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Trading Trust for Discount: Does Frugality Moderate the Impact of Privacy and Security Concerns?

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ABSTRACT

The paper develops a framework (1) to distinguish between the unique and shared dimensions of privacy and security concerns, (2) to examine the impact of privacy and security concerns on the trust-discount tradeoff as moderated by frugality disposition, and (3) to investigate the impact of personality on online privacy and security concerns. We use Utility Theory and its extension, Prospect Theory, to argue that frugality modifies the perception of risk as depicted in privacy and security concerns and monetary gains from discount in the trust-discount tradeoff.

We develop the conceptual model to show the role of privacy and security concerns and the moderating role of frugality in trust-discount tradeoff, as well as the role of personality as the antecedents of privacy and security concerns. Data collected from lab experiments are used to test the model using the structural equation modeling approach. The study is one of the first to study the role of frugality in trust-discount tradeoff. It is also an early attempt to analyze the similarities and dissimilarities between the dimensions of security and privacy concerns. Our findings suggest that frugality plays an important role in moderating the impact of security concerns in trust-discount tradeoff.

On the theoretical side the paper adds to the trust-privacy literature and to the field of psychology by studying the role of frugality and personality in relation to privacy and security concerns. The tradeoff of trust-discount is an area that is not adequately studied. This paper adds insight about this tradeoff. The study has practical implications by showing that while offering discount may counter consumers' privacy concern, it does not reduce the security concern of frugal consumers. Little known websites with low trust perception will not survive by just offering discounts. They need to invest in creating social capital in the form of increased trustworthiness.

Keywords:

Security Concern, Privacy Concern, Frugality Disposition, Trade-off, Discount, Personality

INTRODUCTION

Online users have serious privacy concern (PC) and security concern (SC) when conducting business online—a fear of harmful economic and social consequences that might result from the misuse of their private information disclosed in online transactions. In a survey of Internet users, 93% of the respondents surveyed expressed concern about the privacy of their personal information when buying online (Digital Future Project 2009). Similarly, it is reported that two-thirds of U.S. citizens are concerned about security of their personal information against the threats posed by hackers and cyber criminals (McCrohan 2003, Pavlou et al. 2007). The recent disclosure about the security attacks on Google (WSJ January 19, 2010) and 2,411 other firms (WSJ February 18, 2010) has done little to ease the security concerns of the users. The problem is further intensified by the fact that "companies are loath to disclose or share information on breaches for fear of bad publicity and loss of business to rivals" (WSJ January 19, 2010). Furthermore, as resources diminish due to economic downturn and transformative changes in job markets,

more people have become frugal and cautious about spending[1]. This leads to an interesting dilemma regarding concerns over privacy and security and the desire to find best bargains online.

When buying online, consumers choose a website from a host of websites with various levels of trustworthiness. The decision problem becomes more complex when discount enters the picture. If the low trust website offers the same product at the same price as the high trust website, then the logical choice is the high trust website. The issue of trust-discount tradeoff arises when the high trust website offers little or no discount, and the low trust website offers high discount. In this paper we study how PC and SC influence trust-discount tradeoff and how frugality disposition moderates and modifies the impact of such concerns. We also study the intrinsic antecedents of PC and SC as consumers' personality. In doing so, we identify the shared and distinct dimensions of PC and SC, and focus on *transmission dimension of security concern* (TD-SC), which is distinct from the dimensions of PC.

The paper contributes to the field in the following ways. The paper develops a framework to identify the shared and distinct dimensions of PC and SC and to show how these concerns influence trust-discount tradeoff. Furthermore, we show how frugality moderates the impacts of PC and SC. The role of personality dimensions on PC and SC are identified, indicating the intrinsic sources of such concerns. This study contributes to theory by distinguishing the unique aspects of PC and SC, and by introducing the important role of frugality in the tradeoff between trust vs. discount in the choice of websites.

