfeit goods as genuine. Based on deception and signaling theories, Study Two proposes that counterfeiters manipulate signals that identify a product as a fake using product presentation, and present themselves as legitimate business entities with website trust signals.

Deception occurs in commercial transactions due to information asymmetry and opportunistic behavior. Electronic markets face significant deception issues because sellers and buyers usually have low levels of familiarity with each other, reside in different locations, and typically interact in a single commercial transaction (Utz et al. 2009). In particular, when consumers purchase tangible goods with specific characteristics such as designer goods, electronics or pharmaceutical products, they may unknowingly become victims of counterfeit deception schemes.

Product counterfeiting is the unauthorized manufacturing or commercialization of goods whose characteristics are protected by trademarks, patents and copyrights (Cordell et al. 1996). Although a wide range of goods can be manufactured illegally, the favored

objects of counterfeiters are products that convey status brand image and require somewhat uncomplicated production technology (Penz et al. 2005). According to the U.S. Customs Office (2007), the top commodities preferred by counterfeiters include footwear, apparel, watches, pharmaceuticals and electronics.

Counterfeiting is estimated to bring in about $600 billion annually in worldwide sales (IACC 2008). According to the online brand protection company MarkMonitor (2010), $137 billion in counterfeit goods is sold online in 2010. Since the Internet does not provide an opportunity for users to examine the product before making a purchase, they must rely on the signals provided by sellers through text-based descriptions, pictures and more recently, videos. It is therefore very easy for merchants to manipulate website design and product characteristics to make unsupportable claims about the quality or origin of their offerings.

Counterfeit product trade is conducted in two types of markets (Grossman et al. 1988b). The first type is a *non-deceptive market* where consumers can easily differentiate knockoffs from genuine items, the second type of markets is a *deceptive counterfeit market* (Grossman et al. 1988a) that refers to an environment where consumers cannot differentiate fake from authentic due to a lack of provided information or a lack of familiarity with a product.

We propose that in order to influence purchase intentions of potential buyers, sellers of fake goods must engage in two types of activities: concealing the signals that identify the product as a fake by manipulating product presentation, and presenting

themselves as legitimate business entities by manipulating website trust signals. Drawing on deception and signaling theories, we address the following research question[8]:

"Do product presentation and website trust signals affect perceived deception, trust, and eventually willingness to buy counterfeit goods?"

The hypotheses derived from the theoretical framework are tested experimentally. Study Two seeks to make theoretical and practical contributions to the literature on deception, and to shed light on website trust signals that lead users to trust low-quality sellers online. At the pragmatic level, we strive to inform IS researchers, regulatory bodies and online consumers about counterfeit deception tactics in e-commerce.

The rest of Study Two is structured as follows. First, we review the literature on counterfeiting. After that, we describe the theory of deception and use it to develop a hypothesis regarding product level information. Then, drawing from signaling theory, we formulate a hypothesis regarding seller level information. Next, we discuss the carry over effects from product level perceptions to seller level perceptions and the influence of these perceptions on the users' purchase intentions. Then, we describe the research methodology, data analysis and the discussion of results, and conclude with the potential areas for future research.

4.2 The Counterfeit Goods Market

Since selling counterfeit goods online is a relatively new phenomenon, the vast majority of published papers to date describe counterfeit sales from the offline standpoint. Relevant works with offline focus address the problem from a consumer

[8] We are grateful to an anonymous reviewer for the suggestion to present our research question in this form.

behavior perspective (Penz et al. 2005; Tom et al. 1998), study perceived risks and attitudes (Chakraborty et al. 1997; DeMatos et al. 2007), investigate legal ramifications (Field 2004), and discuss ethical implications (Ha et al. 2006; Hilton et al. 2004).

In consumer behavior studies, the issue of counterfeit goods has been analyzed from the standpoint of the consumer either as a victim or as a willing collaborator. As victims, consumers believe that they bought an authentic item, while as willing collaborators they know that an item is a counterfeit and purchase it anyway (Cordell et al. 1996). While some consumers are misled, others participate in the counterfeit goods scheme willingly, aware that they will not receive imitations of the best quality. Some consumers are motivated by physical and symbolic product attributes and have a favorable attitude towards counterfeit goods because of their lower prices (Grossman et al. 1988b; Nia et al. 2000). Non-price determinants include favorable attitude towards counterfeiting, brand status, novelty seeking, materialism, risk taking, product attributes, perceived fashion content and demographic characteristics (Wee et al. 1995).

Various ways are suggested in this body of literature to combat counterfeiting. Olsen and Granzen (Olsen et al. 1992) proposed a close cooperation between a manufacturer and retailers. Technological implications have also been discussed including holograms and chemical fingerprints to mark the products (Colvin 1999), DNA for textile identifications (Chaudhry et al. 1996), digital watermark method for commercial bills (Ward 2006), and radio frequency identification (RFID) authentication for pharmaceutical industry (King et al. 2007).

While there is some similarity between counterfeit issues in both online and offline worlds, the problem of counterfeiting on the Internet is more complicated because

of the virtual representation environment. Identifying deception when imitation goods are presented as authentic requires online consumers to recognize fraudulent sellers and counterfeit merchandise when direct physical inspection prior to purchase is not possible.

Whether at the level of the purveyor or the product itself, counterfeit detection is challenged by the very nature of online transactions. This study examines online product characteristics and seller characteristics in the context of counterfeit deception and online trust with the purpose of identifying counterfeit deception mechanisms specific to the online environment.

4.3 Theory and Hypotheses Development

4.3.1 Deception and Deception Tactics

Deception and fraud have received extensive attention in academic literature (Buller et al. 1996; DePaulo et al. 1989b; Ekman 1992; Hyman 1989; Johnson et al. 2001). Deception is the form of information manipulation which occurs when a deceiver induces a misrepresentation to influence the behavior of a victim (Johnson et al. 2001). Turner et al. (1975) were among the first to document that deceptiveness occurs due to the manipulation of information. They propose that information can be manipulated through concealment and distortion. This finding is consistent with Ekman (1992) who proposed that there are two major deception strategies – concealment and falsifying. In concealment, the deceiver hides some information without saying anything untrue. In falsifying, the deceiver adds false information as if it were true. In both cases deception is intentional.

The theory of deception by Johnson et al. (2001) describes the occurrence of intentional deception. The theory explains deception from both deceiver and victim sides.

A deceiver tries to change the environment in such a way that a victim mistakenly accepts misrepresented facts as true and behaves in accordance with the deceiver's manipulation. The victims, on the other hand, may be able to detect deception by telling the difference between their expectations and the information given by the deceiver. However, if the potential victim does not possess enough knowledge or experience in the domain in which the deception is likely to occur, the deceiver may have a chance to succeed Grazioli (2004) suggests that Johnson's theory of deception is consistent with other deception theories; however it is more suitable in situations of low interactivity and inter-personality, such as deception that occurs in the business world and on the Internet.

According to Johnson's theory of deception, the deceiver is aware of three processes that the potential victim uses to interpret information: 1) the victim looks for information in the environment; 2) the victim evaluates the information; 3) the victim makes a decision. Johnson et al. (2001) identified two types of failure in the victim's cognitive process that are specifically caused by the actions of the deceiver. These actions are called deception tactics and they are described by referring to the "deception core", which is the item or product whose attributes the deceiver intends to hide or simulate. The selection of deception tactics depends on the characteristics of the transaction, product characteristics and users' characteristics (Grazioli et al. 2003). In selling counterfeit goods over the Internet, the deceiver will use deception tactics that work best for the given combination of circumstances.

The first type of deception tactics is based on hiding or *masking* the correct representation of the core. In this case, the deceiver blocks, removes or confuses the attributes of the core with the intention to disrupt the victim's process of seeking

information. Masking is an instance of concealment because the deceiver hides information without adding anything untrue. Without being exposed to important content such as information about the real quality or origin of the product, potential buyers do not receive enough evidence to detect deception.

The second type of deception tactics is based on providing incorrect representation of the core or *mimicking* features of a legitimate product. These tactics consist of modifying or misclassifying the labels of the core in order to disrupt the victim's process of information assessment. Mimicking corresponds to falsifying, as the deceiver presents false information as if it were true. Mimicking tactics simulate the features of legitimate products and are used in sales of counterfeit goods presented as authentic (Grazioli et al. 2003).

These deception tactics, summarized in Table 4.1, have been used in the detection of financial statement fraud (Johnson et al. 2001), in the fields of criminology and information systems security (Grazioli et al. 2003) and in Internet deception (Grazioli 2004). The tactics are centered on the content and information rather than physical cues, which makes them appropriate for deceptive situations set in virtual environments such as the Internet.

Table 4.1. Deception Tactics

Deception Tactics		Characteristics
Tactics that block the formation of correct representation of the core	Masking	Deceiver skips or removes important parts of the core.
Tactics that promote incorrect representation of the core	Mimicking	Deceiver modifies the core by copying the features of a legitimate item.

Adapted from [Grazioli and Jarvenpaa, 2000]

While deception issues are not new, Internet technology has changed the economics of deception strategies by making deceptive practices less costly, increasing information asymmetry between parties and making prosecution of online deceivers more difficult (Grazioli 2004). Counterfeit deception on the Internet is similar to other forms of online deception such as delivery of a wrong product or inducing buyers to buy products that could not be otherwise sold without deception. At the same time, counterfeit deception is different from other forms of online deception because it involves an attempt to deceive consumers through the misrepresentation of product and brand attributes (Grossman et al. 1988a). Buyers are attracted by branded products because of the brand image associated with a product (Penz et al. 2005). Counterfeiters use this attraction to falsify brand characteristics. There is little value for counterfeiters to forge products with no brand name (Cordell et al. 1996; Penz et al. 2005), thus, generic products and products that do not carry a brand name are less likely to be an object of counterfeit deception online. In addition, counterfeit sellers may employ a bait and switch strategy that is a form of false advertising when a seller advertises one good but delivers another one (Lazear 1995). Although this form of deception can be used with various products, in counterfeiting the deceiver is likely to use a brand product as a bait that later will be switched to a counterfeit product that shares the image dimension of the original branded product.

4.3.2 Product Level Information

According to a mimicking deception tactic, in order to mislead, the deceiver misrepresents attributes of a product, and by so doing, attempts to not only disrupt the victim's process of seeking information but also to disrupt the victim's process of

information assessment. Product misrepresentation is one of the most common forms of reported online deception (Pavlou et al. 2005). As the majority of retail websites currently utilize text and pictures to convey product information (Lightner et al. 2002), exaggerating or overstating product features becomes possible through product presentation manipulation.

Available product presentation formats that are widely used in e-commerce include pictures, videos, and virtual product experience formats (Jiang et al. 2007). A static single image is a basic way to present a product and it usually allows inspection of a product from only one angle (e.g. a front view of a product is depicted). Multiple pictures belong to a more advanced presentation method and allow inspection of a product from several angles. Video presentation enables the examination of the product from every perspective and virtual product experience formats encourage direct interaction with virtual products (Jiang et al. 2007).

As product presentation is intangible in nature, consumers are likely to question the believability and quality of the product represented. To influence the consumers' favorable perception of a product, the deceiver may engage in bait and switch tactics and mimic authentic products by using images of genuine products in which nothing seems to violate the expectations of the buyer. In addition, the deceiver may utilize various types of product presentation formats to induce favorable attitudes towards the products. Thus, to reduce product quality uncertainty and increase believability, the deceiver may use more sophisticated level of product presentation that allows the consumer virtually inspect the product from every angle. Prior research confirms that advanced presentation online affects buyers by reducing apparent risk, creating better mood, and providing an

entertaining shopping experience (Park et al. 2005). Furthermore, more advanced methods of online presentation influence positive perceptions and help buyers better understand products (Jiang et al. 2007). If the mimicking tactic is used in combination with advanced presentation, even sophisticated and technologically competent buyers may believe that the image corresponds to the product that will be sold and delivered because there is no discrepancy between their expectations and the product presentation. Therefore, we hypothesize:

Hypothesis 1: The mimicking deception tactic performed through advanced product presentation will reduce users' perception of counterfeit deception online.

4.3.3 Signaling Theory

Barnett (2005) suggests that the distribution channel of goods plays an important role in recognizing counterfeits. He argues that if the product is sold in a venue populated by unauthorized dealers such as Canal Street in New York City, even untrained consumers are able to clearly identify that products are not authentic and vendors sell fake copies. In contrast, the Internet creates a different shopping environment that is solely based on cognitive representations of products and venues (Grazioli et al. 2003). The abundance of commercial websites makes it difficult for consumers to differentiate between sellers offering original products and sellers offering replicas.

Unlike physical stores that require significant investments into property, personnel and inventory, online stores enjoy low entry cost that creates uncertainty whether the online retailer will stay in business for a long time. Signaling theory (Spence 1973) is used in situations of uncertainty and explains environments with incomplete information. When the costs of being deceived are high, consumers may demand more

reliable signals (Donath 2007a) to form expectations about the business' ability to deliver quality products.