LITERATURE REVIEW, THEORY AND RESEARCH MODEL

Theory

It is known that "[t]rust can mitigate information asymmetry by reducing transaction-specific risks, therefore generating price premiums for reputable sellers" (Ba and Pavlou 2002, p. 243). When dealing with sellers with high trust level (and low discount) versus sellers with low trust level (and high discount), the rational user, according to Utility Theory, will choose no discount as compensation for having high trust and vice versa. This argument is supported by Ba and Pavlou (2002) and Rao and Monroe (1996), who argued that high prices offered by high trust websites as a legitimate compensation for reducing the uncertainty and risk. Furthermore, Utility Theory suggests that individuals make choices by maximizing their utility function, and their choice decisions reflect their personal dispositions (Bansal et al. 2010, Luce 1959, McFadden 2001).

Prospect Theory posits that people are more sensitive to perceived loss than to perceived gain (Kahneman and Tversky 1979). Applied to the tradeoff between trust and discount, each individual assesses the transaction-specific risk associated with transacting with a particular website differently, depending on the perception of risk of dealing with the low trust website (PC and SC) against the monetary gain of discount. The overall utility of the decision would depend upon the balance of perceived gain (discount) and perceived loss (security and privacy concern). However, this relationship becomes more complex when individuals' frugality is taken into account, since frugality could modify the perception of risk as reflected in PC and SC. This argument is supported by Kalyanaram and Little (1994), who found that individuals' perceptions of gain or loss depend on their reference point. We argue that frugality plays an important point in the determination of this intrinsic reference point.

Privacy Concern and Security Concern

Even though PC and SC are acknowledged as separate constructs (Pavlou et al. 2007), many studies argue that they are related or, even worse, confused (Casalo et al. 2007). Little consensus exists on the distinction between PC and SC. Some studies suggest that privacy subsumes security (e.g., Landau 2008, Smith et al. 1996) while others argue that security subsumes privacy (e.g., Kim and Ahn 2006, Udo 2001). Yet a third group proposes that PC and SC are one construct (e.g., Cassalo et al. 2007, Flavian and Guinaliu 2006).

PC is defined as concern over the extent of control over how one's personal information is collected, used and, disseminated (Bansal et al. 2010). Pavlou et al. (2007) has suggested that SC is the concern about the unwillingness and inability of the website to protect the user's information during transmission and/or storage. Even though both SC (Pavlou et al. 2007) and PC (e.g., Singh and Hill 2003) have been characterized as unwillingness and inability of the website to protect user information, privacy concern relates to the issues related to **(PC-1)**

[1] America is turning frugal -http://www.tampabay.com/news/business/year-after-the-economic-fall-leaner-more-frugal-america-emerges/1033894 [last accessed Jan 2, 2010]

disclosure of collection, **(PC-2)** unauthorized secondary use (either deliberate or inadvertent), **(PC-3**) improper access, **(PC-4)** errors in handling (Smith et al. 1996, Stewart and Segars 2002). On the other hand, security issues are related to **(SC-1)** authentication, **(SC-2**) non-repudiation, **(SC-3)** confidentiality, and **(SC-4)** integrity of data (Ratnasingam et al. 2005), see Table 1 for the definition of terms.

We argue that to understand the unique and overlapping dimensions of PC and SC, we need to consider the state of data. Privacy issues arise when the data are in the *possession* of the vendor and are the results of actions (or neglect) by the vendor, whereas security issues arise when the data are in either the *transmission* or *possession* state and abuse takes place as a result of the action by a third-party criminal. This distinction allows us to identify the unique and overlapping dimensions of PC and SC.

Privacy Concern	Security Concern
PC-1. **Collection:** Collecting too much information on the user and storing it in the database	**SC-1. Authentication:** The need to verify the authenticity of the user and the website
PC-2. **Unauthorized secondary use:** Usage of the personal information for other purposes, without users' prior approval	**SC-2. Non-repudiation:** The need to ensure that the transaction is genuine and not disputable
PC-3. **Improper access:** Access to personal information by unauthorized individuals	**SC-3. Confidentiality:** The need for protecting the information from unauthorized access
PC-4. Errors: Accidental and deliberate errors in handling personal information	**SC-4. Integrity:** The need for preventing the information from getting altered or corrupted

Table 1. Dimensions of PC and SC

PC-1 (collection) and PC-2 (unauthorized use) are clearly the result of the vendor's action when it is in the *possession* of data. Therefore, PC-1 and PC-2 are the unique dimensions of PC. Similarly, SC-1 (authentication) and SC-2 (non-repudiation) are dimensions that relate to the state of the data in the *transmission* state from the customer to the vendor and the concern is over criminal activities of third parties. Hence, SC-1 and SC-2 are unique issues related to security concern. PC and SC may overlap in the third and fourth dimensions, since PC-3 and SC-3 are similar in definition, so are PC-4 and SC-4. If confidentiality/improper access issue arises when the data are in the *possession* state, then there would be an overlap between PC-3 and SC-3. Similarly, if error in handling (damage to integrity of data) takes place when the data are in the *possession* state, then PC-4 and SC-4 would overlap. However, if the damage to the confidentiality and integrity of data takes place when the data is in the *transmission* state, then SC-3 and SC-4 would be unique to security concern. Therefore, it is possible to separate PC and SC as two distinct constructs based on the state of the data and the nature of the dimensions.

Since PC arises when the data are in the possession state and in the hands of the online vendor, it reflects an uncertainty and perceived risk about the individual's private information, which requires protective action by selecting higher trust websites.

As to security concern, it could be argued that the transmission aspect of SC has two components: security at the consumer end and security at the website end. Consumers have complete control over their actions in taking precautions to increase the security of their data transmission, such as turning on the firewall or using anti-spyware. However, they have little control over the preventive security actions taken by the website. This too creates uncertainty about the consequences of transmitting and storage of personal information, and gives rise to security concern. The uncertainty and perception of risk associated with data transmission leads to the need for assurance and protection (Gefen et al. 2003), resulting in the tendency to select higher trust websites.

Mayer et al. (1995) define trust as "the willingness of a party to be vulnerable to the actions of another party" (p. 712). With the presence of higher PC and SC, consumers need a higher level of website trustworthiness in order to mitigate the perceived threats to their private information. To achieve the higher level of assurance required to mitigate the perceived threat, the user will be willing to forgo the benefit of price discount offered by websites with a lower trust in favor of higher trust. In other words, individuals with high SC and PC will have a higher trust-discount tradeoff (i.e., will prefer trust over discount).

H1. PC is positively associated with the choice of trust over discount.

H2. SC is positively associated with the choice of trust over discount.

Frugality Disposition

Frugal people are known to be more price and value conscious and less impulsive in purchase decisions. Frugality has been defined as "careful use of resources and avoidance of waste" (DeYoung 1986, p. 285). Lastovicka et al. (1996) identify three frugality characteristics: (1) disciplined in spending of money and less impulsiveness in buying, (2) resourceful in using and reusing possessions, and (3) more independent and not easily swayed by interpersonal influences. Frugal people use products and services resourcefully, and exercise restraint when purchasing (Lastovicka et al. 1999). These characteristics show that the frugal would spend money wisely and would value discount. The desire to be resourceful and save money leads frugal people to be less concerned about the privacy and security of their private data.

H3. Frugality disposition negatively moderates the impact of PC with the choice of trust over discount such that it negatively associates PC with choice of trust over discount.

H4. Frugality disposition negatively moderates the impact of SC with the choice of trust over discount such that it negatively associates SC with choice of trust over discount.

Personality

Previous research has suggested that information sensitivity varies with individual differences (e.g., Bansal et al. 2010, Malhotra et al. 2004). There are several studies suggesting that personality traits impact information sensitivity (e.g., Bansal et al. 2010) and computer anxiety (e.g, Korzaan and Boswell 2008) of the individuals. Based on Prospect Theory, we argue that the perception of risks, PC and SC in this case, depends on individuals' personality. For this research, we use Goldberg's (1992) Big-Five factors since they are considered ubiquitous (Digman 1990). We argue that social and evaluative personality factors (extraversion, agreeableness and intellect) are primarily associated with privacy concern, and negative outcome-avoidance factors (conscientiousness and emotional-instability) are primarily associated with security concern.