Signals are created by sellers to indicate their identity; buyers, at the same time, act as recipients of these signals and examine them to evaluate the credibility and validity of the sellers' true characteristics (Pavlou et al. 2007). Signaling theory (Spence 1973) analyzes the relationship between signals and qualities, showing why some signals are reliable and others are not (Donath 2007a). For a signal to be reliable, it should be perceived by buyers as a credible commitment of a high-quality seller that cannot be easily imitated by a low-quality seller (Pavlou et al. 2007), and the costs of deceptively fabricating the signal must surpass the benefits of falsifying it (Donath 2007a; Kirmani et al. 2000).

There are certain similarities between signaling and deception theories. Both signaling and deception, when applied to online seller-buyer relationships, involve two opposite parties with incongruent goals and an online store as a medium. Sellers attempt to sell their products at higher price; buyers attempt to purchase products of higher quality at the lowest price. In addition, different parties in such seller-buyer relationships have different amounts of information regarding the transaction (Akerlof 1970). As online shopping is characterized by a time lag between product selection, purchase and product delivery, the actual product quality is not observable until the product is delivered (Pavlou et al. 2007). This spatial and temporal separation enforces information asymmetry. Thus, both in signaling and deceptive situations the seller possesses more information about a product to be sold, and the buyer lacks complete information about the product.

Deception and signaling theories differ in terms of their core. The core of deception is the usage of deception tactics. The deceiver has two choices - either to falsify or to mask certain information (Ekman 1992; Johnson et al. 2001). In signaling, the core is a signal that can be either true or false (Donath 2007a). We may assume that in deceptive situations all sellers using deception tactics are deceivers. However, in signaling, sellers that use signals are differentiated by quality that they are able to produce (Pavlou et al. 2007). Some sellers have the ability to produce high quality and convey this information through quality inducing signals. Meanwhile other sellers lack the ability to produce high quality and may misrepresent their actual quality by falsifying or hiding signals. In the deception scenario, the buyer has to correctly interpret and evaluate information provided by the seller (Johnson et al. 2001) in order *to avoid* a low-quality seller. In signaling, the buyer has to examine signals to evaluate the credibility and validity of sellers' real characteristics (Pavlou et al. 2007) in order *to differentiate* between high- and low-quality sellers.

4.4.4 Seller Level Information

To demonstrate higher quality, sellers may invest into website signals that promote quality and trust. A study performed by Cheskin Research/Sapient (1999) identified six fundamental features that signal trust including brand, ease of navigation, fulfillment, presentation, the latest technology, and seals of approval. Kim and Benbasat, (2006) identified that trust in websites is communicated via seals of approval, brand and reputation, fulfillment (privacy and security policy and efficient communications with consumers), referrals, feedback, and links to other reputable websites. Some of these signals are costly to produce. For instance, the introduction of live chat software or real

time product comparison chart can be expensive and not sought after by low-quality sellers as the initial investment on such signals may not be justified by future profits. In addition, some signals are difficult to obtain. For example, displaying an authentic third-party seal such as TRUSTe (http://www.truste.com/) requires accreditation and compliance with the TRUSTe online privacy services.

High-quality sellers may invest in costly signals as such investment is justified by profits from future sales (Kirmani et al. 2000). To look legitimate, low-quality sellers may mimic signals that high-quality sellers use. However, if signals are too costly, mimicking high-quality signals is unattractive for low-quality sellers (Balachander et al. 1994). Furthermore, illegitimate mimicking of high quality signals imposes additional costs on low-quality sellers in case the false signal is discovered (Donath 2007a). In counterfeit online sales, if mimicking is not possible, low-quality sellers may use masking tactics to present themselves as legitimate entities. Grazioli et al. (2003) found that online businesses select masking tactics more frequently, in particular in situations when the interaction occurs between a business deceiver and an individual. Masking is often preferable to mimicking as nothing has to be made up, and concealing information is perceived as less blameworthy than falsifying as nothing false has been said or done (Ekman 1992).

Masking refers to insufficient information disclosure such as withholding, omitting or disguising relevant information (Ekman 1992). In a masking scenario, the seller misleads the buyer by removing crucial elements or key information from the website in the hopes that the users' lack of knowledge of website features will prevent them from noticing discrepancies (Grazioli et al. 2003). For example, to avoid

inconsistencies, low-quality sellers may mask private information about their true identity by not displaying website trust signals. They may hide their contact details to avoid prosecution, or omit privacy and security policies because they do not intend to follow these policies. Masking strategies may be successful in situations with unknowledgeable buyers who are not able to find deception clues and may incorrectly perceive counterfeit products as authentic, and a website as a legitimate entity (Grazioli et al. 2003).

However, imperfections on a website may provide strong cues to the buyers {Everard et al. 2005) omitting important website signals by hiding key attributes may increase buyer level of uncertainty and ambiguity towards the website. If buyers perceive existing information about the seller as incomplete, they may put into question the overall legitimacy of the website and the seller. Thus, we hypothesize:

Hypothesis 2: The masking deception tactic performed through omitting website trust signals will reduce trust in the online seller.

4.4.5 Carryover Effects

The hypotheses developed above articulate the effects of product characteristics on the perception of counterfeit deception (H1) and the effect of website signals on trust in online seller (H2). Consistent with the distinction between product and seller level information, we propose that counterfeit perceptions apply first and foremost to products, while trust in website signals is a seller-level construct. There are, however, carryover effects from seller-level perceptions to product-level perceptions and vice versa. For example, when potential buyers suspect counterfeit deception, they cannot trust the seller, regardless of whether the seller engages in specific website deception tactics. Likewise,

when the website is not deemed trustworthy, potential customers can not trust the authenticity of the products. Therefore, we propose

Hypothesis 3: Trust in the seller and perceived counterfeit deception are negatively correlated.

4.4.6 Willingness to Buy

Effective deception with counterfeit products occurs when buyers are imperfectly informed and cannot immediately observe all of the attributes of a product, otherwise, deceivers would not be able to sell inferior products under false labels (Grossman et al. 1988a). In online environments buyers experience difficulty to evaluate products that may or may not meet their quality expectations (Ba et al. 2002). The Internet intensifies the risk of counterfeiting as the virtual product presentation does not allow physical inspections of products. In addition, online stores are characterized by the spatial and temporal separation that enforces information asymmetry because the buyer lacks exact information about the product until the product is delivered (Pavlou et al. 2007). We expect that, unobservable product characteristics may increase consumers' perceptions of counterfeit deception, and the uncertainty associated with product quality and its actual appearance may decrease consumers' purchase intentions. The willingness to transact with the seller will be determined by the consumer's appraisal of the authenticity of the virtually represented product and/or the likelihood that an authentic product will be delivered upon purchase. In particular, when counterfeit deception is suspected, customers will refrain from making a purchase. Thus, the following hypothesis is formulated:

Hypothesis 4: Higher perception of counterfeit deception will negatively affect the willingness to buy.

In online markets, counterfeit deception may involve misrepresentation of product and seller information. When sellers use misrepresentation buyers experience difficulties to discern the actual quality of products (Gefen et al. 2008). According to Gefen et al. (2008) while the previous research has explained how trust is built in situations with little product uncertainty (i.e. when products can be easily described and the major concern is product non-delivery), there is a need to examine how trust is established when product misrepresentation is involved.

Based on prior research, trust in the seller is a central factor in online transactions and a positive predictor of purchase decisions (Lowry et al. 2008). Trust in the seller is found significant in affecting buyer attitudes towards purchasing online (Everard et al. 2005). In addition, trust in online sellers reduces the level of perceived risk linked to transaction processes (Pavlou 2003), and indicates buyers' belief that online merchants will not engage in opportunistic behavior (Gefen et al. 2003a). When trust is absent in a seller-buyer relationship, buyers do not engage in financial or emotional transactions with the seller (Jarvenpaa et al. 1999). On the contrary, when trust exists, buyers are more likely to engage in emotional or financial transactions, such as purchasing online (Everard et al. 2005). In addition, trust is defined as a 'qualifier' for purchase decisions - buyers must trust the merchant first, and then place an order (Doney et al. 1997). Thus, we expect that in situations of product misrepresentation, when buyers trust the seller, they are more willing to engage in online transactions with that seller. This leads to the following hypothesis:

Hypothesis 5: Trust in the seller will positively affect the willingness to buy in situations of possible online counterfeit deception.

4.4.7 Research Model

Figure 4.1 summarizes hypotheses and presents our research model. The basic premise of the model is twofold: (1) potential buyers form perceptions of the authenticity of products based on the product presentation, and these perceptions influence their trust in the seller and determine their willingness to buy; (2) potential buyers form perceptions of the trustworthiness of the seller based on the availability of website signals, and these perceptions influence their attitudes to product authenticity and determine their willingness to buy. Together, perceptions of counterfeit deception and trust in the seller affect the willingness to engage in online transactions associated with the purchase of products with questionable authenticity.

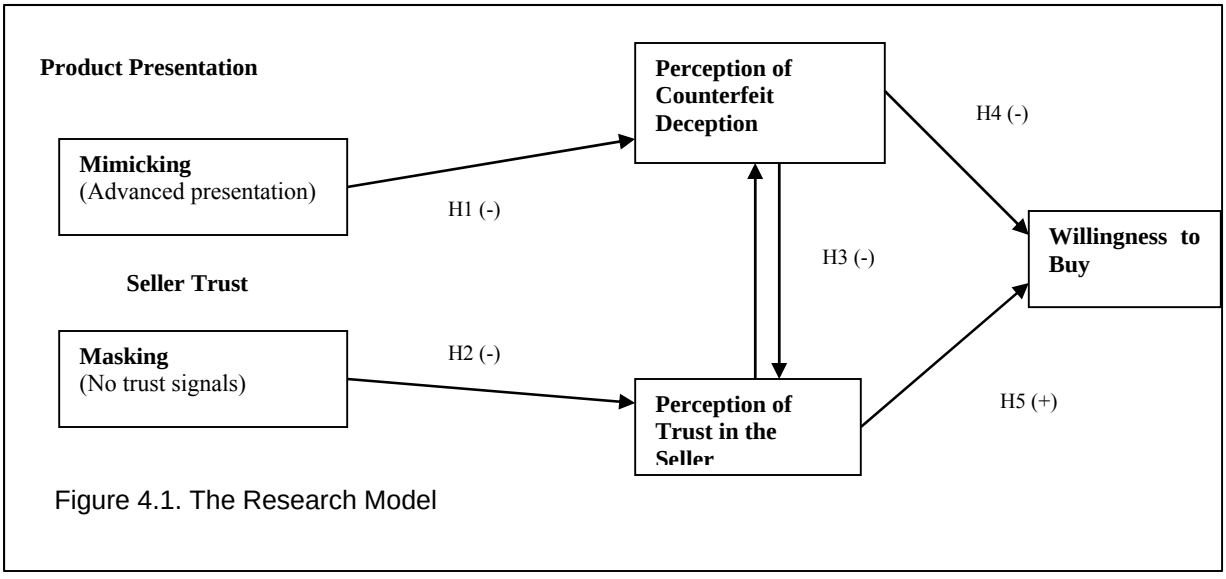

Figure 4.1. The Research Model

4.5 Research Methods

In order to test the research model (Figure 4.1) we conducted a 2x2 between subjects factorial experiment. Two identical websites were created for the purpose of the experiment. Trust in the seller was manipulated based on Kim and Benbasat's framework that identifies key trust related signals in commercial websites: 1) personal information security; 2) customer services; 3) store presence (Kim et al. 2003). Personal information security was operationalized through the Customer Privacy Notice page that contained information about security, information sharing, cookies, and third-party advertisers. Customer services were operationalized through the Customer Support page that contained contact information, "100% satisfaction guarantee" return policy, and customers' testimonials. Store presence was supported by the Third Party Certificate such as Verisign.

The website in a high-trust condition contained website signals such as a Customer Privacy Notice page, a Customer Support page, and a Verisign seal. The website in a low-trust condition did not have observable signals. The websites had identical neutral names - www.onlinewatches.com to avoid the influence of domain name recognition (Kamis et al. 2008) and override the interaction of a familiar brand name and deception (Grazioli 2004).

Product presentation was manipulated by introducing different levels of sophistication within a tactic (static and advanced) and was operationalized through product images. Each website had two different versions of images: 1) website with static low-quality images; 2) website with multiple high-quality images. Static images with low resolution (Park et al. 2002) were used in the static presentation condition. Multiple

images of the same product permitting exterior and interior examination by rotating and zooming were used in the advanced presentation condition.

In the first condition, participants were exposed to advanced presentation and high-trust website and were able to manipulate the image and see the product from different angles. The website contained trust related signals such as a privacy notice, customer support, and a Verisign seal that supported trust towards the website. In the second condition, participants were exposed to advanced presentation and low-trust website. They were able to manipulate the image and to see the product from different angles; however, the website lacked trust signals. In the third condition, participants observed static presentation and high-trust website. They were able to see a single static picture of the product and the website containing trust signals. In the fourth condition, users observed static presentation and low-trust website and were able to see a single static picture and the website without trust signals. (Figure 4.2)

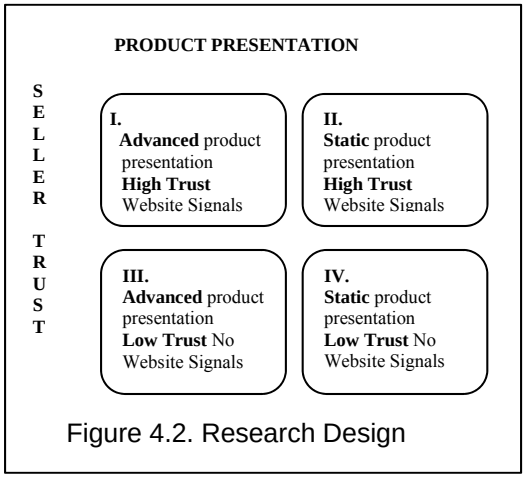

Figure 4.2. Research Design

All product images depicted authentic items to imitate possible behavior of counterfeiters. All images were identical but had a different level of representation. Textual description of the product was provided adjacent to the images. The product description included information about size, color, and other product attributes. The

descriptions were similar to standard product descriptions posted on online retail websites and were the same for all four conditions. The websites and instructions were pilot tested and refined prior to their administration for this study.

Participants were recruited from a large urban college in the Northeast of the U.S., and were randomly assigned to one of the four established conditions and corresponding experimental online stores. In order to establish a common task context, all participants were given a scenario where they had to evaluate a watch from the online store at the request of a friend, and make sure that the product was authentic. To accomplish the task, the participants were asked 1) to evaluate the online store by examining the store's images, policies, features and content; 2) to evaluate the product; 3) to make a purchase decision; 4) to complete the questionnaire.

The participants were instructed to search for a particular watch - Porsche Design P'6610 Chronograph PAT. This watch was chosen for several reasons: 1) Unisex item: watch is considered a product that appeals to both genders, and it has been successfully used in online store experiments (Jiang et al. 2007; Kamis et al. 2008; Kim et al. 2003); 2) Product familiarity: a pilot test demonstrated high familiarity with the brand and low familiarity with watch features; 3) Brand: designer brand products, accessories in particular, are known to be imitated by counterfeiters; 4) Price: the value of the purchase ($1100) justifies counterfeit concerns.

Measures used in the post-test questionnaire were adapted from existing scales (see Appendix A) for (a) willingness to buy (Doney et al. 1997; Grazioli et al. 2000); (b) perceived deception (Grazioli et al. 2000); (c) trust towards the website (Jarvenpaa et al. 1999). Control measures included buyer's trust propensity (Gefen et al. 2003a); attitude

to trusting web stores, attitude toward Internet safety, attitude toward the web (Grazioli et al. 2000); familiarity with the product and demographic information. Some items and scales were used for the purposes of manipulation checks. For example, the product presentation manipulation was checked with the website diagnosticity scale (Jiang et al. 2005; Kempf et al. 1998).

4.6 Results

The sample consisted of 174 subjects with 45, 42, 44 and 43 in conditions 1, 2, 3 and 4 respectively.

The data were analyzed with SmartPLS and SPSS software. SmartPLS was used to evaluate the validity of the constructs and test H1 and H2. SPSS was used to run manipulation checks and test H3-H5.

Partial Least Square (PLS) analysis is a second generation data analysis technique that allows simultaneous modeling of multiple dependent and independent variables in one model (Gefen et al. 2000). This technique has been applied to studies with between subjects factorial design in an online context (Streukens et al. 2010). PLS supports both exploratory and confirmatory research (Gefen et al. 2000).

The data were analyzed with SmartPLS software in two stages. During the first stage, the reliability and the validity of the constructs were established. During the second stage, the model was evaluated. Convergent validity was determined by confirming that all items loaded significantly on their respective constructs. The composite reliabilities of all loadings were above 0.70 for perceived deception. However, two loadings for Trust were marginal at 0.51 and 0.50 and therefore removed from the analysis. AVE values

were above 0.50 for all constructs (Sarker and Valacich, 2010), and Cronbach's Alpha values were above 0.8. The results are reported in Table 4.2.

Table 4.2. Item Loadings, AVE, Composite Reliability and Cronbach's Alpha values

Item	Construct	Item Loading	AVE	Composite Reliability	Cronbach's Alpha	R^2
Accurate (Reversed)	Perceived Deception	**0.8785**	0.7160	0.9378	0.9205	0.13
Misleading		**0.8409**				
Truthful (Reversed)		**0.8979**				
Deceptive		**0.8229**				
Factual (Reversed)		**0.8767**				
Distorted		**0.7519**				
This online store is trustworthy.	Trust towards the Website	**0.9242**	0.5836	0.8885	0.8419	0.21
This online store wants to be known as one that keeps promises and commitments.		**0.758**				
I trust this online store keeps my best interests in mind.		**0.9017**				
This retailer has more to lose than to gain by not delivering on their promises- Dropped		0.5108				
I find it necessary to be cautious with this online store (Reversed) - Dropped		0.5021				
This online store's behavior meets my expectations.		**0.8642**				

Discriminant validity was established by evaluating the correlation between the latent variable scores with the measurement items. All measurement items loaded higher in respect to their designated factor than any other factor (Sarker and Valacich 2010). In addition, discriminant validity was confirmed by calculating the square root of AVE and ensuring that for each construct the square root of its AVE was above other correlations between that factor and other constructs (Sarker and Valacich 2010). See Table 4.3.

Table 4.3. Correlations among Construct Scores and Square Roots of AVEs

	Perceived Deception	Trust towards the Website
Perceived Deception	0.846168	
Trust towards the Website	-0.7231	0.763937

4.6.7 Manipulation Checks

Before proceeding to testing the hypotheses, we checked for pre-existing differences across conditions and verified the integrity of our manipulations. ANOVA tests for potential differences among conditions in the control variables (gender, demographic variables, familiarity with the product, buyer's trust propensity, attitudes to trusting web stores, attitudes toward Internet safety, and attitudes toward the web) detected no significant differences.

The manipulation checks included the following tests: (1) Effect of experimental conditions on willingness to buy; (2) Manipulation check for the product presentation factor; (3) Manipulation check for the seller trust factor and (4) Manipulation check of entire experimental design using perception of product authenticity.

To test the effects of the experimental conditions on the willingness to buy, we computed a chi-square (χ^2 (3, N=174) = 26.57, p<.001) and found significant differences. The first condition, in which both presentation and trust signals mimic those of a reputable website, has about an equal split in the willingness to buy (48.89% negative responses and 51.11% positive responses). The second condition that offers advanced presentation and lacks trust signals has fewer instances of willingness to buy (61.90% negative responses and 38.10% positive responses). The third condition that offers static images and trust signals has fewer instances of willingness to buy (84.09% negative responses and 15.91% positive responses). The last condition that features static images and lacks trust signals has the fewest instances of willingness to buy (93.02% negative responses and 6.98% positive responses). These results, shown in Table 4.3A, indicate

that our experimental conditions produce different effects on the willingness to buy the product.

Willingness to Buy			
Condition	**No**	**Yes**	**Total N (%)**
I (High Trust, Adv. Pres.)	22 (49%)	23 (51%)	*45 (26%)*
II (Low Trust, Adv. Pres.)	26 (62%)	16 (38%)	*42 (24%)*
III (High Trust, Static Pres.)	37 (84%)	7 (16%)	*44 (25%)*
IV (Low Trust, Static Pres.)	40 (93%)	3 (7%)	*43 (25%)*
Total	*125 (72%)*	*49 (28%)*	*174 (100%)*
Chi-Square = 26.57***			
Table 4.4 A Analysis of Willingness to Buy			

*** Significant at p<.0001

To perform manipulation checks for each factor, we conducted two separate ANOVA tests. For product presentation, we used the Web Diagnosticity scale and found that static presentation leads to lower perceptions of diagnosticity than advanced presentation does (2.64 vs. 4.04 significant at p<.0001). For seller trust, we used the item "cautious with website" (which did not load in the "trust towards the website" scale) and found that low-trust manipulation leads to higher means in this item, than the high-trust manipulation (means 5.65 vs. 4.89, significant at p<.01). These results are presented in tables 4.3B and 4.3C respectively.

Web Diagnosticity			
Factor: Product Presentation	**Mean**	**Std.**	**N**
Static	2.64	1.43	*87*
Advanced	4.04	1.64	*87*
Model F = 36.08***			
Table 4.4B Manipulation Check of Product Presentation			

*** Significant at p<.0001

Cautious with Website			
Factor: SellerTrust	**Mean**	**Std.**	**N**
Low	5.65	1.65	*85*
High	4.89	1.86	*89*
Model F = 8.10**			

Table 4.4C Manipulation Check of Website Trust

** Significant at p<.01

When tested separately the experimental manipulations produce the intended effects in their respective perceptions (product presentation in diagnosticity and website trust in cautiousness with website). However, in order to check whether these conditions produce different perceptions of product authenticity, we conducted a two-way ANOVA test using the product authenticity item. According to the results, there are significantly different perceptions of authenticity in four conditions, (F=9.55, p< .0001), as shown in Table 4.3D. These findings lend support to the integrity of our experimental design.

Perceived Authenticity			
Condition	**Mean**	**Std.**	**N**
I (High Trust, Adv. Pres.)	4.29	1.85	*45*
II (Low Trust, Adv. Pres.)	3.79	2.07	*42*
III (High Trust, Static Pres.)	2.82	1.77	*44*
IV (Low Trust, Static Pres.)	2.51	1.33	*43*
Model F = 9.55***			

Table 4.4D Manipulation Check for Experimental Design

4.6.8 Hypotheses Testing

To test the hypotheses H1 and H2, we used the bootstrapping method in SmartPLS. The experimental manipulations were modeled as latent variables with dummy variables as formative indicators, while the dependent variables were modeled as latent variables with multiple items as reflective indicators (Streukens et al. 2010). Hypothesis 1 was supported (β= -0.352, p<0.001), and confirmed that participants in the

advanced presentation condition are less likely to perceive counterfeit deception online, and participants in the static condition are more likely to perceive counterfeit deception online. An additional analysis of variance test showed a mean 3.56 for the static condition and 4.58 for the advanced presentation condition ($F=23.16$, $p<0.0001$).

Hypothesis 2 was not supported ($\beta= 0.113$, $p> 0.05$), thus we could not provide evidence that the lack of trust signals decreases trust in the seller. An additional analysis of variance test showed a mean 3.07 for the low trust condition and 3.61 for the high trust condition ($F=4.9$, $p>0.01$).

A correlation analysis was performed in SPSS to test Hypothesis 3 stating that perceptions of trust in the seller and perceived counterfeit deception are negatively correlated. A significant negative relationship was found between two variables of interest ($r = -0.70$, $p < 0.01$), therefore H3 is supported.

Latent variables analyzed using structural equation modeling techniques are usually assumed to be continuous (Kline, 2005). Thus, a logistic regression performed in SPSS was used to predict the effects of the perception of counterfeit deception and perceptions of trust in the seller on the willingness to buy. All the control variables were included into the model. Logistic regression is used when the response variable of interest has two possible outcomes and is represented by a binary indicator with values 0 and 1 (Kutner et al. 2005). In this study, we chose a binary indicator to measure willingness to buy to allow participants to make a definitive decision regarding the purchase of the product. In the logistic regression model, both effects of the perception of counterfeit deception ($\chi^2 = 9.3$, $p < 0.01$) and trust in the seller ($\chi^2=14.95$, $p < 0.001$) are found to be

significant predictors of the willingness to buy (see Table 4.5). Thus, H4 and H5 are supported.

	b	S.E.	Wald	Sig.	Exp(B)
Perceived Deception	-1.74	0.57	9.3	.002	0.175
Trust in the Seller	2.54	0.66	14.95	.000	12.673
Familiarity	0.19	0.27	0.50	.480	1.208
Gender	0.22	0.94	0.06	.814	1.248
Trust Propensity	-0.37	0.42	0.76	.383	0.693
Trust Web Store	0.33	0.44	0.58	.447	1.394
Internet Safety	0.31	0.56	0.31	.576	1.370
Attitude Web	-0.72	0.44	2.66	.103	0.486
Constant	-3.71	3.70	1.005	.316	

TABLE 4.5. Logistic regression. Likelihood ratio tests

4.7 Discussion

At the product level, our results indicate that the mimicking tactic performed through advanced product presentation plays an important role in increasing the perception of authenticity among online buyers. As product presentation in online stores is a virtual representation, it may (or may not) correspond to the actual product. In particular, sellers who engage in bait and switch tactics may prefer using authentic images that do not correspond to the actual product they have. Advanced presentation of the authentic product that provides the ability to inspect exterior and interior characteristics decreases the perception of counterfeit deception as it makes the look and feel of online products more complete. Therefore, advanced presentation is a powerful retailing strategy in an online counterfeit context as it reduces the level of perceived deception. As the creation of advanced product presentation is becoming more affordable, it generates advantages for counterfeiters when they mimic authentic products to deceive buyers. In this case, it is very important that online users inspect not only the

images of a product but also the overall website design and content as they may provide additional clues for deception detection.