Extraversion. People high in this trait are often more talkative, sociable, and demonstrative (Goldberg 1992). Devaraj et al. (2008) argued that extroverts care about their image and social consequences of behavior, and due to the associated image enhancement, they also care about their job performance. Their desire to enhance performance and interact with others around them would suggest that they would have lower PC. Hence,

H5. Extraversion is negatively associated with PC.

Agreeableness. This trait is associated with likeability and social conformity of individuals (Goldberg 1992). Bansal et al. (2010) found that agreeableness is positively associated with health information sensitivity. Similarly, Korzaan and Boswell (2008) found that agreeableness is positively associated with PC. Agreeable individuals are known to be apprehensive of deviant behaviors (Chauvin et al. 2007). Hence,

H6. Agreeableness is positively associated with PC.

Intellect. Individuals high in intellect are often curious, broadminded, and creative (Goldberg 1992), and hence would be more comfortable with the technology. "Individuals who measure high on this trait tend to be more accepting, less judgmental, have a higher tolerance for, and in many cases embracing, new things" (Korzaan and Boswell 2008, p. 17). In the context of health information, Bansal et al. (2010) showed that intellect is negatively associated with health information sensitivity. Similarly, Korzaan and Boswell (2008) found that intellect lowers computer anxiety. It could be argued that these individuals rationally analyze the pros and cons of using the Internet, and understand that the online companies need one's information in order to provide the service. They value the

associated benefits more than they fear the associated pitfalls, such as misuse of one's information. Thus, they would have lower levels of PC than others.

H7. Intellect is negatively associated with PC.

Conscientiousness. Individuals high in conscientiousness are characterized by traits such as determination and organization (Goldberg 1992). They are also less risk-oriented and less willing to get involved in unsafe situations (Paunonen and Ashton 2001). They see deviant behaviors as more risky and hazardous (Bansal et al. 2010, Chauvin et al. 2007). Hence, they too would be more apprehensive about any misuse of their private information, especially by third parties and hackers, and hence,

H7. Conscientiousness is positively associated with SC.

Emotional-instability. Individuals high in this trait are often anxious, depressed, and fearful (Goldberg 1992). Emotional instability or neuroticism increases computer anxiety (Korzaan and Boswell 2008) and is positively associated with health information sensitivity (Bansal et al. 2010). We argue that such individuals are more apprehensive about any misuse of their private information, especially by third parties and hackers.

H8. Emotional instability is positively associated with SC.

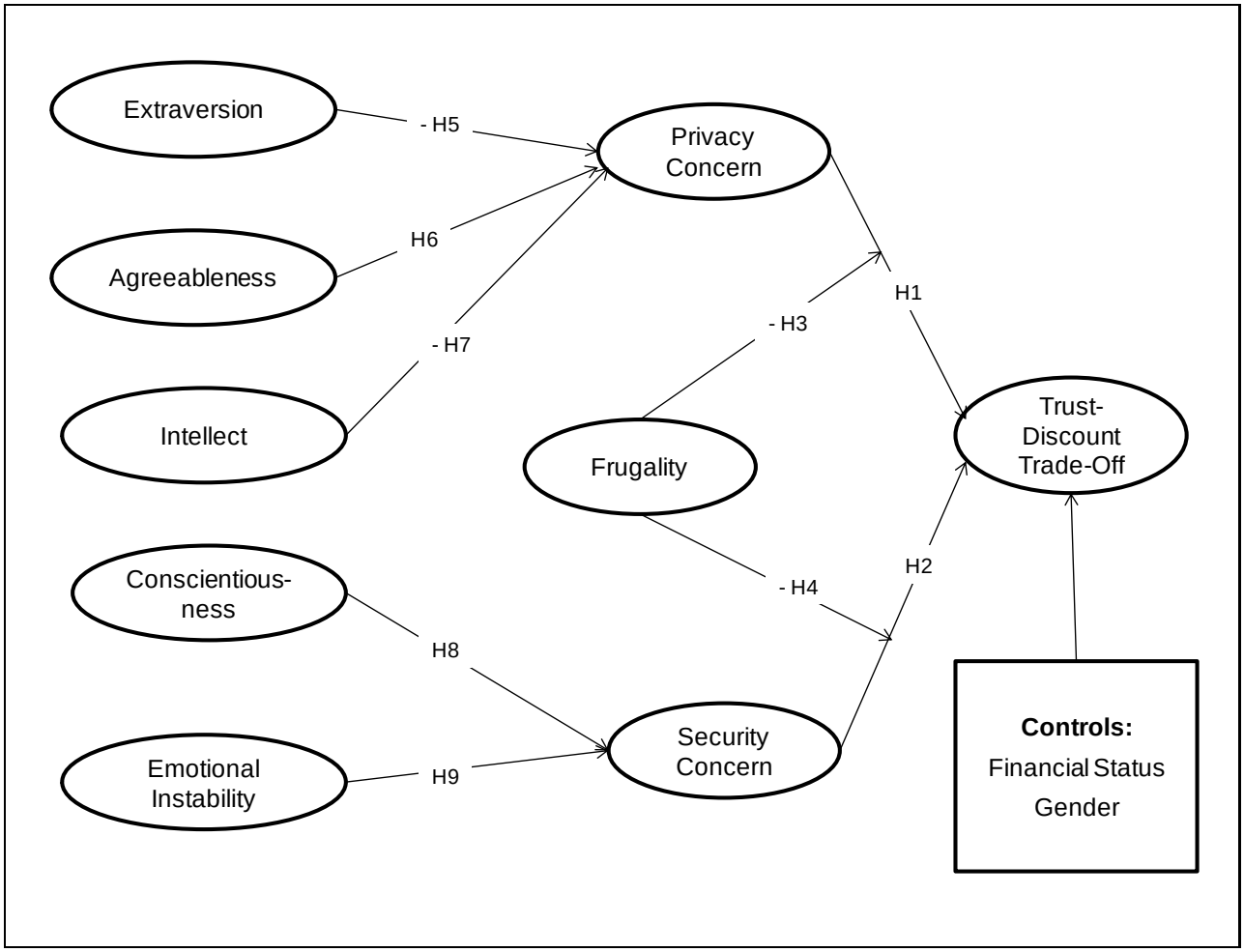

Figure 1. Research Model

Control variables

Focusing on the role of gender in the IS research, Gefen and Straub (1997) argued that there are "striking" (p. 393) gender differences in computer skills between males and females; and that women are known to be more cooperative, and men to be more aggressive and competitive. Furthermore, males and females are also known to differ in the way PC influences their purchasing behavior online (Faja and Timi 2008).

Arguing in favor of perceived financial status, Johnson and Krueger (2006) stated that "it is the value of these [objective financial] measures relative to one's expectations, desires, and standards of comparison that is of importance for satisfaction with one's circumstances in the financial domain." They found that the perceived financial wealth is independent of the actual financial wealth. Thus, we controlled for the perceived financial status, assuming that people with high perceived financial status would care less for any monetary discount, and would rather value their information privacy and security more than others.

RESEARCH METHODOLOGY

Study Design

Participants were students in a Midwestern university. Participants were told that they are looking to buy a digital camera within a price range of $150 to $200. The participants were to choose a website with a trust level ranging on a continuous scale from high trust (with no discount) to low trust (with high discount). The participants were told that all the websites are offering exactly the same product, and that the only variables are trustworthiness of the website and the discount offered. They were told that they had to provide their private information in order to transact with the websites. They were told that the personal information involved information about hobbies/ interests, contact information, and age. High trust websites were defined as having received 100% positive rating (out of one million ratings in their lifetime). Low trust websites were operationalized as "no ratings yet". To avoid the confusion of credit card information as financial information, the participants were told that the e-commerce websites would accept payment through PayPal. They were asked to read the scenario description and answer questions about the scenarios. This was done to make sure that the participants understood the type of information involved and the buying scenario. Those who did not answer the questions correctly were later deleted from the dataset. Participants then filled out the instrument online.

A total of 245 observations were collected, out of which 25 were deleted because the survey was not completed, and 30 were deleted due to failing the "quiz" questions related to the type of information involved and the scenario description. Thus, a total of 190 usable observations were used in the analysis. There were 83 males and 106 females. One person did not disclose the gender. Age ranged from 18 to 52 years. The internet experience had the average of 10.1 years (std dev = 3.4).