At the seller level, the results of this study do not support the premise that a lack of trust features on a website reduces trust in the seller. Although there are differences in perception of websites among participants in a low trust vs. high trust conditions, these differences are not statistically significant.

As expected, the relationship between perceived deception and trust in the seller is negatively correlated. If users are not satisfied with product presentation and suspect counterfeit deception they will not trust the seller even if website trust signals are present. Likewise, if users perceive a website as not trustworthy, their perceptions will carry over to their judgment of the authenticity of a product. Since these carry over effect may suggest the presence of an interaction on the willingness to buy, we ran an additional logistic model with an interaction term and found that this term is not significant.

Both effects of the perception of counterfeit deception and trust in the seller are found to be significant predictors of willingness to buy. Given our measures, for every one unit increase in the perception of counterfeit deception, the willingness to buy decreases by a factor of 0.175 (82.5%), while for every unit increase in trust in the seller, such odds increase by a factor of 12.7. According to these findings, holding control variables constant, trust in the seller is a more important determinant of willingness to buy and once trust is acquired the willingness to purchase from the trusted seller increases dramatically.

The results of this study are informative for advancing our understanding of online user behavior. Accordingly, our findings indicate that while encountering an

unfamiliar website with unrecognizable brand name, users investigate the quality of products and the trustworthiness of a seller. Whereas product images and description can be mimicked and not correspond to the actual product that the seller plans to deliver, a careful examination of website signals may shed more light on the overall credibility of the seller. A careful analysis of information security and privacy policies, customer service policies, and store presence signals is helpful in discovering the real identity of fraudulent sellers, and may reduce the number of counterfeit sale victims in the long run.

4.8 Limitations and Future Research

One limitation of this study is that participants did not actually purchase the watch. Should that be the case, the participants may be more concerned and perhaps more suspicious about the authenticity of the product. Another limitation is that only one category of products was used. Although watches have been used successfully in the evaluation of online products (Jiang et al. 2005; Kamis et al. 2008; Kim et al. 2003), the findings may not be generalized easily to other types of products. Despite these caveats, the results are likely to be relevant for websites without recognizable brand names trying to sell products that are prone to imitations.

In addition, this study focuses only on pre-contractual issues and examines the effect of deception tactics on purchase intentions before the actual transaction. Thus, the actual delivery of fake goods while authentic goods are shown on the website is not addressed empirically. Future research may investigate these deception strategies. Another potential avenue for future research is to enhance the research model with additional constructs and multiple continuous dependent variables and test it with Structural Equation Modeling analysis.

This study also lays the groundwork for the equally interesting research of deception in Consumer-to-Consumer (C2C) dealings, when sellers conduct dishonest business transactions through online auction sites. Further examination of counterfeit deception mechanisms can improve the effectiveness of available institutional methods of controlling counterfeit goods, provide a better explanation of trust in online storefronts, and enable the progress of online transactions in Internet retail and e-commerce in general.

4.9 Implications and Conclusions

Drawing upon deception and signaling theories, this study extends the understanding of signaling and deception tactics in online environments characterized by product uncertainty. Theory of deception proposed by Johnson et al. (Johnson et al. 2001) focuses on deception tactics and compares situations in which a tactic is present or not present. By contrast, this study focuses on the levels of sophistication within a tactic, and proposes that more sophisticated levels within deception tactics are more successful in online environments.[9]

This research is different from other studies on signaling because we focus on the role of an IT artifact (website trust signal) and its usage in online counterfeit deception. This approach is consistent with the call for incorporating conceptualizations and theories of IT artifacts into IS studies (Orlikowski et al. 2001). In addition, this study suggest that signaling theory can be effectively combined with deception theory to shed light on signal usage in situations of online deception. To our knowledge, it is the first attempt to

[9] We thank an anonymous reviewer for pointing out this issue.

combine signals and deception tactics into a framework to examine counterfeit deception online.

This study attempts to fill the gap in research on trust. While the literature on online trust has focused on new, easily described products with little product uncertainty (Gefen et al. 2008), this research deals with products where buyers are concerned with inferring actual product quality. Gefen et al. (2008) emphasize the importance of examining online shopping situations in which sellers do not describe products faithfully and misrepresent products due to lack of integrity, as these situations are likely to be different from settings where product uncertainty is less pronounced.

From a practical point of view, this study is helpful for buyers, sellers and regulating bodies. As more people make purchases online, it is important to identify signals and deception tactics that merchants are likely to use to induce shopping intentions. The results might also be useful for regulatory institutions in their quest to educate online consumers and evaluate online stores.

This study conceptualizes the nature and role of product level information and seller level information as a means for understanding the mechanisms of online counterfeit deception. Furthermore, this study extends theory of deception and signaling theory by applying the concept of fact misrepresentation to situations of counterfeit fraud in an online setting. This study adds new knowledge to the research of online deception that has been clearly identified as a significant threat to Internet commerce (Grazioli et al. 2000). In addition, the study exposes website signals that can be used by deceitful merchants to make users unknowingly purchase counterfeit products from online stores.

The knowledge of these signals can be used for further development of e-commerce and for educating online customers.

CHAPTER 5. WEBSITE SIGNAL PERCEPTIONS AND EQUILIBRIA IN ONLINE MARKETS (STUDY THREE)

Study One has revealed that the number and nature of signals displayed by commercial websites vary depending on the seller quality. Study Two has shown that the lack of website trust signals decreases the buyers' willingness to transact with a seller, and the advanced product presentation serves as a signal of quality that increases the willingness to transact. Study Three focuses on how perceived website signals impact the buyers' perceptions of deception and trust as well as their purchase intentions. In addition, this study investigates the type of equilibria that exist in online markets.

Study Three evaluates signals in actual online pharmacies. Online pharmacies are associated with a certain element of risk as a purchase of low quality medicines can have serious health related consequences for a buyer. From a theoretical perspective, Study Three applies and expands signaling theory by using two levels of observation. First, the individual perceptions formed by website signals are tested. Second, the effect of equilibrium in online markets is discussed.

Study Three extends the previous studies in four directions:

1. It expands the results of Study One by evaluating signal perceptions from the buyer point of view.
2. It introduces a new context to evaluate the buyers' perceptions of signals (e.g. actual online pharmacies as opposed to experimental luxury goods websites covered in Study Two).
3. It evaluates the buyers' perceptions of actual website signals and their impact on the buyers' perceptions of deception and trust as well as their purchase

intentions (as opposed to the perceptions of manipulated signals discussed in Study Two).

4. It introduces a concept of separating and pooling equilibria based on signaling.

5.1 Introduction

Information asymmetry in online commerce can lead to opportunistic behavior that, in turn, can motivate deceptive strategies initiated by unscrupulous sellers. In online markets, deception opportunities arise because of the geographic distances between sellers and buyers, their low level of familiarity with each other, and the limited number of interactions (Utz et al., 2009).

The inability of buyers to inspect products before the purchase intensifies the uncertainty associated with online shopping. To alleviate this uncertainty, sellers indicate their quality by displaying certain signals on websites. These signals may include the availability of privacy, security and return policies, contact details, specific information about products, company facts and other information. However, the mere availability of signals does not necessarily lead to reducing the information asymmetry between a seller and buyer unless buyers notice and form opinions about the signals. Therefore, it is important to investigate if buyers take any cues from websites by observing signals, and if their perceptions of the signals influence their decisions to transact with sellers.

This research focuses on how perceived website signals impact the buyers' perceptions of deception and trust as well as their purchase intentions. In addition, this research investigates the type of equilibria that exist in online markets. The study is centered on the pre-purchase phase of shopping experience and on signals that appear

during this phase. Hypotheses about buyer perceptions and purchase intentions are empirically tested with actual websites in which the users' perceptions of signals are evaluated.

This paper seeks to make theoretical and practical contributions to the literature on website signaling, deception and trust, and to shed light on the buyers' perceptions of website signals. At the theoretical level, we apply and expand signaling theory by using two levels of observation. First, we empirically test individual perceptions formed by website signals. Second, we provide a wider view of the markets by observing the differences among websites of varying quality. At the pragmatic level, we seek to inform online sellers and buyers of the importance of certain groups of signals.

This study focuses on the following research questions:

1. How do the buyers' perceptions of signals affect perceived deception, trust and purchase intentions during the pre-purchase phase of online shopping?
2. Does a separating equilibrium exist in online marketplaces?

To answer these questions, a research model is developed and tested by an empirical survey based on the evaluation by 319 participants of three pharmaceutical websites of varying quality. The websites tested in the study include two high quality websites (one is online only and the other one has both online and physical presence), and the third one is a low quality/online only website.

The rest of the paper is structured as follows: First, we introduce signaling theory that is used to support hypotheses regarding the relationships between signal perceptions and perceptions of trust and deception, and eventually purchase intentions. The next

section introduces pooling and separating equilibria, followed by the research model, the description of research methods, analyses and the explanation of results.

5.2 Signaling Theory

Signaling theory (Spence, 1973) investigates types of signals and the circumstances in which these signals are used. This theory has been applied in information economics to describe market interactions in which different parties have asymmetric information (Boulding and Kirmani, 1993; Spence, 1973). Because some information is private, information asymmetries occur between those who own the information and those who could possibly make better decisions if they had access to this information (Connelly et al., 2011). In seller-buyer relationships, information asymmetry is characterized by the inability of the buyer to precisely evaluate the product or service quality prior to purchase (Mishra et al., 1998) and it is based on the principle that the buyer and seller have different amounts of information regarding the products and services and disincentives to share this information (Akerlof, 1970). The seller is motivated to sell a product as high-priced as possible, and the buyer is motivated to buy a high quality product at the lowest possible price.

Information asymmetry takes place in various markets such as job markets, financial markets and some retail markets (Spence, 2002). Online markets have been affected by information asymmetry issues as well, because web interactions are asymmetrical in nature (Reay et al., 2009). Online sellers have full knowledge of their products, delivery methods and attitude to consumer privacy, while buyers may only assume the actual quality of a seller and products prior to purchase (Pavlou et al., 2007).

Asymmetric information causes two major problems – adverse selection and moral hazard (Kirmani and Rao, 2000). Adverse selection is a failure to verify the actual quality of another party before the transaction. Failure to avoid a website that was created with a purpose of credit card fraud is an example of adverse selection. Moral hazard problems arise after the transaction when one of the parties does not fulfill obligations or cheats. Non-delivery of a product ordered online can be prompted by the opportunistic behavior of a seller and corresponds to moral hazard. While moral hazard problems are mitigated by incentives, adverse selection problems are alleviated by signals (Kirmani and Rao, 2000).

Signals are observable characteristics of an object that can be manipulated (Spence, 1973). When signals are truthful, both sellers and buyers benefit from it. When signals are deceptive, it hurts buyers who may believe that a signal is true and may become a victim of a dishonest seller, and it hurts other honest sellers, as surrounded by fake signals, buyers may come to ignore or misinterpret signals. The reliability of signals is achieved at a cost (Spence, 1973). Spence (1973) suggests that signals are more reliable when it is costly to produce a signal or if there is a high cost of punishment in case a false signal is discovered. Thus, high costs serve as a mechanism to prevent the usage of fake signals.

Signaling theory has been used in the fields of economics, marketing, and information systems. In economics, the implications of signals such as cost (Spence 1973), warranties (Spence, 1977), price (Milgrom et al., 1986), and advertising (Milgrom et al., 1986) have been discussed. Marketing researchers experimentally tested consumer side implications of signaling theory (Boulding and Kirmani, 1993), the effect of prior

knowledge in the consumers' use of warranties as a signal of quality (Srivastava et al., 1998), and created a typology of signals based on the monetary consequence of a signal inferred by the firm, sale contingency of a signal, and the risk of future consequences in case a signal is false (Kirmani and Rao, 2000). In addition the effects of brand (Erdem and Swait, 1998), retailer reputation (Chu and Chu, 1994) and store environment (Baker et al., 1994) were discussed. In Information Systems research, the issue of signaling has been discussed in the areas of strategic signaling (Zmud et al., 2010), offshore outsourcing (Gao et al., 2010), software service provider markets (Banker et al., 2010) and social networks (Donath, 2007a).