Operationalization of Variables

To increase construct validity, we adapted items from existing scales as shown in Table 2. The items were converted into semantic differential scale (0-10) in order to minimize common method variance (Song and Zahedi 2005). In order to tease out the influence of PC and SC separately, we used the items that were unique to each construct.

Construct	Reference
Privacy concern	Malhotra et al. 2004, Smith et al. 1996
Security Concern	Salisbury et al. 2001
Frugality	Lastovicka et al. 1999
Personality	Fraj and Martinez 2006, Goldberg 1992

Table 2. Sources for Construct Items

Data Analysis

We carried out reliability analysis by computing Cronbach alpha, composite factor reliability, and AVE. The reliability results are presented in Table 3. Next, EFA and CFA were conducted to analyze discriminant and

convergent validity of the constructs. The EFA had factor loadings ranging from .79 to .94. Cross loadings were less than .36. The measurement model tested using Mplus 4.1 had CFI of .96, TLI of .95, RMSEA of .05, and SRMR of .06. The factor loadings for all latent construct items in CFA were greater than .76, with t-values from 7.89 to 22.38. The analysis assured that the constructs demonstrated adequate discriminant and convergent validity.

We tested the dataset for the presence of common method variance using the Harman's single factor test (Podsakoff et al. 2003). The first factor explained only 18.7% of the variance, thus suggesting that the common method variance does not pose a serious problem. The data were analyzed with a nonlinear structural equations modeling approach using Mplus 4.1. The moderation was tested by specifying INTEGRATION algorithm in Mplus, which is a maximum likelihood estimator with robust standard errors (Muthén and Muthén 2007). Fit indices for nonlinear covariance-based SEM are not developed yet (Muthén and Muthén 2010). The fit of the non-linear model are assessed by studying the fit indices of the neighboring direct model and checking the fit of the measurement model. In our case, frugality was modeled as a direct antecedent of trust-discount tradeoff. The normed chi-square, CFI, TLI, RMSEA, and SRMR for the direct model were 1.62, .93, .91, .06, and .08, respectively, which showed acceptable level of fit. The measurement model has acceptable fit indices. These two together provide support for the goodness of fit for the estimated non-linear SEM (Muthén and Muthén 2010).

Construct	Cronbach Alpha	CFR	AVE
Privacy Concern	0.84	0.83	0.71
Security Concern	0.90	0.89	0.80
Frugality	0.81	0.82	0.61
Extraversion	0.91	0.92	0.79
Agreeableness	0.93	0.93	0.81
Consciousness	0.82	0.83	0.63
Emotional Instability	0.77	0.79	0.55
Intellect	0.81	0.84	0.63

Table3. Reliability Analysis

		1	2	3	4	5	6	7	8
Privacy Concern	1	**0.84**							
Security Concern	2	0.66	**0.89**						
Frugality	3	0.18	0.07	**0.78**					
Extraversion	4	-0.04	0.01	0.00	**0.89**				
Agreeableness	5	0.12	0.10	0.07	0.22	**0.90**			
Consciousness	6	0.23	0.14	0.37	0.06	0.31	**0.79**		
Emotional Instability	7	0.16	0.13	-0.22	-0.10	-0.24	-0.24	**0.74**	
Intellect	8	-0.07	0.06	0.14	0.35	0.34	0.23	-0.33	**0.79**

Table4. Correlation Matrix

*Diagonal values are square root of AVE

RESULTS AND DISCUSSION

The findings are shown in Figure 2 and discussed below. We found that PC and SC had a positive effect on trust-discount tradeoff (as hypothesized in H1 and H2). This showed that people with high PC and SC preferred trust over discounts. We also found frugality moderated the influence of SC, but not the influence of PC.

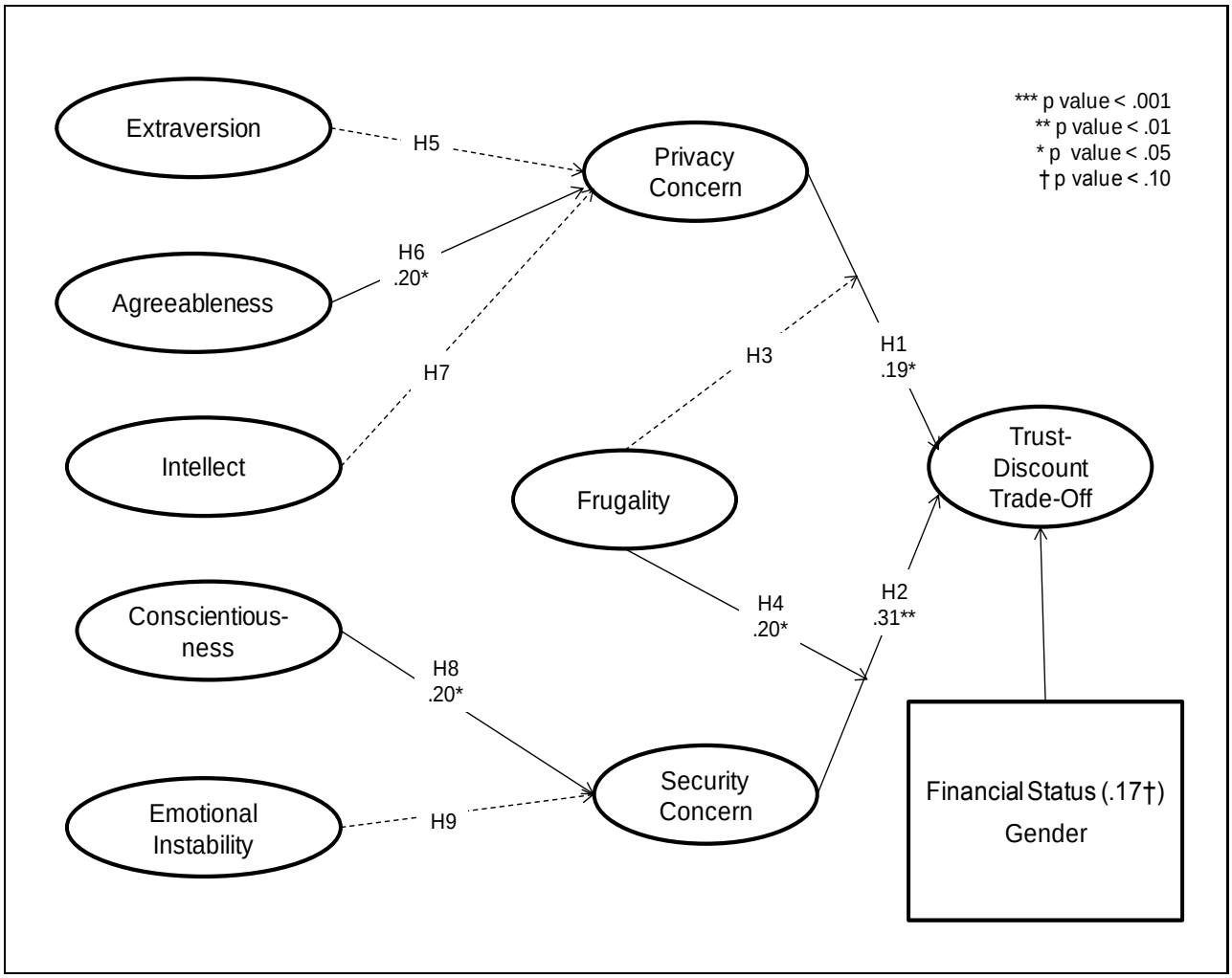

Figure2. Results

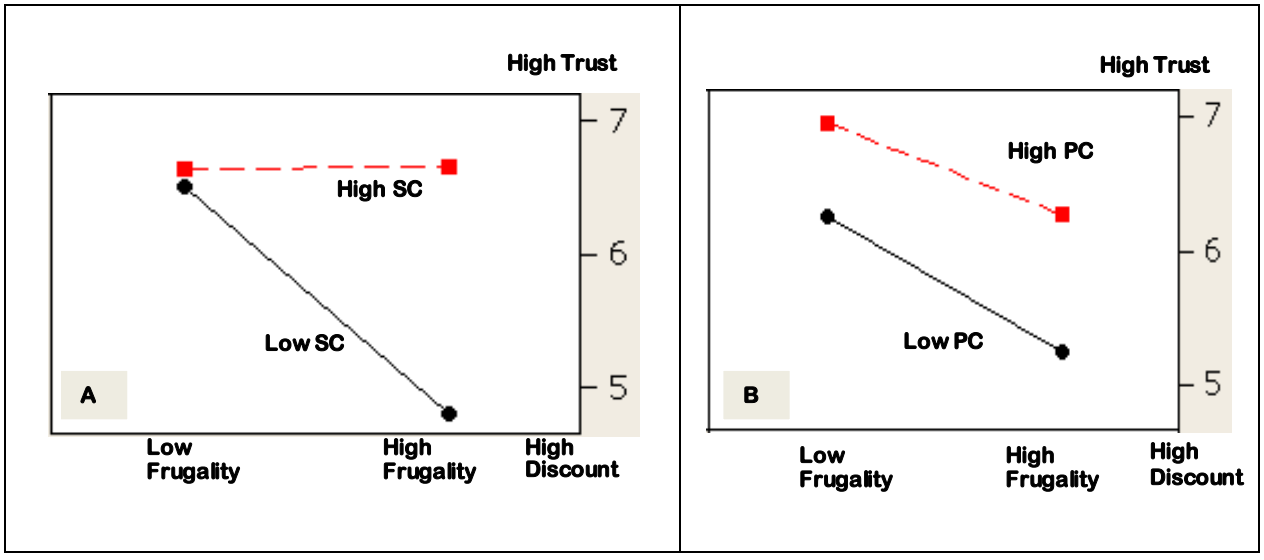

Figure 3. Posthoc analysis of the moderating role of frugality

We hypothesized (in H4) that frugality reduced the impact of SC on the preference for trust. However, the results showed that the direction of moderation was positive. This is an unexpected and interesting finding. It showed that frugal people are not willing to forgo security to get a better bargain. This is an important finding that indicates online vendors cannot use deep discounts to replace the lack of trust in order to attract customers. Frugal customers are careful with their resources and do not impulsively respond to bargain prices without making sure of the security of their information. They are aware that a breach of security could be more costly than the monetary benefit from the bargain, indicating not only that security concern could not be mitigated by price discount but also that frugal people who have higher security concern have a higher level of aversion toward low trust websites and have a higher level of preference for trust over discount.

The results of the impact of personality on PC and SC showed that of five personality dimensions, agreeableness positively influenced PC, supporting the results by Bansal et al. (2010). Conscientiousness increased security concern. These results indicate that the personality dimensions could influence privacy and security concerns. This is an interesting finding, since people with high degree of agreeableness and conscientiousness are apprehensive of deviant behaviors (Chauvin et al. 2007). They have a higher level of PC and SC. This is an area that needs further investigation.

Financial status showed marginal significance on trust-discount trade off in that well-off people preferred trust over discount. Gender was not significant, supporting findings by Drozednko and Jensen (2005), who reported that acceptable discounts levels did not vary by gender.

The posthoc analysis provides further insight into the moderating role of frugality. As Figure 3-A shows, frugal people with high SC preferred trust over discount, and discount did not tempt them to forgo their concern about security. On the other hand, frugal people with low security concern preferred discount over trust. For these people, a good bargain could mitigate their security concern.

Figure 3-B indicates that people with high privacy concern prefer trust over discount. Furthermore, frugality reduces privacy concern for both high and low levels of privacy concern in the same manner. That is, for frugal people, privacy concern could be mitigated by offering discount regardless of the level of their concern. However, this last point did not show in the SEM analysis.

This shows that frugality works as a double-edged sword. It pushes low SC people towards discount. However, frugal people with high security concern will continue to prefer trust over discount. This reveals a unique and interesting behavior of frugal people. This is in line with the finding by Lastovicka et al. (1999) that frugality is distinct from both price consciousness and value consciousness, and that frugality does not correlate with coupon proneness. We believe that frugality is a unique trait that needs further investigation in IT-related behaviors.

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