Signaling theory has been used in online commerce context to investigate how reputation, warranties and advertising expenditures influence trust and perceived risks with an online retailer (Biswas and Biswas, 2004; Wang et al., 2004; Yen, 2006), and to evaluate the role of website quality as a signal of product quality (Wells et al., 2011). Unlike previous studies, this research aims to assess the role of perceptions based on signals that sellers of varying quality provide on their websites as well as to determine the type of equilibrium that exists in online marketplaces.

Signals that have been studied in online commerce research include technological characteristics of websites, website design features, product presentation, website trust features and website content (Fogg et al.,, 2001; Gregg and Walczak, 2008; Kim and Benbasat, 2006, 2009; Mavlanova and Benbunan-Fich, 2011; Pavlou and Fygenson, 2006; Reay et al., 2009; Song and Zahedi, 2005). Although these signals are generally defined as 'website features' in e-commerce studies, the notion of website features

corresponds to our definition of signaling – providing an intentional means of communication of website and seller qualities.

For the purpose of this study, we consider signals as website features that are displayed by a seller with the purpose of conveying certain information to a buyer. We consider both positive and negative signals and evaluate the buyers' perceptions of signals that are most likely to influence perceptions of deception and trust as well as purchase intentions. These perceptions are based on website amateurism, content, physical and human presence and seller warranties. In this study we test only perceptions of internal signals that are provided directly by a seller, while external signals, such as third-party verification seals or the information about the website or seller displayed on external websites are omitted.

5.3 Theory and Hypotheses Development

5.3.1 Perceived Deception

Deception is an intentional attempt designed by a deceiver to influence the behavior of a target (Johnson et al., 2001) and is accomplished by manipulating the information (Xiao and Benbasat, 2011). Turner et al., (1975) propose that information can be manipulated through concealment and distortion. This proposition is consistent with Ekman (1992) who suggests that two major deception strategies include concealment and falsifying. In concealment, the deceiver withholds or omits some information without saying anything untrue. In falsifying, the deceiver presents false or exaggerated information as if it were true.

In online commerce, deception is mostly related to the conflicts of interest between a seller and a buyer especially in situations when financial transactions are

involved (Grazioli, 2004). Online deception can result in opportunistic behavior on the seller side such as fraud, unauthorized collecting and selling of buyer private information, failure to acknowledge a refund, the delivery of inferior products, delayed delivery, or no delivery at all (Gefen et al., 2008; Pavlou et al., 2007).

Perceived deceptiveness of the website is based on its look and content. Xiao and Benbasat (2011) identified types of deceptive techniques that are specific to online commerce - the manipulation of information presentation and generation, and the manipulation of information content. The information presentation and generation refer to the way information is displayed on the website both on static and dynamic webpages. Information can be presented via text, graphics, audio, video and animated content (Lim and Benbasat, 2000), and virtual experience (Jiang and Benbasat, 2005, 2007), and can be generated via search engines, product catalogs and recommendation agents (Xiao and Benbasat, 2011). The manipulation of information content can be achieved by manipulating the way the information is organized on the website as well as misrepresenting product attributes (Xiao and Benbasat, 2011).

Amateurism of a website is a signal that is inferred from the information presentation on the website and may be based on small errors, broken links and website glitches (Fogg et al., 2001). Although amateurism is not deliberately communicated by a seller, it can be interpreted by a buyer as a signal corresponding to certain quality. Signals that are not intentional are relatively ignored in signaling research (Connelly et al., 2011). In addition, signalers can provide signals without complete awareness that they are signaling (Spence, 2002), making the investigation of negative signals equally important. The low quality of information presentation raises concerns about the deceptiveness of a

website (Mavlanova and Benbunan-Fich, 2011). Although the quality of a website does not change the quality of products on the website, various levels of website quality influence purchase intentions (Everard and Galletta, 2005), thus amateurish-looking websites may negatively influence buyer perceptions. Buyers that encounter imperfections on the website may believe that the absence of professionalism on the part of the seller is an indication of the seller's incompetence. Thus, amateurism in websites may serve as a signal of deception.

H1: Perceived website amateurism positively affects perceived deception

Deceptive strategies are often accompanied by the manipulation of information content (Buller and Burgoon, 1996). In online stores the content can be concealed or falsified. For example, an online seller can withhold negative information about the product or exaggerate positive information appearing on the website (Xiao and Benbasat, 2011). Content signals may include product information, expert product reviews, press releases, FAQ sections, and news. Richer information content of a website is one of the most vital signals influencing perceptions of the overall quality of the website (Gregg and Walzcak, 2008). Huizingh (2000) defines the perception of content as highly valued by online users and states that a high-quality website should provide specific and extensive product and company information as well as other information on topics relevant to the company's mission. If website content is perceived as accurate and sufficiently detailed, buyers may be less likely to suspect that the seller is deceptive. Thus, we hypothesize a negative relationship between website content quality and perceived deception.

H2: Perceived website content quality negatively affects perceived deception

If buyers suspect that an online seller's actual quality is not consistent with the quality that the seller is trying to promote through the website, it may provide strong cues of deception to buyers (Everard and Galletta, 2005), and decrease perceived trust towards the seller. Thus we propose that perceived deceptiveness of the website will negatively influence the buyers' perception of trust towards the website and will reduce their purchase intentions.

H3: Perceived deception negatively affects perceived trust

H4: Perceived deception negatively affects purchase intentions

5.3.2 Perceived Trust

Trust is an important factor for online buyers and sellers to instigate and maintain online selling and buying activities (Sun, 2010). Trust in a business context is the disposition of a buyer to depend on a seller (McKnight and Chervany, 2001) and it is a fundamental factor that influences online purchasing intentions and behavior (Everard and Galletta, 2005). Trust in online sellers decreases the level of perceived risk associated with transaction processes (Pavlou, 2003) and shows the buyers' confidence that online sellers will not behave opportunistically (Gefen et al., 2003).

Human presence signals increase the presence of human touch in online environments. In virtual online marketplaces, it is important to provide human related signals such as pictures of people or live chat technology to increase the feel that real people work behind a virtual store representation. Fogg et al. (2001) found that displaying images of organization members on a website increases the website credibility. Social signals such as Facebook and Twitter icons connecting buyers with other customers may also add to the feeling that real people use the website. Trust can

only exist in a social context and the buyer belief that human presence exist on a website is critical in the creation of trust (Gefen and Straub, 2003). Therefore, we propose:

H5: Perceived human presence positively affects perceived trust

Physical store presence signals, such as a store locator, convey longevity and stability of a website as they show that a solid monetary investment has been made for the development of physical stores. Likewise, comparable signals such as listing the organization's physical address and other contact details have been found beneficial for the perception of website credibility (Fogg et al., 2001). Perceived physical presence may increase the perception of website longevity (i.e. the feel that the online store will stay in business longer), and reinforce the belief that the seller will not go out of business shortly. Physical store presence alleviates concerns about the store financial security and provides assurance that the store is a real establishment (Kim and Benbasat, 2003). Hence, we propose:

H6: Perceived physical presence positively affects perceived trust

Warranties are often used as signals for buyers under conditions of incomplete information (Boulding and Kirmani, 1993). The assumption of signaling theory is that a seller will keep promises stated in warranty commitments due to legal considerations. In addition, sellers that honor their warranties may enjoy repeat purchases and word of mouth advertising (Boulding and Kirmani, 1993).

In online commerce, seller warranties often include privacy, return and security policies. These policies include information regarding information sharing, product delivery and returns, and security of transactions (Kim and Benbasat, 2003). McKnight and Chervany (2001) report that companies that state their privacy policy can improve

the buyers' trusting beliefs while Fogg et al. (2001) state that company policies improve the trustworthiness and the credibility of websites. If buyers perceive the source of message content as credible, they are more likely to adopt this content (Zhang and Watts, 2008). As the policies reflect the actions of a seller to provide assurances that the seller will behave in a certain way (Kim and Benbasat, 2003), buyers who believe in these promises will display more trust towards the website if they perceive policies as credible.

H7: Perceived credibility of seller warranties positively affects perceived trust

Seller-buyer relationships that lack trust are characterized by the absence of buyer engagement in financial or emotional transactions with the seller (Jarvenpaa and Tractinsky, 1999). On the contrary, seller-buyer relationships that have trust are characterized by buyer engagement in transactions, such as purchasing online (Everard and Galletta, 2005). Doney and Cannon (1997) define trust as a 'qualifier' for purchase decisions - buyers must trust the seller first, and then place an order. Thus, when buyers trust the seller, they are more willing to engage in online transactions with that seller.

H8: *Perceived trust positively affects purchase intentions*

5.3.3 Separating and Pooling Equilibria

Signaling theory is helpful in creating models for asymmetrical transactions and introduces a form of Nash equilibrium in which 'pooling' or 'separating' equilibria may develop (Reay et al., 2009). In a separating equilibrium buyers do not experience difficulty in differentiating between high- and low-quality sellers, while markets in a pooling equilibrium are more complicated as all types of sellers may use the same strategy and are identical to each other (Boulding and Kirmani, 1993). While a separating equilibrium favors honest sellers and helps buyers to avoid problems of adverse selection,

a pooling equilibrium favors dishonest sellers and force honest sellers out of market (Reay et al., 2009).

Signaling theory presumes that product offerings are of varying quality (e.g. low quality sellers may offer low quality products), and that sellers on the market are either honest or dishonest (Reay et al., 2009). Eventually either separating or pooling equilbria develops within a marketplace.

In a separating equilibrium, high- and low-quality sellers choose separate strategies that are informed by market incentives (Boulding and Kirmani, 1993). For example, an online seller that plans to stay in business for a long time may invest into expensive website design hoping that in the long run there will be a return on their investment as sellers will be appropriately compensated due to the high quality of their offerings. On the other hand such investment will not be profitable for low-quality sellers because they lack the intention to stay in business for a long term, as the poor quality of their products and services may be soon discovered and thus such sellers will be out of market before they can recover the investment.

In a pooling equilibrium, online sellers of both high- and low-quality utilize the same strategies. It happens because no sellers offer a separating signal of quality, but instead all sellers offer the same signals or the signals offered by sellers are unreliable (Reay et al., 2009). For example, if all online sellers build an online storefront using the same open source software and provide similar means for electronic transactions, it is more difficult for buyers to correctly perceive signals sent by multiple sellers and discern online seller quality as nothing differentiates high and low quality sellers.

To alleviate the online product or service quality uncertainty, sellers may use signals that inform buyers about the actual qualities of the offerings. Signals are differentiated by their cost (Spence, 1973). Some signals require significant monetary investment such as the investment into state-of-the-art technology or the production of rich website content. Costly signals improve seller reputation and increase sales in the long term. At the same time, low-quality sellers may avoid signals that are time consuming or require high-priced technology as they do not plan to stay in business for a long time and are not determined to make significant investments. In addition, some signals are differentiated by the cost of punishment in case a false signal is discovered (Spence, 1973). If there is a high cost of punishment, sellers are less likely to fabricate signals to resemble high-quality sellers.

In a basic signaling model, there are two types of sellers: high quality and low quality (Kirmani and Rao, 2000). While each seller knows his/her true quality, buyers can only assume the actual quality of a seller, thus information asymmetry exists. If high quality sellers are motivated to signal and low quality sellers are not, a separating equilibrium emerges and buyers are able to correctly discern the actual quality of a seller (Kirmani and Rao, 2000). For a separating equilibrium to occur, online buyers should be able to understand the value of potential loss associated with signals and must believe that the investment on signals is at risk in case these signals are false (Wells et al., 2011). In addition, online sellers of varying quality should use different signals. Considering the Internet is to a certain degree a mature sales channel (over 875 million consumers worldwide shopped online including 94% of the U.S. internet users (Nielsen, 2008)), we believe that buyers will have sufficient competence to be able to judge websites based on

their design and appearance. Thus, we propose that separating equilibrium exists in online markets.

H9: Online markets will be characterized by a separating equilibrium in which buyers will be able to discern the quality of the sellers based on the signals displayed and this will affect their perceptions and purchase intentions.

5.4 Research Model

Figure 5.1 summarizes hypotheses 1-8 and presents our research model. The basic premise of the model is that perceived website amateurism and website content affect perceived deception (H1 and H2) as the manipulations of information presentation and information content contribute to perceived deceptiveness the most (Xiao and Benbasat, 2011). Perceived deception decreases perceived trust (H3) and decreases purchase intentions (H4). Perceived human presence, physical presence and seller warranties affect perceived trust (H5, H6, H7), as these perceptions are fundamental in establishing trust (Gefen and Straub, 2003; Kim and Benbasat, 2003; Fogg et al., 2001), and perceived trust increases purchase intentions (H8). A separating equilibrium (H9) will affect all perceptions in the model.

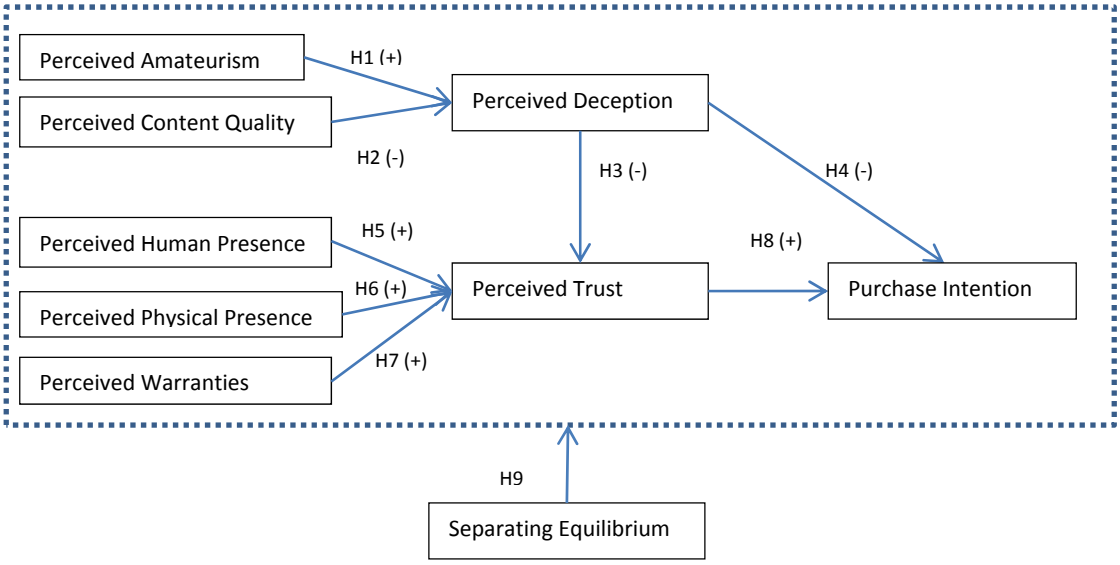

Figure 5.1. The Research Model

5.5 Methodology

To test our research model, a between subjects design was employed. Three different websites were selected for the study. All websites were actual online retail pharmaceutical websites representing three groups of online sellers: online only/high quality, click-and-mortar/high quality, and online only/low quality. Online pharmacies were used in this study as it was relatively easy to obtain the information about the quality of online sellers from the industry associations. The pharmacies were selected based on the guidelines of the National Association of Boards of Pharmacy (NABP, www.nabp.net) and LegitScript (www.legitscript.com), a verification and monitoring service for online pharmacies. The quality of the online pharmacies was assigned based on the NABP and LegitScript recommendations. The selected websites were the most representative of each profile suggested by NABP and LegitScript.

Task. In order to establish a common task context, all participants were given a scenario according to which they had to examine website content and design and make a

purchase decision on behalf of an imaginary person. The participants were asked to locate a specific medicine for an elderly person who had neither a physical ability to go to an actual pharmacy nor the internet skills to make an online purchase. To complete the task, participants were asked to 1) to evaluate the website by examining the store's design and content; 2) to locate a specific product; 3) to make a purchase decision; 4) to complete a post-test questionnaire. The participants in all conditions were asked to search for the same type of medicine that was available on all three websites.

Measures. The post-test questionnaire used measures adapted from existing scales for (a) perceived website amateurism (Fogg et al., 2001); (b) perceived website content quality (Gregg and Walszak, 2008); (c) perceived human presence (Gefen and Straub, 2003); (d) perceived physical presence (Fogg et al., 2001); (e) perceived website warranty credibility (Grazioli and Jarvenpaa, 2000); (f) perceived trust (Loiacono et al., 2007); (g) purchase intentions (Gefen and Straub, 2003).

Subjects. Students enrolled in the introductory IS undergraduate course at the U.S. university participated in the study. Each study participant was randomly assigned to evaluate one of the three websites. In total 319 responses were collected with 104, 108, and 107 participants in each condition (online only/high quality, click-and-mortar/high quality, online only/low quality) Students received a course credit for their participation. The participation was voluntary with alternative options for course credit available.

5.6 Results

5.6.1 Website Coding

Three websites selected for the study provided a range of over-the-counter and prescription-only medicines. All websites had a similar navigability including search and

browsing features. In addition, all websites provided images and descriptions of their products, as well as recommendations on how to use them and possible side effects. All websites displayed privacy, security and return policies.

Three independent researchers coded signals in the three selected online pharmacies. The inter-coder reliability, computed as the percent of agreement obtained for all variables, ranged from 85% to 100%, showing a high level of reliability for all signals. Coding disagreements were adjudicated by discussion and consensus and a joint examination of the feature in question.

Amateurism, content, human presence, physical presence and seller warranties were coded based on the presence or absence of signals. The following signals were used for coding:

- Amateurism of websites was coded based on the presence of broken links, typographical errors, unexpected unavailability, links to bogus websites and not matching domain and company names;
- Content was coded based on the availability of customer reviews, shopping advice, articles about medicines and product information;
- Human presence was measured based on the presence of human pictures, live chat and social signals (Facebook, Twitter);
- Physical presence was coded based on the presence of physical address, store locator, phone and email information;
- Seller warranties were assessed with the availability of privacy, return, security, shipping and HIPAA policies.

The results of the coding are displayed in Table 5.1.

Table 5.1: Total Number of Features in Selected Websites					
	Amateurism (% of total)	Content (% of total)	Human Presence (% of total)	Physical presence (% of total)	Warranties (% of total)
High Quality Online Only	1 (20%)	4 (100%)	2 (50%)	3 (75%)	4 (80%)
High Quality Click-and-mortar	0 (0%)	3 (75%)	4 (100%)	4 (100%)	5 (100%)
Low Quality Online Only	2 (40%)	1 (25%)	2 (50%)	1 (25%)	3 (60%)

The results of the coding indicate that there are differences between the click-and-mortar seller and online-only sellers in terms of amateurism. In the selected website, the store with physical presence was more professional. In all the other areas, high quality websites (online only and click-and-mortar) displayed more content, more human and physical presence signals and more seller warranty signals than the low quality/online only website. The coding procedure thus offers a more concrete view of how signals are employed by sellers of varying quality.

5.6.2 Hypotheses Testing

The sample consisted of 319 participants with 104, 108, and 107 subjects per condition. 167 (52.4%) were females and 152 (47.6%) were males. 83% of participants were between 18-25 years old and 17% of participants were between 26-35 years old.

The data were analyzed using SmartPLS software. Two stages of analysis were implemented. During the first stage, the reliability and the validity of the constructs was established. During the second stage, the model was examined.

Convergent validity was determined by ensuring that all items loaded significantly on their respective constructs. The composite reliabilities of all constructs were above the recommended value of 0.70 and AVE values were above 0.50 (Sarker and

Valacich, 2010). Cronbach's Alpha values were above 0.7 for all constructs. The results are reported in Table 5.2.

Table 5.2. Item Loadings, AVE, Composite Reliability and Cronbach's Alpha

Item	Construct	Item Loading	AVE	Composite Reliability	Cronbach's Alpha	R Squared
PercAmateurism1	Perceived Amateurism	0.6836	0.5377	0.822	0.717	
PercAmateurism2		0.7218				
PercAmateurism3		0.6826				
PercAmateurism4		0.8345				
PercContentQual1	Perceived Content Quality	0.8513	0.7175	0.9101	0.8674	
PercContentQual2		0.8657				
PercContentQual3		0.7695				
PercContentQual4		0.8966				
PercHumanPresence1	Perceived Human Presence	0.8994	0.7906	0.883	0.7356	
PercHumanPresence2		0.8788				
PercPhysPresence1	Perceived Physical Presence	0.8368	0.6775	0.863	0.7626	
PercPhysPresence2		0.8004				
PercPhysPresence3		0.8318				
PercWarranty1	Perceived Warranty Credibility	0.9078	0.8999	0.9642	0.9441	
PercWarranty2		0.9635				
PercWarranty3		0.9733				
PercDeception1	Perceived Deception	0.8575	0.6495	0.9173	0.8916	0.602
PercDeception2		0.8276				
PercDeception3		0.7636				
PercDeception4		0.7364				
PercDeception5		0.7981				
PercDeception6		0.8453				
PercTrust1	Perceived Trust	0.9092	0.8562	0.947	0.916	0.659
PercTrust2		0.9445				
PercTrust3		0.9219				
PurchIntent1	Purchase Intentions	0.909	0.8527	0.9205	0.8286	0.784
PurchIntent2		0.9376				

Discriminant validity was determined by assessing the correlation between the latent variable scores with the measurement items. All measurement items loaded higher in respect to their designated factor than any other factor (Sarker and Valacich, 2010). In addition, discriminant validity was confirmed by calculating the square root of AVE and ensuring that for each construct the square root of its AVE was above other correlations between that factor and other constructs (Sarker and Valacich, 2010). See Table 5.3.

Table 5.3. Correlations among Construct Scores and Square Roots of AVEs

Constructs	Perceived Amateurism	Perceived Content Quality	Perceived Human Presence	Perceived Deception	Perceived Physical Presence	Perceived Warranty Credibility	Purchase Intention	Perceived Trust
Perceived Amateurism	**0.7333**							
Perceived Content Quality	-0.5889	**0.8471**						
Perceived Human Presence	-0.2998	0.4690	**0.8892**					
Perceived Deception	0.5942	-0.7534	-0.3510	**0.8059**				
Perceived Physical Presence	-0.3702	0.5569	0.4401	-0.4919	**0.8231**			
Perceived Warranty Credibility	-0.0743	0.1806	0.0438	-0.1373	0.0725	**0.9486**		
Purchase Intention	-0.5386	0.7574	0.4563	-0.7157	0.6240	0.1814	**0.9234**	
Perceived Trust	-0.5457	0.7912	0.4563	-0.7262	0.6476	0.1793	0.8786	**0.9253**

Note: Bold numbers represent the square root of the AVEs of the constructs.

To test the hypotheses, we used the bootstrapping method. The majority of the hypotheses were supported. The prediction that perceived website amateurism increases perceived deception (H1) was supported ($\beta = 0.230$, $p<0.01$). The expectation that perceived content decreases perceived deception (H2) was also supported ($\beta = -0.618$, $p< 0.001$). The relationship between perceived deception and perceived trust (H3) was significant ($\beta = -0.503$, $p<0.001$), and the negative effect of perceived deception on purchase intentions (H4) was significant ($\beta = -0.166$, $p<0.05$). The positive relation between perceived physical presence and perceived trust (H6) was also significant ($\beta =$

0.332, p<0.001), and the effect of perceived trust on purchase intentions (H8) was significant (β= 0.757, p<0.001). H5 and H7 were not supported. See Figure 5.2 for results of hypotheses 1-8.

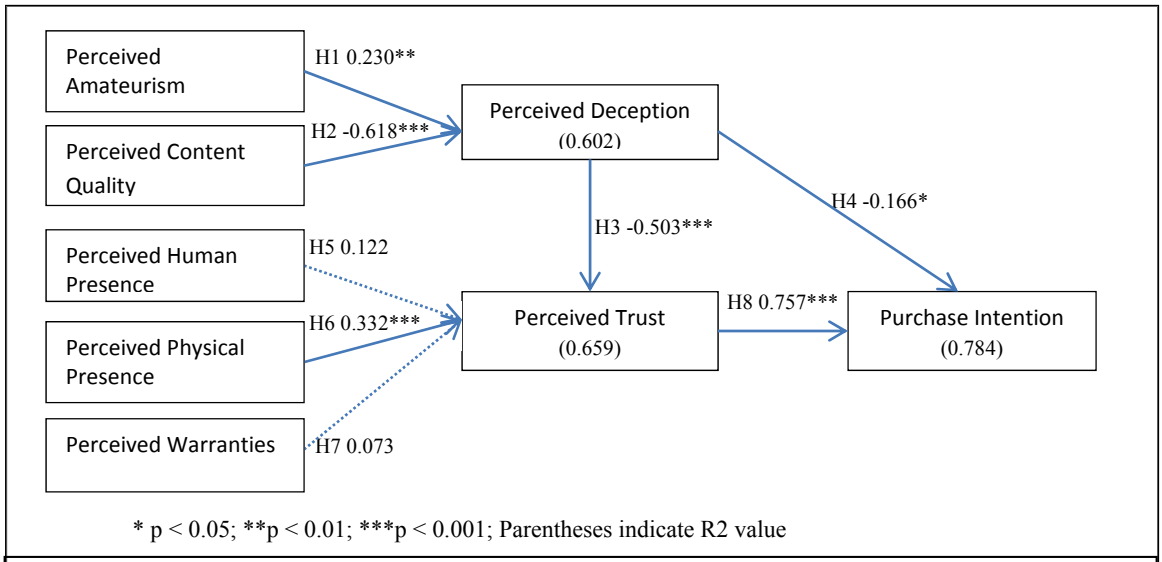

Figure 5.2. Results of the Analysis

To test the presence of a separating equilibrium (H9) we conducted post hoc ANOVA tests and found significant differences among all three conditions. The results shown in Table 5.4, demonstrate that each type of seller produced a different effect on signal perceptions, perceived deception, perceived trust and purchase intentions.

Table 5.4. Results of Post Hoc ANOVA Analysis

Dependent Variable	Website 1 (N=104) Mean and St. Dev.	Website 2 (N=108) Mean and St. Dev.	Website 3 (N=107) Mean and St. Dev.	F	Pairwise Comparisons Bonferroni
Perceived Amateurism	3.23 (0.92)	2.92 (1.03)	3.89 (1.04)	26.240***	1-2* 1-3*** 2-3***
Perceived Content Quality	5.19(1.05)	5.57 (0.92)	4.13 (1.41)	44.960***	1-2* 1-3*** 2-3***
Perceived Human Presence	3.87 (1.25)	4.22 (1.46)	3.35 (1.45)	10.536***	1-2 1-3* 2-3***
Perceived Physical Presence	4.19 (1.26)	5.50 (1.18)	2.69 (1.71)	132.440***	1-2*** 1-3*** 2-3***
Perceived Warranty Credibility	4.91 (1.51)	4.36 (1.83)	4.48 (1.72)	3.071	1-2 1-3 2-3
Perceived Trust	4.86 (1.31)	5.38 (1.17)	3.19 (1.61)	73.647***	1-2* 1-3*** 2-3***
Perceived Deception	2.73 (1.03)	2.32 (0.93)	3.64 (1.33)	39.614***	1-2* 1-3*** 2-3***
Purchase Intentions	4.57 (1.47)	5.06 (1.38)	2.79 (1.63)	68.381***	1-2 1-3*** 2-3***

Website 1 – High Quality/Online Only website;
Website 2 – High Quality/Click-and-Mortar website;
Website 3 – Low Quality/Online Only website

Note: *p<0.05; ***p < 0.001

The results indicate that, in terms of perceived amateurism, perceived content quality, perceived trust and perceived deception, there are significant differences among all three websites. The differences between high quality and low quality websites are more pronounced and significant at $p<0.001$ level, whereas the difference between high quality/online only and high quality/click-and-mortar websites is significant at $p<0.05$ level.

In terms of perceived human presence, the difference between high quality/online only and low quality/online only is significant at $p<0.05$ level, and the difference between high quality/ click-and-mortar sellers and low quality/online only sellers is significant at

$p<0.001$. No difference between high quality/online only and high quality/click-and-mortar websites is found.

In terms of physical presence, differences exist among all types of sellers. High quality/online only, high quality/click-and-mortar and low quality/online only are perceived significantly differently at $p<0.001$.

However, there is no difference among all three types of sellers in terms of seller warranties ($p>0.05$). In terms of purchase intentions, no difference exists between high quality/online only and high quality/click-and-mortar sellers ($p>0.05$), while there is a pronounced difference between high quality sellers and low quality sellers ($p<0.001$).

These results demonstrate that online buyers are able to differentiate the quality of online sellers based on the signals provided. Users in our sample found high quality/online only and high quality/click-and-mortar websites more trustworthy than a low quality website (means 4.86, 5.38 and 3.19 respectively). In addition, they perceived a low-quality website as more deceptive (mean 3.64) than high quality/online only and high quality/click-and-mortar websites (means 2.73 and 2.32 respectively). Finally, the users reported favorable purchase intentions towards high quality/online only and high quality/click-and-mortar websites (means 4.57 and 5.06 respectively), and negative purchase intentions towards a low quality website (mean 2.79). See Figure 5.3.

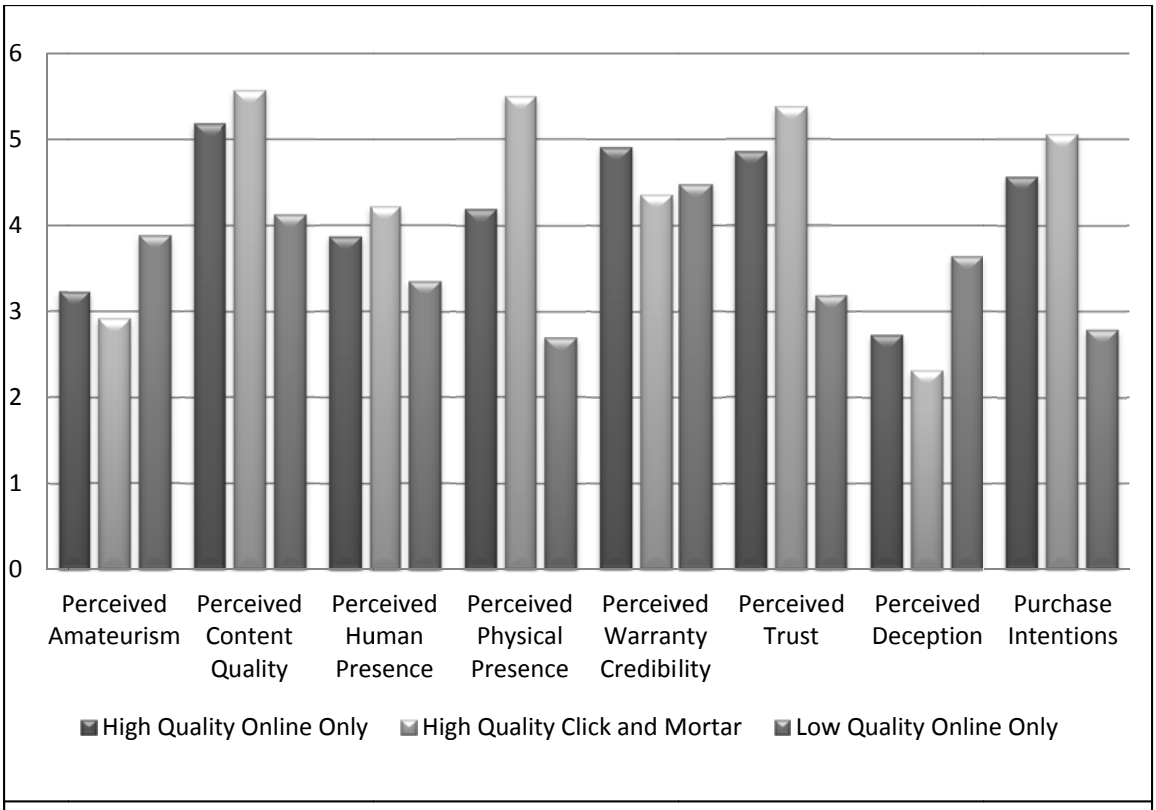

Figure 5.3. The differences among websites according to the subjects' perceptions

These results show that a separating equilibrium exists between high quality and low quality websites, while a partial separating equilibrium exists between high quality/online only and high quality/click-and-mortar websites. Thus, H9 is supported.

5.7 Discussion

The results of this study enabled us to answer our two research questions. With regard to the first research question about the differences in the effect of the buyer's perceptions of signals on deception, trust and purchase intentions in a pre-purchase phase of online shopping, we found that such differences exist and we will discuss them below.

The findings indicate that buyers perceive website interface information provided by sellers through signals differently. Buyers assign more weight towards some signals (website content, physical presence and amateurism) and less weight towards other signals (human presence and seller warranties). These findings support tenets of signaling theory that state the importance of signaling costs. Signals are perceived by the amount of resources required to produce a signal. When signals are costly, buyers believe that a seller is of high-quality otherwise the seller will incur costs in the form of forfeited wealth if the true quality of offerings is discovered (Kirmani and Rao, 2000).

Website content is an example of a costly signal as creating and updating the website content including company details, product images and product descriptions requires effort and constant monitoring of information quality. The same logic applies to the professionalism of a website. Keeping the website more professional and less amateurish requires resources that low quality sellers are not always willing or able to invest. Physical presence is a costly signal because it is prohibitively costly for a seller to provide false or incomplete information (Spence, 1973). If the seller displays false physical address, phone and email information on the website, buyers can potentially verify this information. If the contact information is false, does not exist, or belongs to a different entity, buyers will not trust the seller and the sale will not take place.

Human presence and the availability of seller warranties are not found to be significant. The explanation lies in the core of signaling theory – low cost signals are not reliable enough to be taken seriously by consumers (Spence, 1973). Human presence can be operationalized through human images that are not costly to obtain. Policies can be copied and pasted from other reputable websites without much effort on the seller's side.

Both signals do not require significant money contributions nor do they require maintenance or updates. In addition, the cost of punishment in case of false signals is low as images and policies are difficult to verify as false during the initial pre-purchase phase of online shopping. Buyers can sense insignificance of these signals and thus their perception of trust toward the seller is not affected by these signals.

As hypothesized, perceived amateurism of a website and the quality of its content are found significant predictors of perceived deception. While perceived amateurism increases the level of perceived deception, perceived content quality dramatically decreases the level of perceived deception. Thus, it is necessary for online sellers to pay more attention to the quality and value of the information they provide and the way the information is presented on a website. This finding is important, as to our knowledge, no studies reported the effect of signal perceptions on deception in online commerce.

With regard to antecedents of trust, only perceived physical presence has been found significant. This finding can be explained by signaling costs. Apparently, human presence and seller warranties do not have a strong effect on perceptions of respondents in our sample due to low costs required to produce human presence and warranty signals. The lack of significance of human presence can be also explained by the fact that the majority of our respondents are between 18-25 years old and they can be categorized as digital natives (e.g. persons born at the digital age as opposed to digital immigrants (Prensky, 2001). It is possible, that for a new generation of online consumers human presence signals are less important as they grew up surrounded by online commerce. Seller warranties are found insignificant either due to their low cost or because potential buyers simply do not pay attention to them.

As hypothesized, perceived deception is a significant predictor of trust, and perceived trust increases purchase intentions.

With regard to our second research question about the existence of a separating equilibrium in online markets, the results show that such equilibrium exists. Seller quality is a primary contributor to the equilibrium. The results of post-hoc analyses indicate that high-quality and low-quality websites are categorized by a separating equilibrium, and a partial separating equilibrium occurs between high quality websites based on their range of services (online only vs. click-and-mortar).

The results show that online buyers perceive high quality/click-and-mortar website as more trustworthy and less deceptive, while a low quality website is perceived as less trustworthy and more deceptive out of all three websites. High quality/online only websites are perceived as trustworthy and not as deceptive, but to a lesser degree than high quality/click-and-mortar websites.

In addition, participants in our sample perceived high quality websites as less amateurish, providing better content and more human and physical presence than low quality websites. Interestingly, the participants found no difference in terms of seller warranties on all three websites and ranked all warranties positively. However, seller warranties did not have a significant effect on perceived trust towards the seller. These results explain that buyers generally find warranties believable but do not trust them enough, perhaps because of the low cost of production of such signals.

From a practical point of view, the findings demonstrate that it is extremely important to pay more attention to the quality of a website. As buyers perceive amateurish websites that lack helpful content as more deceptive, sellers should try to

maintain the professionalism of their online storefronts by constantly updating the content and monitoring typos, broken links and other signals that can lead to negative perceptions.

To increase trust, sellers should provide more transparency about the origin of the firm, its location including a physical address and all other contact details such as email and phone information. Although, human presence and seller warranties did not increase perceived trust in our sample, we do not recommend omitting these signals as the lack of them may lead to negative perceptions on the buyers' side.

5.8 Limitations

One limitation of this study is that only websites selling pharmaceutical products were used. This fact opens possibilities for future research to evaluate the role of signals and signal perceptions across other industries.

The participants did not actually purchase the medicine. Should that be the case, the participants could be more concerned about the quality of websites. However, our results demonstrate that participants were able to clearly differentiate among websites of varying quality.

In addition, this study focuses only on pre-contractual issues in online retail and assesses the effect of signal perceptions before the transaction has taken place. While this study contributes to the body of knowledge that relates to adverse selection, future research may investigate problems of moral hazard.

This study also provides potential avenues for future research with additional constructs such as perceptions of signals that are provided by third parties such as verification seals, consumer reviews and seller feedback. Further examination of

signaling mechanisms can provide a richer explanation of antecedents of deception and trust in online storefronts, and enable the progress of online transactions in online retail.

5.9 Conclusion

This study enhances our understanding of signaling in online commerce by evaluating website signal perceptions of online buyers. The results show that signal perceptions are formed according to tenets of signaling theory and are evaluated by the cost of signals. Perceived amateurism, perceived website content and perceived website physical presence are found more significant in affecting buyer perceptions of deception and trust, while perceived human presence and perceived seller warranties are not.

The results of an independent signal coding demonstrated that websites of varying quality display different signals. These results are consistent with the buyers' perceptions of signals, thus showing that a separating equilibrium exists in online marketplaces. Buyers can differentiate among websites of high and low quality by perceiving high quality websites as more trustworthy and less deceptive, and low quality websites as less trustworthy and more deceptive. The buyers' purchase intentions are informed by the quality of a website as well: they are willing to purchase from high quality websites (both online only and click-and-mortar) and reluctant to purchase from low quality websites.

CHAPTER 6. REVIEW AND INTEGRATION OF THE THREE EMPIRICAL STUDIES

6.1 Summary and Discussion of Results

This dissertation examines issues pertaining to the usage of website signals by sellers and buyers. To examine seller behavior, the three-dimensional framework and a classification scheme for signaling in situations of information asymmetry in online commerce are developed by means of content analysis of actual commercial websites. To examine buyer behavior, two empirical studies are conducted to explore the buyers' perceptions of manipulated and actual signals in pharmaceutical and luxury goods markets.

The results of these studies provide answers to the research questions that motivated the research as explained below:

1. *What is the difference in quantity and types of signals that high- and low-quality sellers use pre-contractually?*

In Study One (reported in Chapter 3), a framework based on three dimensions: purchase time, ease of verification and signaling cost is developed. In addition, based on the framework, a classification of actual website signals is produced. It is found that the proposed signaling dimensions influence the choice of signals for sellers: low-quality sellers are likely to use fewer signals in the pre-contractual phase, avoid signals that are easily verifiable and avoid high-cost signals. At the same time, high-quality sellers use more signals in the pre-contractual phase, and prefer signals that are easy to verify as well as costly signals.

2. *How the manipulation of website signals affects the buyers' perceived deception, trust and willingness to buy?*

Study Two (reported in Chapter 4) examines the effect of manipulated website trust signals and product presentation signals on the buyers' willingness to transact with the seller. The results of the study provide evidence that advanced product presentation has a positive influence on the users' perception of the authenticity of products and increases the users' willingness to buy online. The lack of website trust signals provides significant evidence of the untruthfulness of a seller and decreases the users' willingness to buy online.

3. *How do the buyers' perceptions of signals affect perceived deception, trust and purchase intentions pre-contractually?*

The results of Study Three (reported in Chapter 5) show that signal perceptions are formed according to tenets of signaling theory and are evaluated by the cost of signals. Perceived amateurism, perceived website content and perceived website physical presence are found more significant in affecting buyer perceptions of deception and trust, while perceived human presence and perceived seller warranties are not.

4. *Does a separating equilibrium exist in online marketplaces?*

Regarding the question about the existence of a separating equilibrium in online markets, the results of Study 3 suggest that such an equilibrium exists. Seller quality is a primary contributor to the equilibrium. The results indicate that high-quality and low-quality websites are categorized by a pure separating equilibrium, and a partial separating equilibrium occurs between high quality online only and click-and-mortar websites.

While Study One mainly focuses on signals from the seller perspective, Studies Two and Three complement findings of Study One by exploring buyer attitudes and perceptions towards signals and sellers.

Altogether these studies cover different types of products – pharmaceutical and luxury goods - both categories are prone to counterfeiting, deception and delivery of inferior products. In addition, these studies explore online signaling using a range of real-life websites as well as experimental ones. Together these findings provide an understanding of the issues that sellers experience while considering types of signals to display on their websites, and provide an insight into the buyers' perceptions and attitudes towards signals.

6.2 Theoretical Contributions of the Three Empirical Studies

Drawing upon signaling theory, this dissertation extends the understanding of signal usage in online environments by making both theoretical and practical contributions.

Study One proposes and validates a tri-dimensional framework consisting of the purchase time continuum, ease of verification and signaling cost. According to our best knowledge, this is the first study that combines three distinct signaling dimensions into a framework to examine the actual usage of signals by online sellers of varying quality.

In addition, this study provides a new theoretical lens to clarify the role and nature of certain signaling mechanisms in online marketplaces. Our findings suggest that signaling theory and the three-dimensional framework based on actual website signals is valuable in explaining the behavior of online sellers. Although signaling has been used in studies of online commerce, extensive frameworks offering explanations of online seller behavior have not been yet created. This study thus offers an important contribution in this regard.

Study Two extends the understanding of signaling and deception tactics in online environments characterized by product uncertainty. As opposed to earlier theories of deception (see Johnson et al. 2001) that compare situations in which a deception tactic is either present or not, this study focuses on the levels of sophistication within a tactic, and proposes that more sophisticated levels within deception tactics are more successful in online markets.

In addition, this study suggest that signaling theory can be effectively combined with deception theory to shed light on signal usage in situations of online deception. To our knowledge, it is the first attempt to combine signaling and deception tactics into a framework to examine counterfeit deception online.

This study attempts to fill the gap in research on trust. Prior literature on online trust has focused on products with little product uncertainty (Gefen et al. 2008), this research deals with products where buyers are concerned with inferring actual product quality. The importance of examining online shopping situations in which sellers do not describe products faithfully and misrepresent products due to lack of integrity has been emphasized as extremely important in online commerce (Gefen et al. 2008).

Study Three contributes to theory by evaluating perceptions of actual signals displayed on websites and assessing the type of equilibrium that exists in online markets. This study introduces types of signals that affect perceived deception and perceived trust, and provides a comparison of signal perceptions based on the quality of a seller.

From a practical point of view, the three studies can be useful for buyers, sellers and regulating bodies. As the number of users in online commerce increases, sellers should be aware of implications of signaling to promote trustworthiness and lack of

deceptiveness to buyers. Buyers can benefit from the knowledge of signaling in deceptive situations. The understanding of signals based on the cost and verifiability can prove instrumental in selecting a good quality seller and avoiding adverse selection. The regulating bodies may find our results useful in identification types of signals that are misrepresented on websites with a purpose of deceiving potential buyers.

6.3 Suggestions for Future Research

This research lays down a path for future investigation of website signals. First, in this program of research, only pre-contractual signals alleviating adverse selection problems are analyzed. As problems of moral hazard are equally important in situations of information asymmetry, we suggest that future research focus on post-contractual buyer behavior as well as incentives that motivate sellers not to behave opportunistically.

Second, three studies described above evaluate websites and products that are particularly prone to counterfeiting and inferior quality such as medicines and luxury goods. Future research can apply the research models developed here to a wider range of contexts – different industries, different markets, and different products – and incorporate other categories or support other levels of analyses.

6.4 Conclusion

Three studies presented in this dissertation provide a systematic approach to understanding the role of signals both from seller and buyer perspectives using signaling and deception theories. By analyzing both seller and buyer perspective, we aim to encourage IS researchers to create complete investigation of the research questions, particularly in studies in which two parties with conflicting interests are involved.

APPENDICES

Appendix 1. Study Two. Questionnaire Items

Willingness to buy (Doney et al. 1997), (Grazioli et al. 2000)

The following item is answered on Yes/No scale *Will you buy this watch for your friend from this store?*

Perceived deception (Grazioli et al. 2000)
The following items are answered on a 1–7 scale where 1 = 'definitely not' and 7 = 'definitely yes'
Please evaluate the quality of product information given by the store. To what extent do you believe that the product information provided by the store is:

1. Accurate
2. Misleading
3. Truthful
4. Deceptive
5. Factual
6. Distorted

Trust towards the website. (Jarvenpaa et al. 1999)
This online store is trustworthy. (strongly disagree / strongly agree)

1. This online store wants to be known as one who keeps promises and commitments. (strongly disagree / strongly agree)
2. I trust this online store keeps my best interests in mind. (strongly disagree / strongly agree)
3. I find it necessary to be cautious with this online store. (strongly disagree / strongly agree) [reverse]
4. This retailer has more to lose than to gain by not delivering on their promises. (strongly disagree / strongly agree)
5. This online store's behavior meets my expectations. (strongly disagree / strongly agree)

CONTROL VARIABLES

Familiarity with the product
The following item is answered on a 1–7 scale where 1 = 'not familiar' and 7 = 'very familiar'
Buyer's Trust Propensity (Gefen et al. 2003)

1. I usually trust sellers unless they give me a reason not to trust them.
2. I generally give sellers the benefit of the doubt.
3. My typical approach is to trust sellers until they prove I should not trust them.

Attitude to trusting web stores (Grazioli et al. 2000)
The following items are answered on a 1–7 scale of strongly disagree to strongly agree.

1. Most Internet sites tell the truth about their abilities and experiences.

2. Most Internet sites can be counted on to do what they say they will do.
3. Most sites are honest in describing their customers' experiences.

Attitude toward Internet safety (Grazioli et al. 2000)
The following items are answered on a 1-7 scale of strongly disagree to strongly agree.

1. I would feel safe completing commercial transactions over the Internet.
2. The Internet is secure for transactions.
3. If possible, it is best to avoid shopping from the Internet.

Attitude toward the web (Grazioli et al. 2000)
The following items are answered on a 1-7 scale of strongly disagree to strongly agree.

1. Buying from Internet sites that do not have a physical store may cause more problems than buying from sites that do have a physical store.
2. Buying from a web-only store is more risky than buying from a web store that has a physical counterpart.
3. Buying on the WWW is risky.

MANIPULATION CHECK

Perceived website diagnosticity (Jiang et al. 2005), (Kempf et al. 1998)
The following items are answered on a 1-7 scale of strongly disagree to strongly agree.

1. This website is helpful for me to evaluate the product
2. This website is helpful in familiarizing me with the product
3. This website is helpful for me to understand the performance of the product.

Appendix 2. Study Three. Task Scenario

Your neighbor, Mrs. Jones, is 82 years old and she is not familiar with e-commerce and shopping over the internet. She prefers to buy the medicines she needs at a local pharmacy. Sometimes she does not feel well to go out and she wants to find a way to get her medicines delivered to her home. Mrs. Jones has heard that pharmacies can deliver medicines if you place an order online. However, since she is not an experienced online shopper, she is afraid of being deceived. In addition, Mrs. Jones does not have access to the internet at her house to complete an online purchase.

Mrs. Jones is asking for your help to evaluate a pharmacy website before she decides whether to make a purchase.

Mrs. Jones heard on the news the other day that some websites might be fraudulent and there is a chance that they sell fake medicines. As Mrs. Jones is concerned about her health, the level of risk is even higher. She trusts your opinion and needs your assistance and recommendations.

Please connect to the website and find the medicine that Mrs. Jones wants (Zyrtec, allergy medicine). Try to identify if the website is safe and if the medicine presented on the website is authentic. Based on your findings, make a decision of whether to purchase the medicine from the website.

For the purposes of this task you **MUST NOT** purchase anything from the website. Please make your assessment of the website features and offerings solely based on the website information. Pay particular attention to website trust and security features, such as privacy and security policies, third-party seals (VeriSign, TrustE, PayPal and others if available), shipping and return policies.

Appendix 3. Study Three. Questionnaire Items

The following items are answered on a 1–7 scale of strongly disagree to strongly agree.

Purchase intentions (Gefen and Straub, 2003)

1. I am very likely to buy a product from this website
2. I would use my credit card to purchase from this website
3. I would hesitate to provide my personal information to this website (Removed)

Perceived deception (adapted from Grazioli and Jarvenpaa 2000).
Please evaluate the quality of information given by the store. To what extent do you believe that the information provided by the store is:

1. Accurate
2. Misleading (R)
3. Truthful
4. Deceptive (R)
5. Factual
6. Distorted (R)

Perceived trust. (Loiacono et al. 2007)

1. I feel safe in my transactions with the Web site.
2. I trust the Web site to keep my personal information safe.
3. I trust the Web site administrators will not misuse my personal information.

Physical Presence (Grazioli and Jarvenpaa 2000).

1. This store only exists on the web (Removed)
2. The store has a physical presence.
   The following questions are adapted from (Fogg et al. 2001)
3. The site provides a quick response to your customer service questions (Removed)
4. The site lists the organization's physical address.
5. The site gives a contact phone number. (Removed)
6. The site gives a contact email address.

Human Presence (adapted Gefen and Straub, 2003)

1. There is a sense of human contact in this store
2. There is a sense of human warmth in this store

Seller Warranties (adapted from Grazioli and Jarvenpaa, 2000)
How convincing/believable are the following website policies:

1. privacy policy
2. security policy
3. return policy

Content Quality (adapted from Gregg and Walszak, 2008)

1. The content of this website does not help me at all. (R)
2. The content of this website is accurate.

3. The content of this website is sufficiently detailed.
4. I find the content of this website very helpful

Amateurism (Fogg et al. 2001)

1. The site's domain name does not match the company's name.
2. The site has a typographical error.
3. The site is sometimes unexpectedly unavailable.
4. The site has a link that doesn't work (Removed)
5. The site links to a site you think is not credible.
6. The site is rarely updated with new content.

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